TECHNICAL MANUAL

GENERAL SUPPORT MAINTENANCE MANUAL

SWEEP GENERATOR:
SG-1206/U
(NSN 6625-01-288-6361)
(EIC: KNX)

WARNING – This document contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U. S. C., Sec 2751 et seq) or the Export Administration Act 1979, as amended, Title 50, U.S.C., App. 2401 et seq. Violations of these export laws are subject to severe criminal penalties. Disseminate in accordance with provisions of DOD Directive 5230.25.

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HEADQUARTERS, DEPARTMENT OF THE ARMY
15 MAY 1992

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

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

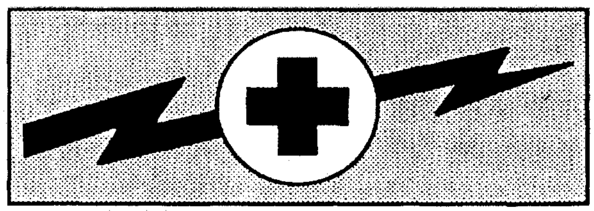
2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

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 RESPIRATION

WARNING



HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions

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

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

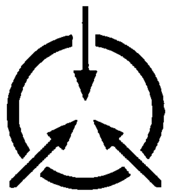
Be careful not to contact high-voltage connections of 115 or 230 volts ac input when installing or operating this equipment.

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

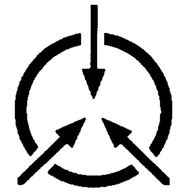
WARNING

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

ESD
CLASS 1

NOTE

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

GENERAL HANDLING PROCEDURES FOR ESDS ITEMS

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

MANUAL GROUNDING PROCEDURES

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

ESD PROTECTIVE PACKAGING AND LABELING

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

CAUTION

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

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

CAUTION

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

STEP 1 Turn off and/or disconnect all power and signal source and loads used with the unit.

STEP 2 Place the unit on grounded conductive work surfaces.

STEP 3 Ground the repair operator using a conductive wrist strap or other device using a 1-M series resistor to protect the operator.

STEP 4 Ground any tools (including soldering equipment) that will contact the unit. Contact with the operator's hand provides a sufficient ground for tools that are otherwise electrically isolated.

STEP 5 All electrostatic sensitive replacement components are shipped in conductive foam or tubes and must be stored in the original shipping container until installed.

STEP 6 When these devices and assemblies are removed from the unit, they should be placed in 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 device unnecessarily or remove from their packages until actually used or tested.

CHANGE No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 1 May 2006

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FOR
SWEEP GENERATOR
SG-1206/U
(NSN 6625-01-288-6361) (EIC: KNX)

HAZARDOUS MATERIAL INFORMATION – This document has been reviewed for the presence of solvents used as cleaning solutions containing hazardous materials defined by the EPCRA 302 and 313 lists by the AMCOM G-4 (Logistics) Environmental Division. As of the base document, dated 15 May 1992, all references to solvents containing hazardous materials have been removed from this document by substitution with non-hazardous or less hazardous materials where possible.

OZONE DEPLETING CHEMICAL INFORMATION – This document has been reviewed for the presence of Class I ozone depleting chemicals by AMCOM G-4 (Logistics) Environmental Division. As of the base document, dated 15 May 1992, all references to Class I ozone depleting chemicals have been removed from this document by substitution with chemicals that do not cause atmospheric ozone depletion.

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TM 11-6625-3231-40, dated 15 May 1992, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the outer margin of the page.

Remove Pages	Insert Pages
a, b	a, b
NONE	A/(B Blank)
i/(ii blank)	i, ii
1-1, 1-2	1-1, 1-2
2-1, 2-2	2-1, 2-2
A-1/(A-2 blank)	A-1/(A-2 Blank)
B-1, B-2	B-1, B-2
DA Forms 2028-2	DA Forms 2028
Cover Page	Cover Page

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
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LIST OF EFFECTIVE PAGES

NOTE

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Date of issue for original and changed pages are:

Original	0	15 May 1992
Change	1	01 May 2006

Total number of pages in this publication is 260 consisting of the following:

* Zero in this column indicates an original page.

Technical Manual

No. 11-6625-3231-40

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 15 May 1992

GENERAL SUPPORT MAINTENANCE MANUAL

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SWEEP GENERATOR
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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HOW TO USE THIS MANUAL

This manual tells about the Signal generator SG-1206/U and contains instructions about how to use it during maintenance on other electronic equipment,

The technical manual for the electronic equipment being maintained will tell where to make certain connections and when to use various accessories which are part of the SG-1206.

When first receiving the SG-1206 , start at the front of the manual and go all the way through to the back. Become familiar with every part of the manual and the SG-1206.

This manual has an edge index which will help find specific information in a hurry. Simply spread the pages on the right edge of the manual until the printed blocks can be seen. Open the manual where the block on the edge of the page lines up with the selected topic printed on the front cover block.

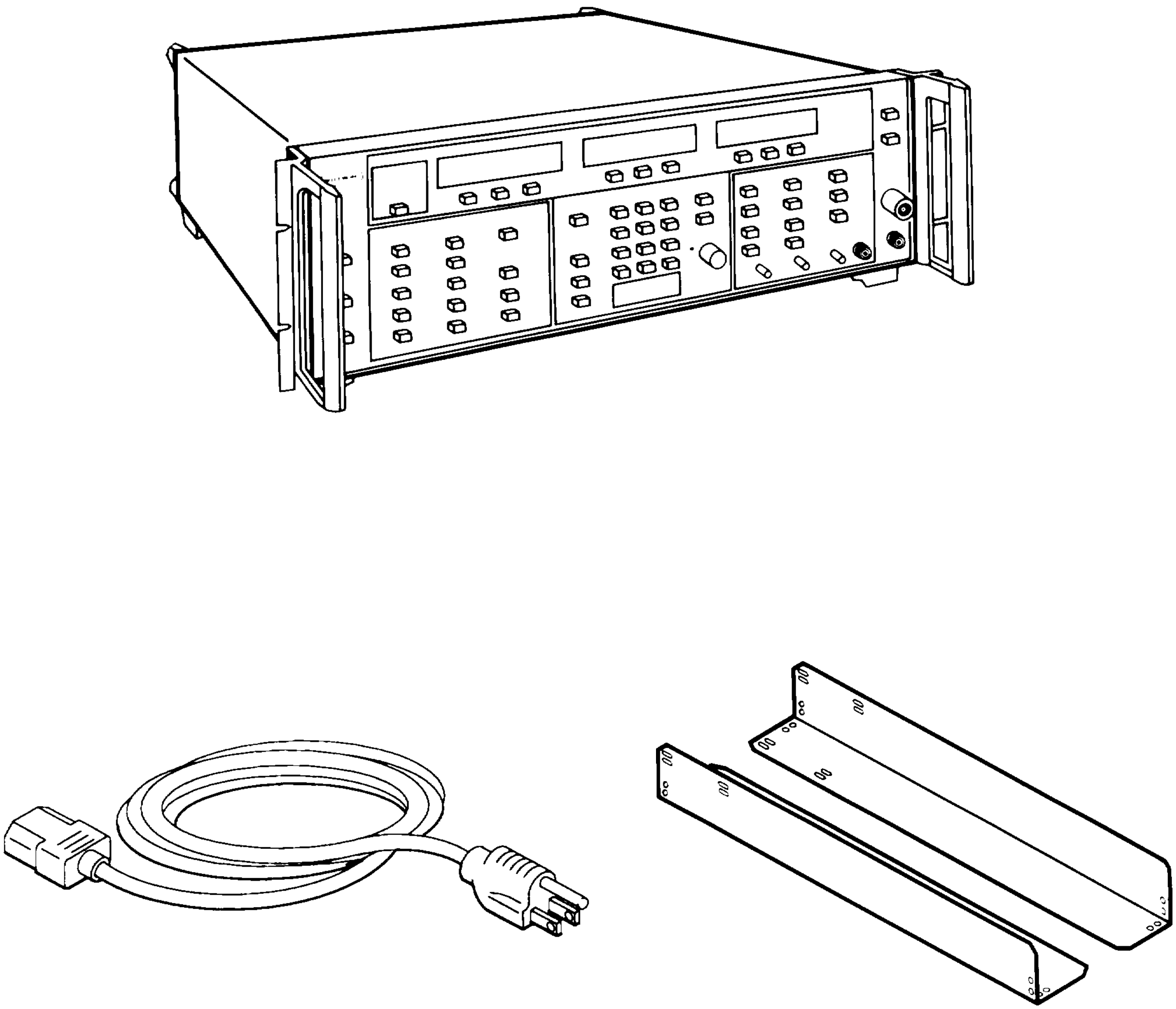

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Figure 1-1. Sweep Generator SG-1206/U.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual: General Support Maintenance Manual

b. Equipment Name and Model Number: Sweep Generator SG-12061U.

c. Purpose of Equipment: The Sweep Generator (fig. 1-1) is designed for use in applications requiring a swept or fixed frequency source of RF or microwave energy.

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.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 750-8, as contained in Maintenance Management Update.

b. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 41 40.55/SEC NAVINST 4355.1 8/AFR400-54/MCO 4430.3J.

c. Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 461 0.33 C/AFR 75-18/MCO P4610. 19D/DLAR 4500.15.

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

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

1-5. NOMENCLATURE CROSS-REFERENCE LIST.

Common names will be used when the Sweep Generator SG-1206/U 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
Sweep Generator	Sweep Generator SG-1206/U
SG-1206	Sweep Generator SG-1206/U

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S).

If your Sweep Generator SG–1206/U needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design, or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Aviation and Missile Command, AMSAM-MMC-MA-NM, Redstone Arsenal, AL. 35898-5000. We'll send you a reply.

1-7. WARRANTY INFORMATION.

The Sweep Generator is warranted by Wiltron against defects in materials and workmanship for one year from the date of shipment, except for YIG -tuned oscillators, which are warranted for two years. Wiltron's obligation covers repairing or replacing products which prove to be defective during the warranty period. Buyers shall prepay transportation charges for equipment returned to Wiltron for warranty repairs. Obligation is limited to the original purchaser. Wiltron is not liable for consequential damages. The foregoing warranty does not apply to Wiltron connectors that have failed due to normal wear. Also, the warranty does not apply to defects resulting from improper or inadequate maintenance by the Buyer, unauthorized modification or misuse, or operation outside of the environmental specifications of the product. No other warranty is expressed or implied, and the remedies provided herein are the Buyer's sole and exclusive remedies.

Section II. EQUIPMENT DESCRIPTION

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. CHARACTERISTICS.

- Sweep-frequency or continuous-wave operation over the full band
- Five front-panel or GPIB selectable sweep-frequency ranges: Full, F1-F2, M1-M2, ∆F CF, ∆F Ml
- Fine-frequency adjustments (Frequency Vernier operation) providing up to ±12.7 MHz control in CW and ∆ F sweep modes
- Three sweep triggering modes: Auto, Line, and External

b. CAPABILITIES AND FEATURES.

- Eight frequency markers: Ml thru M8
- Three marker display modes: Video, RF, Intensity
- Alternately changes between two front-panel setups
- Sweeps power over an up-to-15 dB range
- Retains front panel control settings in nonvolatile memory for up to 10 years. Whenever the instrument is turned on, it comes on line having the same control settings and values as when turned off last.

1-9. EQUIPMENT DATA.

WEIGHTS AND DIMENSIONS

Weight	32 lb (14.5 kg)
Height	5.25 in. (133 mm)
Width	17 in. (432 mm)
Depth	18.75 in. (476 mm)

POWER REQUIREMENTS

Voltage	115/230 Vac ±20% 48 to 400 Hz
Input power	250 VA maximum
Fuses (2)	4 Amp SB, 1 15/230 Vac operation

ENVIRONMENTAL

Operating temperature range	32 to 131°F (0 to 55°C)
Storage temperature range	–40 to 167°F (–40 to 70°C)
Relative humidity	95% ±5% @ 50 to 86°F (10 to 30°C) 75% ±5% @ 86 to 104°F (30 to 40°C) 45% +5% @ 104 to 122°F (40 to 50°C)
Operating altitude	0 to 10,000 ft (3,050 meters)
Storage altitude	0 to 40,000 ft (12,190 meters)

PERFORMANCE

Frequency range	10 MHz to 20 GHz
Frequency accuracy, CW mode (25°C +5°C)	± 10 MHz
Frequency stability	
With temperature (MHz/°C)	±750 kHz, at ≤ 2 GHz output frequency ±0.02%, at >2 GHz output frequency
With 10 dB power level change	±200 kHz, at ≤ 2 GHz output frequency ±500 kHz, at >2 GHz output frequency
With 3:1 load SWR	≤ 200 kHz, at ≤ 2 GHz output frequency ±300 kHz, at >2 GHz output frequency
Frequency resolution14	
Normal	1 MHz
With Frequency Vernier mode selected	100 kHz
With Step Sweep (GPIB selectable function)	4096 programmable points
Sweep time	0.01 to 99 seconds
Output power (25°C ± 15°C)	+13 dBm, at ≤ 2 GHz output frequency +10 dBm, at >2 to 18 GHz output frequency +7 dBm, at >18 GHz output frequency
Power level accuracy	±1.5 dB
Attenuator accuracy per step	±0.4 dB
Leveled power variation	±1.0 dB, at 52 GHz output frequency ±1,1 dB, at >2 GHz output frequency
Source SWR (50 Ω)	1.5:1, at ≤ 2 GHz output frequency 2.1:1, at >2 GHz output frequency
Signal purity	
Harmonics	≤ -25 dBc
Nonharmonics	<–45 dBc
Residual FM (measured in a 30 Hz to 15 kHz bandwidth)	<5 kHz pk, at ≤ 4 GHz output frequency <7 kHz pk, at 4 to 6.5 GHz output frequency <15 kHz pk, at >6.5 GHz output frequency
Amplitude modulation (AM)	
Sensitivity	1 dB per volt
Frequency response (typical)	20 kHz, at ≤ 2 GHz output frequency 100 kHz, at >2 GHz output frequency
Frequency modulation (FM)	
Sensitivity	Selectable, –60 MHz per volt or–6 MHz per volt
Maximum deviation (modulation frequency), dc to 100 Hz, –60 MHz/V	±75 MHz
Maximum deviation (modulation frequency), >100 Hz to 100 kHz, –6 MHz/V	±7 MHz

1-10. SAFETY, CARE, AND HANDLING.

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

Section III. PRINCIPLES OF OPERATION

1-11. GENERAL FUNCTIONAL DESCRIPTION.

The SG-1206 is a microprocessor-controlled, broadband, sweep-frequency and continuous-wave (CW) signal source. It is physically organized into four assemblies and functionally organized into nine groups. The four physical assemblies are as follows:

- A1 Basic Frame
- A2 Front Panel
- A3 Rear Panel
- A4 RF Deck

The nine functional groups are as follows:

- User Interface and Instrument Control
- Sweep Ramp
- Marker Generator
- ALC
- Frequency Instruction
- FM
- Frequency Generation
- RF Control and Sampling
- Power Supply

Operationally, the functional groups consist of circuit card assemblies (CCAS) and microwave assemblies that are both physical and functional groupings. The overall block diagram (fig. FO-1) shows the CCAs and microwave assemblies and how they relate to the higher physical and-functional groups. Refer to this figure for the following circuit discussion.

① A1 A1 GPIB Interface CCA interfaces the SG-1206 with the IEEE-488 Bus (GPIB), The CCA has two sets of input and output (I/O) lines. One set is via the rear panel GPIB connector to an external controller, the other set is via on-board connectors to A2A12 Microprocessor CCA.

② A2A12 Microprocessor CCA controls the operation of the SG-1206. It has 1/0 links with A2A11 Front Panel CCA and all of the CCAS in Al Basic Frame Assembly. It also routes the signals from the front panel MARKER AMPL'D, RF SLOPE, and MANUAL SWEEP controls to CCAS in the basic frame. The Marker Amplitude signal goes to A1A3 Markers Generator CCA, the RF Slope signal goes to A1A4 ALCCCA, and the Manual Sweep signal goes to A1A5 Frequency Instruction CCA. Digital latches on A1A14 Motherboard CCA link A1 CCA'S to A2A12 for error code reporting.

③ A2A11 Front Panel CCA, in conjunction with A2A1 Front Panel Subassembly, is the mounting plane for the front panel keys, indicators, and numeric displays. It communicates with A2A12 Microprocessor CCA via an 1/0 data bus. The External Input and External ALC Gain signals are routed directly to A1A4 ALC CCA. They do not go through A2A12 Microprocessor CCA.

④ A1A2 Ramp Generator CCA generates the analog sweep ramp, one of the three voltage-tuning signals used to produce the sweep generator swept-frequency output. It has I/O communication with A2A12 Microprocessor CCA. Other inputs and outputs are as follows:

- INPUTS - External ramp trigger signal from the rear panel SWEEP TRIGGER INPUT connector; End-of-Band (EOB) signal from A1A10 FM/Attenuator; and Intensity Marker signal from A1A3 Markers Generator CCA.
- OUTPUTS - Ramp Out signal to A1A5 Frequency Instruction CCA; and Blanking signals to the rear panel POS Z BLANKING and NEG Z BLANKING connectors.

⑤ A1A3 Markers Generator CCA generates the Ml thru M8 RF, Video, and Intensity markers. It has I/O communication with A2A12 Microprocessor CCA. Other inputs and outputs are as follows:

- INPUTS -Marker Amplitude signal from A2A12 Microprocessor CCA; and Ramp signal from A1A5 Frequency Instruction CCA.
- OUTPUTS - Routes ramp generated on A1A2 Ramp Generator CCA to the front and rear panel HORIZ OUTPUT connectors; and Marker signals to the rear panel MARKER OUTPUT connector and to A1A4 ALC CCA.

⑥ *A1A4* ALC CCA controls the automatic leveling of the RF output power. It has I/O communication with A2A12 Microprocessor CCA. Other inputs and outputs are as follows:

- INPUTS -RF Markers from A1A3 Markers Generator CCA; RF Slope signal from A2A12 Microprocessor CCA; External Input signal from A2A1 Front Subpanel; ALC IN 2 GHz signal from internal A4DC1 Directional Coupler; ALC IN *<2* GHz signal from directional coupler in A4A1 Down Converter.
- *OUTPUTS* – PIN Modulator Driver signal to A1A6, A1A7, A1A8 YIG Driver CCAS; and ATTN 1-4 control voltages to A1A1O FM/Attenuator CCA.

⑦ A1A5 Frequency Instruction CCA provides overall control for the Frequency Generation function. This function consists of the three YIG Drivers CCAS and their associated A4 RF Deck Assembly components. It has I/O communication with A2A12 Microprocessor CCA. Other inputs and outputs are as follows:

- INPUTS - Ramp in signal from A1A2 Ramp Generator CCA; Manual Sweep signal from A2A12 Microprocessor CCA; and Frequency Correction Bus from A1A6, A1A7, A1A8 YIG Driver CCAS.
- *OUTPUTS* - Control signals (FCen/VPF, Fcorr, FCen, Δ F>50 MHz) to the three YIG Driver CCAS; Δ F $\leq$ 50MHz signal to A1A10 CCA; and Ramp, O – 10 V signal to A1A3 Markers Generator CCA.

⑧ A1A10 FM/Attenuator CCA controls frequency modulation for the YIG oscillators. It also provides drive signals for the 2-to-8 GHz YIG tracking filter and control voltages for A4ATI Step Attenuator. It has I/O communication with A2A12 Microprocessor CCA. Other inputs and outputs are as follows:

- INPUTS - Microprocessor control data (ATTN 1-4) to set attenuation for A4AT1 Step Attenuator; Δ F $\leq$ 50 MHz control signal from A1A5 Frequency Instruction CCA; FM control input from rear panel EXT FM ∅ LOCK INPUT connector; and Control signals from A1A6, A1A7, A1A8 YIG Driver CCAs.
- *OUTPUTS* -Tracking Filter control signal to S/C-Band YIG Oscillator; FM coil tuning voltages to S/C-Band, X-Band, and Ku-Band YIG oscillators; Attenuator control voltages to A4AT1 Step Attenuator; and EOB signal to A1A2 Ramp Generator CCA.

9 A1A6, A1A7, and A1A8 YIG Driver CCAS provide drive currents for both the PIN Switch and their associated YIG oscillator tuning coils. Their inputs and outputs are as follows:

- INPUTS - Frequency data (ROM Bus) from A2A12 Microprocessor CCA; Control signals (FCen/VPF, FCorr, FCen, AF >50 MHz) from A1A5 Frequency Instruction CCA; SNB and SNR control lines between YIG Driver CCAS; and PIN Mod Driver signal from A1A4 ALC CCA.
- OUTPUTS – YIG oscillator linearity data (FC Bus) to A1A5 Frequency Instruction CCA; Tuning currents and bias voltages to respective YIG oscillator; and Control signals (Het YIG Sel, FM Coil Sel, Track Filter) to A1A10 FM/Attenuator CCA.

10 The YIG-tuned oscillators are microwave oscillators providing precisely controlled wideband tuning. Such tuning is accomplished by controlling current through a tuning solenoid that acts as a resident YIG-tuned filter. In the SG-1206, the oscillators are GaAs FET types.

11 The MOD (modulator) unit is a current-controlled variable attenuator. It provides amplitude modulation and power leveling for the S/C-Band Osc output. It also provides impedance matching and isolation.

12 A4S1 PIN Switch is a current-controlled switch and variable attenuator. It switches between the three YIG oscillators so as to couple only one at a time to the RF OUTPUT circuit. The variable attenuator provides the means for amplitude-modulating and power-leveling the RF output signal.

13 A4A1 Down Converter generates the 0.01 to 2 GHz sweep and CW-frequency outputs. When the operator selects a frequency between 0.01 and 2 GHz, the S/C-Band YIG oscillator sweeps between 4.61 and 6.6 GHz. This output, via A4S1 PIN Switch, mixes with the output from a 4.6 GHz local oscillator in A4A1 Down Converter. The difference frequency, after being amplified, provides the 0.01 to 2 GHz output. A portion of this energy is detected and fed to the A1A4 ALC CCA for internal leveling.

14 A4DC1 Directional Coupler detects and couples a portion of the 2-to-20 GHz RF output for power leveling. It sends a detected sample to A1A4 ALC CCA for internal power leveling.

15 A4AT1 Step Attenuator provides up to 110 dB of attenuation for the RF output. A1A1O FM/ATTEN CCA provides the drive current for the attenuator.

16 A1A14 Motherboard CCA connects the various Al Basic Frame Assembly and A2 Front Panel Assembly CCAS with the A3 Rear Panel Assembly connectors and A4 RF Deck Assembly components, This CCA also contains PIN Switch port drive circuits, part of the switching power supply circuit, and digital latches used with circuits on A1A12 CCA for error code reporting.

17 A1A13 Switching Power Supply CCA works in conjunction with circuits on A1A14 Motherboard CCA. It supplies operating voltages for SG-1206 circuits.

1-12. DETAILED FUNCTIONAL DESCRIPTION.

The following is a detailed functional description of key SG-1206 assemblies.

a. A1A1 GPIB Interface CCA. This CCA (fig. 1-2) provides the interface between the SG-1206 and the IEEE-488 Bus (GPIB). It has its own Microprocessor and GPIB Interface IC'S. The Microprocessor IC provides both control for the GPIB Interface IC and other on-board circuits and communications between this CCA and A2A12 Microprocessor CCA. The GPIB Interface IC provides communications between the SG-1206 and the GPIB controller.

A1A1 GPIB Interface CCA is functionally organized into the following circuits:

- **Analog Interface Circuits.** These circuits provide the interface between the analog circuits in the Sweep Generator that can cause an SRQ (service request) and the GPIB microprocessor.
- **LED Drivers.** These circuits drive the REMOTE, LOCAL LOCKOUT, TALK, LISTEN, and SRQ front panel GPIB LED indicators.
- Road Only memory (ROM). The ROM contains the operational program that controls A1A1 CCA.
- **Random Access Memory (RAM).** The RAM temporarily stores the received GPIB commands.

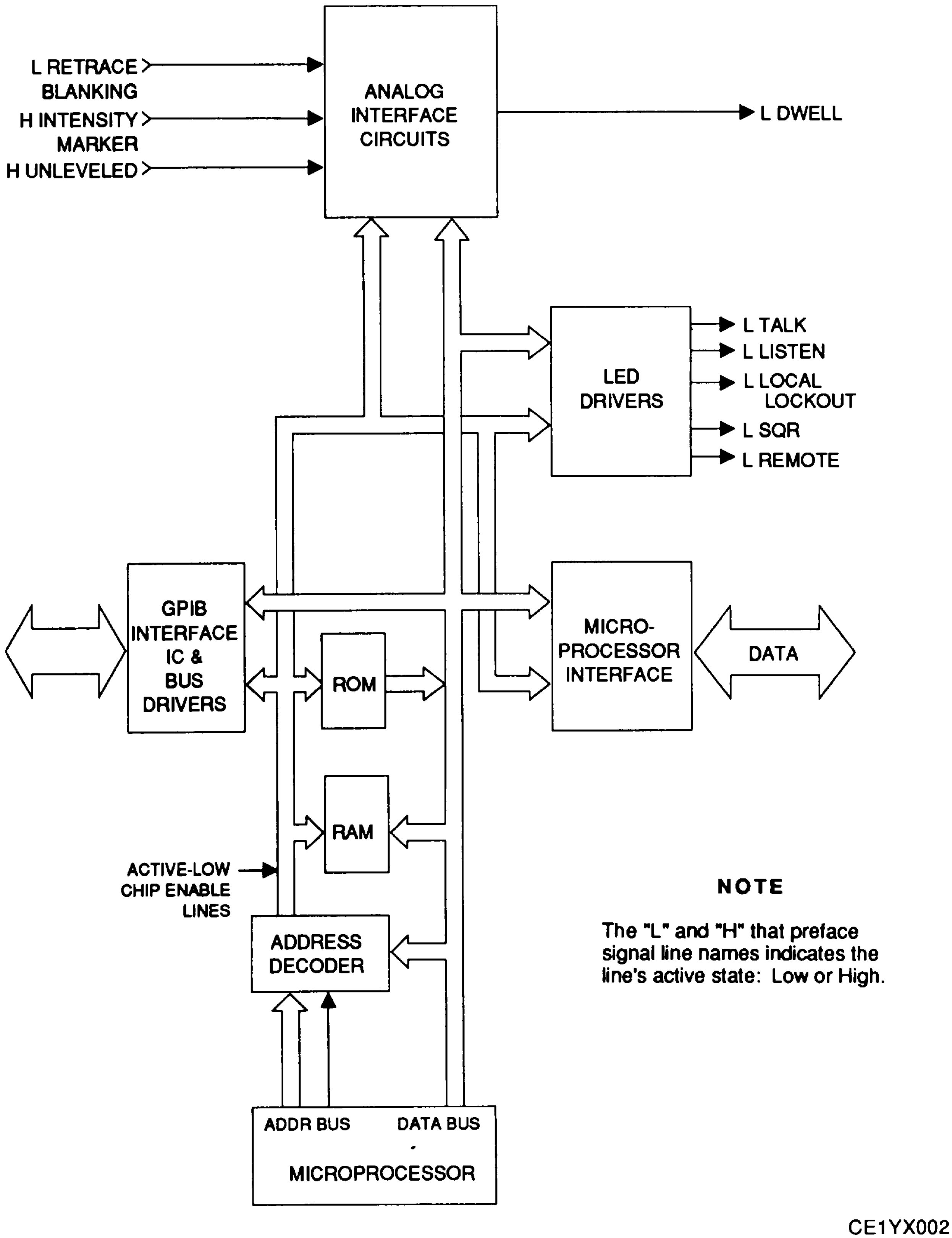


Figure 1-2. A1A1 GPIB Interface CCA Functional Block Diagram.

b. A2A12 Microprocessor CCA. This CCA (fig. 1-3) provides the following functions:

- It interfaces front panel keys with analog sweep and microwave-signal generation circuits. This interface is via A2A1 1 Front Panel CCA.
- It controls the operation of the SG-1206 using its kernel elements. This kernel comprises a Microprocessor IC (microprocessor), a Keyboard/Display Interface IC, 16K bytes of ROM, and 8K bytes of RAM.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L = Low Active State. H = High Active State.

The Keyboard/Display Interface IC interfaces the microprocessor with the front panel keys and numeric displays. This IC sends scan lines to A2A11 CCA via the SLO-SL3 & L CAD Bus. These lines cause continuous scanning of front panel keys and numeric-display digits. When a key is pressed, an 8-bit word representing that key goes out over the COL1-COL8 Bus to the Keyboard/Display Interface IC. This word is known as the keycode. The intelligence contained therein eventually finds its way to the microprocessor. Conversely, when the microprocessor selects a numeric display for update, a likewise-coded word representing that display-segment is sent over the NAO-NA3/NBO-NB3 Bus to one of the three displays.

The I/O Buffer #2 circuit interfaces the microprocessor with A1A2 thru A1A5 analog CCA'S, the ROM Bus latch, and the diagnostic (self-test) latches on A1A14 Motherboard CCA. Also, the bidirectional buffer #2 circuit interfaces the microprocessor with Al Al GPIB Interface CCA.

The Input Buffer routes control signal data. This data comes from analog CCA'S A1A2, A1A3, and A1A4, A1A1 GPIB Interface CCA, and A2A11 Front Panel CCA. It goes to the microprocessor.

The I/O Buffer #1 circuit buffers the input/output interface circuit from the kernel elements in the microprocessor. This kernel consists of the following:

- **Microprocessor.** The microprocessor is a complete central-processing unit. It contains all of the necessary registers, plus the arithmetic logic unit and control lines that provide addresses for the memory circuits.
- **Battery Backed-up RAM.** The RAM circuit stores the data input via the front panel keys. The internal RAM Battery provides operating power for the read/write memory when the ac power is turned off, This makes this memory non-volatile.
- **ROM.** The ROM contains both the microprocessor operational program and the reset (default) parameter data.
- **Port Decoders.** The port decoders are divided between input and output ports. The microprocessor output-port data are decoded and select one of 64 output ports. The selected port then receives the data that the microprocessor has concurrently sent over the data bus.

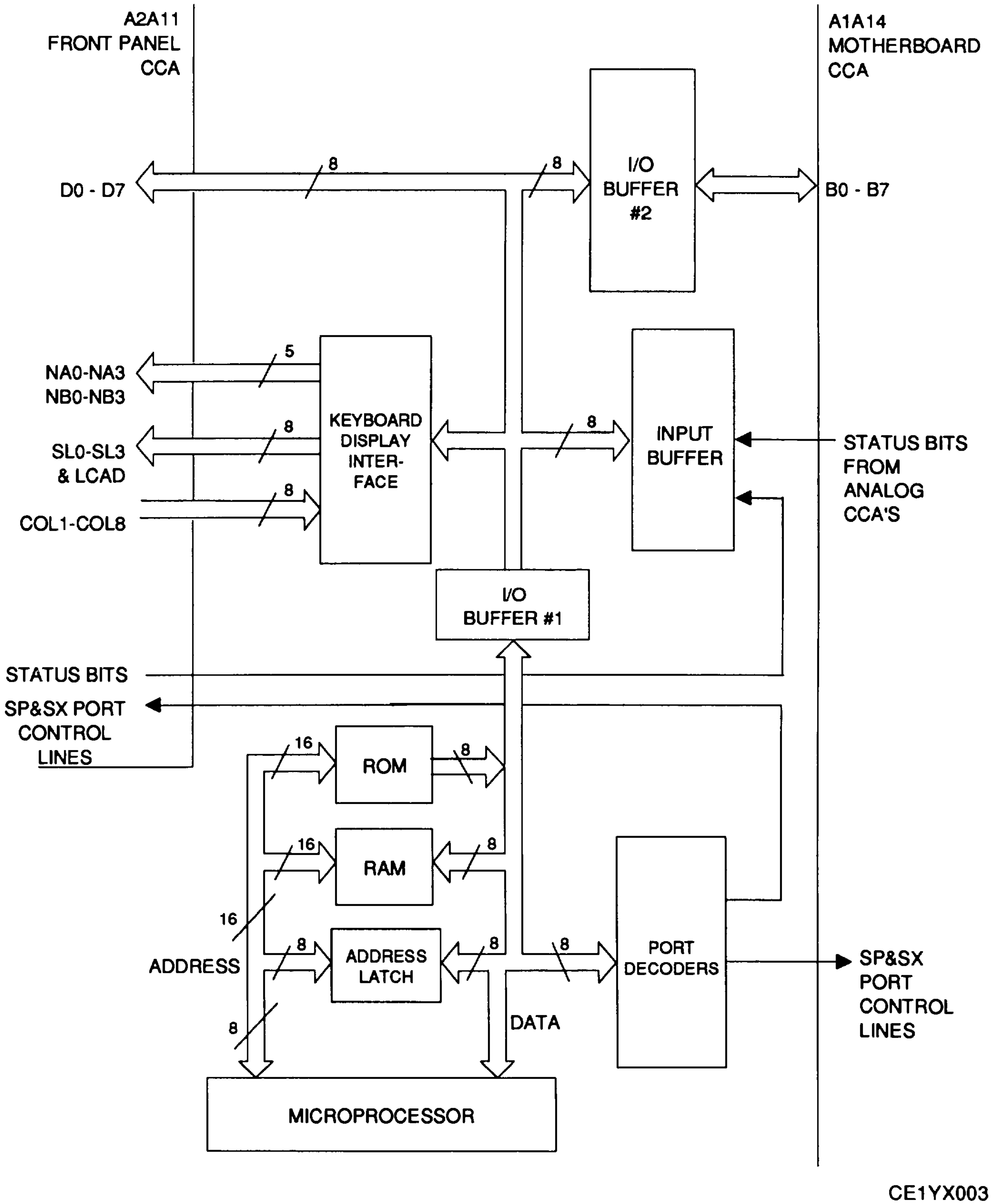


Figure 1-3. A2A12 Microprocessor CCA Functional Block Diagram.

c. A2A71 Front Pane/ CCA. This CCA (fig. 1-4) along with A2A1 Front Subpanel Assembly is the mounting plane for the front panel keys, indicators, and numeric displays. A2A11 CCA is functionally divided into three circuits: Display, Switch, and LED.

The display circuitry consists of the following:

- 4-to-16 Decoder circuit
- Current Source circuit
- Numeric Display digits
- Current Sink circuit

The inputs to the display circuit are scanning data via the SLO-SL3 & L CAD Bus and display-segment data via the NAO-NA3/NBO-NB3 Bus. Both buses are from the Keyboard/Display Interface IC on A2A12 CCA. When decoded, this scanning data scan the display digits; the segment data light the selected segment.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L - Low Active State. H = High Active State.

The switch circuit contains two groups of switches. The main switch group consists of the 3-to-8 Decoder and the 8x8 Switch Matrix. The inputs to this switch circuit are the SLO-SL3 scan-bus lines from the Keyboard/Display Interface IC. When decoded, these lines sequentially scan the eight tows of switch-matrix switches. Key status goes to the Keyboard/Display Interface IC via the 8-bit COL1-COL8 Bus.

The second switch group is the FREQUENCY VERNIER, INCREASE and DECREASE switches. These switches communicate information when held depressed. Each switch has two sets of contacts the ones shown and another located within the switch matrix.

The LED circuitry consists of three groups of LED's:

- LED's showing GPIB status
- LED's that flash
- LED's that light steadily

The GPIB LED's are the REMOTE, LOCAL LOCKOUT, TALK, LISTEN, and SRQ indicators. The flashing LED's are the UNLEVELED, RF OFF, SWEEPING FREQUENCY, SWEEPING POWER, and EXTERNAL ALC GAIN CAL (ALCCAL) indicators. A2A12 CCA directly controls both the GPIB and the flashing LED's. Except for those LED's mentioned, all the other front panel LED's are non-flashing types. A2A12 CCA controls these non-flashing LED's via the LED Latches. The latches are clocked by select-port lines SP16-SP21.

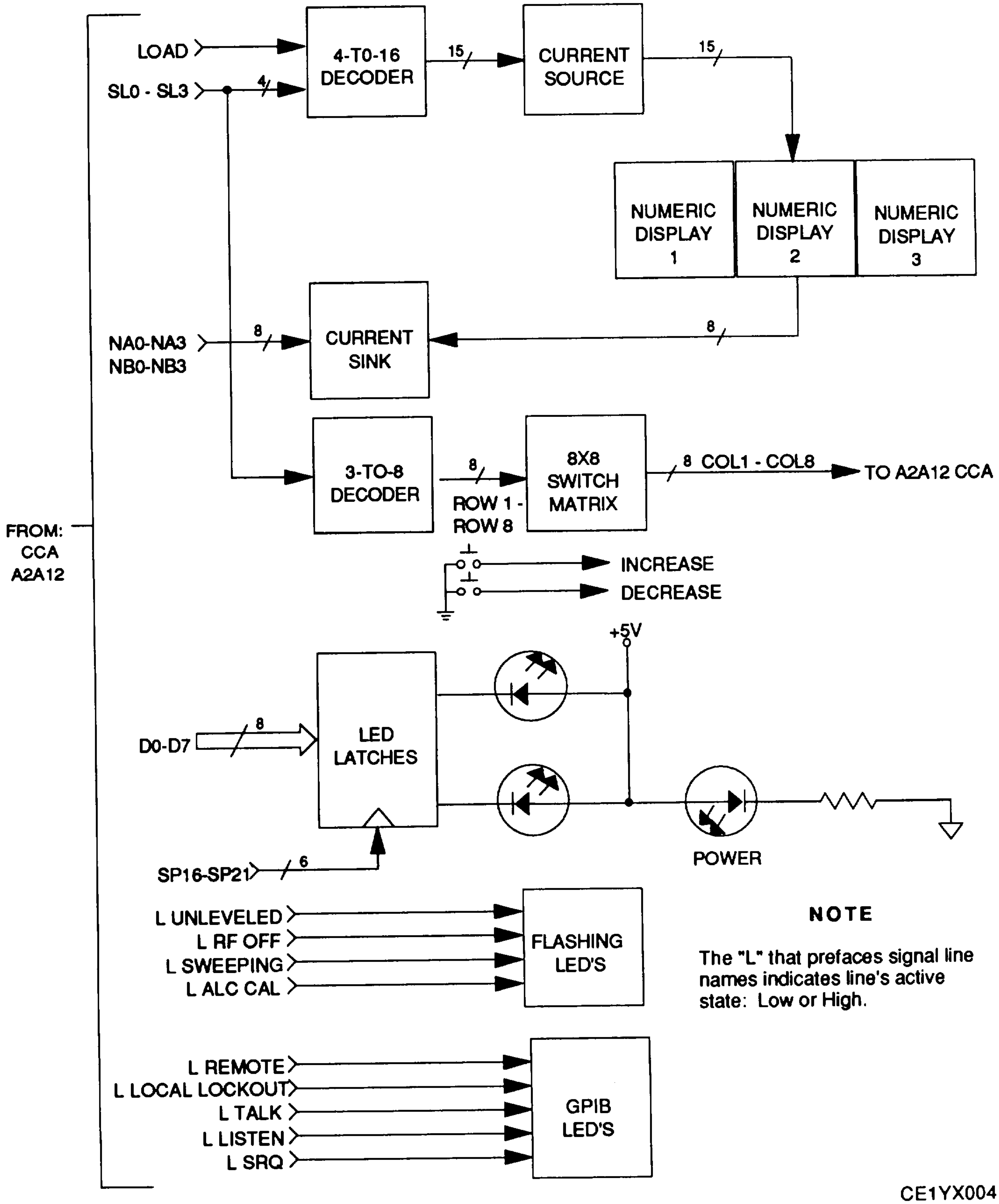
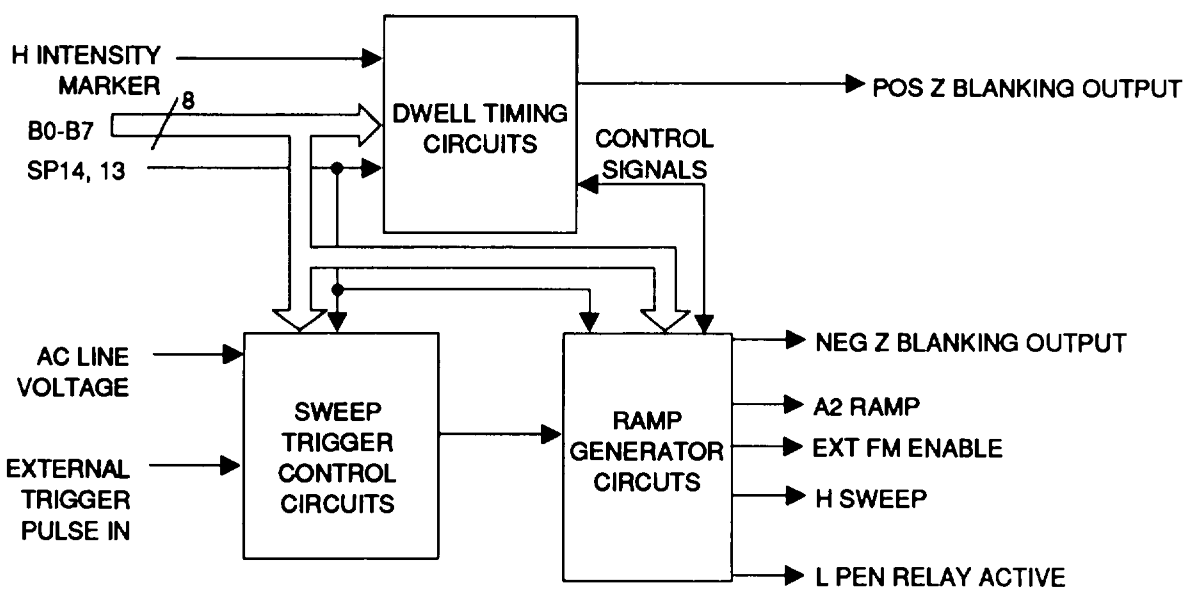


Figure 1-4. A2A11 Front Panel CCA Functional Block Diagram.

d. A7A2 Ramp Generator *CCA.* This CCA (fig. 1-5) generates the analog sweep ramp (fig. 1-6). This ramp is one of the voltage-tuning signals used to produce the sweep generator swept-frequency output. The CCA also generates the Pos Z Blanking Output signal for the respective rear panel connectors. The A1A2 Ramp Generator CCA can be said to contain three functional blocks. These blocks are described below.

- **Ramp Generator.** These circuits generate the 0-10 V ramp available from the front and rear panel HORIZ OUTPUT connectors. The A2 Ramp signal goes to the A1A5 Frequency Instruction CCA, then to the front and rear panels. The Ramp Generator circuits also generate four other signals, as shown. The Neg Z Blanking Output and L Pen Relay Active signals go to rear panel connectors. The former is a negative-going blanking signal that occurs during sweep retrace; the latter controls the A1A14K1 penlift relay. This relay connects to the PEN LIFT OUTPUT connector. The relay controls the lifting and dropping of the pen on an external X-Y recorder. The remaining two output signals, Ext FM Enable and H Sweep, are used by A1A10 FM/Attenuator CCA and the diagnostic circuit on A1A14 Motherboard CCA. The inputs to this functional block are (1) data and strobe pulses from A2A12 Microprocessor CCA and (2) control signals from both the Sweep Trigger Control and Dwell Timing Circuits.
- **Dwell Timing Circuits.** These circuits control the dwell (halting) of the sweep ramp to allow coordinate actions, such as bands witching, to occur. Figure 1-6 shows the various dwell-signals and describes how they affect the sweep ramp.
- **Sweep Trigger Control.** These circuits control the recurrence of the sweep ramp. The inputs to this block are of two types: digital data from A2A12 Microprocessor CCA and analog signals from the power supply and rear panel. The digital data contains front panel TRIGGER keys information (AUTO, LINE, EXT OR SINGLE). The two analog signals (AC Line Voltage and External Trigger Pulse) provide drive for their respective control circuits.



NOTE

The "L" and "H" that prefaces signal line names indicates the line's active state: Low or High.

CE1YX005

Figure 1-5. A1A2 Ramp Generator CCA Functional Block Diagram.

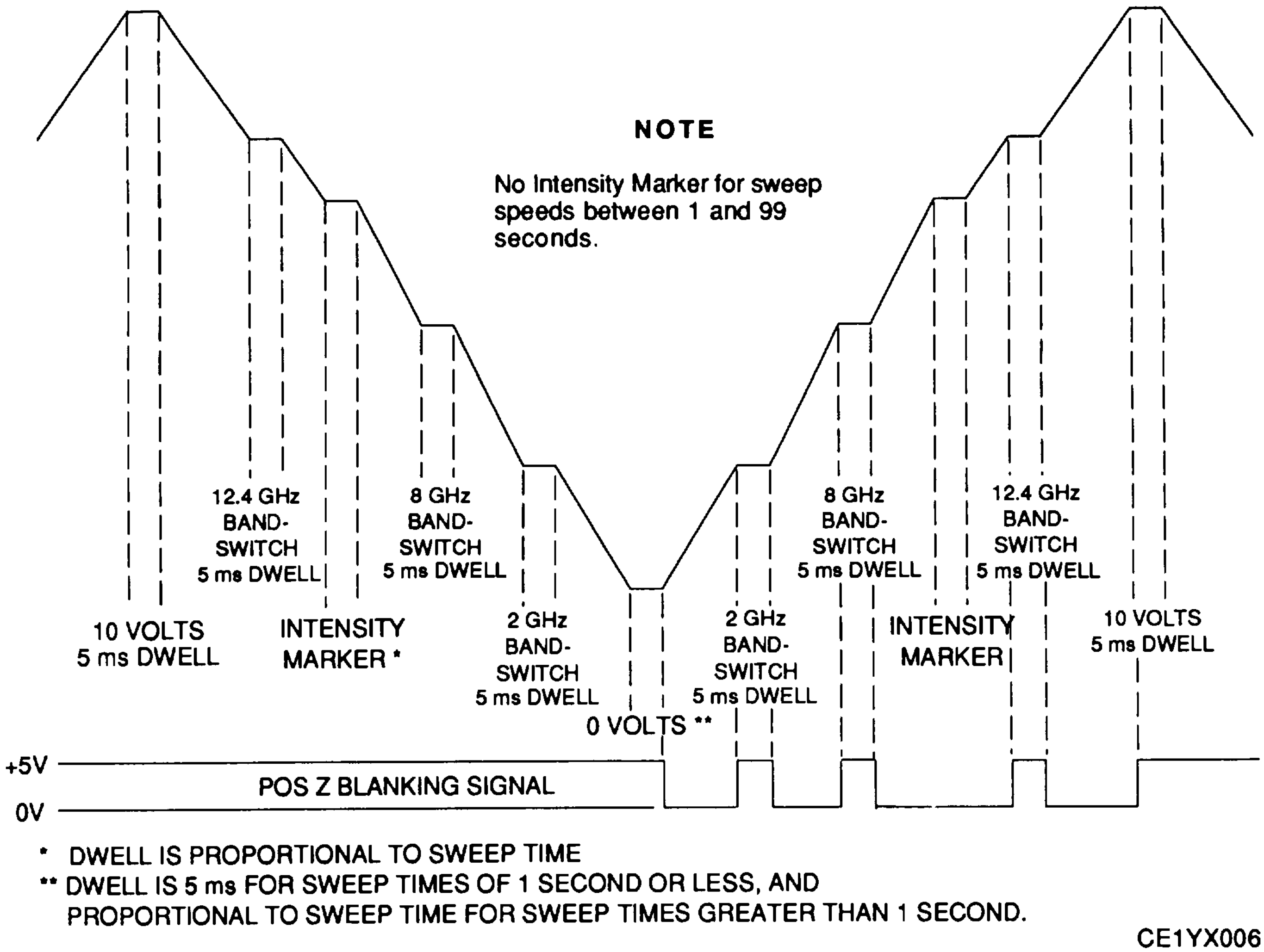


Figure 1-6. Analog Sweep Ramp.

e. A1A3 *Marker Generator CCA.* This CCA (fig. 1-7) generates the Ml thru M8 RF, Video, and Intensity markers. This CCA has four functional blocks. Inputs to the CCA are as follows:

- 0-10 V sweep ramp from A1A5 CCA
- Retrace Blanking control lines from A1A2 Ramp Generator CCA
- Data bus and control lines from A2A12 Microprocessor CCA. The 0-10 V Sweep Ramp may be either the ramp output signal from A1A2 Ramp Generator CCA, the manual sweep input from the front panel, or the step frequency DAC signal from Al Al GPIB Interface CCA.
- A2A12 Microprocessor CCA inputs. These inputs are an 8-bit data bus, a 3-bit marker-select digital word, or seven strobe pulses that serve as latch-clock-control bits. The data bus provides marker frequency and mode data.

The main functional block in A1A3 CCA is the Marker Generator. Containing eight identical circuits, it converts the data bus M1-M8 frequency data to appropriate M1-M8 analog voltages. It then compares these M1-M8 voltages with the 0-10 V Sweep Ramp input signal and generates appropriate M1-M8 frequency markers. The eight circuits provide output signals that are summed into one composite-marker signal. This signal goes to the Marker Output circuit via the front panel MARKER AMP L” D control. The composite marker signal also goes directly to the Intensity Marker output circuit.

The Marker Select, Control, and Mode Enable Logic block processes the data bus mode information to decode between Video, RF, or Intensity marker modes. This block outputs control signals to the Marker Generator block and mode-enable signals to the Marker Output circuit. The control signals determine which of the up-to-eight markers are to be generated, and the mode-enable signals determine marker mode: Video, RF, or Intensity.

The Marker Output circuit outputs the following:

- Video Marker signal to the rear panel.
- Intensity Marker signal to A1A2 Ramp Generator CCA.
- RF Marker to the Power Sweep circuit. The output of the Power Sweep circuit goes to A1A4 ALC CGA, where it modifies the RF output level to produce a dip in power at the marker frequency.

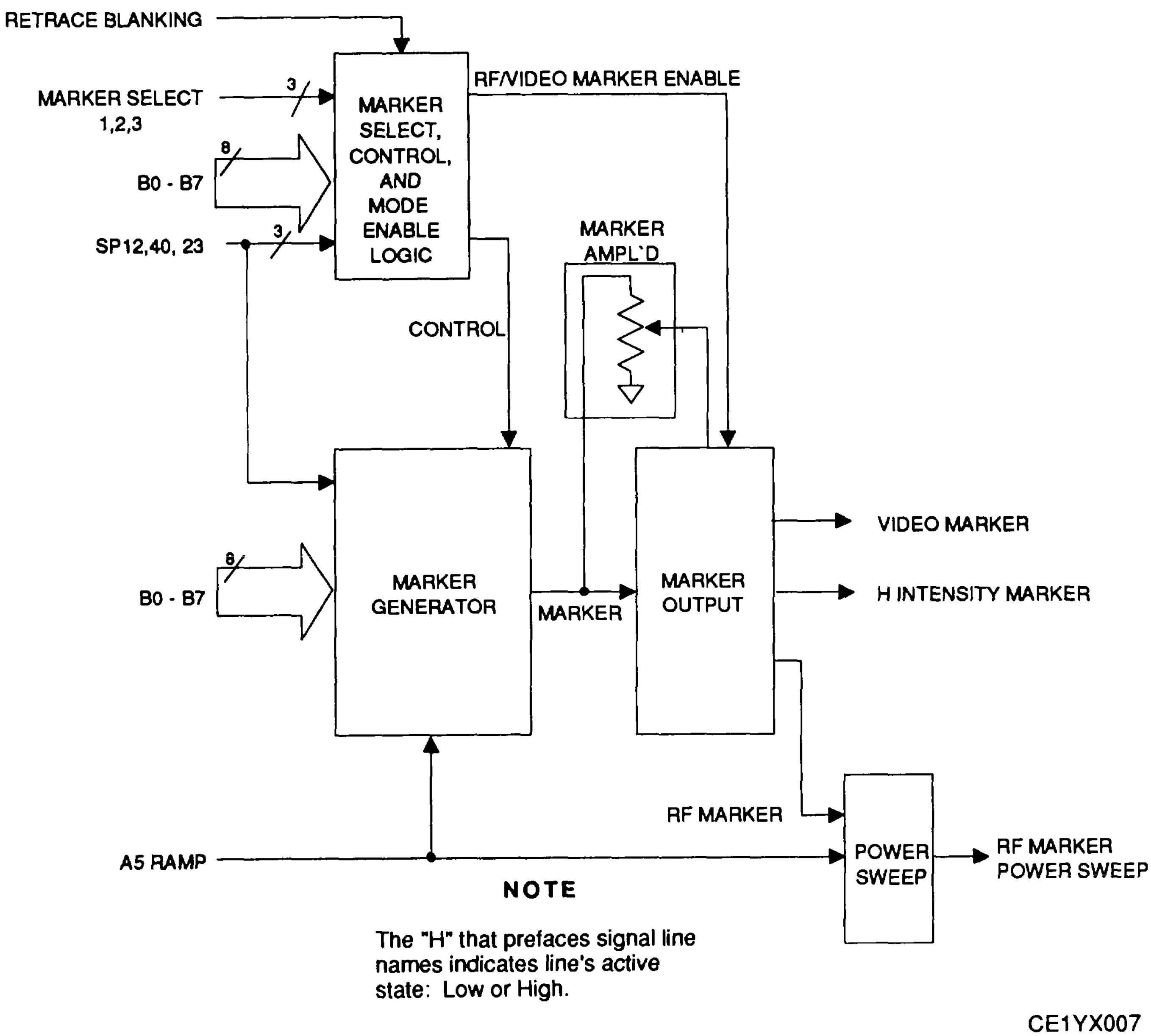


Figure 1-7. A1A3 Marker Generator CGA Functional Block Diagram.

f. A1A4 *ALC CCA.* This CCA, along with circuits on A4 RF Deck Assembly and the appropriate S/C, X, or Ku-Band YIG Driver, provides for automatically leveling RF output power (fig. 1-8). Although not shown in figure 1-8, this CCA also processes A4AT1 Step Attenuator control bits. It receives these bits (ATTN 1 thru ATTN 4 lines) from A1A12 Microprocessor CCA. It then routes them to A4AT1, via current-drivers on A1A10 FM/Attenuator CCA.

The output from the microprocessor-selected YIG oscillator goes to A4DC1 Directional Coupler via A4S1 PIN Switch. The directional coupler sends a sample of the RF power to its built-in RF detector. If the operator selects internal leveling, the detected power goes to the Log Amp/Shaper. Routing is via either the appropriate >2 GHz or <2 GHz Preamp. If external leveling is selected, an externally connected detector couples its output to the Log Amp/Shaper via the Absolute Value circuit. At the Log Amp/Shaper, the detected signal gets amplified and shaped. Its relationship to the main power signal also changes from logarithmic to linear. The changed signal goes to the Level Amp. There it is summed with the voltage output from the Latch/DAC IC.

One Log Amp/Shaper output is the analog-voltage representation of the digital power-word selected using the front panel LEVEL key. The Level Amp output goes to the PIN Driver/Linearizer circuit on A1A6, A1A7, or A1A8 YIG Driver CCA. Which of these CCA'S it goes to depends on which YIG oscillator is supplying the output frequency. The PIN Driver/Linearizer circuit customizes loop gain for each YIG oscillator. The other output provides the input to the Unlevel Compare circuit. This circuit provides drive for the front panel UNLEVEL indicator LED. If the output of the Level Amp goes positive (more power called for than YIG oscillator can deliver) the UN LEVEL indicator lights.

Other inputs to the Level Amp are as follows:

- EXTAM signal from the rear panel EXT AM INPUT connector.
- RF Marker signal from A1A3 Markers Generator CCA.
- RF Slope signal from the front panel RF SLOPE control. This signal provides a linear boost in output power as the RF oscillator sweeps across its frequency band. The RF Slope input is a negative-going voltage ramp that is proportional to frequency. It provides an increase in output power at the higher frequencies.
- Ext Sq Wave In signal from the rear panel EXTSQUARE WAVE INPUT connector. This signal, which square-wave modulates the RF output signal, goes to the Sq Wave Sample/Hold circuit. Using front panel keys, the operator selects whether modulation is 1 kHz or 27.8k Hz.

The Compensation circuit that bridges the Level Amp stabilizes the loop. It also slows the response of the ALC loop when the operator selects power meter leveling. This is necessary because of the power meter's slower response to variations in output power,

The circuit associated with the front panel EXTERNAL INPUT connector provides two functions.

- The Absolute Value circuit provides for using a positive or negative external detector. The circuit output is positive for either input polarity.
- The External Gain Compare circuit provides for calibrating the gain of the external leveling loop. When the operator presses the EXTERNAL ALC GAIN control, this control applies the EXTERNAL INPUT signal to the External Gain Compare circuit. With this signal in place, EXTERNAL ALC GAIN control is adjusted such that the voltage from the external detector equals that from the internal detector. When equal, the CAL indicator lights and remains lit until EXTERNAL ALC GAIN control is released.

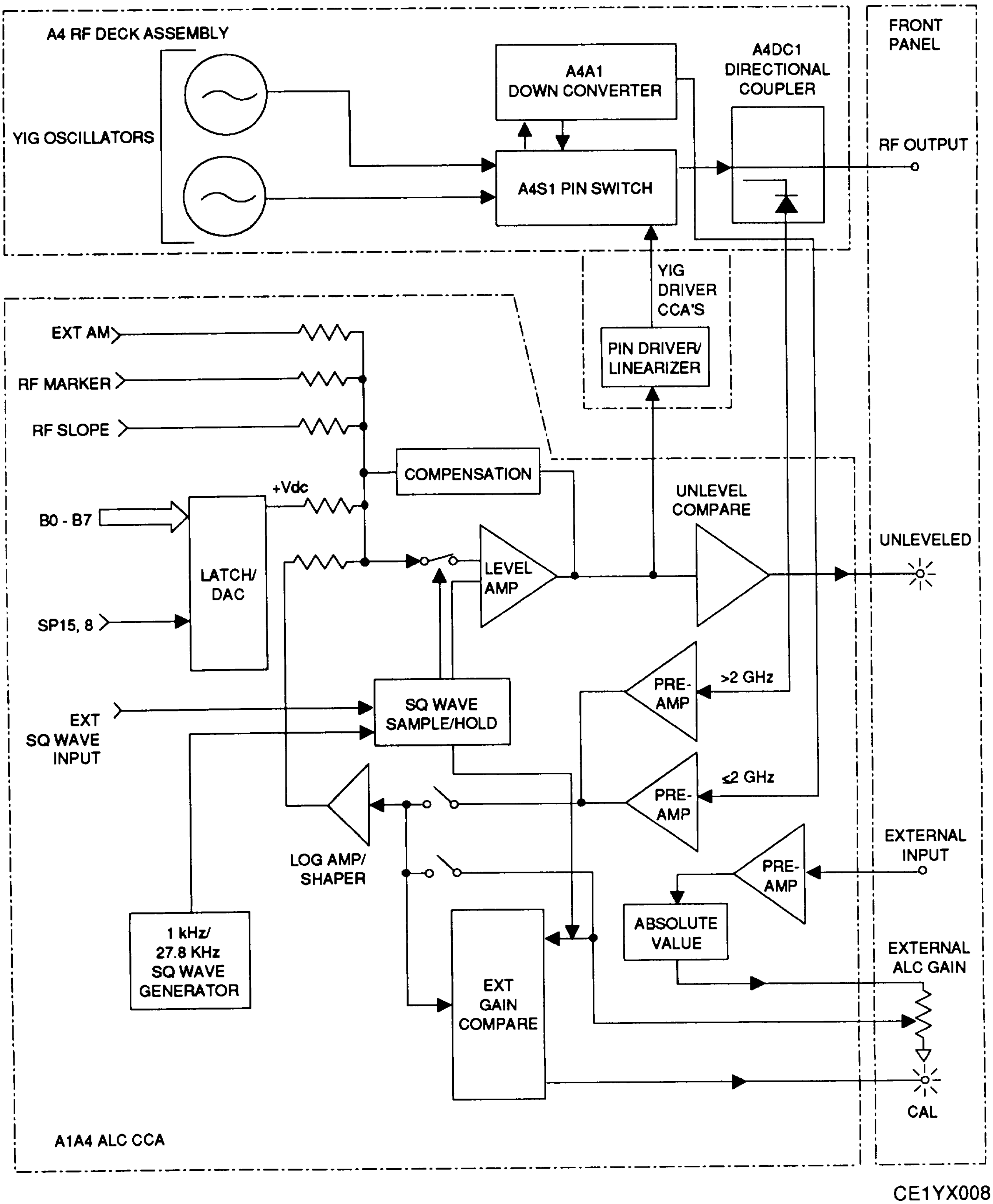


Figure 1-8. ALC Loop Functional Block Diagram

g. A1A5 Frequency Instruction CCA. This CCA (fig. FO-2) outputs the following signals:

- YIG oscillator tuning voltages to A1A6, A1A7, and AIA8 YIG Driver CCAS
- Narrow (< 50 MHz) sweep-tuning-voltage ramp to Al Al FM/Attenuator CCA.
- Regulated +10 V bands witch-reference voltage to the three YIG Driver CCAS.
- RF Slope control voltage to A1A4 ALC CCA via the front panel RF SLOPE control.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L = Low Active State. H = High Active State.

The three main YIG tuning voltages supplied by A1A5 CCA are the F Cen, AF 50 MHz, and F Corr signals. These three signals are summed on the YIG Driver CCA'S and used to generate the YIG tuning current. The F Cen signal is the output of the Center Frequency digital-to-analog converter (DAC) circuit. The input to this circuit is a 16-bit word from the microprocessor. This word represents (1) the center frequency in a FULL, F1-F2, or M1-M2 sweep; (2) the CF frequency in a AF CF sweep; (3) the MI frequency in a AF MI sweep; or (4) the selected CWCF, CW F1, CW F2, CW M1, or CW M2 frequency. The two 8-bit words that constitute the center-frequency-control word go to the FCen DAC via FCen Latches 1 and 2. Word number 1 (the most significant word) loads into latch number 2 when the microprocessor clocks SPO low. Word number 2 (the least significant word) loads into latch number 1 when SP1 clocks low. After word number 2 latches, the microprocessor clocks both the SPO and SP1 lines low. This loads the DAC. This latching arrangement allows all 16 bits of the center-frequency-control word to be applied simultaneously to the FCen DAC. The other A1A5 CCA input affecting the F Cen signal line is Freq Offset. This line provides the -60 MHz/V frequency modulation capability that is selectable from the front panel.

The AF >50 MHz signal is the output from the Sweep Width (Δ F) DAC. The AF DAC circuit is a multiplier DAC that scales the analog REF input by N/4096 (where N=0 to 4096). The digital input to the AF DAC is a 12-bit word from the microprocessor. This word represents (1) the sweep width in a FULL, F1-F2, or M1-M2 sweep; (2) the AF value in a AFCF or Δ F M1 sweep; or (3) a zero value in any of the five CW frequency modes. The input digital word loads into the AF DAC when the microprocessor clocks SP6 and SP7 low.

The analog Ref input to the Sweep Width (AF) DAC is a 10 V signal (–5 Vto +5 V). It comes from the Sweep Sel Switch, via the –5 V Offset circuit. The inputs to the Sweep Sel Switch are a O to 10 V manual tuning voltage from the front panel MANUAL SWEEP control, a O to 10 V ramp from A1A2 Ramp Generator CCA, or a O to 10 V step frequency tuning voltage from the Step Freq DAC. The input to this DAC is a 12-bit word from the microprocessor. This word is generated in response to GPIB commands. It is formed using two 8-bit words. The remaining 4 bits in word number 1 control the Sweep Sel Switch and provide an input for the CW Filter Current Driver circuit. The input digital word loads into the Step Freq DAC when the microprocessor clocks SP3 and SP4 low.

The output of the Sweep Width DAC goes to the W/M/N Switch. This switch is controlled by the microprocessor, via the AF Latch 2 circuit. The W/M/N switch selects between a wide (>1000 MHz), medium (51 to 1000 MHz), or narrow (s50 MHz) sweep width. If the microprocessor commands a wide sweep width, the DAC output goes to the output circuit via a buffer. If the microprocessor commands a medium sweep width, the DAC output goes to the divide-by-16 resistor where it is scaled down before going on to the output circuit. If the microprocessor commands a narrow sweep width, the DA Coutput goes to the Diff Amp circuit. This circuit cancels any common-mode signals existing between the analog ground on A1A5 CCA and the analog ground on A1A10 CCA. The Diff Amp output (Δ F ≤ 50 MHz signal line) goes to A1A10 FM/Attenuator CCA.

The F Corr signal is the output from the I/E (current to voltage) Converter circuit. The input to this circuit is the sum of the current outputs from the ROM Lin DAC, the Freq Ver DAC, and the Freq Overlap circuit. The ROM Lin DAC provides a linearity correction frequency for the YIG oscillator. The input to this DAC is from the linearizer ROM on A1A6, A1A7, or A1A8 YIG Driver CCA, depending on which YIG oscillator is then in use. This linearizing ROM stores data that corrects for nonlinear frequency characteristics in the YIG oscillator.

The Freq Ver DAC provides for the up-to -+12.7 MHz correction from the front panel FREQUENCY VERNIER keys. The input to this DAC is an 8-bit word from the microprocessor that represents the front panel FREQUENCY VERNIER control-word output. This word is latched into the Freq Ver Latch when the microprocessor clocks SP 2 low.

The Freq Overlap circuit provides a 15 MHz frequency overlap between bands during a >200 MHz frequency sweep. This frequency overlap prevents frequency gaps from occurring due to the ±10 MHz accuracy of the YIG oscillators. There are four control inputs to this switching circuit, in addition to the FCen/VPF signal that provides the frequency-overlap-tuning voltage. Three of the inputs are from the YIG Driver CCA'S. These inputs select the resistor values needed to scale the FCen/VPF ramp down to the correct frequency-overlap value. The fourth control input, L >200 MHz, determines when the circuit will be activated. For Δ F values greater than 200 MHz, the circuit is switched into the F Corr line circuit; for Δ F values $\leq$ 200 MHz, the circuit is not active. When no frequency correction is needed, the F Corr signal is O volts. If no linearity correction is required, the Lin ROM DAC input is 01111111. If the operator has not applied frequency vernier correction to the selected frequency parameter, then 01111111 is also clocked into the Freq Ver Latch. When the output currents of the two frequency-correction DACS are summed with the equal-but-opposite current from the current balance resistor and if no frequency overlap voltage is applied the I/E Converter outputs O V.

The other signals generated on A1A5 CCA are the FCen/VPF, V/G Hz, Ramp Out, CW Filter, L CW Mode, and RF Slope control. The FCen/VPF signal is from the FCen/VPF switch. The inputs to this switch are FCen and the sum of FCen and either AF50 MHz or Δ F $\leq$ 50 MHz. If the sweep width is $\leq$ 200 MHz, the FCen signal is switched onto the FCen/VPF line. This line goes to the YIG Driver CCA'S. There it controls oscillator bands witching. If the sweep width is 200 MHz or less, bands witching is inhibited. Control for the FCen/VPF switch is from the microprocessor, via the AF Latch 2 circuit.

The V/GHz signal is the sum of the FCen and either the AF50 MHz or the Δ F $\leq$ 50 MHz signals. The two signals are summed at the FCen/VPF Sum circuit and applied to the V/GHz Amp. At the V/GHz Amp, the output of the sum circuit is scaled so that the amplitude of the output ramp is 1V/GHz, This output goes to the rear panel V/GHz OUTPUT connector. The Ramp Out signal is from the Ramp Buffer Amp circuit. It goes to A1A14 Motherboard CCA. There, it is buffered and applied to the rear panel HORIZ OUTPUT connector. The CW Filter signal is from the CW Filter Current Driver circuit. The input to this circuit is from the microprocessor, via the Step Freq Latch 2 circuit. The CW Filter Current Driver converts the latch-output voltage to a current, which drives the CW filter relay on the YIG Driver CCA'S. The L CW Mode signal results from ANDing the three Δ F Latch 2 input signals. Only in a CW mode are all three of these signals high simultaneously. The L CW Mode signal goes to A1A4 ALC CCA. The RF Slope Control signal is from the Offset Amplifier circuit. This circuit applies an offset voltage to the front panel RF SLOPE control.

h. A1A6, A1A7, and A7A8 YIG Driver CCAS. These CCA'S provide drive currents for their associated YIG oscillator tuning coils and for A4S1 PIN Switch. They also provide modulating currents for the ALC-loop PIN attenuator. The CCA'S also develop the oscillator- bands witch logic voltages.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L = Low Active State. H = High Active State.

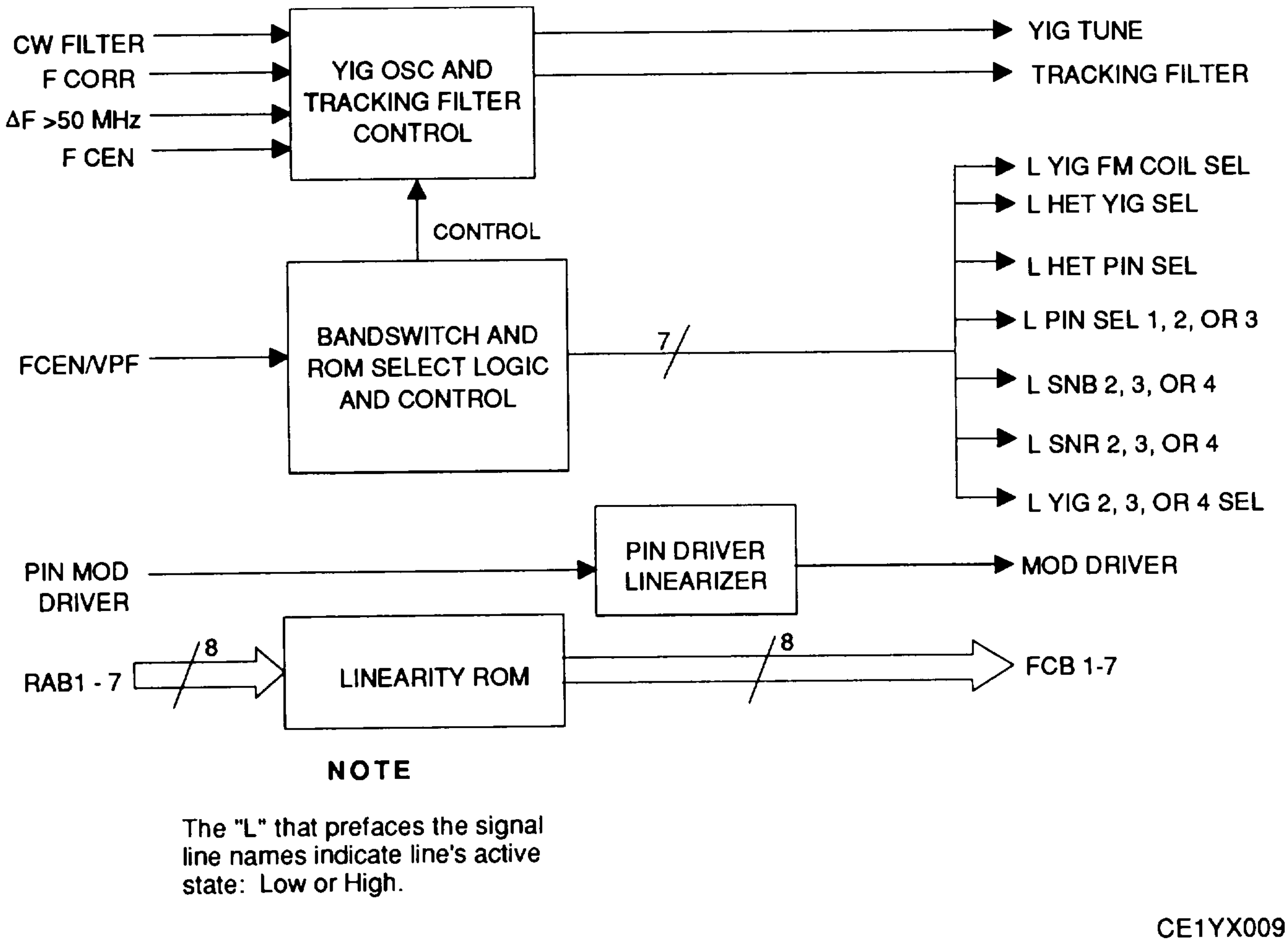


Figure 1-9. YIG Driver CCAS Functional Block Diagram.

The SG-1206 uses three YIG oscillators to sweep its frequency range. Each requires a YIG Driver CCA (A1A6, A1A7, A1A8). To provide for an increased range to 26.5 or 40 GHz, an additional CCA slot (labeled A9) is also available. In the SG-1206, this slot contains a blank card, while associated A1A14P16 motherboard connector contains a jumper plug. To describe how these YIG Driver CCA"S interrelate to provide a continuous sweep from 10 MHz to 20 GHz, refer to figure FO-3 and the discussion below.

The three main signals used to develop tuning and bias currents are the F Cen, Δ F >50 MHz, and F Corr from A1A5 CCA. These three signals feed in parallel to all three YIG driver CCA'S. However, because the H SNB (select next band) oscillator-bandswitch lines on A1A7 and A1A8 are both initially false, A1A6 CCA is the only one that can use the signals. There, they are summed and used to generate the frequency sweep.

The fourth A1A5 CCA signal, FCen/VPF, provides for oscillator bands witching. A bands witch occurs on A1A6 CCA at 2 GHz and again at 8 GHz. At 2 GHz, the L Het PIN Select line goes false. This switches both the 0.01-to-2 GHz A4A1 Down Converter Band also referred to as Het (heterodyne band) out of the circuit and the S/C-Band (2-to-8 GHz) YIG in. At 8 GHz, several events occur:

- The YIG oscillator tuning coil leaves the oscillator tuned to a rest frequency of 8 GHz.
- The Mod Driver line on A1A6 CCA sets the Mod attenuator to maximum attenuation, and the L PIN SELect line causes the S/C-band element in A4S1 PIN Switch to turn off. This action attenuates by 260 dBc the feedthrough of the S/C-Band YIG oscillator signal.
- The SNB and SNR (select-next-band and select-next-ROM) lines on A1A6 CCA toggle from low to high, selecting the X-Band (8-to-12.4 GHz) YIG oscillator and linearizer ROM. Selecting the X-Band YIG oscillator, A1A7 CCA sums the three signals from A1A5 CCA (F Cen, AF50 MHz, F Corr) and uses them to generate the X-band sweep. This sweep starts at 8 GHz. As on A1A6 CCA, the FCen/VPF signal from A1A5 CCA provides for oscillator bands witching. A1A7 CCA has only one bands witch point (12.4 GHz). When it is reached, the following occur:
  - The YIG oscillator tuning coil leaves the oscillator tuned to its rest frequency (12.4 GHz).
  - The Mod Driver line on A1A7 CCA sets the X-band attenuator in A4S1 PIN Switch to maximum attenuation. The L PIN SELect line turns the X-band switch off. This action attenuates by 260 dBc the feedthrough of the X-band signal.
  - The SNB and SNR lines on A1A7 CCA toggle from low to high and select the Ku-Band YIG oscillator and ROM. The Ku-band circuit action is similar to that described for S/C and X bands.

The YIG Driver CCA'S are similar in their design and operation, The major difference is that the A1A6 CCA also drives the A4A1 Down Converter. It also contains circuits for controlling the tracking filter that is built into the S/C-band YIG oscillator package. The following functional description is for the S/C-band circuit. The X- and Ku-band circuits are similar, except for the absence of tracking filter and Het (down converter) lines.

The A1A6 CCA (fig. 1-9) contains four functional blocks. The YIG Osc and Tracking Filter Control circuits tune the YIG oscillator and its built-in tracking filter. The tracking filter provides harmonic suppression. The inputs to this block are the F Corr, Δ F >50 MHz, F Cen and CW Filter control signals from A1A5 CCA.

The Bands witch and ROM Select Logic and Control circuits provide for bands witching between the three YIG Driver CCA'S. The input is FCen/VPF. The outputs are the L YIG FM Coil Sel, L Het YIG Sel, L Het Pin Sel, L Pin Sel, L SNB, L SNR, and LYIG Sel control lines.

The PIN Driver Linearize circuit processes the modulation control signal for the S/C-band Modulator circuit, which for this band is a separate component. For the other two bands, the modulator/attenuator pad is built into A4S1 PIN Switch. The modulator provides ALC control for their associated YIG oscillator output signal.

The Linearity ROM circuit provides compensation for its associated YIG oscillator. ROM addressing is from A2A12 CCA, via A1A4 CCA. Circuit output goes to A1A5 CCA.

i. A1A10 FM/Attenuator CCA. This CCA (fig. 1-10) generates currents that control (1) FM modulation for the YIG oscillators, (2) drive for the 2-to-8 GHz YIG oscillator tracking filter, and (3) operation of A4AT1 Step Attenuator. Additionally, it generates the End of Band (EOB) signal used on A1A2 Ramp Generator CCA.

NOTE

In the following circuit discussion, the L or H that precedes a signal-line name indicates the line's active (or true) logic state. L = Low Active State. H = High Active State.

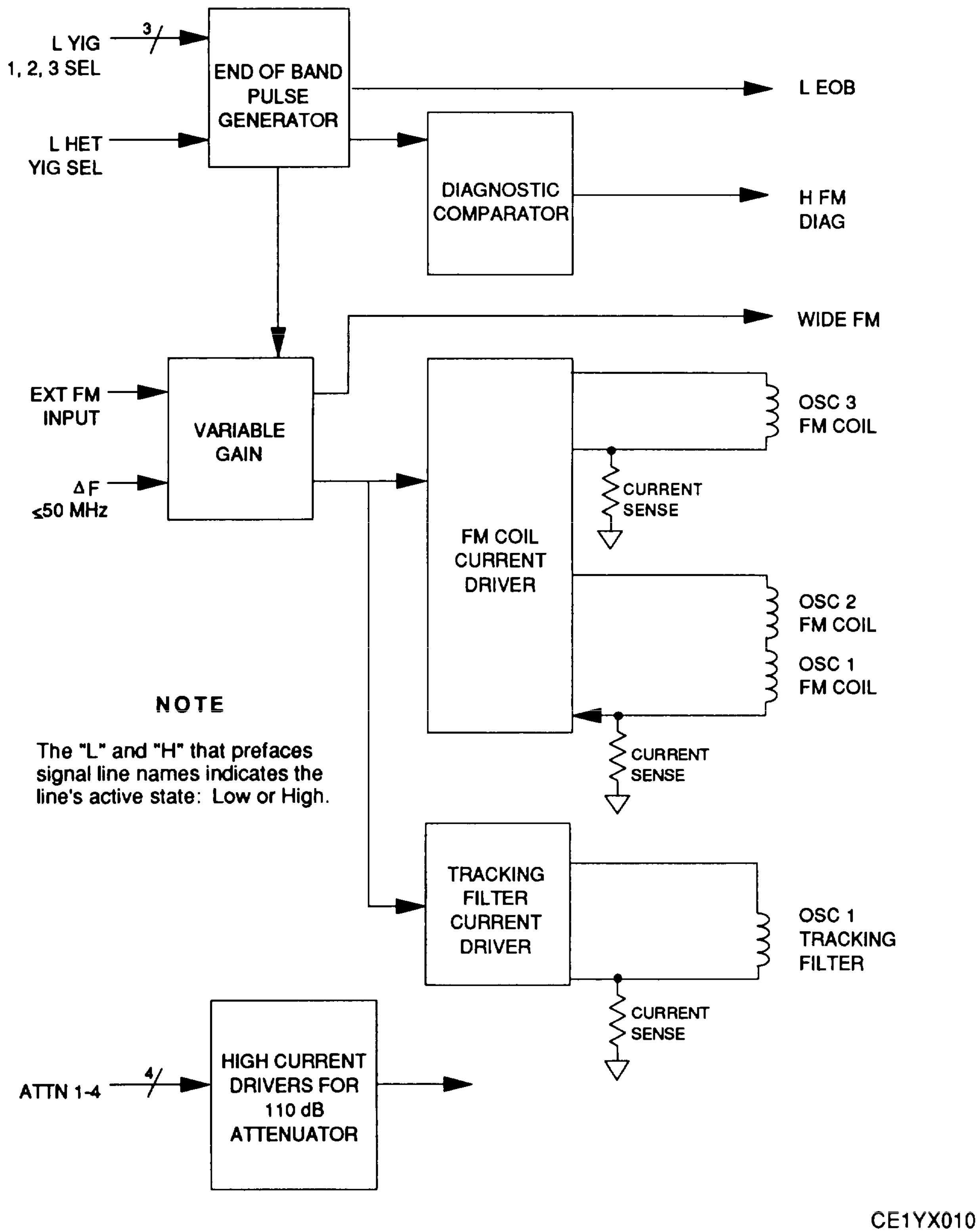


Figure 1-10. A1A10 FM/Attenuation Functional Block Diagram.

The signal input for this CCA enters on either the Ext FM Input signal line, the Δ F $\leq$ 50 MHz signal line, or on both concurrently. The Δ F $\leq$ 50 MHz signal line is from the A1A5 CCA. If the operator selects a delta-frequency sweep mode (AF CF, AF M1) and a sweep width (Δ F) of 50 MHz or less, this input is a voltage ramp. The amplitude of this ramp depends on the sweep width. For a sweep width of 50 MHz, the amplitude of the ramp is 10 V (from -5 V to +5 V). For sweep widths less than 50 MHz, the amplitude of the ramp is proportionally less than 10 V. The Ext FM Input signal line is.from the rear panel EXT FM ∅ LOCK INPUT connector.

The Variable Gain circuit provides a voltage gain for the FM input signal. Stage gain depends on which of the available YIG oscillators is supplying the output frequency. The output of this circuit goes to the FM Coil Current Driver circuit. The output from the FM Coil Current Driver circuit drives the YIG oscillator FM tuning coils. This coil current returns to ground via the Current Sense resistor, which is effectively in series with the FM coils. The voltage drop across the Current Sense resistor is proportional to the current through the FM coils.

The S/C-Band (Osc 1) and X-Band (Osc 2) YIG oscillators receive their drive and FM coil currents in series. Only one oscillator band at a time, however, has its output switched to the sweep generator RF output circuit. This RF output switching is a function of A4S1 PIN Switch.

Besides supplying the input for the FM coil-currerrt driver circuits, the Variable Gain circuit also supplies the input for the Tracking Filter Current Driver circuit. A tracking filter is used only with the S/C-band YIG oscillator (Osc 1). This filter is a high-Q YIG bandpass filter that resides in the same module as the YIG oscillator. It is in series with the YIG oscillator and tracks at the same frequency. it attenuates harmonic and spurious signals.

The fourth current driver circuit is the High Current Drivers circuit. It controls A4AT1 Step Attenuator. These drivers provide the operating currents for the attenuator circuits.

The remaining circuit on A1A10 CCA is the End-of-Band Pulse Generator. This circuit generates a low-true pulse at all bands witch points. Inputs to this circuit are the Het YIG Sel line and the YIG Sel lines from the three YIG Driver CCA'S. Another output from this circuit goes to the Diagnostic Comparator circuit. The output of the Diagnostic Comparator circuit is normally o volts. If the output goes to a TTL high (+3.5 to +5 V), it causes Error Code 23 to appear on the front panel.

j. Switching Power Supply. This power supply is a half-bridge, quasi-square-wave, high-efficiency +5 V converter. It includes the following circuits.

- ±15 V LC (Iow current) supply.
- ±15 V HC (high current) supply.
- +12 V regulated supply.
- +24 V regulated supply.
- -38 V regulated supply.
- +18 V unregulated supply,
- +28 V unregulated supply.

As shown in figure FO-4, the switching power supply circuits and components are dispersed over the following CCA'S and assemblies:

- A3 Rear Panel Assembly (Line Voltage Selector Module and Fan).
- A1A14 Motherboard CCA (Off-Line Rectifier, Start-up Transformer, Power Switch, Over-Voltage Sense, Out-of-Reg Sense, Line Sense, –38 V, +24 V, Rectifiers and Filters, and ±15 V LC Regulator circuits).
- A1A13 Switching Power Supply CCA (Control Amplifier, Soft-Start Control, Shut-Down Timer, Over-Current Sense, Pulse-Width Modulator, and Switching Transistors circuits).
- A4 RF Deck Assembly (–38 V Regulator pass transistor and ±15 VHC Regulator circuits).

The ac line power is applied to the Off-Line Rectifier circuit. This circuit is a full-wave voltage doubler (115 V line) or a full-wave bridge rectifier (230 V line). The voltage output for either input-line voltage is 330 V (±165 V). Resistors A1A13R3 and A1A13R8 sense the circuit's output current. If the current exceeds 3 amperes, it activates the optically coupled Over-Current Sense circuit. When activated, this circuit causes the Shut Down Timer to turn off the switching transistor drive voltage. The ±165 V output from the Off-Line Rectifier circuit goes to the de-isolated Switching Transistors on A1A13 Switching Power Supply CCA.

The Switching Transistors alternately switch between +165 V and -165 V at a 50 kHz rate. These transistors are driven by the Pulse-Width Modulator (PWM) circuit. This circuit (fig, 1-11) develops a train of pulses. The duty cycle of this pulse train varies between approximately 25 and 40 percent, depending on the amplitude of control voltage Vc. This Vc -voltage amplitude is determined by the Control Amplifier, the Soft-Start Control circuit, or the Shut -DownTimer circuit.

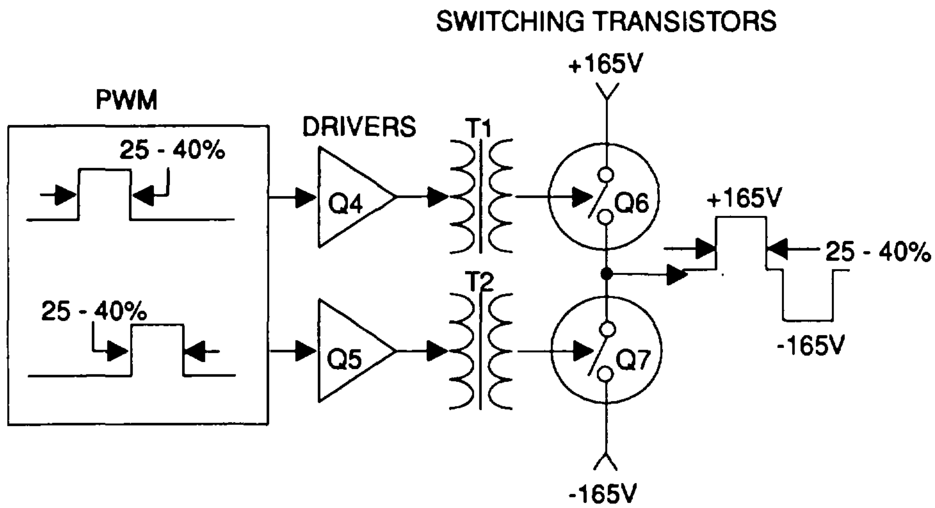


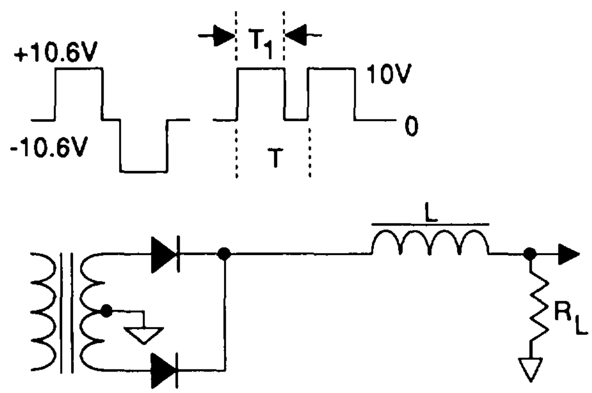
Figure 1-11. Simplified Schematic for Switching Transistors.

The input to the Control Amplifier is the +5 V Sense line from A1A14 Motherboard CCA. This line senses the voltage across the +5 V load. The output of A1A13U3 forces the PWM to adjust the duty cycle to whatever is necessary to maintain +5 V at the sense line.

The input to the Soft-Start Control circuit is +12 Vfrom the +12 V Regulator. At the instant the POWER key is pressed to ON, +12 V is applied to Al A13Q8 and, via A1A13C23, to the Vc pin on A1A13U4. With the Vc pin at +12 V, the duty cycle of the Al A13U40utput pulse train is minimum. This causes the output of the +5 V supply to be minimum. As A1A13C23 charges, the voltage at the A1A13U4 Vc pin decreases, the duty cycle of the A1A13U4 output pulse train increases, and the +5 V supply output voltage increases. When the Control Amplifier senses that 5 V has been reached (approximately 20 ins), regulation occurs. If a malfunction were to occur, such as A1A13U3 failing, the Over-Voltage circuit (A14Q4) would trigger the Shut-Down Timer circuit at approximately 5.7 V.

The input to the Shut-Down Timer circuit is a trigger pulse caused by the Over-Voltage/Current line going low. When triggered, this circuit generates a 1 second pulse (approximately) that causes the Vc voltage on A1A13U4 to go to +12 V. This shuts down the Switching Transistors. After A1A13U5 times out, the power supply soft-starts. However, if the condition causing the A1A13U5 trigger is still present, A1A13U5 generates another pulse and shuts the supply down again. This A1A13U5 pulsing operation continues until the overvoltage/current condition is corrected or the POWER switch is pressed to OFF.

DC isolation transformers A1A13T1 and A1A13T2 couple the outputs from the PWM circuit to field-effect transistors A1A13Q6 and A1A13Q7. These FET's require a bias of approximately 5 V to be switched on. The outputs from AI A13Q6 and A1A13Q7 form a composite waveform (fig. 1-12). The peak-to-peak value of this waveform is directly proportional to the peak-to-peak value of the 115 V line (or directly proportional to the peak value of the 230 V line). This waveform is coupled to the five secondaries of A1A13T3 (fig, FO-4). The reduced voltages appearing in these secondaries are also proportional to the line voltage. These reduced voltages are rectified and passed through inductors which function as integrators. The value of the voltage that is output from the filter can be controlled entirely by A1A13T1 and A1A13T2.



CE1YX012

Figure 1-12. Simplified Schematic for Regulator.

The four rectifier circuits, excepting the +5 V circuit, supply their respective outputs to voltage regulators. The -38 V Regulator is driven by the -43 V supply. The +24 V Regulator is driven by the +28 V supply. The -15 V LC (low current) and HC (high current) Regulators are driven by the 18 Vsupply. And the +15 V LC and HC Regulators are driven by the +18 V supply. The unregulated +18 V also goes to the YIG driver bias supply on the YIG Driver CCA's and to the +15 V Rectifier circuit. At the +15 V Rectifier Circuit, the +18 V reverse-biases Al A14CR7/CR8 and provides the input for voltage regulator A1A13VR1.

The remaining two circuits in figure FO-4 are the Out of Reg Sense and the Line Voltage Sense circuits. The Out of Reg Sense circuit detects when any of the regulated supplies go out of tolerance. If such a condition exists, the L OR diagnostic line goes true and the A14 OUT OF REG indicator lights. The Line Sense circuit detects when the ac line exceeds the ±2O percent limits required for circuit operation.

CHAPTER 2

MAINTENANCE INSTRUCTIONS

Section L. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT.

Common tools and equipment required for general support maintenance of Sweep Generator SG-1206/Lf are listed in the Maintenance Allocation Chart (MAC), TM 11-6625-3231-12, Appendix B.

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

Special tools, TMDE, and support equipment required for general support maintenance are listed in the Maintenance Allocation Chart (MAC), TM 11-6625-3231-12, Appendix B. Special tools are listed and illustrated in Repair Parts and Special Tools List, TM 11-6625-3231-24P.

2-3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List, TM 11-6625-3231-24P.

Section II. SERVICE UPON RECEIPT

2-4. SERVICE UPON RECEIPT OF MATERIAL.

a. Unpacking. Special design reusable packing material inside this shipping carton provides maximum protection for Sweep Generator. Avoid damaging carton and packing material during equipment unpacking. Use the following steps for unpacking Sweep Generator:

- Cut and remove paper sealing tape on carton top and open carton.
- Remove packing foam.
- Remove inner packing container by either turning shipping carton upside down or lifting inner container up and out.
- Cut and remove protective aluminum foil from inner packing container.
- Cut and remove paper sealing tape on carton top and open carton.
- Grasp Sweep Generator firmly, and while restraining packing carton, lift up and out of packing carton.
- Place Sweep Generator on a suitable flat, clean, and dry surface. Remove protective plastic bag.
- Place desiccant bags back inside protective plastic bag, and place plastic bag inside of shipping carton.
- Return shipping carton to supply system.

b. Checking Unpacked Equipment.

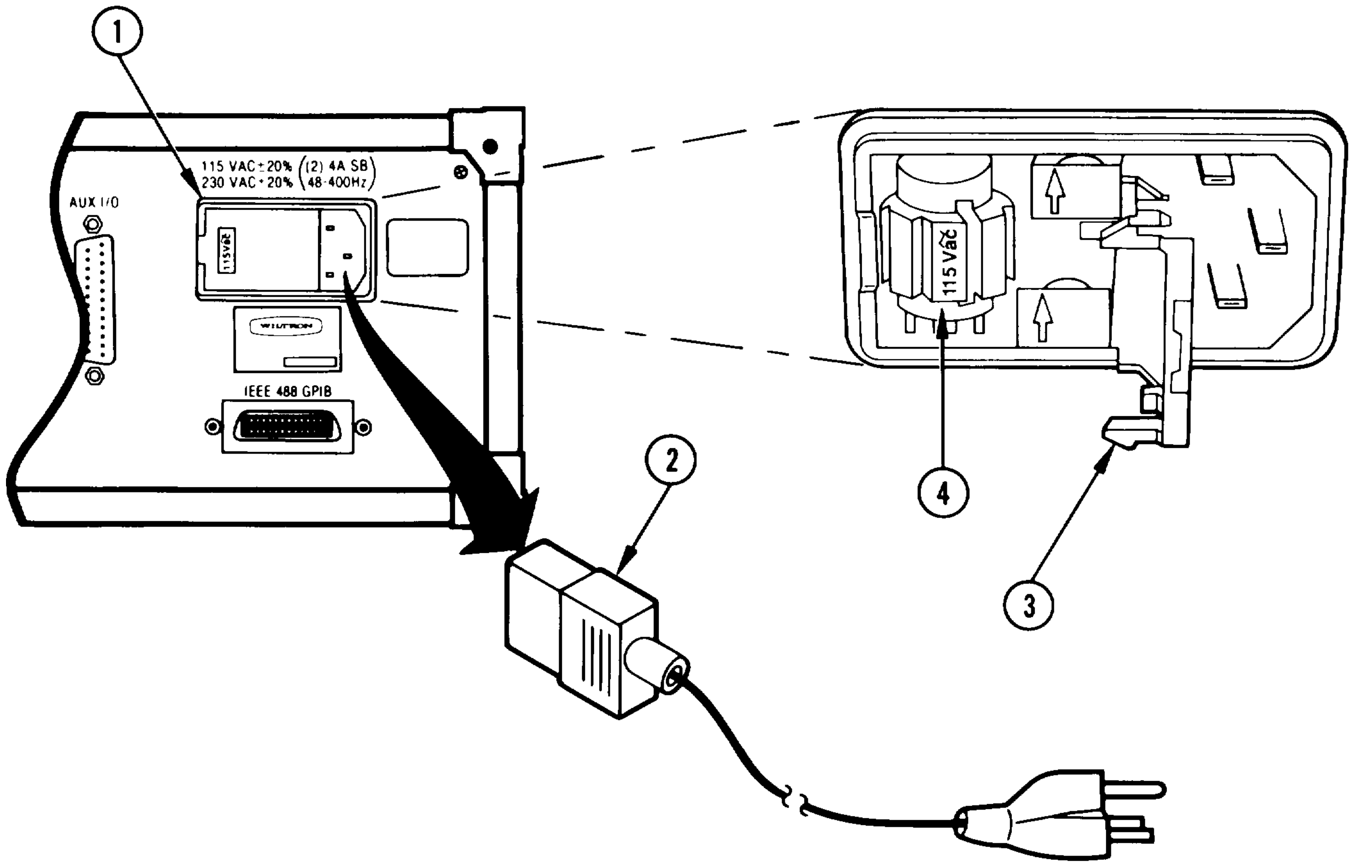
- Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).
- Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of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

2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

Inspect rear panel line module to ensure that Sweep Generator is set correctly (115 V or 230 V). If not correct, change to correct line voltage value using following procedure.

- On line module (1), remove line cord (2) and pry cover (3) open.
- Remove voltage selector drum (4) by pulling straight out.
- Rotate drum so that desired line voltage marking faces out; then reinstall drum.
- Close cover (3) and reinstall line cord (2),

b. Complete performance tests (para 2-32).



Section III. TROUBLESHOOTING

SYMPTOM INDEX

2-6. GENERAL.

Troubleshooting at the intermediate general support maintenance level requires you to locate any malfunction 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 you will find here are those that could be caused by faulty items you can fix.

NOTE

- Before using the troubleshooting table, check your work order and talk to unit maintenance, if possible, for a description of the symptoms and the 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 that you can use when troubleshooting the Sweep Generator:

a. The Sweep Generator has built-in self tests and diagnostics that are used in troubleshooting. A self-test is automatically initiated at power-up, and can be initiated manually from the front panel or remotely over IEEE-488 bus (GPIB).

b. Refer to the principles of operation, Chapter 1, Section III as required. This provides circuit theory of the section you are troubleshooting with references to the functional and schematic diagrams. Sweep Generator Functional Block diagrams are located on figures FO-1 thru FO-4. Sweep Generator assembly and cable locator diagram is located on figure FO-5. Schematic diagrams and assembly component locator diagrams for all-repairable assemblies/circuits are located on figures FO-6 thru FO-20.

c. Circuit cooler spray (Appendix B, item 4) can be used in isolating problems. The most generally used method is to spray suspected circuits/components to see if the malfunction can be temporarily fixed. This method will not work all the time, but it can be a great timesaver. It is especially helpful on intermittent problems that get worse with a rise in temperature. However, use this spray sparingly. Overspraying operational amplifiers, for example, can create a feedback path around the amplifier that will be detrimental to circuit operation.

d. Many problems on Sweep Generators that have been in service for awhile are caused by corrosion. Sometimes removing and reseating the affected plug-in assembly or cable will correct a malfunction. Cleaning connector pins and/or switch contacts with alcohol (Appendix B, item 2) will repair many types of digital and analog circuit malfunctions.

e. For microcircuit and connector orientation, pin one is identified by a “1” on printed circuit board, or a square solder pad.

2-8. EQUIPMENT INSPECTION.

The following inspection procedures shall be used to locate obvious malfunctions with the Sweep Generator.

a. Inspect all external surfaces of Sweep Generator for physical damage, breakage, loose or dirty contacts, and missing components.

b. Remove top, bottom, and side covers (para 2-51) as required to gain access to 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 any board assemblies in the Sweep Generator unless the instrument is turned to off. Some board assemblies contain devices that can be damaged if the board is removed when the power is on. Several components, including MOS devices, can be damaged by electrostatic discharge. Use conductive foam and grounding straps when servicing is required around sensitive components. Use a grounding strap when servicing is required around sensitive components. Use care when unplugging IC'S from high-grip sockets.

c. Inspect printed circuit board surfaces for discoloration, cracks, breaks, and warping.

d. Inspect printed circuit board traces for breaks, cracks, cuts, erosion, or looseness.

e. Inspect all assemblies for burnt or loose components.

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

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

2-9. ERROR CODES.

The Sweep Generator uses error codes to indicate system faults. The software routines that generate error codes are initiated (1) at instrument turn-on, (2) when SELF TEST key is pressed, or (3) over the IEEE-488 Bus. When initiated, the error-code routines run sequentially beginning with 00 and continuing through to 24 (last test). If multiple errors are detected, each error-code number appears in turn as the error-code routines cycle through their testing. Therefore, when multiple error codes appear, it is important to troubleshoot them in order from lowest to highest number.

2-10. TROUBLESHOOTING TABLE.

The Troubleshooting table (table 2-1) lists common malfunctions which may be found during normal operation or maintenance of the Sweep Generator or its components. You should perform the tests or inspections and corrective actions in the order listed.

CAUTION

Use caution when probing test points or connectors during troubleshooting as some of the transistors used in the Sweep Generator contain metal containers that, if accidently shorted (to ground or other levels), can cause permanent damage,

NOTES

- After repair of Sweep Generator verify malfunction is cleared. If not, perform the proper adjustment (table 2-2).
- All voltage readings referenced to A1A14TP3 (fig. FO-14, sheet 1) unless otherwise specified.
- TTL low logic level is –0.5 to +0.8 V; TTL high logic level is +3.5 to +5.5 v.
- See figure FO-5 for assembly and cable location diagram.

Table 2-1. Troubleshooting.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. Sweep Generator Displays Error Code(s).

Press SE LF TEST key and record all errors displayed in window.

ERROR Code 00 Displayed (Voltage supply other than 5 V is out of tolerance).

Adjust Power Supply (para 2-35).

If malfunction still exists, perform Power Supply Test procedure (para 2-11).

- Replace faulty component/assembly.

ERROR Code 01 Displayed (Line voltage too low).

Verify line voltage source is from 92-138 Vac or 184–276 Vat.

Adjust Power Supply (para 2-35).

If malfunction still exists, verify voltage at A1A14U4-1 (fig. FO-13, sheet 1) is +4.2 V±0. 1 V.

- If correct, and A1A14DS5 is OK, replace A1A14U1O.
- If incorrect, measure voltage at A1A14U4-7.
  - If $\geq$ ±12 V, replace Al A14U4.
  - If <+12 V, troubleshoot around A1A14CR6-9 using figure FO-13, sheet 8. Replace faulty component.

ERROR Code 02 Displayed (Line voltage to high).

Verify line voltage source is from 92 –138 Vac or 184 – 276 Vat.

Adjust Power Supply (para 2-35).

If malfunction still exists, verify voltage at A1A14U4-1 (fig. FO-13, sheet 1) is +4.2 V±0.1 V.

- If correct, and A1A14DS4 is OK, replace A1A14U10
- If incorrect, measure voltage at A1A14U4-7.
  - If $\geq$ ±12 V, replace A1A14U4.

  If <+12 V, troubleshoot around A1A14CR6-9 using figure FO-13, sheet 8. Replace faulty component.

ERROR Code 03 Displayed (RAM failure).

Cycle POWER from ON to OFF to ON.

Press SELF TEST key.

If error code repeats, replace A2A12 Microprocessor CCA (para 2-61).

ERROR Code 08 Displayed (ROM failure).

Cycle POWER from ON to OFF to ON.

Press SELF TEST key.

If error code repeats, replace A2A12 Microprocessor CCA (para 2-61).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. Sweep Generator Displays Error Code(s) — Continued.

ERROR Code 09 Displayed (Frequency failure 0.01-TO-2 GHz down converter band).

Perform Frequency Band Error Test procedure - Down Converter Band (para 2-13).

- Replace faulty component/assembly.

ERROR Code 10 Displayed (Frequency failure 2-TO-8 GHz S/C-Band).

Perform Frequency Band Error Test procedure - S/C-Band (para 2-13).

- Replace faulty component/assembly.

ERROR Code 11 Displayed (Frequency failure 8-TO-12.4 GHz X-Band).

Perform Frequency Band Error Test procedure - X-Band (para 2-13).

- Replace faulty component/assembly.

ERROR Code 12 Displayed (Frequency failure 12.4-TO-20 GHz Ku-Band).

Perform Frequency Band Error Test procedure - Ku-Band (para 2-13).

- Replace faulty component/assembly.

ERROR Code 14 Displayed (Frequency failure 0.01-TO-20 GHz).

Perform Frequency Error Test procedure (para 2-14).

- Replace faulty component/assembly.

ERROR Code 15 Displayed (ALC loop failure 0.01-TO 2-GHz down converter band).

Evaluate all error codes displayed.

- If error codes 15, 16, 17, 18 and 20 are displayed, replace A4S1 PIN Switch Assembly (para 2-72).
- If error codes 15, 16, and 20 are displayed, replace A1A6 YIG Driver CCA (para 2-53), A4A4C11-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If error codes 15 and 20 are displayed, Adjust ALC Bandwidth and Low-Level Noise (para 2-46).
  - If adjustment fails to repair malfunction, perform Power Leveling Error Test procedure, – Down Converter Band (para 2-15). Replace faulty component/assembly.

ERROR Code 16 Displayed (ALC loop failure 2-TO-8 GHz S/C-Band).

Evaluate all error codes displayed.

- If error codes 16, 17, 18, and 20 are displayed, replace ALC Assembly (A1A4 ALC CCA, para 2-53; and A4DC1 Directional Coupler, para 2-71).
- If error codes 16 and 20 are displayed, Adjust ALC Bandwidth and Low-Level Noise (para 2-46).
  - If adjustment fails to repair malfunction, perform Power Leveling Error Test procedure, - S/C-Band (para 2-15). Replace faulty component/assembly.

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. Sweep Generator Displays Error Code(s) —Continued.

ERROR Codes 17 and 20 Displayed (ALC loop failure 8-TO-12.4 GHz X-Band).

Adjust ALC Bandwidth and Low-Level Noise (para 2-46).

If adjustment fails to repair malfunction, perform Power Leveling Error Test procedure, – X-Band (para 2-15).

- Replace faulty component/assembly.

ERROR Codes 18 and 20 Displayed (ALC loop failure 12.4-TO-20 GHz Ku-Band).

Adjust ALC Bandwidth and Low-Level Noise (para 2-46).

If adjustment fails to repair malfunction, perform Power Leveling Error Test procedure, - Ku-Band (para 2-15).

- Replace faulty component/assembly.

ERROR Code 20 Displayed (ALC loop failure one or more bands).

Evaluate all error codes displayed.

- If error codes 20, 21, and 22EE are displayed, and A1A2S1 (fig. FO-7) is in NORM position, replace A1A2 Ramp Generator CCA (para 2-53).

Adjust ALC Bandwidth and Low-Level Noise (para 2-46).

If adjustment fails to repair malfunction, perform Power Leveling Error Test procedure (para 2-15).

- Replace faulty component/assembly.

ERROR Code 21 Displayed (Analog sweep failure).

Perform Analog Sweep Test procedure (para 2-16).

- Replace faulty component/assembly.

ERROR Code 22 Displayed (Frequency markers failure).

Perform Frequency Markers Test procedure (para 2-17).

- Replace faulty component/assembly.

ERROR Code 23 Displayed (FM circuit failure).

Perform Internal FM Circuit Test procedure (para 2-18).

- Replace faulty component/assembly.

ERROR Code 24 Displayed (A1A1 CCA failure).

Set POWER to OFF.

Remove and reinstall A1A1 CCA (para 2-53) making sure contact seat

Set POWER to ON.

Press SELF TEST key.

If error code repeats, replace A1A1 GPIB Interface CCA para 2-53).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. All other SG-1206 Failures.

Step 1. Set POWER switch to OFF.

- Disconnect all external cables except power cable.

Step 2. Set POWER switch to ON. Verify power indicator lights.

- If indication is incorrect, perform Power Supply Test procedure - +5 Volt Supply (para 2-11).
- If indication is correct, proceed with step 6.

Step 3. Verify AC Line voltage and rear panel fuse.

- Replace faulty component.

  If rear panel fuse opens again, proceed with step 4.

  If rear panel fuse does not open, proceed with step 6.

Step 4. Disconnect power cable, and remove A1A13 CCA (para 2-55). Replace rear panel fuses, and reconnect power cable.

- If fuse(s) open, troubleshoot Al A14FL1/L1/L2 and line voltage module using figure FO-13, sheet 2. Replace faulty component/ assembly.

Step 5. Set POWER switch to ON.

- If fuse(s) open, troubleshoot Al A14T1/CR39 –42 using figure FO-13, sheet 2). Replace faulty component/ assembly.
- If fuse(s) do not open, perform A1A13 Switching Power Supply CCA Test procedure (para 2-12). Replace faulty component/ assembly.

Step 6. After approximately 15 seconds, verify "PASS" appears on the front panel display.

- If front panel displays error code(s), troubleshoot using table 2-1, malfunction 1.

Step 7. Complete performance tests (para 2-32).

NOTE

Complete as many performance tests as possible to assist in isolating malfunction.

. If all performance tests pass, unit is operational.

l If performance tests fail, troubleshoot malfunction using table 2-1, malfunctions 3 through 19.

l If all performance tests pass, and malfunction only occurs during operation, proceed with step 8.

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. All other SG-1206 Failures —Continued.

Step 8. Evaluate the malfunction.

- If DECR/lNCR control is malfunctioning, perform DE CR/l NCR Control Circuit Test procedure (para 2-20).
- If external ALC GAIN control is malfunctioning, perform External ALC Gain Control Circuit Test procedure (para 2-27).
- If internal square wave mode is inoperative, perform Internal Square Wave Test procedure (para 2-31).
- If markers are malfunctioning, perform Adjust Marker Frequencies (para 2-38).
- If horizontal output connector has no signal, perform Horizontal Output Circuit Test procedure (para 2-28).
- If rear panel output connectors (NEG Z BLANKING, POS Z BLANKING, MARKER, or PENLIFT) are malfunctioning, perform Rear Panel Output Connector Test procedure (para 2-29).
- If rear panel V/GHz output connector is malfunctioning, Adjust A1A5 Frequency Instruction CCA (para 2-37) – V/GHz Adjustment. If adjustment fails to repair malfunction, perform Rear Panel Output Connector Test procedure (para 2-29) - V/GHz Test.
- If rear panel input connectors (EXT SQ WAVE or EXTERNAL SWEEP) are malfunctioning, perform Rear Panel Input Connector Test procedure (para 2-30).
- If front panel locks up when trying to change parameters, and the front panel key is not’ binding or stuck closed, replace A2A12 Microprocessor CCA (para 2-61).

- Replace faulty component/assembly.

3. CW Frequency Accuracy Test Failure.

Step 1. Adjust A1A6, A1A7, A1A8 YIG Driver CCAS (para 2-39).

Step 2. If adjustment fails to repair malfunction, verify voltage between A1A6TP1 (-) (fig. FO-11) and A1A14P14 pin 15 (fig. FO-14, sheet 1) (+) is -5 Vdc ±0.5 Vdc

- If incorrect, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).

Step 3. Verify voltage between A1A7TP1 (-) (fig. FO-11) and A1A7TP4 (+) is +15 Vdc ±0.7 Vdc.

- If incorrect, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/ATl YIG/isolator Assembly (para 2-69).

Step 4. Verify voltage between A1A8TP1 (-) (fig. FO-11) and A1A8TP4 (+) is +15 Vdc ±0.7 Vdc.

- If incorrect, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. CW Frequency Accuracy Test Failure — Continued.

Step 5. Adjust Frequency (para 2-40).

Step 6. If adjustment fails to repair malfunction, record frequencies at which problem occurs.

- If problem is in 0.01 to 1.9 GHz range only, replace A4A1 Down Converter Assembly (para 2-66).
- If problem is in 2.1 to 7.9 GHz range only, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If problem is in 8.1 to 12.3 GHz range only, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is in 12.5 to 20 GHz range only, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
- If problem is from 0.01 to 20 GHz range only, perform Frequency Error Test procedure (para 2-14).

  - Replace faulty component/assembly.

4. Sweep Accuracy Test Failure.

Step 1. Adjust Δ F $\leq$ 50 MHz Circuit (para 2-43).

Step 2. If adjustment fails to repair malfunction, record Δ F frequencies at which problem occurs.

- If problem is only Δ F 50 MHz, perform Δ F Circuit Test procedure - $\leq$ 50 MHz (para 2-26).
- If problem is only Δ F 500 MHz, perform Δ F Circuit Test procedure - 51 to 1000 MHz (para 2-26).
- If problem is only Δ F5 GHz, proceed with step 3.

Step 3. Adjust Manual Sweep (para 2-41).

- If manual sweep cannot be adjusted, perform Manual Sweep Control Test (para 2-25).

  - Replace faulty component/assembly.

- If manual sweep can be adjusted, and adjustment fails to repair malfunction, perform Δ F Circuit Test procedure - $\leq$ 50 MHz (para 2-26).

  - Replace faulty component/assembly.

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. Frequency Vernier Accuracy Test Failure.

Step 1. Adjust Frequency Vernier (para 2-42).

Step 2. If adjustment fails to repair malfunction, record frequencies at which problem occurs.

- If problem is only in 2 to 8 GHz range, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/UI YIG/Modulator Assembly (para 2-70).
- If problem is only in 8 to 12.4 GHz range, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/Isolator Assembly (para 2-69).
- if problem is only in 12.4 to 20 GHz range, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
- If problem is from 0.01 to 20 GHz range. perform Frequency Vernier Function Test procedure (para 2-23) .

- Replace faulty component/assembly.

6. Sweep Ramp Accuracy Test Failure.

Adjust Analog Sweep Time (para 2-36).

- If adjustment fails to repair malfunction, replace A1A2 Ramp Generator CCA (para 2-53).

7. Leveled Power Variation and Output Connector SWR Test Failure.

Step 1. Adjust ALC Bandwidth and Low-Level Noise (para 2-46).

Step 2. If adjustment fails to repair malfunction, record frequencies at which problem occurs.

- If problem is only at 15 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G YIG Assembly (para 2-68).
- If problem is only at 10 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G/AT1 YIG/isolator Assembly (para 2-69).
- If problem is only at 5 Gf+z, replace A1A6 YIG Driver CCA (para 2-53), A4A-4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If problem is at both 1 and 5 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/UI YIG/Modulator Assembly (para 2-70).
- If problem is only at 1 GHz, replace A4A1 Down Converter Assembly (para 2-66).
- If problem is at 1, 5, 10, and 15 GHz, OR if problem is low-level noise, replace A1A4 ALC CCA (para 2-53), and A4DC1 Directional Coupler (para 2-71).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

8. RF Slope Control Accuracy Test Failure.

Adjust RF Slope (para 2-47).

- If adjustment fails to repair malfunction, replace A1A4 ALC CCA (para 2-53), and A4DC1 Directional Coupler (para 2-71).

9. Maximum Output Power and Power Level Accuracy Test Failure.

Step 1. Adjust Output Power Level (para 2-48).

- If problem is limited to the 2 to 8 GHz range, perform Adjust Tracking Filter (para 2-44). If adjustment limits cannot be obtained, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).

Step 2. Adjust Coupler-Detector and Down Converter-Detector Tracking (para 2-50).

- If adjustments fail to repair malfunction, replace A1A4 ALC CCA (para 2-53), and A4DC1 Directional Coupler (para 2-71).

10. Power Sweep Accuracy Test Failure.

Step 1. Adjust Power Sweep (para 2-49).

Step 2. If adjustment fails to repair malfunction, perform Power Sweep Function Test (para 2-24).

- Replace faulty component/assembly.

11. Residual FM Test Failure.

Repeat test and record frequencies at which problem occurs.

- If problem is at 50 MHz, 1.8 GHz, and/or 7.8 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If problem only at 12 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is only at 20 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
- If problem is at all frequencies, perform High Residual FM Test procedure (para 2-22).
  - Replace faulty component/assembly.

12. External FM and Phase-Lock Test Failure.

Perform External FM Circuits Test (para 2-21).

- Replace faulty component/assembly.

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

13. AM Sensitivity and Frequency Response Test Failure.

Step 1. Set POWER key to OFF.

Step 2. Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.

Step 3. Set POWER key to ON, and press RESET key.

Step 4. Press CWCF key.

Step 5. Connect DC Power Supply to EXTAM INPUT connector. Set output to +1 Vdc.

Step 6. Measure voltage between A1A4P1 -16 (+) and A1A4P1-9 (–) (fig. FO-9).

- If +1 V, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
- If not troubleshoot connector and 4 pin cable at A1A14P10 (fig. FO-9).

Step 7. Set POWER key to OFF, and reinstall A1A4 CCA.

14. AM Bandwidth Verification Test Failure.

Repeat test and record frequencies at which problem occurs.

- If problem is only at 15 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2GI YIG Assembly (para 2-68).
- If problem is only at 10 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/ATI YIG/isolator Assembly (para 2-69).
- If problem is at both 1 and 5 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/UI YIG/Modulator Assembly (para 2-70).
- If problem is only at 1 GHz, replace A4A1 Down Converter Assembly (para 2-66).
- If problem is at 1, 5, 10, and 15 GHz, replace A1A4 ALC CCA (para 2-53), and A4DC1 Directional Coupler (para 2-71).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

15. RF Output Harmonic Attenuation Test Failure.

Step 1. Verify all semi-rigid cables are not damaged, and connected and torqued to specified limits.

Step 2. Repeat test and record frequencies at which problem occurs.

- If problem is only in 0.01 to 2 GHz range, replace A4A1 Down Converter Assembly (para 2-66).
- If problem is only in 2 to 8 GHz range, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/UI YIG/Modulator Assembly (para 2-70).
- If problem is only in 8 to 12.4 GHz range, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is only in 12.4 to 20 GHz range, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

16. RF Output Spurious Signals Test Failure.

Step 1. Verify all semi-rigid cables are not damaged, and connected and torqued to specified limits.

Step 2. Repeat test and record frequencies at which problem occurs.

- If problem is only in 0.01 to 2 GHz range, replace A4A1 Down Converter Assembly (para 2-66).
- If problem is only in 2 to 8 GHz range, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/UI YIG/Modulator Assembly (para 2-70).
- If problem is only in 8 to 12.4 GHz range, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is only in 12.4 to 20 GHz range, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

17. RF Output Power Source and Display Signals Test Failure.

Repeat test and record frequencies at which problem occurs.

- If problem is at 2.1 or 7.9 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If problem is at 8.1 or 12.3 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is at 12.5 or 20 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

Table 2-1. Troubleshooting — Continued.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

18. RF Output Frequency Stability vs-Output Level Test Failure.

Repeat test and record frequencies at which problem occurs.

- If problem is at 2.1 or 7.9 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
- If problem is at 8.1 or 12.3 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
- If problem is at 12.5 or 20 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

19. RF Output Step Attenuator Accuracy Test Failure.

Perform RF Output Circuit Test (para 2-19).

- Replace faulty component/assembly.

2-11. POWER SUPPLY TEST.

DESCRIPTION

This test is used to isolate power supply malfunctions in the A1A14 CCA and outlying load circuits to the malfunctioning component or assembly.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-14) unless otherwise specified.

1. This procedure is used to fault isolate one of the 10 power supply voltages in the Sweep Generator.
   - If the malfunctioning supply is known, proceed to the individual procedure provided in this paragraph.
   - If the malfunctioning supply is unknown, proceed as follows.
2. On SG-1206,
   - Set POWER to ON.
   - Press RESET key.
   - If the front panel POWER indicator fails to light, or the panel is dead, perform +5 V Supply Test below.
3. Using a Digital Multi meter, verify the following supply voltages:

Supply Voltage	Digital Multi meter (+) Lead	Reading	Perform
+5 v	A1A14TP1 (fig. FO-14)	+5 V±0.7V	+5 V Supply Test
–5 v	A1A14P24 pin 1 (fig. FO-14)	-5 V±0.7V	–5 V Supply Test
-15 VHC	A1A14P12 pin 3 (fig. FO-14)	-15 V±0.7V	–15 V VHC Supply Test
–15 VLC1	A1A14TP5 (fig. FO-14)	-15 V±0.7V	-15 V VLC1 Supply Test
–15 VLC2	A1A14VR4 pin 3 (fig. FO-13)	-15 V±0.7V	–15 V VLC2 Supply Test
+15 VHC	A1A14P12 pin 5 (fig. FO-14)	+15 V±0.7V	+15 V VHC Supply Test
+15 VLC1	A1A14TP4 (fig. FO-14)	+15 V±0.7V	+15 V VLC1 Supply Test
+15 VLC2	A1A14VR3 pin 3 (fig. FO-13)	+15 V±0.7v	+15 V VLC2 Supply Test
+24 V	A1A14VR1 pin 3 (fig. FO-13)	+24 V±1.5V	+24 V Supply Test
–38 v	A1A14TP6 (fig. FO-14)	-38 V±1.5 V	-38 V Supply Test

   - If voltage is not as specified, proceed with the referenced test provided later in this paragraph.
   - If more than one voltage is not as specified, perform A1A13 Switching Power Supply CCA Test (para 2-12).
4. Verify voltage at A1A14XA13 pin 22 (+) is >-16 Vdc (e. g., –17 V).
   - If incorrect, perform A1A13 Switching Power Supply CCA Test (para 2-12).

2-11. POWER SUPPLY TEST — Continued.

5. Verify voltage at A1A14XA13 pin 26 (+) is >+16 Vdc.
   - If incorrect, perform A1A13 Switching Power Supply CCA Test (para 2-12).
6. Verify fan is operating.
   - If correct, proceed with step 8.
7. Verify voltage at A1A14XA13 pin 21 (+) is 2+26 Vdc.
   - If incorrect, perform A1A13 Switching Power Supply CCA Test (para 2-12).
   - If correct, troubleshoot Al A14VR1/VR2 and associated circuit using figure FO-13, sheet 3. Replace faulty component.
8. Verify A1A14DS3 is lit.
   - If correct, troubleshoot A1A14U4B, A1A14U5C, A1A14U5D, and associated circuit using figure FO-13, sheet 8. Replace faulty component.
   - If incorrect, replace A1A14U10.
9. Remove power and disconnect test equipment.

+5 *VOLT SUPPLY.*

WARNING

Lethal voltages exist on A1A14 Motherboard capacitors, even with power removed. After turning off power, wait 5 minutes for capacitors to discharge before making measurements or otherwise working on circuit under high-voltage cover.

1. Remove cable Cover and High-voltage Cover (para 2-52).
2. Reconnect SG-1206 to line-voltage source, and set POWER key to ON.

WARNING

Lethal currents are present when line voltage is applied and SG-1206 is switched on. Use care to avoid electric shock.

3. Verify voltage between A1A14XA13 pin A (–) and A1A14XA13 pin C (+) (fig. FO-14) is +270 to +390 Vdc.
   - If correct, proceed with step 7.
4. Verify voltage between A1A14T1 pins 1 and 4 is 115 or 230 Vac ± 20%.
   - If correct, troubleshoot A1A14CR39 thru CR42 and associated circuit using figure FO-13, sheet 2. Replace faulty component.

2-11. POWER SUPPLY TEST — +5 VOLT SUPPLY — Continued.

5. Verify voltage between A1A14FL1 pins 3 and 4 is 115 or 230 Vac 120%.
   - If correct, replace A1A14S1 Power Switch (para 2-57).
6. Verify voltage between A1A14FL1 pins 1 and 2 is 115 or 230 Vac +20%.
   - If correct, replace A1A14FL1.
   - If incorrect, troubleshoot A1A14L1, L2, and line voltage module using figure FO-13, sheet 2. Replace faulty component.
7. Verify voltage between A1A14XA13 pin 8 (+) and A1A14XA13 pin 7 (-) is 2+12 Vdc.
   - If correct, proceed with step 9.
8. Verify voltage between A1A14T1 pin 5 and A1A14T1 pin 8 is from 10 to 17 Vat.
   - If correct, troubleshoot Al A14CR6 thru A1A14CR9 and associated circuit using figure FO-13, sheet 8. Replace faulty component.
   - If incorrect, troubleshoot A1A14T1 and associated circuit using figure FO-13, sheet 2. Replace faulty component.
9. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A1 thru A1A8 and A1A10 CCAS (para 2-53).
   - Set POWER key to ON.
   - If front panel POWER indicator remains out, go to step 13.
10. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall Al Al.
    - Set POWER key to ON.
    - If POWER indicator goes out, replace A1A1 GPIB Interface CCA (para 2-53).
11. Repeat step 11 sequentially for A1A2, A1A3, A1A4, A1A6, A1A7, A1A6, and A1A10 CCA'S.
    - If A1A2, A1A3, or A1A10 CCA is faulty, replace CCA (para 2-53).
    - If A1A4 CCA is faulty, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
    - If A1A6 CCA is faulty, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
    - If A1A7 CCA is faulty, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/ATl YIG/isolator Assembly (para 2-69).
    - If A1A8 CCA is faulty, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
12. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A5 CCA.
    - Set POWER key to ON.
    - If POWER indicator goes out, troubleshoot A1A5 CCA +5 V input circuit using figure FO-10. Replace faulty component.

2-11. POWER SUPPLY TEST — +5 VOLT SUPPLY — Continued.

13. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A1 thru A1A10 CCA'S.
   - Remove A2 Front Panel (para 2-58), disconnect cables from A1A14P5, A1A14P6, and A1A14P7, then reinstall front panel.
   - Set POWER key to ON.
   - If A1A14DS1 does not light, perform A1A13 Switching Power Supply CCA Test (para 2-12).
   - Set POWER key to OFF.
   - Remove Front Panel, and reconnect ribbon cables to A1A14P5, A1A14P6 and A1A14P7.
   - Disconnect ribbon cables from A2A11P1, A2A11P2, and A2A11P3 (fig. FO-14).
   - Set POWER key to ON.
   - If A1A14DS1 lights, replace A2A11 Front Panel CCA (para 2-60).
   - If A1A14DS1 does not light, replace A2A12 Microprocessor CCA (para 2-61).
14. Remove power and disconnect test equipment.

-5 VOLT SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect cable from A1A14P14 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. On SG-1206, verify voltage at A1A14P24 pin 1 is -5 Vdc ± 0.7 Vdc.
   - If incorrect, troubleshoot A4VR2 (fig. FO-20) and associated circuit using figure FO-13, sheet 4. Replace faulty component.
   - If correct, locate source of loading using figure FO-14. If source cannot be located, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/Ul YIG/Modulator Assembly (para 2-70).
3. Remove power, and disconnect test equipment.

-15 VOLT VHC SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6, A1A7, A1A8, and A1A10 CCAS (para 2-53).
   - Disconnect cables from Al A14P12, P13, P14, and P17 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at Al A14P12 pin 3 is -15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A4VR4 (fig. FO-20) and associated circuit using figure FO-13, sheet 4. Replace faulty component.

2-11. POWER SUPPLY TEST — -75 VOLT VHC SUPPLY — Continued.

3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.
4. Verify voltage at A1A14P12 pin 3 is -15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Reconnect Cable to Connector	Replace
A1A6	Cable 17 to A1 A14P14	A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
None	Cable 1 to A1 A14P12	A4A1 Down Converter Assembly (para 2-66).
A1A7	Cable 16 to A1 A14P13	A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
A1A8	Cable 14 to A1A14P17	A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
A1A1O	N/A	A1A10 FM/Attenuator CCA (para 2-53).

5. Remove power, and disconnect test equipment.

-15 VOLT VLC1 SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A2, A1A3, A1A4, and A1A5 CCAS (para 2-53).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14TP5 (fig. FO-14) is -15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A1A14VR6 and associated circuit using figure FO-13, sheet 4. Replace faulty component.
3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — -15 VOLT VLC1 SUPPLY — Continued.

4. Verify voltage at A1A14TP5 is -15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Replace/Troubleshoot
A1A2	Replace A1A2 Ramp generator CCA (para 2-53).
A1A3	Replace A1A3 Markers Generator CCA (para 2-53).
A1A4	Replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
A1A5	Troubleshoot -15 V circuit using FO-10, sheet 2. Replace faulty component.

5. Remove power, and disconnect test equipment.

-15 VOLT VLC2 SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6, A1A7, A1A8, and A1A10 CCAS (para 2-53).
   - Disconnect cables from A1A14P13, P14, and P17 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14VR4 pin 3 is -15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A1A14VR4 and associated circuit using figure FO-13, sheet 4. Replace faulty component.
3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — -15 VOLT VLC2 SUPPLY — Continued.

4. Verify voltage at A1A14VR4 pin 3 is -15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Reconnect Cable to Connector	Replace
A1A6	Cable 17 to A1A14P14	A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
A1A7	Cable 16 to A1A14P13	A1A7 YIG Driver CCA (para 2-53), A4A3C11-3. Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
A1A8	Cable 14 to A1A14P17	A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
A1A10	N/A	A1A10 FM/Attenuator CCA (para 2-53).

5. Remove power, and disconnect test equipment.

+15 VOLT VHC SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6, A1A7, A1A8, and A1A10 CCAS (para 2-53).
   - Disconnect cables from A1A14P12, P13, P14, and P17 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14P12 pin 5 is +15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A4VR3 (fig. FO-20) and associated circuit using figure FO-13, sheet 4. Replace faulty component.
3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — +15 VOLT VHC SUPPLY — Continued.

4. Verify voltage at A1A14P12 pin 5 is +15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Reconnect Cable to Connector	Replace
A1A6	Cable 17 to A1 A14P14	A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
None	Cable 1 to A1A14P12	A4A1 Down Converter Assembly (para 2-66).
A1A7	Cable 16 to A1A14P13	A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
A1A8	Cable 14 to A1A14P17	A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
A1A10	N/A	A1A10 FM/Attenuator CCA (para 2-53).

5. Remove power, and disconnect test equipment.

+15 VOLT VLC1 SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A2, A1A3, A1A4, and A1A5 CCAS (para 2-53).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14TP4 (fig. FO-14) is +15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A1A14VR5 and associated circuit using figure FO-13, sheet 4. Replace faulty component.
3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — +15 VOLT VLC1 SUPPLY — Continued.

4. Verify voltage at A1A14TP4 is +15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Replace/Troubleshoot
A1A2	Replace A1A2 Ramp generator CCA (para 2-53).
A1A3	Replace A1A3 Markers Generator CCA (para 2-53).
A1A4	Replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-66).
A1A5	Troubleshoot +15 V circuit using FO-10, sheet 2. Replace faulty component

5. Remove power, and disconnect test equipment.

+15 VOLT VLC2 SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6, A1A7, A1A8, and A1A10 CCAS (para 2-53).
   - Disconnect cables from A1A14P13, P14, and P17 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14VR3 pin 3 is +15 Vdc ±0.7 Vdc.
   - If incorrect, troubleshoot A1A14VR3 and associated circuit using figure FO-13, sheet 4. Replace faulty component.
3. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — +15 VOLT VLC2 SUPPLY — Continued.

4. Verify voltage at A1A14VR3 pin 3 is +15 Vdc ±0.7 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Reconnect Cable to Connector	Replace
A1A6	Cable 17 to A1A14P14	A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
A1A7	Cable 16 to A1A14P13	A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
A1A8	Cable 14 to A1A14P17	A1A8 YIG Driver CCA (para 2-53), A4A2QI-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
A1A10	N/A	A1A10 FM/Attenuator CCA (para 2-53).

5. Remove power, and disconnect test equipment.

+24 VOLT SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A10 CCA (para 2-53).
   - Disconnect cables from A1A14P12, P31, and P49 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14VR1 pin 3 is +24 Vdc ±1.5 Vdc, and voltage at A1A14VR2 pin 3 is +24 Vdc ±1.5 Vdc.
   - If correct, proceed with step 4.
3. Verify voltage at A1A14XA13 pin 21 (fig. FO-14) is ≥ +26 Vdc.
   - If incorrect, perform A1A13 Switching Power Supply CCA Test (para 2-12).
   - If incorrect, troubleshoot Al A14VR1/VR2 and associated circuitry using figure FO-13, sheet 3. Replace faulty component.
4. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — +24 VOLT SUPPLY — Continued.

5. Verify voltage at A1A14VR1 pin 3 is +24 Vdc ±1.5 Vdc.
   - If voltage is as specified, repeat step 4 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

Install CCA	Reconnect Cable to Connector	Replace
A1A10	N/A	A1A10 FM/Attenuator CCA (para 2-53).
None	Cable 11 to A1A14P31	A4AT1 Step Attenuator (para 2-71).
None	Cable 8 to A1A14P49	A3B1 Fan Assembly (para 2-64).
None	Cable 1 to Al A14P12	A4A1 Down Converter Assembly (para 2-66).

6. Remove power, and disconnect test equipment.

-38 VOLT SUPPLY.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6, A1A7, and A1A8 CCAS (para 2-53).
   - Disconnect cables from A1A14P13, P14, and P17 (fig. FO-14).
   - Set POWER key to ON (disregard error).
2. Verify voltage at A1A14TP6 is –38 Vdc ±1.5 Vdc.
   - If correct, proceed with step 4.
3. Verify voltage between A1A14XA13 pin 28 (+) and pin 25 (–) is >–41 Vdc (e.g. –42 V).
   - If correct, troubleshoot A4VR1, A1A14Q1 thru Q3 and associated circuit using figure FO-13, sheet 3. Replace faulty component.
   - If incorrect, perform A1A13 Switching Power Supply CCA Test (para 2-12).
4. On the SG-1206,
   - Set POWER key to OFF.
   - Install the CCA as instructed in the table below.
   - Reconnect the cable as instructed in the table below.
   - Set POWER key to ON.

2-11. POWER SUPPLY TEST — -38 VOLT SUPPLY — Continued.

5. Verify voltage at A1A14TP6 is -38 Vdc ±1.5 Vdc.
   - If voltage is as specified, repeat step 3 installing the next CCA/cable.
   - If voltage is not as specified, replace faulty components and assemblies as instructed.

install CCA	Reconnect Cable to Connector	Replace
A1A6	Cable 17 to A1A14P14	A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
A1A7	Cable 16 to A1A14P13	A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
A1A8	Cable 14 to A1A14P17	A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).

6. Remove power, and disconnect test equipment.

2-12. A1A13 SWITCHING POWER SUPPLY CCA TEST.

DESCRIPTION

This test is used to isolate malfunctions in the A1A13 CCA to the malfunctioning component.

WARNING

After pressing POWER key to OFF in following step, wait at least 5 minutes for capacitor voltages to decay to a safe level.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- Schematic voltages are nominal values, except for those shown at the output of the regulated supplies.

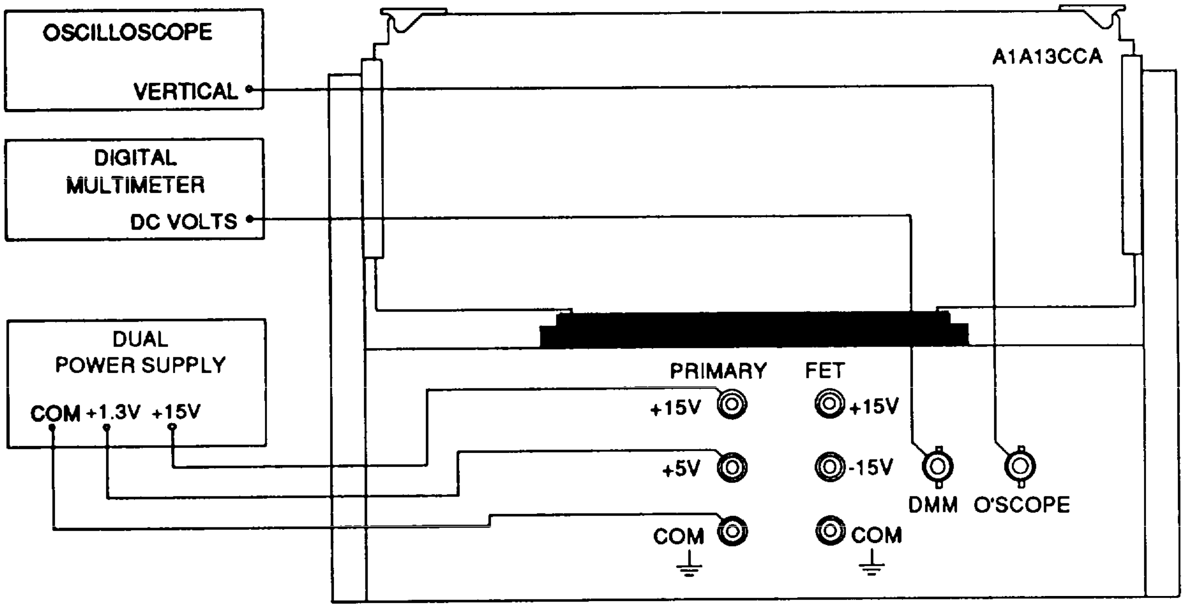
PRELIMINARY SETUP.

1. On the SG-1206,
   - Set POWER key to OFF.
   - Remove A1A13 CCA (para 2-55).
   - Remove A1A13 Heat Sink Plate (para 2-56).
2. Turn on Dual and Single Power Supplies and adjust voltages as follows:
   - Dual Power Supply Output #1 to +1.3 Vdc.
   - Dual Power Supply Output #2 to +15 Vdc.
   - Single Power Supply Output #3 to -15 Vdc.
3. Turn all Power Supplies to off.
4. Connect test equipment as shown.

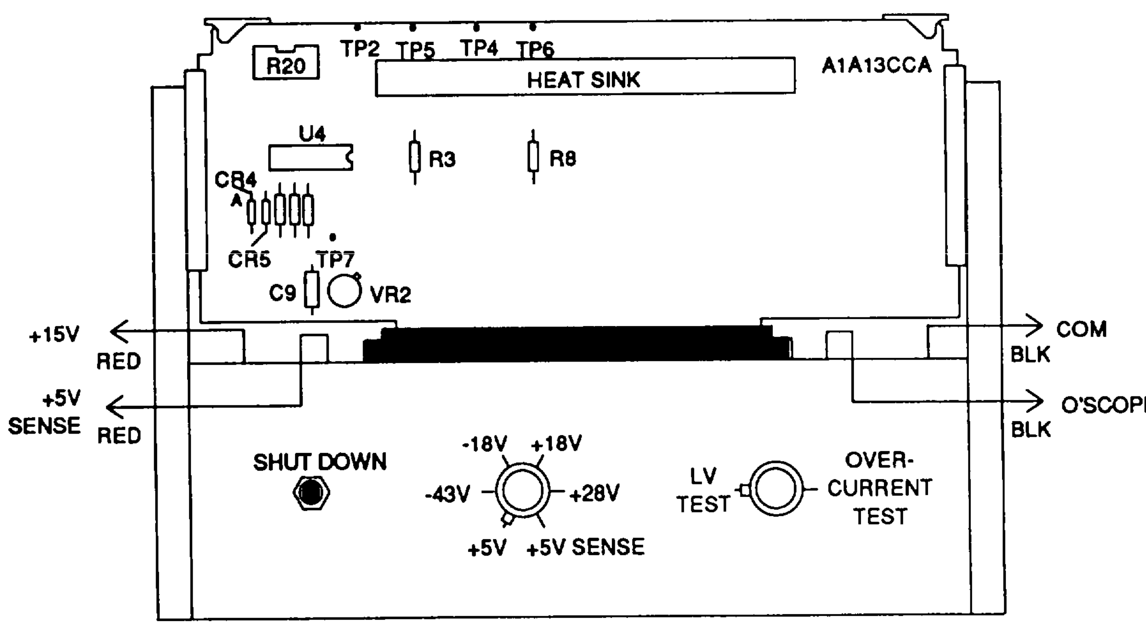
OVERCURRENT.

1. Position OVERCURRENT TEST/LV TEST switch to OVERCURRENT TEST.
2. Connect test fixture as follows:
   - +15 V test lead to Al A13TP5.
   - COM test lead to top of A1A13R3.
3. Turn Dual Power Supply to on and verify Digital Multimeter reads <+1 V.
   - If incorrect, replace A1A13U2 (fig. FO-13).
4. Turn Dual Power Supply to off.

2-12. A1A13 SWITCHING POWER SUPPLY CCA TEST- OVERCURRENT-CONTINUED



TEST FIXTURE - REAR



TEST FIXTURE - FRONT

NOTE

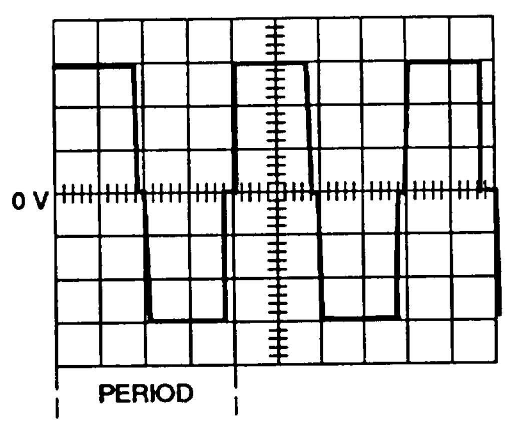
Preface Reference Designators with A1A13.

2-12. A1A13 SWITCHING POWER SUPPLY CCA TEST — OVERCURRENT — Continued.

5. Connect COM lead to A1A13TP6.
6. Turn Dual Power Supply to on and verify Digital Multimeter reads >+10 V (fluctuating voltage is normal).
   - If incorrect, replace A1A13U1 and A1A13U2.
7. Turn Dual Power Supply to off.
8. Connect test fixture +15 V test lead to top of A1A13R8.
9. Turn Dual Power Supply to on and verify Digital Multimeter reads c+l V.
   - If incorrect, replace A1A13U1.
10. Turn Dual Power Supply to off.
11. Position OVERCURRENT TEST/LV TEST switch to LV TEST.
12. Disconnect test fixture +15 V and CO Mtest leads.

LOW VOLTAGE (L V).

1. On the test fixture,
   - Connect jumper between +15V PRIMARY and +15V FET terminals.
   - Connect –15 V terminal to Single Power Supply output.
   - Connect O'SCOPE test lead to A1A13TP4 and +5 V SENSE test lead to A1A13TP7.
2. Turn both Power Supplies to on and verify that +20 V supply draws less than 0.3 A, and that –20 V supply draws less than 0.1 A.
   - If incorrect, proceed with Shorts Test later in this paragraph.
3. Adjust Oscilloscope controls as follows:
   - Horizontal controls to 5 ~sec/Div.
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
4. Verify displayed waveform is as shown.
   - If period is not 20 ps, adjust A1A13R20.
   - If the waveform does not resemble that shown, or if period cannot be adjusted to 20 KS, proceed with Switching Current Test later in this paragraph.



5. Rotate test fixture VOLTAGE SELECT switch to +5 V SENSE position.
6. Increase Dual Power Supply #1 output to +4.5 V as displayed on Multi meter and verify that waveform disappears.
   - If incorrect, replace A1A13U4.
7. Adjust Dual Power Supply #1 output to O V. Turn both Power Supplies to off.
8. Connect test fixture +5 V SENSE test lead to A1A13TP2.
9. Turn both Power Supplies to on.

2-12. A1A13 *SWITCHING POWER SUPPLY CCA TEST — LOW VOLTAGE (L V) — Continued.*

10. Slowly increase Dual Power Supply #1 output until waveform at A1A13TP4 disappears.
    - If waveform does not disappear between +4.9 V and +5.3 V as displayed on Multimeter, proceed with Reference Voltage Test later in this paragraph.
11. Decrease Dual Power Supply #1 output to +1.3 V.
12. Momentarily press SHUT DOWN button and verify that waveform disappears.
    - If incorrect, replace A1A13U5.
13. Rotate VOLTAGE SELECT knob to each voltage position shown in table below. Verify that Nominal Output Voltage is correct for each, as shown on Digital Multi meter.

Test Fixture Voltage Settings	Nominal Output Voltage
+5 v	+0.2 to + 1.2V
-43 v	–6.9 to –7.9V
-18V	–2.3 to –3.3 V
+18V	+2.3 to +3.3 V
+28 V	+4.1 to +5.1 V

- If all voltages are out of tolerance, replace A1A13T3.
- If +5 V setting is out of tolerance, troubleshoot components that connect between +5 V secondary on A1A13T3 (pins 3, 5) and edge connector A1A13P1, pins 16, T, 17, U; and 11, M, 12, N (fig. FO-13, sheet 7).
- If -43 V setting is out of tolerance, troubleshoot components that connect between 43 V secondary on A1A13T3 (pins 15, 17) and edge connector A1A13P1, pins 28 and F (fig. FO-13, sheet 7).
- If -18 V setting is out of tolerance, troubleshoot components that connect between 18 V secondary on A1A13T3 (pins 12, 13) and edge connector A1A13P1, pins 19, W, 22, Z, 23, A (fig. FO-13, sheet 7).
- If +18 V setting is out of tolerance, troubleshoot components that connect between +18 V secondary on A1A13T3 (pins 13, 14) and edge connector A1A13P1, pins 26, D (fig. FO-13, sheet 7).

NOTE

The following components are common to both -18 V and +18 V circuits: CR20-CR23, R62, C37, and R63.

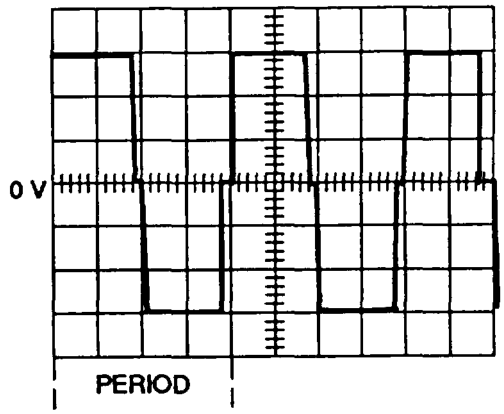
- If +28 V setting is out of tolerance, troubleshoot components that connect between +28 V secondary on A1A13T3 (pins 6- 8) and edge connector A1A13P1, pins 21, Y (fig. FO-13, sheet 7).
- If all voltage settings are within tolerance, A1A13 CCA is functioning properly.

CAUTION

Before replacing or reinstalling A1A13 CCA, check that voltage at A1A14XA13 pin A (-) and A1A14XA13 pin C(+) (fig, FO-14) is +330 V ±60 V, and that voltage at A1A14XA13 pin 8 (+) and A1A14XA13 pin 7 (-) is greater than +12 V. If either voltage is incorrect, proceed with Power Supply Test procedure (para 2-11) – +5 V Test.

2-12. A1A13 SWITCHING *POWER SUPPLY CCA TEST — SHORTS.*

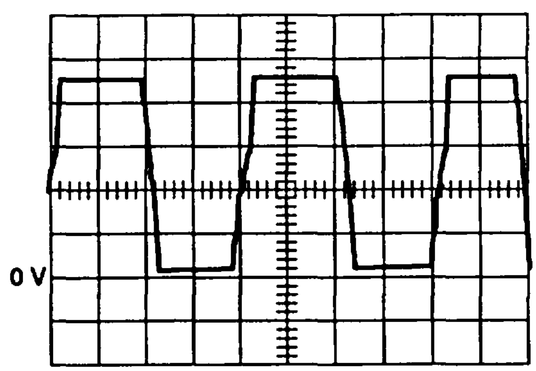
1. Adjust Oscilloscope controls as follows:
   - Horizontal controls to 5 µsec/Div.
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
2. Verify displayed waveform is as shown.
   - If positive half of waveform is missing, replace A1A13Q6.
   - If negative half of waveform is missing, replace A1A13Q7.
   - If waveform appears to be correct, troubleshoot components that connect between A1A13P1 pin 3 and A1A13Q6 and between A1A13P1 pin 1 and A1A13Q7 (fig. FO-13).



3. Turn both Power Supplies to off.
4. Connect test fixture +5 V SENSE test lead to A1A13TP2.
5. Turn both Power Supplies to on, and proceed with Low Voltage (LV) Test, step 13 earlier in this paragraph.

SWITCHING CIRCUIT.

1. Turn both Power Supplies to off.
2. Connect O'SCOPE lead to anode of A1A13CR4, then A1A13CR5.
3. Adjust Oscilloscope controls as follows:
   - Horizontal controls to 5 µsec/Div.
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
4. Turn both Power Supplies to on and verify displayed waveform is as shown.
   - If correct, replace A1A13Q6 and A1A13Q7.
5. Turn both Power Supplies to off.
6. Connect O'SCOPE lead to A1A13U4 pin 8, then A1A13U4 pin 11.
7. Turn both Power Supplies to on and verify displayed waveform is as shown.
   - If correct, troubleshoot A1A13Q4, A1A13Q5, and associated circuit (fig. FO-13, sheet 6).
   - If waveform at either or both A1A13U4 pins does not resemble that shown below, replace A1A13U4.



8. Turn both Power Supplies to off.
9. Connect test fixture +5 V SENSE test lead to A1A13TP2.
10. Turn both Power Supplies to on, and proceed with Low Voltage (LV) Test, step 13 earlier in this paragraph.

2-12. A1A13 SWITCHING *POWER SUPPLY CCA TEST — REFERENCE VOLTAGE.*

REFERENCE VOLTAGE TEST.

1. Turn both Power Supplies to off.
2. Disconnect Digital Multi meter from test fixture, and reconnect test leads between the top of A1A13C9 (+) and A1A13P1 pin 13 (-).
3. Turn both Power Supplies to on and verify Digital Multi meter reads +10 V **0.2* V.
   - If incorrect, replace A1A13VR2 (fig. FO-13).
   - If correct, replace A1A13U3.
4. Turn both Power Supplies to off.
5. Connect Digital Meter to test fixture DMM connector.
6. Connect test fixture +5 V SENSE test lead to A1A13TP2.
7. Turn both Power Supplies to on, and proceed with Low Voltage (LV) Test, step 13 earlier in this paragraph.

2-13. FREQUENCY BAND ERROR TEST.

DESCRIPTION

This test is used to isolate band related frequency problems in the Sweep Generator to the malfunctioning component or assembly.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-14) unless otherwise specified.

DOWN CONVERTER BAND.

1. On the *SG-1206,*
   - Set POWER key to OFF.
   - Remove A1A6 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CWCF key and set to 1.000 GHz.
2. Verify level at A1A6P1 pin H (fig. FO-11) is TTL high.
   - If incorrect, replace A1A14U8 (fig. FO-15).
3. Verify voltage at A1A6P1 pin 16 is +0.5 Vdc ±0.1 Vdc.
   - If correct, proceed with step 5.

2-13. FREQUENCY BAND ERROR TEST — DOWN CONVERTER BAND — Continued.

4. Verify voltage at A1A6P1 pin 12 is +10 Vdc ±0.01 Vdc.
   - If correct, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
5. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A6 CCA.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON *(DO NOT PRESS RESET).*
6. Verify voltage at A1A5P1 pin S (fig. FO-10) is +10 Vdc ±0.01 Vdc.
   - If incorrect, troubleshoot A1A5U30/Q3 and associated circuit using figure FO-10, sheet 2. Replace faulty component.
7. Verify voltage at A1A5P1 pin Ã is +0.5 Vdc ±0.1 Vdc.
   - If incorrect, troubleshoot A1A5U9 thru U12 and associated circuit using figure FO-10, sheet 4. Replace faulty component.
8. Verify level at A1A5U18 pin 15 is TTL low.
   - If incorrect, replace A1A5U18.
   - If correct, replace A1A5U26.
9. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
10. Remove power, and disconnect test equipment.

S/C-BAND.

1. On the SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW CF key and set to 5.000 GHz.
2. Verify level at A1A6P1 pin E (fig. FO-11) is TTL high.
   - If correct, proceed with step 4.
3. Verify level at A1A6P1 pin D is TTL high.
   - If incorrect, replace A1A14U7 (fig. FO-15).
4. Verify voltage at A1A6P1 pin 19 is +2.5 Vdc ±0.1 Vdc.
   - If incorrect, troubleshoot A1A5U9 thru U12 and associated circuit using figure FO-10, sheet 4. Replace faulty component.

2-13. FREQUENCY BAND ERROR TEST — S/C-BAND — Continued.

5. Verify voltage at A1A6P1 pin 16 is +2.5 Vdc ±0.1 Vdc.
   - If correct, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
6. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A6 CCA.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
7. Verify level at A1A5U18 pin 15 (fig. FO-10) is TTL low.
   - If incorrect, replace A1A5U18.
   - If correct, replace A1A5U26,
8. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
9. Remove power, and disconnect test equipment.

X-BAND.

1. On the SG-1206,
   - Set POWER key to OFF.
   - Remove A1A7 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CWCF key.
2. Verify level at A1A7P1 pin E (fig. FO-11) is TTL high.
   - If correct, proceed with step 4.
3. Verify level at A1A7P1 pin D is TTL high.
   - If incorrect, replace A1A14U7 (fig. FO-15).
4. Verify voltage at A1A7P1 pin 19 is +5 Vdc ±0.1 Vdc.
   - If incorrect, troubleshoot A1A5U9 thru U12 and associated circuit using figure FO-10, sheet 4. Replace faulty component.
5. Verify voltage at A1A7P1 pin 16 is +5 Vdc ±0.1 Vdc.
   - If correct, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
6. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A7 CCA.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).

2-13. FREQUENCY BAND ERROR TEST — X-BAND — Continued.

7. Verify level at A1A5U18 pin 15 (fig. FO-10) is TTL low.
   - If incorrect, replace A1A5U18.
   - If correct, replace A1A5U26.
8. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
9. Remove power, and disconnect test equipment.

Ku-BAND.

1. On the SG-1206,
   - Set POWER key to OFF.
   - Remove A1A8 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW CF key and set to 15.000 GHz.
2. Verify level at A1A8P1 pin E (fig. FO-11) is TTL high.
   - If correct, proceed with step 4.
3. Verify level at A1A8P1 pin D is TTL high.
   - If incorrect, replace A1A14U7 (fig. FO-15).
4. Verify voltage at A1A8P1 pin 19 is +7.5 Vdc ±0.25 Vdc.
   - If incorrect, troubleshoot A1A5U9 thru U12 and associated circuit using figure FO-10, sheet 4. Replace faulty component.
5. Verify voltage at A1A8P1 pin 16 is +7.5 Vdc ±0.25 Vdc.
   - If correct, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
6. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A8 CCA.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
7. Verify level at A1A5U18 pin 15 (fig. FO-10) is TTL low.
   - If incorrect, replace A1A5U18.
   - If correct, replace A1A5U26.
8. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
9. Remove power, and disconnect test equipment.

2-14. FREQUENCY ERROR TEST.

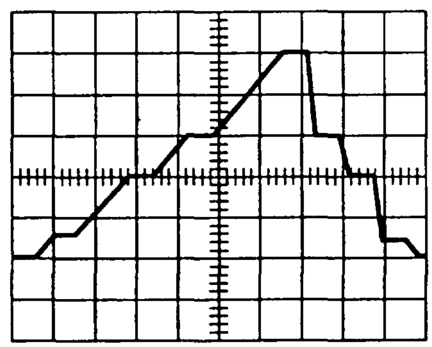
DESCRIPTION

This test is used to isolate 0.01 to 20 GHz frequency generation and control circuitry malfunctions in the in the A1A5 CCA to the malfunctioning component.

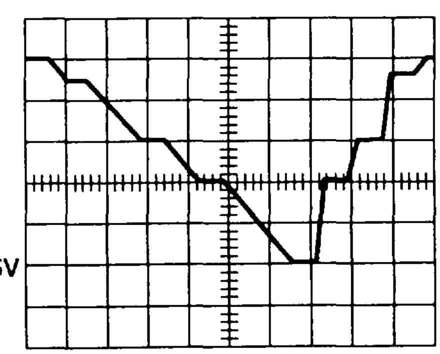
NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A5TP11 (fig. FO-10) unless otherwise specified.

1. On the SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
2. Connect Oscilloscope to A1A5P1 pin W (fig. FO-10).
3. Set Oscilloscope controls as follows:
   - Horizontal controls to 10 msec/Div.
   - Vertical controls to 2 V/Div.
   - Coupling to DC.
   - 0 Volt reference as shown.



4. Verify waveform is as shown.
   - If correct, troubleshoot A1A5U1 and associated components using figure FO-10, sheet 2. Replace faulty components or assemblies.
5. Connect Oscilloscope input to A1A5TP7 and verify waveform is as shown in step 3, except from –5 v to +5 v.
   - If correct, troubleshoot A1A5U23, A1A5U25, A1A5U26, and associated components using figure FO-10, sheet 6. Replace faulty components or assemblies.
6. Connect Oscilloscope input to A1A5TP6 and verify waveform is as shown in step 3, except from–5 V to +5 v.
   - If correct, troubleshoot A1A5U19, A1A5U22, and associated components using figure FO-10, sheet 3. Replace faulty components.
7. Connect Oscilloscope input to A1A5TP5 and verify waveform is as shown.
   - If correct, troubleshoot A1A5U16, A1A5U17, and associated components using figure FO-10, sheet 3. Replace faulty components.



2-14. FREQUENCY ERROR TEST — Continued.

8. Connect Oscilloscope input to A1A5P1 pin 16 and verify waveform is as shown in step 3.
   - If correct, troubleshoot A1A5U13, A1A5U14, A1A5U5, and associated components using figure FO-10, sheet 2. Replace faulty components or assemblies.
   - If incorrect, replace A1A2 Ramp Generator CCA (para 2-53).
9. On the SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
10. Remove power, and disconnect test equipment.

2-15. POWER LEVELING ERROR TEST.

DESCRIPTION

This test is used to isolate a power leveling problems in the Sweep Generator to the malfunctioning component or assembly.

CAUTION

Do not twist, bend, or otherwise damage semi-rigid cable in following procedure.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-15) unless otherwise specified.

Leveling problems are usually confined to one of the four frequency bands.

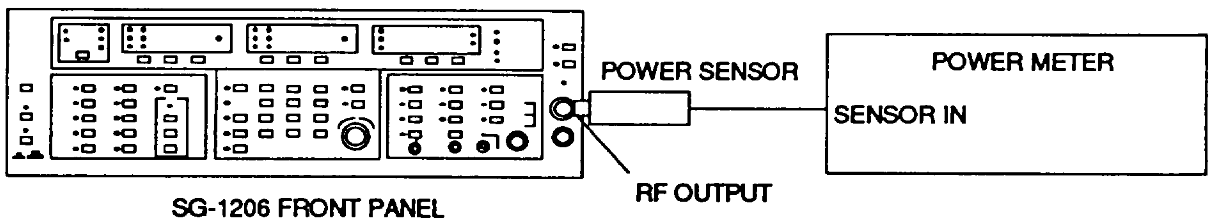
- If the malfunctioning band is known, perform Power Leveling Error Test Setup below, then proceed to the individual procedure provided in this paragraph.
- If the malfunctioning band is unknown, perform the Maximum Output Power and Power Level Accuracy performance test (para 2-32) and record the frequencies that failed. Use the following information to determine which test to perform.

  Failure occurred from 0.010 GHz to 20 GHz - Replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
  Failure occurred from 0.010 GHz to 2 GHz - Perform Down Converter Band Test.
  Failure occurred from 2 GHz to 8 GHz - Perform S/C-Band Test.
  Failure occurred from 8 GHz to 12.4 GHz - Perform X-Band Test.
  Failure occurred from 12.4 GHz to 20 GHz – Perform Ku-Band Test.

  Perform Preliminary Setup, then proceed to individual procedure provided in this paragraph.

2-15. POWER LEVELING ERROR TEST — PRELIMINARY SETUP.

1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. On SG-1206,
   - Set POWER to ON.
   - Press RESET key.
   - Press F1-F2 key.

DOWN CONVERTER BAND.

1. On SG-1206,
   - Press F1 key and set to0.010GHz.
   - Press F2 key and set to 2.000 GHz.
   - Press MANUAL SWEEP key.
   - Rotate MANUAL SWEEP control fully CCW.
2. Set Power Meter CAL FACTOR to average of Power Sensor's 10 MHz to 2 GHz setting.
3. On SG-1206, SLOWLY rotate MANUAL SWEEP control CW, and verify Power Meter reads from +5.5 to +8.5 dBm.
   - If correct, and ERROR code 15 is displayed, replace A1A4 ALC CCA (para 2-53) and A4DCI Directional Coupler (para 2-71).
4. Verify voltage at A1A14P12 pin 5 (fig. FO-14) is +15 Vdc ± 1 V.
   - If incorrect, perform Power Supply Test procedure– +15 VHC Supply (para 2-11).
5. Verify voltage at A1A14P12 pin 3 is -15 Vdc ±1 V.
   - If incorrect, perform Power Supply Test procedure--15 VHC Supply (para 2-11).
6. On SG-1206,
   - Set POWER key to OFF.
   - Remove RF Deck Assembly Cover (para 2-65).
   - Remove A4W3 from between A4S1J6 and A4A1 RF INPUT (fig. FO-5) and connect Power Sensor to A4S1J6.
   - Set POWER key to ON (DO NOT PRESS RESET Disregard Error and UNLEVELED indicator.

2-15. POWER LEVELING ERROR TEST — DOWN CONVERTER BAND — Continued.

7. On SG-1206, rotate MANUAL SWEEP control fully CCW, then SLOWLY rotate CW and verify the Power Meter reads >+11 dBm.

NOTE

Disregard readings if UNLEVELED indicator is OFF (towards CW limit).

- If correct, proceed to step 11.

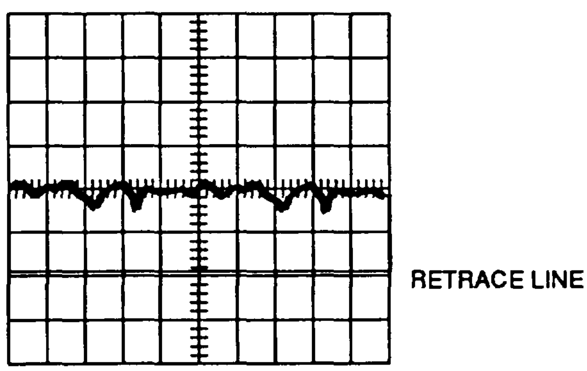
8. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A6 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key to ON.

9. Set Oscilloscope coupling for DC, and verify voltage at A1A14P15 pin 2 is –3 Vdc ±1.5 Vdc.
   - If incorrect, replace A4S1 PIN Switch Assembly (para 2-72).

10. Connect Oscilloscope probe to A1A6P1 pin 2 (fig. FO-11) and ground to A1A6TP1. Set horizontal controls to 10 msec/Div. Verify waveform is displayed that is TTL low for ≈ 50 msec.
    - If incorrect, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
    - If correct, troubleshoot A1A14Q5, A1A14Q8, A1A14Q9, and associated components using figure FO-20, sheet 5. Replace faulty component.

11. On SG-1206,
    - Set POWER key to OFF.
    - Disconnect Power Sensor from A4S1J6
    - Reinstall A4W3 and torque connectors to 8 inch-pounds.
    - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
    - Set POWER key to ON (DO NOT PRESS RESET).
    - Press AUTO key.

12. Connect Oscilloscope horizontal (X) input to SG - 1206 HORZ output connector, and vertical (Y) to A1A4P1 pin S (probe) (fig. FO-9) and A1A4TP2 (ground). Set Oscilloscope controls as follows:
    - Mode to X:Y.
    - Vertical controls to 5 V/Div.
    - Coupling to AC.
    - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).



13. Verify waveform is as shown.
    - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
    - If incorrect (missing), replace A4A1 Down Converter (para 2-66).

2-15. POWER LEVELING ERROR TEST — DOWN CONVERTER BAND — Continued.

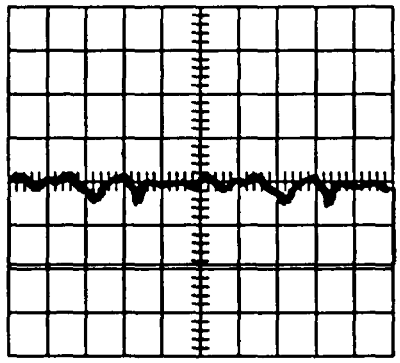
14. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A6 CCA and/or A1A4 CCA.
    - Reinstall RF Deck Assembly Cover.
15. Remove power, and disconnect test equipment.

S/C-BAND.

1. On SG-1206,
    - Press F1 key and set to 2.000 GHz.
    - Press F2 key and set to 8.000 GHz.
    - Press MANUAL SWEEP key.
    - Rotate MANUAL SWEEP control fully CCW.
2. Set Power Meter CAL FACTOR to average of Power Sensor's 2 GHz to 8 GHz setting.
3. On SG-1206, SLOWLY rotate MANUAL SWEEP control CW, and verify Power Meter reads from +5.5 to +8.5 dBm.
    - If correct, and ERROR code 16 is displayed, replace A1A4 ALCCCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
4. On SG-1206,
    - Set POWER key to OFF.
    - Remove A1A6 CCA (para 2-53) and reinstall on CCA extender.
    - Set POWER key to ON (DO NOT PRESS RESET).
5. Verify voltage at A1A6P1 pin R (fig. FO-11) is +15 Vdc ±1 V.
    - If incorrect, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
6. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A6 CCA.
    - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
    - Set POWER key to ON (DO NOT PRESS RESET).
    - Press AUTO key.
7. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A4P1 pin S (probe) (fig. FO-9) and A1A4TP2 (ground). Set Oscilloscope controls as follows:
    - Mode to X:Y.
    - Vertical controls to 5 V/Div.
    - Coupling to AC.
    - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).

2-15. POWER LEVELING ERROR TEST — S/C-BAND — Continued.

8. Verify waveform is as shown.
   - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).



9. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
   - Remove RF Deck Assembly Cover (para 2-65).
   - Remove A4W2 from between A4A4U1 and A4S1J2 (fig. FO-5) and connect Power Sensor to A4A4U1 'RF OUTPUT.
   - Set POWER key to ON (DO NOT PRESS RESET). Disregard Error and UNLEVELED indicator.
   - Press MANUAL SWEEP key.
10. On SG-1206, rotate MANUAL SWEEP control fully CCW, then SLOWLY rotate CW and verify the Power Meter reads >+13 dBm.

NOTE

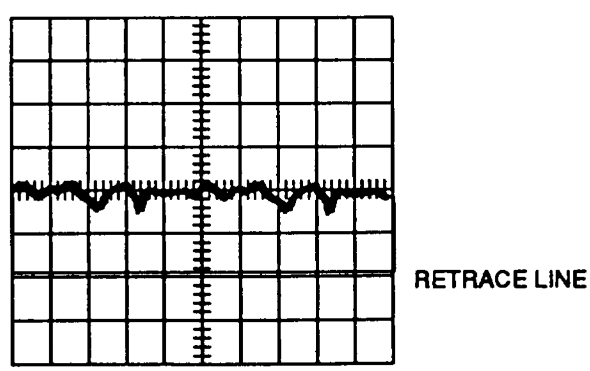
Disregard readings if UNLEVELED indicator is OFF (towards CW limit).

   - If incorrect, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
11. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect Power Sensor from A4A4U1.
   - Reinstall A4W2 and torque connectors to 8 inch-pounds.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key.
12. Set Oscilloscope coupling for DC, and verify voltage at A1A14P15 pin 3 (fig. FO-14) is -3 Vdc ±1.5 Vdc.
   - If correct, replace A4S1 PIN Switch Assembly (para 2-72).
   - If incorrect, troubleshoot A1A14Q6, A1A14Q10, A1A14Q11, and associated components using figure FO-20, sheet 5. Replace faulty component.
13. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall RF Deck Assembly Cover.

14, Remove power, and disconnect test equipment.

2-15. POWER LEVELING ERROR TEST — X-BAND.

1. On SG-1206,
   - Press F1 key and set to 8.000 GHz.
   - Press F2 key and set to 12.400 GHz.
   - Press MANUAL SWEEP key.
   - Rotate MANUAL SWEEP control fully CCW.
2. Set Power Meter CAL FACTOR to average of Power Sensor's 8 GHz to 12.4 GHz setting.
3. On SG-1206, SLOWLY rotate MANUAL SWEEP control CW, and verify Power Meter reads between +5.5 to +8.5 dBm.
   - If correct, and ERROR code 17 is displayed, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
4. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A7 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
5. Verify voltage at A1A7P1 pin R (fig. FO-11) is + 15 Vdc ±1 V.
   - If incorrect, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
6. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A7 CCA.
   - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key.
7. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A4P1 pin S (probe) (fig. FO-9) and A1A4TP2 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 5 V/ Div.
   - Coupling to AC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
8. Verify waveform is as shown.
   - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).



2-15. POWER LEVELING ERROR TEST — X-BAND — Continued.

9. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
   - Remove RF Deck Assembly Cover (para 2-65).
   - Remove A4W1 from between A4A3AT1 and A4S1J3 (fig. FO-5) and connect Power Sensor to A4A3AT1 RF OUTPUT.
   - Set POWER key to ON (DO NOT PRESS RESET). Disregard Error and UNLEVELED indicator.
   - Press MANUAL SWEEP key.
10. On SG-1206, rotate MANUAL SWEEP control fully CCW, then SLOWLY rotate CW and verify the Power Meter reads >+15 dBm.

NOTE

Disregard readings if UNLEVELED indicator is OFF (towards CW limit).

   - If incorrect, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
11. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect Power Sensor from A4A3AT1.
   - Reinstall A4W1 and torque connectors to 8 inch-pounds.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key.
12. Set Oscilloscope coupling for DC, and verify voltage at A1A14P15 pin 4 (fig. FO-14) is -3 Vdc ±1.5 Vdc.
   - If incorrect, proceed with step 15.
13. Connect Oscilloscope vertical (Y) to A1A14P15 pin 8. Set Oscilloscope controls as follows:
   - Vertical controls to 0.1 V/Div.
   - Coupling to AC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
14. Verify displayed waveform is leveled across entire trace (similar to the waveform shown in step 8, except retrace is on top).
   - If incorrect, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
   - If correct, replace A4S1 PIN Switch Assembly (para 2-72).
15. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A7 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).

2-15. POWER LEVELING ERROR TEST — X-BAND — Continued.

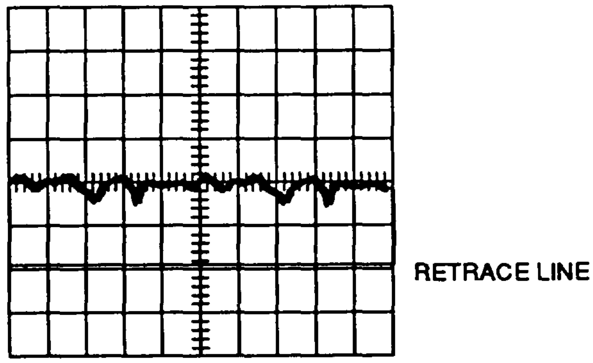
16. Connect Oscilloscope input to A1A7P1 pin A. Set horizontal controls to 10 msec/Div. Verify waveform is displayed that is TTL low for ≈ 50 msec.
   - If incorrect, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/AT1 YIG/isolator Assembly (para 2-69).
   - If correct, troubleshoot A1A14Q7, A1A14Q12, A1A14Q13, and associated components using figure FO-20, sheet 4. Replace faulty component.
17. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A7 CCA.
   - Reinstall RF Deck Assembly Cover.
18. Remove power, and disconnect test equipment.

Ku-BAND TEST.

1. On SG-1206,
   - Press F1 key and set to 12.400 GHz.
   - Press F2 key and set to 20.000 GHz.
   - Press MANUAL SWEEP key.
   - Rotate MANUAL SWEEP control fully CCW.
2. Set Power Meter CAL FACTOR to average of Power Sensor's 12.4 GHz to 20.0 GHz setting.
3. On SG-1206, SLOWLY rotate MANUAL SWEEP control CW, and verify Power Meter reads from +5.5 to + 8.5d Bm.
   - If correct, and ERROR code 18 is displayed, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
4. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A8 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
5. Verify voltage at A1A8P1 pin R (fig. FO-11) is +15 Vdc ±1 V.
   - If incorrect, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
6. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A8 CCA.
   - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key.

2-15. POWER LEVELING ERROR TEST — Ku-BAND — Continued.

7. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A4P1 pin S (probe) (fig. FO-9) and A1A4TP2 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 5 V/Div.
   - Coupling to AC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
8. Verify waveform is as shown.
   - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).



9. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
   - Remove RF Deck Assembly Cover (para 2-65).
   - Remove A4W5 from between A4A2J1 and A4S1J4 (fig. FO-5) and connect Power Sensor to A4A2J1.
   - Set POWER key to ON (DO NOT PRESS RESET). Disregard Error and UNLEVELED indicator.
   - Press MANUAL SWEEP key.
10. On SG-1206, rotate MANUAL SWEEP control fully CCW, then SLOWLY rotate CW and verify the Power Meter reads >+17 dBm.

NOTE

Disregard readings if UNLEVELED indicator is OFF (towards CW limit).

   - If incorrect, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
11. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect Power Sensor from A4A2J1.
   - Reinstall A4W5 and torque connectors to 8 inch-pounds.
   - Set POWER key to ON (DO NOT PRESS RESET).
   - Press AUTO key.
12. Set Oscilloscope coupling for DC, and verify voltage at A1A14P15 pin 5 (fig. FO-14) is –3 Vdc ±1.5 Vdc.
   - If correct, proceed with step 15.

2-15. ***POWER LEVELING ERROR TEST — Ku-BAND — Continued.***

13. Connect Oscilloscope vertical (Y) to A1A14P15 pin 9. Set Oscilloscope controls as follows:
    - Vertical controls to 0.1 V/Div.
    - Coupling to AC.
    - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
14. Verify displayed waveform is leveled across entire trace (similar to the waveform shown in step 8, except retrace is on top).
    - If incorrect, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
    - If correct, replace A4SI PIN Switch Assembly (para 2-72).
15. On SG-1206,
    - Set POWER key to OFF.
    - Remove A1A8 CCA (para 2-53) and reinstall on CCA extender.
    - Set POWER key to ON (DO NOT ***PRESS RESET).***
16. Connect Oscilloscope input to A1A7P1 pin A. Set horizontal controls to 10 msec/Div. Verify waveform is displayed that is TTL low for ≈50 msec.
    - If incorrect, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
    - If correct, troubleshoot A1A14Q14, A1A14Q15, A1A14Q16, and associated components using figure FO-20, sheet 3. Replace faulty component.
17. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A8 CCA.
    - Reinstall RF Deck Assembly Cover.
18. Remove power, and disconnect test equipment.

2-16. ANALOG SWEEP TEST.

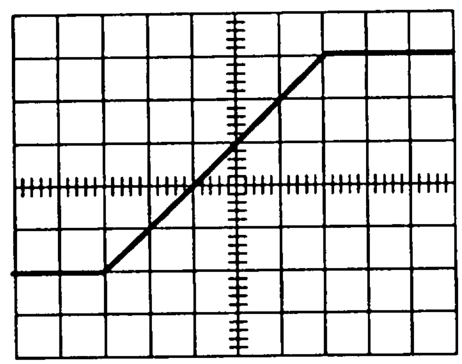
DESCRIPTION

This test is used to isolate malfunctions in the analog-sweep-ramp generating circuits on A1A2 CCA, ramp-inhibiting CCAS (A1A1, A1A3, and Al Al O), and diagnostics circuit on A1A14 CCA.

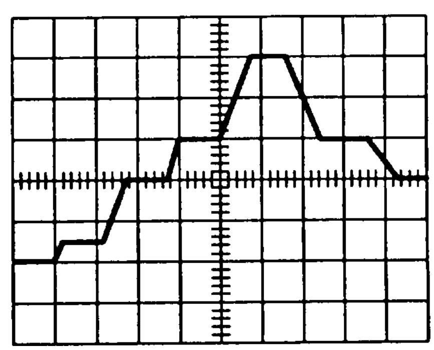
NOTE

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

1. On SG-1206,
   - Set POWER key to ON.
   - Press RESET key.
   - Press Δ F CF key.
   - Press SWEEP TIME key and set to 10 msec.



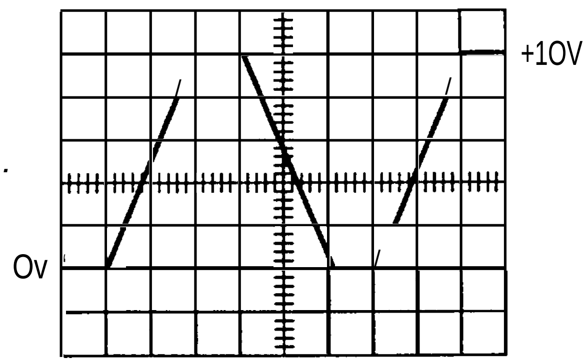
2. Connect Oscilloscope vertical input to SG-1206 HO RI Z OUTPUT connector. Set Oscilloscope controls as follows:
   - Vertical controls to 2 V/ Div.
   - Horizontal controls to 2 msec/Div.
   - Coupling to DC.
3. Verify waveform is as shown.
   - If incorrect, proceed with step 6.
4. On SG-1206, press FULL key.
5. Set Oscilloscope horizontal controls to 5 msec/Div and verify waveform is as shown.
   - If correct, replace A1A14U10 (fig. FO-15).



6. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A2 CCA (para 2-53) and reinstall on CCA extender.
   - Remove A1A1 CCA (para 2-53).
   - Set POWER key to ON *(DO NOT PRESS RESET).*
7. Connect Oscilloscope vertical input to A1A2TP4 (probe) (fig. FO-7) and A1A2TP5 (ground) (fig. FO-9).
8. Verify Oscilloscope displays waveform as shown in step 5.
   - If correct, replace A1A1 GPIB Interface CCA (para 2-53).

2-16. ANALOG SWEEP TEST — Continued.

9. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall AIA1 CCA.
   - Remove A1A3 CCA.
   - Set POWER key to ON ***(DO NOT PRESS RESET).***
10. Verify Oscilloscope displays waveform as shown in step 5.
    - If correct, replace A1A3 Markers Generator CCA (para 2-53).
11. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A3 CCA.
    - Remove AIAl O CCA (para 2-53).
    - Set POWER key to ON (DO ***NOT PRESS RESET).***
12. Verify Oscilloscope displays waveform as shown.
    - If correct, replace AIAl O FM/Attenuator CCA (para 2-53).
    - If incorrect, replace A1A2 Ramp Generator CCA (para 2-53).



13. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A2 and A1A1O CCA.
14. Remove power, and disconnect test equipment.

2-17. FREQUENCY MARKERS TEST.

DESCRIPTION

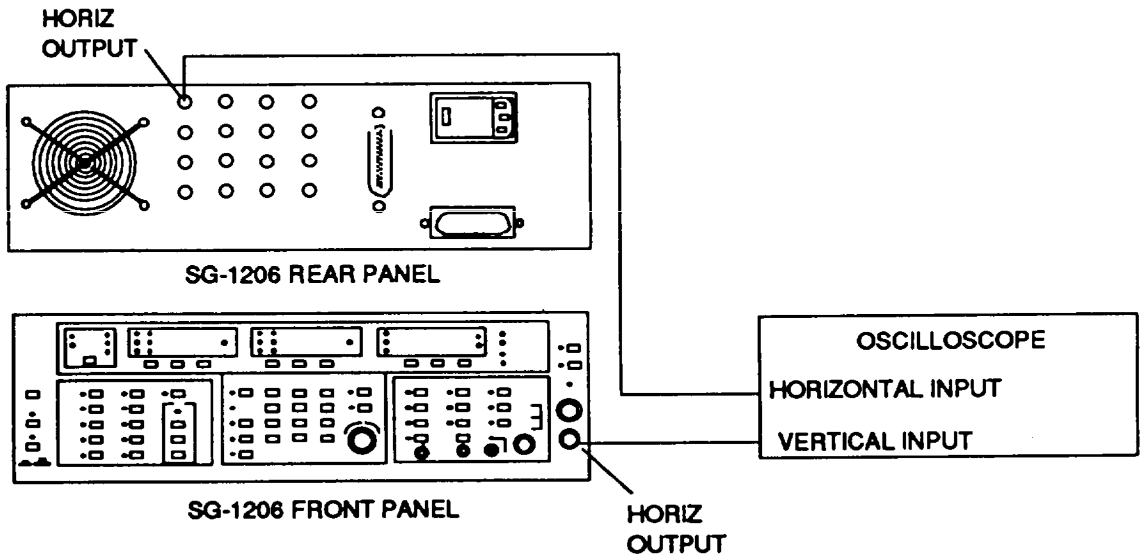
This test is used to isolate malfunctions in the frequency markers generating circuit on AIA3 CCA, control circuit on A1A5 CCA, and diagnostics circuit on A1A14 CCA.

NOTE

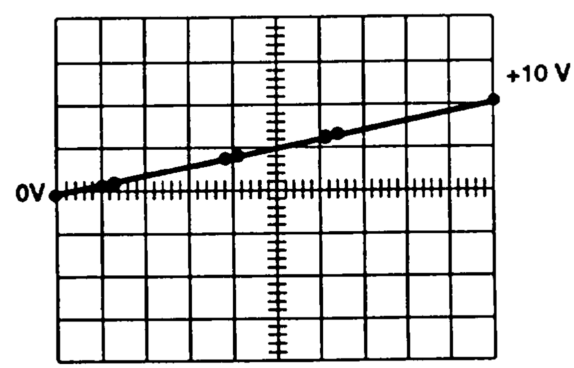
- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/o r tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A3TP2 (fig. FO-8) unless otherwise specified.

2-17. FREQUENCY MARKERS TEST — Continued.

1. Connect test equipment as shown.



2. On SG-1206,
   - Set POWER key to ON.
   - Press RESET key.
   - I Press SWEEP TIME key and set to 10 msec.
3. Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).

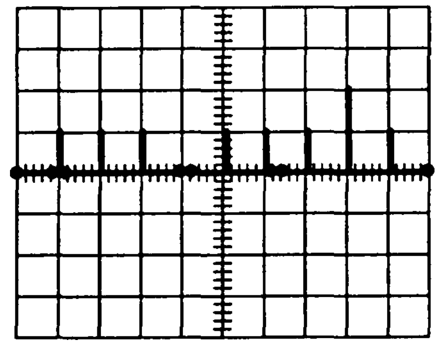


4. Verify waveform is as shown.
   - If correct, proceed with step 7.
5. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A3 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
6. Connect Oscilloscope vertical input to A1A3P1 pin T and verify waveform identical to step 4 is shown.
   - If correct, replace A1A3 Markers Generator CCA (para 2-53).
   - If incorrect, troubleshoot A1A5U13, A1A5U15 and associated components using figure FO-10, sheet 2. Replace faulty components.
7. Connect Oscilloscope vertical input to rear panel MARKER OUTPUT connector.

2-17. FREQUENCY MARKERS TEST — Continued.

8. On SG-1206, sequentially press M1 thru M8 keys to on (M3 thru M8 require SHIFT key), and turn front panel MARKER AMPL'D control fully CW.

9. Adjust Oscilloscope controls to display eight markers as shown.



- If all eight markers are present, replace A1A14U8 and A1A14U9 (fig. FO-15).

NOTE

The last marker selected will have an amplitude of 10 V.

10. Connect Oscilloscope vertical input to A1A3TP15.
    - If eight markers are not present, replace A1A3 Markers Generator CCA (para 2-53).

11. Connect Oscilloscope vertical input to A1A3P1 pin 8.
    - If eight markers are not present, replace A1A3 Markers Generator CCA (para 2-53),
    - If eight markers are present, replace A1A14U8 and A1A14U9 (fig. FO-15).

12. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A3 CCA.

13. Remove power, and disconnect test equipment.

2-18. INTERNAL FM CIRCUIT TEST.

DESCRIPTION

This test is used to isolate malfunctions in the internal FM generating circuit on A1A10 CCA, control circuit on A1A5 CCA, and diagnostics circuit on A1A14 CCA.

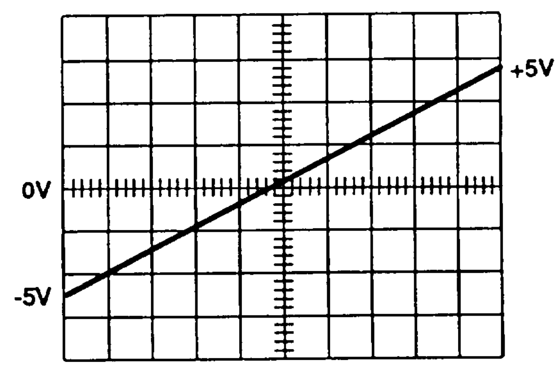
NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-15) unless otherwise specified.

1. On SG-1206,
    - Set POWER key to ON.
    - Press RESET key.
    - Press Δ FCF key.
    - Press Δ F key and set to 50 MHz.

2-18. INTERNAL FM CIRCUIT TEST — Continued.

2. Verify logic level at A1A10TP9 (fig. FO-12) toggles between TTL low and TTL high.
   - If correct, replace A1A14U8 (fig. FO-15).
3. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A10 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
4. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A10P1 pin U. Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 2 V/Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).



5. Verify waveform is as shown.
   - If correct, replace A1A10 FM/Attenuator CCA (para 2-53).
6. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A10 CCA.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
7. Connect Oscilloscope vertical input to A1A5P1 pin K (fig. FO-10) and verify waveform identical to step 5 is displayed.
   - If incorrect, troubleshoot A1A5U21 and associated components using figure FO-10, sheet 3. Replace faulty component.
8. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
9. Remove power, and disconnect test equipment.

2-19. RF OUTPUT CIRCUIT TEST.

DESCRIPTION

This test is used to isolate malfunctions in the A1A4 Step Attenuator and A2A1J1 RF Output connector assemblies.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-14) unless otherwise specified.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A4AT1 Step Attenuator and A4DC1 Directional Coupler Assembly (para 2-71). Remove A4AT1 from mounting plate. Reinstall A4DC1 in SG-1206, and reconnect A4DC1 input cable to A4S1J5.
   - Connect Power Meter Power Sensor to A4DC1 RF OUT connector (fig. FO-5).

   CAUTION

   Levels in excess of +20 dBm (100 mW) can be present at the output of the Directional Coupler Assembly. Use a coaxial attenuator if this level exceeds the rated input of the Power Sensor.

   - Set POWER key to ON.
   - Press RESET key.
   - Press RF ON key to OFF.
   - Press CWCF key.
   - Press LEVELING INTERNAL key (UNLEVELED indicator ON).
   - Press RF ON key to ON.
2. Set Power Meter CAL FACTOR to Power Sensor's 10 GHz setting and verify Power Meter reads > +8 dBm.
   - If incorrect, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
3. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect Power Sensor, and connect A4DC1 RF OUT connector to A4AT1 Step Attenuator.
   - Connect power sensor to A4AT1 output connector.
   - Reconnect A4AT1 ribbon cable to A1A14P31.
   - Set POWER key to ON (DO NOT PRESS RESET).
4. Verify Power Meter reads 2+5 dBm.
   - If correct, replace RF OUTPUT connector.

2-19. RF OUTPUT CIRCUIT TEST — Continued.

5. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect Power Sensor from A4AT1 output connector.
   - Remove A1A10 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
6. Connect Oscilloscope vertical input using 10:1 probe to A1A10P1 pin 14.

NOTE

Use of 1:1 probe will cause output to load giving false readings.

7. On SG-1206,
   - Press LEVELING INTERNAL key (indicator to ON).
   - Press LEVEL key and enter level values as shown below. At each level, verify the voltage shifts by required amount.

Set SG-1206 Level To	Voltage Shifts From-To
–10 dBm	From 0 V±2 V to +24±2 V
–20 dBm	From +24 ±2 V to 0 V ±2 V
–30 dBm	From 0 V ±2 V to +24 ±2 V
–40 dBm	From +24 ±2 V to 0 V ±2 V
–50 dBm	From 0 V ±2 V to +24 ±2 V
–60 dBm	From +24±2 V to 0 V ±2 V
–70 dBm	From 0 V ±2 V to +24 ±2 V
-80 dBm	From +24 ±2 V to 0 V ±2 V
–90 dBm	From 0 V ±2 V to +24 ±2 V
-100 dBm	From +24 ±2 V to 0 V ±2 V
-110dBm	From 0 V±2 V to +24±2 V

   - If incorrect, replace A1A10 FM/Attenuator CCA (para 2-53).
8. Connect Oscilloscope vertical input using 10:1 probe to A1A10P1 pin 8.
9. On SG-1206,
   - Press LEVEL key and set to 0 dBm.
   - Press LEVEL key and enter level values as shown below. At each level, verify the voltage shifts by required amount.

Set SG-1206 Level To	Voltage Shifts From-To
–20 dBm	From 0 V ±2 V to +24 ±2 V
–40 dBm	From +24 ±2 V to 0 V ±2 V
–60 dBm	From 0 V±2 V to +24 ±2 V
-80 dBm	From +24 ± V to 0 V ±2 V
–100 dBm	From 0 V±2 V to +24±2 V

   - If incorrect, replace A1A10 FM/Attenuator CCA (para 2-53).

2-19. RF OUTPUT CIRCUIT TEST — Continued.

10. Connect Oscilloscope vertical input using 10:1 probe to A1A10P1 pin 10.
11. On SG-1206, press LEVEL key and set to 0 dBm.
12. On SG-1206, press LEVEL key and set to -40 dBm, and verify voltage shifts from 0 V±2 V to +24 ±2 V.
    - If incorrect, replace A1A10 FM/Attenuator CCA (para 2-53).
13. On SG-1206, press LEVEL key and set to 0 dBm.
14. On SG-1206, press LEVEL key and set to –73 dBm, and verify voltage shifts from 0 V ±2 V to +24 ±2 V.
    - If incorrect, replace A1A10 FM/Attenuator CCA (para 2-53).
    - If correct, replace A4AT1 Step Attenuator (para 2-71).
15. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A10 CCA.
    - Reinstall A4AT1 Step Attenuator and A4DC1 Directional Coupler Assembly.
16. Remove power, and disconnect test equipment.

2-20. DECR/INCR CIRCUIT TEST.

DESCRIPTION

This test is used to isolate malfunctions in DECR/INCR control circuit to the malfunctioning component or assembly.

NOTE

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

1. Verify DE CR/I NCR Malfunction as follows:
    - Set POWER key to ON.
    - Press RESET key.
    - Press CW CF key to ON.
    - Rotate DECR/INCR control CCW and CW while observing display.
    - If frequency reading does not vary (proportionally to speed of knob), circuit is faulty.

2-20. DECR/INCR CIRCUIT TEST — Continued.

2. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect cable from A2A12P8 (fig. FO-18).

NOTE

It may be necessary to remove A2 Front Panel Assembly (para 2-58) to disconnect cable and access connector A2A12P8.

   - Set POWER key to ON.
   - Press RESET key.
3. Verify voltage between A2A12P8 pin 4 (+) (fig. FO-18) and A2A12P8 pin 2 (-) is +5 Vdc ±0.25 V.
   - If incorrect, replace A2A12 Microprocessor CCA (para 2-61).
4. On SG-1206,
   - Set POWER key to OFF.
   - Reconnect cable to A2A12P8.
   - Set POWER key to ON ***(DO NOT PRESS RESET).***
5. Connect Oscilloscope vertical input to A2A12P8 pin 1 (probe) with A2A12P8 pin 2 (ground). Set Oscilloscope controls as follows:
   - Horizontal controls to 10 msec/Div.
   - Vertical controls to 2 V/ Div.
6. Verify pulses are displayed as DE CR/I NCR control is rotated CW then CCW.
   - If incorrect, replace A2A1R2 DE CR/I NCR control (para 2-60).
7. Connect Oscilloscope to A2A12P8 pin 3 (probe) with A2A12P8 pin *2* (ground)
8. Verify pulses are displayed as DE CR/I NCR control is rotated CW then CCW.
   - If incorrect, replace A2A1R2 DE CR/I NCR control (para 2-60).
   - If correct, replace A2A12 Microprocessor CCA (para 2-61).
9. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A2 Front Panel (if removed).
10. Remove power, and disconnect test equipment.

2-21. EXTERNAL FM CIRCUITS TEST.

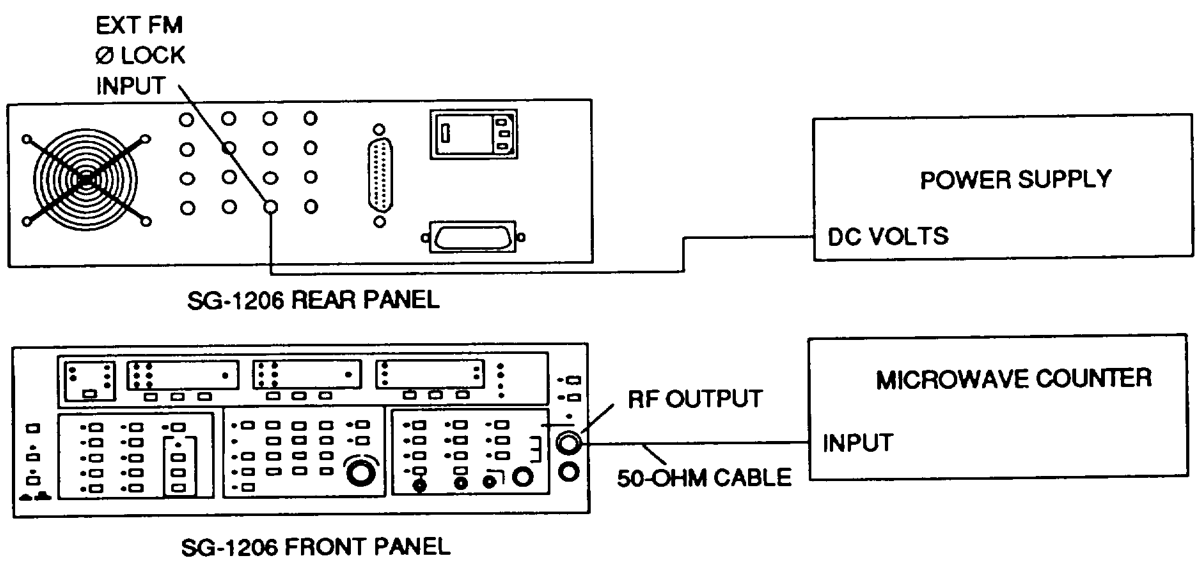
DESCRIPTION

This test is used to isolate malfunctions in the external frequency modulation circuits on A1A5 CCA, A1A10 CCA, and A4A2, A4A3, A4A4 YIG Assemblies.

NOTE

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

1. Connect test equipment as shown (to the >500 MHz input).



2. On SG-1206,
   - Set POWER key to ON.
   - Press RESET key.
3. Set Power Supply output to –1.0 Vdc +0.1 V.
4. On SG-1206, press CWCF key and set CF to any frequency between 2 and 8 GHz.
5. Record Counter reading.
6. On SG-1206, press -6 MHz/V key.
7. Verify frequency increases by 6 MHz +1.2 MHz.
8. On SG-1206, press –6 MHz/V key (release function).

2-21. EXTERNAL FM CIRCUITS TEST — Continued.

9. Repeat steps 4 thru 8 setting CF to any frequency between 8 and 12.4 GHz, then 12.4 and 20 GHz. Record any failures.
   - If frequency change is incorrect for all three bands, replace A1A10 FM/Attenuator CCA (para 2-53).
   - If frequency change is incorrect from 2 to 8 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
   - If frequency change is incorrect from 8 to 12.4 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/ATI YIG/isolator Assembly (para 2-69).
   - If frequency change is incorrect from 12.4 to 20 GHz, replace A1A8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
10. On SG-1206, press CW CF key and set CF to any frequency between 2 and 8 GHz.
11. Record Counter reading.
12. On SG-1206, press SHIFT key then –60 MHz/V key.
13. Verify frequency increases by 60 MHz +12 MHz.
14. On SG-1206, press SHIFT key then –60 MHz/V key (release function)
15. Repeat steps 10 thru 14 setting CF to any frequency between 8 and 12.4 GHz, then 12.4 and 20 GHz. Record any failures.
   - If frequency change is incorrect for all three bands, troubleshoot A1A5U6 and associated circuit using figure FO-10, sheet 4. Replace faulty component.
   - If frequency change is incorrect from 2 to 8 GHz, replace A1A6 YIG Driver CCA (para 2-53), A4A4Q1-3 Transistors (para 2-67), and A4A4G1/U1 YIG/Modulator Assembly (para 2-70).
   - If frequency change is incorrect from 8 to 12.4 GHz, replace A1A7 YIG Driver CCA (para 2-53), A4A3Q1-3 Transistors (para 2-67), and A4A3G1/ATI YIG/isolator Assembly (para 2-69).
   - If frequency change is incorrect from 12.4 to 20 GHz, replace AIA8 YIG Driver CCA (para 2-53), A4A2Q1-3 Transistors (para 2-67), and A4A2G1 YIG Assembly (para 2-68).
16. Remove power, and disconnect test equipment.

2-22. HIGH RESIDUAL FM TEST.

DESCRIPTION

This test is used to isolate high residual FM malfunctions in the Sweep Generator.

NOTE

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

2-22. HIGH RESIDUAL FM TEST — Continued.

1. On SG-1206,
   - Set POWER key to OFF.
   - Disconnect cable from A1A14P49 (fig. FO-14).
   - Set POWER key to ON.
2. Repeat Residual FM Test procedure (para 2-32).
3. If test is now within specified limits, replace A3B1 fan (para 2-64).
4. On SG-1206,
   - Set POWER key to OFF.
   - Reconnect cable to A1A14P49.
   - Set POWER key to ON.
   - Press MANUAL SWEEP key and set MANUAL SWEEP control to mid-range.
5. Set Oscilloscope coupling to AC and verify the following power supply ripple voltages are within specified limits.

Supply Voltage	Probe Input	Probe Ground	Max Ripple (P-P)
+5 v	A1A14TP1	A1A14TP2	150 mV
–15 VHC	A1A14P12 pin 3	A1A14TP3	150 mV
–15 VLC1	A1A14TP5	AA14 TP3	100 mV
-15 VLC2	A1A14VR2 pin 3	A1 A14TP3	100 mV
+15 VHC	A1A14P12 pin 5	A1 A14TP3	150 mV
+15 VLC1	A1A14TP4	A1 A14TP3	100 mV
+15 VLC2	A1A14VR3 pin 3	A1 A14TP3	100 mV
-38 V	A1A14TP6	A1 A14TP3	100 mV

   - If incorrect for +5 V supply, perform A1A13 Switching Power Supply CCA Test (para 2-12),
   - If incorrect for -15 VHC supply, troubleshoot A4VR4 using figure FO-13, sheet 4. Replace faulty component.
   - If incorrect for -15 VLC1 supply, troubleshoot A1A14VR6 using figure FO-13, sheet 4. Replace faulty component.
   - If incorrect for -15 VLC2 supply, troubleshoot A1A14VR4 using figure FO-13, sheet 4. Replace faulty component.
   - If incorrect for +15 VHC supply, troubleshoot A4VR3 using figure FO-13, sheet 4. Replace faulty component.
   - If incorrect for +15 VLC1 supply, troubleshoot A1A14VR5 using figure FO-13, sheet 5. Replace faulty component.
   - If incorrect for +15 VLC2 supply, troubleshoot A1A14VR3 using figure FO-13, sheet 5. Replace faulty component.
   - If incorrect for -38 V supply, troubleshoot A4VR1 and A1A14Q1 thru A1A14Q3 using figure FO-13, sheet 3. Replace faulty component.
6. Remove power, and disconnect test equipment.

2-23. FREQUENCY VERNIER FUNCTION TEST.

DESCRIPTION

This test is used to isolate malfunctions in the FREQUENCY VERNIER circuits on A2A12 CCA and A1A5 CCA.

NOTE

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

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - CWCF key.
2. Connect Oscilloscope input between A1A5U5 pin 11 (probe) (fig. FO-10) and A1A5TP11 (ground). Set Oscilloscope controls as follows:
   - Horizontal controls to 2 msec/Div.
   - Vertical controls to 10 mV/Div.
3. On SG-1206, press and hold FREQUENCY VERNIER INCREASE key and verify a very narrow pulse moving either direction is displayed on Oscilloscope.

NOTE

- This pulse is extremely narrow and difficult to discern. Adjust oscilloscope sweep time and delay if necessary to display pulse.
- If INCREASE key is held for more than =10 seconds, the upward limit will be reached, and the pulse will disappear. Press OFF key to reset.

   - If incorrect, replace A2A12 Microprocessor CCA (para 2-61).
   - If correct, troubleshoot A1A5U4, A1A5U5, A1A5U28, and associated circuit using figure FO-10, sheet 5. Replace faulty component.
4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
5. Remove power, and disconnect test equipment.

2-24. POWER SWEEP FUNCTION TEST.

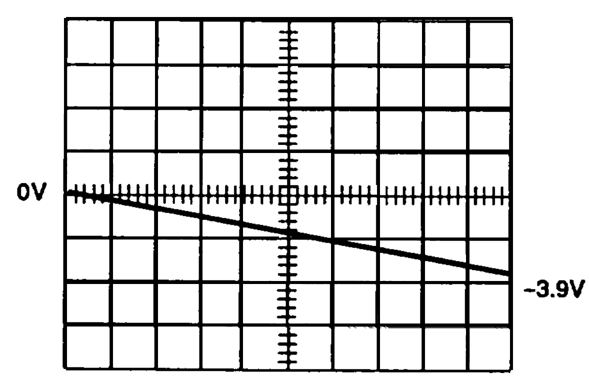
DESCRIPTION

This test is used to isolate malfunctions in the A1A3 CCA power sweep circuit.

NOTE

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

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A3 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW CF key.
   - Press dB/SWEEP key and set to 10 dB
   - Press SHIFT key, then POWER SWEEP key.
2. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A3P1 pin W (probe) (fig. FO-8) and A1A3TP1 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y
   - Vertical controls to 2 V/ Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
3. Verify waveform is as shown.
   - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
   - If incorrect or missing, replace A1A3 Marker Generator CCA (para 2-53).



4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A3 CCA.
5. Remove power, and disconnect test equipment.

2-25. MANUAL SWEEP CONTROL TEST.

DESCRIPTION

This test is used to isolate malfunctions in MANUAL SWEEP control circuits on A2A11 CCA and A1A5 CCA.

NOTE

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

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press MANUAL SWEEP key and rotate MANUAL SWEEP control fully CCW.
2. Connect oscilloscope vertical input to A1A5P1 pin 17 (probe) (fig. FO-10) and A1A5TP11 (ground). Set Oscilloscope controls as follows:
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
3. Turn MANUAL SWEEP control CW and verify voltage variation on Oscilloscope is from 0 (CCW) to +10 v (cW).
   - If correct, troubleshoot A1A5U13 and associated components using figure FO-10, sheet 2. Replace faulty component.
   - If incorrect, replace A2A11 Front Panel CCA (para 2-60).
4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A3 CCA.
5. Remove power, and disconnect test equipment.

2-26. AF CIRCUIT TEST.

DESCRIPTION

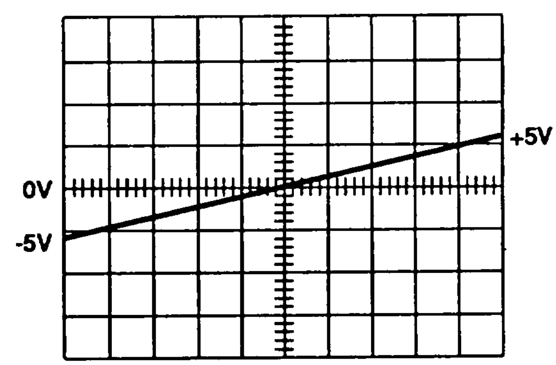
This test is used to isolate malfunctions in the A1A5 CCA and A1A10 CCA Δ F sweep circuits.

NOTE

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

<50 MHz.

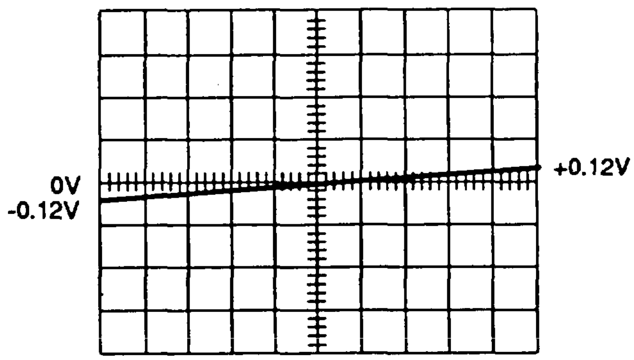
1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press Δ F CF key.
   - Press Δ F key and set to 50 MHz.
2. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A5P1 pin K (probe) (fig. FO-10) and A1A5TP11 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 5 V/Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
3. Verify waveform is as shown.
   - If waveform is correct, replace A1A10 FM/Attenuator CCA (para 2-53).
   - If waveform is incorrect, troubleshoot A1A5U21 and associated components using figure FO-10, sheet 3. Replace faulty component.



4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA,
5. Remove power, and disconnect test equipment.

2-26. AF CIRCUIT TEST — 51 to 1000 MHZ.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press Δ F CF key.
   - Press CF key and set to 8.000 GHz.
   - Press Δ F key and set to 500 MHz.
2. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A5P1 pin X (probe) (fig. FO-10) and A1A5TP11 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 0.2 V/Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
3. Verify waveform is as shown.
   - If waveform is incorrect, troubleshoot A1A5U16, A1A5U17, A1A5U19, A1A5U22 and associated components using figure FO-10, sheet 3. Replace faulty component.



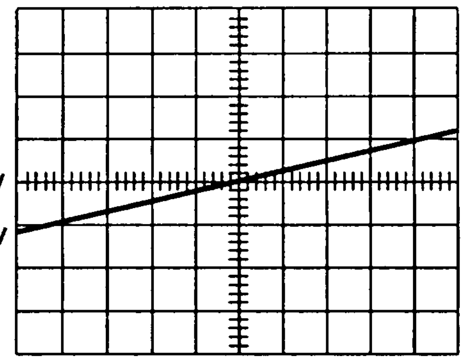
4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
5. Remove power, and disconnect test equipment.

>1000 MHz.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press Δ F CF key.
   - Press CF key and set to 8,000 GHz.
   - Press Δ F key and set 105. 000GHZ.

2-26. Δ F CIRCUIT TEST — >1000 MHz — Continued.

2. Connect Oscilloscope horizontal (X) input to SG-1206 HORIZ output connector, and vertical (Y) to A1A5P1 pin X (probe) (fig. FO-10) and A1A5TP11 (ground). Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 1 V/ Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).
3. Verify waveform is as shown.
   - If waveform is incorrect, troubleshoot A1A5U16, A1A5U17, A1A5U19, A1A5U22 and associated components using figure FO-10, sheet 3. Replace faulty component.



4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
5. Remove power, and disconnect test equipment.

2-27. EXTERNAL ALC GAIN CONTROL CIRCUIT TEST.

DESCRIPTION

This test is used to isolate malfunctions in the EXTERNAL ALC GAIN control circuit on A1A4 ALC CCA.

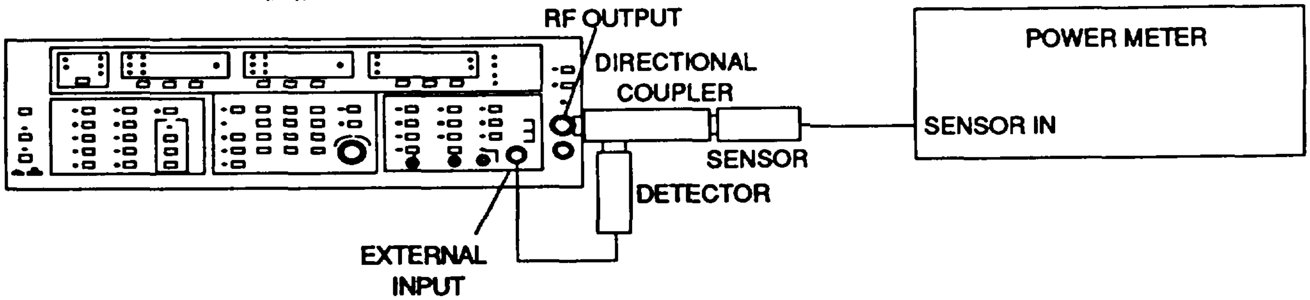
NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.
- While measuring DC voltages in this procedure the ground lead is connected to A1A14TP3 (fig. FO-14) unless otherwise specified.

2-27. EXTERNAL ALC GAIN CONTROL CIRCUIT TEST — Continued.

1. Verify External ALC Gain Control is malfunctioning as follows:

   - Connect test equipment as shown.



Set POWER key to ON.

Press RESET key.

Press F1 key and set to 2.000 GHz.

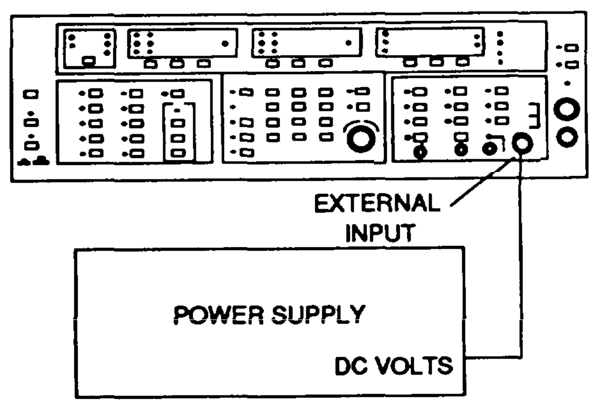
Press F2 key and set to 4.000 GHz.

Press F1-F2 key.

Press DETECTOR key to ON.

Set EXTERNAL ALC GAIN control to midrange.

2. Connect test equipment as shown.



3. Set Power Supply output for -1 Vdc +0.2 Vdc.
4. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A4 CCA and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
5. Verify voltage at AI A4P1 pin F (fig. FO-9) is >+10 Vdc.

   If incorrect, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
6. Connect Oscilloscope vertical input to A1A14P39 pin 2 (fig. FO-14).
7. On SG-1206, rotate EXTERNAL ALC GAIN control to full CCW position and verify voltage on Oscilloscope display decreases to O V *0.5 V.

   If correct, replace A2A1R1 External ALC Gain control (para 2-60).
8. Connect Oscilloscope vertical input to A1A4P1 pin H.
9. On SG-1206, rotate EXTERNAL ALC GAIN control to full CW position and verify voltage on Oscilloscope display increases to >+10 V.

   If correct, replace A1A4 ALC CCA (para 2-54) and A4DC1 Directional Coupler (para 2-71).

10, On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.

11. Remove power, and disconnect test equipment.

2-28. HORIZ OUTPUT CIRCUIT TEST.

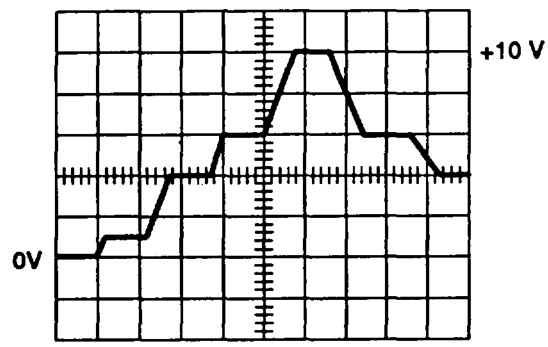
DESCRIPTION

This test is used to isolate malfunctions in the the HORIZ OUTPUT connectors and circuits on A1A2 CCA, A1A5 CCA, and A1A14 CCA.

NOTE

- Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test,
- While measuring DC voltages in this procedure the ground lead is connected to A1A5TP1 (fig. FO-10) unless otherwise specified.

1. Verify HORIZ Output is malfunctioning as follows:
   - Set POWER key to ON.
   - Press RESET key.
   - Press SWEEP TIME key and set to 10 msec.
   - Connect Oscilloscope vertical input to FRONT, then REAR HORIZ OUTPUT connector.
   - Set Oscilloscope controls to 5 msec/Div, 2 V/Div, DC coupled, and verify waveform is shown.
   - If incorrect, HO RI Z OUTPUT connector circuit is malfunctioning.



2. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
3. Connect Oscilloscope vertical input to A1A5P1 pin 15.
4. Verify waveform is as shown for step 1.
   - If correct, replace A1A14U12 (fig. FO-19, sheet 2).
5. Connect Oscilloscope vertical input to A1A5P1 pin 16.
6. Verify waveform is as shown for step 1.
   - If correct, troubleshoot A1A5U13, A1A5U15 and associated circuit using figure FO-10, sheet 2. Replace faulty component.
   - If incorrect, replace A1A2 Ramp Generator CCA (para 2-53).
7. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
8. Remove power, and disconnect test equipment.

2-29. REAR PANEL OUTPUT CONNECTOR TEST.

DESCRIPTION

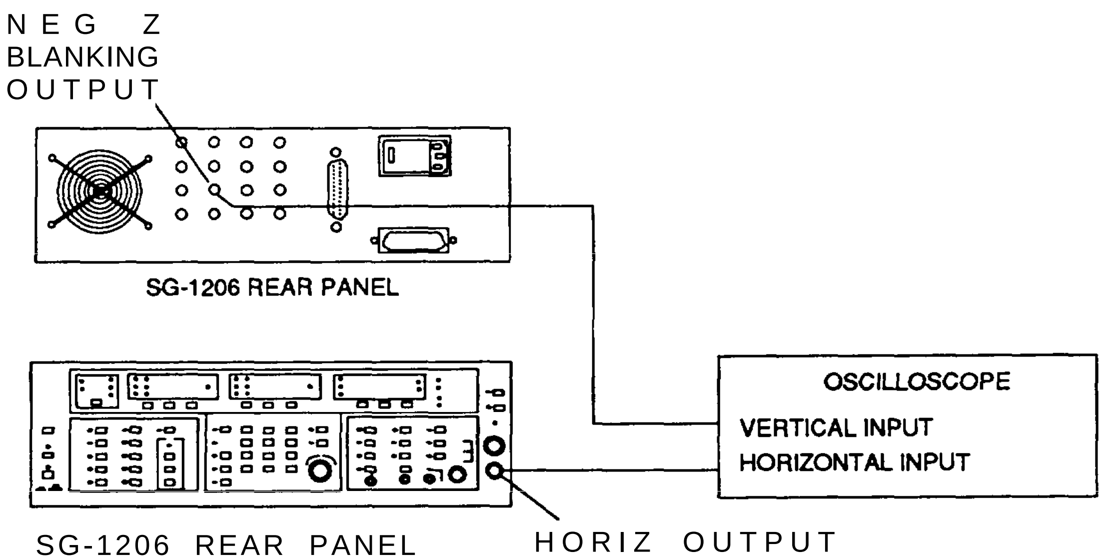
This test is used to isolate malfunctions in the the NEG Z BLANKING OUTPUT, POS Z BLANKING OUTPUT, PEN LIFT OUTPUT, V/G Hz, and VIDEO MARKER output connectors to the malfunctioning assembly or component.

NOTE

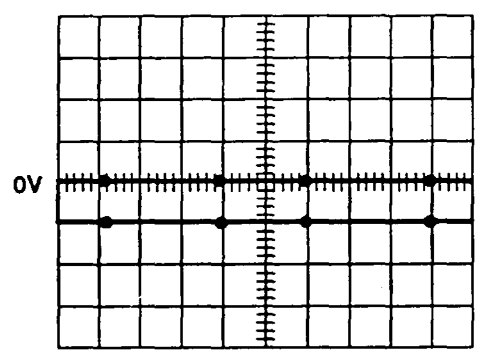
Perform this procedure only when instructed from table 2-1 or another troubleshooting test. Do not perform this or any other troubleshooting test as a separate procedure unless otherwise instructed as certain conditions have been established and/or tested prior to performing this test.

NEG Z BLANKING OUTPUT.

1. Verify NEG Z Blanking Output Circuit is malfunctioning as follows:
   - Set POWER key to OFF,
   - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
   - Connect test equipment as shown.



   - Set POWER key to ON.
   - Press RESET key.
   - Set Oscilloscope Mode to X:Y, vertical controls to 5 V/Div, coupling to DC, and adjust horizontal channel controls so trace extends full width of screen (10 divisions).
   - Verify waveform is as shown.
   - If waveform is incorrect, circuit is malfunctioning.



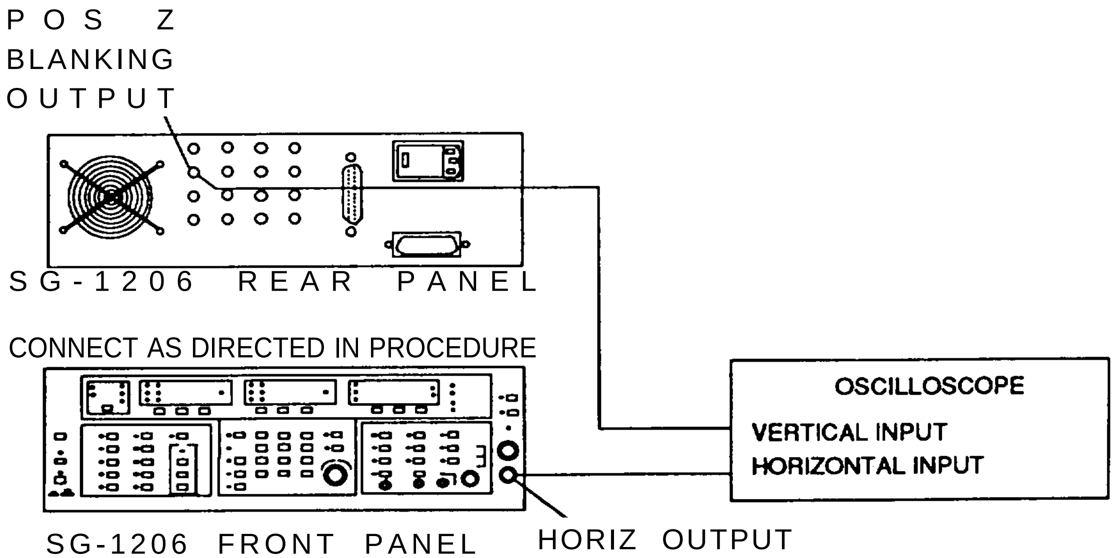
2. Connect Oscilloscope to A1A4P1 pin 7 (probe) (fig. FO-9 and A1A14TP2 (ground (fig. FO-14).

2-29. REAR PANEL OUTPUT CONNECTOR TEST - NEG Z BLANKING OUTPUT - Continued.

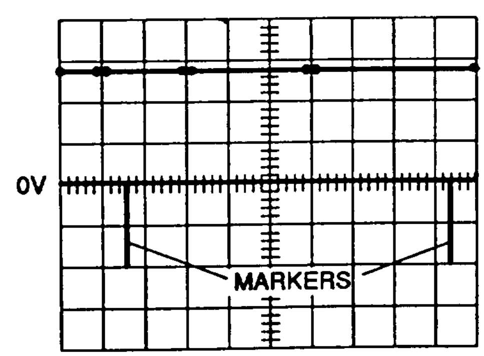
3. Verify waveform is as shown for step 1.
   - If incorrect, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
5. Remove power, and disconnect test equipment.

POS Z BLANKING OUTPUT.

1. Verify POS Z Blanking Output Circuit is malfunctioning as follows:
   - Set POWER key to OFF.
   - Remove A1A2 CCA (para 2-53) and reinstall on CCA extender.
   - Connect test equipment as shown.



   - Set POWER key to ON.
   - Press RESET key.
   - Set Oscilloscope Mode to X:Y, vertical controls to 2 V/Div, coupling to DC, and adjust horizontal channel controls so trace extends full width of screen (10 divisions).
   - Verify waveform is as shown.
   - If waveform is incorrect, circuit is malfunctioning.



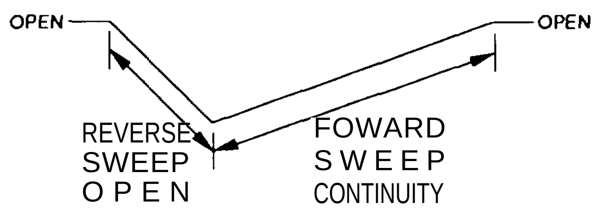
2. Connect Oscilloscope to A1A2P1 pin 6 (probe) (fig. FO-7) and A1A2TP5 (ground).
3. Verify waveform is as shown for step 1 without markers.
   - If incorrect, replace A1A2 Ramp Generator CCA (para 2-53).

2-29. REAR PANEL OUTPUT CONNECTOR TEST - POS Z BLANKING OUTPUT - Continued.

4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A2 CCA.
   - Remove A1A3 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON (DO NOT PRESS RESET).
5. Connect Oscilloscope to A1A3P1 pin A (probe) (fig. FO-8) and A1A3TP1 (ground).
6. Verify waveform is as shown for step 1.
   - If incorrect, replace A1A3 Markers Generator CCA (para 2-53).
7. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A3 CCA.
8. Remove power, and disconnect test equipment.

PENLIFT OUTPUT.

1. Verify Penlift Output Circuit is malfunctioning as follows:
   - Set POWER key to ON.
   - Press RESET key.
   - Press SWEEP TIME key and set to 10 sec.
   - Press EXT OR SINGLE key.
   - Connect Digital Multi meter (configured for Ω) to PENLIFT OUTPUT connector center pin and shield.
   - Press EXT OR SINGLE key (starts a single sweep) and observe the Digital Multi meter.
   - If multi meter indicates no continuity at start of sweep, continuity during sweep, and no continuity at end of sweep (as shown), PENLIFT OUTPUT circuit is functioning properly.



2. On SG-1206, press EXT OR SINGLE key and observe the Digital Multi meter.
   - If multi meter indicates continuity at all times, replace relay A1A14K1 (fig. FO-19),
3. Configure Digital Multimeter to read DC volts, and connect between A1A14K1 pin 1 (+) and A1A14K1 pin 3 (–).
4. On SG-1206, press EXTOR SINGLE key and observe the Digital Multi meter.
   - If relay does not click, but Digital Multi meter indicates +5 V, replace A1A14K1.
   - If Digital Multi meter indicates +0 V, replace A1A2 Ramp Generator CCA (para 2-53).
5. Remove power, and disconnect test equipment.

2-29. REAR PANEL OUTPUT CONNECTOR TEST - V/GHz OUTPUT.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW CF key.
2. Verify voltage between A1A5P1 pin 9 (+) (fig. FO-10) and A1A5P1 pin 13 (–) is +10 V +0.02 V.
   - If incorrect, troubleshoot A1A5U24 and associated circuit using figure FO-10, sheet 6. Replace faulty component.
3. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A5 CCA.
4. Remove power, and disconnect test equipment.

MARKERS OUTPUT.

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A3 CCA (para 2-53) and reinstall on CCA extender
   - Set POWER key to ON.
   - Press RESET key.
2. Verify voltage between A1A3P1 pin K (-) (fig. FO-8) and A1A3P1 pin M (+) is +15 Vdc *0.7 V, and voltage between A1A3P1 pin K (-) and A1A3P1 pin N (+) is -15 Vdc +0.7 V.
   - If both voltages are correct, replace A1A3 Markers Generator CCA (para 2-53).
   - If only +15 V incorrect, perform Power Supply Test procedure - +15 VLC1 Supply (para 2-11).
   - If only -15 V incorrect, perform Power Supply Test procedure —-15 VLC1 Supply (para 2-11).
3. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A3 CCA.
4. Remove power, and disconnect test equipment

2-30. REAR PANEL INPUT CONNECTOR TEST.

DESCRIPTION

This test is used to isolate malfunctions in the EXT SWEEP and EXT SQUARE WAVE input connectors to the malfunctioning assembly or component.

NOTE

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

EXTERNAL SWEEP TEST.

NOTE

Perform External Sweep Test only if malfunction is limited to external sweep (internal sweep mode functions normally).

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A2 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
2. Connect Function Generator to rear panel EXT SWEEP connector. Set Function Generator controls to output a O to 10 V ramp (or triangle) at 10 Hz.
3. Connect Oscilloscope vertical input to A1A2P1 pin B (probe) (fig. FO-7) and A1A2TP5 (ground).
4. Verify that Function Generator signal (0-10 V) is present.
   - If incorrect, troubleshoot A1A14U11 and associated components using figure FO-9, sheet 2. Replace faulty components.
5. Verify A1A2S1 is in NORM position.
   - If correct, replace A1A2 Ramp Generator CCA (para 2-53).
6. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A2 CCA.
7. Remove power, and disconnect test equipment.

2-30. REAR PANEL INPUT CONNECTOR TEST — EXTERNAL SQUARE WAVE TEST.

NOTE

Perform External Square Wave Test only if malfunction is limited to external square wave (internal square wave mode functions normally).

1. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW CF key.
2. Connect Function Generator to rear panel EXT SQ WAVE INPUT connector. Set Function Generator controls to output a 1 V square wave at 50 kHz.
3. Verify voltage between A1A4P1 pin 15 (+) (fig. FO-9) and A1A4P1 pin 9 (–) is +1 V.
   - If correct, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
   - If incorrect, troubleshoot cable 2 connected to A1A14P10 using figure FO-14. Replace faulty component.
4. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
5. Remove power, and disconnect test equipment.

2-31. INTERNAL SQUARE WAVE TEST.

DESCRIPTION

This test is used to isolate malfunctions in the internal square wave generation circuitry to the malfunctioning assembly or component.

NOTE

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

1. On SG-1206,
   - Set POWER key to OFF
   - Remove A1A4 CCA (para 2-53) and reinstall on CCA extender.
   - Set POWER key to ON.
   - Press RESET key.
   - Press SHIFT key, then 1 kHz INT AM key.
2. Connect Oscilloscope vertical input to A1A4P1 pin X (probe) (fig. FO-9) and A1A4P1 pin P (ground).
3. Verify voltage toggles from TTL high to TTL low at nominal 1 kHz rate.
   - If incorrect, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
4. On SG-1206, press SHIFT key, then 27.8 kHz INT AM key.
5. Verify voltage toggles from TTL high to TTL low at nominal 27.8 kHz rate.
   - If incorrect, replace A1A4 ALC CCA (para 2-53) and A4DC1 Directional Coupler (para 2-71).
   - If correct, replace A4S1 PIN Switch (para 2-73).
6. On SG-1206,
   - Set POWER key to OFF.
   - Reinstall A1A4 CCA.
7. Remove power, and disconnect test equipment.

Section IV. MAINTENANCE PROCEDURES

2-32. PERFORMANCE TEST.

DESCRIPTION

This procedure covers:

- CW Frequency Accuracy Test
- Sweep Accuracy Test
- Frequency Vernier Accuracy Test
- Sweep Ramp Accuracy Test
- Leveled Power Variation and Output Connector SWR Test
- RF Slope Control Accuracy Test
- Maximum Output Power and Power Level Accuracy Test
- Power Sweep Accuracy Test
- Residual FM Test
- External FM and Phase-Lock Test
- AM Sensitivity and Frequency Response Test
- AM Bandwidth Verification Test
- RF Output Harmonic Attenuation Test
- RF Output Spurious Signals Test
- RF Output Power Source and Display Signals Test
- RF Output Frequency Stability-vs-Output Level Test
- RF Output Step Attenuator Accuracy Test

CAUTION

The RESET state of the Sweep Generator places a +7.0 dB signal sweeping from 10 MHz to 20 GHz at the RF Output connector. Verify that the maximum-power-input rating of any test equipment connected to the output connector is not exceeded.

NOTE

Unless otherwise specified:

- Performance test procedure steps should be done in the order given.
- Keep test equipment interconnecting cables as short as possible.
- Allow a 60 minute warm-up period when performing the first performance test to allow the Sweep Generator to stabilize.
- Allow the Sweep Generator 5 minutes to stabilize if turned off less than five minutes during performance tests.
- The initialized setup of Sweep Generator controls and indicators is to be performed prior to each performance test.

INITIALIZED SETUP.

1. Initialization of Sweep Generator controls and indicators is accomplished by pressing the RESET key.

2. Initialized state of Sweep Generator should be as follows:

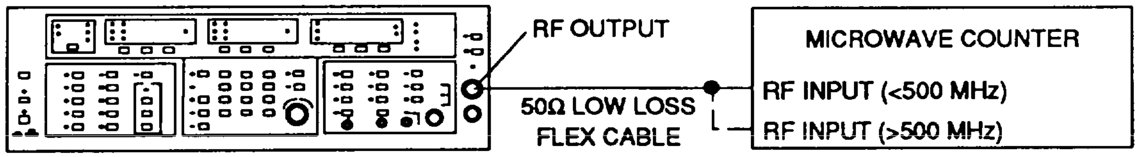
Frequency Range	FULL
F1 Frequency	0.010GHz
* CF Frequency	10.000 GHz
* M1 Frequency	3.000 GHz
F2 Frequency	20.000 GHz
* AF Frequency	1.000 GHz
* M2 Frequency	19.000 GHz
Level	+7.0 dBm
“Sweep Time	0.050 sec
* dB/Sweep	+0.0 dB
Sweeping	FREQUENCY
Trigger	AUTO
Markers	VIDEO
Leveling	INTERNAL
RF ON	ON
All other displays and indicators	OFF

*Press key to display state.

3. Press RF ON key to OFF.

CW FREQUENCY ACCURACY TEST.

1. Connect test equipment as shown (to the <500 MHz input).



2. On SG-1206,
   - Press RESET key.
   - Press CW F1 key and set to 0.010 GHz.
   - Press CW F2 key and set to 1.900 GHz.
   - Press CW F1 key, wait three seconds, then press CW F2 key and wait three seconds. Repeat CW F1/CW F2 sequence two more times to set YIG hysteresis.
3. On SG-1206, press CW F1 key. After one minute verify Counter reads from 0.000 to 0.020 GHz.
4. Connect the SG-1206 RF Output to the Counter >500 MHz input (as shown above).
5. On SG-1206, press CW F2 key. After one minute verify Counter reads from 1.890 to 1.910 GHz.
6. Repeat steps 2, 3, and 5 using SG-1206 F1 and F2 frequencies shown below. Verify readings are within specified limits.

NOTE

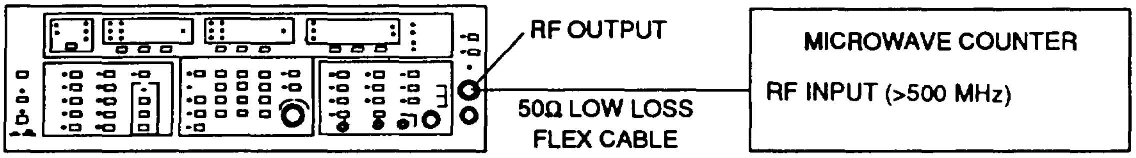
Do not repeat step 4. The remaining measurements are made using the Counter >500 MHz input connected to the SG-1206 RF output.

F1 Frequency (GHz)		F2 Frequency (GHz)	
SG-1206 CW F1	Counter Reading	SG-1206 CW F2	Counter Reading
2.100	2.090 to 2.110	7.900	7.890 to 7.910
8.100	8.090 to 8.110	12.300	12.290 to 12.310
12.500	12.490 to 12.510	20.000	19.990 to 20.010

7. On SG-1206, set RF ON to OFF.
8. Disconnect test equipment.

SWEEP ACCURACY TEST.

1. Connect test equipment as shown (to the >500 MHz input).



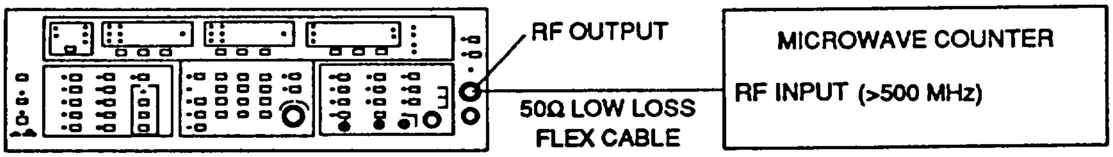
2. On SG-1206,
   - Press RESET key.
   - Press Δ F CF key.
   - Press CF key and set to 5.000 GHz.
   - Press Δ F key and set to 0.050 GHz.
   - Press MANUAL SWEEP key and rotate control fully CCW.
3. Record Counter reading (to 1 MHz resolution).
4. On SG-1206, rotate MANUAL SWEEP control fully CW.
5. Record Counter reading (to 1 MHz resolution).
6. Verify the difference between readings recorded in step 3 and 6 are from 46 MHz to 54 MHz.
7. Repeat steps 2 thru 6 using SG-1206 CF and Δ F frequencies shown below. Verify readings are within specified limits.

CF Frequency	Δ F Frequency	Calculated Difference
10.000 GHz	0.050 GHz	46 MHz to 54 MHz
15.000 GHz	0.050 GHz	46 MHz to 54 MHz
5.000 GHz	0.500 GHz	460 MHz to 540 MHz
10.000 GHz	0.500 GHz	460 MHz to 540 MHz
15.000 GHz	0.500 GHz	460 MHz to 540 MHz
5.000 GHz	5.000 GHz	4,600 MHz to 5,400 MHz
10.000 GHz	5.000 GHz	4,600 MHz to 5,400 MHz
15.000 GHz	5.000 GHz	4,600 MHz to 5,400 MHz

8. On SG-1206, set RF ON to OFF.
9. Disconnect test equipment.

FREQUENCY VERNIER ACCURACY TEST.

1. Connect test equipment as shown (>500 MHz input).



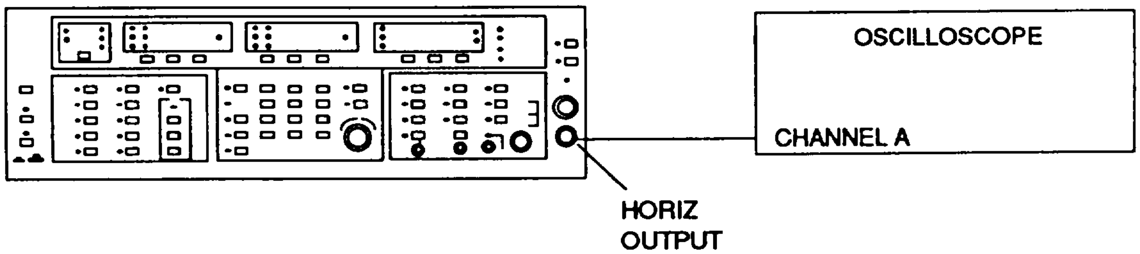
2. On SG-1206,
   - Press RESET key.
   - Press CW CF key.
   - Press CF key and set to 5.000 GHz.
   - Press and hold Frequency Vernier INCREASE key until Counter reading stops increasing.
3. Record Counter reading (to 100 kHz resolution).
4. On SG-1206, press Frequency Vernier OFF key.
5. Record Counter reading (to 100 kHz resolution).
6. Verify the difference between readings recorded in steps 3 and 5 are from 11.2 MHz to 14.2 MHz.
7. On SG-1206, press hold Frequency Vernier DECREASE key until Counter reading stops decreasing.
8. Record Counter reading (to 100 kHz resolution).
9. On SG-1206, press Frequency Vernier OFF key.
10. Record Counter reading (to 100 kHz resolution).
11. Verify the difference between readings recorded in steps 8 and 10 are from 11.3 MHz to 14.3 MHz.
12. Repeat steps 2 thru 11 using SG-1206 CF frequencies shown below. Verify readings are within specified limits.

CF Frequency	Increase Difference	Decrease Difference
10.000 GHz	11.2 MHz to14.2 MHz	11.3 MHz to 14.3 MHz
15.000 GHz	11.2 MHz to 14.2 MHz	11.3 MHz to 14.3 MHz

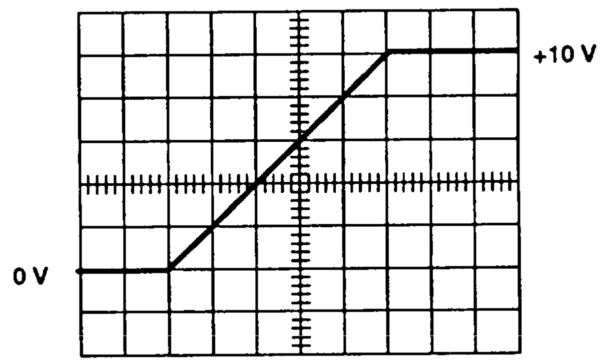
13. On SG-1206, set RF ON to OFF.
14. Disconnect test equipment.

SWEEP RAMP ACCURACY TEST.

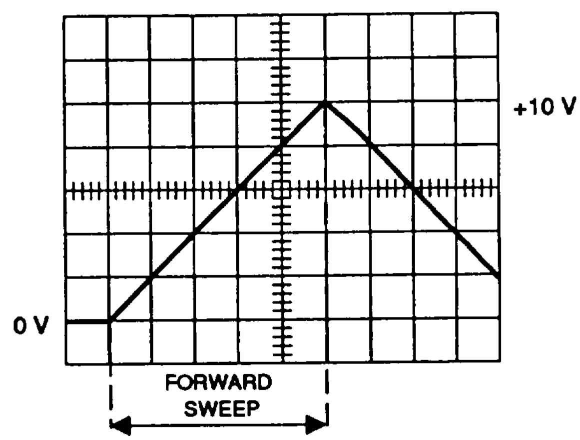
1. Connect test equipment as shown.



2. On SG-1206,
   - Press RESET key.
   - Press Δ F CF key.
   - Press SWEEP TIME key and set to 0.010 seconds.
3. Set the Oscilloscope controls as follows:
   - Horizontal controls to 2 ms/Div.
   - Vertical controls to 2 V/Div.
   - Coupling to DC.
   - Verify Oscilloscope displays a 10 ms ramp (±2 ms) as shown.



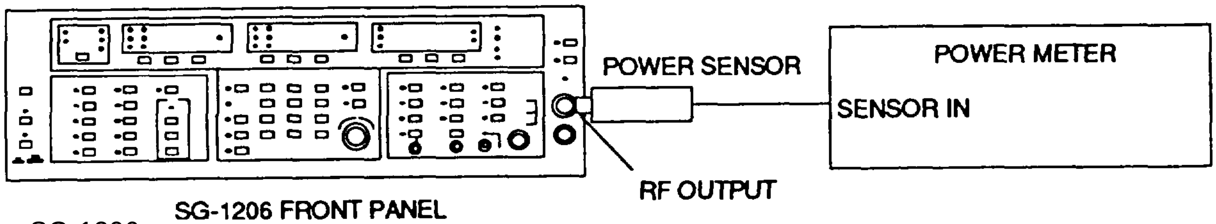
4. On SG-1206, press SWEEP TIME key and set to 1.000 seconds.
5. Set the Oscilloscope controls as follows:
   - Horizontal controls to 200 ms/Div.
   - Verify Oscilloscope displays a 1.0 sec ramp (±200 ms) as shown.



6. On SG-1206, set RF ON to OFF.
7. Disconnect test equipment.

LEVELED POWER VARIATION AND OUTPUT CONNECTOR SWR TEST.

1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



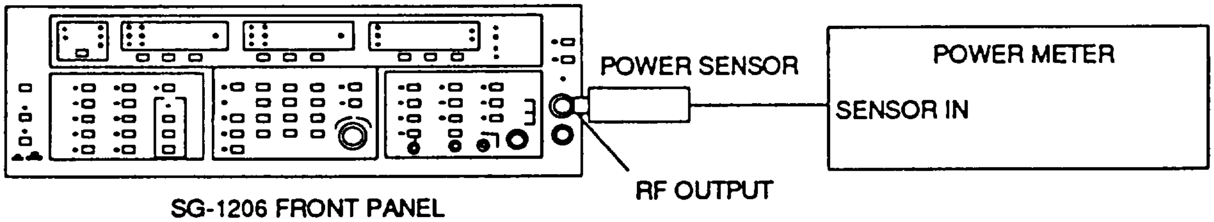
3. On SG-1206,
   - Press RESET key.
   - Rotate RF SLOPE control fully CCW (OFF).
   - Press CW CF key and set to 0.010 GHz.
4. Set Power Meter CAL FACTOR to Power Sensor's 10 MHz setting.
5. Record Power Meter reading.
6. Repeat steps 3 thru 5 using SG-1206 CF frequencies shown below. Enter the Power Sensor's calibration factor for the CF frequency currently being measured.

CF Frequency	Power Meter CAL FACTOR	Power Reading
1.000 GHz	Power Sensor's 1 GHz setting	Record
2.000 GHz	Power Sensor's 2 GHz setting	Record
3.000 GHz	Power Sensor's 3 GHz setting	Record
4.000 GHz	Power Sensor's 4 GHz setting	Record
5.000 GHz	Power Sensor's 5 GHz setting	Record
6.000 GHz	Power Sensor's 6 GHz setting	Record
7.000 GHz	Power Sensor's 7 GHz setting	Record
8.000 GHz	Power Sensor's 8 GHz setting	Record
9.000 GHz	Power Sensor's 9 GHz setting	Record
10.000 GHz	Power Sensor's 10 GHz setting	Record
11.000 GHz	Power Sensor's 11 GHz setting	Record
12.000 GHz	Power Sensor's 12 GHz setting	Record
13.000 GHz	Power Sensor's 13 GHz setting	Record
14.000 GHz	Power Sensor's 14 GHz setting	Record
15.000 GHz	Power Sensor's 15 GHz setting	Record
16.000 GHz	Power Sensor's 16 GHz setting	Record
17.000 GHz	Power Sensor's 17 GHz setting	Record
18.000 GHz	Power Sensor's 18 GHz setting	Record
19.000 GHz	Power Sensor's 19 GHz setting	Record
20.000 GHz	Power Sensor's 20 GHz setting	Record

7. Verify the difference between the minimum and maximum recorded readings is <1.5 dB.
8. On SG-1206, set RF ON to OFF.
9. Disconnect test equipment.

RF SLOPE CONTROL ACCURACY TEST.

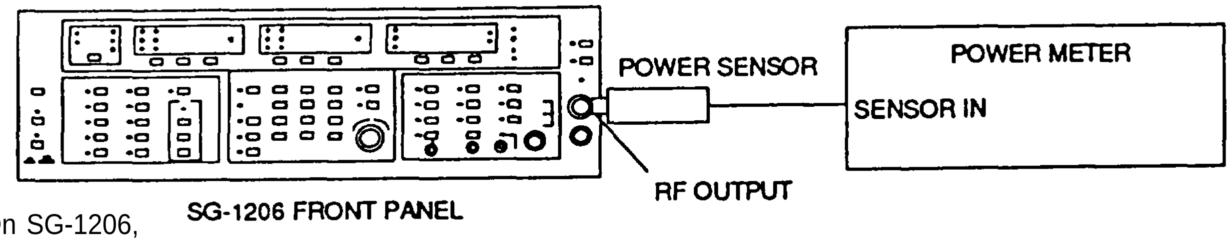
1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. On SG-1206,
   - Press RESET key.
   - Press LEVEL key and set to +2.0 dBm.
   - Rotate RF SLOPE control fully CCW (OFF).
   - Press CW F1 key and set to 0.050 GHz.
4. Set Power Meter CAL FACTOR to Power Sensor's 50 MHz setting.
5. Record Power Meter reading.
6. On SG-1206,
   - Rotate RF SLOPE control fully CW.
   - Press CW F2 key.
7. Set Power Meter CAL FACTOR to Power Sensor's 20 GHz setting.
8. Verify Power Meter reading is a minimum of 2.0 dB higher than the indication recorded in step 5.
9. On SG-1206, set RF ON to OFF.
10. Disconnect test equipment.

MAXIMUM OUTPUT POWER AND POWER LEVEL ACCURACY TEST.

1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. On SG-1206,
   - Press RESET key.
   - Rotate RF SLOPE control fully CCW (OFF).
   - Press SWEEP TIME key and set to 1.000 second.
4. On SG-1206,
   - Press F1-F2 key.
   - Press F1 key and set to 0.010 GHz.
   - Press F2 key and set to 2.000 GHz.
   - Press LEVEL key and set to +13.0 dBm.
5. On SG-1206, increase output power in 0.1 dB steps (per sweep) using the INCR/DECR control until the UNLEVELED indicator lights.
   - If the UNLEVELED indicator lights before +15.0 dBm is obtained, SLOWLY decrease output power (in 0.1 dB steps) until the UNLEVELED indicator JUST goes out. Proceed to step 6.
   - If +15.0 dBm is obtained without the UNLEVELED indicator lighting, proceed to step 6.
6. On SG-1206, press CW CF key.
7. Set Power Meter CAL FACTOR to Power Sensor's 10 MHz setting.
8. On SG-1206, press CF key and set to 0.010 GHz.
9. Verify Power Meter reading is >+13.0 dBm.
10. Repeat steps 7 through 9 using SG-1206 CF frequencies and Power Meter CAL FACTOR settings shown below. At each frequency, verify the Power Meter reading is within specified limits.

CF Frequency	Power Meter CAL FACTOR	Power Reading
1.000 GHz	Power Sensor's 1 GHz setting	>+13.0 dBm
2.000 GHz	Power Sensor's 2 GHz setting	>+13.0 dBm

11. Repeat steps 4 through 6 using F1 frequency of 2.000 GHz, F2 frequency of 18.000 GHz and LEVEL of +10.0 dBm.

MAXIMUM OUTPUT POWER AND POWER LEVEL ACCURACY TEST — Continued.

12. Repeat steps 7 through 9 using SG-1206 CF frequencies and Power Meter CAL FACTOR settings shown below. At each frequency, verify the Power Meter reading is within specified limits.

CF Frequency	Power Meter CAL FACTOR	Power Reading
1.000 GHz	Power Sensor's 1 GHz setting	>+10.0 dBm
2.000 GHz	Power Sensor's 2 GHz setting	>+10.0 dBm
3.000 GHz	Power Sensor's 3 GHz setting	>+10.0 dBm
4.000 GHz	Power Sensor's 4 GHz setting	>+10.0 dBm
5.000 GHz	Power Sensor's 5 GHz setting	>+10.0 dBm
6.000 GHz	Power Sensor's 6 GHz setting	>+10.0 dBm
7.000 GHz	Power Sensor's 7 GHz setting	>+10.0 dBm
8.000 GHz	Power Sensor's 8 GHz setting	>+10.0 dBm
9.000 GHz	Power Sensor's 9 GHz setting	>+10.0 dBm
10.000 GHz	Power Sensor's 10 GHz setting	>+10.0dBm
11.000 GHz	Power Sensor's 11 GHz setting	>+10.0 dBm
12.000 GHz	Power Sensor's 12 GHz setting	>+10.0 dBm
13.000 GHz	Power Sensor's 13 GHz setting	>+10.0 dBm
14.000 GHz	Power Sensor's 14 GHz setting	>+10.0 dBm
15.000 GHz	Power Sensor's 15 GHz setting	>+10.0 dBm
16,000 GHz	Power Sensor's 16 GHz setting	>+10.0 dBm
17.000 GHz	Power Sensor's 17 GHz setting	>+10.0 dBm
18.000 GHz	Power Sensor's 18 GHz setting	>+10.0 dBm

13. Repeat steps 4 through 6 using F1 frequency of 18.000 GHz, F2 frequency of 20.000 GHz and LEVEL of +7.0 dBm.

14. Repeat steps 7 through 9 using SG-1206 CF frequencies and Power Meter CAL FACTOR settings shown below. At each frequency, verify the Power Meter reading is within specified limits.

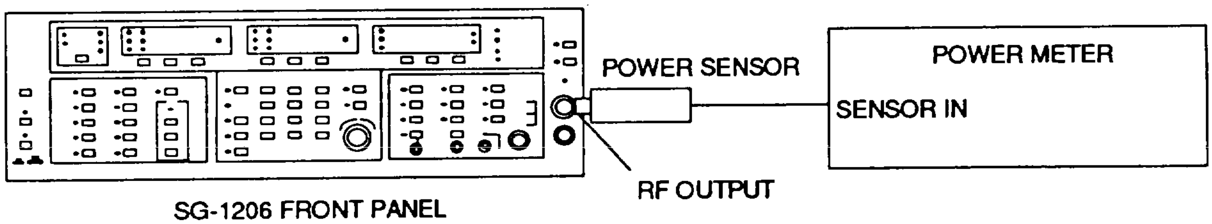
CF Frequency	Power Meter CAL FACTOR	Power Reading
18.000 GHz	Power Sensor's 18 GHz setting	>+7.0 dBm
19.000 GHz	Power Sensor's 19 GHz setting	>+7.0 dBm
20.000 GHz	Power Sensor's 20 GHz setting	>+7.0 dBm

15. On SG-1206, set RF ON to OFF.

16. Disconnect test equipment.

POWER SWEEP ACCURACY TEST.

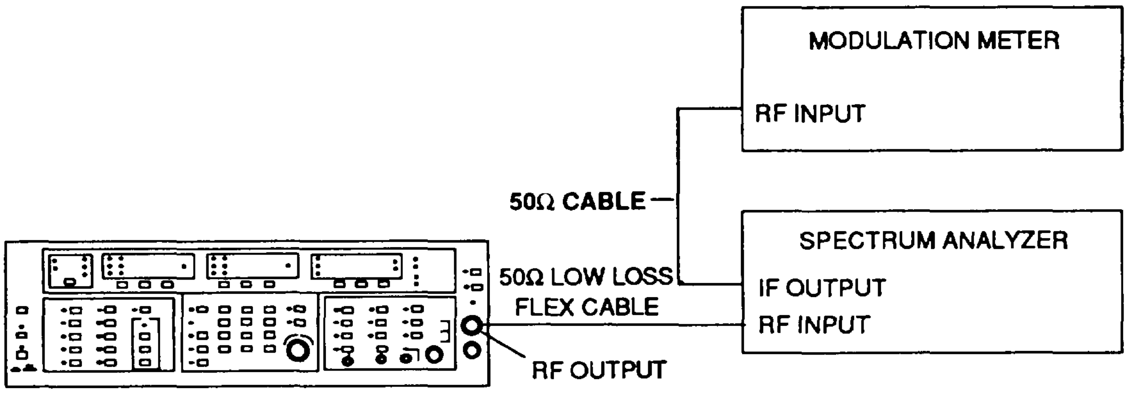
1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. On SG-1206,
   - Press RESET key.
   - Press MANUAL SWEEP key.
   - Press CW CF key and set to 2.050 GHz.
4. Set Power Meter CAL FACTOR to Power Sensor's 2 GHz setting.
5. Record Power Meter reading.
6. On SG-1206,
   - Press LEVEL key.
   - Enter -9.9 on keypad and press MHz/d B/ins key (will display –2.9 dBm).
7. Record Power Meter reading.
8. On SG-1206,
   - Press dB/SWEEP key.
   - Enter +9.9 on keypad and press MHz/d B/ins key.
   - Press SHIFT key, then POWER SWEEP key.
   - Rotate MANUAL SWEEP control fully CW.
9. Verify Power Meter reading is ±1.0 dB from the indication recorded in step 5.
10. On SG-1206, rotate MANUAL SWEEP control fully CCW.
11. Verify Power Meter reading is ±1.0 dB from the indication recorded in step 7.
12. On SG-1206, set RF ON to OFF.
13. Disconnect test equipment.

RESIDUAL FM TEST.

1. Connect test equipment as shown.



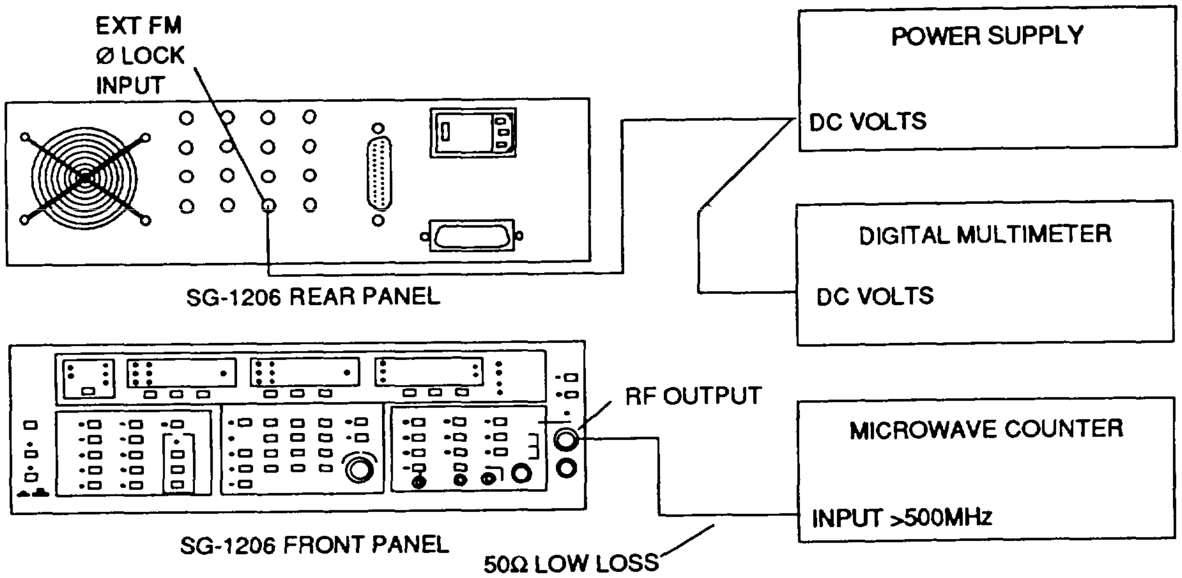
2. On SG-1206,
   - Press RESET key.
   - Press CW F1 key and set to 0.050 GHz.
3. Set Spectrum Analyzer controls as follows:
   - Span/Div to 1 MHz.
   - Vertical scale to 10 dB.
   - Resolution bandwidth to 100 kHz.
   - Sweep time to AUTO.
   - Adjust center-frequency control(s) to position output signal on center-frequency graticule line.
   - Set span to O Hz.
   - Adjust reference level controls to position the signal peak at the top graticule line.
4. Verify that frequency deviation as measured on Modulation Meter is <5.0 kHz.
5. Repeat steps 2 through 4 using SG-1206 F1 frequencies shown below. At each frequency, verify the Modulation Meter reading is within specified limits.

F1 Frequency	Frequency Deviation
1.800 GHz	<5. o kHz
7.800 GHz	<15.0 kHz
12.000 GHz	<15.0 kHz
20.000 GHz	<15.0 kHz

6. On SG-1206, set RF ON to OFF.
7. Disconnect test equipment.

EXTERNAL FM AND PHASE-LOCK TEST.

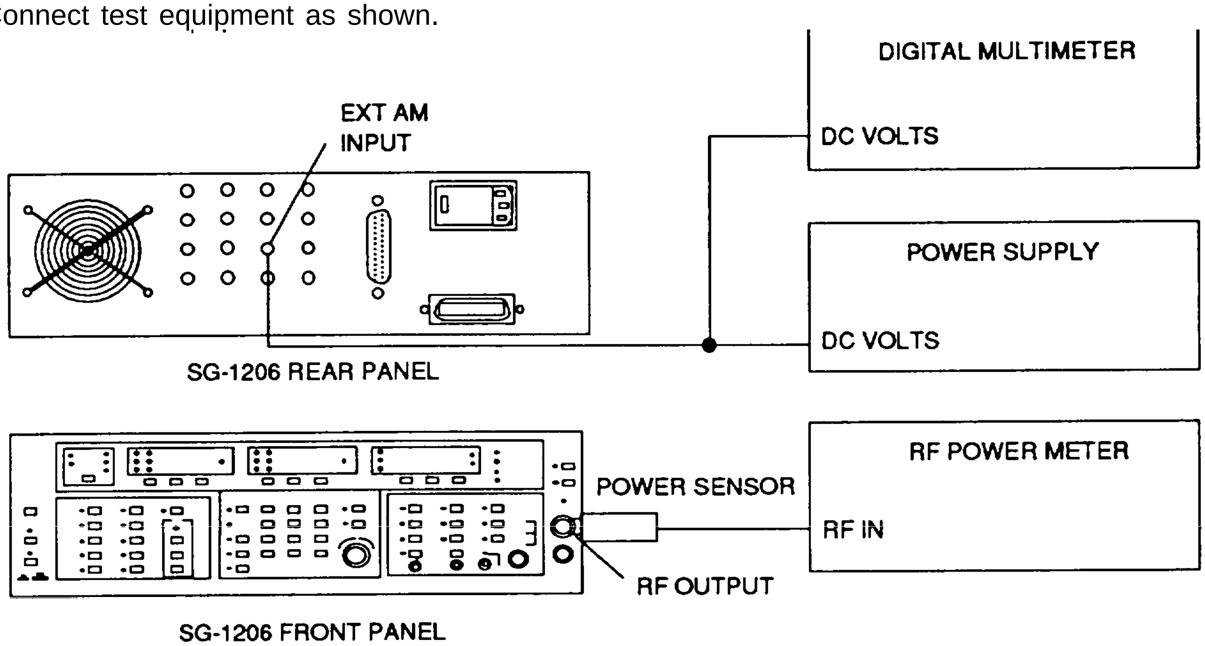
1. Connect test equipment as shown.



2. On SG-1206,
   - Press RESET key.
   - Press CW CF key.
3. Set Power Supply output for –4.00 Vdc ±0.04 Vdc.
4. On SG-1206,
   - Using FREQUENCY VERNIER keys, set frequency as shown on Microwave Counter to 10 GHz ±1 MHz. Record frequency to 100 kHz resolution.
   - Press -6 MHz/V key and verify frequency increases by 24.0 MHz ±5 MHz.
   - Press SHIFT key, -60 MHz/V key, and verify frequency increases by 240 MHz ±50 MHz.
5. Set Power Supply output for +4.00 Vdc ±0.04 Vdc.
6. On SG-1206,
   - Using FREQUENCY VERNIER keys, set frequency as shown on Microwave Counter to 10 GHz ±1 MHz. Record frequency to 100 kHz resolution.
   - Press -6 MHz/V key and verify frequency decreases by 24.0 MHz ±5 MHz.
   - Press SHIFT key, -60 MHz/V key, and verify frequency decreases by 240 MHz ±50 MHz.
7. On SG-1206, set RF ON to OFF.
8. Disconnect test equipment.

AM SENSITIVITY AND FREQUENCY RESPONSE TEST.

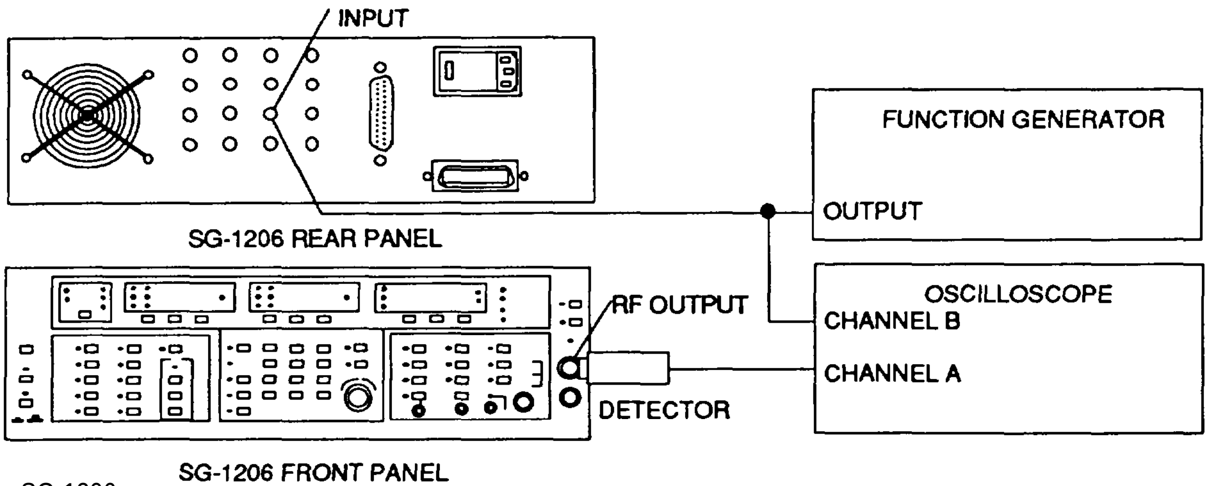
1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. Set Power Meter CAL FACTOR to Power Sensor's 10 GHz setting.
4. Set Power Supply controls as follows:
   - Output to –5.0 Vdc ±0.2 Vdc.
   - Power switch to OFF.
5. On SG-1206,
   - Press RESET key.
   - Press CW CF key.
6. Record Power Meter reading.
7. Set Power Supply power switch to ON.
8. Verify Power Meter reading decreases by ±5 dB ±1 dB from the indication recorded in step 6.
9. On SG-1206, set RF ON to OFF.
10. Disconnect test equipment.

AM BAND WIDTH VERIFICATION TEST.

1. Connect test equipment as shown.



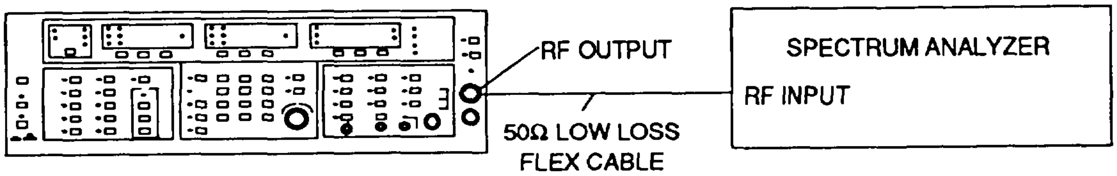
2. On SG-1206,
   - Press RESET key.
   - Press LEVEL key and set to +2.0 dBm.
3. On SG-1206, press CW CF key and set to 15.000 GHz.
4. Set Function Generator controls as follows:
   - Function to sine wave.
   - Output frequency to 10 kHz.
   - Output level to 2 V p-p.
5. Set Oscilloscope channel A vertical controls until the displayed sine wave spans 8 major vertical divisions.
6. Set Function Generator output frequency to 100 kHz.
7. Verify waveform amplitude is greater than 4 minor vertical divisions (0.8 major division).
8. Repeat steps 3 through 7 with SG-1206/U CF frequency and Function Generator output frequency set as follows.

CF Frequency (step 3)	Function Generator Frequency (step 6)
10.000 GHz	100 kHz
5.000 GHz	100 kHz
1.000 GHz	20 kHz

9. On SG-1206, set RF ON to OFF.
10. Disconnect test equipment.

RF OUTPUT HARMONIC ATTENUATION TEST.

1. Connect test equipment as shown.



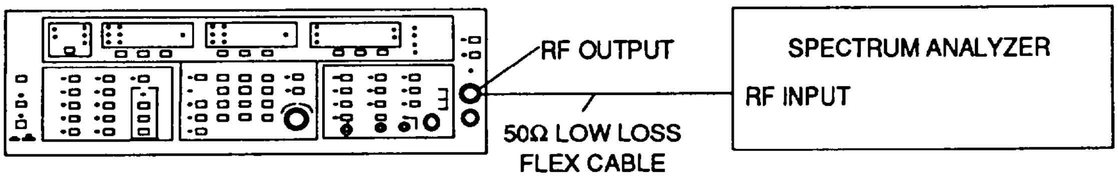
2. On SG-1206,
   - Press RESET key.
   - Press LEVEL key and set to +10.0 dBm.
3. On SG-1206, press CW F1 key and set to 0.010 GHz.
4. Set Spectrum Analyzer controls as follows:
   - Span/Div to 5 MHz.
   - Vertical scale to 10 dB.
   - Resolution bandwidth to 100 kHz.
   - Sweep time to AUTO.
   - Adjust center-frequency control(s) to position the fundamental signal on center-frequency graticule line.
   - Adjust reference level controls to position fundamental signal peak at top graticule line.
   - Measure (2nd) harmonic and verify level is ← 25 dBc.
   - Measure (3rd) harmonic and verify level is ← 25 dBc.
   - Measure any desired harmonically related signal and verify level is ← 25 dBc.
5. Repeat steps 3 and 4 using SG-1206 F1 frequencies shown below. At each frequency, verify harmonically related signal levels are within specified limits.

F1 Frequency	Measured Harmonics
1.000 GHz	<–25 dBc
2.000 GHz	<–25 dBc
3.000 GHz	<-25 dBc
4.000 GHz	<–25 dBc
5.000 GHz	<–25 dBc
6.000 GHz	<–25 dBc
7.000 GHz	<–25 dBc
8.000 GHz	<-25 dBc
9.000 GHz	<-25 dBc
10.000 GHz	<–25 dBc
11.000 GHz	<–25 dBc
12.000 GHz	<–25 dBc
13.000 GHz	<–25 dBc
14.000 GHz	<–25 dBc
15,000 GHz	<–25 dBc
16.000 GHz	<–25 dBc
17.000 GHz	<–25 dBc
18.000 GHz	<–25 dBc

6. On SG-1206, set RF ON to OFF.
7. Disconnect test equipment.

RF OUTPUT SPURIOUS SIGNALS TEST.

1. Connect test equipment as shown.



2. On SG-1206,
   - Press RESET key.
   - Press LEVEL key and set to +10.0 dBm.
   - Press CW F1 key and set to 0.010 GHz.
3. Set Spectrum Analyzer controls as follows:
   - Span/Div to 10 MHz.
   - Vertical scale to 10 dB.
   - Resolution bandwidth to 100 kHz.
   - Sweep time to AUTO.
   - Adjust center-frequency control(s) to position the fundamental signal on center-frequency graticule line.
   - Adjust reference level controls to position the fundamental signal peak at the top graticule line.
4. Tune the SG-1206/U to any desired frequency between 10 MHz and 20 GHz in search of spurious signals (not harmonically related) using the DE CR-INCR control. Verify any spurious signals present are ←45 dBc.

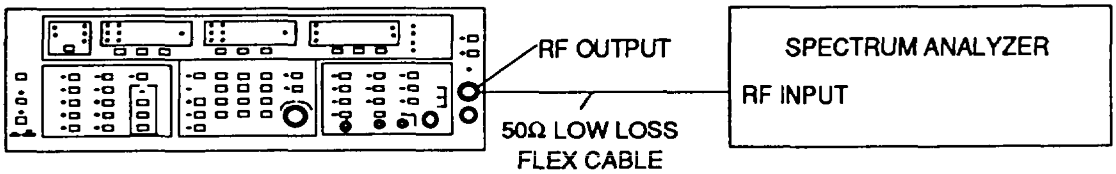
NOTE

Spurious signals will be weak in amplitude (–40 to -60 dBc), and may appear and disappear abruptly.

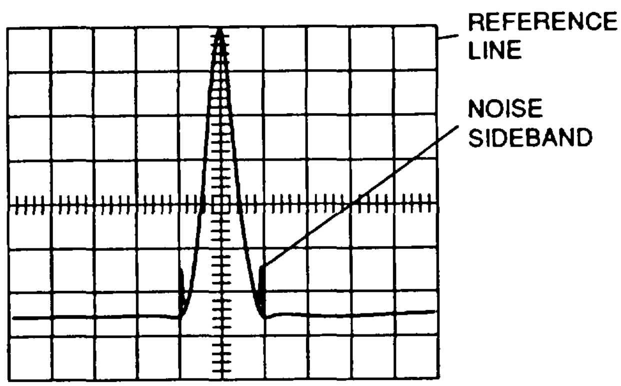
5. On SG-1206, set RF ON to OFF.
6. Disconnect test equipment.

RF OUTPUT POWER SOURCE AND DISPLAY SIGNALS TEST.

1. Connect test equipment as shown.



2. On SG-1206,
   - Press RESET key.
   - Press LEVEL key and set to +10.0 dBm.
3. On SG-1206, press CW F1 key and set to 2.100 GHz.
4. Set Spectrum Analyzer controls as follows:
   - Span/Div to 100 kHz.
   - Vertical scale to 10 dB.
   - Resolution bandwidth to 10 kHz.
   - Sweep time to AUTO.
   - Adjust center-frequency control(s) to position the fundamental signal on center-frequency graticule line.
   - Adjust reference level controls to position the fundamental signal peak at the top graticule line.
   - Verify that noise sidebands located 50 kHz (and 'multiples thereof) from fundamental frequency are <-45 dBc as shown.



NOTE

When looking for sidebands, maintain a minimum 10 dB sideband-to-noise ratio.

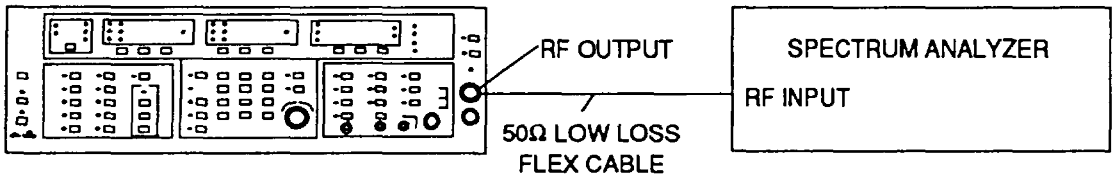
5. Repeat steps 3 and 4 using the following SG-1206 F1 frequencies. At each frequency, verify noise sidebands are within specified limits.

F1 Frequency	Measured Noise Sidebands
7.900 GHz	<-45 dBc
8.100 GHz	<–45 dBc
12.300 GHz	<-45 dBc
12.500 GHz	<-45 dBc
20.000 GHz	<-45 dBc

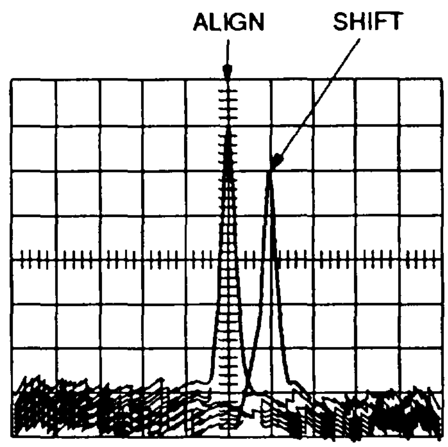
6. On SG-1206, set RF ON to OFF.
7. Disconnect test equipment.

RF OUTPUT FREQUENCY STABILITY-VS-OUTPUT LEVEL TEST.

1. Connect test equipment as shown.



2. On SG-1206,
   - Press RESET key
   - Press CW F1 key and set to 2.100 GHz.
3. Set Spectrum Analyzer controls as follows:
   - Span/Div to 100 kHz.
   - Vertical scale to 10 dB.
   - Resolution bandwidth to 10 kHz
   - Sweep time to AUTO.
   - Adjust center-frequency control(s) to position the fundamental signal on center-frequency graticule line.



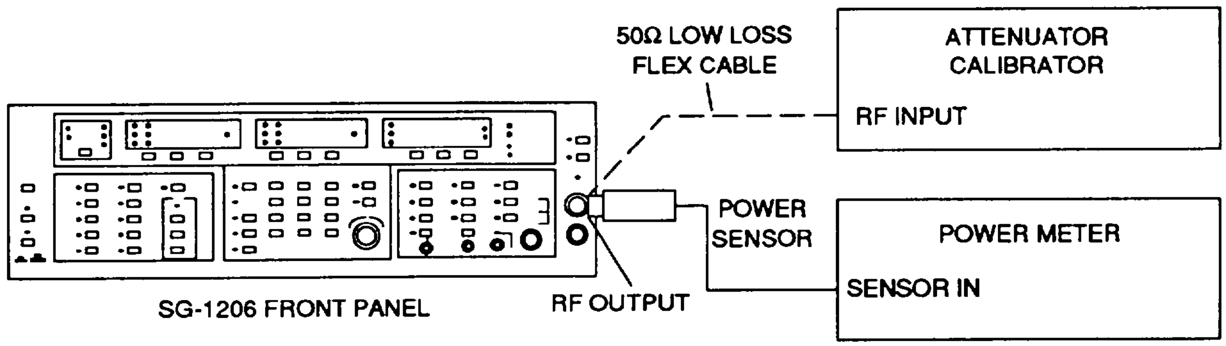
4. On SG-1206,
   - Press LEVEL key.
   - Enter -9.9 on keypad and press MHz/dB/ms key (will display -2.9 dBm).
5. Verify that displayed signal moves away from center line by <500 kHz in either direction after display has settled as shown.
6. On SG-1206, press LEVEL key and set to +7.0 dBm.
7. Repeat steps 2 thru 6 using SG-1206 F1 frequencies, Spectrum Analyzer Span/Div shown below. Verify readings are within specified limits.

SG-1206/U F1 Frequency (step 2)	Spectrum Analyzer Span/Div (step 3)	Displayed Signal Movement (step 5)
7.900 GHz	200 kHz/Div	<600 kHz
8.100 GHz	500 kHz/Div	<600 kHz
12.300 GHz	500 kHz/Div	<600 kHz
12.500 GHz	500 kHz/Div	<600 kHz
20.000 GHz	500 kHz/Div	<600 kHz

8. On SG-1206, set RF ON to OFF.
9. Disconnect test equipment.

RF OUTPUT STEP ATTENUATOR ACCURACY TEST.

1. Zero Power Meter and Power Sensor.
2. Connect test equipment as shown.



3. On SG-1206,
   - Press RESET key.
   - Press CW F1 key and set to 1.900 GHz.
4. Set Power Meter CAL FACTOR to Power Sensor's 1.9 GHz setting.
5. On SG-1206, press LEVEL key and set to +0.0 dBm.
6. Verify Power Meter reading is 0.0 dBm ±2.6 dB.
7. Disconnect the Power Meter, and connect the Attenuator Calibrator as shown previously.
8. Set Attenuator Calibrator controls as follows:
   - Press MEASUREMENT ON button.
   - Press REFERENCE button.
   - Press ON button.
   - Press MEAS-REF button.
9. On SG-1206, press LEVEL key and set to –10 dBm.
10. Verify the Attenuator Calibrator reads 10 dB ± 2.6 dB.
11. Repeat steps 9 and 10 using SG-1206 levels shown below. Verify readings are within specified limits.

SG-1206/U Level	Attenuator Calibrator Reading
–10 dBm	10 dBm ±2.6 dB
–20 dBm	20 dBm ±2.6 dB
–30 dBm	30 dBm ±2.6 dB
–40 dBm	40 dBm ±2.6 dB
–50 dBm	50 dBm ±2.6 dB
–60 dBm	60 dBm ±2.6 dB
–70 dBm	70 dBm ±2.6 dB
–80 dBm	80 dBm ±2.6 dB

12. On SG-1206, set RF ON to OFF.
13. Disconnect test equipment.

2-33. ADJUSTMENTS.

DESCRIPTION

The adjustment procedures cover:

- Adjust Power Supply (para 2-35)
- Adjust Analog Sweep Time (para 2-36)
- Adjust A1A5 Frequency Instruction CCA (para 2-37)
- Adjust Marker Frequencies (para 2-38)
- Adjust A1A6, A1A7, A1A8 YIG Drivers (para 2-39)
- Adjust Frequency (para 2-40)
- Adjust Manual Sweep (para 2-41)
- Adjust Frequency Vernier (para 2-42)
- Adjust Δ F <50 MHz Circuit (para 2-43)
- Adjust Tracking Filter (para 2-44)
- Adjust Sweep Rate Compensation (para 2-45)
- Adjust ALC Bandwidth and Low Level Noise (para 2-46)
- Adjust RF Slope (para 2-47)
- Adjust Output Power Level (para 2-48)
- Adjust Power Sweep (para 2-49)
- Adjust Coupler-Detector and Down Converter Detector Tracking (para 2-50)

CAUTION

The RESET state of the Sweep Generator places a +7.0 dB signal sweeping from 10 MHz to 20 GHz at the RF Output connector. Verify that the maximum-power-input rating of any test equipment connected to the output connector is not exceeded.

NOTES

- Specific adjustments may be necessary after repair/replacement of specific assemblies in the SG-1206 or failure of a performance test. Adjustment is not required if malfunction has been cleared after repair.

  Never perform all adjustments from para 2-35 thru 2-50 at one time.
- Do not adjust components unless instructed to do so in the procedures, as many are factory adjustable only.
- The adjustment needed after repair/replacement of specific assemblies are as shown in table 2-2.
- Use A1A14TP3 (fig. FO-14, sheet 1) for all ground connections unless otherwise specified.
- All indications and waveforms are referenced to chassis ground unless otherwise specified.
- All voltages specified as DC unless otherwise specified.
- TTL low logic level is -0.5 to +0.8 V and TTL high logic level is +3.5 to +5.5 v.
- Assembly and cable location diagram is figure FO-1. Individual circuit card component locator diagrams are on figures FO-6 thru FO-20.
- After adjust procedure is completed remove power and install top, bottom, and side covers (para 2-51).

Table 2-2. Post Repair/Replace Adjustments.

Repaired/Replaced Assembly	Adjust
A1A1 GPIB interface CCA	None
A1A2 Ramp Generator CCA	Analog Sweep Time (para 2-36) Marker Frequencies (para 2-38) Frequency (para 2-40) Manual Sweep (para 2-41) Frequency Vernier (para 2-42) Δ F <50 MHz Circuit (para 2-43)
A1A3 Markers Generator CCA	Marker Frequencies (para 2-38) Adjust Power Sweep (para 2-49)
ALC Assembly: A1A4 ALC CCA A4DC1 Directional Coupler A4AT1 Step Attenuator A4S1 PIN Switch A4A1 Down Converter	ALC Bandwidth and Low Level Noise (para 2-46) RF Slope (para 2-47) Output Power Level (para 2-48) Power Sweep (para 2-49) Coupler-Detector and Down Converter Detector Tracking (para 2-50)
A1A5 Frequency Instruction CCA	Analog Sweep Time (para 2-36) A1A5 Frequency Instruction CCA (para 2-37) Marker Frequencies (para 2-38) A1A6, A1A7, A1A8 YIG Drivers (para 2-39) Frequency (para 2-40) Manual Sweep (para 2-41) Frequency Vernier (para 2-42) Δ F <50 MHz Circuit (para 2-43)
A1A13 Switching Power Supply CCA	None
A1A14 Motherboard CCA	Adjust Power Supply (para 2-35).
A2A11 Front Panel CCA	None
A2A12 Microprocessor CCA	None
A4A2 Ku-Band Assembly: A1A8 YIG Driver CCA A4A2G1 YIG Oscillator A4A2Q1, A4A2Q2, and A4A2Q3 Power Transistors	Marker Frequencies (para 2-38) A1A6, A1A7, A1A8 YIG Drivers (para 2-39) Frequency (para 2-40) Manual Sweep (para 2-41) Frequency Vernier (para 2-42) Δ F <50 MHz Circuit (para 2-43)
A4A3 X-Band Assembly: A1A7 YIG Driver CCA A4A3G1/AT1 YIG Oscillator A4A3Q1, A4A3Q2, and A4A3Q3 Power Transistors	Marker Frequencies (para 2-38) A1A6, A1A7, A1A8 YIG Drivers (para 2-39) Frequency (para 2-40) Manual Sweep (para 2-41) Frequency Vernier (para 2-42) Δ F <50 MHz Circuit (para 2-43)
A4A4 S/C-Band Assembly: A1A6 YIG Driver CCA A4A4G1/U1 YIG Oscillator A4A4Q1, A4A4Q2, and A4A4Q3 Power Transistors	Marker Frequencies (para 2-38) A1A6, A1A7, A1A8 YIG Drivers (para 2-39) Frequency (para 2-40) Manual Sweep (para 2-41) Frequency Vernier (para 2-42) Δ F <50 MHz Circuit (para 2-43)

2-34. INITIAL SETUP

1. Remove top cover (para 2-51).

NOTE

Keep the top cover in place during the procedures except when necessary to make an internal connection or adjustment.

2. Perform turn-on procedures TM 11-6625-3231-12, paragraph 2-6.

WARNING

Dangerous voltages are present with the covers removed. Where maintenance can be performed without power applied, the power should be removed.

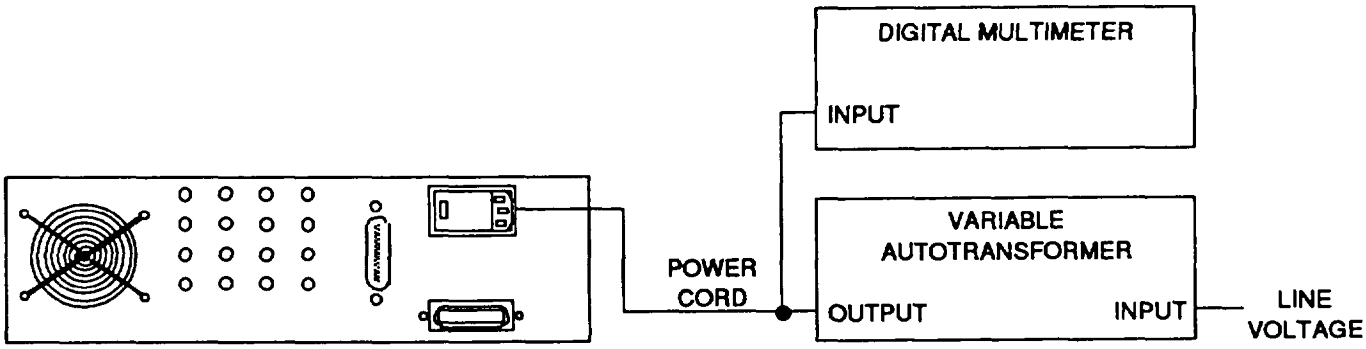
3. On SG-1206,
   - Press RESET key.
   - Set RF ON to OFF.

2-35. ADJUST POWER SUPPLY.

1. Perform Initial Setup procedure (para 2-34).
2. Remove left side cover (para 2-51).
3. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A2 CCA (para 2-53).
   - Set POWER key to ON.
   - Press RESET key.
   - Press CW-F2 key.
   - Rotate A1A14R89 (fig. FO-14, sheet 1) to CW limit (minimum of 15 turns).
4. Read entire step before proceeding. On SG-1206,
   - SLOWLY rotate A1A14R89 CCW until A1A14DS3 JUST goes out.
   - SLOWLY rotate A1A14R89 CW until A1A14DS3 JUST turns on.
   - Adjust A1A14R89 to midpoint of on and off states.
5. On SG-1206, set POWER key to OFF.

2-35. ADJUST POWER SUPPLY — Continued.

6. Connect test equipment as shown.



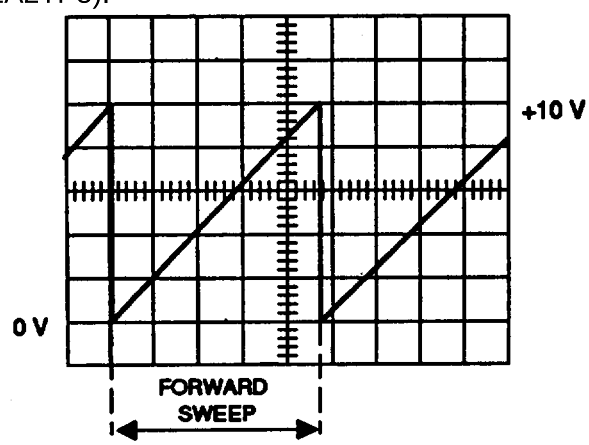
7. Set Variable Autotransformer output to =115 Vat.
8. On SG-1206, set POWER key to ON.
9. Adjust Variable Autotransformer output to 86 Vat.
10. On SG-1206,
    - Adjust A1A14R79 to CW limit.
    - SLOWLY rotate A1A14R79 CCW until A1A14DS5 lights.
    - Adjust Variable Autotransformer to 115 V and verify A1A14DS5 is off.
11. Adjust Variable ‘Autotransformer output to 135 Vat.
12. On SG-1206,
    - Adjust A1A14R80 to CW limit.
    - SLOWLY rotate A1A14R80 CCW until A1A14DS4 lights.
    - Adjust Variable Autotransformer to 115 V and verify A1A14DS4 is off.
13. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A2 CCA.
14. Remove power and disconnect test equipment.

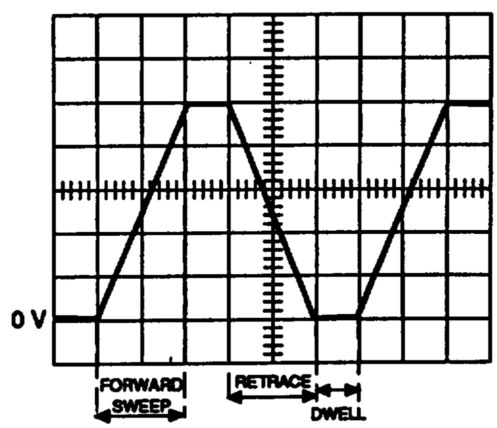
2-36. ADJUST ANALOG SWEEP TIME.

1. Perform Initial Setup procedure (para 2-34).
2. On SG-1206,
    - Set POWER key to OFF.
    - Remove A1A2 CCA (para 2-53) and reinstall on CCA extender.
    - Set POWER key to ON.
    - Press RESET key.
    - Press SWEEP TIME key and set to 99.00 seconds.
3. Connect Digital Multi meter (+) lead to A1A2TP6 (fig, FO-7) and (-) lead to A1A2TP5.

2-36. ADJUST ANALOG SWEEP TIME — Continued.

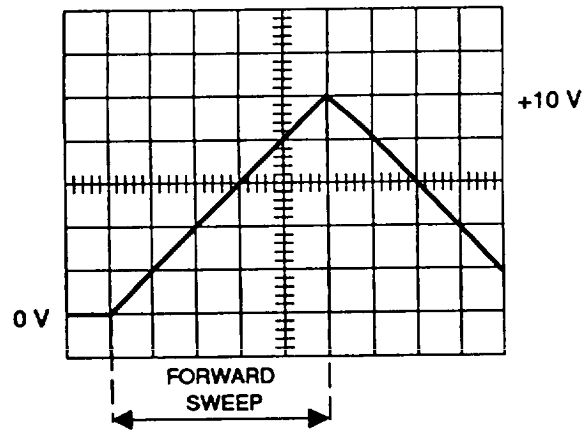
4. Connect SG-1206 HORIZ OUTPUT connector to Oscilloscope channel A input using a 50 Ω BNC cable.
5. Set Oscilloscope controls as follows:
   - Horizontal controls to 0.5 sec/Div.
   - Vertical controls to 1 V/Div.
   - Coupling to DC.
   - 0 Volt reference to bottom graticule line.
6. While ramp voltage is increasing as displayed on Oscilloscope, adjust A1A2R31 for Digital Multimeter reading of +10 Vdc ±0.01 V.
7. Connect Digital Multimeter (+) lead to A1A2TP7.
8. While ramp voltage is from 1 to 10 V as displayed on Oscilloscope, adjust A1A2R39 for Digital Multimeter reading of +0 Vdc ±0.1 V.
9. Connect Digital Multimeter (+) lead to A1A2TP4.
10. On SG-1206,
    - Press SWEEP TIME key and set to 0.050 seconds.
    - Press EXT OR SINGLE key twice (triggers a sweep).
    - Wait ≈ 30 seconds (for voltage to settle).
    - Adjust A1A2R76 for Digital Multimeter reading of +10 Vdc ±0.05 V.
11. Connect Oscilloscope input to A1A2TP4 (ground to A1A2TP5).
12. Set Oscilloscope controls as follows:
    - Horizontal controls to 200 msec/Div.
    - Vertical controls to 2 V/Div.
    - Coupling to DC.
    - 0 Volt reference to graticule line 2nd from bottom.
13. On SG-1206,
    - Press AUTO key.
    - Press ΔF CF key.
    - Press SWEEP TIME key and set to 0.900 second.
    - Adjust A1A2R10 for forward sweep duration of 0.9 sec ±0.1 sec as shown.
14. Set Oscilloscope horizontal controls to 5 msec/Div.
15. On SG-1206,
    - Press SWEEP TIME key and set to 0.010 second.
    - Adjust A1A2R6 for forward sweep duration of 10 msec ±1 msec and dwell 5 msec ±0.2 msec as shown.





2-36. ADJUST ANALOG SWEEP TIME — Continued.

16. Set Oscilloscope horizontal controls to 200 msec/Div.
17. On SG-1206,
    - Press SWEEP TIME key and set to 1.000 second.
    - Adjust A1A2R17 for forward sweep duration of 1 sec ±0.1 sec as shown.
18. On SG-1206,
    - Set POWER key to OFF.
    - Reinstall A1A2 CCA.
19. Remove power and disconnect test equipment.



2-37. ADJUST A1A5 FREQUENCY INSTRUCTION CCA.

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1. Perform Initial Setup procedure (para 2-34).

NOTE

If repair was not performed in F Center circuit (A1A5U9 thru A1A5U12 and associated components, fig. FO-10) proceed with the V/GHz Adjustment.

F Center Adjustment.

1. On SG-1206,
    - Set POWER key to OFF.
    - Remove A1A5 CCA (para 2-53) and reinstall on CCA extender.
    - Remove A1A5 F Center Cover (para 2-54).
    - Set POWER key to ON.
    - Press RESET key.
    - Press SHIFT key.
    - Press Δ F CF key.
2. Connect Digital Multi meter (+) lead to A1A5TP2 (fig. FO-10, sheet 1) and (-) lead to A1A5TP3.
3. On SG-1206,
    - Adjust A1A5R23 for 0 V ±50 µV.
    - Set POWER key to OFF.
    - Reinstall A1A5 F Center circuit cover.
    - Reinstall A1A5 CCA.
    - Set POWER key to ON.

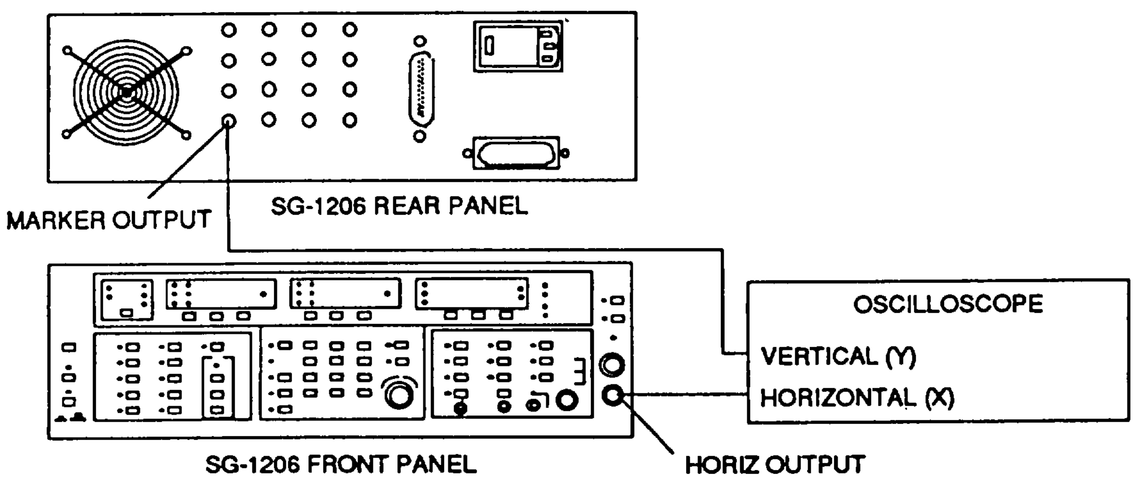
2-37. ADJUST A1A5 FREQUENCY INSTRUCTION CCA — Continued.

V/GHz Adjustment.

4. Connect Digital Multi meter to SG-1206 rear panel V/GHz connector using a 50 Ω BNC cable.
5. On SG-1206,
   - Set RF ON to ON.
   - Press CW F1 key and set to 20.000 GHz.
   - Adjust A1A5R47 for 20 V ±0.02 V.
   - Set POWER key to OFF.
6. Remove power and disconnect test equipment.

2-38. ADJUST MARKER FREQUENCIES.

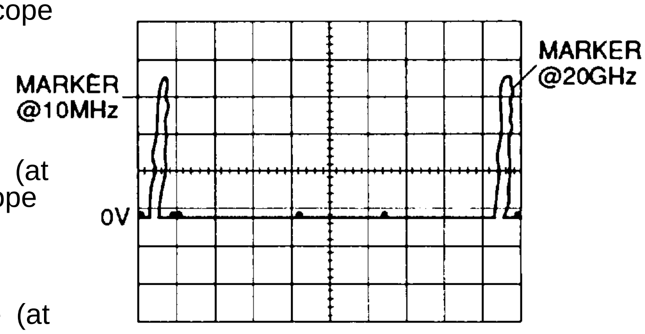
1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Connect test equipment as shown.



4. On SG-1206,
   - Set RF ON to ON.
   - Press M2 key.
   - Press SELECTED MARKER OFF key.
   - Rotate front panel MARKER AMPLITUDE control fully CW.
5. Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical controls to 2 V/ Div.
   - Coupling to DC.
   - Adjust horizontal channel controls so trace extends full width of screen (10 divisions).

2-38. ADJUST MARKER FREQUENCIES — Continued.

6. On SG-1206,
   - Press M1 key and set to 0.010 GHz.
   - Adjust A1A3R13 (fig. FO-8) until M1 marker is just visible (at maximum amplitude) at left edge of Oscilloscope display as shown.
   - Press M1 key and set to 20.000 GHz.
   - Adjust A1A3R9 until M1 marker is just visible (at maximum amplitude) at right edge of Oscilloscope display as shown.
   - Press SELECTED MARKER OFF key.
   - Press M2 and set to 0.010 GHz.
   - Adjust A1A3R21 until M2 marker is just visible (at maximum amplitude) at left edge of Oscilloscope display as shown.
   - Press M2 and set to 20.000 GHz.
   - Adjust A1A3R18 until M2 marker is just visible (at maximum amplitude) at right edge of Oscilloscope display as shown.
   - Press SELECTED MARKER OFF key.



7. Repeat step 6 selecting markers M3 thru M8 and performing the adjustments as listed below.

NOTE

Markers M3 thru M8 are enabled by first pressing the SHIFT key, then the desired marker key M3-M8).

Marker	10 MHz Adjust (left)	20 GHz Adjust (right)
M3 (SHIFT F1)	A1A3R30	A1A3R28
M4 (SHIFT CF)	A1A3R41	A1A3R38
M5 (SHIFT M1)	A1A3R49	A1A3R47
M6 (SHIFT F2)	A1A3R58	A1A3R56
M7 (SHIFT ΔF)	A1A3R68	A1A3R65
M8 (SHIFT M2)	A1A3R77	A1A3R74

8. On SG-1206,
   - Set POWER to OFF.
   - Install CCA Retainer.
9. Remove power and disconnect test equipment.

2-39. ADJUST A1A6, A1A7, A1A8 YIG DRIVER CCAs.

1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Connect Digital Multi meter (+) lead to A1A6TP5 (fig. FO-11) and (-) lead to A1A6TP1.
4. On SG-1206,
   - Set RF ON to ON.
   - Press CW F1 key and set to 2.000 GHz.
   - Rotate A1A6R67 CCW until Digital Multimeter indicates TTL low.
   - SLOWLY rotate A1A6R67 CW until Digital Multimeter JUST changes to TTL high.
5. Repeat step 5 at SG-1206 F1 frequencies, Digital Multi meter connection points, and adjustment as indicated below.

F 1 Frequency	Digital Multi meter (+) Lead	Digital Multi meter (-) Lead	Adjust
8.000 GHz	A1A6TP3	A1A6TP1	A1A6R49
12.400 GHz	A1A7TP3	A1A7TP1	A1A7R49

6. Rotate A1A8R49 to CW limit (minimum of 15 turns).
7. On SG-1206,
   - Set POWER to OFF.
   - Install CCA Retainer.

Remove power and disconnect test equipment.

2-40. ADJUST FREQUENCY.

1. Perform Initial Setup procedure (para 2-34).
2. Loosen CCA Retainer (para 2-53 steps 1 and 2) but leave down.
3. Connect Microwave Counter >500 MHz input to SG-1206 RF OUTPUT connector using a 50 Ω low loss flex cable.

NOTE

- Allow SG-1206 1-hour warm-up with covers in place before making frequency adjustments.
- When making frequency adjustments, quickly remove top cover, adjust component, then set top cover back in place.

2-40. ADJUST FREQUENCY — Continued.

2. On SG-1206,
   - Set RF ON to ON.
   - Press CW F1 key and set to 2.100 GHz.
   - Press CW F2 key and set to 7.900 GHz.
   - Press CW F1 key, wait ten seconds, then press CW F2 key and wait ten seconds. Repeat CW F1/CW F2 sequence two more times to set YIG hysteresis.
3. On SG-1206, press CW F1 key. After one minute verify Counter reads from 2.100 GHz to 2.102 GHz.
   - If incorrect, adjust A1A6R12 (fig. FO-11) until reading is within specified limits.
4. On SG-1206, press CW F1 key. After one minute verify Counter reads from 2.100 GHz to 7.900 GHz.
   - If incorrect, adjust A1A6R6 until reading is within specified limits.
5. Repeat steps 3 and 4 until both readings are within specified limits.
6. Repeat steps 3 thru 5 using SG-1206 F1 and F2 frequencies shown below. If readings are out of specified limits, perform adjustment indicated.

F1 Frequency (GHz)			F2 Frequency (G Hz)		
CW F1	Counter Reading	Adjust	CW F2	Counter Reading	Adjust
8.100	8.100 to 8.102	A1A7R12	12.300	12.298 to 12.300	A1A7R6
12.500	12.500 to 12.502	A1A8R12	20.000	19.998 to 20.000	A1A8R6

7. On SG-1206,
   - Press CW F1 key and set to 1.000 GHz.
   - Adjust A1A6R83 until Counter reads 1.000 GHz ±1 MHz.
8. On SG-1206,
   - Press CW F1 key and set to 0.010 GHz.
   - Move 50 Ω low loss cable from Counter >500 MHz input to <500 MHz input, and verify Counter reads from 9 MHz to 14 MHz.
   - Press CW F1 key and set to 1.900 GHz.
   - Move 50 Ω low loss cable from Counter <500 MHz input to >500 MHz input, and verify Counter reads from 1.895 GHz to 1.905 GHz.
   - If either reading is incorrect, repeat step 7 until both readings are within specified limits.
9. On SG-1206,
   - Set POWER to OFF.
   - Install CCA Retainer.
10. Remove power and disconnect test equipment.

2-41. ADJUST MANUAL SWEEP.

1. Perform Initial Setup procedure (para 2-34).
2. On SG-1206,
   - Set POWER key to OFF.
   - Remove A1A5 CCA (para 2-53), jumper A1A5TP13 (fig. FO-10, sheet 1) and A1A5TP14.
   - Reinstall A1A5 CCA leaving CCA Retainer screw loose.
   - Set POWER key to ON.
   - Press RESET key.
3. Connect Microwave Counter >500 MHz input to SG-1206 RF OUTPUT connector using a 50 Ω low loss flex cable.

NOTE

- Allow SG-1206 1-hour warm-up with covers in place before making frequency adjustments.
- When making frequency adjustments, quickly remove top cover, adjust component, then set top cover back in place.

4. On SG-1206,
   - Press F1-F2 key.
   - Press F1 and set to 2.100 GHz.
   - Press F2 key and set to 7.900 GHz.
   - Press MANUAL SWEEP key and rotate front panel control fully CCW.
5. Verify Counter reads 2.100 GHz ±5 MHz.
   - If incorrect, adjust A1A6R3 (fig. FO-11) until reading is within specified limits.
6. On SG-1206, rotate MANUAL SWEEP control fully CW, and verify Counter reads 7.900 GHz ± 5 MHz.
   - If correct, proceed with step 10.
7. Record Counter reading to 1 MHz resolution.
8. Calculate 1/2 the difference of the reading recorded in step 7 from 7.900 GHz (observe the sign), then add result to 2.100 GHz.
   - For example, if recorded reading is 7.890 GHz; difference from 7.900 is –10 MHz, divided by 2 is –5 MHz, added to 2.100 GHz equals 2.095 GHz.
   - For example, if recorded reading is 7.905 GHz; difference from 7.900 is +5 MHz, divided by 2 is +2.5 MHz, added to 2.100 GHz equals 2.103 GHz.
9. On SG-1206,
   - Rotate MANUAL SWEEP control fully CCW.
   - Adjust A1A6R3 to value calculated in step 8.

2-41. ADJUST MANUAL SWEEP — Continued.

10. Repeat steps 4 thru 9 using SG-1206 F1 and F2 frequencies shown below. If readings are out of specified limits, perform adjustment indicated.

F1 Frequency (GHz) Manual Sweep Control CCW			F2 Frequency (GHz) Manual Sweep Control CW	
F1	Counter Reading	Adjust	F2	Counter Reading
8.100	8.100 ±0.005	A1A7R3	12.300	12.300 *0.005
12.500	12.500 ±0.005	A1A8R3	20.000	20.000 *0.005

11. On SG-1206,
    - Set POWER to OFF.
    - Remove A1A5 CCA, remove jumper, then reinstall CCA.
12. Remove power and disconnect test equipment.

2-42. ADJUST FREQUENCY VERNIER.

1. Perform Initial Setup procedure (para 2-34).
2. Connect Microwave Counter >500 MHz input to SG-1206 RF OUTPUT connector using a 50 Ω low loss flex cable.

NOTE

- Allow SG-1206 1-hour warm-up with covers in place before making frequency adjustments.
- When making frequency adjustments, quickly remove top cover, adjust component, then set top cover back in place.

3. On SG-1206,
    - Press RF ON key to ON.
    - Press CW CF key and set to 2.100 GHz.
    - Press FREQUENCY VERNIER OFF key.
4. After one minute record Counter reading to 100 kHz resolution.
5. On SG-1206,
    - Press and hold FREQUENCY VERNIER INCREASE key until frequency stops increasing.
    - Adjust A1A6R9 (fig. FO-11) until Counter reads 12.7 MHz higher than the value recorded in step 4, ±0.2 MHz.
    - Press FREQUENCY VERNIER OFF key.
6. After one minute record Counter reading to 100 kHz resolution.
7. On SG-1206, press and hold FREQUENCY VERNIER DECREASE key until frequency stops decreasing.

2-42. ADJUST FREQUENCY VERNIER — Continued.

8. Verify counter reads 12.8 MHz lower than the value recorded in step 6, ±0.4 MHz.
   - If incorrect, repeat steps 3 through 8 until both readings are within specified limits.
9. Repeat steps 3 thru 8 using SG-1206 CF frequencies shown below. If readings are out of specified limits, perform adjustment indicated.

CF Frequency	Adjust
8.100 GHz 12.500 GHz	A1A7R9 A1A8R9

10. Remove power and disconnect test equipment.

2-43. ADJUST Δ F ≤ 50 MHz CIRCUIT.

1. Perform Initial Setup procedure (para 2-34).
2. Connect Microwave Counter >500 MHz input to SG-1206 RF OUTPUT connector using a 50 Ω low loss flex cable.

NOTES

- Allow SG-1206 1-hour warm-up with covers in place before making frequency adjustments.
- When making frequency adjustments, quickly remove top cover, adjust component, then set top cover back in place.

3. On SG-1206,
   - Press RF ON key to ON.
   - Press Δ F CF key.
   - Press CF key and set to 5.000 GHz.
   - Press Δ F key and set to 0 MHz.
   - Press MANUAL SWEEP key.
   - Press FREQUENCY VERNIER INCREASE/DECREASE keys until Counter reads CF frequency ±1 MHz.
   - Press Δ F key and set to 50 MHz.
4. On SG-1206,
   - Rotate MANUAL SWEEP front panel control fully CW.
   - Adjust A1A10R10 (fig. FO-12) for a Counter reading of 5.025 GHz ±1 MHz.
   - Rotate MANUAL SWEEP control fully CCW.
5. Verify Counter reads 4.975 GHz ±5 MHz.
   - If incorrect, repeat steps 3 through 5 until both readings are within specified limits.

2-43. ADJUST Δ F ≤ 50 MHz CIRCUIT — Continued

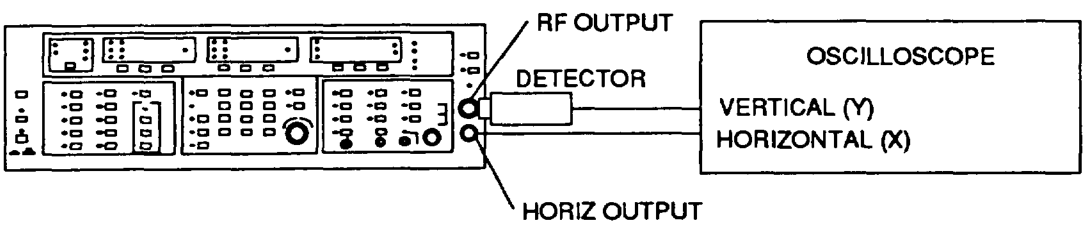
6. Repeat steps 3 thru 5 using SG-1206 CF frequencies shown below. If readings are out of specified limits, perform adjustment indicated.

CF Frequency	Adjust	Counter Reading Manual Sweep Control	
		CW	CCW
10.000 GHz	A1A10R11	10.025 GHz ±1 MHz	9.975 GHz ±5 MHz
15.000 GHz	A1A10R12	15.025 GHz ±1 MHz	14.975 GHz ±5 MHz

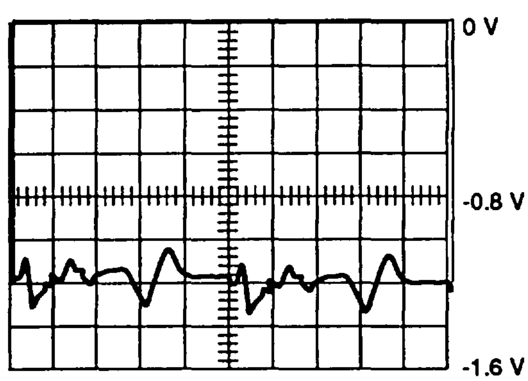
7. Remove power and disconnect test equipment.

2-44. ADJUST TRACKING FILTER.

1. Perform Initial Setup procedure (para 2-34).
2. Connect test equipment as shown.



3. On SG-1206,
   - Set RF ON to ON.
   - Press LEVEL key and set to +10.0 dBm.
   - Press F1-F2 key.
   - Press F1 key and set to 2.000 GHz.
   - Press F2 key and set to 8.000 GHz.
4. Set Oscilloscope controls as follows (calibrates display to 10 dBm power level):
   - Mode to X:Y.
   - Vertical (Y) controls to 0.2 V/Div.
   - Coupling to DC.
   - Adjust horizontal (X) channel controls so trace extends full width of screen (10 divisions).
   - Adjust vertical (Y) channel cal control so trace deflects 4 or 5 divisions.
5. On SG-1206, press INTERNAL key (leveling to off). Disregard UNLEVELED indicator.
6. Set Oscilloscope vertical (Y) channel controls to obtain a waveform similar to one shown.



2-44. ADJUST TRACKING FILTER — Continued.

7. On SG-1206, alternately adjust A1A6R93 (fig. FO-11) and A1A6R95 to obtain a waveform with the most negative voltage across the display.

NOTE

A1A6R95 adjusts left edge and A1A6R93 adjusts right edge. Adjust to average the waveform at the most negative voltage possible (trade off on sides).

8. On SG-1206,
   - Press INTERNAL key (leveling to on).
   - Press Δ F CF key.
   - Press Δ F key and set to 0.050 GHz.
   - Press CF key and set to 2.000 GHz.
   - Verify UNLEVELED indicator is not lit.
9. On SG-1206, SLOWLY tune CF frequency from 2.000 GHz to 8.000 GHz using DECR-INCR Control. Verify UNLEVELED indicator does not light.
   - If UNLEVELED indicator lights, repeat steps 3 to 9.
10. Remove power and disconnect test equipment.

2-45. ADJUST SWEEP RATE COMPENSATION.

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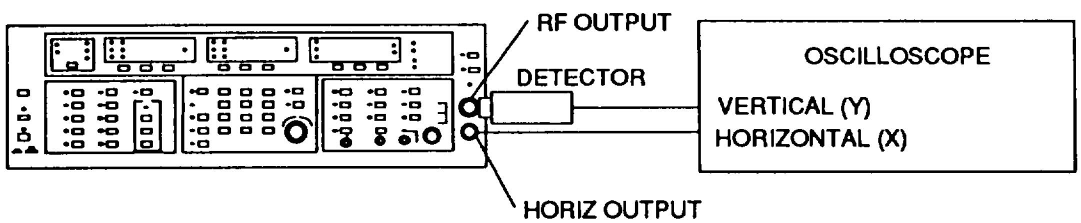
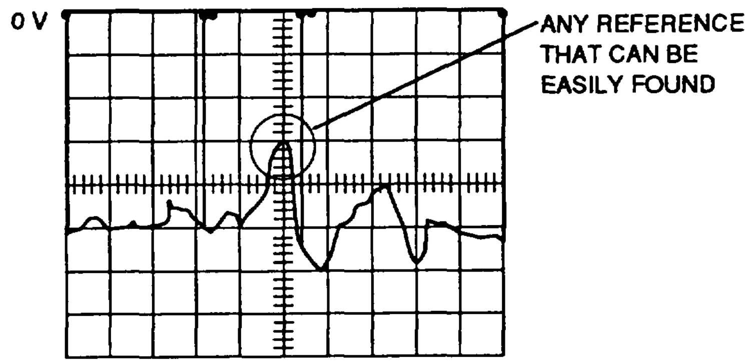
1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Connect test equipment as shown.



4. On SG-1206,
   - Set RF ON to ON.
   - Press INTERNAL key (leveling to off). Disregard UNLEVELED indicator.
   - Press F1-F2 key.
   - Press F1 key and set to 2.100 GHz.
   - Press F2 key and set to 7.900 GHz.
   - Press SWEEP TIME key and set to 0.300 sec.

2-45. ADJUST SWEEP RATE COMPENSATION — Continued.

5. Set Oscilloscope controls as follows (calibrates display to 10 dBm power level):
   - Mode to X:Y.
   - Vertical (Y) controls to 0.5 V/Div.
   - Coupling to DC.
   - Adjust horizontal (X) channel controls so trace extends full width of screen (10 divisions).
   - Adjust vertical (Y) channel controls to obtain a waveform similar to one shown.



6. Set Oscilloscope horizontal (X) channel controls to place a unique, easy to find reference point on the waveform directly over one of the horizontal graticule lines. A peak close to the center of the screen works best, as shown.
7. On SG-1206,
   - Press SWEEP TIME key and set to 0.010 sec.
   - Adjust A1A6R1 (fig. FO-11) until the same reference point on the waveform from step 6, is on the same horizontal graticule line as in step 6 (minimum horizontal shift between both sweep rates).
8. Repeat steps 4 thru 7 using SG-1206 F1 and F2 frequencies shown below. Perform adjustment indicated to minimize horizontal shift between both sweep rates.

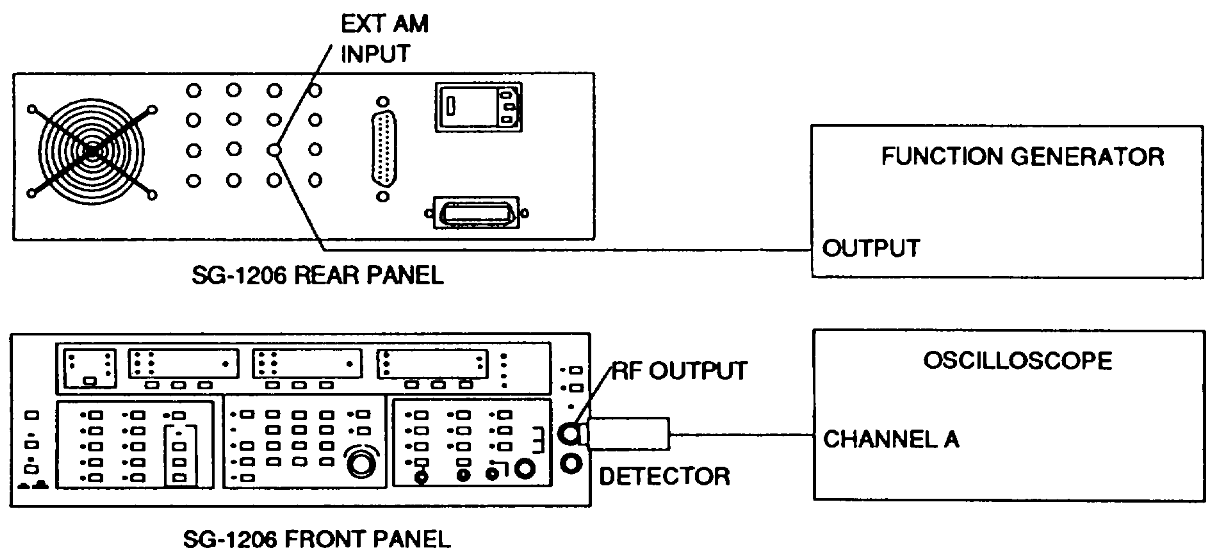
F1 Frequency	F2 Frequency	Adjust
8.100 GHz	12.300 GHz	A1A7R1
12.500 GHz	20.000 GHz	A1A8R1

9. On SG-1206,
   - Set POWER to OFF.
   - Install CCA Retainer.
10. Remove power and disconnect test equipment.

2-46. ADJUST ALC BANDWIDTH AND LOW-LEVEL NOISE.

ALC BANDWIDTH.

1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Connect test equipment as shown.



4. On SG-1206,
   - Set RF ON to ON.
   - Press LEVEL key and set to +10 dBm.
   - Press CW F1 key and set to 15.000 GHz.
5. Test equipment is setup to measure 12.9 dB, as follows:
   - Set Function Generator to off.
   - Set Oscilloscope controls as follows:

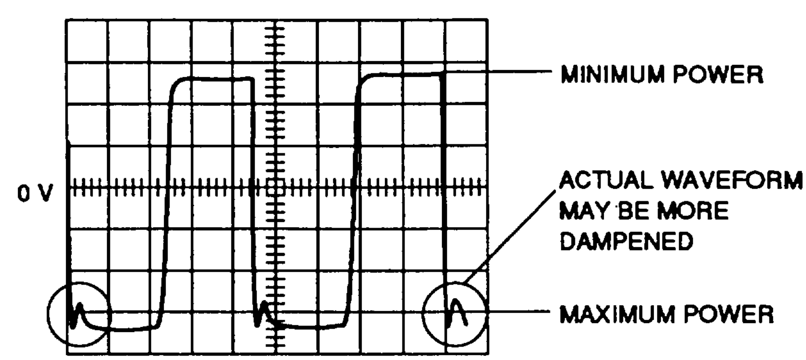
     Vertical controls to 0.05 V/Div.

     Horizontal controls to 20 µsec/Div.

     Vertical input to ground and adjust trace to top graticule line.

     Vertical input coupling to DC.

     Trace to next-to-bottom graticule line using vertical vernier control (called maximum-power reference line for remainder of procedure).



2-46. ADJUST ALC BANDWIDTH AND LOW-LEVEL NOISE — Continued.

- On SG-1206, press LEVEL and set to -2.9 dBm.
- On Oscilloscope, note graticule line of trace (called minimum-power reference line for remainder of procedure).
- On SG-1206, press LEVEL and set to +10.0 dBm.
- Set Function Generator controls as follows:

  Power to ON

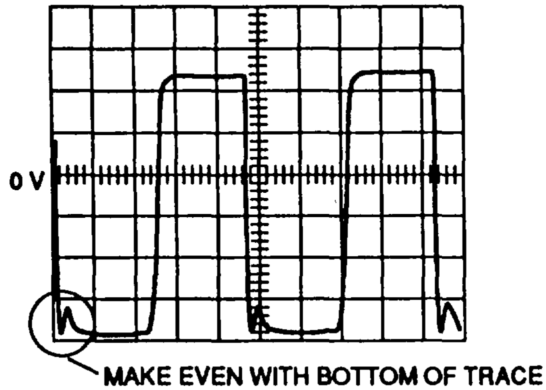
  Offset to 0 V

  Output to 0 V

  Frequency to 10 kHz

  Function to square wave

  Adjust offset and output level controls to provide square wave that fills the area between the minimum and maximum power-reference lines on oscilloscope as shown.



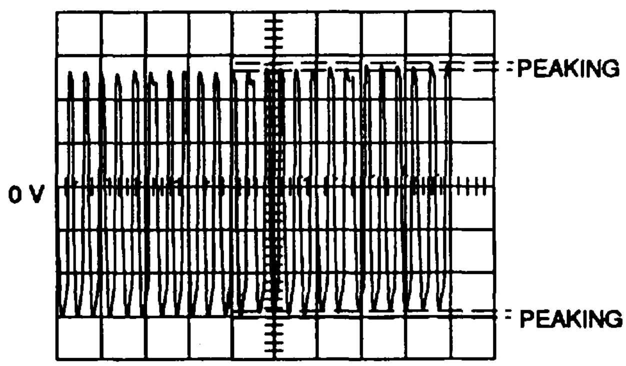
6. On SG-1206, adjust A1A8R33 (fig. FO-11) and A1A4R123 (fig. FO-9) so that bottom of square wave has one cycle of ringing and bottom of ringing wave is level with bottom of square wave as shown.

7. Quickly set Function Generator frequency from 10 kHz to 100 kHz while observing the displayed waveform. Verify amplitude of waveform at 100 kHz does not exceed amplitude of waveform at 10 kHz by more than 5% (any amount of decrease is acceptable).

   - If incorrect, readjust A1A8R33 and A1A4R123 until waveform is within specified limits.

8. Set Function Generator frequency to 10 kHz.

9. Repeat steps 4 thru 8 using SG-1206 output levels and F1 frequencies shown below. Perform adjustment indicated.



NOTE

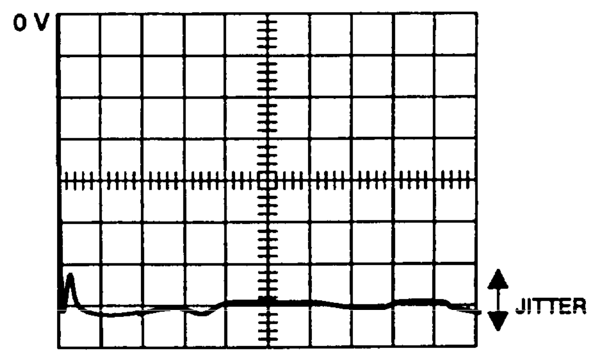
At some of the lower frequencies, ringing may not be as pronounced as in the sample waveform shown. Use adjustments to “square up-the waveform base in these cases.

Level (step 4)	F1 Frequency (step 4)	Adjust
7 dB	10.000 GHz	A1A7R33
7 dB	5.000 GHz	A1A6R33
7 dB	1.000 GHz	A1A4R124 & A1A6R33
7 dB	5.000 GHz	None

2-46. ADJUST ALC BANDWIDTH AND LOW-LEVEL NOISE — Continued.

LOW LEVEL NOISE.

10. On SG-1206,
    - Disconnect Function Generator from EXT AM Input connector.
    - Press RESET key.
    - Press F1-F2 key.
    - Press F2 key and set to 2.000 GHz.
    - Press LEVEL key and set to -2.9 dBm.
11. Connect SG-1206 front panel HORIZ OUTPUT connector to Oscilloscope horizontal input connector (leave vertical input connected).
12. Set Oscilloscope controls as follows:
    - Mode to X:Y.
    - Vertical (Y) controls to 0.02 V/Div.
    - Coupling to DC.
    - Adjust horizontal (X) channel controls so trace extends full width of screen (10 divisions).
    - Adjust vertical (Y) channel controls to obtain a waveform similar to one shown,

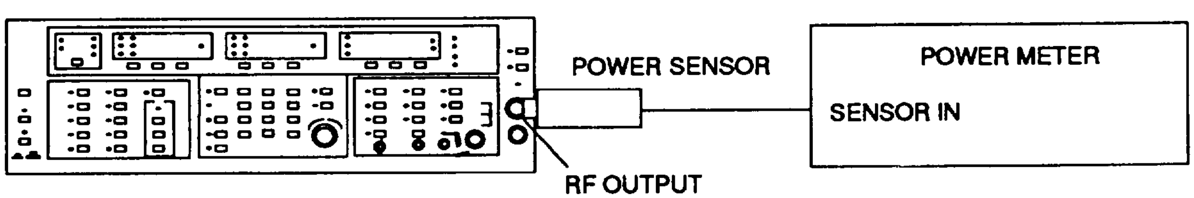


13. On SG-1206,
    - Adjust A1A4R6 (fig. FO-9) for minimum jitter.
    - Press F1 key and set to 2.000 GHz.
    - Press F2 key and set to 20.000 GHz.
    - Adjust A1A4R12 for minimum jitter.
14. On SG-1206,
    - Set POWER to OFF.
    - Install CCA Retainer.
15. Remove power and disconnect test equipment.

2-47. ADJUST RF SLOPE.

---

1. Perform Initial Setup procedure (para 2-34).
2. Zero Power Meter and Power Sensor.
3. Connect test equipment as shown.

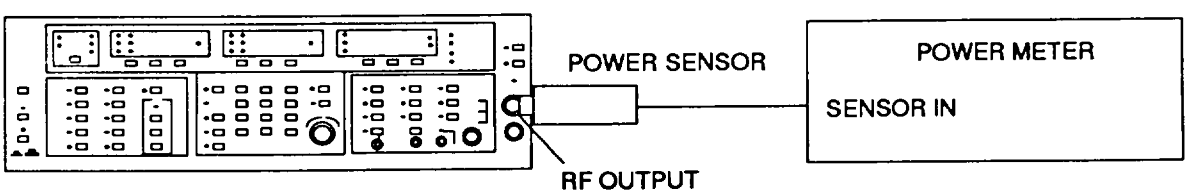


2-47. ADJUST RF SLOPE — Continued.

4. Set Power Meter CAL FACTOR to Power Sensor's 2.1 GHz setting.
5. On SG-1206,
   - Set RF ON to ON.
   - Press LEVEL key and set to -2.9 dBm.
   - Rotate RF SLOPE control fully CCW (off).
6. On SG-1206, press CW F1 key and set to 2.100 GHz.
7. Record Power Meter reading.
8. On SG-1206, press CW F2 key.
9. Set Power Meter CAL FACTOR to Power Sensor's 20 GHz setting.
10. Verify Power Meter reading is the same as in step 7 ±0.1 dB.
    - If incorrect, repeat steps 6 thru 10 adjusting A1A4R115 (fig. FO-9) until both readings are within specified limits.
11. Remove power and disconnect test equipment.

2-48. ADJUST OUTPUT POWER LEVEL.

1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Zero Power Meter and Power Sensor.
4. Connect test equipment as shown.



5. Set Power Meter CAL FACTOR to Power Sensor's 2 GHz setting.
6. On SG-1206,
   - Set RF ON to ON.
   - Press CW F1 key and set to 2,050 GHz.
7. Verify Power Meter reads +7. o dBm ±0.1 dB.
   - If incorrect, adjust A1A4R66 (fig. FO-9) until reading is within specified limits.
8. On SG-1206, press LEVEL key and set to –2.9 dBm.
9. Verify Power Meter reads -2.9 dBm ±0.1 dB.
   - If incorrect, adjust A1A4R72 until reading is within specified limits.
10. On SG-1206, press LEVEL key and set to +7.0 dBm.
11. Repeat steps 7 thru 10 as required until all readings within specified limits.

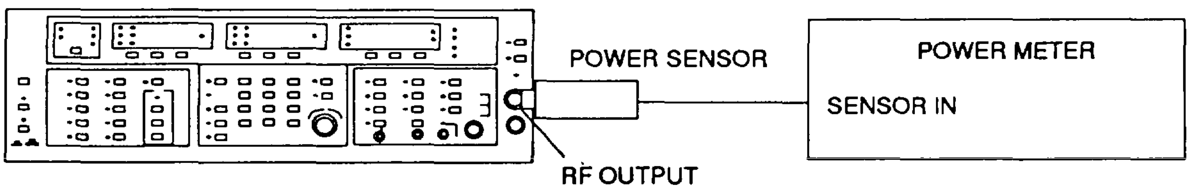
2-48. ADJUST OUTPUT POWER LEVEL — Continued.

12. On SG-1206,
    - Set POWER to OFF.
    - Install CCA Retainer.
13. Remove power and disconnect test equipment.

2-49. ADJUST POWER SWEEP.

---

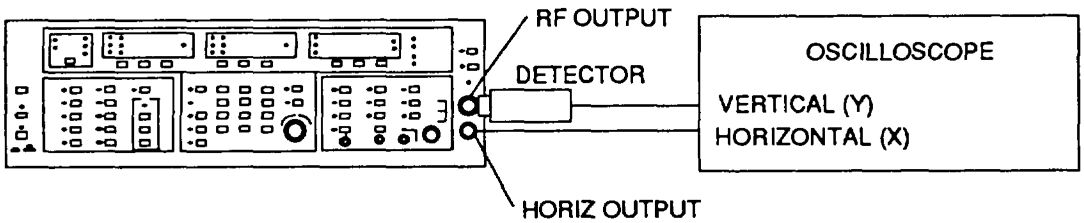
1. Perform Initial Setup procedure (para 2-34).
2. Zero Power Meter and Power Sensor.
3. Connect test equipment as shown.



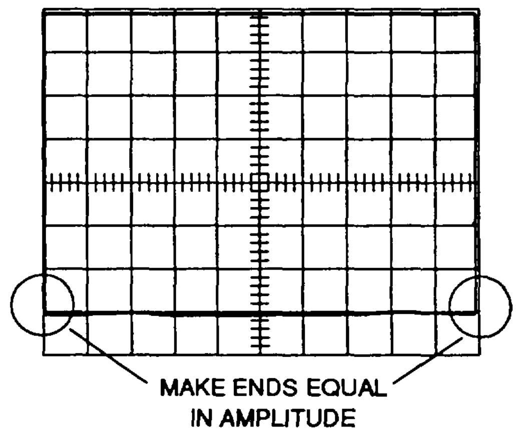
4. Set Power Meter CAL FACTOR to Power Sensor's 2 GHz setting.
5. On SG-1206,
    - Set RF ON to ON.
    - Press LEVEL key and set to –2.9 dBm.
    - Press MANUAL SWEEP key and set front panel control fully CCW.
    - Press CW CF key and set to 2.100 GHz.
    - Press dB/SWEEP key and set to 10.0 dB.
    - Press SHIFT key, then POWER SWEEP key.
6. Verify Power Meter reading is –2.9 dBm. ±0.1 dB. Record reading.
7. On SG-1206, rotate MANUAL SWEEP control fully CW.
8. Verify Power Meter reading is 10 dB more than reading in step 6.
    - If incorrect, adjust A1A3R88 (fig. FO-8) until reading is within specified limits.
9. Remove power and disconnect test equipment.

2-50. ADJUST COUPLER-DETECTOR AND DOWN-CONVERTER-DETECTOR TRACKING.

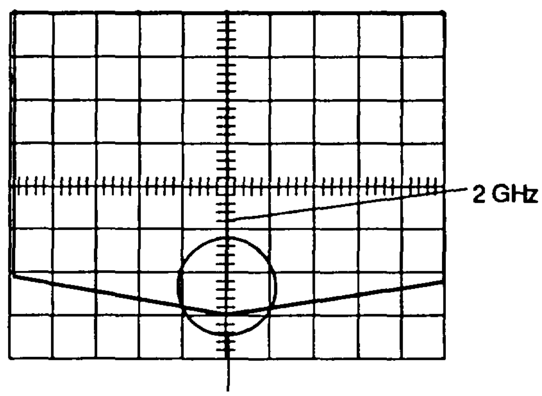
1. Perform Initial Setup procedure (para 2-34).
2. Lift CCA Retainer (para 2-53 steps 1 and 2).
3. Connect test equipment as shown.



4. On SG-1206,
   - Set RF ON to ON.
   - Press Δ F CF key.
   - Press CF key and set to 1.000 GHz.
5. Set Oscilloscope controls as follows:
   - Mode to X:Y.
   - Vertical (Y) controls to 0.05 V/Div.
   - Coupling to DC.
   - Adjust horizontal (X) channel controls so trace extends full width of screen (10 divisions).
   - Adjust vertical (Y) channel controls so trace is next-to-bottom graticule.



6. On SG-1206,
   - Adjust A1A4R142 (fig. FO-9) so both ends of trace have equal deflection as shown.
   - Press CF key and set to 2.000 GHz.
   - Adjust A1A4R68 so center of trace has equal deflection as shown.
   - Press LEVEL key and set to –2.9 dBm.



7. Set Oscilloscope controls as follows:
   - Vertical (Y) controls to 0.01 V/Div.
   - Adjust vertical (Y) channel controls so trace is next-to-bottom graticule.
8. On SG-1206, adjust A1A4R70 so center of trace has equal deflection as shown previously.
   - If equal levels deflection cannot be obtained, adjust A1A4R5 to move the trace slightly past where levels are equal, then readjust A1A4R70 to obtain equal-deflection.
9. On SG-1206,
   - Press LEVEL key.
   - Press 1 key, then MHz/dB/mS key (displays -1.9 dBm).
10. Set Oscilloscope vertical (Y) channel controls so trace is next-to-bottom graticule.
11. Verify that center of trace is equally deflected ±2.5 minor divisions.

2-50. ADJUiST COUPLER-DETECTOR AND DOWN-CONVERTER-DETECTOR TRACKING — Continued.

12. Repeat steps 9 thru 11 nine times, and verify deflection is within specified limits.

NOTE

Each time step 9 is performed, the display will indicate the following levels.

1st	-0.9 dBm
2nd	+0.1 dBm
3rd	+1.1 dBm
4th	+2.1 dBm
5th	+3.1 dBm
6th	+4.1 dBm
7th	+5.1 dBm
8th	+6.1 dBm
9th	+7.1 dBm

- If incorrect, repeat steps 6 thru 12 until all deflections are within specified limits.

13. On SG-1206,
    - Set POWER to OFF.
    - Install CCA Retainer.
14. Remove power and disconnect test equipment.

2-51. REPLACE EQUIPMENT COVERS AND BOTTOM FEET.

DESCRIPTION

This procedure covers: Remove. Install.

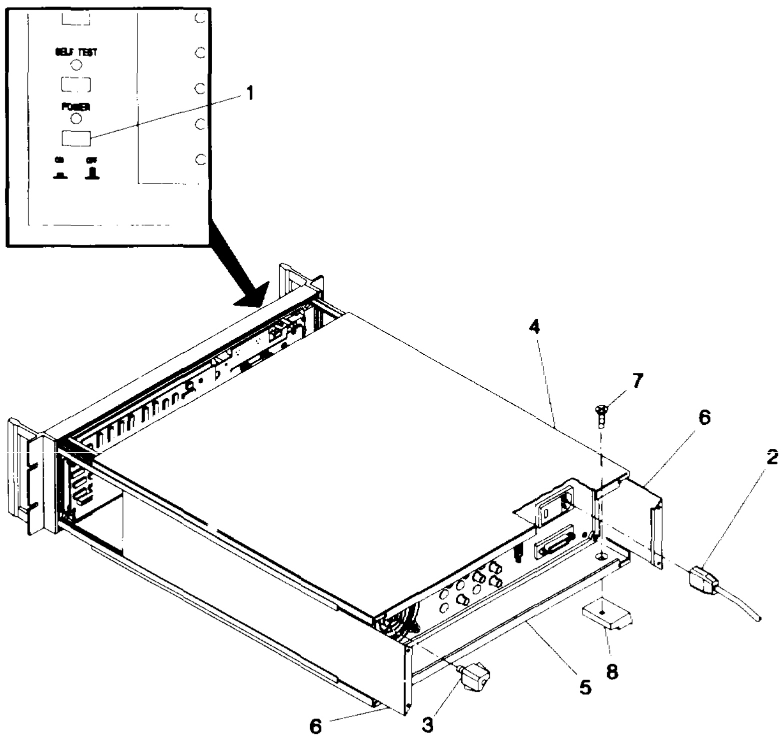
INITIAL SETUP

WARNING

Hazardous voltages are present when covers' are removed. Where maintenance can be performed without having power applied, disconnect power cord from ac source.

REMOVE

1. Set power switch (1) to OFF.
2. Disconnect power cable (2).
3. Loosen recessed screw in foot (3), and remove feet.
4. Slide top (4) and bottom (5) covers to rear.
5. Slide side covers (6) to rear.
6. Remove four screws (7) and bottom feet (8).



INSTALL

1. Install four bottom feet (8) using screws (7).
2. Insert bottom cover (5) into left and right grooves.
3. Press cover forward and into groove on front panel casting.
4. Install top cover (4) using the same method.
5. Install left and right side covers (6).
6. Install four rear feet (3).

END OF TASK

2-52. REPLACE CABLE COVER AND HIGH VOLTAGE SHIELD.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

Remove bottom cover (para 2-51).

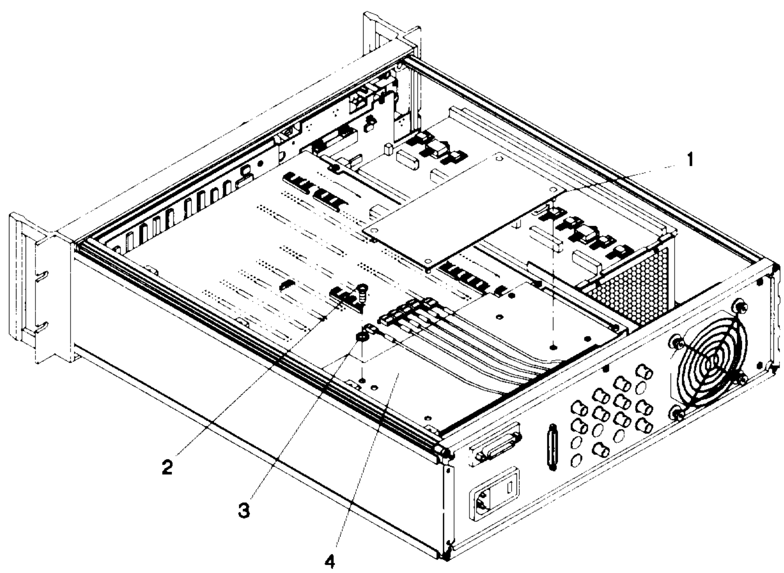
REMOVE

1. Pry up and remove cable cover (1).

WARNING

Removal of high-voltage cover in following step exposes lethal, charged-capacitor voltages.

2. Remove four screws (2), lockwashers (3), and high-voltage cover (4).



INSTALL

1. Install high-voltage cover (4) using four screws (2) and lockwashers (3).
2. Installable cover (1).

NOTE

FOLLOW-ON MAINTENANCE:

Install bottom cover (para 2-51).

END OF TASK

2-53. REPLACE A1A1 THRU A1A8, AND A1A10 CCAs.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

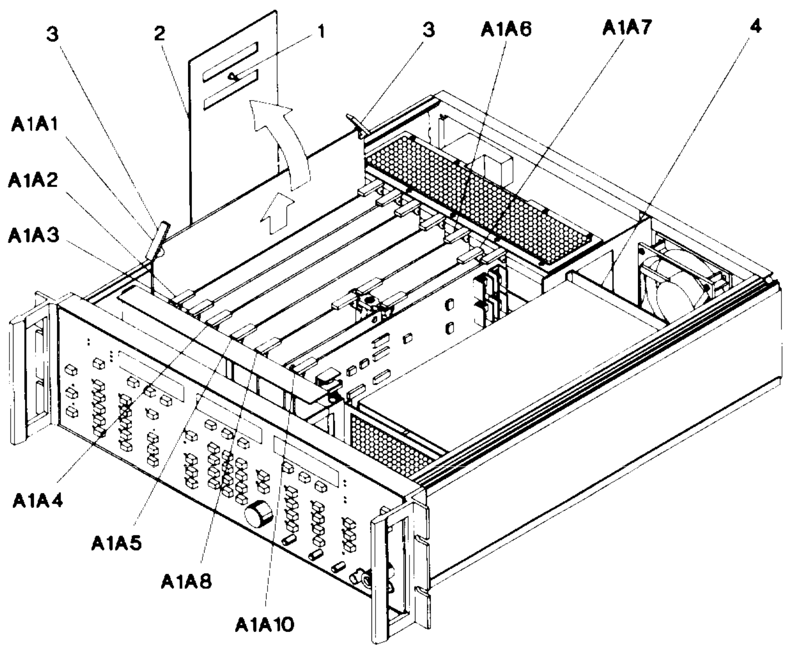
NOTE

PRELIMINARY PROCEDURES:

Remove top cover (para 2-51).

REMOVE

1. Loosen captive screw (1) on CCA retainer assembly (2).
2. Lift CCA retainer assembly to full upright position.
3. Lift CCA tabs (3) and withdraw desired CCA.



INSTALL

NOTE

A1A1 thru A1A8 CCAs are installed so components face away from RF deck assembly (4). A1A10 CCA is installed so components face toward RF deck assembly.

1. With edge tabs (3) up, insert CCA into proper slot.
2. Press on CCA top edge to seat bottom edge-connector.

NOTE

When CCA is properly seated, tabs (3) will be horizontal.

3. Return CCA retainer assembly (2) to horizontal position and retighten captive screw (1).

NOTE

FOLLOW-ON MAINTENANCE:

Install top cover (para 2-51).

END OF TASK

2-54. REPLACE A1A5 F CIRCUIT COVER.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

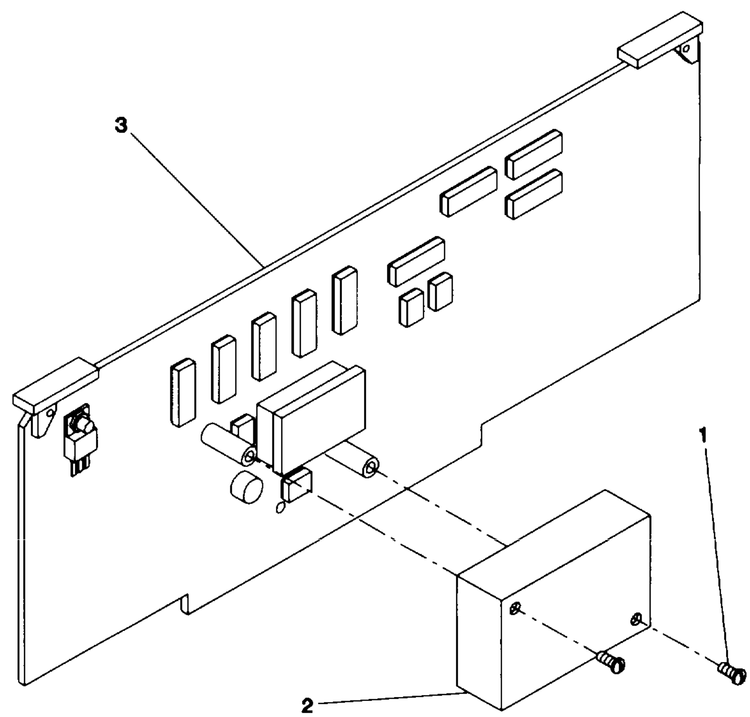
- Remove top cover (para 2-51)
- Remove A1A5 CCA (para 2-53).

REMOVE

1. Remove two screws (1) and cover (2).

INSTALL

1. Install cover (2) on A1A5 CCA (3) using two screws (1).



NOTE

FOLLOW-ON MAINTENANCE:

- Install A1A5 CCA (para 2-53).
- Install top cover (para 2-51).

END OF TASK

2-55. REPLACE A1A13 SWITCHING POWER SUPPLY CCA.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

Remove top cover (para 2-51).

WARNING

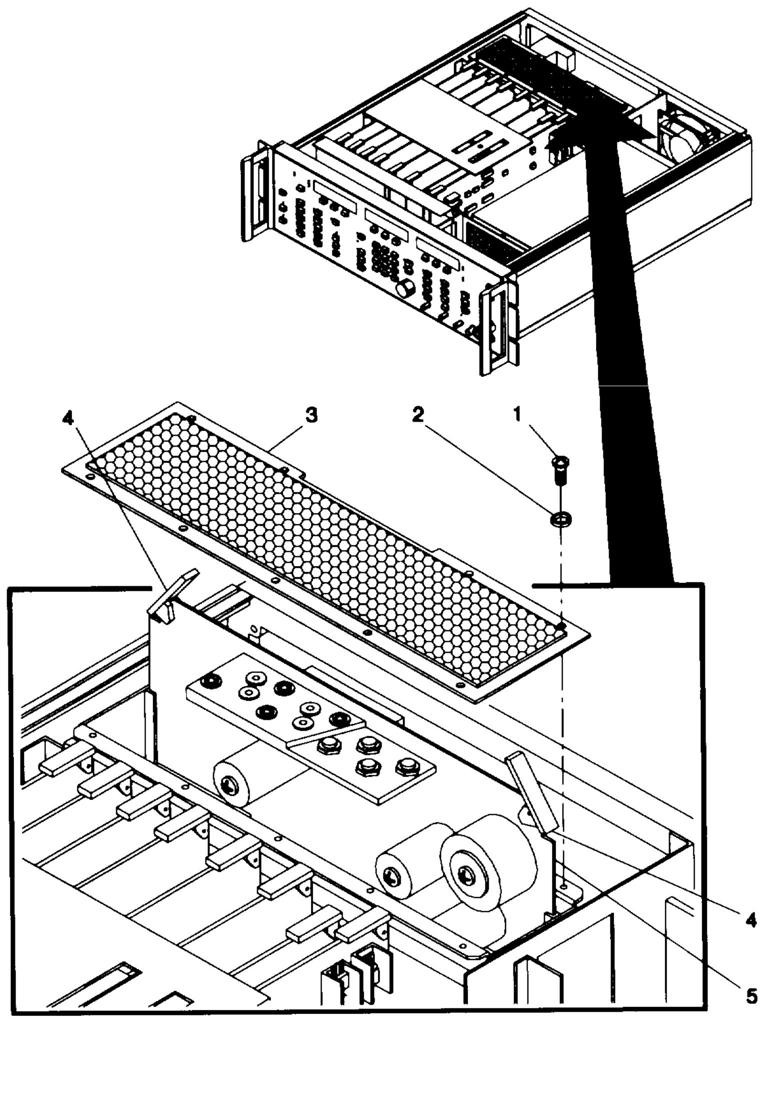
The switching power supply contains high voltages. To prevent electrical shock after power is removed, discharge capacitors to ground through 10 W resistor.

REMOVE

1. Remove nine screws (1), lockwashers (2), and cover (3).
2. Lift CCA tabs (4) and withdraw A1A13 CCA (5).

INSTALL

1. Insert A1A13 CCA (5) into slot with components facing forward.
2. Press on top edge of CCA to seat bottom edge-connector.
3. Place cover (3) on top of card cage as shown and install nine screws (1) and lockwashers (2).



NOTE

FOLLOW-ON MAINTENANCE:

Install top cover (para 2-51).

END OF TASK

2-56. REPLACE A1A13 HEAT SINK PLATE.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

- Remove top, bottom, and side covers (para 2-51).
- Remove A1A13 CCA (para 2-55).

REMOVE

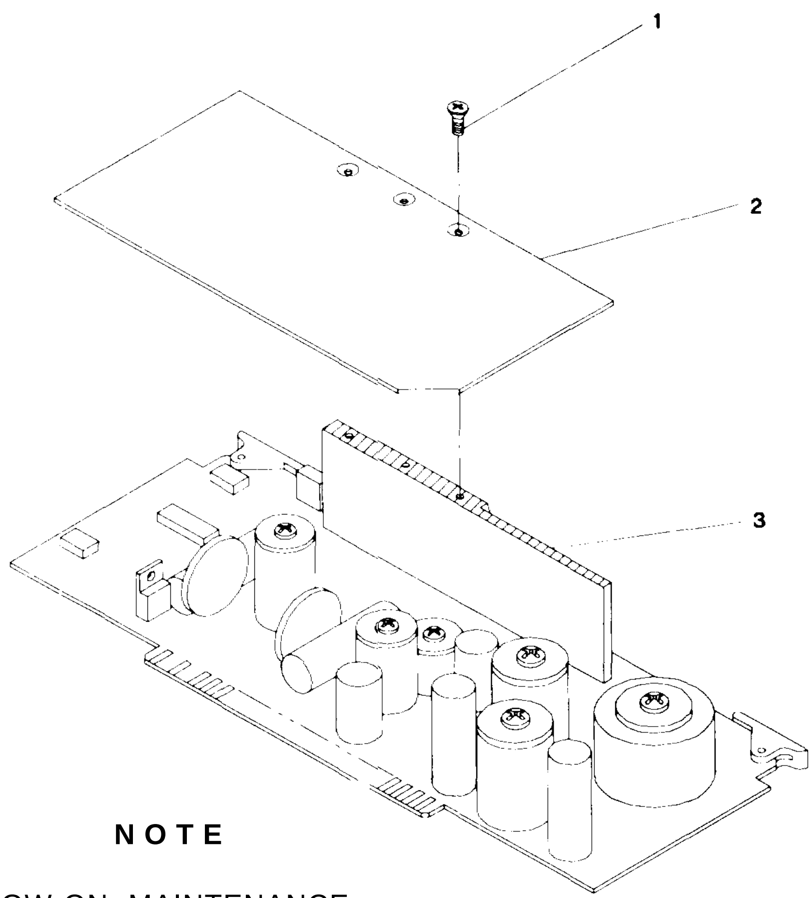
1. Remove three screws (1) and plate (2).

INSTALL

NOTE

Before installing heat sink plate in following step, clean and recoat mounting surfaces with silicone heat sink compound (Appendix B, Item 5).

1. Install panel (2) using three screws (1).



NOTE

FOLLOW-ON MAINTENANCE:

- Install A1A13 CCA (para 2-55).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-57. REPLACE A1A14S1 POWER SWITCH.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

Remove top, bottom, and side covers (para 2-51).

REMOVE

1. Pry gripper fingers (1) on POWER switch shaft (2) apart; push shaft forward to dislodge from switch (3).
2. Pull shaft (2) to rear and remove.
3. Working from bottom remove cable cover (4).

WARNING

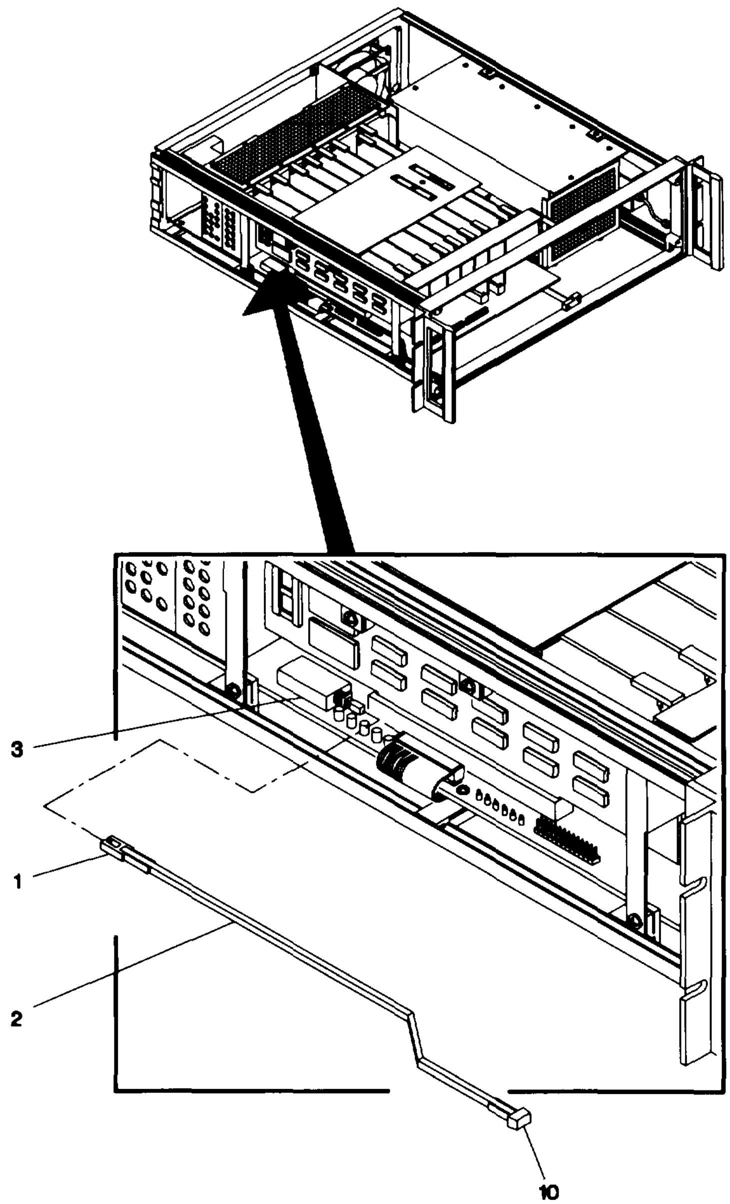
Removal of high-voltage cover in following step exposes lethal, charged-capacitor voltages.

4. Remove four screws (5), lockwashers (6), and high-voltage cover (7).

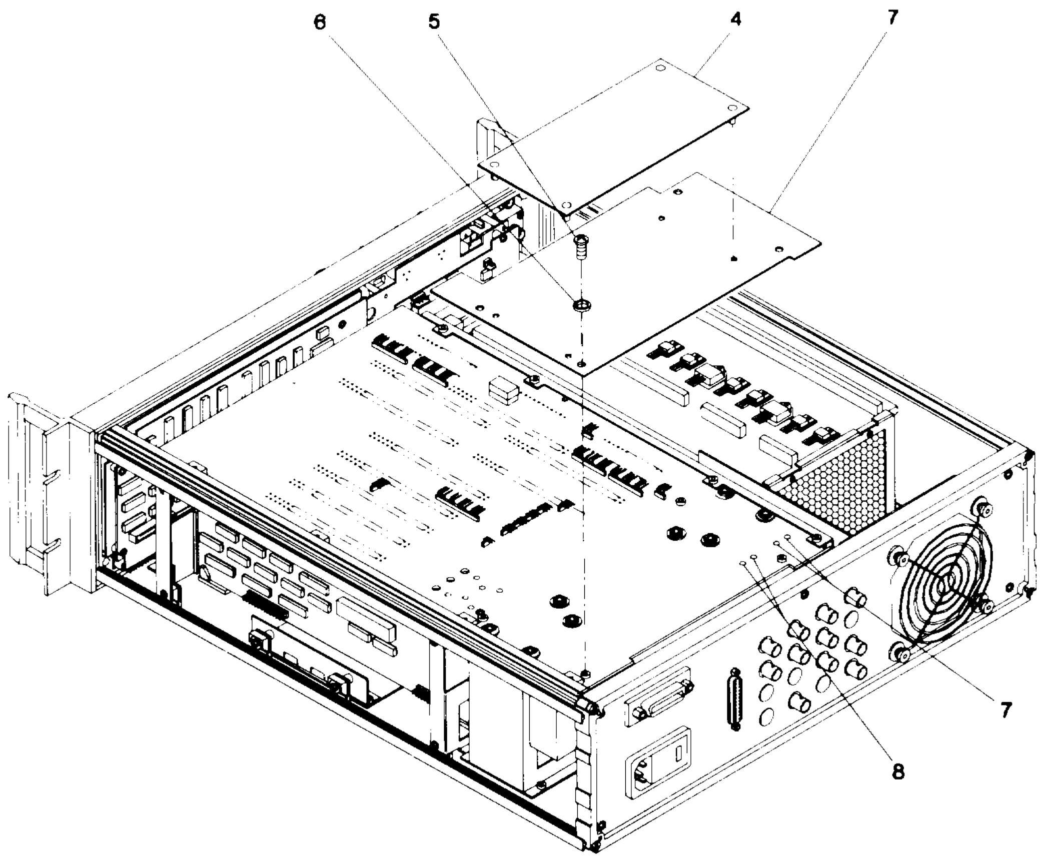
WARNING

Discharge A1A14C12 (8) and C13 (9) by shorting pins together.

5. Unsolder and remove POWER switch (3).



2-57. REPLACE A1A14S1 POWER SWITCH — Continued.



INSTALL

1. Place POWER switch into position, and solder in six places.
2. Install high-voltage cover (7) using four screws (5) and lockwashers (6).
3. Install cable cover (4).
4. Set power switch (3) to ON position (in) and insert key cap (10) through hole in rear of front panel.
5. Snap gripper fingers (1) over mating part of POWER switch (3).

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-58. REPLACE A2 FRONT PANEL ASSEMBLY.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

CAUTION

Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.

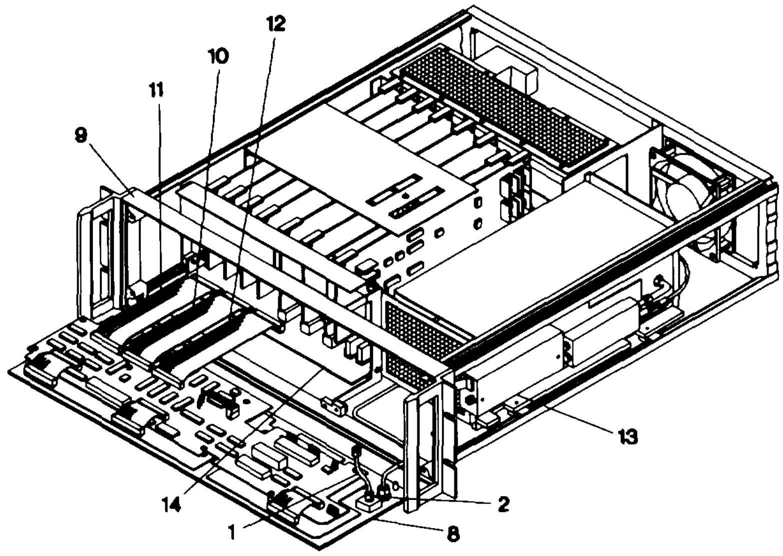
NOTE

PRELIMINARY PROCEDURES:

Remove top bottom, and side covers (para 2-51).

REMOVE

1. Disconnect semi-rigid cable (1) from attenuator (13).
2. Working from bottom, disconnect 3 pin cable (3) and 2 pin cable (4), and remove cables from cable clamps (5).
3. Remove six hex-head screws (6) and lockwashers (7).
4. Carefully withdraw A2 Front Panel Assembly (8) from front panel casting (9), and lay it face down on flat surface.
5. Disconnect coax cable (2) from HORIZ connector. Disconnect three ribbon cables (10, 11, 12) from A1A14 CCA (14).

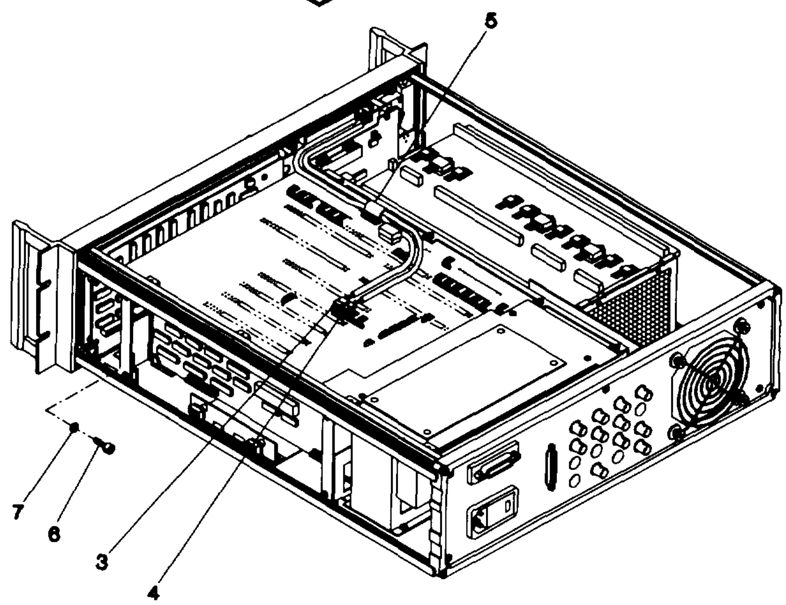


INSTALL

1. Lay A2 Front Panel Assembly (8) on its face in front of front panel casting (9) as shown.
2. Connect coax cable (2) to HORIZ OUTPUT connector and torque to 8 inch-pounds.
3. Reconnect ribbon cables to A1A14P5 (10), A1A14P6 (11), and A1A14P7 (12).

NOTE

When reinstalling front panel assembly in next step, align center pin on semi-rigid cable (1) with center conductor on input connector attenuator (13).



2-58. REPLACE A2 FRONT PANEL ASSEMBLY — Continued.

4. Carefully fit front panel assembly into casting and secure with six hex-head screws (6) and lockwashers (7).
5. Connect semi-rigid cable (1); torque to 8 inch-pounds.
6. Route cables between A1A14 (14) CCA and front casting (left of bracket) and through cable clamps (5).
7. Reconnect connector number 11 (4) to A1A14P37 and connector number 12 (3) to A1A14P39 with slotted opening on cable connectors facing away from A1A14 CCA.

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-59. REPLACE A2A1R2 DECR/INCR CONTROL AND/OR A2A1R1/S1 EXTERNAL ALC GAIN CONTROL/PUSH-TO-CAL SWITCH.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

- Remove top, bottom, and side covers (para 2-51).
- Remove A2 Front Panel Assembly (para 2-58).
- Remove A2A12 Microprocessor CCA (para 2-61) only if removing A2A1R2.
- Remove A2A11 Front Panel CCA (para 2-60) - only if removing A2A1R2.

REMOVE

A2A1R2 DECR/INCR Control.

1. Remove 4 pin connector (1).
2. Loosen two set screws (2) and remove knob (2).
3. Remove nut (3), lock washer (4) and control (5).

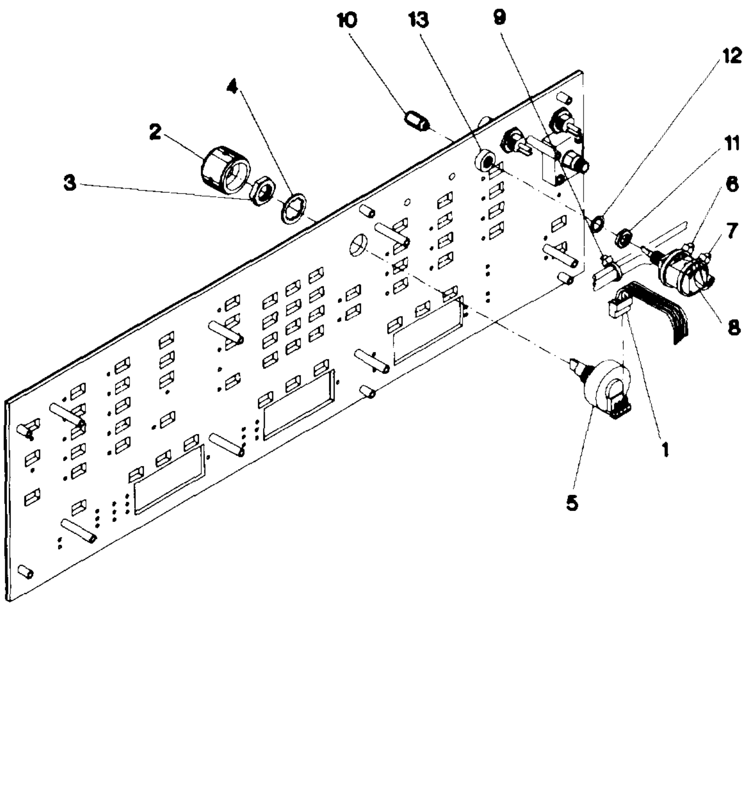
A2A1R1 EXTERNAL ALC GAIN Control/A2A1S1 PUSH-TO-CAL switch.

1. Cut cable ties (6) and (7) and remove.
2. Tag and unsolder seven wires from control-switch (8).
3. Cut cable tie (9).

CAUTION

Removing knob in next step may destroy the control-switch; the control-switch shaft is likely to come out with the knob.

4. Carefully remove knob (10).
5. Loosen nut (11), unscrew and remove control-switch (8), nut (11) and washer (12).



2-59. REPLACE A2A1R2 DECR/INCR CONTROL AND/OR A2A1R1/S1 EXTERNAL ALC GAIN CONTROL/PUSH-TO-CAL SWITCH — Continued.

INSTALL

A2A1R2 DECR/INCR Switch.

1. Place DECR-INCR control (5) into position on front panel.
2. Secure control using lock washer (4), and nut (3).
3. Slide knob (2) onto control shaft and secure with two set screws.
4. Connect cable connector (1).

A2A1R1 EXTERNAL ALC GAIN Control/A2A1S1 PUSH-TO-CAL Switch.

1. Screw control-switch (8), with washer (12) in place, into threaded insert on front panel (13).
2. Align control/switch to position solder lugs as shown and tighten nut (11).
3. Solder wires in place.
4. Install cable ties (Appendix B, Item 7) (6, 7, 9).
5. Press knob (10) onto control shaft.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A2A11 Front Panel CCA (para 2-60) – if removed.
- Install A2A12 Microprocessor CCA (para 2-61) - if removed.
- Install A2 Front Panel Assembly (para 2-58).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-60. REPLACE A2A11 FRONT PANEL CCA.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

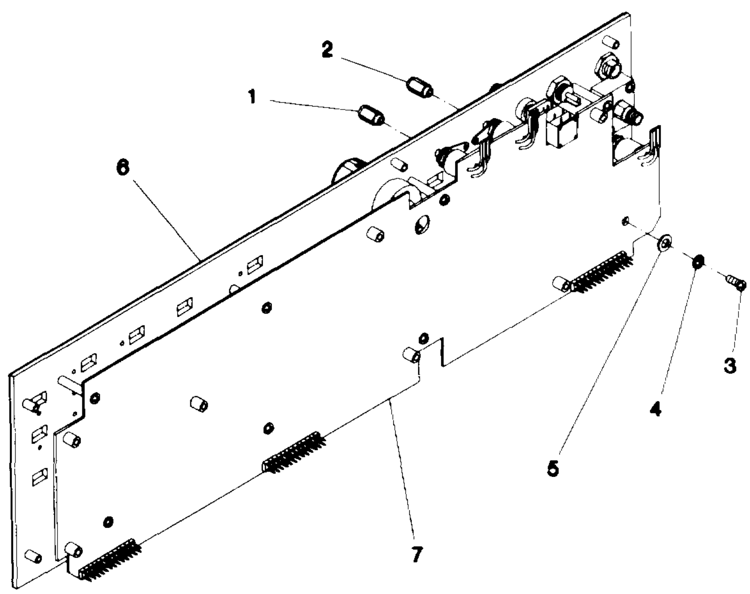
NOTE

PRELIMINARY PROCEDURES:

- Remove top, bottom, and side covers (para 2-51).
- Remove A2 Front Panel Assembly (para 2-58).
- Remove A2A12 Microprocessor CCA (para 2-61).

REMOVE

1. Remove two knobs (1, 2).
2. Remove eight screws (3), lockwashers (4), and flat washers (5).
3. Separate A2A1 Subassembly (6) from A2A11 CCA (7).



INSTALL

1. Position A2A11 Front Panel CCA (7), so that key caps extend upward.

NOTE

When reinstalling Front Panel CCA in next step, align LED's from front panel.

2. Position A2A1 Front Panel Subassembly (6) onto A2A11 Front Panel CCA (7); align LEDs, displays, and keys with their associated cutouts on front panel.
3. Install eight screws (3), lockwashers (4), and flat washers (5).
4. Install two front panel knobs (1, 2).

NOTE

FOLLOW-ON MAINTENANCE:

- Install A2A12 Microprocessor (para 2-61).
- Install A2 Front Panel Assembly (para 2-58).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-61. REPLACE A2A12 MICROPROCESSOR CCA.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

- Remove top and bottom, and side covers (para 2-51).
- Remove A2 Front Panel Assembly (para 2-58).

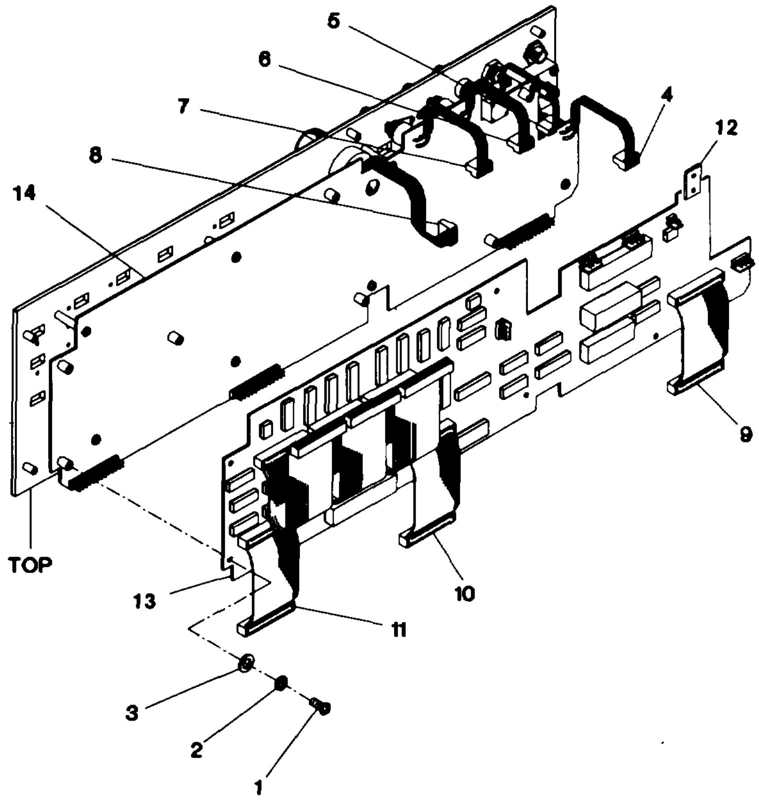
REMOVE

1. Disconnect cable connectors from A2A12 and A1A11 CCAs connectors as shown below:

NOTE

Cable connector numbers are located either on the connector or on the cable.

Locator Key Number	CCA Connector Number	Cable Connector Number
4	A2A12 P25	5
5	A2A12 P4	4
6	A2A12 P24	6
7	A2A12 P23	7
8	A2A12 P8	2
9	A2A11 J3	3
10	A2A11 J1	2
11	A2A11 J2	1



2. Remove seven screws (1), lockwashers (2), and flat washers (3), leaving bracket (12) connected to A2A12 (13).
3. Remove A2A12 CCA (13).

INSTALL

1. Position A2A12 CCA (13) on top of A2A11 CCA (14) so components face away from A2A11 CCA.
2. Install seven screws (1), lockwashers (2), and flat washers (3).
3. Connect cable connectors to A2A12 and A1A11 CCAs as listed in REMOVE procedure, step 1.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A2 Front Panel Assembly (para 2-58).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-62. REPLACE A3 REAR PANEL ASSEMBLY.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

Remove top, bottom, and side covers (para 2-51).

REMOVE

1. Remove six screws (1) and tilt assembly (2) an inch or so away from casting (3).
2. Disconnect connector (4).
3. Withdraw assembly (2) from casting (3); lay face down on flat surface.

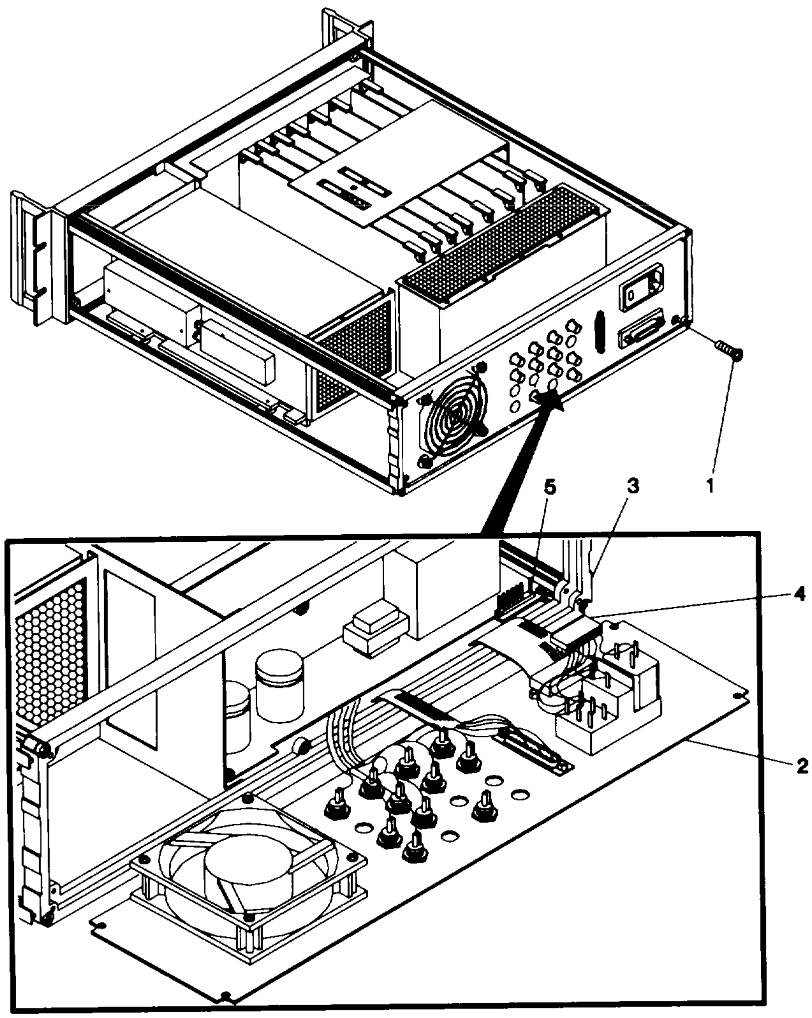
NOTE

All piece parts are accessible with rear panel in this position. If completely removing rear panel, proceed with step 4.

4. Disconnect following cables.

Cable or Connector Number	CCA Connector
19	A1A14P4
14	A1A14XA16
CBL 7	A1A14P40
CBL 5	A1A14P41
CBL 6	A1A14P42
CBL 2	A1A14P10
*CBL 3	A1A14P34
*CBL 13	A2 HORIZ
CBL 8	A1A14P49

*= remove from cable clips



2-62. REPLACE A3 REAR PANEL ASSEMBLY — Continued.

INSTALL

CAUTION

When reconnecting cables to A1A14 (bottom side), ensure that slotted opening on cable connector faces away from A1A14 CCA. Failure to observe this CAUTION will result in miswiring of components and could cause damage to SG-1206.

1. If removed, reconnect cable connectors as listed in REMOVE procedure, step 4.
2. Insert assembly (3) into casting (2).
3. Reconnect connector (4) to A1A14P1 (5).
4. Reinstall six screws (1) and tighten.

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-63. REPLACE A3A1 LINE VOLTAGE MODULE.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

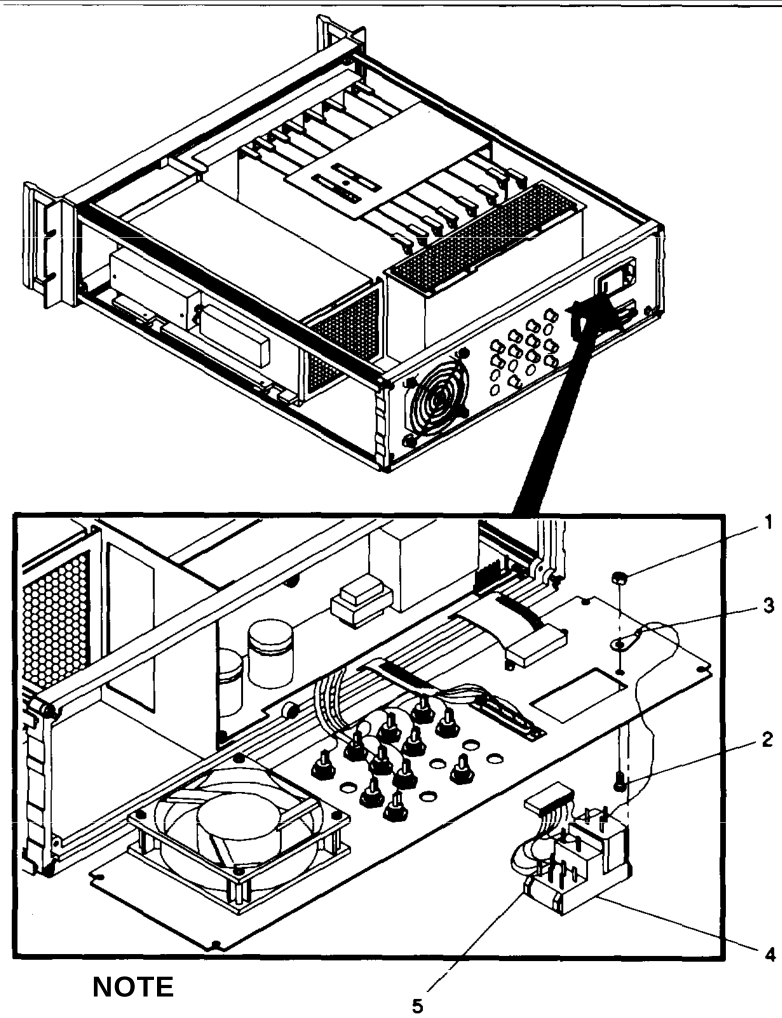
- Remove top and side covers (para 2-51).
- Remove A3 Rear Panel Assembly (para 2-62) steps 1 thru 3.

REMOVE

1. Remove nut (1), screw (2), and wire (3).
2. Squeeze-in four snap locks (4), and remove line voltage module (5).

INSTALL

1. Push line voltage module (5) through hole in rear panel and snap into place.
2. Install screw (2), wire (3), and nut (1).



NOTE

FOLLOW-ON MAINTENANCE:

- Install A3 Rear Panel Assembly (para 2-62) steps 2 thru 4.
- Install top and side covers (para 2-51).

END OF TASK

2-64. REPLACE A3B1 FAN.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

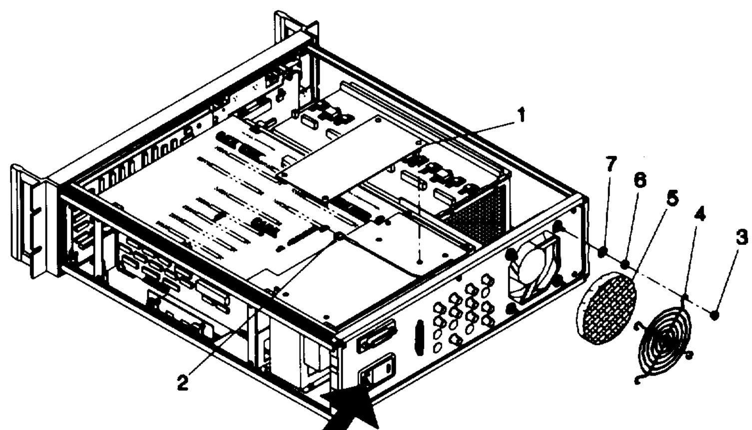
NOTE

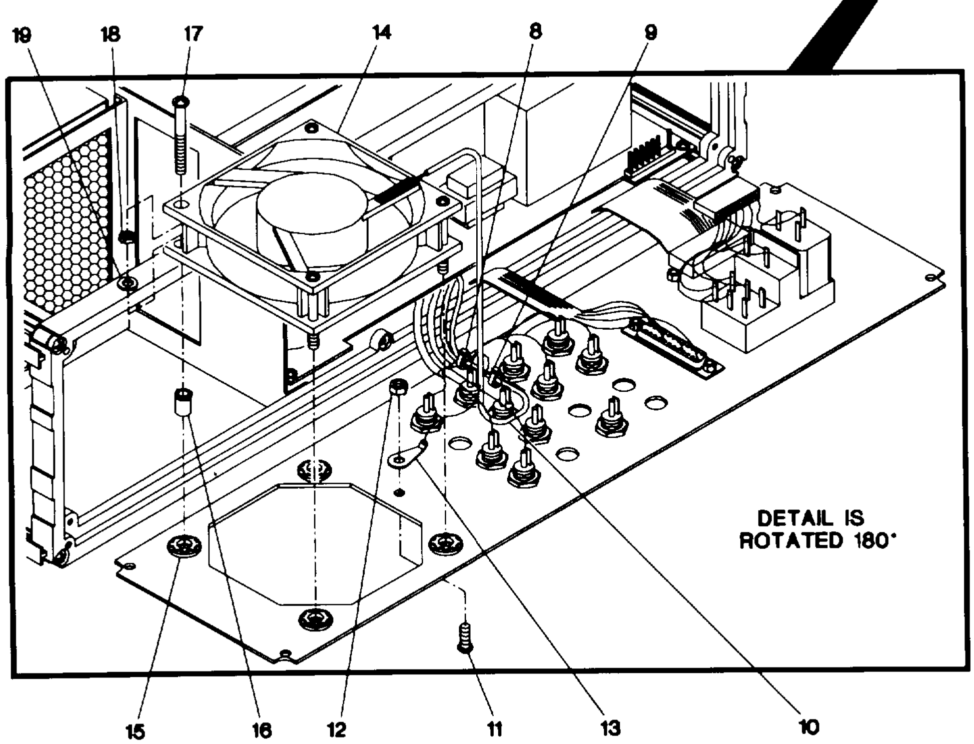
PRELIMINARY PROCEDURES:

Remove top, bottom, and side covers (para 2-51).

REMOVE

1. Remove cable cover (1), and disconnect 3 pin cable (2).
2. Remove four thumbnuts (3), cable guard (4), and air filter (5).
3. Remove four nuts (6) and flat washers (7).
4. Remove A3 Rear Panel Assembly (para 2-62 steps 1 thru 3).
5. Cut cable ties (8) and (9), and pull cable (10) free of harness.
6. Remove screw(n), nut (12), wire (13), and fan (14).





2-64. REPLACE A3B1 FAN — Continued.

INSTALL

1. Verify sleeves (15) are installed in grommets (16).
2. Install four screws (17), lockwashers (19), and nuts (18) on fan (14).
3. Place fan (14) into position on rear panel with air flow inward and secure using four nuts (6) and four flat washers (7).
4. Route cable in with harness and secure with new cable ties (Appendix B, Item 7) in locations (8 and 9).
5. Install screw(n), nut (12), and wire (13).
6. Install A3 Rear Panel Assembly (para 2-62, steps 2 thru 4).
7. Install air filter (5), cable guard (4), and four thumbnuts (3).
8. Connect cable connector (2) to A1A14P49 with slotted opening on cable connector facing away from A1A14CCA.
9. Installable cover (1).

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-65. REPLACE A4 RF DECK ASSEMBLY COVER.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

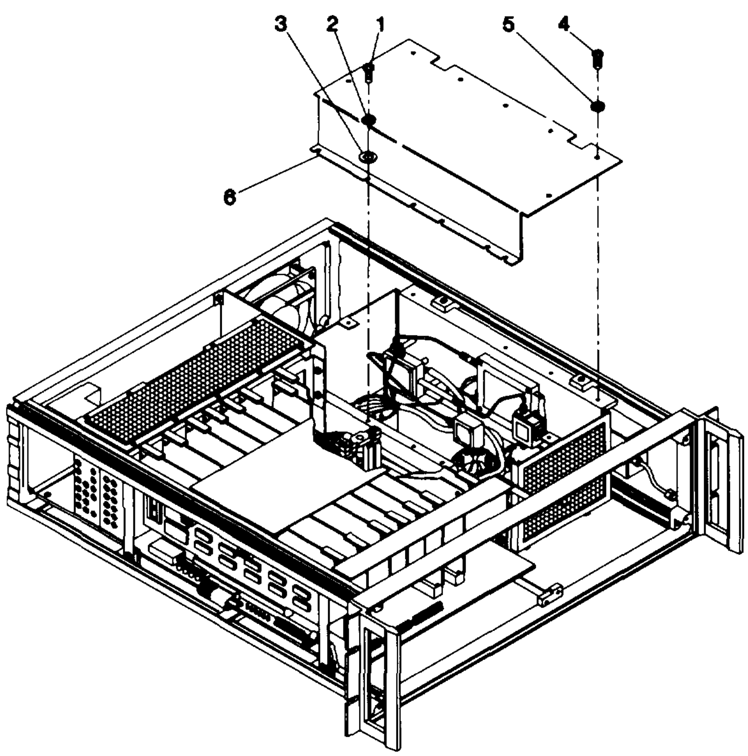
NOTE

PRELIMINARY PROCEDURES:

- Remove top and side covers (para 2-51).
- It may be necessary to remove A1A10 (para 2-53) to provide easier access to cover screws.

REMOVE

1. Remove six screws (1), lockwashers (2), and flat washers (3).
2. Remove seven screws (4), lockwashers (5), and cover (6).



INSTALL

1. Install cover (6) securely in place.
2. Install seven screws (4) and lockwashers (5) and five screws (1), lockwashers (2), and flat washers (3).

NOTE

FOLLOW-ON MAINTENANCE:

Install top and side covers (para 2-51).

END OF TASK

2-66. REPLACE A4A1 DOWN CONVERTER ASSEMBLY.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

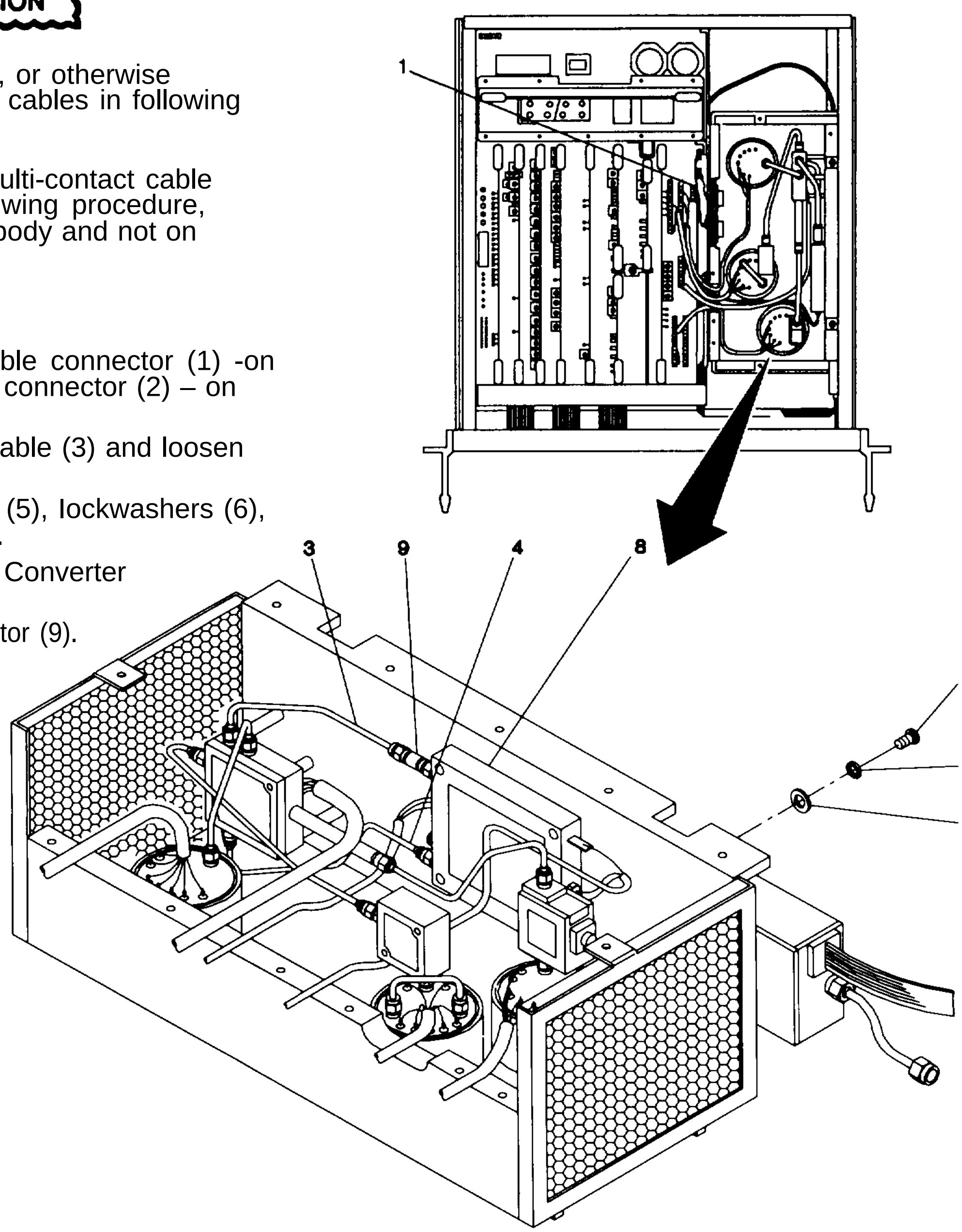
- Remove top and side covers (para 2-51).
- Remove A4 RF Deck Assembly cover (para 2-65).

CAUTION

- Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.
- When removing multi-contact cable connectors in following procedure, pull on connector body and not on cable.

REMOVE

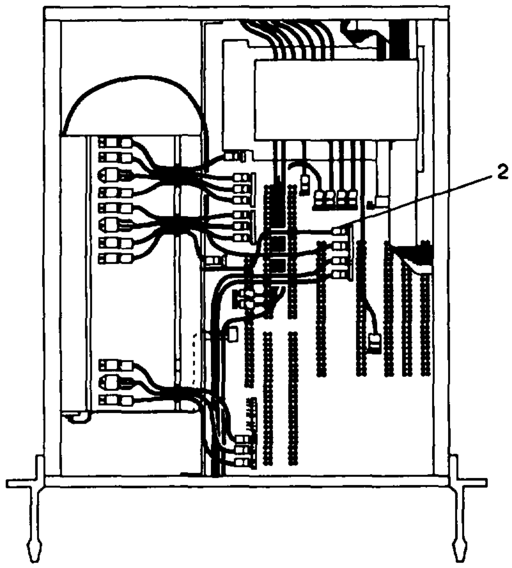
1. Disconnect 4 pin cable connector (1) -on top, and 3 pin cable connector (2) – on bottom.
2. Remove semi-rigid cable (3) and loosen coupling nut (4).
3. Remove two screws (5), lockwashers (6), and flat washers (7).
4. Remove A4A1 Down Converter Assembly (8).
5. Remove A4AT2 attenuator (9).



2-66. REPLACE A4A1 DOWN CONVERTER ASSEMBLY — Continued.

INSTALL

1. Install A4AT2 attenuator (9) on A4A1 Down Converter Assembly (8).
2. Place A4A1 Down Converter Assembly into position and secure with two screws (5), lockwashers (6), and flat washers (7).
3. Connect semi-rigid cable (3) and coupling nuts (4), and torque to 8 inch-pounds.
4. Connect 4 pin cable connector (1) to A1A14P12.
5. Connect 3 pin cable connector (2) to A1A14P35 (bottom) with slotted opening on cable connector facing away from A1A14 CCA.



NOTE

FOLLOW-ON MAINTENANCE:

- Install A4 RF Deck Assembly cover (para 2-65).
- Install top and side covers (para 2-51).

END OF TASK

2-67. REPLACE A4A2Q1-3/A4A3Q1-3/A4A4Q1-3 TRANSISTORS AND/OR A4VR1/A4VR2 VOLTAGE REGULATORS.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

Remove top, bottom, and side covers (para 2-51).

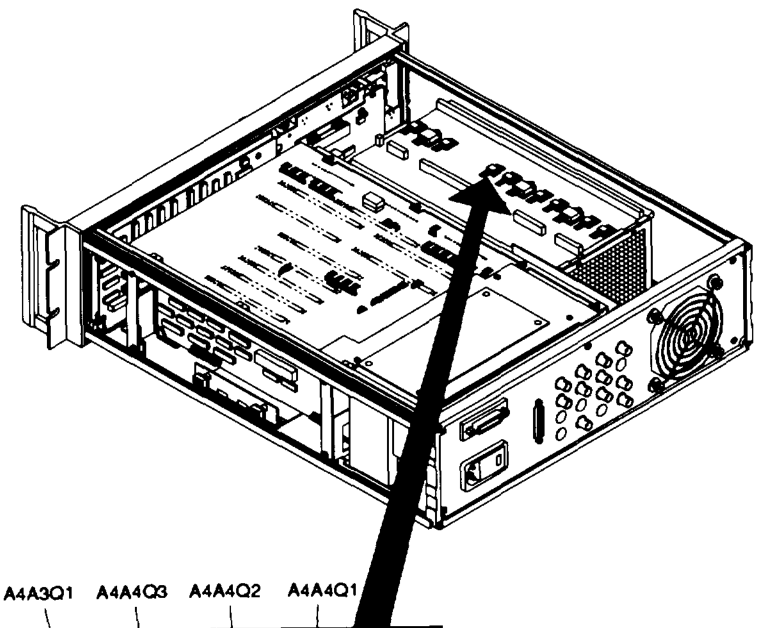
REMOVE

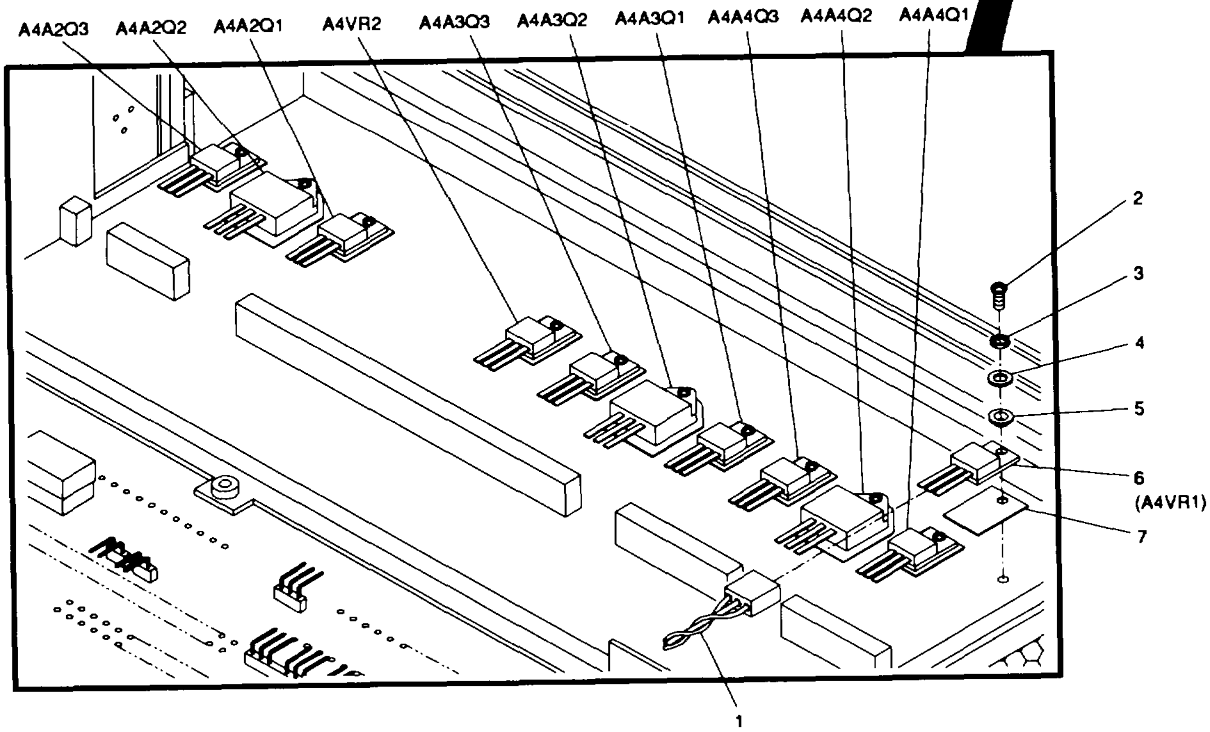
A4A2Q1, A4A2Q3, A4A301, A4A3Q3, A4A4Q1, A4A4Q3, A4VR1, or A4VR2

1. Disconnect 3 pin cable (1) at desired component.
2. Remove screw (2), lockwasher (3), flat washer (4), insulated shoulder washer (5), component (6), and thermal pad (7).

A4A2Q2, A4A3Q2, or A4A4Q2

1. Cut away heat-shrink tubing, then tag and unsolder three wires from component leads.
2. Remove screw (2), lockwasher (3), flat washer (4), insulated shoulder washer (5), component (6), and thermal pad (7).





2-67. REPLACE A4A2Q1-3/A4A3Q1-3/A4A4Q1-3 TRANSISTORS AND/OR A4VR1/A4VR2 VOLTAGE REGULATORS — Continued.

INSTALL

A4A2Q1, A4A2Q3, A4A3Q1, A4A3Q3, A4A4Q1, A4A4Q3, A4VR1, or A4VR2

1. Install thermal pad (7), component (6), insulated shoulder washer (5), screw (2), lockwasher (3), and flat washer (4).
2. Reconnect 3 pin cable (1) at desired component with slotted opening on cable connector facing away from chassis.

NOTE

Cable connector numbers are located either on the connector or on the cable.

Component	Cable Number	Connected To
A4A2Q1	W1	A1A14P28
A4A2Q3	W3	A1A14P30
A4A3Q1	W1	A1A14P21
A4A3Q3	W3	A1A14P23
A4A4Q1	W1	A1A14P18
A4A4Q3	W3	A1A14P20
A4VR1	W8	A1A14P44
A4VR2	W9	A1A14P24

A4A2Q2, A4A3Q2, or A4A4Q2

NOTE

Before installing transistors in following steps, clean and recoat transistor mounting surface and chassis surface with silicone heat sink compound (Appendix B, Item 5).

1. Install thermal pad (7), component (6), insulated shoulder washer (5), screw (2), lockwasher (3), and flat washer (4).
2. Install heat-shrink tubing (Appendix B, Item 6) over individual wires, then solder three wires to component leads.

Component	Cable Number	Connected To
A4A2Q2	W2	A1A14P29
A4A3Q2	W2	A1A14P22
A4A4Q2	W2	A1A14P19

3. Position and shrink tubing.

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-68. REPLACE A4A2G1 Ku-BAND YIG OSCILLATOR ASSEMBLY.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

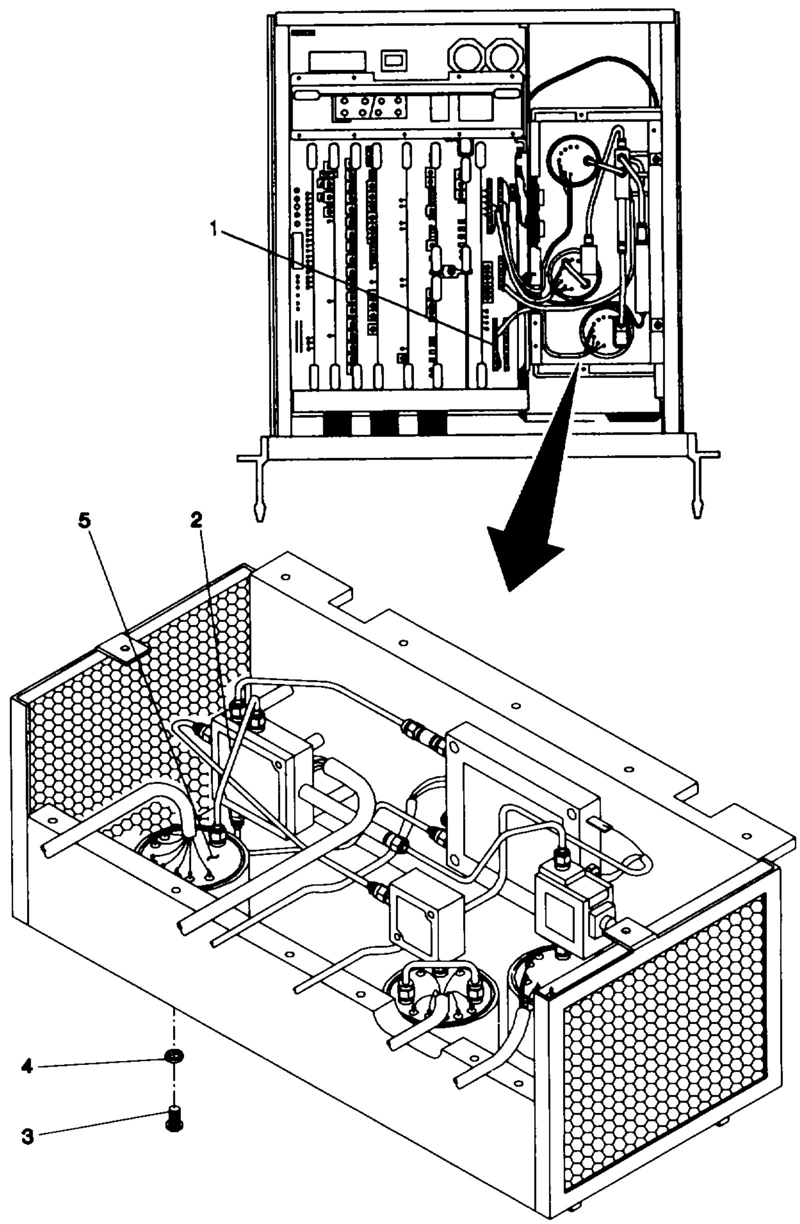
- Remove top, bottom, and side covers (para 2-51).
- Remove A4 RF Deck Assembly cover (para 2-65).

CAUTION

- Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.
- When removing multi-contact cable connectors in following procedure, pull on connector body and not on cable.

REMOVE

1. Disconnect 16 pin cable connector (1).
2. Remove semi-rigid cable (2).
3. Remove two screws (3) and lockwashers (4).
4. Remove Ku-Band YIG oscillator A4A2G1 (5).



2-68. REPLACE A4A2G1 Ku-BAND YIG OSCILLATOR ASSEMBLY — Continued.

INSTALL

NOTE

Before installing A4A2G1 in following steps, clean and recoat mounting surface with silicone heat sink compound (Appendix B, Item 5).

1. Install Ku-Band YIG Oscillator A4A2G1 (5) using two screws (3) and lockwashers (4).
2. Install semi-rigid cable (2) and torque to 8 inch-pounds.
3. Connect 16 pin cable connector (1) to A1A14P17.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A4 RF Deck Assembly cover (para 2-65).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-69. REPLACE A4A3G1 X-BAND YIG OSCILLATOR AND A4A3AT1 ISOLATOR ASSEMBLIES.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

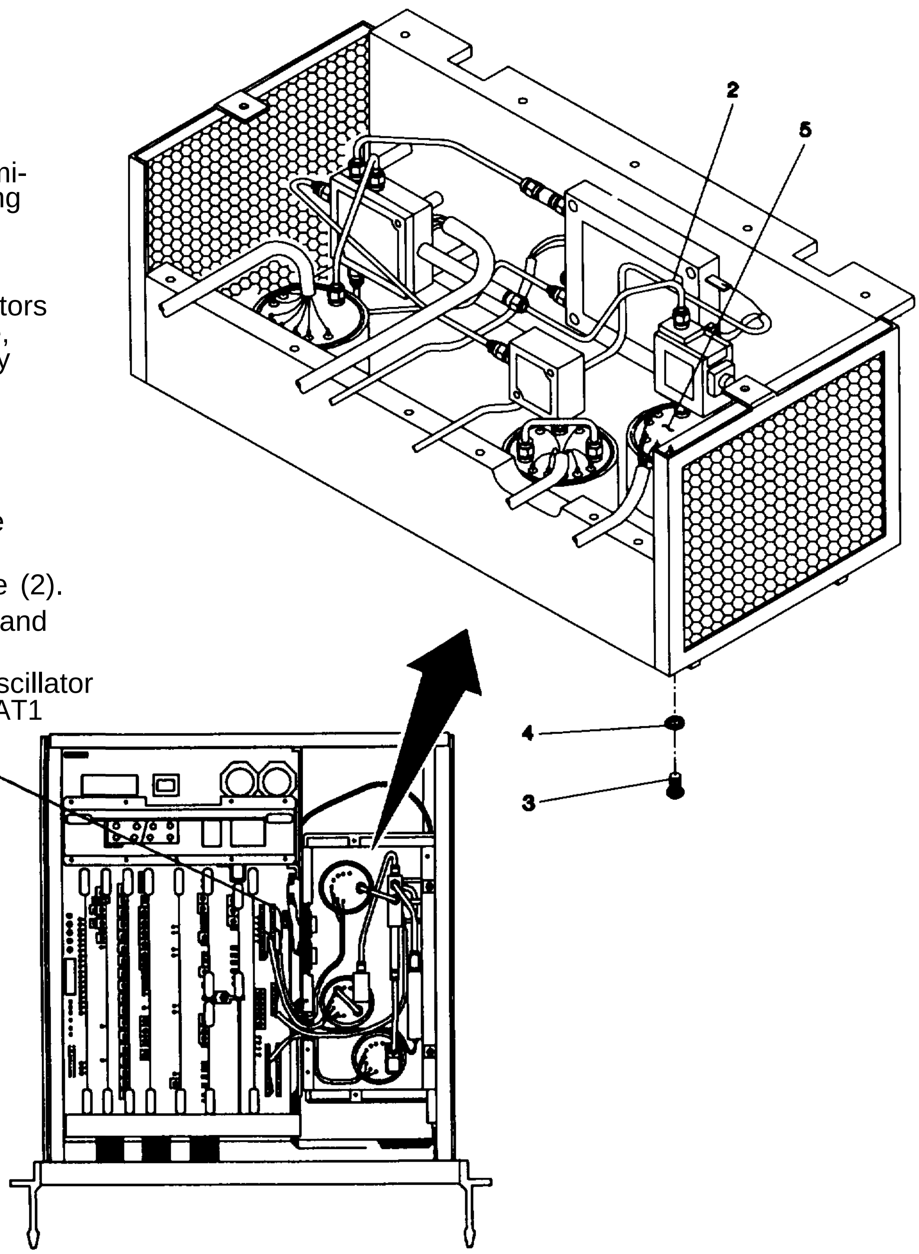
- Remove top, bottom, and side covers (para 2-51).
- Remove A4 RF Deck Assembly cover (para 2-65).

CAUTION

- Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.
- When removing multi-contact cable connectors in following procedure, pull on connector body and not on cable.

REMOVE

1. Disconnect 16 pin cable connector (1).
2. Remove semi-rigid cable (2).
3. Remove two screws (3) and lockwashers (4).
4. Remove X-Band YIG Oscillator A4A3G11 Isolator A4A3AT1 Assembly (5).



2-69. REPLACE A4A3G1 X-BAND YIG OSCILLATOR AND A4A3AT1 ISOLATOR ASSEMBLIES — Continued.

INSTALL

NOTE

Before installing A4A3G1 in following steps, clean and recoat mounting surface with silicone heat sink compound (Appendix B, Item 5).

1. Install X-Band YIG Oscillator A4A3G1/ Isolator A4A3AT1 Assembly (5) using two screws (3) and lockwashers (4).
2. Install semi-rigid cable (2) and torque to 8 inch-pounds.
3. Connect 16 pin cable connector (1) to A1A14P13.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A4 RF Deck Assembly cover (para 2-65).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-70. REPLACE A4A4G1 S/C-BAND YIG OSCILLATOR AND A4A4U1 MATCH MODULATOR ASSEMBLIES

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

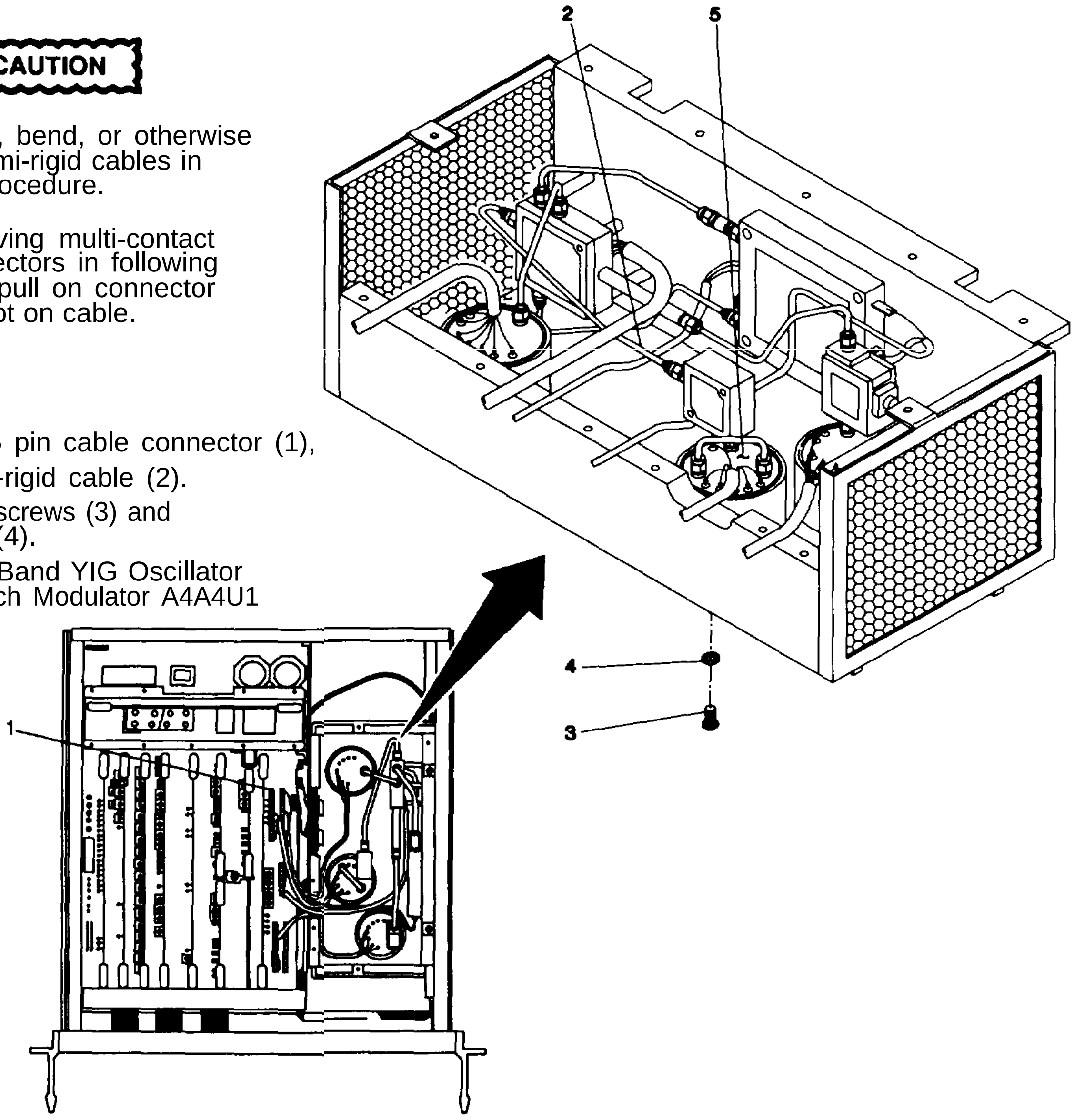
- Remove top, bottom, and side covers (para 2-51).
- Remove A4 RF Deck Assembly cover (para 2-65).

CAUTION

- Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.
- When removing multi-contact cable connectors in following procedure, pull on connector body and not on cable.

REMOVE

1. Disconnect 16 pin cable connector (1),
2. Remove semi-rigid cable (2).
3. Remove two screws (3) and lockwashers (4).
4. Remove S/C-Band YIG Oscillator A4A4G1/ Match Modulator A4A4U1 Assembly (5).



2-70. REPLACE A4A4G1 S/C-BAND YIG OSCILLATOR AND A4A4U1 MATCH MODULATOR ASSEMBLIES — Continued.

INSTALL

NOTE

Before installing A4A4G1 in following steps, clean and recoat mounting surface with silicone heat sink compound (Appendix B, Item 5).

1. Install S/C-Band YIG Oscillator A4A4G1/ Match Modulator A4A4U1 Assembly (5) using two screws (3) and lockwashers (4).
2. Install semi-rigid cable (2) and torque to eight inch-pounds.
3. Connect 16 pin cable connector (1) to A1A14P14.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A4 RF Deck Assembly cover (para 2-65).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

2-71. REPLACE A4AT1 STEP ATTENUATOR AND A4DC1 DIRECTIONAL COUPLER.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

CAUTION

Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.

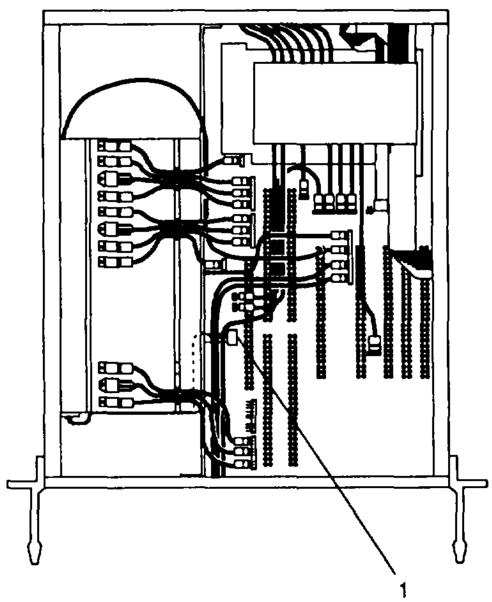
NOTE

PRELIMINARY PROCEDURES:

Remove top, bottom, and side covers (para 2-51).

REMOVE

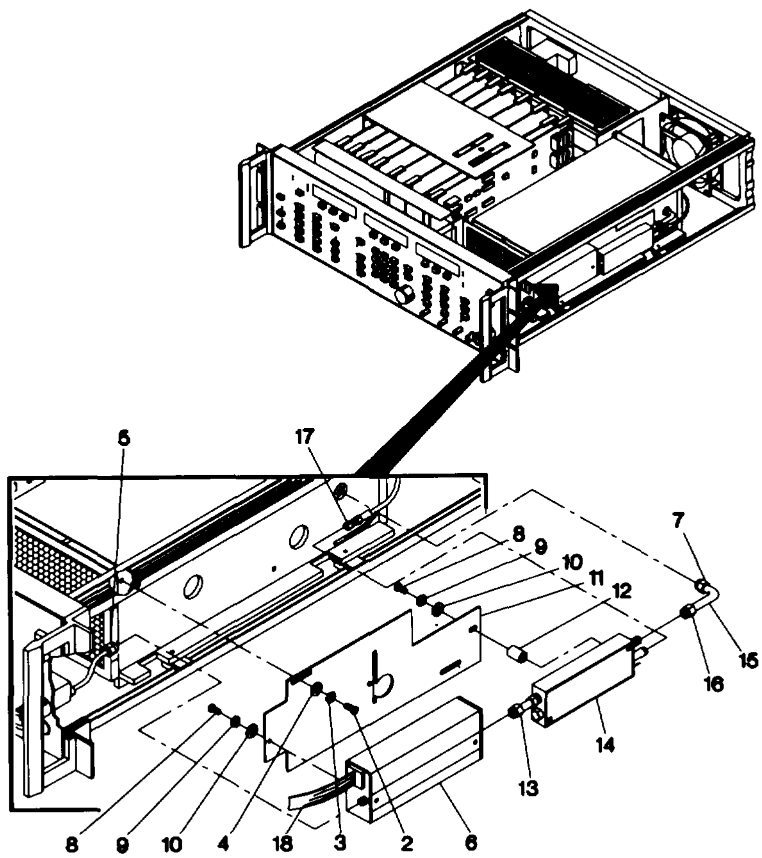
1. Disconnect ribbon cable from A1A14P31 (1).
2. Loosen (but do not remove) two screws (2).
3. Disconnect semi-rigid cable coupling nut (5) from A4AT1 Step Attenuator (6).
4. Disconnect semi-rigid cable coupling nut (7) and coax cable (17).
5. Remove two screws (2), lockwashers (3), and flat washers (4).
6. Remove step attenuator/ directional coupler assembly (6 & 14) by lifting up and to the rear.
7. Remove three screws (8), lockwashers (9), flat washers (10), and mounting bracket (11).
8. Remove spacer (12).
9. Disconnect coupling nut (13) to separate step attenuator (6) from directional coupler (14).
10. Disconnect coupling nut (16), and remove cable assembly (15) from directional coupler.



2-71. REPLACE A4AT1 STEP ATTENUATOR AND A4DC1 DIRECTIONAL COUPLER — Continued.

INSTALL

1. Connect RF cable (17) to directional coupler (14).
2. Install cable assembly (15). Tighten coupling nut (16) finger-tight.
3. On directional coupler, connect semi-rigid cable coupling nut (13) to input connector on step attenuator (6); tighten finger-tight.
4. Install step attenuator/ directional coupler assembly (6 & 14) on mounting bracket (11) using spacer (12) and three screws (8), lockwashers (9), and flat washers (10).
5. Position assembled mounting bracket onto RF deck.



CAUTION

Ensure that output connector on step attenuator (6) and semi-rigid cable elbow connector (7) mate with their respective connectors.

6. Install two screws (2), lockwashers (3), and flat washers (4).
7. Connect semi-rigid cable coupling nut (5) to step attenuator (6); tighten finger-tight.
8. Torque four coupling nuts (5, 7, 13, 16) to 8 inch-pounds.
9. Route step attenuator ribbon cable (18) under cable assemblies as shown, and connect to A1A14P31 (1).

NOTE

FOLLOW-ON MAINTENANCE:

Install top, bottom, and side covers (para 2-51).

END OF TASK

2-72. REPLACE A4S1 PIN SWITCH ASSEMBLY.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

- Remove top and side covers (para 2-51).
- Remove A4 RF Deck Assembly cover (para 2-65).

CAUTION

- Do not twist, bend, or otherwise damage semi-rigid cables in following procedure.
- When removing multi-contact cable connectors in following procedure, pull on connector body and not on cable.

REMOVE

1. Disconnect 10 pin cable connector (1).
2. Remove four semi-rigid cables (3 thru 6).
3. Disconnect semi-rigid cable coupling nuts (8 and 9).
4. Remove two screws (10).
5. Remove A4S1 PIN Switch Assembly (2).
6. Remove cable assembly (11).
7. Remove two screws (12), lockwashers (13), and spacers (14).

INSTALL

1. Install two screws (12), lockwashers (13), and spacers (14).
2. Install semi-rigid cable assembly (11) on pin switch (2) and torque coupling nut to 8 inch-pounds.

NOTE

Before tightening, orient cable so when pin switch (2) is installed, the cable will connect to A4A1 down converter assembly (7).

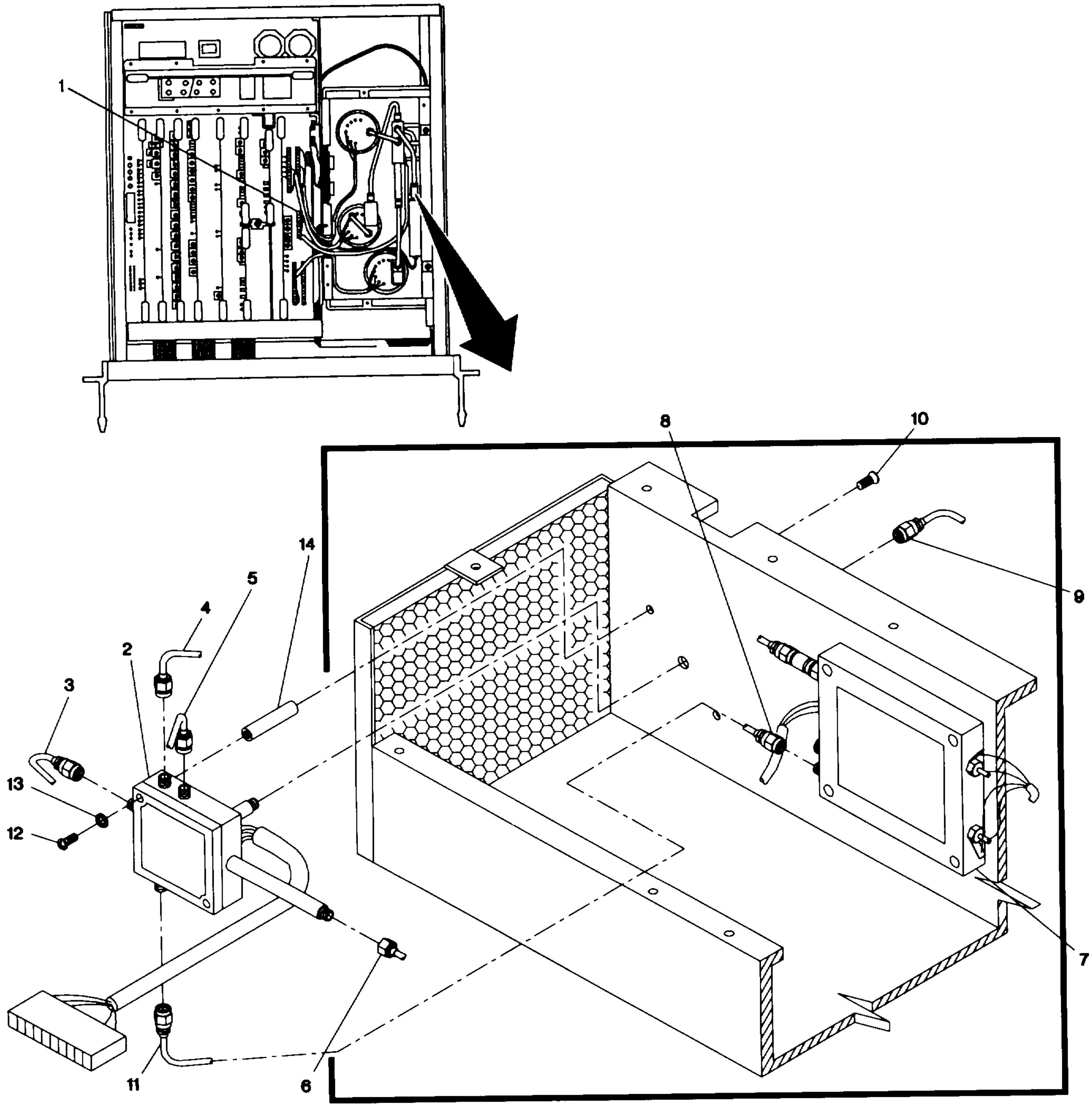
3. Place A4S1 PIN Switch Assembly (2) into position and secure using two screws (10).

NOTE

In the following steps, tighten all coupling nuts finger-tight.

4. Connect semi-rigid cable coupling nuts (8 and 9).
5. Reconnect four semi-rigid cable coupling nuts (3 thru 6).
6. Torque six coupling nuts (3 thru 6, 8, 9) to 8 inch-pounds.
7. Connect cable connector (1) to A1A14P15.

2-72. REPLACE A4S1 PIN SWITCH ASSEMBLY — Continued.



NOTE

FOLLOW-ON MAINTENANCE:

- Install A4 RF Deck Assembly cover (para 2-65).
- Install top and side covers (para 2-51).

END OF TASK

2-73. REPLACE A4VR3 AND/OR A4VR4 VOLTAGE REGULATORS.

DESCRIPTION

This procedure covers: Remove. Install.

INITIAL SETUP

NOTE

PRELIMINARY PROCEDURES:

- Remove top, bottom, and side covers (para 2-51).
- Remove A1A5 thru A1A10 CCA's (para 2-53).
- Remove RF Deck cover (para 2-65).
- Remove A4A4G1 S/C-Band YIG Oscillator/A4A4U1 Match Modulator Assemblies (para 2-70) -only if removing A4VR3.

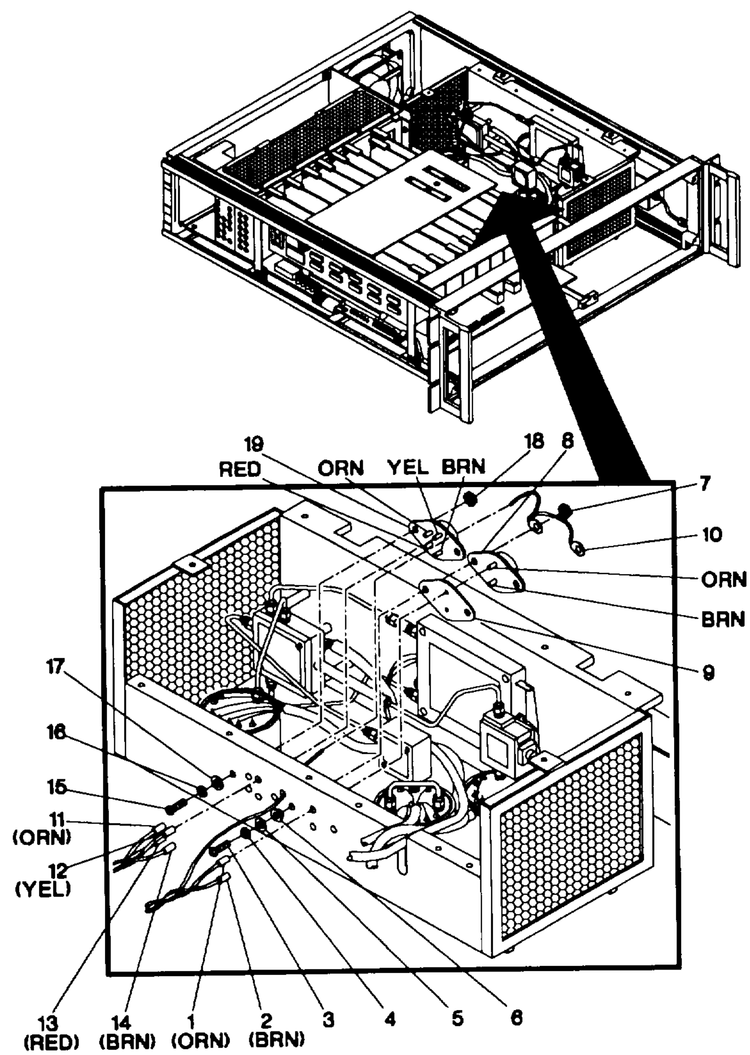
REMOVE

A4VR3 Voltage Regulator.

1. Cut away heat-shrink tubing, then tag and unsolder two wires (1, 2).
2. Remove two screws (3), lockwashers (4), flat washers (5), insulated shoulder washers (6), nuts (7), A4VR3 (8), thermal pad (9), and red wires (lo).

A4VR4 Voltage Regulator.

1. Cut-away heat-shrink tubing, then tag and unsolder four wires (11 thru 14).
2. Remove two screws (15), lockwashers (16), flat washers (17), nuts (18), and A4VR4 (19).



2-73. REPLACE A4VR3 AND/OR A4VR4 VOLTAGE REGULATORS — Continued.

INSTALL

A4VR3 Voltage Regulator.

NOTE

Reinstall red wires (10) before installing nuts (7), in following step.

1. Install thermal pad (9), A4VR3 (8), insulated shoulder washers (6), screws (3), lockwashers (4), flat washers (5), and nuts (7).
2. Install heat-shrink tubing (Appendix B, Item 6) over individual wires, then solder two wires to A4VR3 leads.
3. Position and shrink tubing.

A4VR4 Voltage Regulator.

NOTE

Before installing A4VR4 in following step, clean and recoat regulator mounting surfaces with silicone heat sink compound (Appendix B, Item 5).

1. Install A4VR4 (19), screws (15), lockwashers (16), flat washers (17), and nuts (18).
2. Install heat-shrink tubing (Appendix B, Item 6) over individual wires, then solder four wires (11 thru 14) to A4VR4 leads.
3. Position and shrink tubing.

NOTE

FOLLOW-ON MAINTENANCE:

- Install A4A4G1 S/C-Band YIG Oscillator/A4A4U1 Match Modulator Assemblies (para 2-70) if removed.
- Install RF Deck cover (para 2-65).
- Install A1A5 thru A1A10 CCA's (para 2-53).
- Install top, bottom, and side covers (para 2-51).

END OF TASK

Section V. PREPARATION FOR STORAGE OR SHIPMENT

2-74. PACKAGING.

Package Sweep Generator in original shipping container. When using packing materials other than the original, use the following guidelines:

- Wrap Sweep Generator in non-static generating plastic packing material.
- Use double-wall cardboard shipping container.
- Protect all sides with shock-absorbing material to prevent Sweep Generator movement within the container.
- Seal the shipping container with approved sealing tape.
- Mark "FRAGILE" on all sides, top, and bottom of shipping container.

2-75. TYPES OF STORAGE.

- Short-Term (administrative) = 1 to 45 days.
- Intermediate = 46 to 180 days.
- Long term = over 180 days. After long term storage, perform turn-on procedure (TM 11-6625-3231-12, para 2-6). If this procedure fails, perform troubleshooting procedures (table 2-1).

2-76. ENVIRONMENT.

The Sweep Generator should be stored in a clean, dry environment. In high humidity environments, protect the Sweep Generator from temperature variations that could cause internal condensation. The following environmental conditions apply to both shipping and storage:

Temperature . . . . -40 to +167° F (-40 to + 70° C)

Relative Humidity (sea level) . . . . less than 95% ±5% at +50 to +86° F (+10 to + 30°C)
less than 75% ±5% at +86 to + 104° F (+ 30 to + 40°C)
less than 45% ±5% at +104 to +122° F (+ 40 to + 50°C)

Altitude . . . . less than 40,000 feet (12,00 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.

Equipment Inspection and Maintenance Worksheet... DA Form 2404

Product Quality Deficiency Report.. Form SF 368

Recommended Changes to Publications and Blank Forms... DA Form 2028

Report of Discrepancy (ROD).. Form SF 364

Transportation Discrepancy Report (TDR).. Form SF 361

A - 3. TECHNICAL MANUALS.

Operators and Unit Maintenance Manual for Sweep Generator SG-1206lU....... TM 11-6625-3231-12

Procedures for Destruction of Electronics Materiel to Prevent Enemy
Use (Electronics Command).. TM 750-244-2

Unit Direct Support and General Support Repair Parts and Special
Tools List for Sweep Generator SG-1206lU ....TM 11-6625-3231-24P

A - 4. MISCELLANEOUS.

Abbreviations and Acronyms ………... ASME-Y14/38M

Calibration and Requirements for the Maintenance of Army Materiel.................................. TB 43-180

Common Table of Allowances.. CTA 50-970

Consolidated Index of Army Publications and Blank Forms.. DA Pam 25-30

First Aid for Soldiers ....FM 4-25.11

Safety Precautions for Maintenance of Electrical Electronic Equipment................................ TB 385-4

The Army Maintenance Management System (TAMMS).. DA Pam 750-8

APPENDIX B

EXPENDABLEIDURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

8 - 1. SCOPE.

This appendix lists expendable supplies you will need for maintenance on Sweep Generator SG-1206A/U. These items are authorized to you by CTA 50-970, Expendable items (Except Medical, Class V, Repair Parts, and Heraldic Items).

8 - 2. EXPLANATION OF COLUMNS.

a. Column (I)—Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. D").

b. Column (2)—Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew.

O - Unit Maintenance.

H - General Support Maintenance.

c. Column (3)—National Stock Number. This column indicates the national stock number assigned to the item and will be used for requisitioning purposes.

d. Column (4)—Description. This column indicates the federal item name and if required, a minimum description to identify the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

e. Column (5)—Unit of Measure (U/M). This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA. IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C	**8305-00-267-3015**	Cloth, Cheesecloth, Cotton, Lintless, CCC-C-440, Type If, Class 2 (81 349)	YD
2	O	**6810-00-753-4993**	Alcohol, Isopropyl, 8 oz Can, TT-I-735, Grade A (81349)	CN
3	C	**7930-00-068-1669**	Detergent, Mild, Liquid	02
4	H	**6850-01-33-1841**	Freezing Compound, 15 oz Can (21267)	OZ
5	H	**6850-00-927-9461**	Silicone Heat Sink Compound, 5 oz Tube (71984)	02
6	H	**5970-00-81 2-2974**	Tubing, Insulating, Heat Shrink (06090)	1N.
7	H	**5975-01 -1 84-1 697**	Strap, tiedown, Elec (36956)	EA

INDEX

Subject	Paragraph Figure, Table, Number

SPECIAL CHARACTERS AND NUMBERS

A

INDEX — Continued

INDEX — Continued

Subject | Paragraph Figure, Table, Number

A - Continued

B

INDEX — Continued

INDEX — Continued

INDEX — Continued

INDEX — Continued

Subject	Paragraph Figure, Table, Number

P

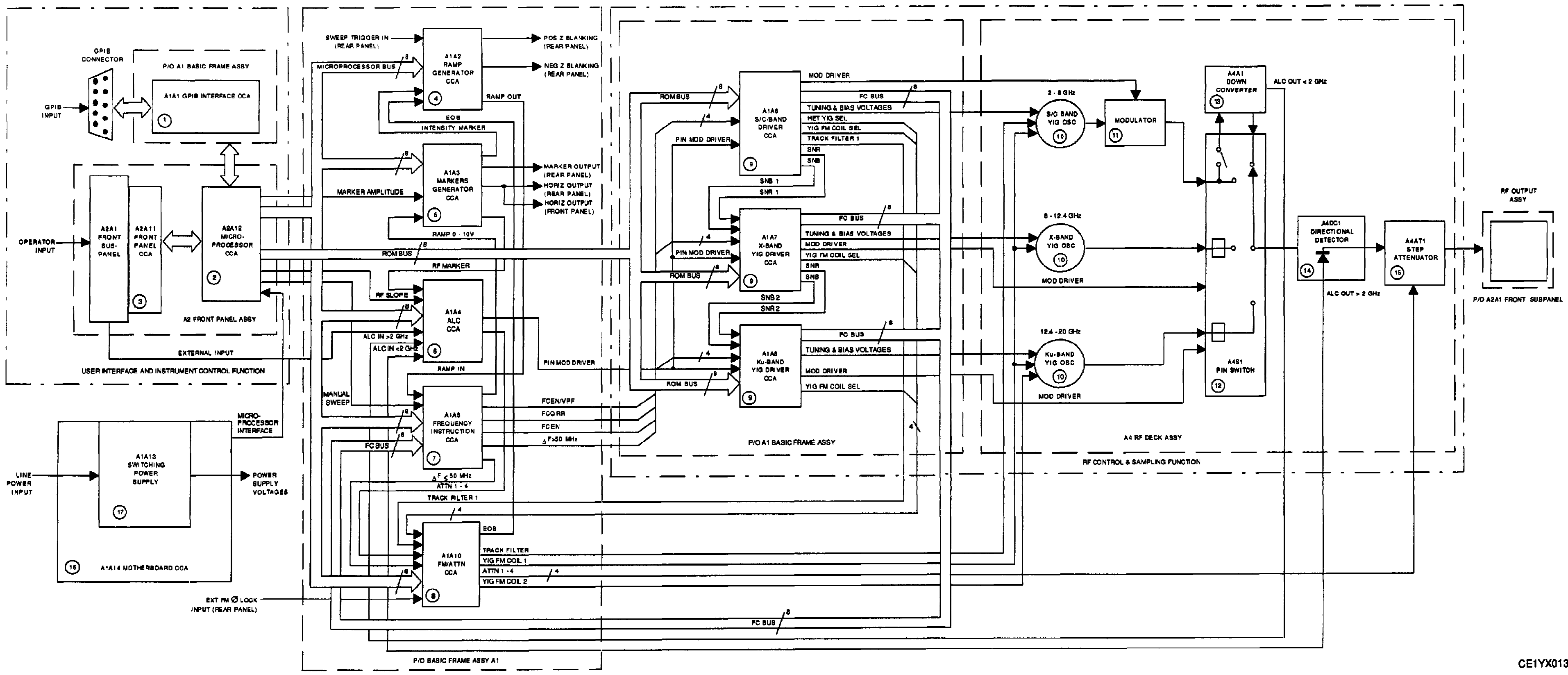
INDEX — Continued

INDEX — Continued

INDEX — Continued

INDEX — Continued

* U.S. GOVERNMENT PRINTING OFFICE: 1992-612-084-60232



CE1YX013

Figure FO-1. SG1206 Functional Block Diagram.

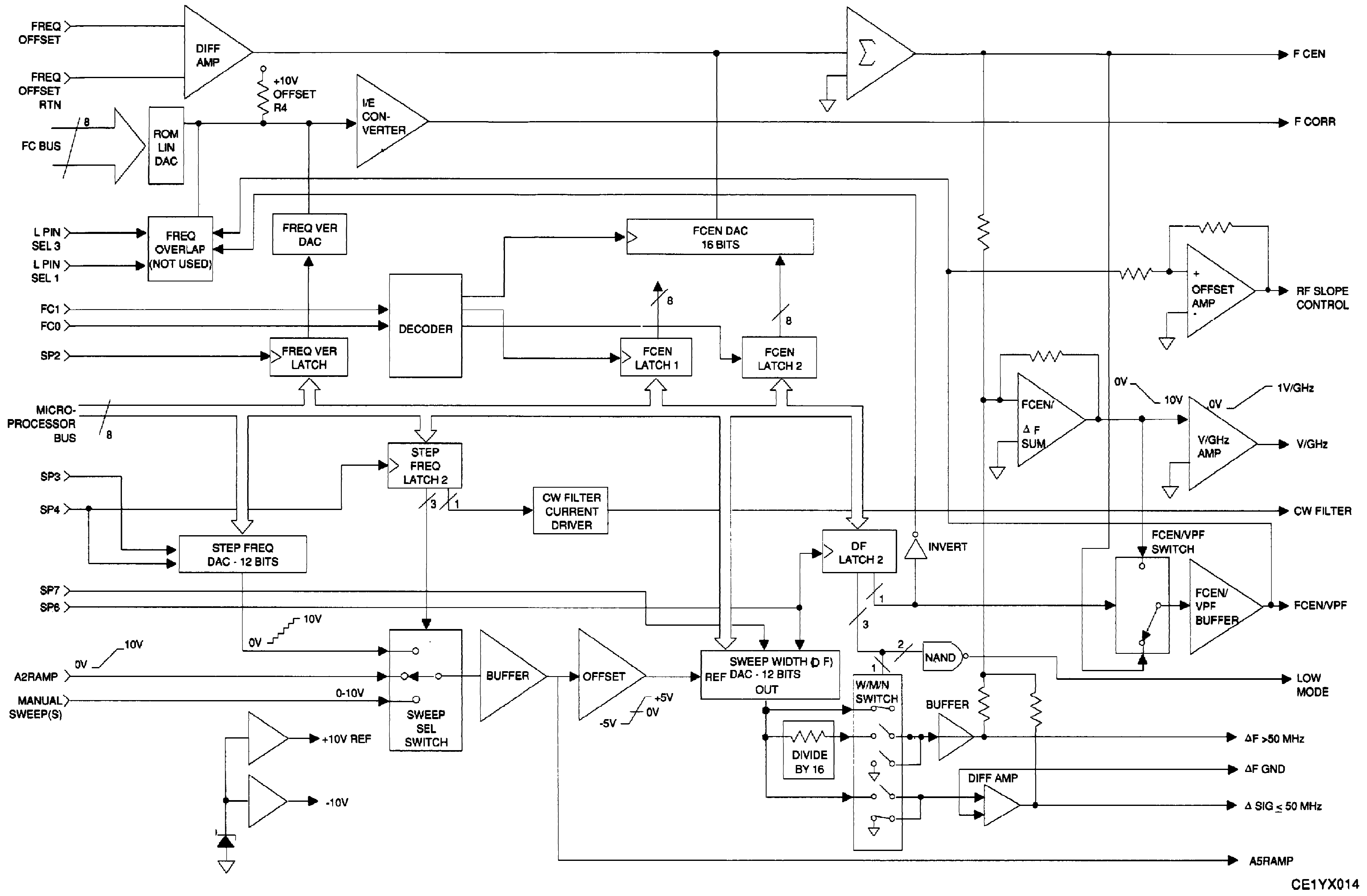


Figure FO-2. A1A5 Frequency Instruction CCA Functional Block Diagram.

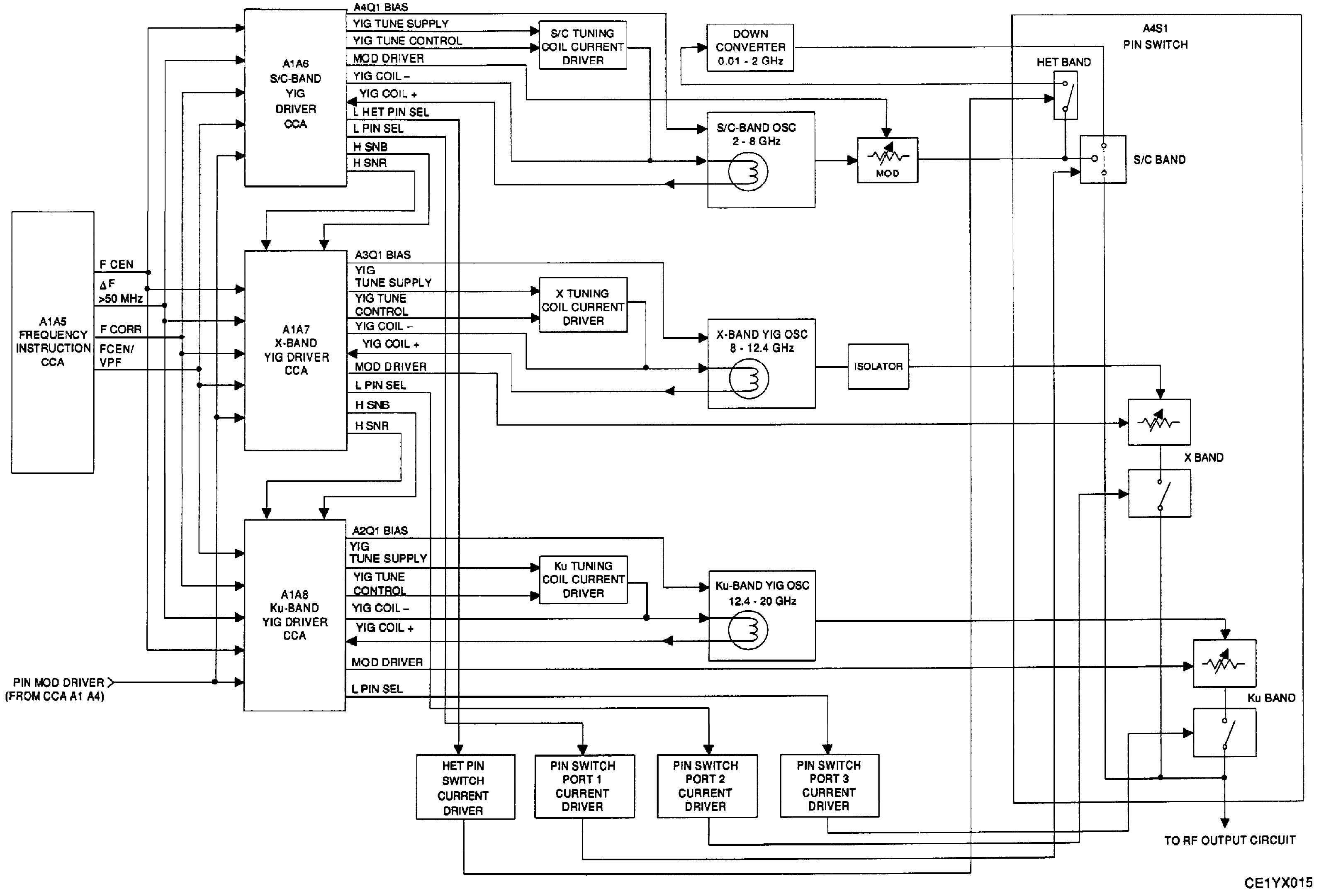


Figure FO-3. Frequency Generation Circuits Functional Block Diagram.

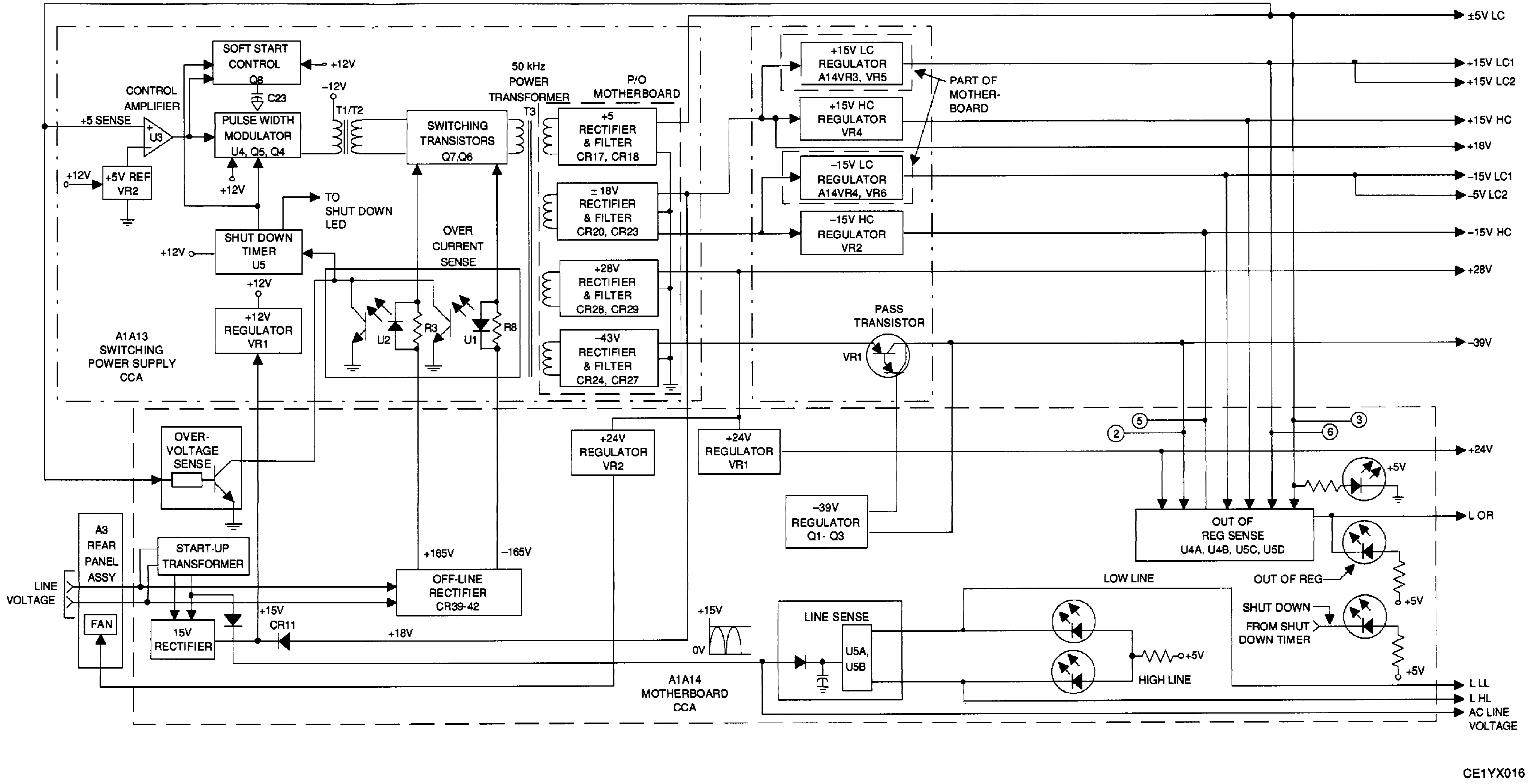


Figure FO-4. Switching Power Supply Functional Block Diagram.

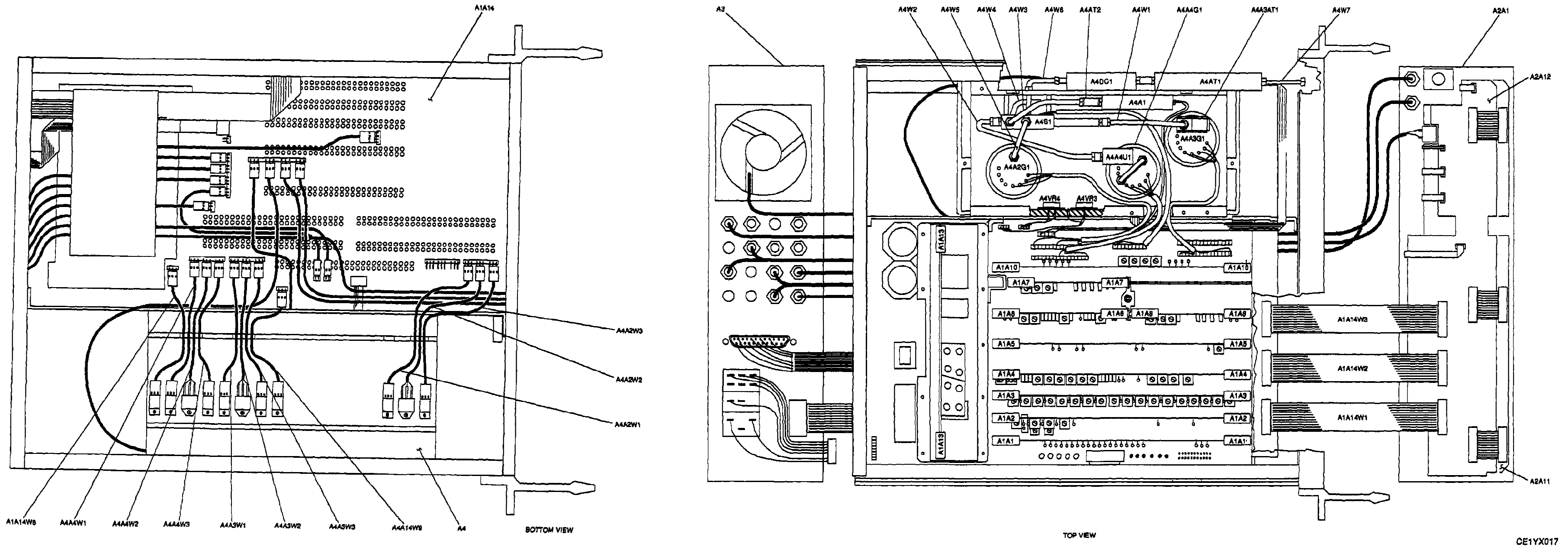
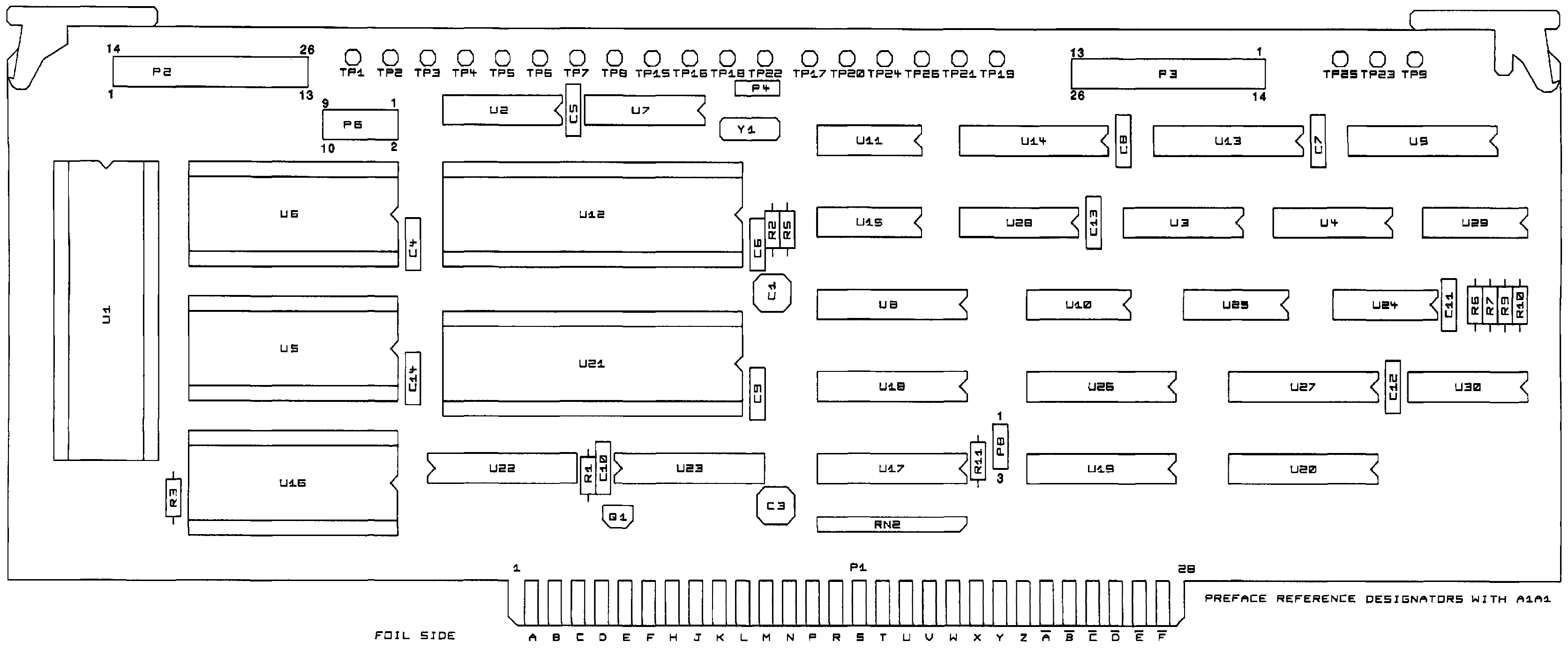
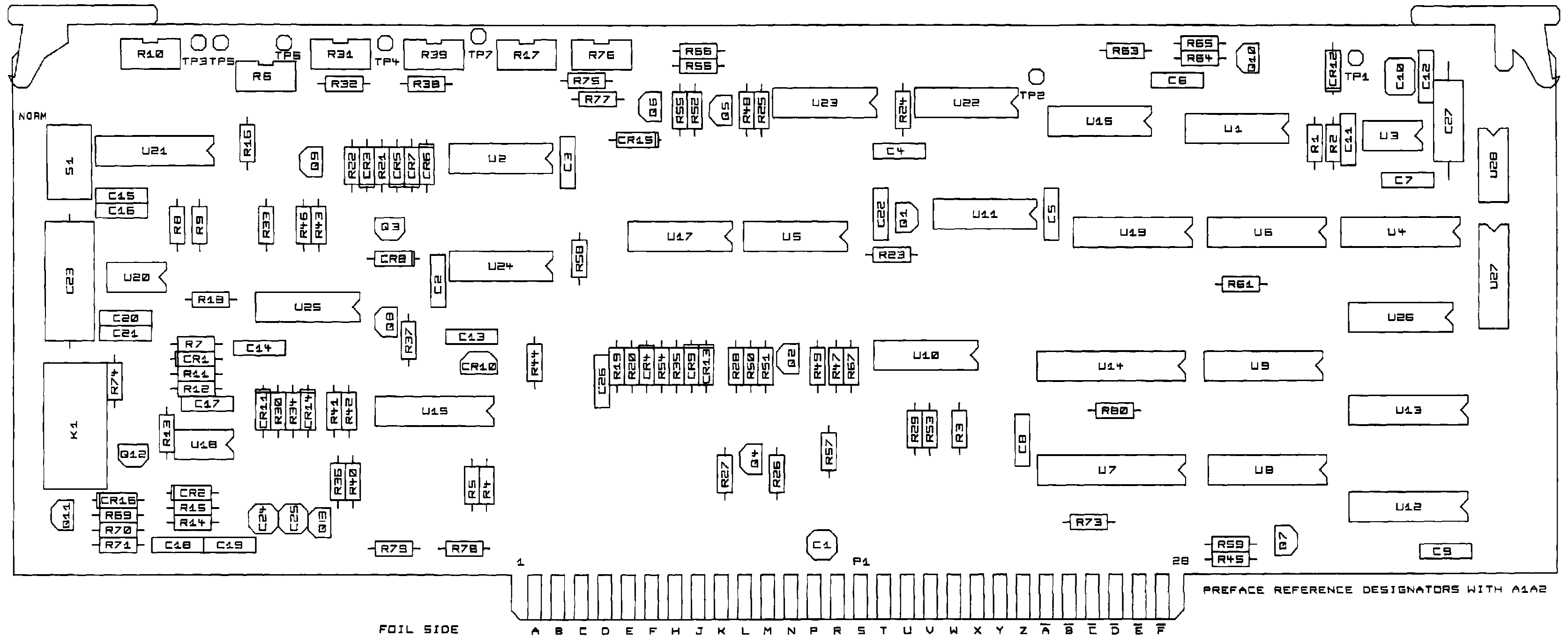


Figure FO-5. Assembly and Cable Locator Diagram.



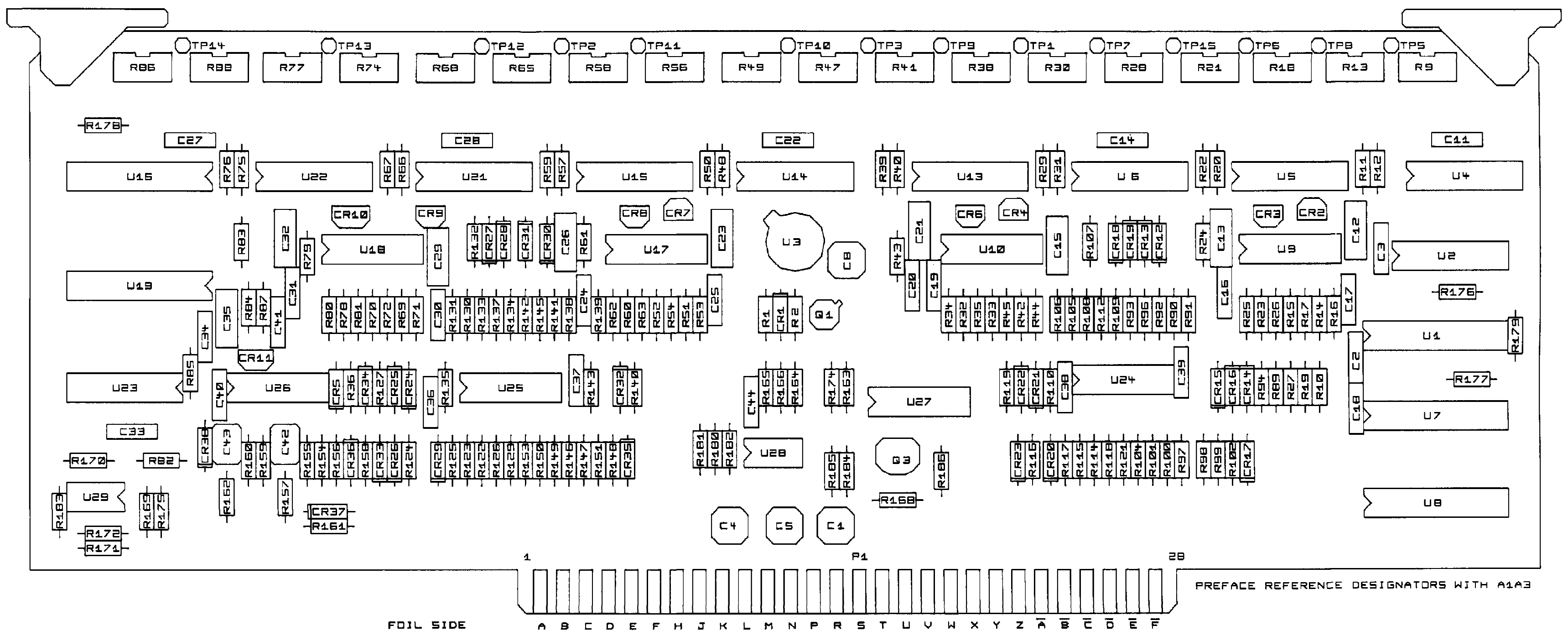
CE1YX018

Figure FO-6. A1A1 GPIB Interface CCA Component Locator Diagram.



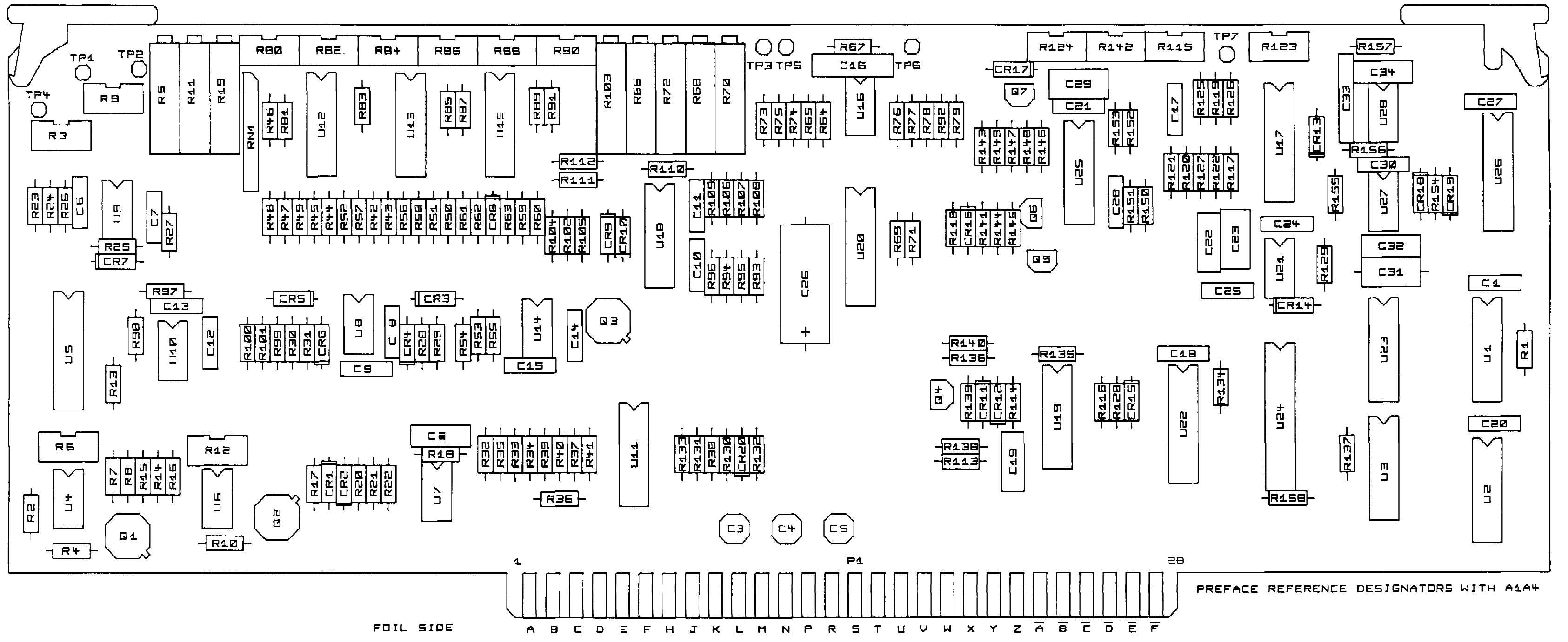
CE1YX019

Figure FO-7. A1A2 Ramp Generator CCA Component Locator Diagram.



CE1YX020

Figure FO-8. A1A3 Markers Generator CCA Component Locator Diagram.



CE1YX021

Figure FO-9. A1A4 ALC (Automatic Level Control) CCA Component Locator Diagram.

NOTES

- Unless otherwise specified, resistances are in ohms, capacitances are in microfarads, and inductances in microhenries.
- Prefix reference designators with A1A5.
- Conditional voltages and waveforms for A1A5 Frequency Instruction CCA IC's:
  Conditions: SG-1206 in "RESET" condition, EXT HORIZ output connected to external Y input on Oscilloscope.
  H = TTL High (3.5 to 5.5 volts)
  L = TTL Low (–0.5 to +0.8 volts)

SCHEMATIC SYMBOLS

SHEET 1 A / SHEET 2 B — Boat shows continuation of signal on different page of this schematic set. Signals leave a page on the right and enter on the left.

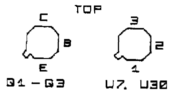
Denotes screwdriver adjust

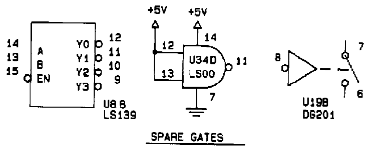
Denotes Test Point

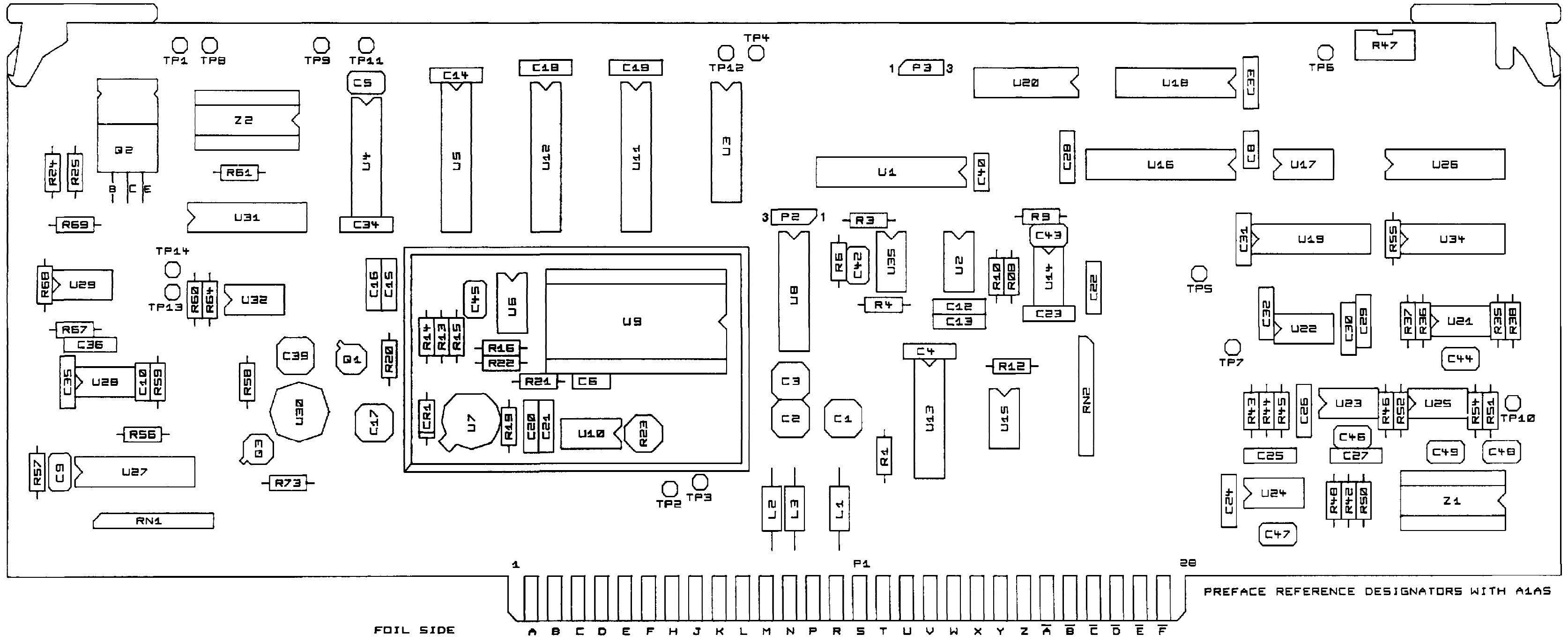
Denotes +5V Return

Denotes Analog Ground 1

Denotes Analog Ground 2







CE1YX022

Figure FO-10. A1A5 Frequency Instruction CCA Component Locator & Schematic Diagram (Sheet 1 of 6)

SEE SHEET 1 FOR NOTES.

U1	
PIN	VOLTS (V) / TTL LEVEL
1	0 ±0.2
2	0 ±0.2
3	GROUND
4	H
5	+15 ±1.0
6	+15 ±1.0
7	H
8	H
9	H
10	H
11	H
12	H
13	H
14	H
15	H
16	H

U2	
PIN	VOLTS (V) / TTL LEVEL
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	–15 ±1.0
5	NOT USED
6	0 ±0.2

U20A	
PIN	VOLTS
1	H
2	H
7	GROUND
12	H
13	L

U3	
PIN	VOLTS (V) / TTL LEVEL
1	+5 ±0.5
2	H
3	L
4	H
5	H
6	L
7	H
8	GROUND
9	H
10	H
11	L
12	H
13	H
14	NC
15	L
16	+5 ±0.5

U13	
PIN	VOLTS (V) / TTL LEVEL
1	H
2	WAVEFORM B
3	0 ±0.2
4	–15 ±1.0
5	GROUND
6	MAN. SWP (0 TO +10)
7	WAVEFORM B
8	H
9	L
10	WAVEFORM B
11	
12	NOT USED
13	+15 ±1.0
14	WAVEFORM B
15	0
16	H

U14	
PIN	VOLTS (V) / TTL LEVEL
1	NOT USED
2	+2.5 ±0.3
3	+2.5 ±0.3
4	–15 ±1.0
5	NOT USED
6	WAVEFORM A
7	+15 ±1.0

U15	
PIN	VOLTS (V) / TTL LEVEL
1	NOT USED
2	WAVEFORM B
3	
4	–15 ±1.0
5	NOT USED
6	WAVEFORM B
7	+15 ±1.0

U30	
PIN	VOLTS
IN	+14.4 ±1.0
REF	GROUND

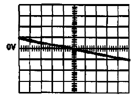
Q3	
PIN	VOLTS
E	+15 ±1.0
B	+14 ±1.0

U35	
PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	–15 ±1.0
5	NOT USED
6	0 ±0.2

Q2	
PIN	VOLTS
E	+5 ±0.5
B	H

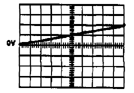
A

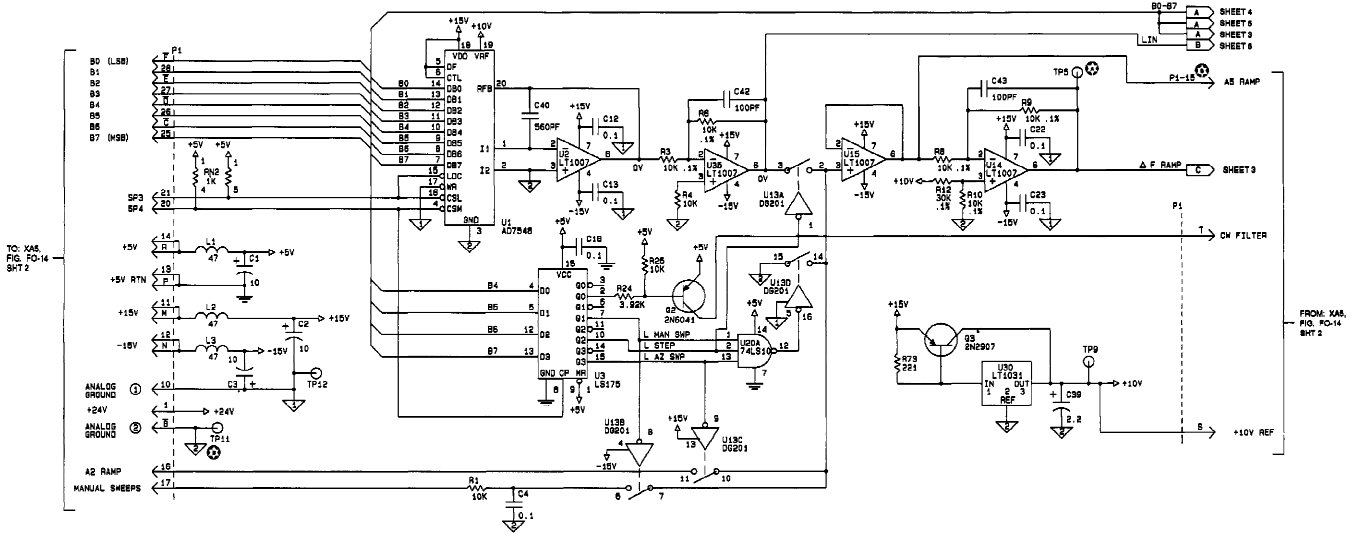
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



B

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV





CE1YX023

Figure FO-10. A1A5 Frequency Instruction CCA Component Locator & Schematic Diagram (Sheet 2 of 6)

SEE SHEET 1 FOR NOTES.

U15	
PIN	VOLTS (V) / TTL LEVEL
1	0 ±0.2
2	0 ±0.2
3	GROUND
4	H
5	+15 ±1.0
6	+15 ±1.0
7	H
8	H
9	H
10	H
11	H
12	H
13	H
14	H
15	H
16	H
17	GROUND
18	+15 ±1.0

U17	
PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	NOT USED
6	WAVEFORM C
7	+15 ±1.0

U18	
PIN	VOLTS
1	+5 ±0.5
2	L
3	H
4	H
5	H
6	L
7	H
8	GROUND
9	H
10	H
11	L
12	H
13	H
14	L

U19	
PIN	VOLTS
1	L
2	WAVEFORM C
3	
4	−15 ±1.0
5	GROUND
6	NOT USED
7	NOT USED
8	NOT USED
9	L
10	L
11	L
12	L
13	+15 ±1.0
14	WAVEFORM C

U21	
PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	NOT USED
6	0 ±0.2

U26C & D	
PIN	VOLTS
4	−15 ±1.0
5	GROUND
9	L
10	GROUND
11	GROUND
13	+15 ±1.0
14	WAVEFORM C
15	GROUND
16	H

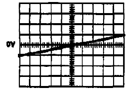
U34A	
PIN	VOLTS
1	L
2	H
3	H

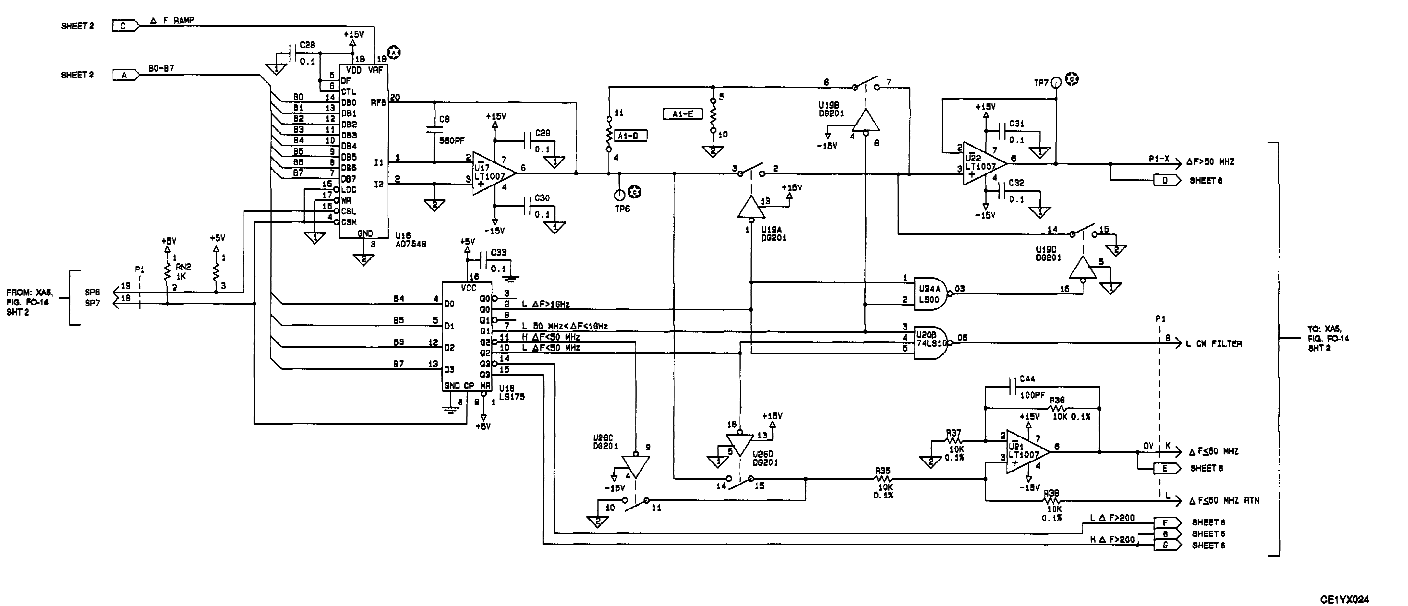
U20B	
PIN	VOLTS
3	H
4	H
5	L
6	H

U22	
PIN	VOLTS
1	NOT USED
2	WAVEFORM C
3	
4	−15 ±1.0
5	NOT USED
6	WAVEFORM C
7	+15 ±1.0
8	NOT USED

C

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV





CE1YX024

Figure FO-10. A1A5 Frequency Instruction CCA
Component Locator & Schematic Diagram (Sheet 3 of 6).

SEE SHEET 1 FOR NOTES.

U6	
PIN	VOLTS (V) / TTL LEVEL
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	NOT USED
6	0 ±0.2

U7	
PIN	VOLTS (V) / TTL LEVEL
IN	+4 ±0.5
REF	−10 ±0.2

Q1	
PIN	VOLTS
E	−10 ±0.2
B	−11 ±0.5

U8	
PIN	VOLTS (V) / TTL LEVEL
1	GROUND
2	H
3	H
4	H
5	H
6	H
7	L
8	GROUND
9	SPARE
10	SPARE
11	SPARE
12	SPARE
13	SPARE

† U9*				
PIN	VOLTS (V) /TTL LEVEL			
	CWCF= 1 GHz	CWCF= 5 GHz	CWCF= 10 GHz	CWCF= 15 GHz
1	H	L	H	L
2	H	H	L	L
3	L	L	H	L
4	H	H	L	L
5	L	H	H	H
6	L	H	H	H
7	H	H	H	H
8	H	H	H	H'
9	L	H	H	H
10	L	H	H	H
11	L	L	H	L
12	L	L	L	H
13	−10 ±0.2	−10 ±0.2	−10 ±0.2	−10 ±0.2
14	+0.5 ±0.05	+2.5 ±0.05	+5.0 ±0.05	+7.5 ±0.05
15	0 ±0.2	0 ±0.2	0 ±0.2	0 ±0.2
16	0 ±0.2	0 ±0.2	0 ±0.2	0 ±0.2
17	+15 ±1.0	+15 ±1.0	+15 ±1.0	+15 ±1.0
18	GROUND	GROUND	GROUND	GROUND
19	H	H	H	H
20	H	H	H	H

* Logic high for this IC is +2.5 V to +5.5 V

† U10				
PIN	VOLTS (V) /TTL LEVEL			
	CWCF= 1 GHz	CWCF= 5 GHz	CWCF= 10 GHz	CWCF= 15 GHz
1	0 to +15	0 to +15	0 to +15	0 to +15
2	0	0	0	0
3	0	0	0	0
4	−15 ±1.0	−15 ±1.0	−15 ±1.0	−15 ±1.0
5	0 to −15	0 to −15	0 to −15	0 to −15
6	+0.5 ±0.05	+2.5 ±0.05	+5.0 ±0.05	+7.5 ±0.05
7	+15 ±1.0	+15 ±1.0	+15 ±1.0	+15 ±1.0

U12				
PIN	VOLTS (V) /TTL LEVEL			
	CF= 1 GHz	CF= 5 GHz	CF= 10 GHz	CF= 15 GHz
1	GROUND	GROUND	GROUND	GROUND
2	L	L	L	L
3	H	H	H	H
4	H	H	H	H
5	L	H	L	H
6	H	H	H	L
7	H	H	H	H
8	H	H	H	H
9	H	H	H	H
10	GROUND	GROUND	GROUND	GROUND
11	H	H	H	H
12	H	L	H	L
13	H	H	H	H
14	H	H	H	H
15	H	H	L	L
16	L	L	H	L

† U11				
PIN	VOLTS (V) /TTL LEVEL			
	CF= 1 GHz	CF= 5 GHz	CF= 10 GHz	CF= 15 GHz
1	GROUND	GROUND	GROUND	GROUND
2	L	L	L	L
3	H	H	H	H
4	H	H	H	H
5	L	H	L	H
6	H	H	H	L
7	H	H	H	H
8	H	H	H	H
9	H	H	H	H
10	GROUND	GROUND	GROUND	GROUND
11	H	H	H	H
12	H	L	H	L
13	H	H	H	H
14	H	H	H	H

† SG1206 PLACED IN "RESET" CONDITION, THEN CW CF (FOR U9, U10, AND U11, VOLTAGES ARE SHOWN FOR THE MID FREQUENCY.)

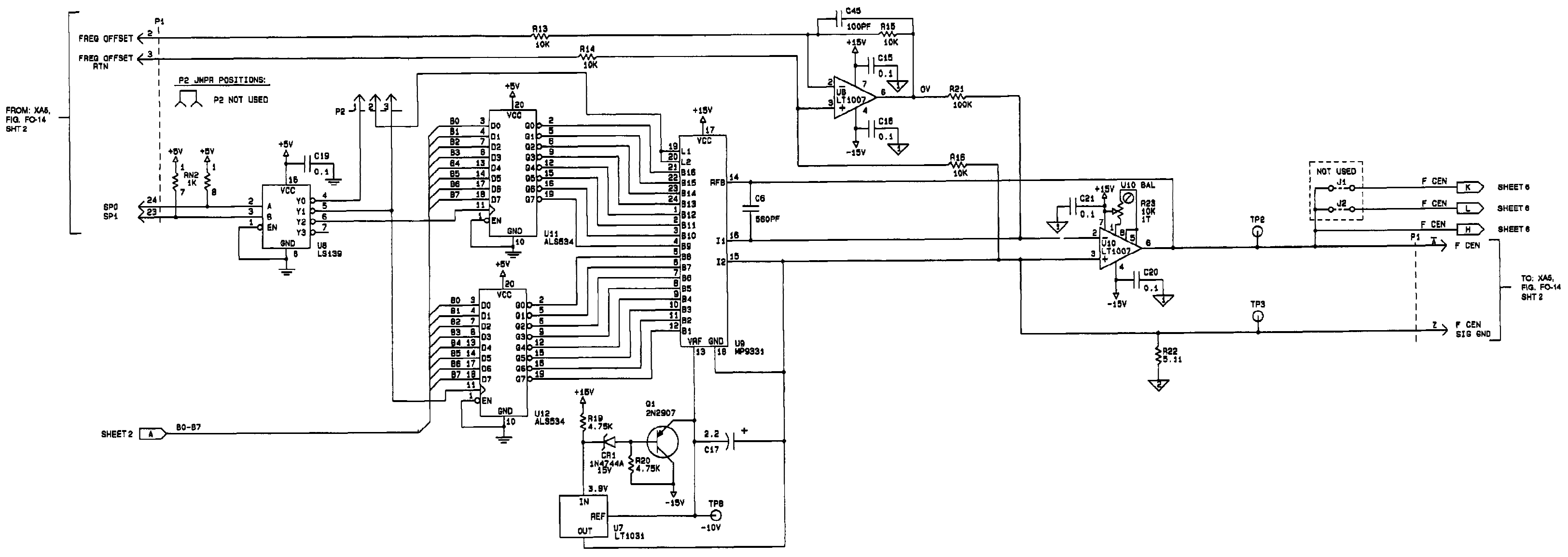


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Figure FO-10. A1A5 Frequency Instruction CCA Component Locator & Schematic Diagram (Sheet 4 of 6).

SEE SHEET 1 FOR NOTES.

U4	
PIN	VOLTS (V) / TTL LEVEL
1	GROUND
2	GROUND
3	−15 ±1.0
4	0 ±0.2
5	H
6	L
7	L
8	L
9	L
10	L
11	L
12	L
13	H

U5	
PIN	VOLTS (V) / TTL LEVEL
1	GROUND
2	L
3	H
4	H
5	L
6	L
7	H
8	H
9	L
10	GROUND
11	H
12	L
13	H
14	H
15	L
16	L

U20C	
PIN	VOLTS
8	WAVEFORM L
9	WAVEFORM E
10	H
11	WAVEFORM G

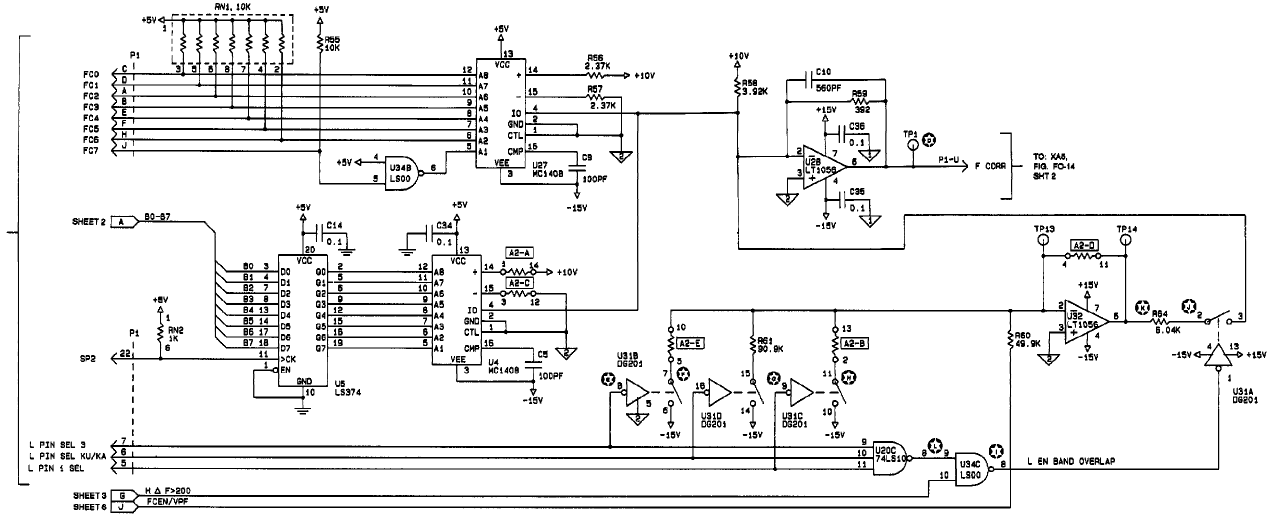
U26	
PIN	VOLTS
1	NOT USED
2	0
3	0
4	−15 ±1.0
5	NOT USED
6	WAVEFORM D
7	+15 ±1.0

U27	
PIN	VOLTS
1	L
2	L
3	−15 ±1.0
4	0
5	H
6	L
7	L
8	L
9	L
10	L
11	H
12	L
13	H

U32	
PIN	VOLTS
1	NOT USED
2	0
3	0
4	−15 ±1.0
5	NOT USED
6	WAVEFORM K
7	+15 ±1.0

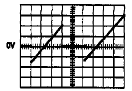
U31	
PIN	VOLTS
1	WAVEFORM I
2	WAVEFORM J
3	L
4	−15
5	GROUND
6	−15 ±1.0
7	WAVEFORM F
8	WAVEFORM E
9	WAVEFORM G
10	−15 ±1.0
11	WAVEFORM H
12	NOT USED
13	+15 ±1.0
14	−15 ±1.0
15	0 ±0.2
16	H

U34B & C	
PIN	VOLTS
4	H
5	L
6	H
7	L
8	WAVEFORM I
9	WAVEFORM M
10	H



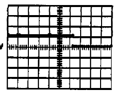
D

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 0.1V/DIV

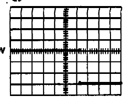


E

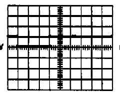
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



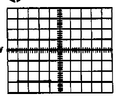
F



G

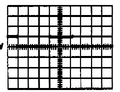


H



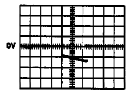
I

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV

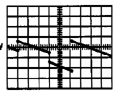


J

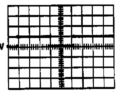
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 10V/DIV



K



L



CE1YX026

Figure FO-10. A1A5 Frequency Instruction CCA Component Locator & Schematic Diagram (Sheet 5 of 6).

SEE SHEET 1 FOR NOTES.

U23

PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	NOT USED
6	WAVEFORM M
7	+15 ±1.0
8	NOT USED

U24

PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15
5	NOT USED
6	WAVEFORM N
7	+24 ±1.0

U25

PIN	VOLTS
1	NOT USED
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	NOT USED
6	WAVEFORM B
7	+15 ±1.0
8	NOT USED

U26A & B

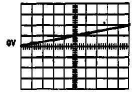
PIN	VOLTS
1	L
2	WAVEFORM B
3	
6	+5 ±0.5
7	WAVEFORM B
8	H

U29

PIN	VOLTS
1	WAVEFORM M
2	0 ±0.2
3	0 ±0.2
4	−15 ±1.0
5	0 ±0.2
6	0 ±0.2
7	WAVEFORM B
8	+15 ±1.0

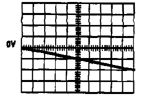
B

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



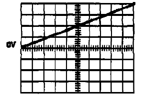
M

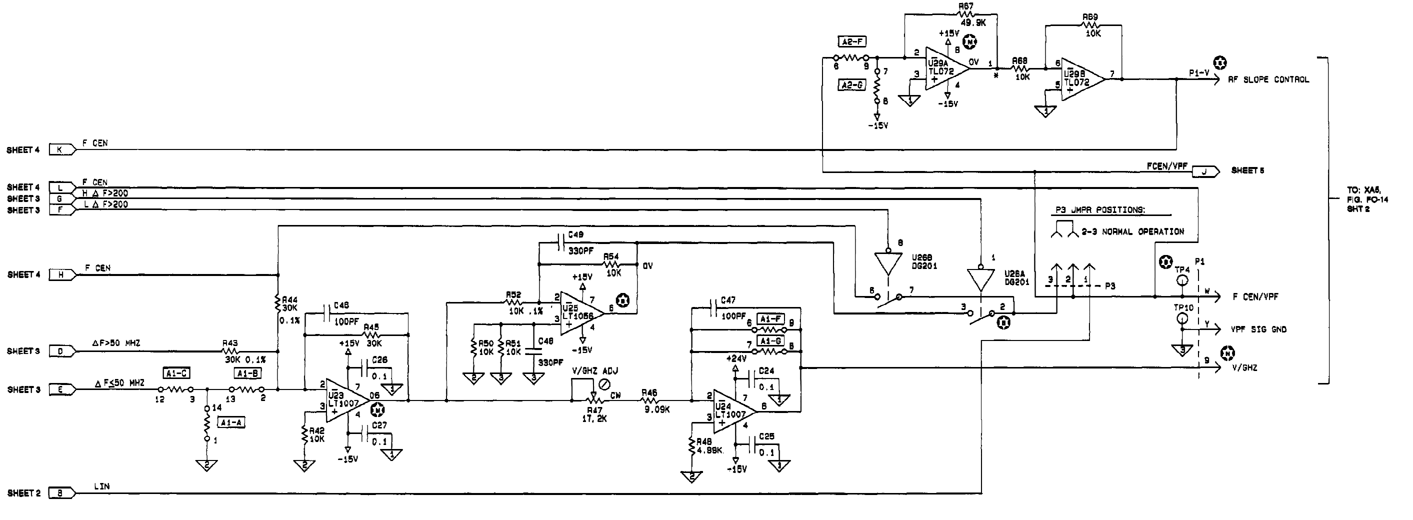
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



N

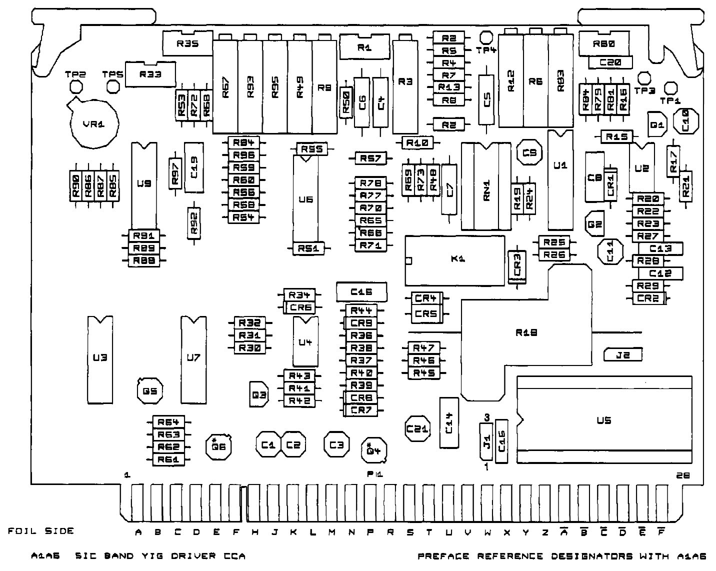
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV

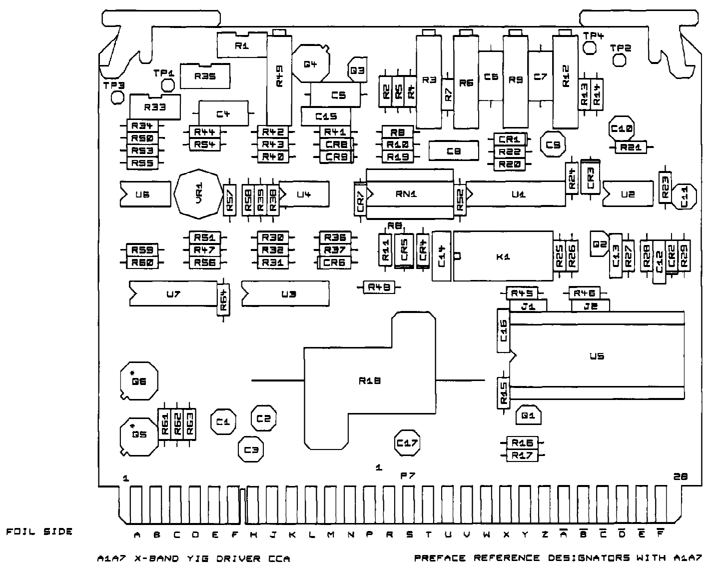


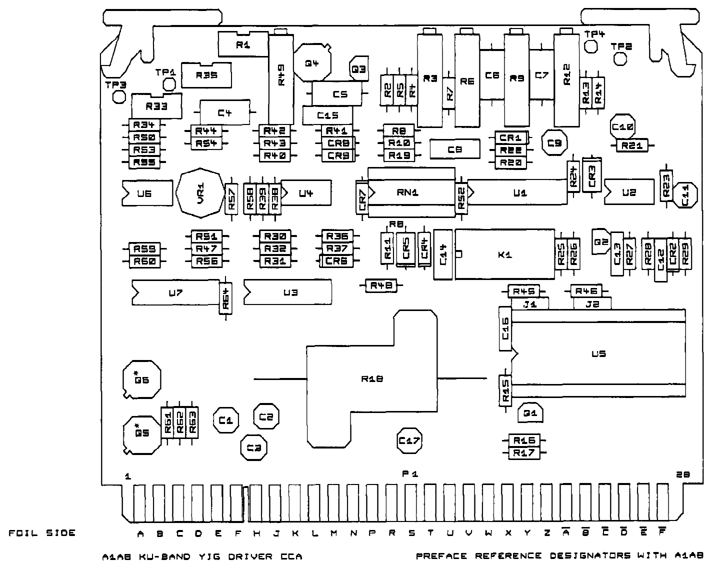


CE1YX027

Figure FO-10. A1A5 Frequency Instruction CCA Component Locator & Schematic Diagram (Sheet 6 of 6).



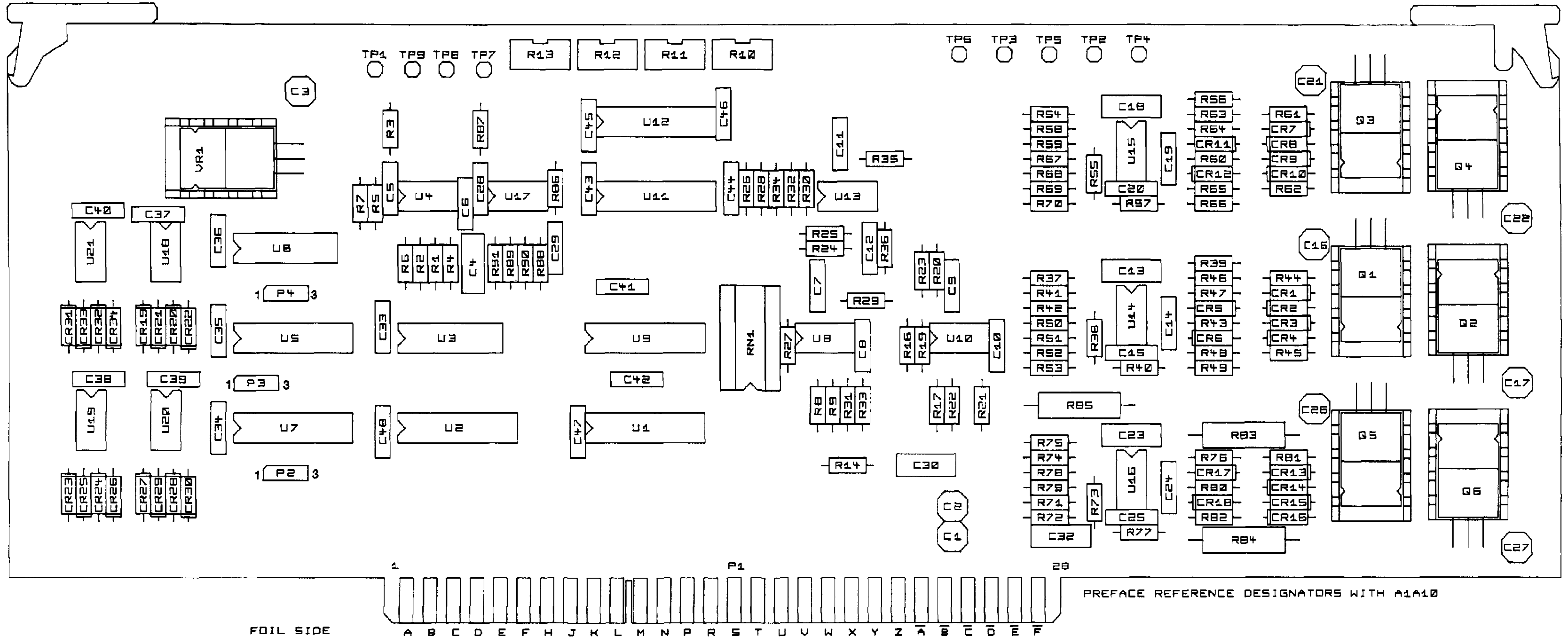




* METAL CASED COMPONENT. DO NOT SHORT TO GROUND OR OTHER COMPONENTS.

CE1YX028

Figure FO-11. A1A6, A1A7, A1A8 YIG Driver CCAs Component Locator Diagrams



CE1YX029

Figure FO-12. A1A10 FM/ATTN CCA Component Locator Diagram.

NOTES

- Unless otherwise specified, resistances are in ohms, capacitances are in microfarads, and inductances in microhenries.
- Prefix reference designators with A1A14.
- For Parts Locations, See Fig. FO-20 for A4VR1 thru A4VR4, and Fig. FO-30 for A3 Assembly Parts.

SCHEMATIC SYMBOLS

A / A — Boat shows continuation of signal on different page of this schematic set. Signals leave a page on the right and enter on the left.

Denotes screwdriver adjust

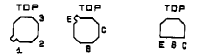
TP5 — Denotes Test Point

Denotes +5V Return

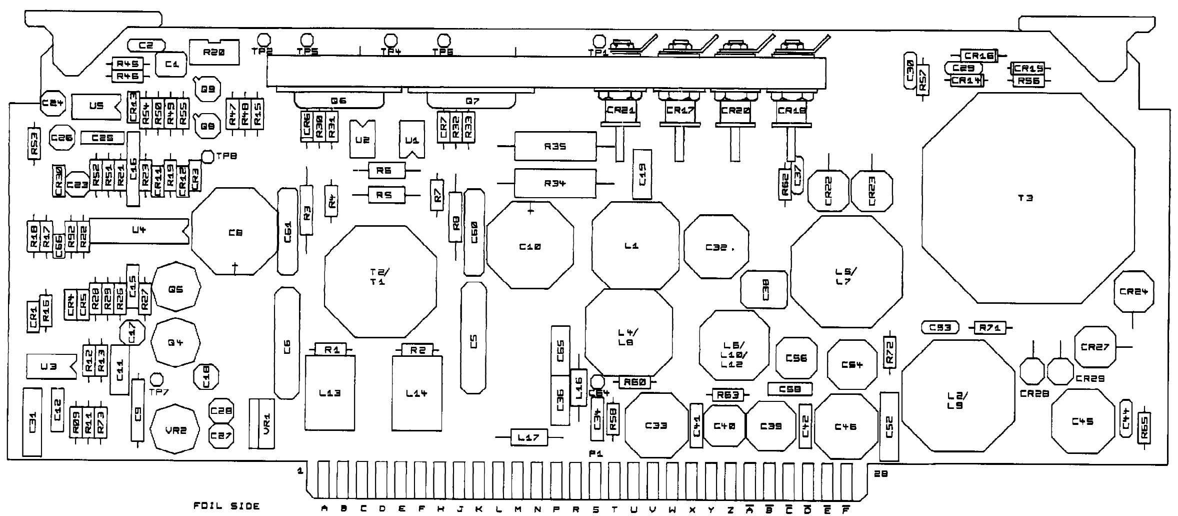
Denotes Analog Ground 1
–V 1 Denotes Relative Voltages

Denotes Analog Ground 2
–V 2 Denotes Relative Voltages

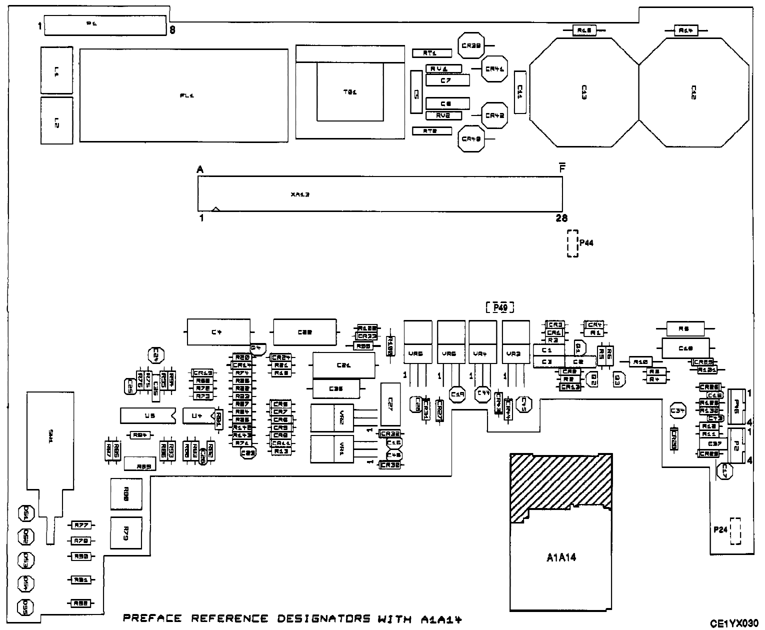
Denotes Chassis Ground



A1A13VR2 — A1A13Q3, A1A13Q4, A1A13Q8, A1A13Q9 — A1A14Q1- A1A14Q4



PREFACE REFERENCE DESIGNATORS WITH A1A13
COMPONENTS ARE STACKED ON THOSE SHOWING TWO OR MORE REFERENCE DESIGNATOR NUMBERS.
COMPONENT WHOSE REFERENCE DESIGNATOR APPEARS FIRST IS ON TOP.

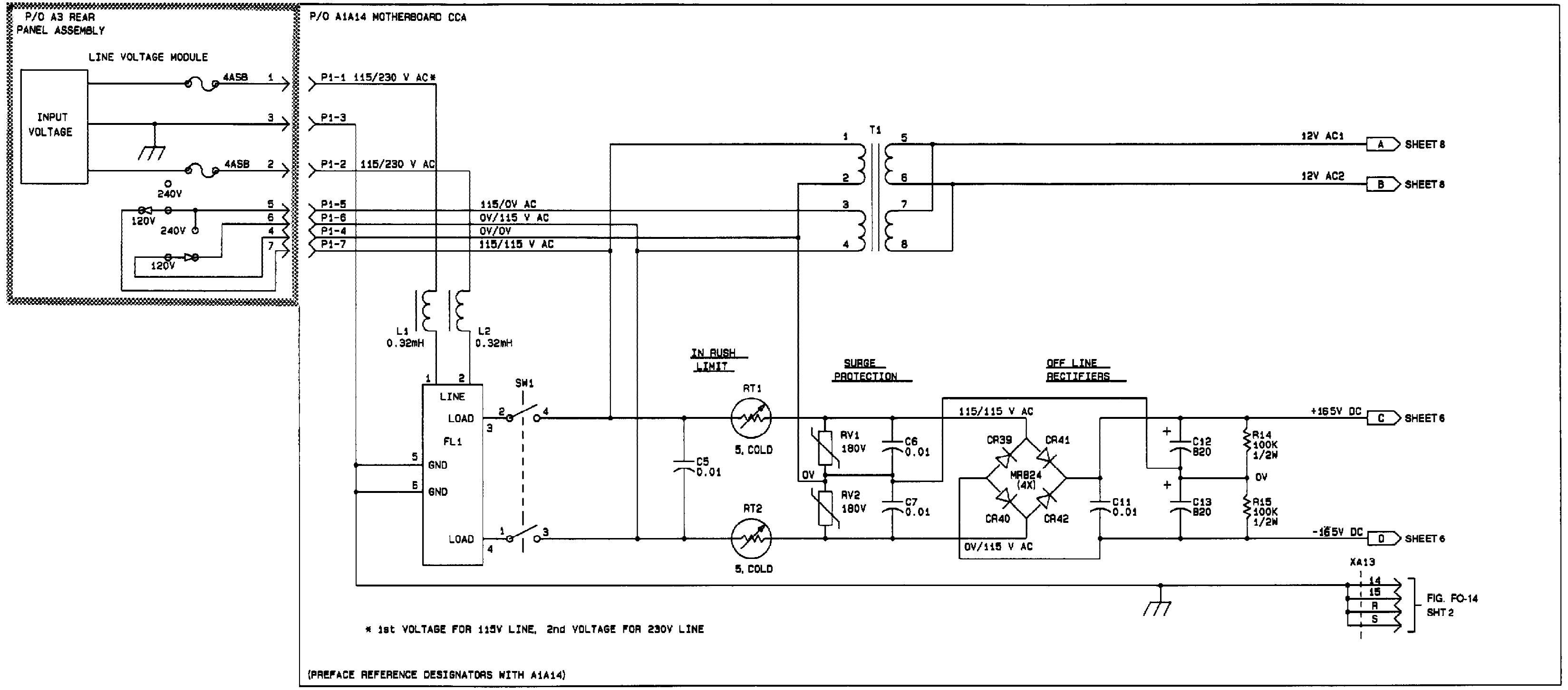


PREFACE REFERENCE DESIGNATORS WITH A1A14

CE1YX030

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 1 of 8).

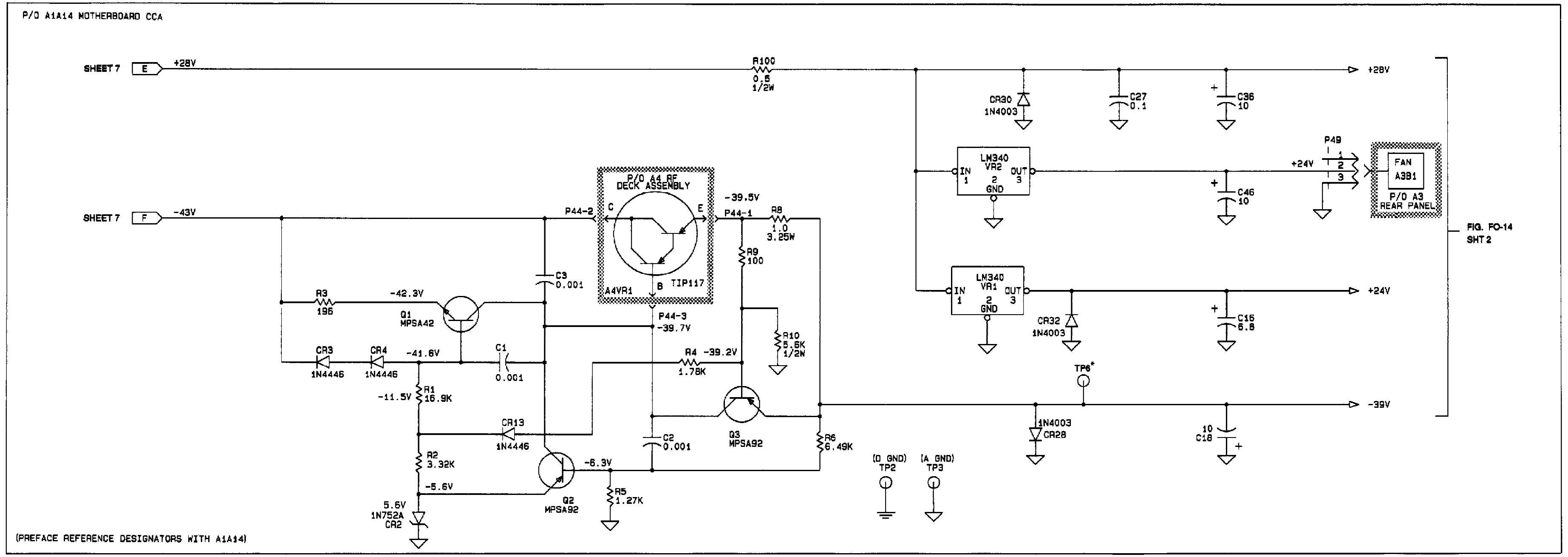
SEE SHEET 1 FOR NOTES.



CE1YX031

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 2 of 8).

SEE SHEET 1 FOR NOTES.

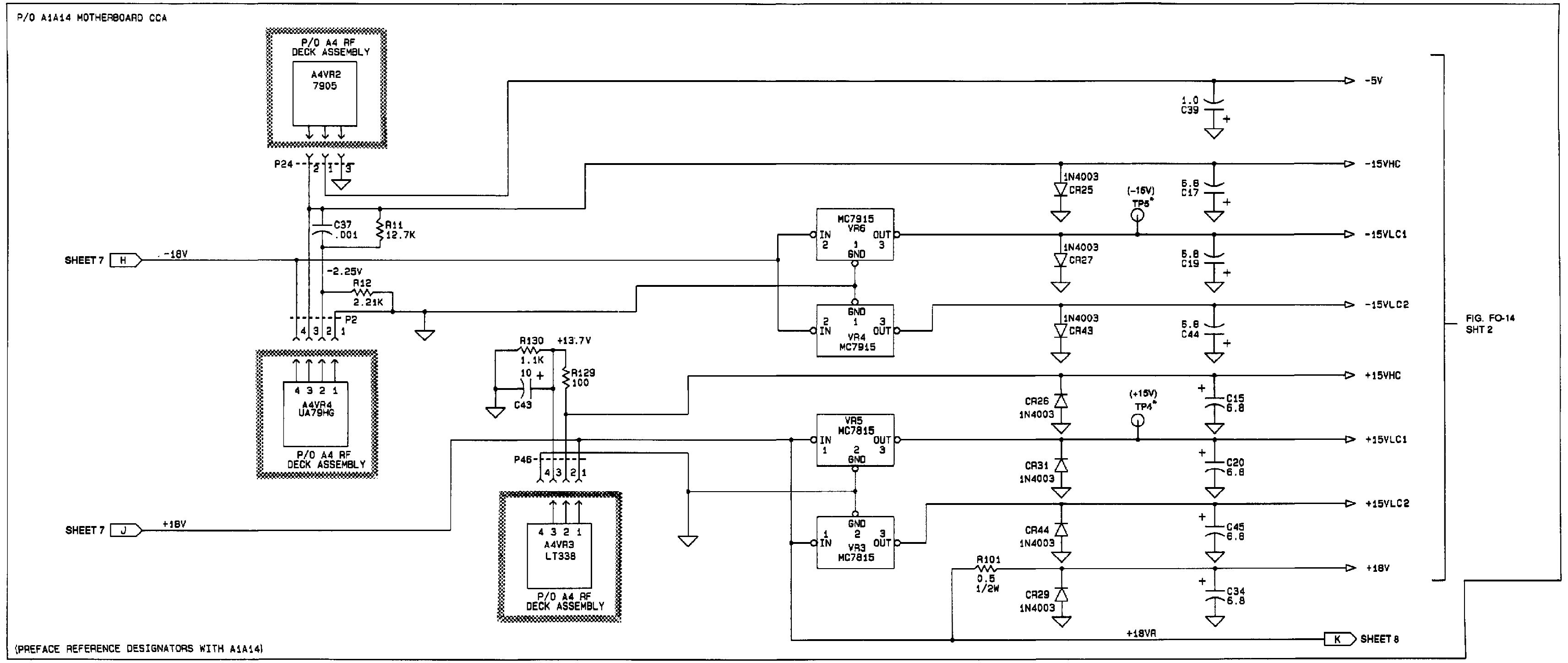


*(SEE FO-14 SHEET 1 FOR LOCATION)

CE1YX032

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 3 of 8).

SEE SHEET 1 FOR NOTES.

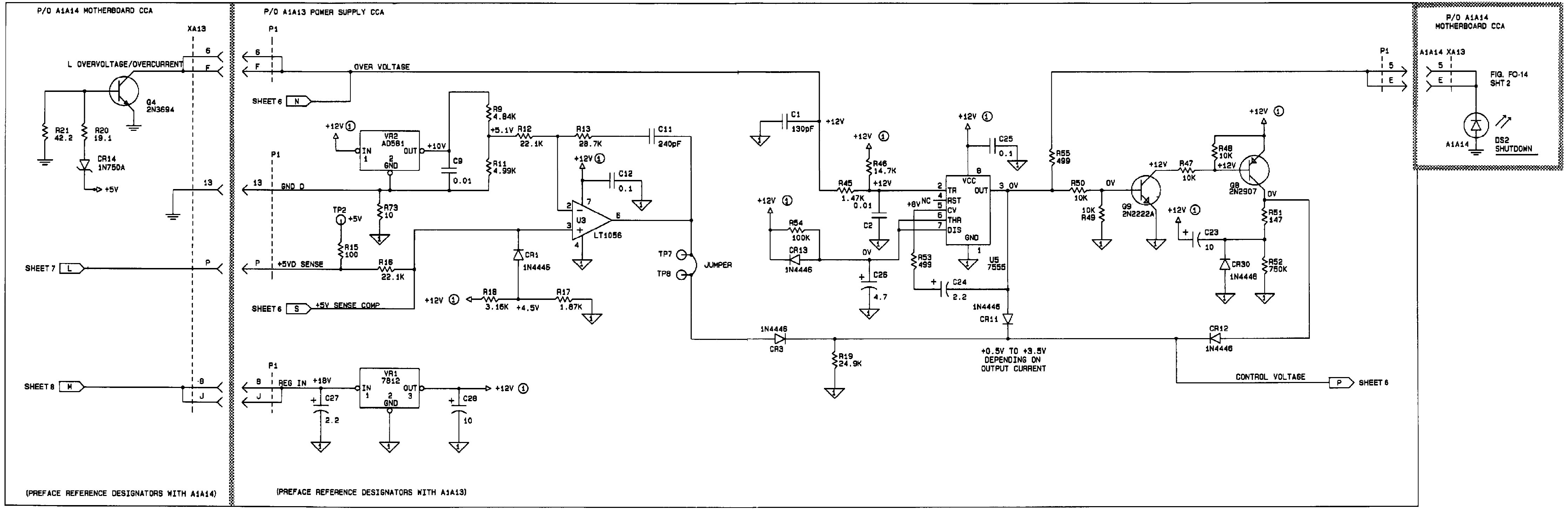


*(SEE FO-14 SHEET 1 FOR LOCATION)

CE1YX033

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 4 of 8).

SEE SHEET 1 FOR NOTES.



CE1YX034

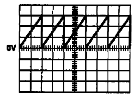
Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 5 of 8).

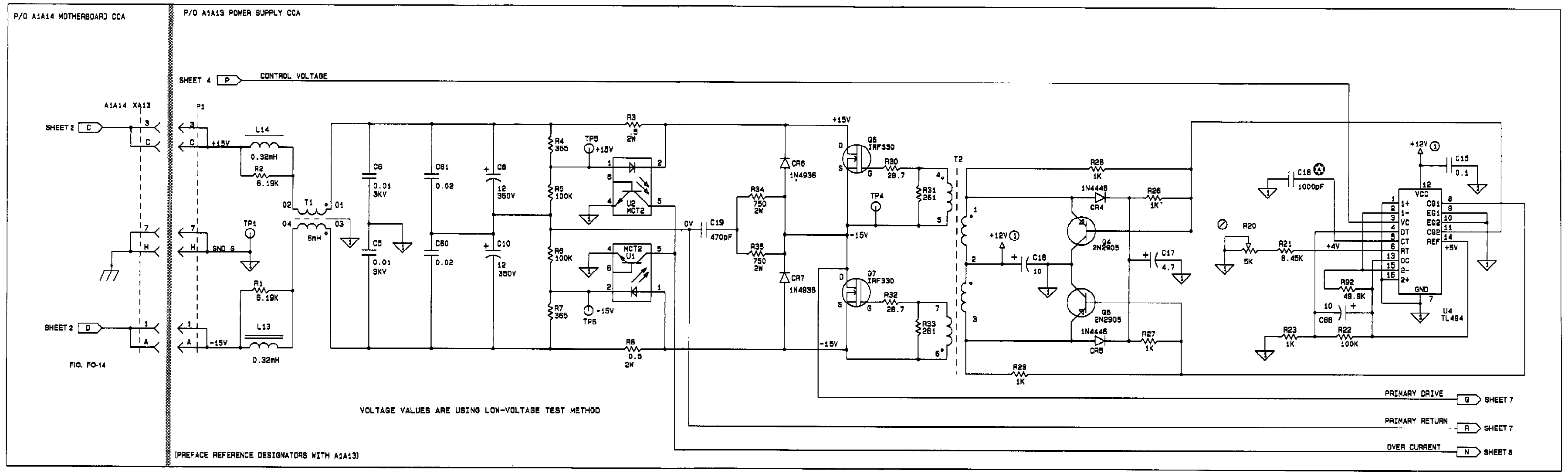
SEE SHEET 1 FOR NOTES.

(A)

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 5 μs
VERTICAL SCALE: 1V/DIV

SG-1206 SETUP:
PRESS RESET KEY.

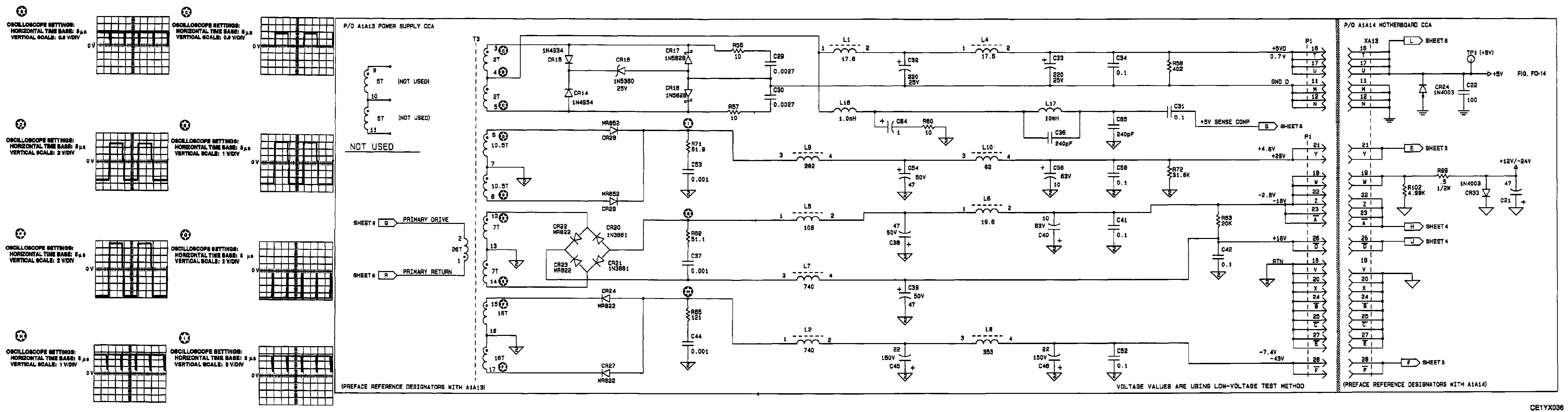




CE1YX035

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 6 of 8).

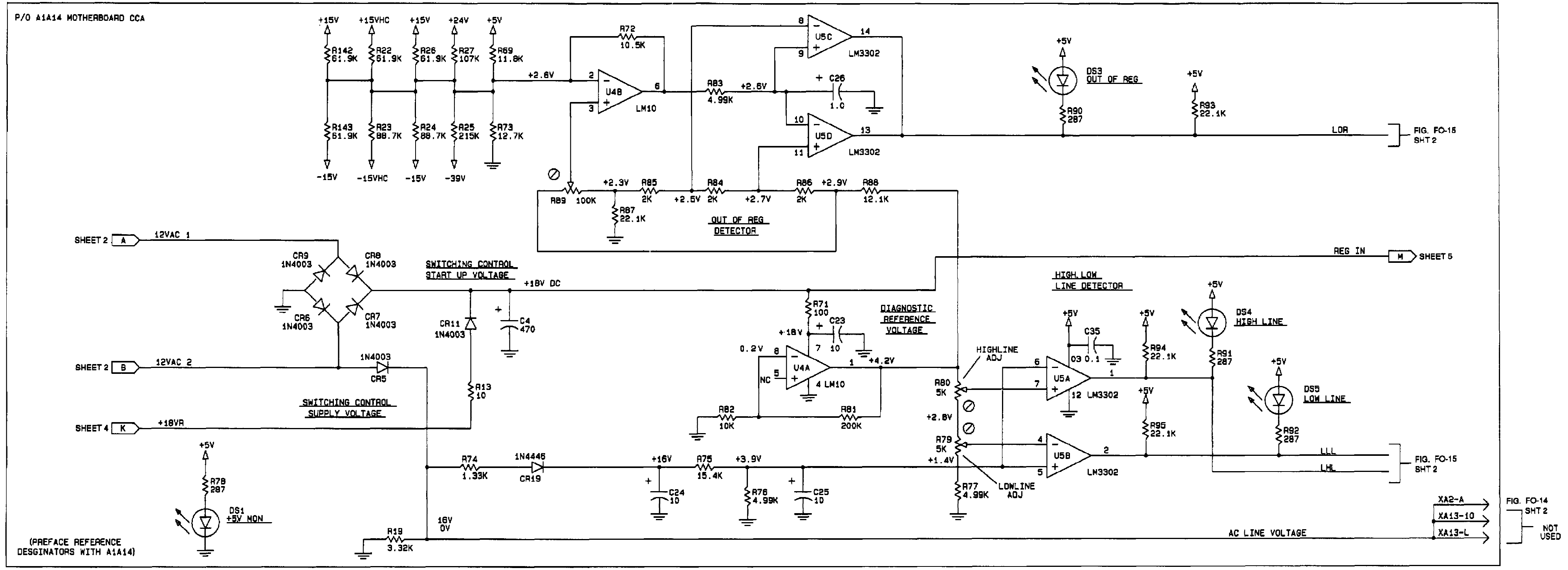
SEE SHEET 1 FOR NOTES.



CE1YX036

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 7 of 8).

SEE SHEET 1 FOR NOTES.



CE1YX037

Figure FO-13. A1A13 (w/A1A14) Switching Power Supply Component Locator & Schematic Diagram (Sheet 8 of 8).

NOTES

- Unless otherwise specified, resistances are in ohms, capacitances are in microfarads, and inductances in microhenries.
- Prefix reference designators with A1A14.

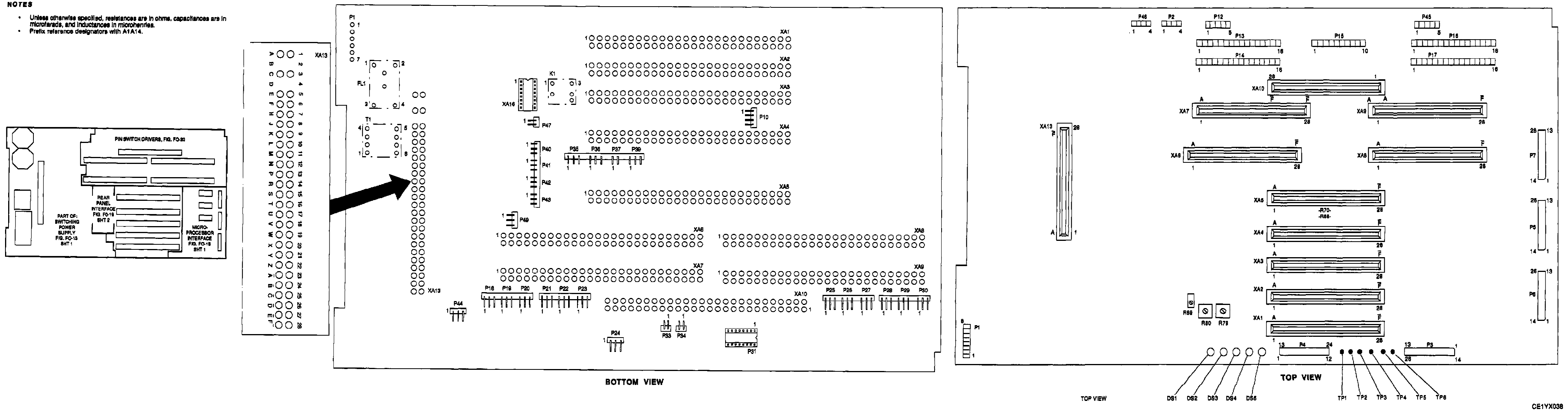
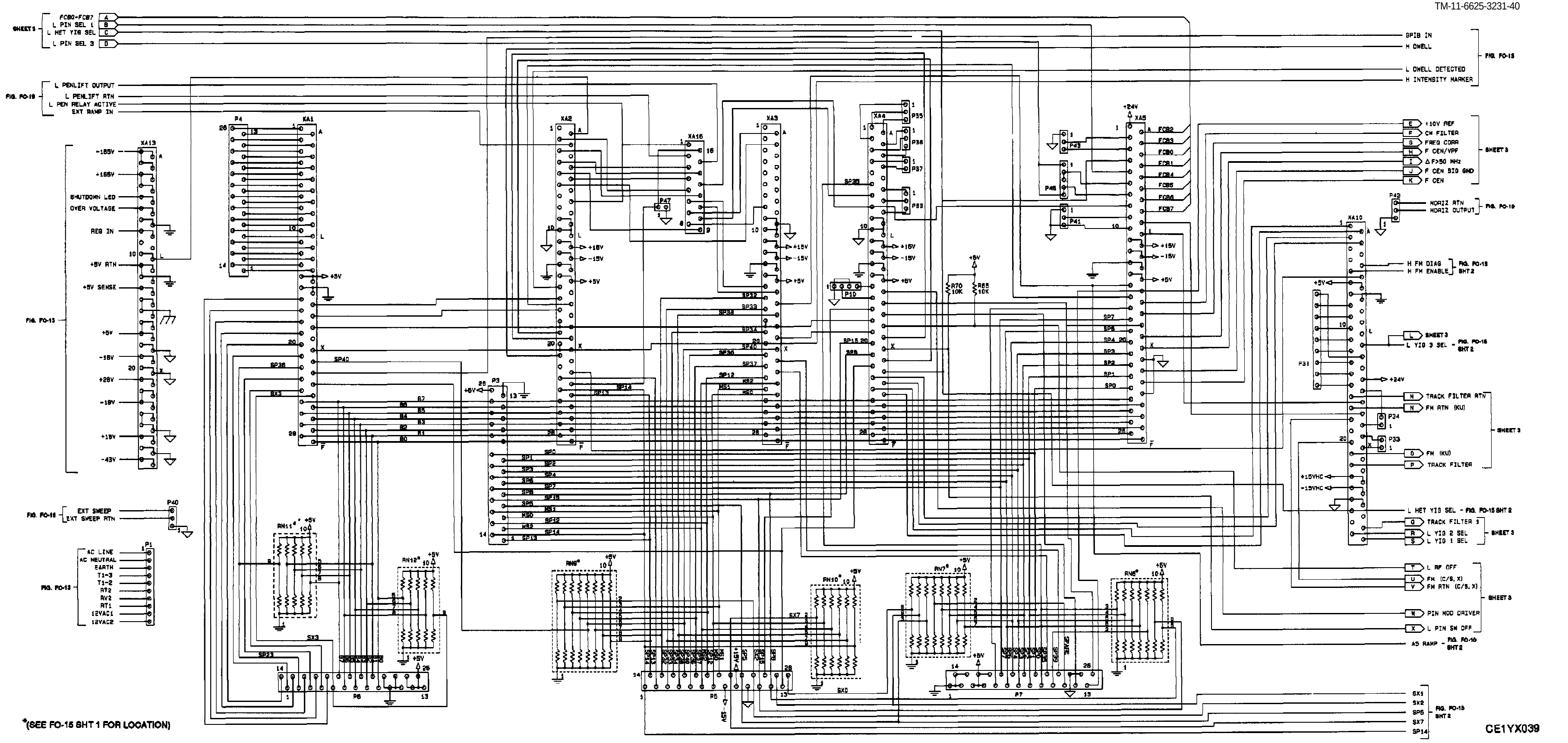


Figure FO-14. A1A14 Motherboard CCA Component Locator & Interconnection Diagram (Sheet 1 of 3).

SEE SHEET 1 FOR NOTES.



*(SEE FO-15 SHT 1 FOR LOCATION)

CE1YX039

Figure FO-14. A1A14 Motherboard CCA Component Locator & Interconnection Diagram (Sheet 2 of 3).

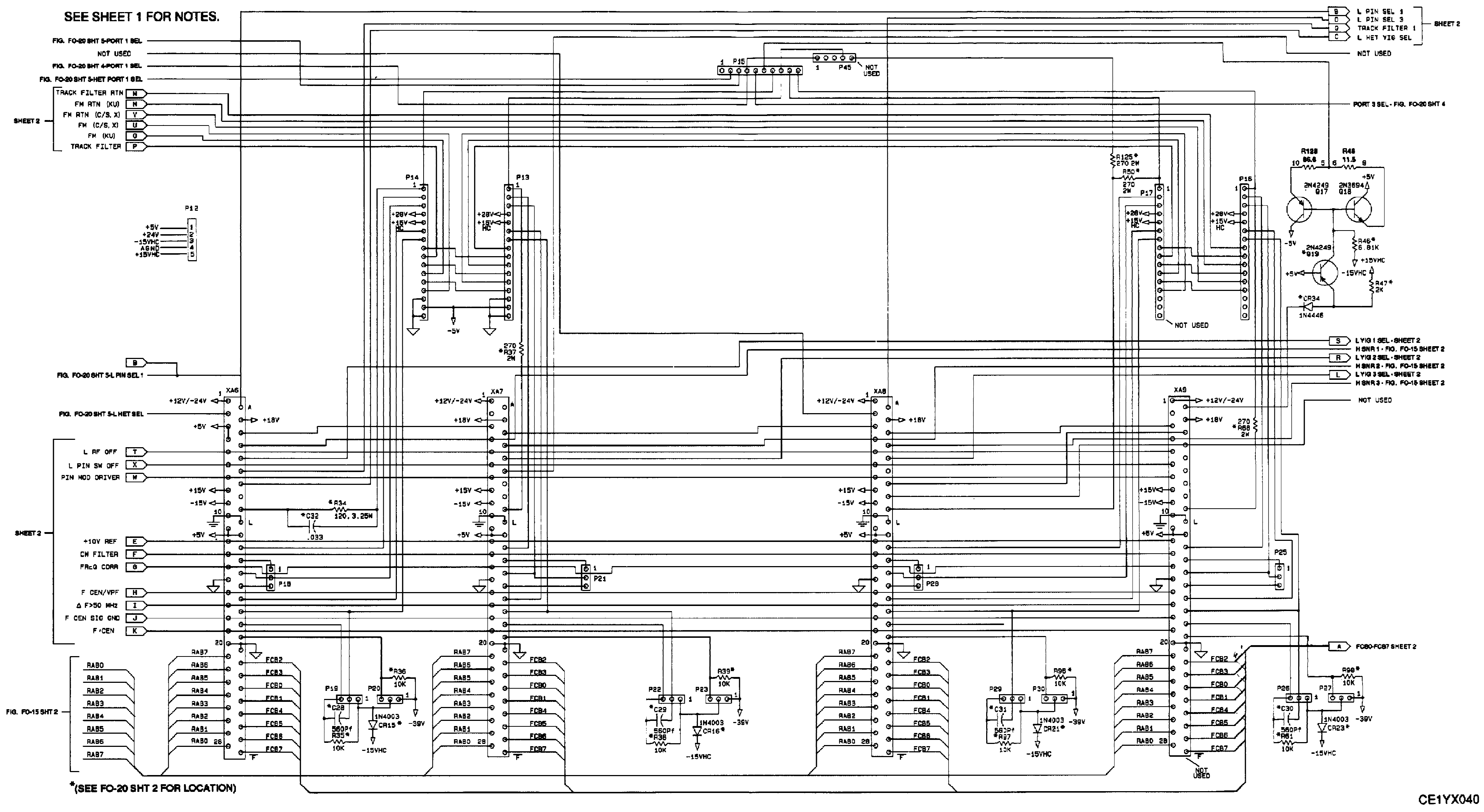


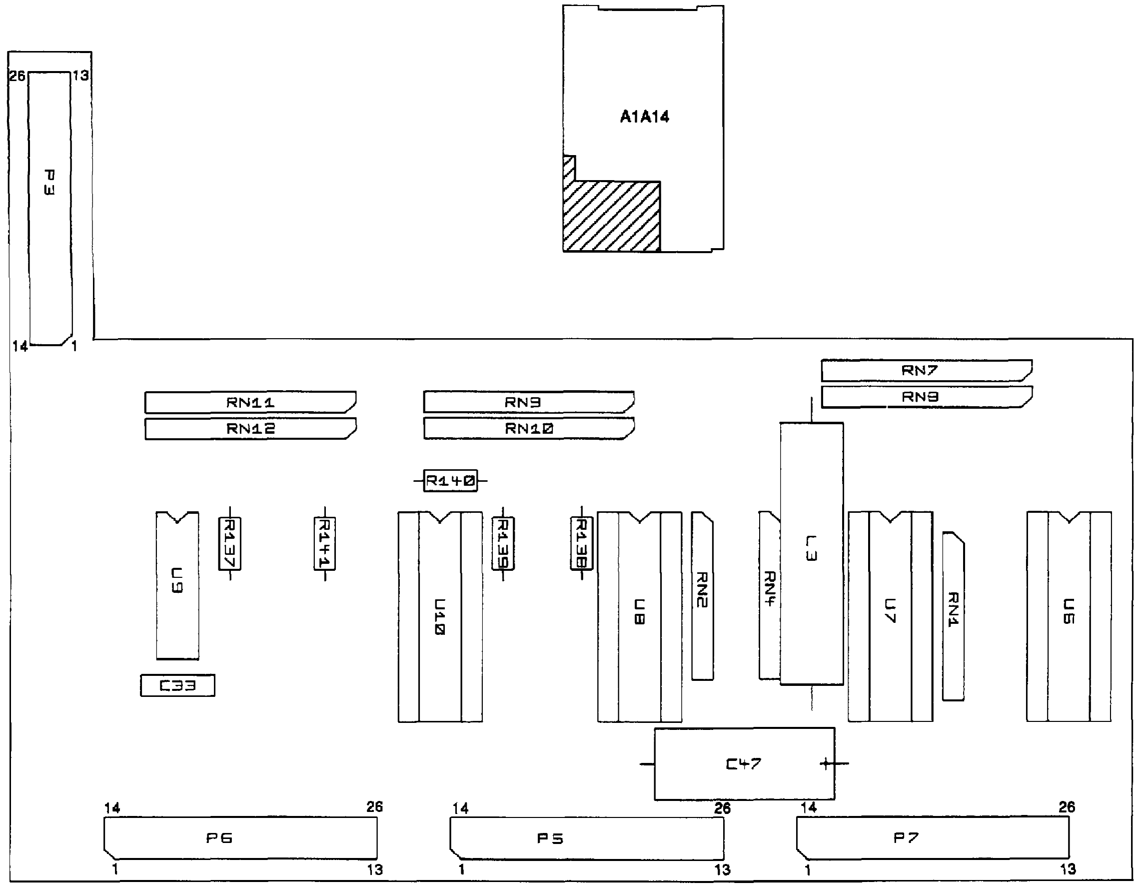
Figure FO-14. A1A14 Motherboard CCA Component Locator & Interconnection Diagram (Sheet 3 of 3).

NOTES

- Unless otherwise specified, resistance are in ohms, capacitances are in microfarads, and inductances in microhenries.
- Prefix reference designators with A1A14.
- Conditional voltages and waveforms for A1A14 Microprocessor Interface CCA IC's:
  Conditions: SG-1206 in "RESET" condition, EXT HORIZ output connected to external horizontal input on Oscilloscope.
  H = TTL High (3.5 to 5.5 volts)
  L = TTL Low (–0.5 to +0.8 volts)

SCHEMATIC SYMBOLS

Denotes +5V Return



PREFACE REFERENCE DESIGNATORS WITH A1A14

CE1YX041

Figure FO-15. A1A14 Microprocessor-Interface Component Locator & Schematic Diagram (Sheet 1 of 2).

SEE SHEET 1 FOR NOTES.

U6	
PIN	VOLTS (V) / TTL LEVEL
1	GROUND
2	L
3	H
4	H
5	L
6	L
7	H
8	H
9	L
10	GROUND
11	H
12	L
13	H
14	H
15	L
16	L
17	H

U7	
PIN	VOLTS (V) / TTL LEVEL
1	H
2	H
3	WAVEFORM A
4	WAVEFORM B
5	H
6	H
7	WAVEFORM C
8	H
9	H
10	GROUND
11	+5 ±0.5
12	H
13	H
14	L
15	H
16	H
17	L

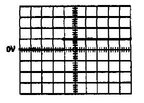
U8	
PIN	VOLTS (V) / TTL LEVEL
1	H
2	H
3	WAVEFORM D
4	L
5	H
6	H
7	GROUND
8	GROUND
9	H
10	GROUND
11	+5 ±0.5
12	H
13	H
14	H
15	H
16	H
17	H

U9	
PIN	VOLTS (V) / TTL LEVEL
1	NOT USED
2	H
3	H
4	NOT USED
5	H
6	L
7	L
8	H
9	L
10	H
11	L

U10	
PIN	VOLTS (V) / TTL LEVEL
1	H
2	H
3	H
4	H
5	H
6	H
7	H
8	L
9	H
10	L
11	H
12	H
13	L
14	WAVEFORM F
15	H
16	H

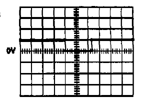
A

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



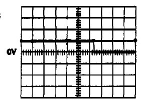
B

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



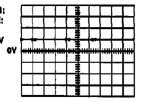
C

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



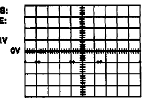
D

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



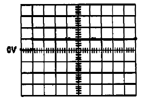
E

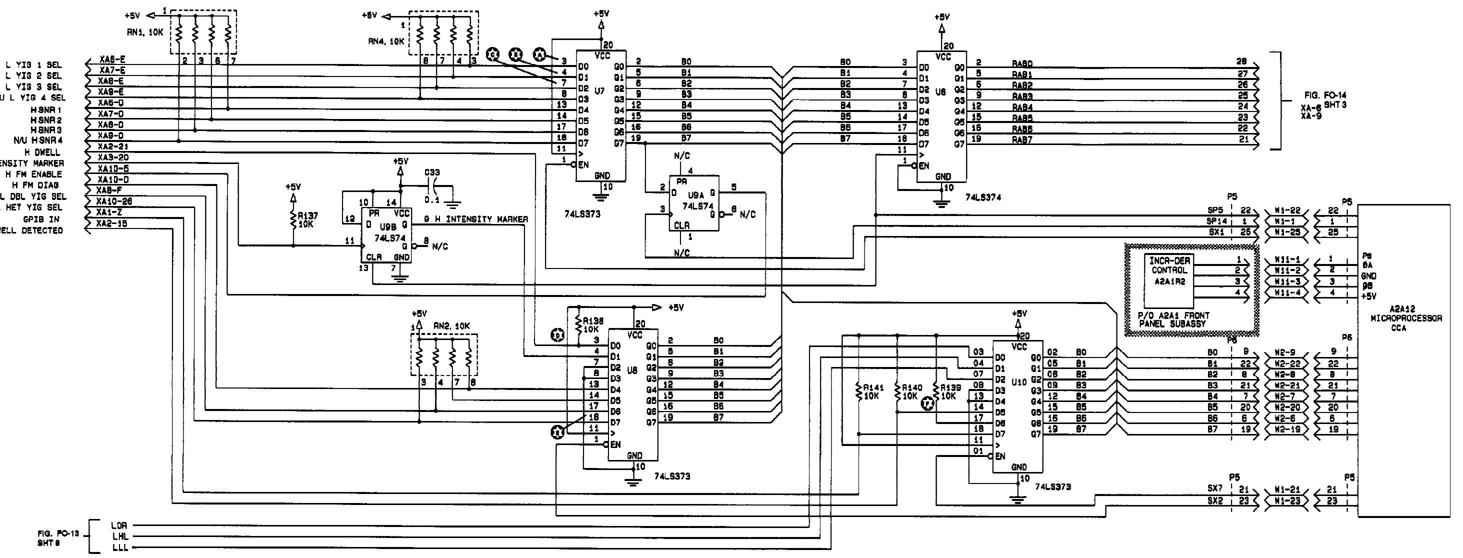
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV



F

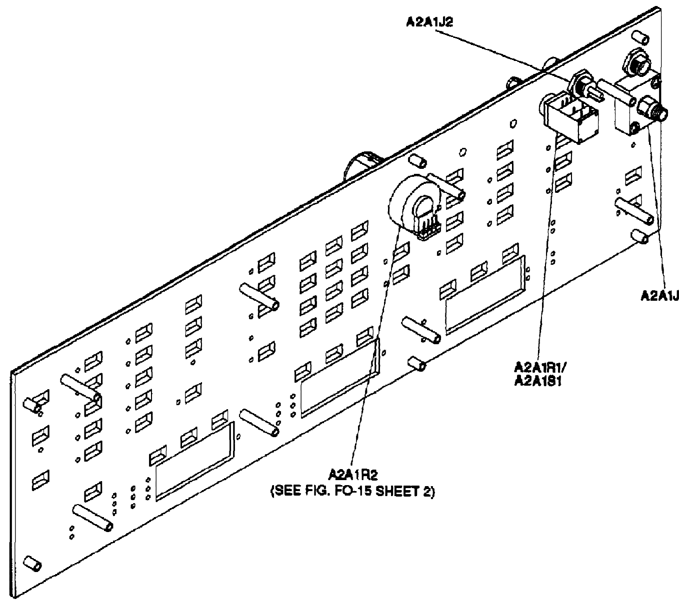
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE:
EXTERNAL
VERTICAL SCALE: 5V/DIV

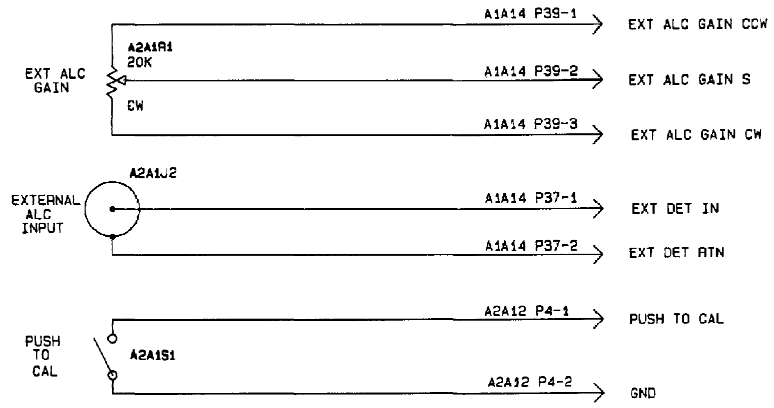




CE1YX042

Figure FO-15. A1A14 Microprocessor-Interface Component Locator & Schematic Diagram (Sheet 2 of 2).





CE1YX043

Figure FO-16. A2A1 Front Subpanel Assembly Component Locator & Schematic Diagram.

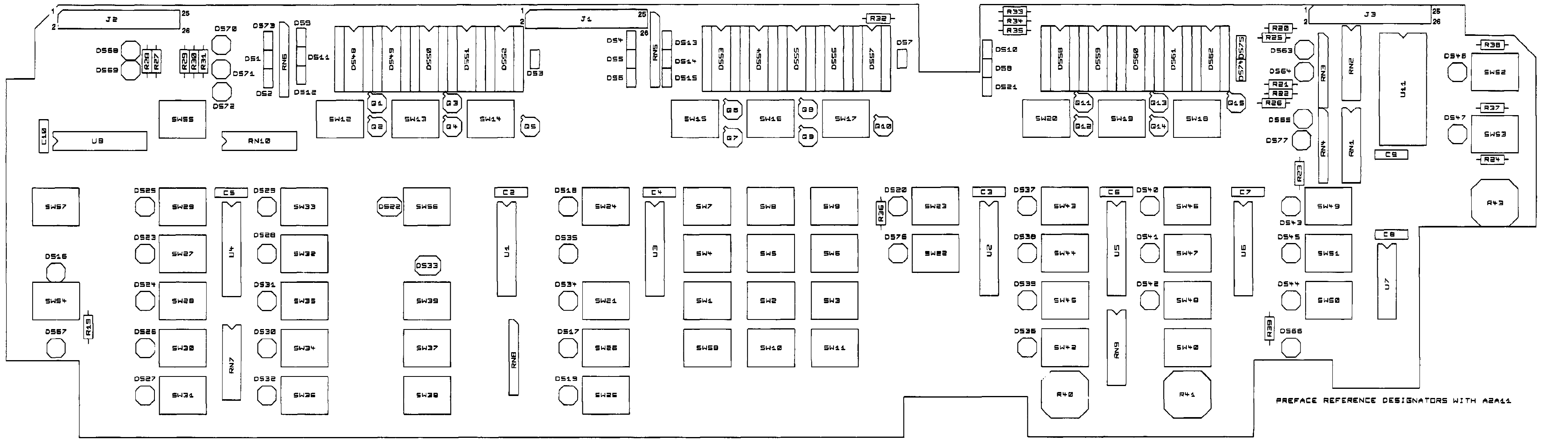


Figure FO-17. A2A11 Front Panel CCA Component Locator Diagram.

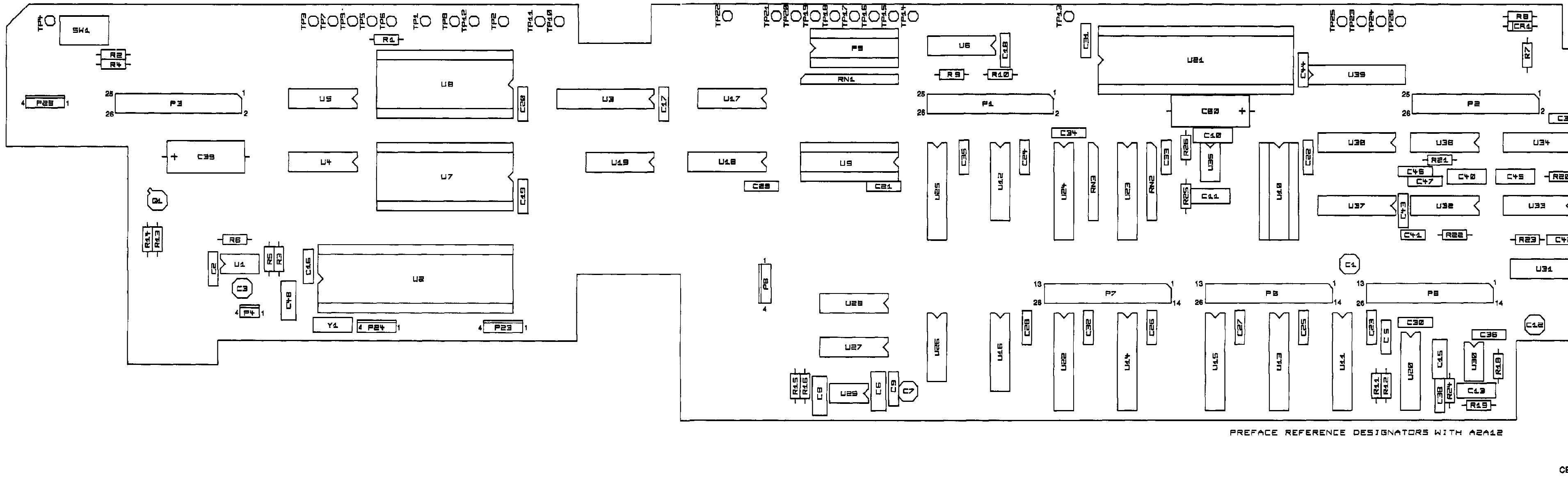


Figure FO-18. A2A12 Microprocessor CCA Component Locator Diagram.

NOTES

- Unless otherwise specified, resistances are in ohms, capacitances are in microfarads, and inductances in microhenries.
- Prefix all reference designators with A3, unless otherwise specified.
- Conditional voltages and waveforms for A1A14 Microprocessor Interface CCA IC's:

  Conditions: SG-1206 in "RESET" condition, EXT HORIZ output connected to external horizontal input on Oscilloscope.
  H = TTL High (3.5 to 5.5 volts)
  L = TTL Low (–0.5 to +0.8 volts)

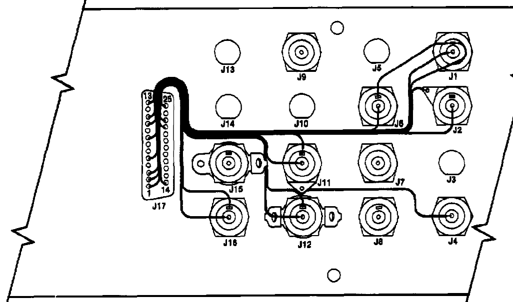
SCHEMATIC SYMBOLS

Denotes Analog GND.

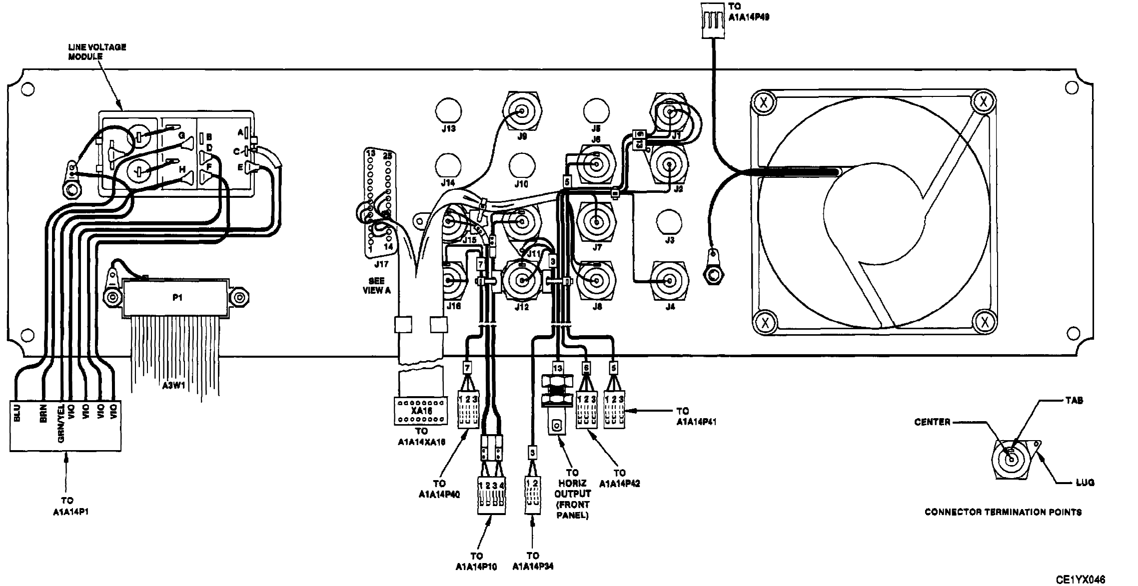
Denotes Chassis GND.

Connector Numbers to Names

Connector Number	Connector Name	Connector Number	Connector Name
J1, J17-1	HORIZ OUTPUT	J10	None
J2, J17-3	POS Z BLANKING OUTPUT	J11	EXT AM INPUT
J3	None	J12	EXT FM Ø LOCK INPUT
J4, J17-5	MARKER OUTPUT	J13	None
J5	None	J14	None
J6, J17-14	V/GHz OUTPUT	J15	EXT SQ WAVE INPUT
J7	NEG Z BLANKING OUTPUT	J16	EXT SWEEP
J8	PENLIFT OUTPUT	J17	AUX I/O
J9	SWEEP TRIGGER INPUT	A3W1J1	IEEE 488 GPIB



VIEW A
ADDITIONAL WIRING, A3J17 TO BNC CONNECTORS

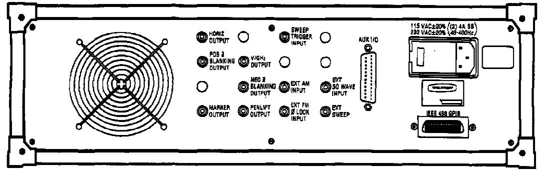


CONNECTOR TERMINATION POINTS

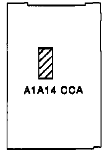
CE1YX046

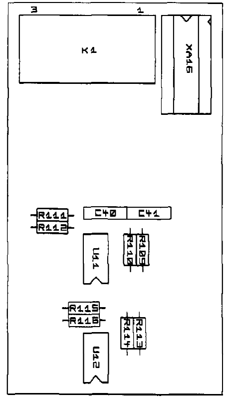
Figure FO-19. A3 (w/A1A14) Rear Panel Assembly Wiring, Component Locator, & Schematic Diagram (Sheet 1 of 3).

SEE SHEET 1 FOR NOTES.



A3 REAR PANEL ASSEMBLY





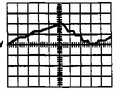
U11	
PIN	VOLTS
1	NOT USED
*2	0
*3	0
4	−15
5	NOT USED
*6	0
7	+15
8	NOT USED

*0-10 V WAVEFORM IF EXTERNAL SWEEP INPUT IS USED

U12	
PIN	VOLTS
1	NOT USED
2	WAVEFORM B
3	WAVEFORM B
4	−15
5	NOT USED
6	WAVEFORM A
7	+15
8	NOT USED

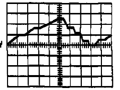
A

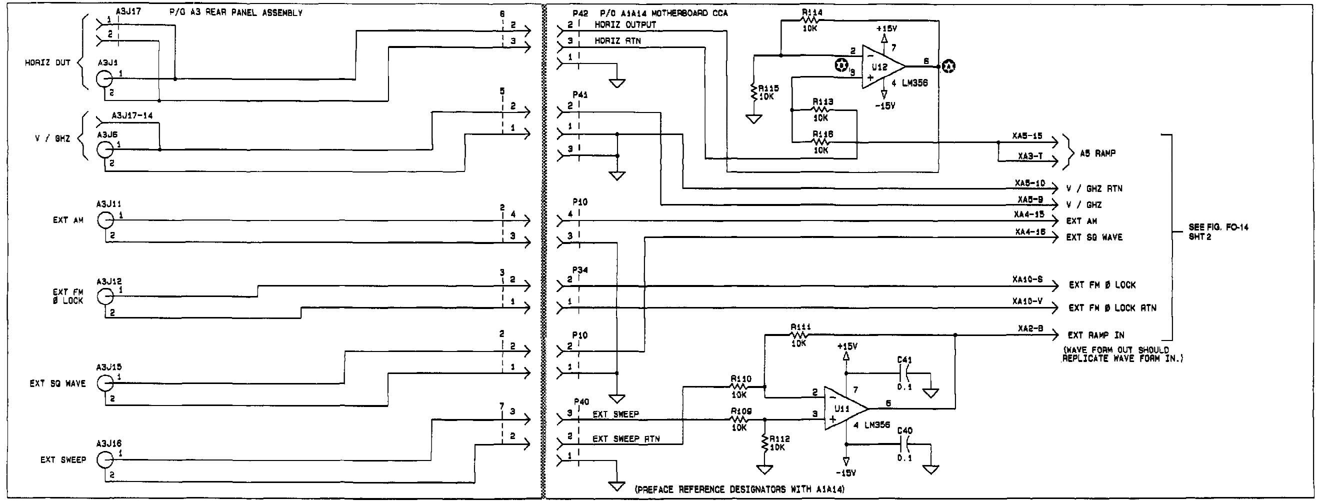
OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 10 ms
VERTICAL SCALE: 5V/DIV



B

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: 10 ms
VERTICAL SCALE: 2V/DIV

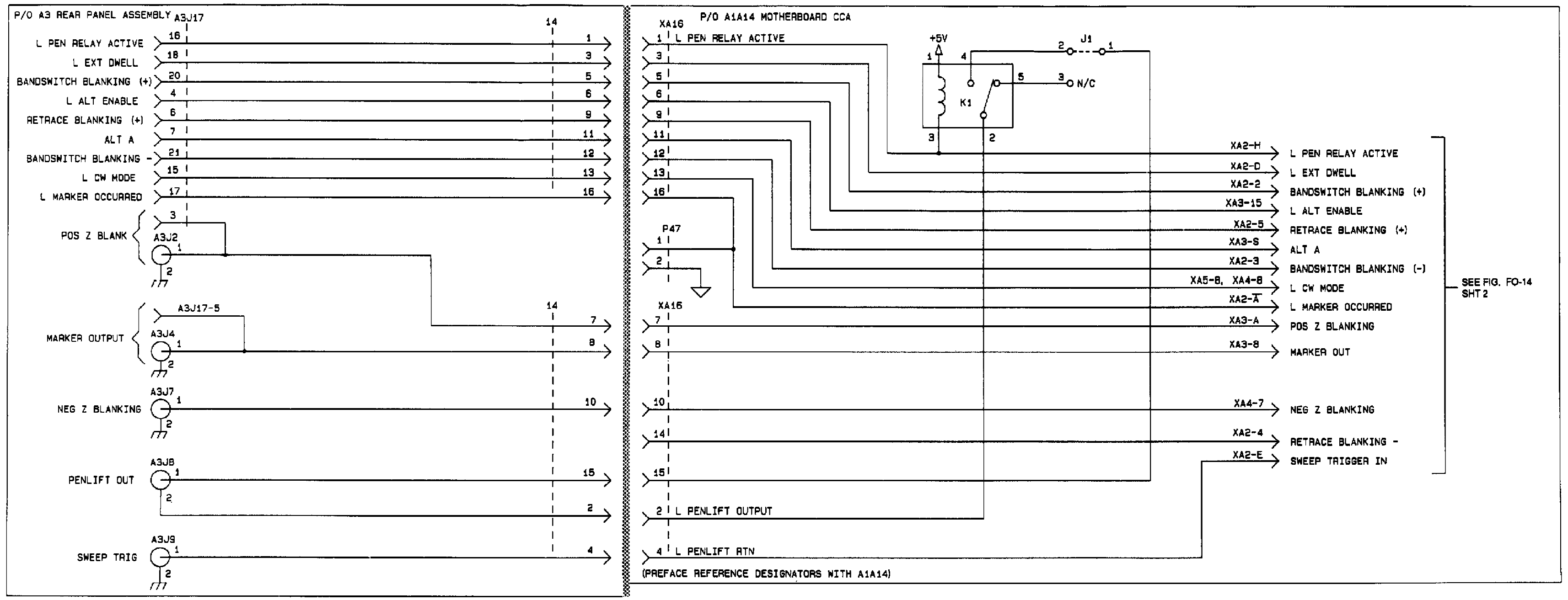




CE1YX047

Figure FO-19. A3 (w/A1A14) Rear Panel Assembly Wiring, Cpmponent Locator, & Schematic Diagram (Sheet 2 of 3).

SEE SHEET 1 FOR NOTES.



CE1YX048

Figure FO-19. A32 (w/A1A14) Rear Panel Assembly Wiring, Component Locator, & Schematic Diagram (Sheet 3 of 3).

NOTE

- Unless otherwise specified, resistance are in ohms, capacitances are in microfarads, and inductances in microhenries.

SCHEMATIC SYMBOLS

Denotes Chassis Ground.

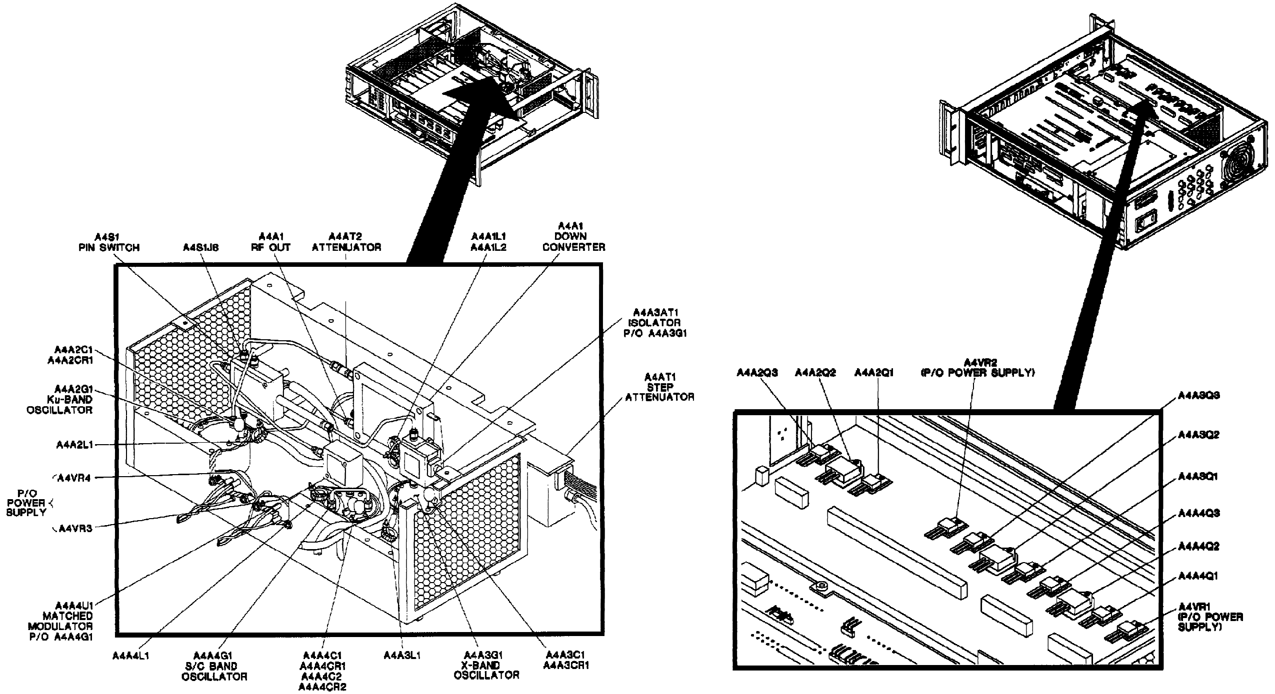
TOP
EBC
Q5 Q6 Q8-Q11

TOP
EBC
Q7 Q12 Q13 Q20-Q22

TOP
EBC
Q23-Q28, Q14-Q16

CABLE CONNECTIONS

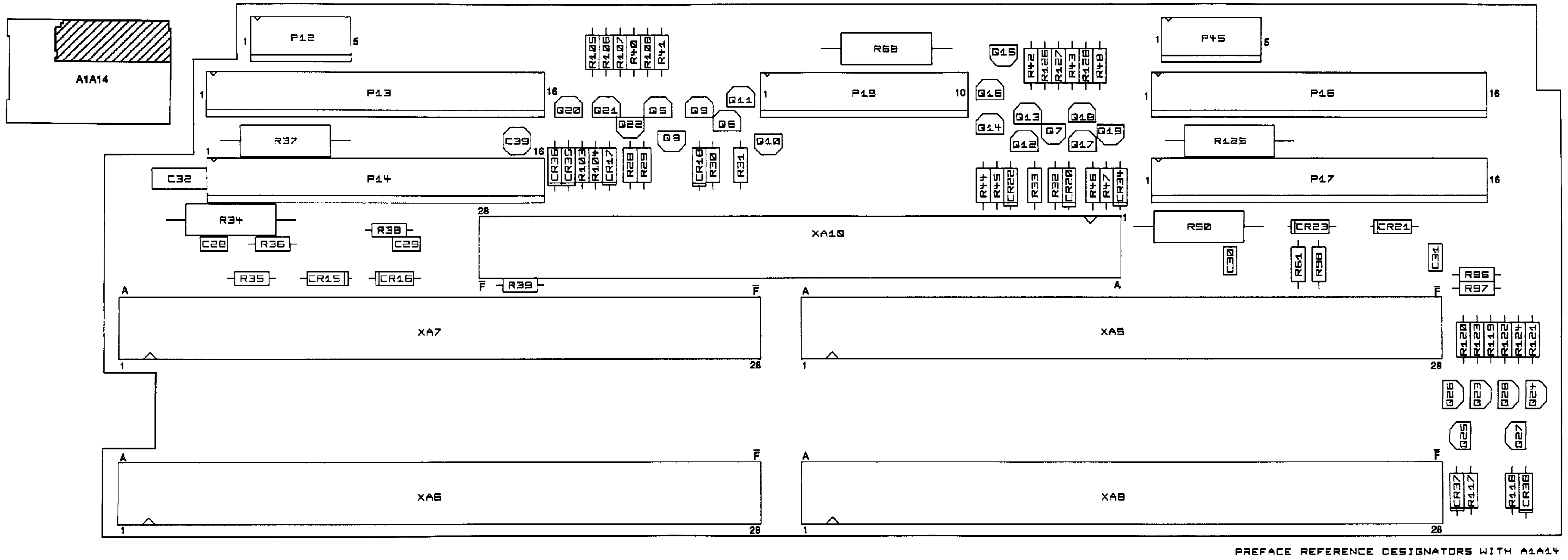
Component	Cable Number	Connected To
A4A2Q1	W1	A1A14P28
A4A2Q2	W2	A1A14P29
A4A2Q3	W3	A1A14P30
A4A3Q1	W1	A1A14P21
A4A3Q2	W2	A1A14P22
A4A3Q3	W3	A1A14P23
A4A4Q1	W1	A1A14P18
A4A4Q2	W2	A1A14P19
A4A4Q3	W3	A1A14P20
A4VR1	W8	A1A14P44
A4VR2	W9	A1A14P24



CE1YX049

Figure FO-20. A4 (w/A1A14) RF Deck Component Locator, & Schematic Diagram (Sheet 1 of 5).

SEE SHEET 1 FOR NOTES.



CE1YX050

Figure FO-20. A4 (w/A1A14) RF Deck Component Locator, & Schematic Diagram (Sheet 2 of 5).

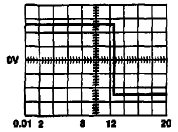
SEE SHEET 1 FOR NOTES.

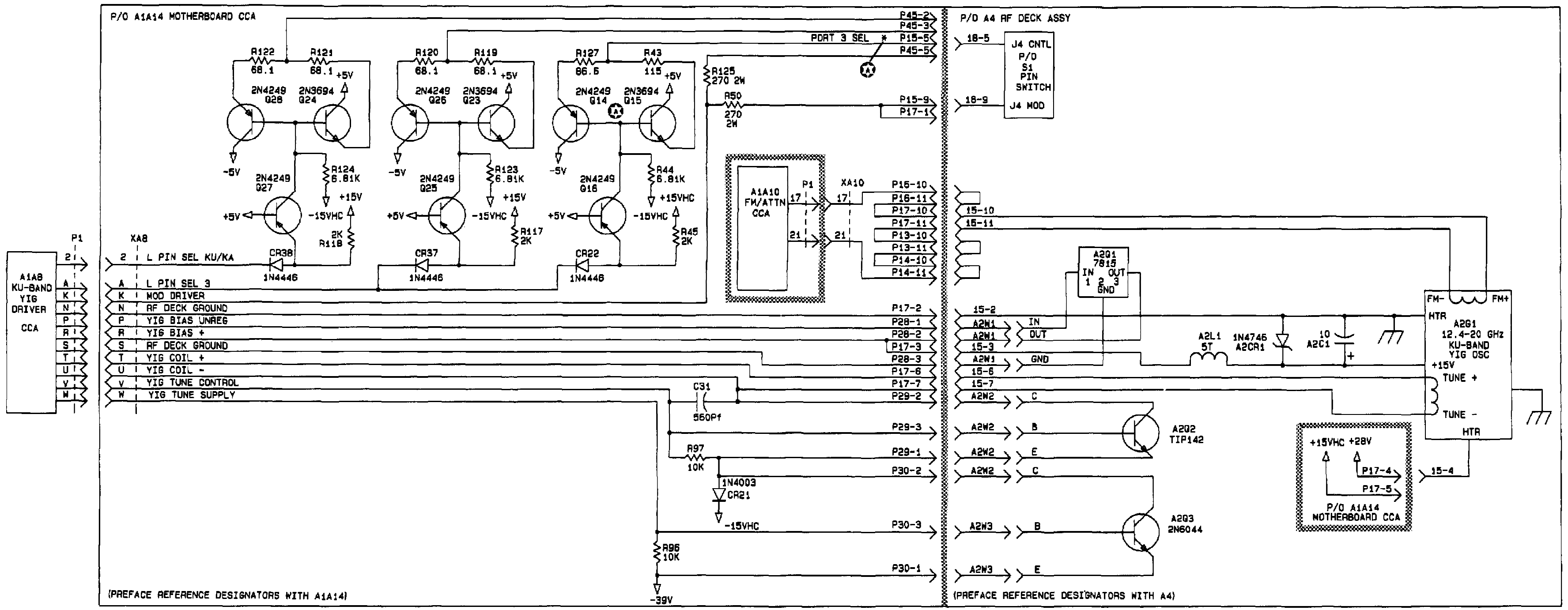
(A)

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2V/DIV

SG-1206 SETUP:

1. PRESS RESET KEY.
2. CONNECT HORIZ OUTPUT TO HORIZONTAL INPUT ON OSCILLOSCOPE.
3. DISCONNECT A4PS1 CONNECTOR FROM A1A14P15 (FIG. FO-14).
4. CONNECT OSCILLOSCOPE BETWEEN A1A14P15-5 (PROBE) AND A1A14TP2 (D GND).
5. IF WAVEFORM INCORRECT, MOVE PROBE TO JUNCTION OF A1A14Q17-B, Q18-B AND Q19-E.
6. IF WAVEFORM INCORRECT, MEASURE DC VOLTAGES TO DETERMINE FAULTY COMPONENT.





CE1YX051

Figure FO-20. A4(w/A1A14) RF Deck Component Locator, & Schematic Diagram (Sheet 3 of 5).

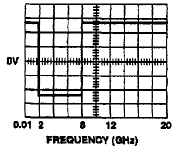
SEE SHEET 1 FOR NOTES.

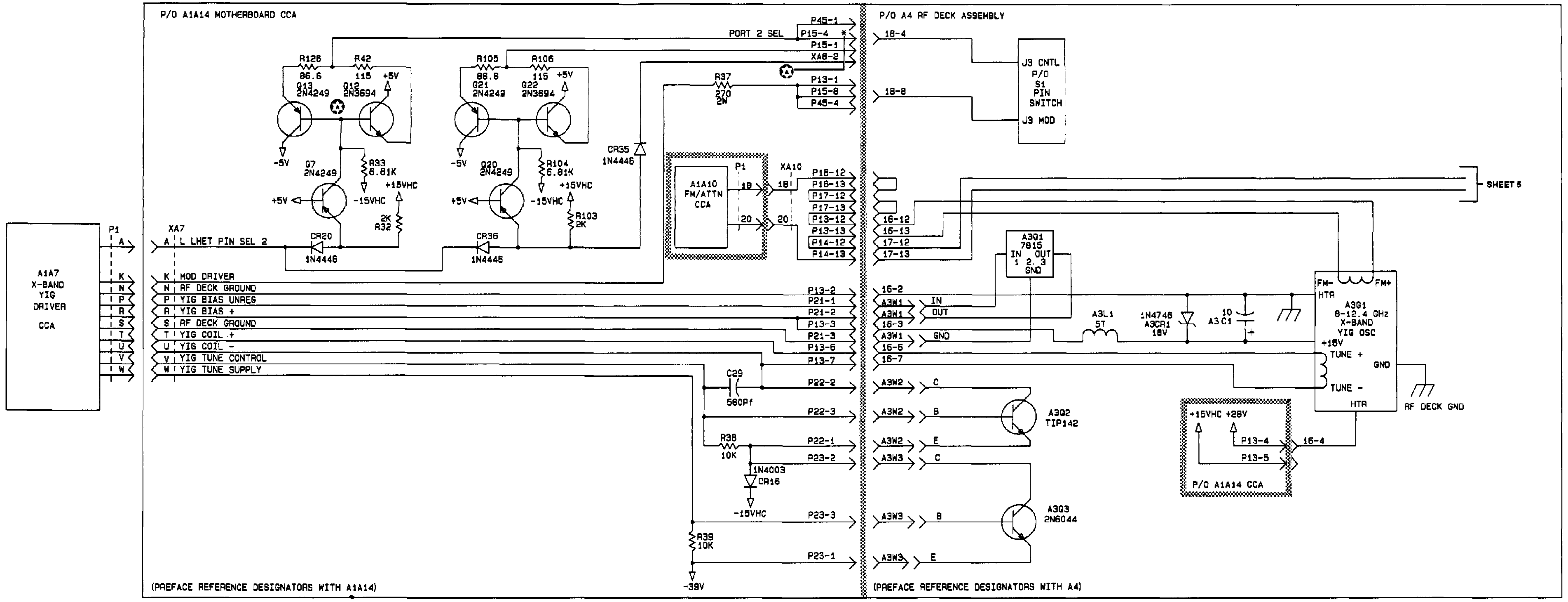
A

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2V/DIV

SG-1206 SETUP:

1. PRESS RESET KEY.
2. CONNECT HORIZ OUTPUT TO HORIZONTAL INPUT ON OSCILLOSCOPE.
3. DISCONNECT A4PS1 CONNECTOR FROM A1A14P15 (FIG. FO-14).
4. CONNECT OSCILLOSCOPE BETWEEN A1A14P15-3 (PROBE) AND A1A14TP2 (D GND).
5. IF WAVEFORM INCORRECT, MOVE PROBE TO JUNCTION OF A1A14Q10-B, Q11-B AND Q6-E.
6. IF WAVEFORM INCORRECT, MEASURE DC VOLTAGES TO DETERMINE FAULTY COMPONENT.





CE1YX052

Figure FO-20. A4 (w/A1A14) RF Deck Component Locator, & Schematic Diagram (Sheet 4 of 5).

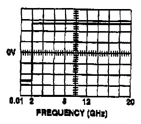
SEE SHEET 1 FOR NOTES.

(A)

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2V/DIV

SG-1206 SETUP:

1. PRESS RESET KEY.
2. CONNECT HORIZ OUTPUT TO HORIZONTAL INPUT ON OSCILLOSCOPE.
3. DISCONNECT A4PS1 CONNECTOR FROM A1A14P15 (FIG. FO-14).
4. CONNECT OSCILLOSCOPE BETWEEN A1A14P15-2 (PROBE) AND A1A14TP2 (D GND).
5. IF WAVEFORM INCORRECT, MOVE PROBE TO JUNCTION OF A1A14Q8-B, Q9-B AND Q5-E.
6. IF WAVEFORM INCORRECT, MEASURE DC VOLTAGES TO DETERMINE FAULTY COMPONENT.

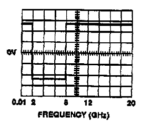


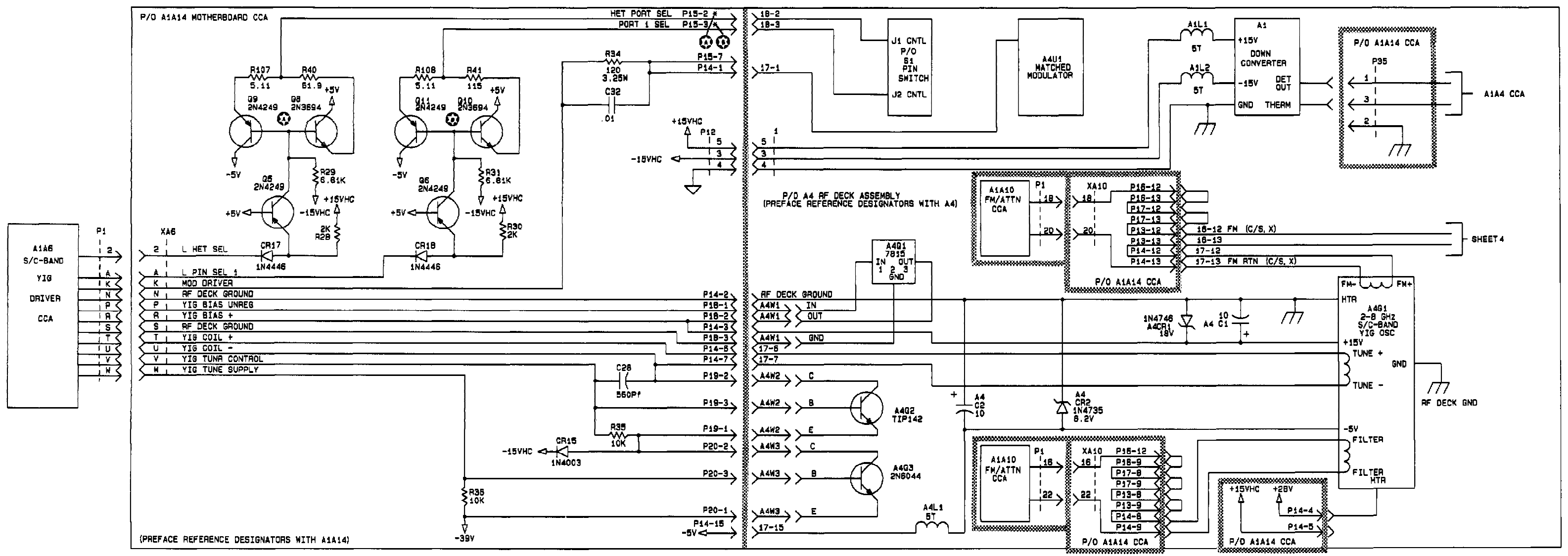
(B)

OSCILLOSCOPE SETTINGS:
HORIZONTAL TIME BASE: EXTERNAL
VERTICAL SCALE: 2V/DIV

SG-1206 SETUP:

1. PRESS RESET KEY.
2. CONNECT HORIZ OUTPUT TO HORIZONTAL INPUT ON OSCILLOSCOPE.
3. DISCONNECT A4PS1 CONNECTOR FROM A1A14P15 (FIG. FO-14).
4. CONNECT OSCILLOSCOPE BETWEEN A1A14P15-3 (PROBE) AND A1A14TP2 (D GND).
5. IF WAVEFORM INCORRECT, MOVE PROBE TO JUNCTION OF A1A14Q10-B, Q11-B AND Q6-E.
6. IF WAVEFORM INCORRECT, MEASURE DC VOLTAGES TO DETERMINE FAULTY COMPONENT.





CE1YX053

Figure FO-20. A4 (w/A1A14) RF Deck Component Locator, & Schematic Diagram (Sheet 5 of 5).

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

Milton H. Hamilton

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
01670

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These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@wherever.army.mil>
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:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25–30; the proponent agency is ODISC4.	Use Part II (*reverse*) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE 8/30/02

TO: (*Forward to proponent of publication or form)(Include ZIP Code)*	FROM: (*Activity and location)(Include ZIP Code)*
Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM–MMC–MA–NP Redstone Arsenal, 35898	MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 9–1005–433–24	16 Sep 2002	Organizational, Direct Support, And General Support Maintenance Manual for Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used On Avenger Air Defense Weapon System

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.

EXAMPLE

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788–1234	

TO: (*Forward direct to addressee listed in publication*)	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**
Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM–MMC–MA–NP Redstone Arsenal, 35898	MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565	8/30/02

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788–1234	

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25–30; the proponent agency is ODISC4.	Use Part II (*reverse*) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE
TO: (*Forward to proponent of publication or form*)(*Include ZIP Code*) Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM-MMC-MA-NP Redstone Arsenal, AL 35898	FROM: (*Activity and location*)(*Include ZIP Code*)	

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

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.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE

TO: (*Forward direct to addressee listed in publication*) Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM-MMC-MA-NP Redstone Arsenal, AL 35898	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE