6070A
6071A

Synthesized RF Signal Generators

Calibration Manual

PN 577551
February 1981

FLUKE®

WARRANTY

Notwithstanding any provision of any agreement the following warranty is exclusive:

The JOHN FLUKE MFG. CO., INC., warrants each instrument it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1-year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90-days), or any product or parts which have been subject to misuse, neglect, accident, or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, John Fluke Mfg. Co., Inc., will repair and calibrate an instrument returned to an authorized Service Facility within 1 year of the original purchase; provided the warrantor's examination discloses to its satisfaction that the product was defective. The warrantor may, at its option, replace the product in lieu of repair. With regard to any instrument returned within 1 year of the original purchase, said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident, or abnormal conditions of operations, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS, OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. JOHN FLUKE MFG. CO., INC., SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE.

If any failure occurs, the following steps should be taken:

1. Notify the JOHN FLUKE MFG. CO., INC., or nearest Service facility, giving full details of the difficulty, and include the model number, type number, and serial number. On receipt of this information, service data, or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument, transportation prepaid. Repairs will be made at the Service Facility and the instrument returned, transportation prepaid.

SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT

All shipments of JOHN FLUKE MFG. CO., INC., instruments should be made via United Parcel Service or "Best Way" prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER

The instrument should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact the nearest Fluke Technical Center.) Final claim and negotiations with the carrier must be completed by the customer.

The JOHN FLUKE MFG. CO., INC, will be happy to answer all applications or use questions, which will enhance your use of this instrument. Please address your requests or correspondence to: JOHN FLUKE MFG. CO., INC., P.O. BOX 43210, MOUNTLAKE TERRACE, WASHINGTON 98043, ATTN: Sales Dept. For European Customers: Fluke (Holland) B.V., P.O. Box 5053, 5004 EB, Tilburg, The Netherlands.

*For European customers, Air Freight prepaid.

John Fluke Mfg. Co., Inc., P.O. Box 43210, Mountlake Terrace, Washington 98043

Rev. 4/80

Table of Contents

(continued on page ii)

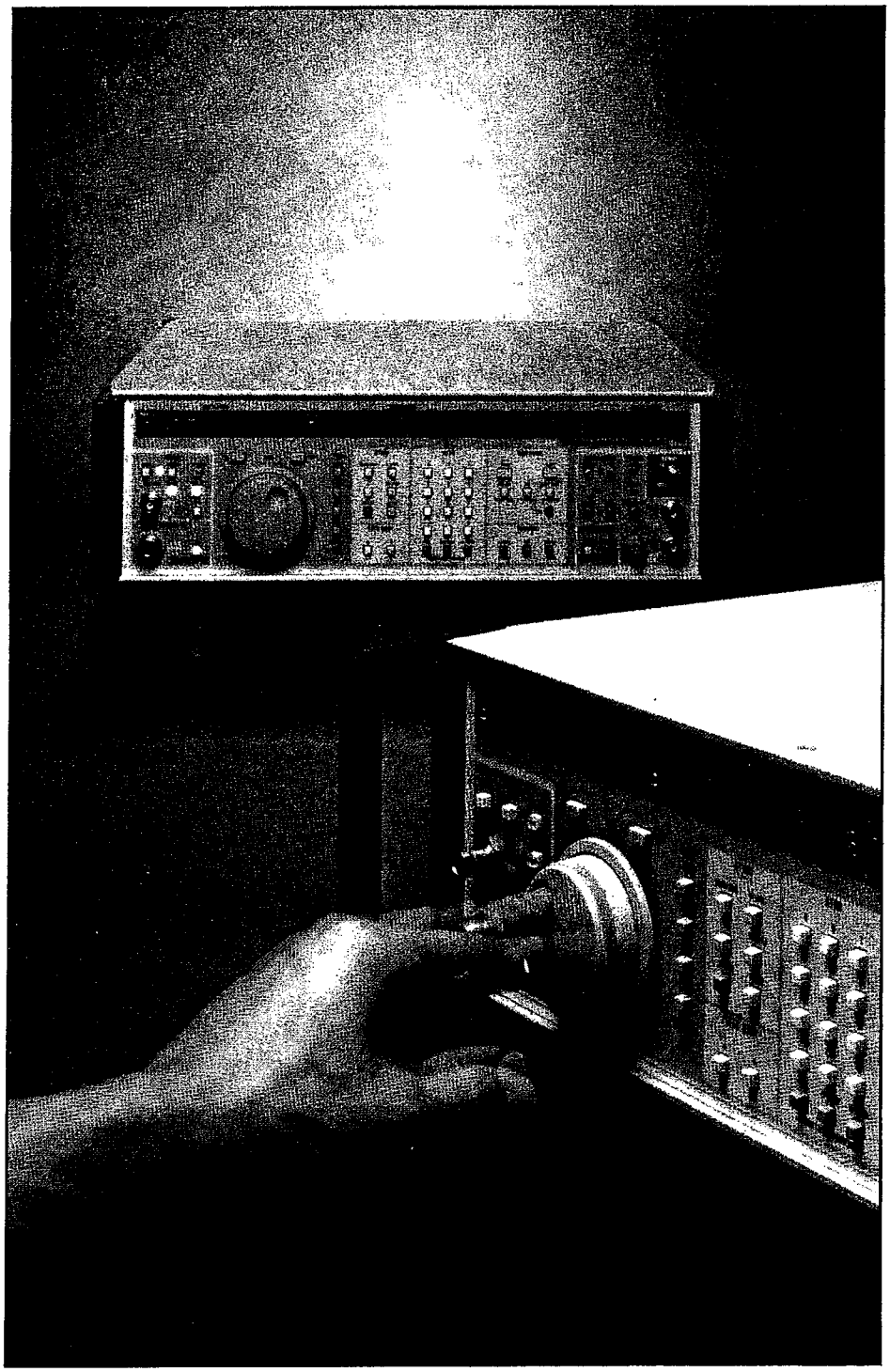
TABLE OF CONTENTS, *continued*

(continued on page iii)

TABLE OF CONTENTS, *continued*

List of Tables

List of Illustrations



6070A/6071A Synthesized RF Signal Generators

Section 1
Introduction and Specifications

1-1. THE MANUAL SET

1-2. The John Fluke Models 6070A and 6071A RF Synthesized Signal Generators are documented by a set of four manuals: the 6070A/6071A Operator Manual, the 6070A/6071A Calibration Manual, the 6070A/6071A Service Manual, and the 6070A/6071A Schematics Manual, (Figure 1-1). The 6070A/6071A Operator Manual introduces the instrument; familiarizes the operator with all instrument controls, connectors, and indicators; and presents detailed operating information and procedures for both local and systems operation. The 6070A/6071A Calibration Manual provides procedures for general maintenance, performance checks, and calibration adjustments. The 6070A/6071A Service Manual describes the theory of operation and troubleshooting and include a list of replaceable parts. The 6070A/6071ASchematic manual contains a functional block diagram, wire lists, interconnection diagrams, and all schematic diagrams of the instrument.

1-3. The major difference between the two models is that the 6071A has twice the upper frequency limit of the 6070A. Because of their similarity, most of the text in this manual applies to both models. Text that applies to just the 6070A or just the 6071A is identified as such.

1-4. THE 6070A/6071A CALIBRATION MANUAL

1-5. The information in this, the 6070A/6071A Calibration Manual is divided into seven sections:

1	INTRODUCTION AND SPECIFICATIONS	Introduces the 6070A/6071A Instruction Manual set and the 6070A/6071A Calibration Manual and list the specifications of the instrument and the test equipment required to complete the performance checks and the calibration procedures.
2	SHIPPING AND SERVICE INFORMATION	Describes how to ship the instrument and how to get problems corrected.
3	ACCESS PROCEDURES	Describes the procedures necessary to gain access to each circuit inside the instrument.
4	GENERAL MAINTENANCE PROCEDURES	Describes procedures for cleaning the instrument, for selecting a different line power configuration, and for changing fuses.

5	PERFORMANCE CHECKS	Describes procedures to verify proper operation of the instrument.
6	ADJUSTMENT PROCEDURE	Describes procedures for making all routine adjustments and describes the procedure used to reprogram the Calibration EPROM.
7	PERFORMANCE CHECKS AND CALIBRATION OF OPTIONS	Describes the procedure for completing the performance checks and calibration procedures required by instruments with options installed. Each option has a separate subsection.

1-6. LIST OF RECOMMENDED TEST EQUIPMENT

1-7. The test equipment recommended for the performance checks and calibration adjustments are listed in Table 1-1. If the recommended test equipment is not available, equivalent test equipment can be used.

1-8. 6070A/6071A SPECIFICATIONS

1-9. Table 1-2 lists the specifications of the 6070A and the 6071A.

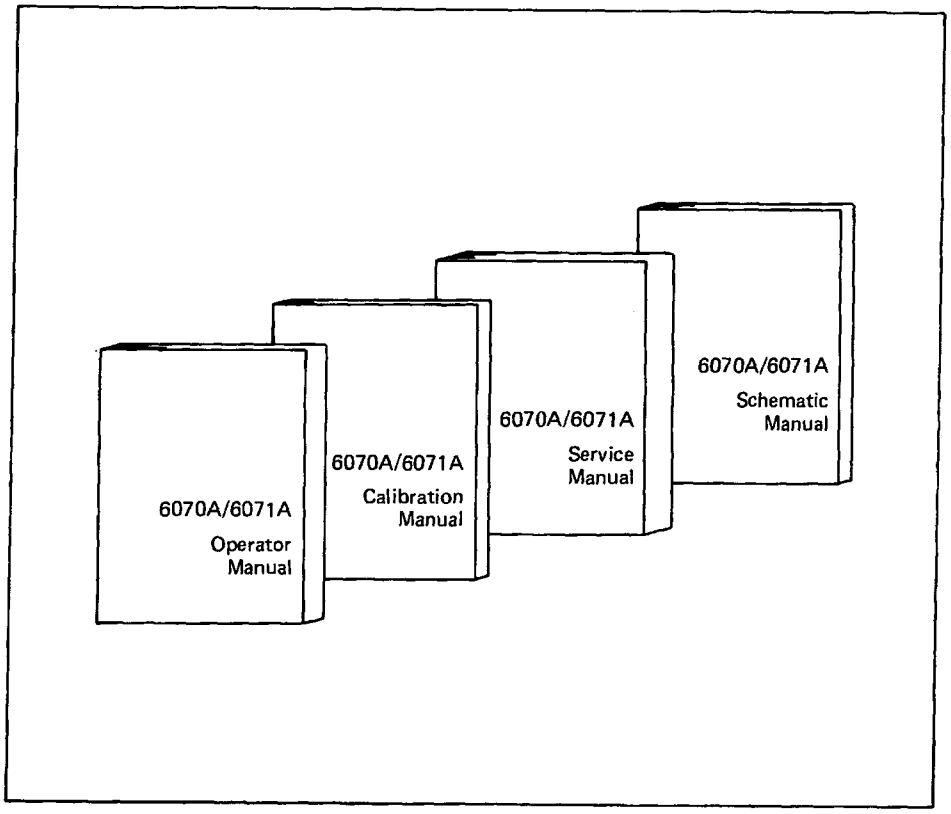


Figure 1-1. 6070A/6071A Instruction Manual Set

Table 1-1. 6070A/6071A List of Required Test Equipment

ITEM	MINIMUM USE SPECIFICATIONS	RECOMENDED INSTRUMENT
Systems DMM	Accuracy ±0, 15% at 1V rms and 3 kHz	JF 8502A with Option -09A
True RMS Voltmeter		JF 8920A
Low Frequency Spectrum Analyzer	>1 MHz, 10 Hz Resolution	TEK 7L5 with Option 25, L3
High Frequency Spectrum Analyzer	>2.1 GHz	TEK 7L13, Mod. 139U
Low Frequency Synthesized Signal Generator	>10 MHz	JF 8011A with Option -02
UHF Synthesized Signal Generator	0.2 to 1040 MHz, +13 dBm	JF 6071A
Frequency Counter	>520 MHz	JF 7260A with Option -310
Modulation Analyzer	0.2 to 1000 MHz FM, ØM, AM	HP 8901A with Option -01
Power Meter	0.005 to 1 GHz, SWR <1.1 -20 to +20 dBm*	HP 432A
Power Sensor, Calibrated**	0.005 to 1 GHz, SWR <1.1 -20 to +20 dBm*	HP 478A with Option H75*
Attenuator, 10 dB, Calibrated**	SWR <1.1, 0 to 1.0 GHz Type-N	HP 8491A NARDA 777C-10
10 MHz Frequency Standard	Adequate accuracy for user	
Dual Directional Coupler	0.05 to 1 GHz >35 dB Directivity	NARDA 3020
Low Pass Filter, 1.75 MHz	3 dB Frequency >1 MHz, rejection >40 dB above 5 MHz	Allen Avionics VLF-1P7
Signal Analyzer	Frequency Range >10 kHz, 1 Hz Resolution at 100 Hz	HP 3582A
Oscilloscope	Dual Trace	TEK 475
DC Block, 1000 pf, BNC	50V	
Low Noise Amplifier	10 nV/$\sqrt{Hz}$, >40 dB Gain	TEK AM 502***
DC Operational Amplifier		TEK AM 501***
Feed Thru Termination	50 ohms ±0.1%	JF 442905
Adapter, Type-N to BNC	50 ohm	JF Y9308
Mixer, Double Balanced	BNC, 3 to 1000 MHz	JF Y9313
Attenuator, Fixed	BNC, 6 dB	JF Y9100

Table 1-1. 6070A/6071A List of Required Test Equipment (cont)

ITEM	MINIMUM USE SPECIFICATIONS	RECOMMENDED INSTRUMENT
SWR Test Cable	Approximately 25 feet with <1.6 dB loss at 1 GHz. SWR <1.05 to 1 GHz	JF Y6002
Torque Screwdriver	Torque Range 7 to 9 inch pounds	Jergens H10S CL-6500

*Requires the Calibrated 10 dB Attenuator.

**Both the Power Sensor and the 10 dB Attenuator (if used) must be screened for SWR by the user so that the correct values are known for the tests.

***Require the TEK TM 503 mainframe.

Table 1-2. 6070A/6071A Specifications

Unless otherwise noted, the following performance is guaranteed over the specified environmental an AC line power conditions (see GENERAL at the end of this table), and for normal autoranging operation, 20 minutes after the instrument is turned on.

FREQUENCY

Range
6070A ..... 0.2 to 519.999999 MHz.
6071A ..... 0.2 to 1039.999998 MHz.

Resolution ..... 1 Hz (2 Hz above 520 MHz for the 6071A).

Accuracy and Stability ..... Same as the Reference Oscillator.

Switching Time ..... The time from when the signal at the rear panel OUT VALID connector goes false until the frequency of the RF output signal is within 100 Hz of the final value is less than 70 ms (typically, the IEEE and instrument processing time before the signal at OUT VALID goes false is 10 ms).

Connector ..... Type-N, front panel RF OUTPUT connector. 50 Ohms impedance, nominal.

NOTE: The 607XA-830 Rear RF Output Option makes the RF output signal available at the rear panel instead of at the front panel. Specifications for options are listed near the end of this table.

REFERENCE OSCILLATOR

Internal
TYPE ..... Free-air, 10 MHz crystal oscillator.
AGING RATE ..... < ±0.5 ppm/month
TEMPERATURE STABILITY .... ±5 ppm over the ambient temperature range of 25°C ±25°C (77°F ± 45°F).

NOTE: The 607XA-130 Oven Reference Oscillator Option provides a more stable internal reference. Specifications of options are listed near the end of this table.

External
CONNECTOR ..... BNC rear panel REF IN connector. Input impedance is nominally 50 Ohms, ac coupled.
INPUT SIGNAL ..... The instrument accepts 0.3 to 4.0V peak-to-peak sine or square wave at 1, 2, 2.5, 5, or 10 MHz.
LOCK RANGE ..... ±8 ppm frequency difference. Out-of-lock is indicated by the FREQ and UNCAL annuciators.

Reference Output ..... 10 MHz (TTL) available at the rear panel REF OUT connector (BNC).

AMPLITUDE

Specified Range ..... +19 to -140 below 520 MHz.
+13 to -140 520 MHz and above.

NOTE: AM is restricted above +13 dBm (+7 dBm above 520 MHz) and below -131 dBm.

Unspecified Overrange ..... Up to +20.9 dBm and down to -150 dBm, typically.

Resolution ..... 0.1 dB (at least 1% when displaying voltage).

Table 1-2. 6070A/6071A Specifications (cont)

Switching Time ..... The time from when the signal at the rear panel OUT VALID connector goes false until the amplitude of the RF output signal is within 0.1 dB of the final value is less than 10 ms (typically, the IEEE and instrument processing time before the signal at OUT VALID goes false is 10 ms for voltage and 40 ms for dB programming).

Accuracy and Flatness

RF OUTPUT		ACCURACY (dB)**
FREQUENCY (MHz)	LEVEL (dBm)*	
0.2 to 520 MHz (6070A and 6071A)	+19 to +13 +13 to -131 -131 to -140	±1.5 ±[0.8 - 0.01 (output level in dBm)] ±4.0
520 to 1040 MHz (6071A only)	+13 to +7 +7 to -131 -131 to -140	±2.5 ±[1.6 - 0.015 (output level in dBm)] ±4.5

*Subtract 6 dB from the level ranges when AM is on (not specified for <-131 dBm).
**Add ±0.5 dB to the accuracy specification if the 607XA-870 Reverse Power Protection Option is installed.

Source SWR (reference to 50 Ohms) Less than the values listed in the following table.

LEVEL (dBm)	SOURCE SWR	
	0.2 TO 520 MHz	520 TO 1040 MHz
≥+7	2.0	2.5
<+7	1.5	2.0

SPECTRAL PURITY

Spurious ..... Spurs are below the values listed in the following table or -140 dBm, whichever is greater (or -130 dBm at 520 MHz if the 607XA-870 Reverse Power Protection Option is installed).

SPURIOUS SIGNALS	SPECTRAL PURITY (dBc) RF OUTPUT FREQUENCY (MHz)				
	0.2 TO 62.5	62.5 TO 125	125 TO 250	250 TO 520	520 TO 1040
Non-harmonic					
>10 kHz offset*	-90	-100	-96	-90	-84
<10 kHz offset	-70	-82	-76	-70	-64
<0.55 kHz offset	-56	-68	-62	-56	-50
Sub-harmonic (f/2, 3f/2, 5f/2, etc.)	N/A				-35
Harmonic 6070A					
>+13 dBm	-30	-30	-30	-25	N/A
≤+13 dBm	-35	-35	-35	-35	
Harmonic 6071A					
>+13 dBm	-30	-30	-25	-20	N/A
≤+13 dBm	-35	-35	-35	-35	-25

*Spurs are 5 dB worse during HI DEV Mode operation.

Table 1-2. 6070A/6071A Specifications (cont)

Noise Spectral Density ..... The SSB phase noise density is a function of offset and output frequency. The following performance is guaranteed when not in the HI DEV Mode and includes the effect of the internal reference.

FREQUENCY (MHz)	NOISE SPECTRAL DENSITY (dBc/Hz)				
	OFFSET FROM CARRIER				
	0.1 kHz	1 kHz	5 kHz	20 kHz	>3 MHz
0.2 to 62.5	-75	-85	-107	-123	-129
62.5 to 125	-94	-100	-125	-140	-144
125 to 250	-88	-94	-121	-138	-144
250 to 520	-82	-88	-115	-132	-144
520 to 1040	-76	-82	-109	-126	-138

Signal-to-Phase Noise Ratio vs. Offset Frequency from Carrier at 80, 320, and 500 MHz. (Typical)

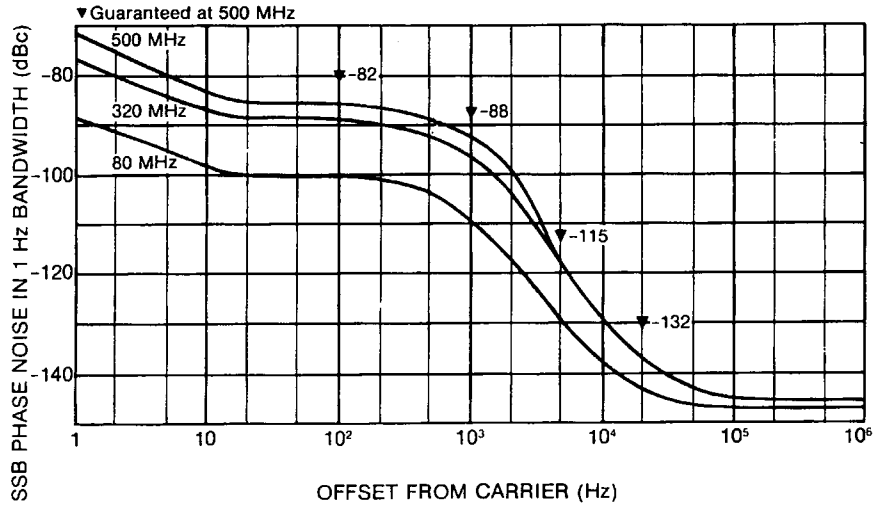
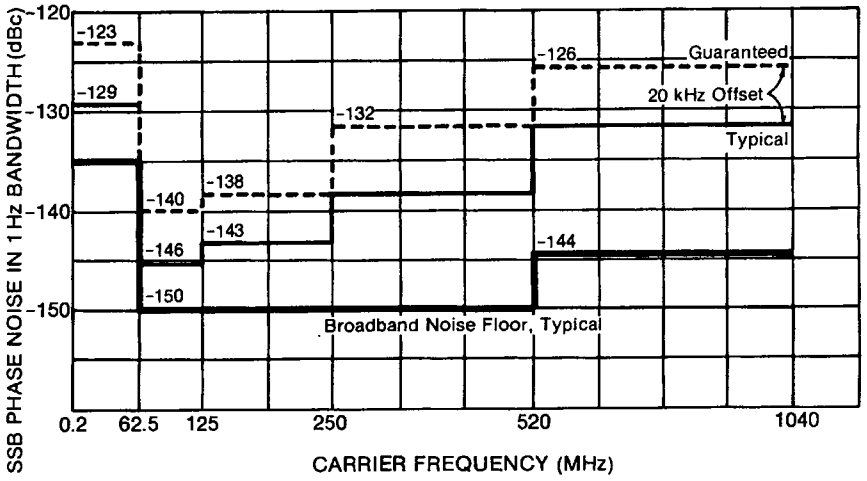
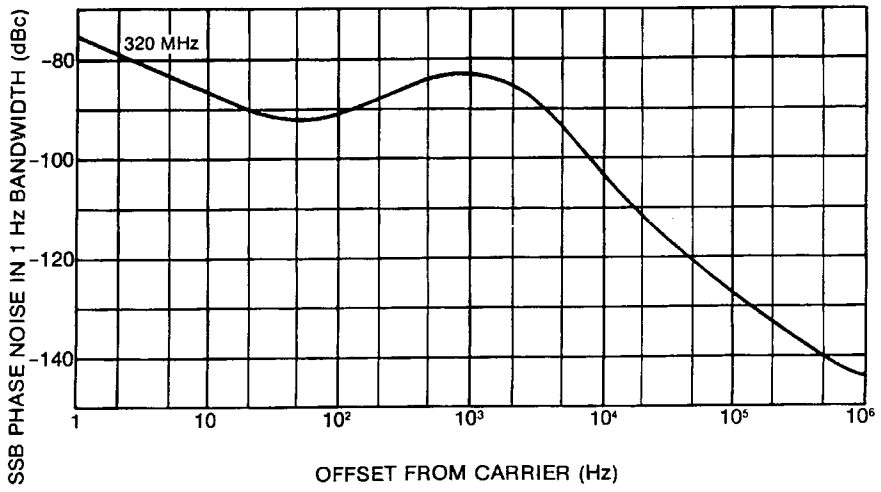


Table 1-2. 6070A/6071A Specifications (cont)

Signal-to-Phase Noise Ratio vs. Carrier Frequency for 20 kHz Offset from Carrier and Broadband Noise Floor (≥3 MHz Offset).



Signal-to-Phase Noise Ratio vs. Offset Frequency from Carrier at 320 MHz in HI DEV Mode (Typical).



Residual FM (Hz rms) ..... The following table lists the residual FM for CW (and low deviation ACFM and 0M).

FREQUENCY (MHz)	RESIDUAL FM (Hz rms)			
	0.3 TO 3 kHz BW		0.05 TO 15 kHz BW	
	HI DEV OFF	HI DEV ON	HI DEV OFF	HI DEV ON
.2 to 62.5	3.5	20	5	35
62.5 to 125	0.5	5	0.75	9
125 to 250	0.85	10	1.3	18
250 to 520	1.7	20	2.5	35
520 to 1040	3.4	40	5	70

Table 1-2. 6070A/6071A Specifications (cont)

Residual AM ..... <0.02% rms in a 50 Hz to 15 kHz post detection bandwidth on all bands.

AMPLITUDE MODULATION

Depth ..... 0 to 99.9% in 0.1% steps where the total output level (amplitude combined with AM) does not exceed +19 dBm peak at RF output frequencies below 520 MHz or exceed +13 dBm peak for RF output frequencies above 520 MHz.

Accuracy ..... ±5% of full scale above 5 MHz or +5% to -8% of full scale below 5 MHz for rates shown in the Distortion specifications that follow. Amplitude accuracy is not specified below -131 dBm.

Distortion (internal or external)

FREQUENCY (MHz)	RATE	DEPTH FOR SPECIFIED ACCURACY	DISTORTION		
			0 TO 30% AM	30 TO 70% AM	70 TO 90% AM
0.2 to 5	≤1 kHz	<90%	<2%	<5%	<7%
5 to 520	≤3 kHz	<90%	<1.5%	<3%	<3%
520 to 1040	≤3 kHz	<70%	<2%	<3%	<5%

Bandwidth, 3 dB ..... at 90% AM for RF output frequencies between 5 MHz and 520 MHz or at 70% AM for RF output frequencies below 5 MHz and above 520 MHz.

FREQUENCY (MHz)	DC COUPLED	AC COUPLED
0.2 to 5	0 to 8 kHz	20 Hz to 8 kHz
5 to 1040	0 to 50 kHz	20 Hz to 50 kHz

Incidental FM ..... <0.3 fm for 30% AM (<0.6 fm above 520 MHz for 6071A), where fm is modulation frequency, at the rates listed in the Distortion specifications.

FREQUENCY MODULATION

Deviation Ranges

FREQUENCY (MHz)	DEVIATION RANGES (kHz)	
	HI DEV MODE OFF	HI DEV MODE ON
0.2 to 62.5	10, 20, 50, 100, 200	50, 100, 200, 500, 1000
62.5 to 125	2, 5, 10, 20, 50	10, 20, 50, 100, 200
125 to 250	5, 10, 20, 50, 100	20, 50, 100, 200, 500
250 to 520	10, 20, 50, 100, 200	50, 100, 200, 500, 1000
520 to 1040	20, 50, 100, 200, 500*	100, 200, 500, 1000

*HI DEV MODE ON if deviation >400 kHz.

Resolution ..... 100 Hz up to 99.9 kHz Dev
1 kHz above 99.9 kHz Dev

Table 1-2. 6070A/6071A Specifications (cont)

Maximum Deviation

FREQUENCY (MHz)	MAXIMUM DEVIATION (kHz)	
	ACFM THE LESSER OF:	DCFM THE LESSER OF:
0.2 to 62.5*	999 or fm(520 - fo)	499 kHz
62.5 to 125	199 or fmfo	fo or 99.9
125 to 250	499 or fmfo	fo or 199
250 to 520	999 or fmfo	fo or 499
520 to 1040	999 or fmfo	fo or 999

Where: fm = the numeric value of modulation frequency expressed in kHz.
fo = the numeric value of the RF output frequency in MHz.

*At low RF output frequencies, the sum of the modulation frequency and the deviation should not exceed 1000(fo - 0.2).

Minimum Deviation ..... 10% of range except for 2, 20, and 200 kHz ranges 12.5% of range for 2, 20, and 200 kHz ranges.

Deviation Accuracy (internal or external, AC or DC)
AT 400 AND 1000 Hz
HI DEV Off ..... ±(10% + 0.125% of range)
HI DEV On ..... ±(7% + 0.125% of range)
FROM 0.3 TO 50 kHz (HI DEV ON OR OFF, DCFM ON OR OFF).... ±(12% + 0.125% of range)

Distortion ..... The total harmonic distortion on internal or on external sources up to a 50 kHz rate is a function of output frequency and mode, and is less than the values listed in the following table.

FREQUENCY (MHz)	DISTORTION (% THD)	
	HI DEV OFF	HI DEV ON
0.2 to 62.5	0.5 + 0.75/100 kHz DEV	1.5
62.5 to 125	0.5 + 3/100 kHz DEV	1.5
125 to 250	0.5 + 1.5/100 kHz DEV	1.5
250 to 520	0.5 + 0.75/100 kHzDEV	1.5
520 to 1040	0.5 + 0.375/100 kHz DEV	1.5

NOTE: Distortion for the DCFM Mode is 0.5% plus 1.2% per 100 kHz DEV below 62.5 MHz or (600/fo)% per 100 kHz DEV above 62.5 MHz. The specification applies at the ambient temperature at which DCFM is enabled, where fo is the RF output frequency in MHz.

Bandwidth ..... The frequency where the response is 3 dB below the maximum is at least 250 kHz at the high end and less than 20 Hz at the low end when AC coupled.

Incidental AM ..... <0.5% AM for up to 50 kHz deviation at a 1 kHz rate.

Table 1-2. 6070A/6071A Specifications (cont)

Center Frequency Accuracy ..... Same as the reference oscillator for ACFM. The center frequency accuracy values are listed in the following table for the DCFM Mode (after enabling DCFM).

FREQUENCY (MHz)	MAXIMUM INITIAL OFFSET (Hz)	TYPICAL FREQUENCY STABILITY (Hz/MINUTE)
0.2 to 62.5	±1000	50
62.5 to 125	±250	12.5
125 to 250	±500	25
250 to 520	±1000	50
520 to 1040	±2000	100

PHASE MODULATION

Index Ranges

FREQUENCY (MHz)	INDEX RANGES (RADIANS)	
	HI DEV OFF	HI DEV ON
0.2 to 62.5	1, 2, 5, 10, 20	5, 10, 20, 50, 100
62.5 to 125	0.2, 0.5, 1, 2, 5	1, 2, 5, 10, 20
125 to 250	0.5, 1, 2, 5, 10	2, 5, 10, 20, 50
250 to 520	1, 2, 5, 10, 20	5, 10, 20, 50, 100
520 to 1040	2, 5, 10, 20, 50*	10, 20, 50, 100

*HI DEV Mode if index > 40 Radians.

Resolution ..... 0.01 radian up to 9.99 radian.
0.1 radian above 99.9 radian.

Maximum Index ..... Same as the highest available range.

Minimum Index ..... 10% of range except for 0.2, 2, and 20 radian ranges
12.5% of range for 0.2, 2, and 20 radian ranges.

Index Accuracy (internal or external)
AT 400 AND 1000 Hz
HI DEV Off ..... ±(10% + 0.125% of range)
HI DEV On ..... ±(7% + 0.125% of range)
FROM 0.3 TO 3 kHz (HI DEV ON OR OFF) ..... ±(12% + 0.125% of range)

Distortion ..... The total harmonic distortion is less than the values in the following table.

FREQUENCY (MHz)	HI DEV OFF	HI DEV ON
0.2 to 62.5	0.5% + (0.75 x 10^{-5}fm)% per Rad	1.5%
62.5 to 125	0.5% + (3.0 x 10^{-5}fm)% per Rad	1.5%
125 to 250	0.5% + (1.5 x 10^{-5}fm)% per Rad	1.5%
250 to 520	0.5% + (0.75 x 10^{-5}fm)% per Rad	1.5%
520 to 1040	0.5% + (0.37 x 10^{-5}fm)% per Rad	1.5%
Where fm is the numerical value of the modulation frequency in Hz.		

Table 1-2. 6070A/6071A Specifications (cont)

Bandwidth	The frequency where the response is 3 dB below the maximum is at least 12 kHz at the high end and less than 20 Hz (ac coupled) or dc (dc coupled) at the low end.
Incidental AM	<0.5% AM for deviations up to 50 radians at 1 kHz rate
EXTERNAL MODULATION INPUT	
Connector	Front and rear panel MOD IN connectors (BNC), connected in parallel, with a nominal 600 Ohm input impedance.
External Input Sensitivity	1V peak provides the programmed modulation depth.
INTERNAL MODULATION OSCILLATOR	
Frequency Ranges	20 Hz to 199 Hz 200 Hz to 1,990 kHz 2 kHz to 19.9 kHz 20 kHz to 199 kHz
Unspecified Overrange	Down to 1 Hz and up to 255 kHz.
Frequency Accuracy	±3% over the range 20 to 30°C (68 to 86°F). ±(3% + 0.1%/°C)below 20 and above 30°C.
Distortion	<0.15% THD from 0.2 to 100 kHz <0.2% THD below 0.2 kHz and above 100 kHz.
Output	Front panel MOD OUT connector (BNC) and associated level control provide nominally 0 to 1 volt peak into 600 Ohms. Level is not programmable. Output impedance is 600 Ohms, nominal.
OTHER OUTPUTS	
Sweep Analog Output	Front panel SWP OUT connector (BNC) provides 0 to 10V up to a 1000 point stepped ramp. Accuracy of the output is ±5% of output ±0.1V.
Penlift	Rear panel PEN LIFT connector (BNC) provides a TTL signal which is high during sweep retrace and until the next sweep starts.
Output Valid	Rear panel OUT VALID connector (BNC) provides a TTL signal which is low when the RF output is potentially unsettled. This signal is also available on the IEEE interface.

Table 1-2. 6070A/6071A Specifications (cont)

MEMORY

Memory Functions	Store, recall, insert above, delete, define top.
Number of Locations	9 standard, volatile (contents are lost when power is removed); 50 with the 607XAA-570 Non-Volatile Memory Option (contents are retained for about 4 years after power is removed). Front panel setups can be stored in each location and later recalled.

FREQUENCY SWEEP

Sweep Modes	Auto, (repetitive), single, manual.
Sweep Functions	Symmetrical sweep, asummetrical sweep, sweep speed.
Data Entry Parameters	Sweep width and sweep increment.
Sweep Speed	When slow sweep speed is not selected, the instrument will sweep frequency as fast as possible without regard to whether or not the frequency is settled. When slow sweep speed is selected, the settled period of each increment can be set to 20 ms, 50 ms, 100 ms, 200 ms, and 500 ms.
Sweep Output	0 to +10V, up to 1000-point stepped ramp. Available at the front panel SWP OUT connector.
Penlift/Z Axis Blanking Output	TTL level at the rear panel PEN LIFT connector. High during sweep retrace and until the next sweep starts.

REMOTE CONTROL

Interface	IEEE Standard 488, 1978.
Functions Controlled	All front panel controls except the POWER and MOD OUT controls.
Status Indicators	REM (remote), ADDR (addressed), SRQ.
Interface Functions	SH1, AH1, T6, TE0, L3, LE0, SR1, RL1, PP0, DC1, DT1, C0.

GENERAL

Temperature	
OPERATING	0 to 50°C (32 to 122°F)
NON-OPERATING	-40 to 75°C (-40 to 167°F)
Operating Humidity	0 to 95% up to 25°C (77°F) 0 to 75% up to 50°C (122°F)

Table 1-2. 6070A/6071A Specifications (cont)

Conducted and Radiated Interference	<3 uV induced in a 2 turn, 1-inch loop that is 1 inch from any surface and measured into a 50 Ohms receiver. Complies with RE02 and CE03 of MIL-STD-461A, sections 4.3,1 and 4.3.2 of MIL-I-6181D, both narrow and broad band.		
Size	width	height	depth
	43 cm	13.3 cm	54.6 cm
	17 inches	5.25 inches	21.5 inches
Weight	28 kg (61 lbs.)		
Power	100, 120, 200, and 240V ac ±10%, 47 to 63 Hz.		
Protection Class	Class 1 (as defined in IEC 348)		

OPTIONS

607XA-130 Oven Reference Option

FREQUENCY	10 MHz
AGING RATE	$<\pm 5 \times 10^{-10}$/day, after a 21 day warmup.
TEMPERATURE STABILITY	$<\pm 2 \times 10^{-10}$/°C.
POWER	On during standby operation (STBY indicator on).

607XA-570 Non-Volatile Memory Option

NUMBER OF LOCATIONS	50
STORAGE TIME	With power removed, the contents will be retained for about 4 years.
POWER SOURCE	Instrument power supply, operating or in standby. Battery when power is removed.
POWER-ON CONDITION	Instruments with this option return the front panel to the setup that existed when the instrument was placed in standby or was turned off.

607XA-830 Rear RF Output Option
(replaces the front panel RF OUTPUT connector)

SPECIFICATIONS	Same as standard instrument.
CONNECTOR	Type N, rear panel RF OUT connector.

607XA-831 Auxiliary RF Output Option

FREQUENCY	Same as RF output frequency.
AMPLITUDE	>-18 dBm for normal autoranging operation.
IMPEDANCE	50 Ohms, nominal.
CONNECTOR	BNC, rear panel AUX OUT connector.

Table 1-2. 6070A/6071A Specifications (cont)

607XA-870 Reverse Power Protection Option	
PROTECTION LEVEL	Up to 50 watts from a 50 Ohm source over the frequency range of 0.2 to 1040 MHz. Will withstand up to 50V dc (dc blocking capacitor at the output).
LEVEL ACCURACY	Add ±0.5 dB to Amplitude Accuracy (listed earlier in this table).
HARMONICS	Degrade harmonics specifications (listed earlier in this table) by 5 dB for levels above +13 dBm.

Section 2
Shipping and Service Information

2-1. SHIPPING INFORMATION

2-2. The instrument is packaged and shipped in foam-packed container. When you receive the instrument, inspect it thoroughly for possible shipping damage. Special instructions for inspection claims are included in the shipping container.

2-3. If reshipment is necessary, use the original shipping container. If the original container is not available, order a new one from the John Fluke Mfg. Co., Inc., P.O. Box 43210; Mountlake Terrace, WA 98043; telephone (206) 774-2211. When ordering a new shipping container, state the instrument model number.

2-4. SERVICE INFORMATION

2-5. Warranty

2-6. Each John Fluke Model 6070A and 6071A Synthesized RF Signal Generator is warranted for a period of one year delivery to the original purchaser. The WARRANTY is located at the front of the 6070A/6071A Operator Manual.

2-7. Service

2-8. Factory authorized service (including calibration) for either the 6070A or the 6071A is available at selected John Fluke Technical Service Centers. For service and/or calibration, return your instrument to the nearest John Fluke Techanial Service Center. The local technical service center will handle transportation to and from the selected technical service centers as required. Tables A-1 and A-2 in Appendix A provide a complete list of John Fluke Technical Service Centers. Appendix A is located at the rear of this manual. If requested, you will be provided with an estimate before work is begun on instruments that are beyond the warranty period.

2-9. ADDITIONAL INFORMATION

2-10. For any additional information, contact your nearest John Fluke Sales Representative or the John Fluke Mfg. Co., Inc.; P.O. Box 43210, Mountlake Terrace, WA 98043; telephone (206) 774-2211. Tables A-3 and A-4 in Appendix A provide a complete list of the John Fluke Sales Representatives. Appendix A is located at the rear of this manual.

Section 3
Access Procedures

3-1. INTRODUCTION

3-2. The information in this section describes instrument access procedures. Each access procedure is composed of a disassembly procedure and the corresponding assembly procedure. The disassembly procedures allow access to only the Auxiliary Power Supply Fuse and the test points adjustments described in Sections 6 and 7C. The assembly procedures describe how to put the instrument back together. The figures that illustrate these procedures are located at the end of this section. The 6070A/6071A Service Manual contains procedures that provide access to every replaceable component in the instrument.

3-3. INTERIOR ACCESS PROCEDURE

3-4. Introduction

3-5. The Interior Access Procedure allows access to the interior of the instrument. This procedure is basic to every other access procedure. Since the following disassembly and assembly procedures are simple, they are not illustrated.

3-6. Disassembly Procedure

3-7. Remove the top and bottom covers to gain access to the interior of the instrument. Use the following procedures:

1. Remove the five screws along the front edge and the five screws along the rear edge of each cover.

2. Lift the covers off of the instrument.

3-8. Assembly Procedure

3-9. Assemble the instrument by installing the top and bottom covers using the following procedure:

1. Slide the covers back onto the instrument. Make sure that the cover slots are toward the front of the instrument. Make sure that the edge of each cover side fits onto the slots in the side rails of the instrument.

2. Fasten the covers in place using the screws removed during the disassembly procedure.

3-10. A3A3 DELAY DISCRIMINATOR PCB ACCESS PROCEDURE

3-11. Introduction

3-12. The A3A3 Delay Discriminator PCB Access Procedure allows access to the test points and adjustments described in Section 6. After the module cover has been removed, the cover screws must be torqued back in place to insure specified RF integrity. Figure 3-1 illustrates the sequence in which the screws must be torqued.

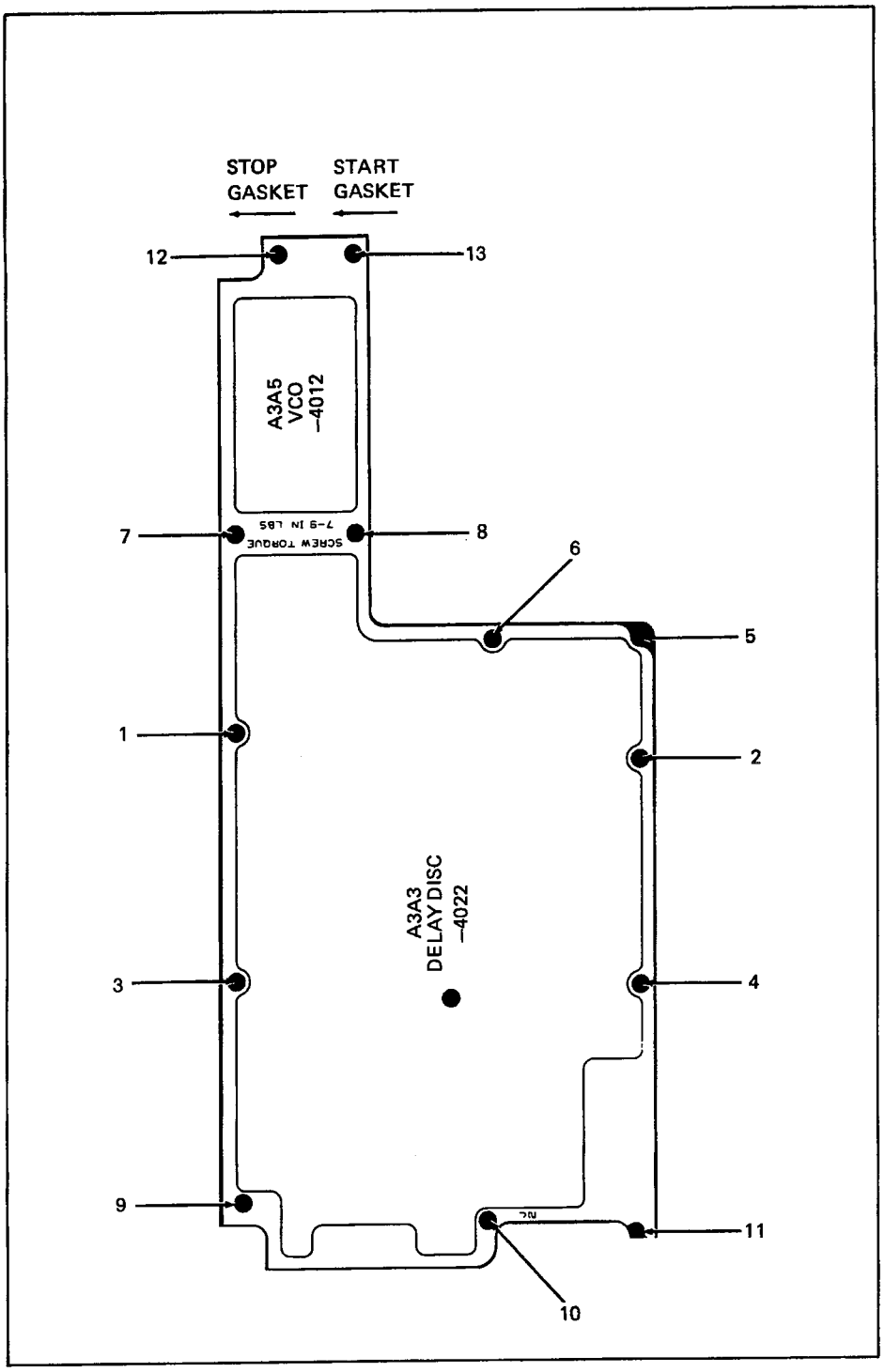


Figure 3-1. A3A3 Delay Discriminator/A3A5 VCO Cover

3-13. Disassembly Procedure

3-14. Complete the following procedure to gain access to the A3A3 Delay Discriminator PCB test points and adjustments described in Section 6.

1. Set the front panel POWER control and the rear panel MAIN POWER switch to the OFF positions and remove line power from the instrument.

2. Complete the disassembly portion of the Interior Access Procedure.

3. Remove the thirteen screws and flat washers that hold the A3A3 Delay Discriminator/A3A5 VCO cover in place.

4. Carefully lift the cover off; do not distrub the RF gaskets under the cover.

3-15. Assembly Procedure

3-16. Complete the following procedure to assemble the instrument:

1. Make sure that the RF gasket is in place. The gasket should start and end halfway between screws number 1 and number 8 (Figure 3-1). Inspect the RF gaskets for damage (areas that are folded over, worn, or pinched).

2. If the RF gasket falls out, use the following steps to properly install it:

   a. Start the RF gasket at screw number 13 (Figure 3-1).

   b. Traveling counterclockwise, press the gasket into the groove.

   c. The end of the gasket should continue past the beginning of the gasket (at screw 13) to screw 12 (Figure 3-1).

3. Lower the cover carefully and start the 13 screws through the washers. Do not tighten any of the screws.

4. Use the Torque Screwdriver to tighten all the screws. Use the following procedure:

   a. Torque all the screws to 3 inch-pounds in the numerical sequence shown in Figure 3-1.

   b. Torque all the screws to 7 to 9 inch-pounds in the numerical sequence shown in Figure 3-1. The torque value should be the same for all screws.

3-17. A3A1 PHASE DETECTOR PCB ACCESS PROCEDURE

CAUTION

To prevent damage to the coaxial cables and connectors, observe the cautions when handling the cables or connectors:

1. Do not bend the cables.

2. Do not place excessive strain between the cables and the connectors.

3. Start SMA connectors carefully - keep the connector straight with respect to the jack.

3-18. Introduction

3-19. The A3A1 Phase Detector PCB Access Procedure allows access to the test points and adjustments discussed in Section 6. After the module cover has been removed, the cover screws must be torqued back in place to insure specified RF integrity. Figures 3-2, 3-3, 3-4, and 3-5 illustrate the disassembly and assembly procedures.

3-20. Disassembly Procedure

3-21. Complete the following procedure to gain access to the A3A1 Phase Detector PCB test points and adjustments described in Section 6:

1. Set the front panel POWER control and the rear panel MAIN POWER switch to the OFF positions and remove line power from the instrument.

2. Complete the disassembly portion of the Interior Accews Procedure.

3. Swing the Synthesizer Module out using the following procedure:

   a. Refer to Figure 3-2 and disconnect J3, J5, J6, J7, J8, J9, J10.

   b. Remove the four screws and washers (H1 and H2) and the two screws (H3) shown in Figure 3-3.

   c. Swing the Synthesizer Module out 90o and lock it in this position by fastening the two screws (H3) in positions B.

4. Remove the 19 screws and washers that hold the lower cover of the Synthesizer Module in place (Figure 3-5).

5. Carefully remove the cover so that the RF gaskets under the cover are not disturbed.

6. If the instrument is to be operated (as in the procedures described in Section 6), jumper cables from the 6070A/6071A Service Kit must be installed between some of the connectors and the connections that have been disconnected.

3-22. Assembly Procedure

3-23. Complete the following procedure to assemble the instrument.

1. Make sure that the RF gaskets are in place (Figure 3-4) and inspect that RF gaskets for damage (areas that are folded over, worn, or pinched).

2. If any RF gaskets falls out, use the following steps to properly install it:

   a. Start the RF gasket at the appropriate START GASKET point shown in Figure 3-4.

   b. Traveling in the direction indicated, press the gasket into the groove.

   c. The end of the gasket should be at the TERMINATE GASKET point shown in the Figure 3-4.

3. Lower the cover carefully and start the 19 screws through the washers. Do not tighten any of the screws.

4. Use Torque Screwdriver to tighten all the screws. Use the following procedure:

   a. Torque all the screws to 3 inch-pounds in the numerical sequence shown in Figure 3-5.

   b. Torque all the screws to 7 to 9 inch-pounds in the numerical sequence shown in Figure 3-5. The torque value should be the same for all screws.

5. Swing the Synthesizer Module back into place using the following procedure:

   a. Remove any jumper cables that may have been installed.

   b. Remove the two screws (H3) from the Position B holes.

CAUTION

To avoid cable damage when swinging the synthesizer module back in place, make sure that the cables between the synthesizer plate and thedelay line are in the positions shown in Figure 3-6.

   c. Swing the Synthesizer Module completely into position; make sure that the semi-rigid coaxial cables between the Synthesizer Module and the Delay Line are in the Positions shown in Figure 3-6. This insures that these cables are not damaged by one of the screws in the Synthesizer Module cover or by cables being crossed over one another.

   d. Fasten the two screws (H3) into Position A (Figure 3-2) and fasten the four washers and screws (H1 and H2) back in place.

   e. Refer to Figure 3-2 and connect J3, J5, J6, J7, J8, J9, J10.

6. Complete the assembly portion of the Interior Access Procedure.

3-24. POWER SUPPLY ACCESS PROCEDURE

WARNING

LETHAL VOLTAGES ARE EXPOSED WHEN THE POWER SUPPLY IS DISASSEMBLED. REMOVE LINE POWER BEFORE STARTING DISASSEMBLY AND OBSERVE ALL APPLICABLE SAFETY PRECAUTIONS IF LINE POWER IS RECONNECTED TO THE INSTRUMENT BEFORE THE POWER SUPPLY IS ASSEMBLED.

3-25. Introduction

3-26. The following procedures provide access to all power supply test points and adjustments and to the Auxiliary Power Supply Fuse. Figures 3-2 illustrates the disassembly and assembly procedures.

3-27. Disassembly Procedure

3-28. Use the following procedure to access the Auxiliary Power Supply Fuse (F2) and the power supply test points and adjustments described in Section 6.

1. Set the front panel POWER control and the rear panel MAIN POWER switch to the OFF positions and remove line power from the instrument.

2. Complete the disassembly portion of the Interior Access Procedure.

3. Remove the washers and locking nuts (H4 and H5) from the BNC and Type-N connectors at the left side (facing from the rear of the instrument) of the rear panel (Figure 3-2).

4. On the A6A6 Series Pass Motherboard PCB (immediately in front of the fan), disconnect P4, P5, P6, and P7 (Figure 3-3).

5. Under the A6A6 Series Pass Motherboard PCB, remove the folded portion of the IEEE cable from the retaining strap (Figure 3-3).

6. Remove the 12 screws (H6) that connect the Rear Panel Assembly to the instrument.

7. If the 607XA-130 Oven Reference Option is not installed, go to Step 8. If the 607XA-130 Oven Reference Option is installed, remove the right rear handle (facing from the front of the instrument) before going to Step 8. Use the following procedure:

a. Remove the decal from the base of the right rear handle.

b. Remove the five screws that connect the right rear handle to the instrument and remove the handle.

8. Pull the Rear Panel Assembly from the instrument and replace the right rear handle.

9. Rotate the Rear Panel Assembly so that it rests upon the back of the handles.

10. Remove the six screws (H7) that hold the power supply cover in place.

11. Slide the power supply cover off of the power supply. All power supply adjustments and test points described in Section 6 are now accessed.

12. The Auxiliary Power Supply Fuse (F2) is located on the bottom of the power supply on the A5A2 Power Supply Regulator PCB Assembly.

3-29. Assembly Procedure

3-30. Complete the following steps to assemble the instrument:

1. Make sure that the front panel POWER control is in the STBY position, that the rear panel MAIN POWER switch is in the OFF position, and that the instrument is disconnected from line power.

2. Slide the power supply cover in place and secure it using the six screws (H7).

3. If the 607XA-130 Oven Reference Option is installed, remove the right rear handle.

4. Slide the Rear Panel Assembly partially back into place. Be careful to insert all of the BNC and Type-N connectors through the appropriate holes in the Rear Panel Assembly.

5. Plug J4, J5, J6, and J7 into the appropriate connectors.

6. Fold the IEEE cable and insert the fold under the retaining strap.

7. Slide the Rear Panel Assembly completely into place and secure it using the 12 screws (H6).

8. Fasten the BNC and Type-N connectors to the rear panel using the washers and lock-nuts (H6 and H5).

9. If the 607XA-130 Oven Reference Option is not installed, go to Step 8. If the 607XA-130 Oven Reference Option is installed, connect the right rear handle before going to Step 9. Use the following procedure:

a. Place the handle in position and tighten the five screws.

b. Glue the decal back in place at the base of the handle.

10. Complete the assembly portion of the Interior Access Procdure.

3-31. A4A6/A4A7 (X2) OUTPUT AMPLIFIER PCB ACCESS PROCEDURE

3-32. Introduction

3-33. The A4A6/A4A7 (X2) Output Amplifier PCB Access Procedure allows the technician access to the test points and adjustments described in Section 6. The A4A7 Output Amplifier PCB is used in the Model 6070A instruments. The A4A6 X2 Output Amplifier PCB is used in Model 6071A instruments. Both pcbs are physically located in the same place and have the same access procedure. After the module cover has been removed, the cover screws must be tightened to a specified torque value to insure RF integrity.

3-34. Disassembly Procedure

3-35. Complete the following procedure to access the output amplifier pcb test points and adjustments described in Section 6:

1. Set the front panel POWER control to STBY. Set the rear panel MAIN POWER switch to OFF. Disconnect the instrument from line power.

2. Complete the disassembly portion of the Interior Access Procedure.

3. Remove the screws and washers that hold that bottom cover of the output module (Figure 3-8) in place.

4. Carefully lift the cover off; do not disturb the RF gaskets under the cover.

3-36. Assembly Procedure

3-37. Complete the following procedure to assemble the instrument:

1. Make sure the RF gaskets are in place (Figure 3-7) and inspect the RF gaskets for damage (areas that are folded over, worn, or pinched).

2. If one of the gaskets falls out, use the following steps to properly install it:

a. Start the gasket at the appropriate START GASKET point shown in Figure 3-7.

b. Traveling in the direction indicated, press the gasket into the groove.

c. The end of the gasket should be at the TERMINATE GASKET point shown in Figure 3-7.

3. Lower the cover carefully in place and start all the screws through the washers. Don't tighten any of the screws.

4. Use the Electric Torque Screwdriver to tighten all the screws according to the following procedure:

a. Torque all screws to 3 inch-pounds in the numerical sequence shown in the Figure 3-8.

b. Torque all screws to 7 to 9 inch-pounds in the numerical sequence shown in Figure 3-8. The torque value should be the same for all screws.

5. Complete the assembly portion of the Interior Access Procedure.

3-38. A4A5 R.P.P. PCB ACCESS PROCEDURE

CAUTION

To prevent damage to the coaxial cables and connectors, observe the following cautions when handling the cables and connectors.

1. Do not bend the cables.

2. Do not place excessive strain between the cables and the connectors.

3. Start SMA connectors carefully - keep the connector straight with respect to the jack.

3-39. Introduction

3-40. The A4A5 R.P.P. PCB Access Procedure allows access to the adjustments described in Section 7C. Figures 3-2, 3-3, 3-9, and 3-10 illustrate the procedure.

3-41. Disassembly Procedure

3-42. Complete the following procedure to access the A4A4 R.P.P. adjustment described in Section 7C.

1. Set the front panel POWER control to STBY. Set the rear panel MAIN POWER control to OFF. Remove line power from the instrument.

2. Complete the disassembly portion of the Interior Access Procedure.

3. Complete the following steps to swing out the Output Module:

a. Refer to Figure 3-2 and disconnect J1, J4, J5, J13, andJ14.

b. Remove the four screws and washers (H1 and H2) and the two screws (H3) shown in Figure 3-3.

c. Lift the Output Module until J10, J11, and J12 can be reached. Disconnect J10, J11, and J12.

d. Swing the module out 90° and lock it in this position by installing the two screws (H3) in positions B. Remove the R.P.P. cover screws.

5. Carefully lift the cover off; do not disturb the RF gasket under the cover.

6. If the instrument is to be operated (as in the procedures described in Section 7C), jumper cables from the 6070A/6071A Service Kit must be installed. For the procedures in Section 7C, install two jumper cables: one from A4AJ5 to A3AJ5 and one from A4A13 to A3AJ10.

3-43. Assembly Procedure

3-44. Complete the following procedure to assemble the instrument:

1. Remove the jumper cables that have been installed.

2. Make sure the RF gaskets are in place (Figure 3-9) and inspect the RF gaskets for damage (areas that are folded over, worn, or pinched).

3. If the RF gaskets falls out, use the following steps to properly install it:

   a. Start the gasket at the START GASKET point shown in Figure 3-9.

   b. Traveling in the direction indicated, press the gasket into the groove.

   c. The end of the gasket should be at the TERMINATE GASKET point shown in Figure 3-9.

4. Lower the cover carefully in place and start all the screws through the washers. Don't tighten any of the screws.

5. Use the Electric Torque Screwdriver to tighten all the screws according to the following procedure:

   a. Torque all screws to 3 inch-pounds in the numerical sequence in Figure 3-10.

   b. Torque all screws to 7 to 9 inch-pounds in the numerical sequence shown in Figure 3-10. The torque value should be the same for all screws.

6. Swing the Output Module back into place using the following procedures:

   a. Remove the two screws (H3) from Positions B.

   b. Swing the Output Module toward the instrument until J10, J11, and J12 can be connected. Connect J10, J11, and J12.

   c. Swing the Output Module completely back into position.

   d. Fasten the two screws (H3) into Position A (Figure 3-2) and fasten the four washers and screws (H1 and H2) back in place.

   e. Refer to Figure 3-2 and connect J1, J4, J5, J13, and J14.

7. Complete the assembly portion of the Interior Access Procedure.

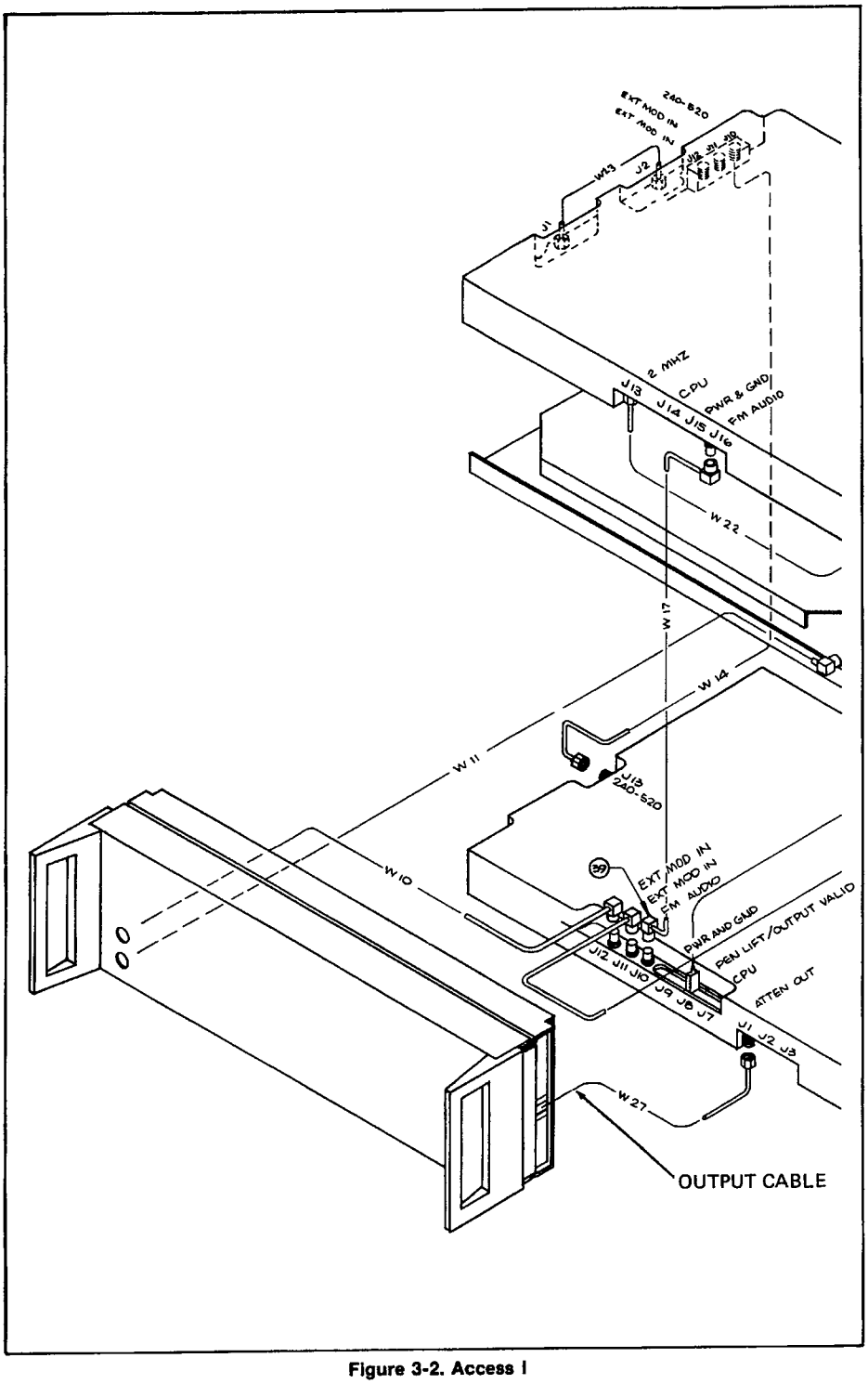


Figure 3-2. Access I

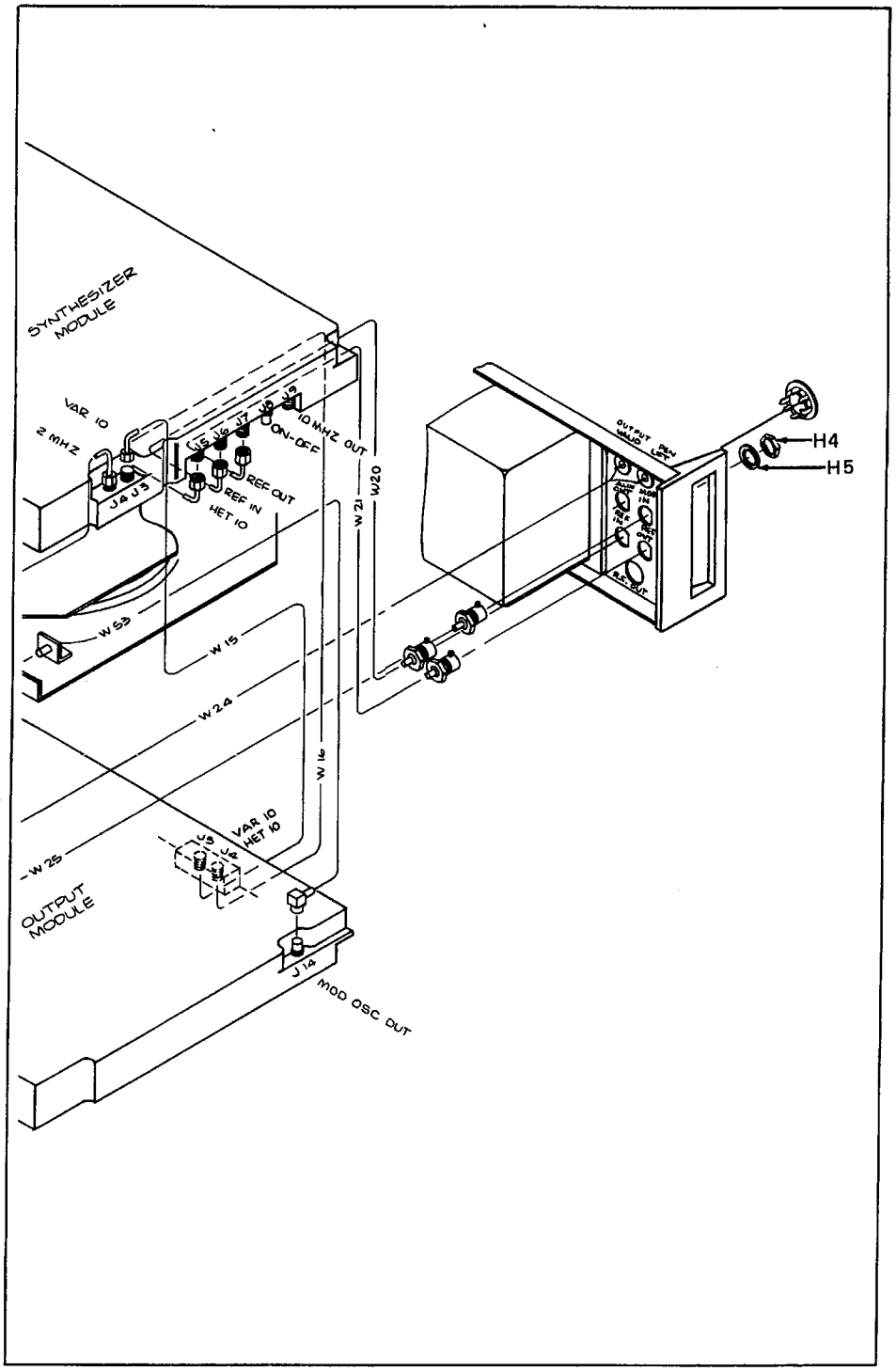


Figure 3-2. Access I (cont)

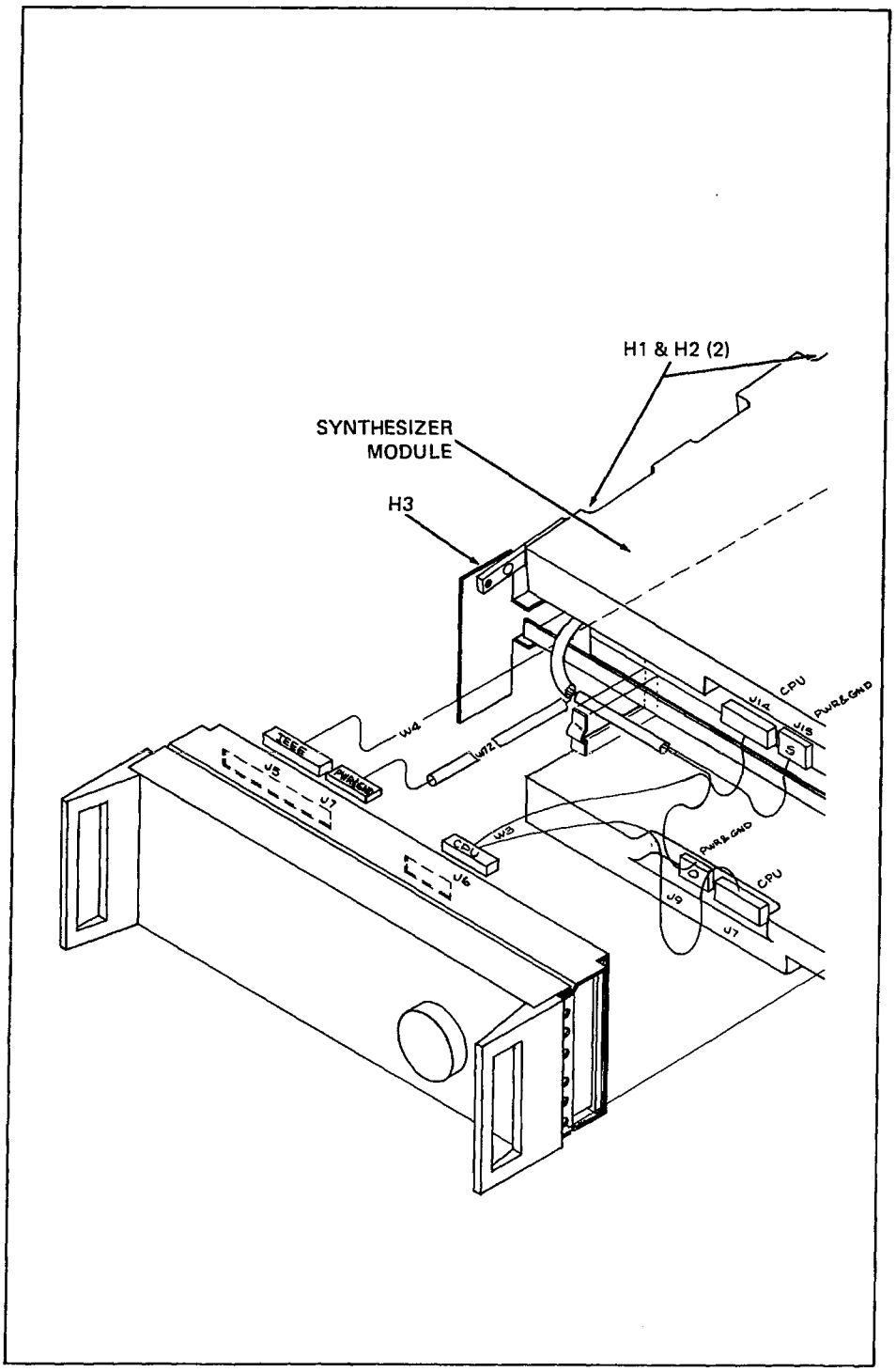


Figure 3-3. Access II

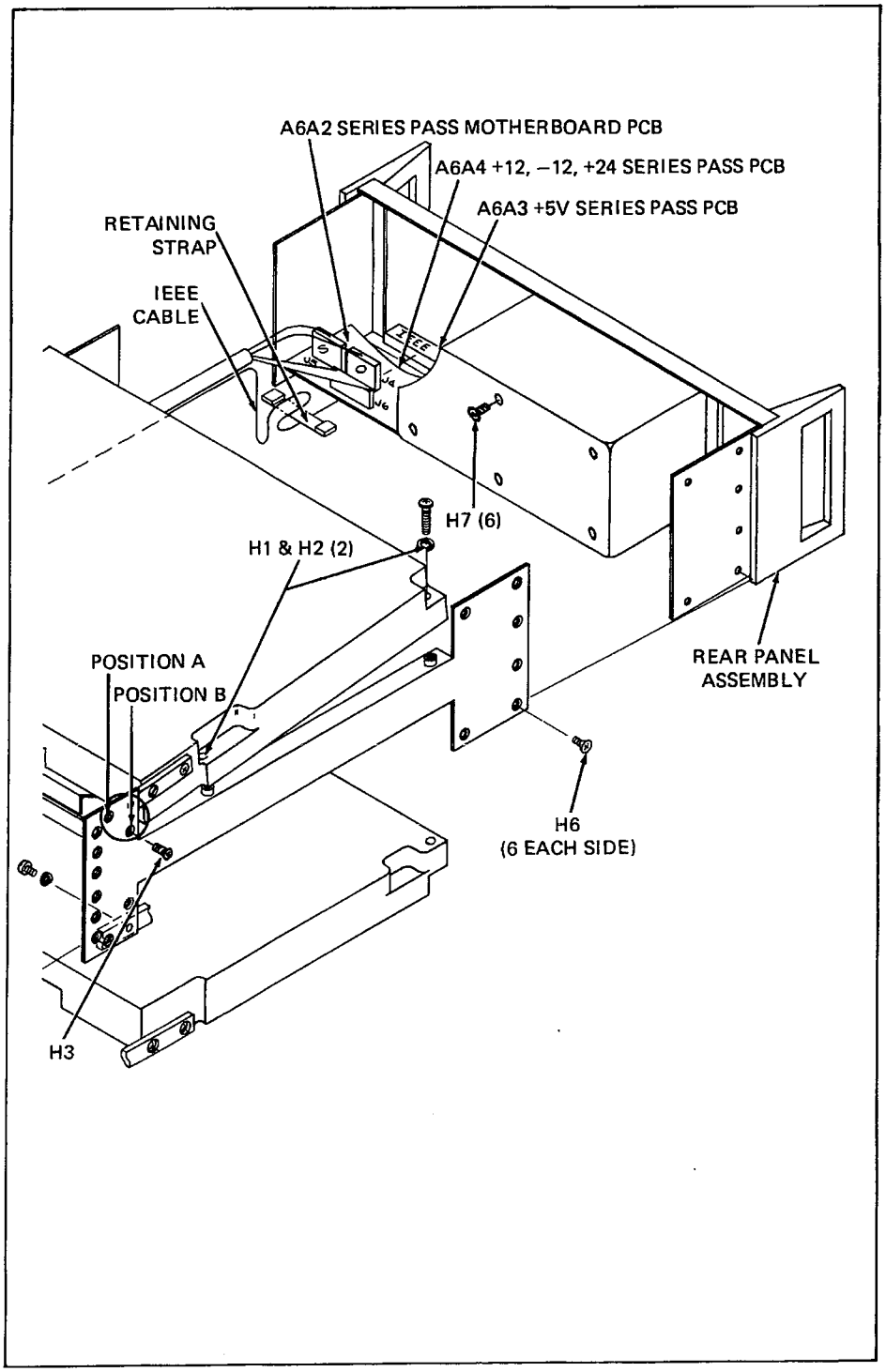


Figure 3-3. Access II (cont)

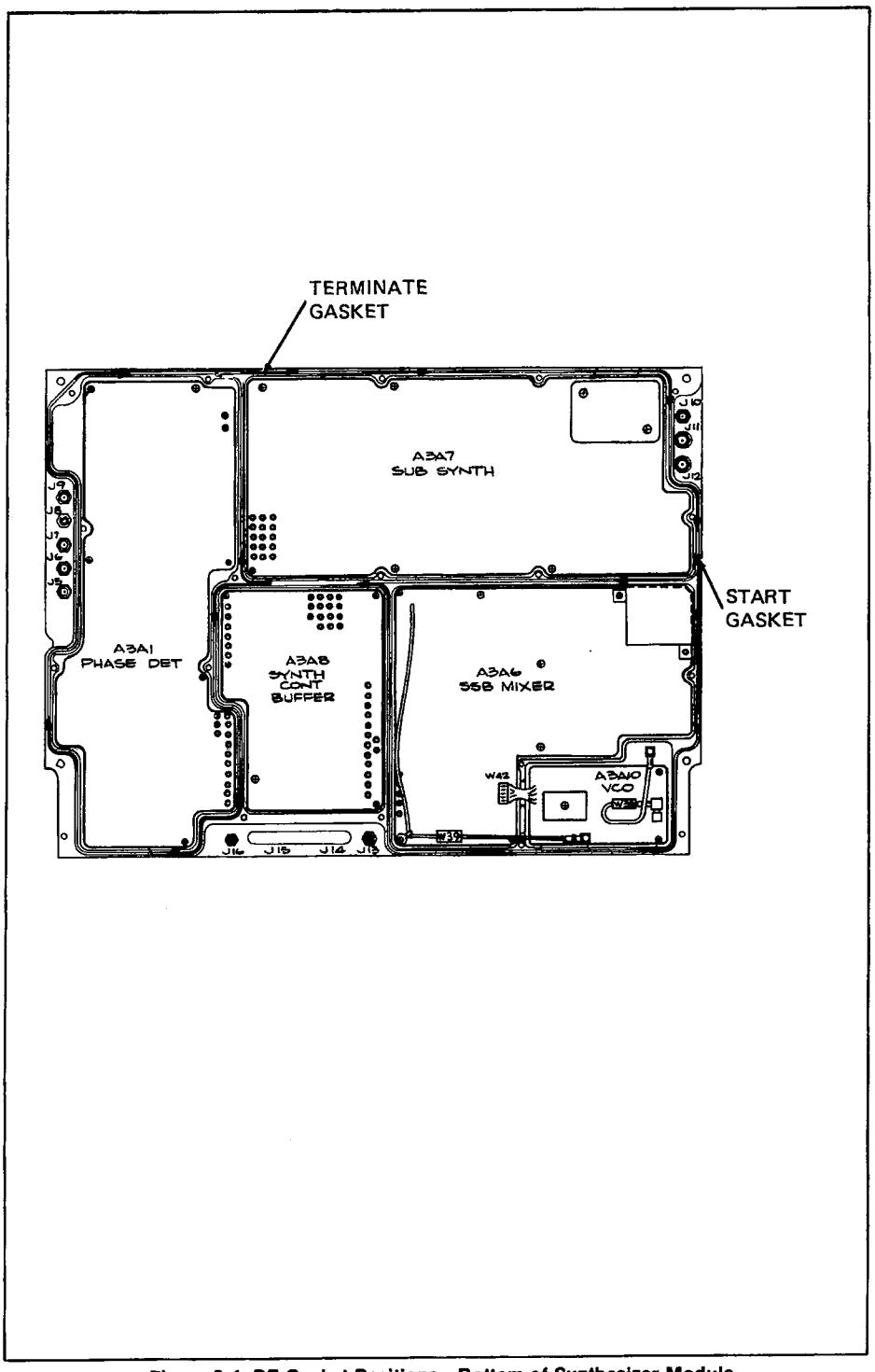


Figure 3-4. RF Gasket Positions - Bottom of Synthesizer Module

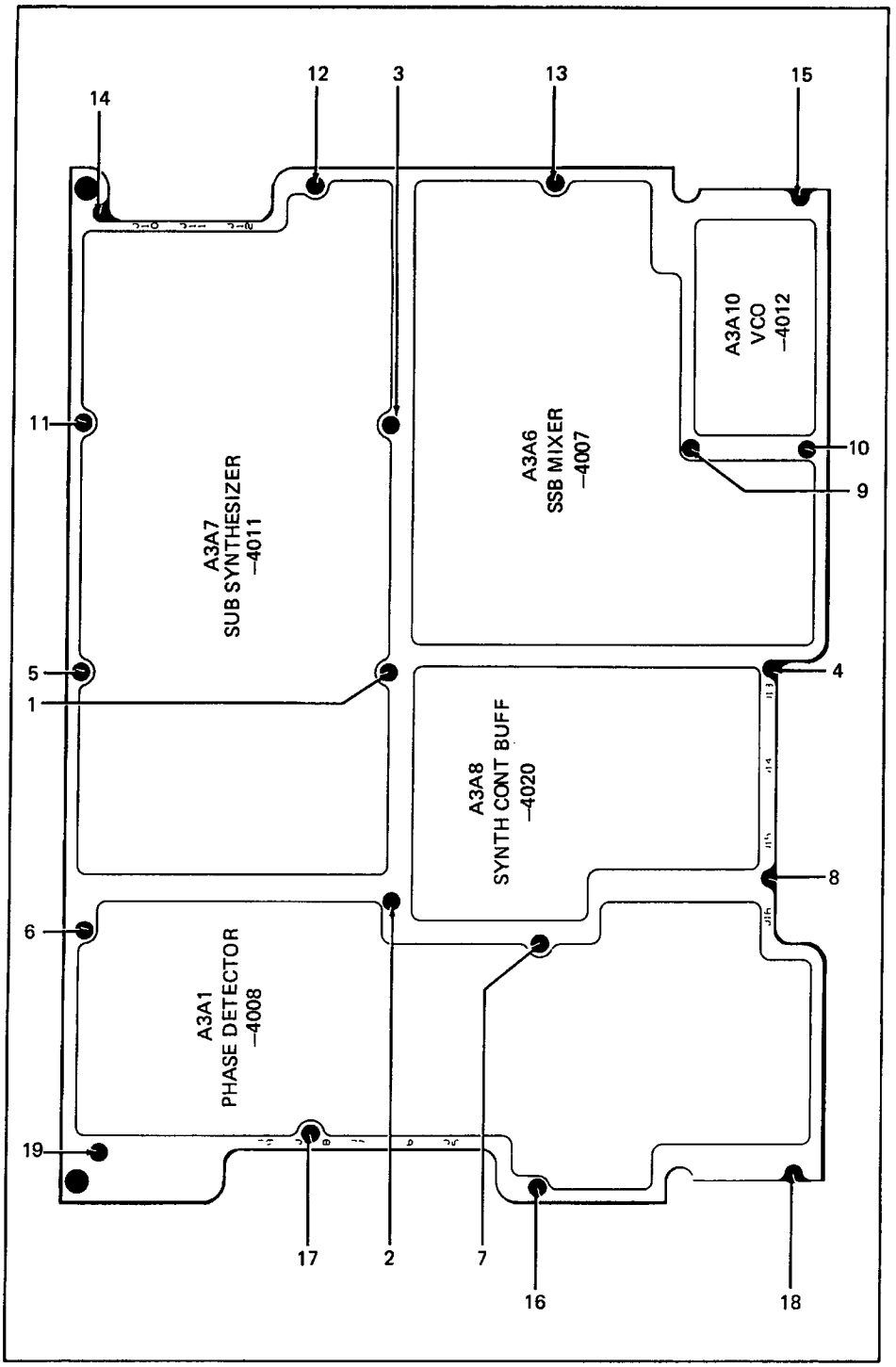


Figure 3-5. Bottom Cover of the Synthesizer Module

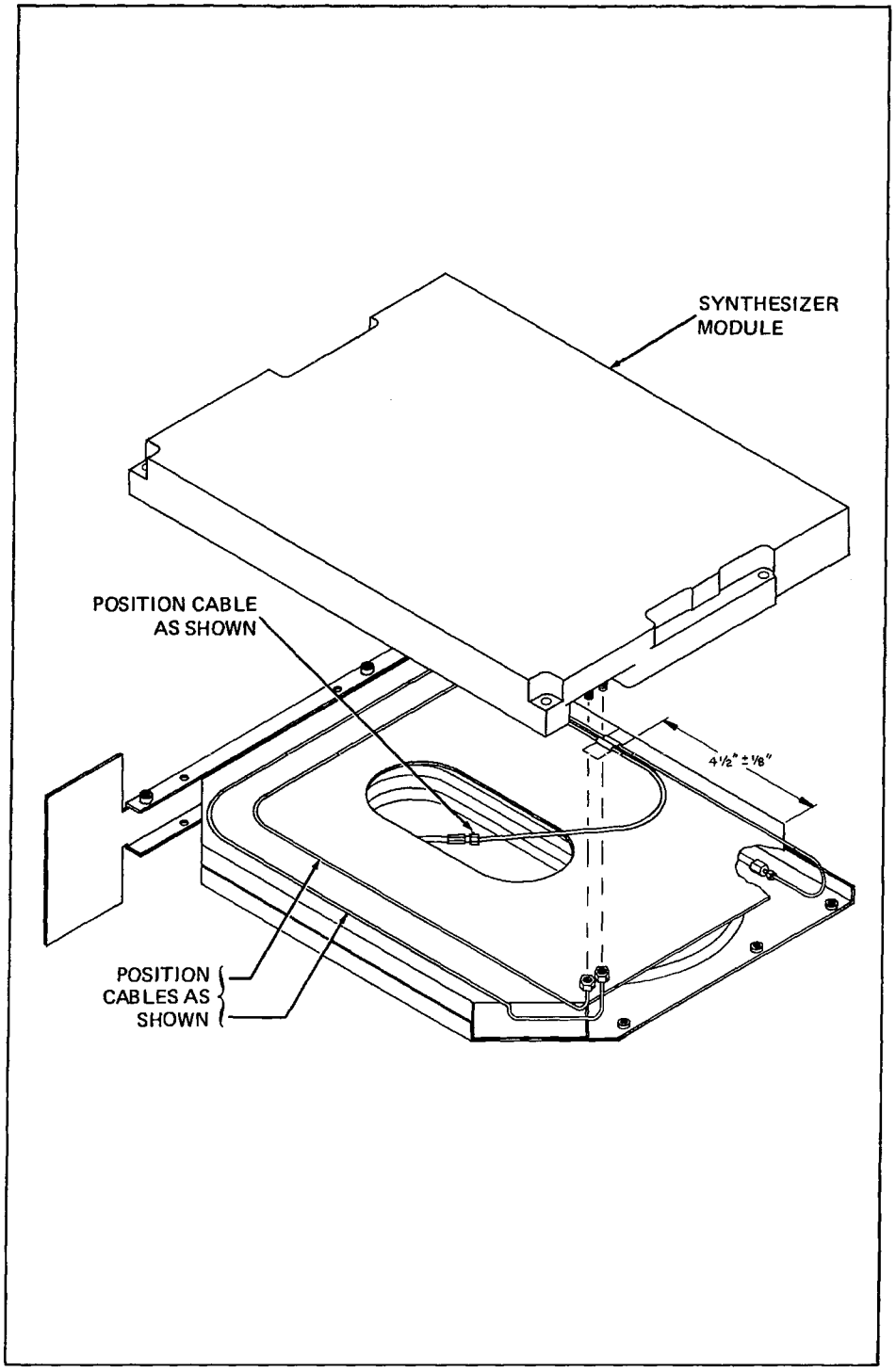


Figure 3-6. Cable Locations

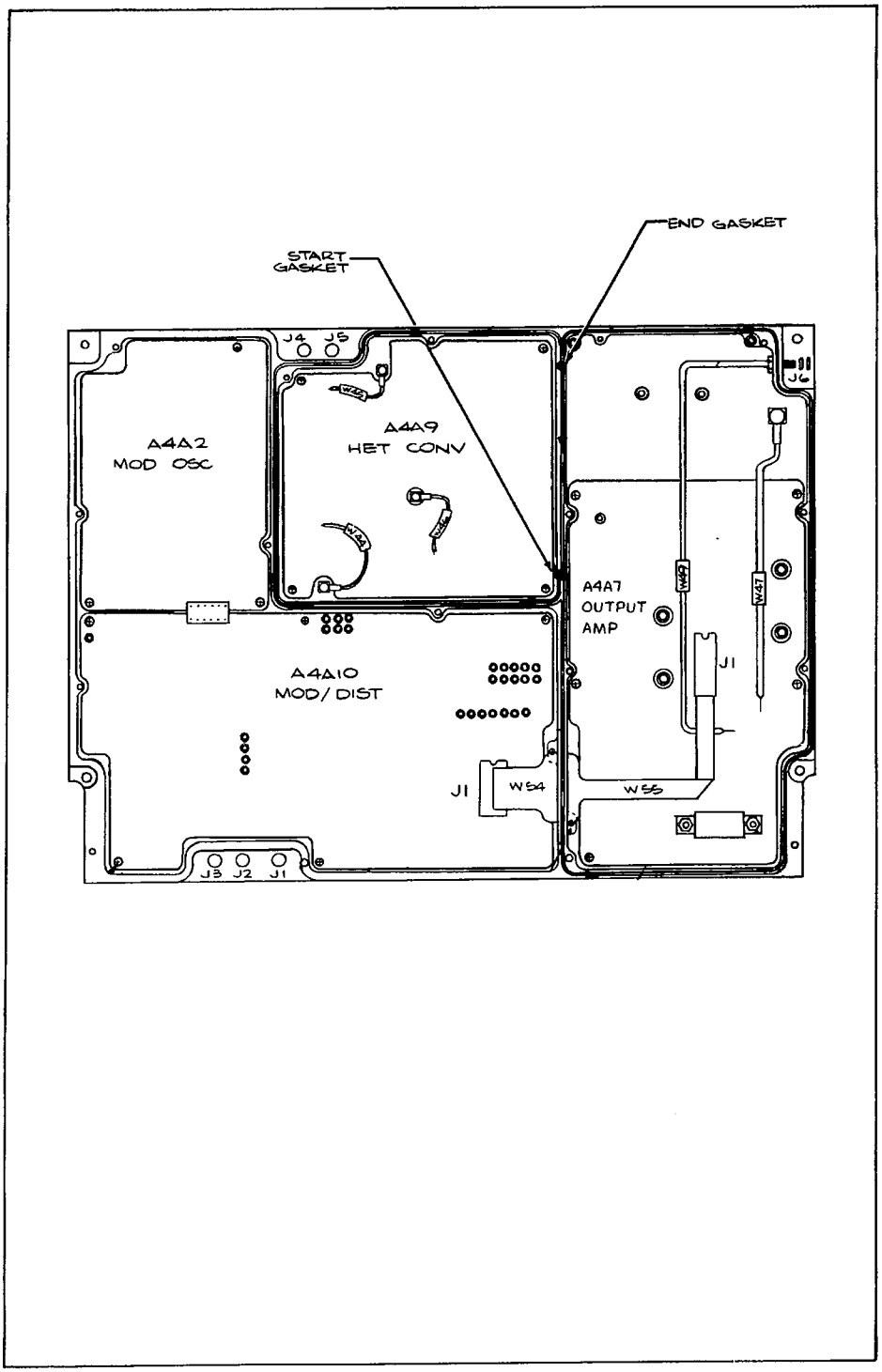


Figure 3-7. RF Gasket Positions - Bottom of Output Module

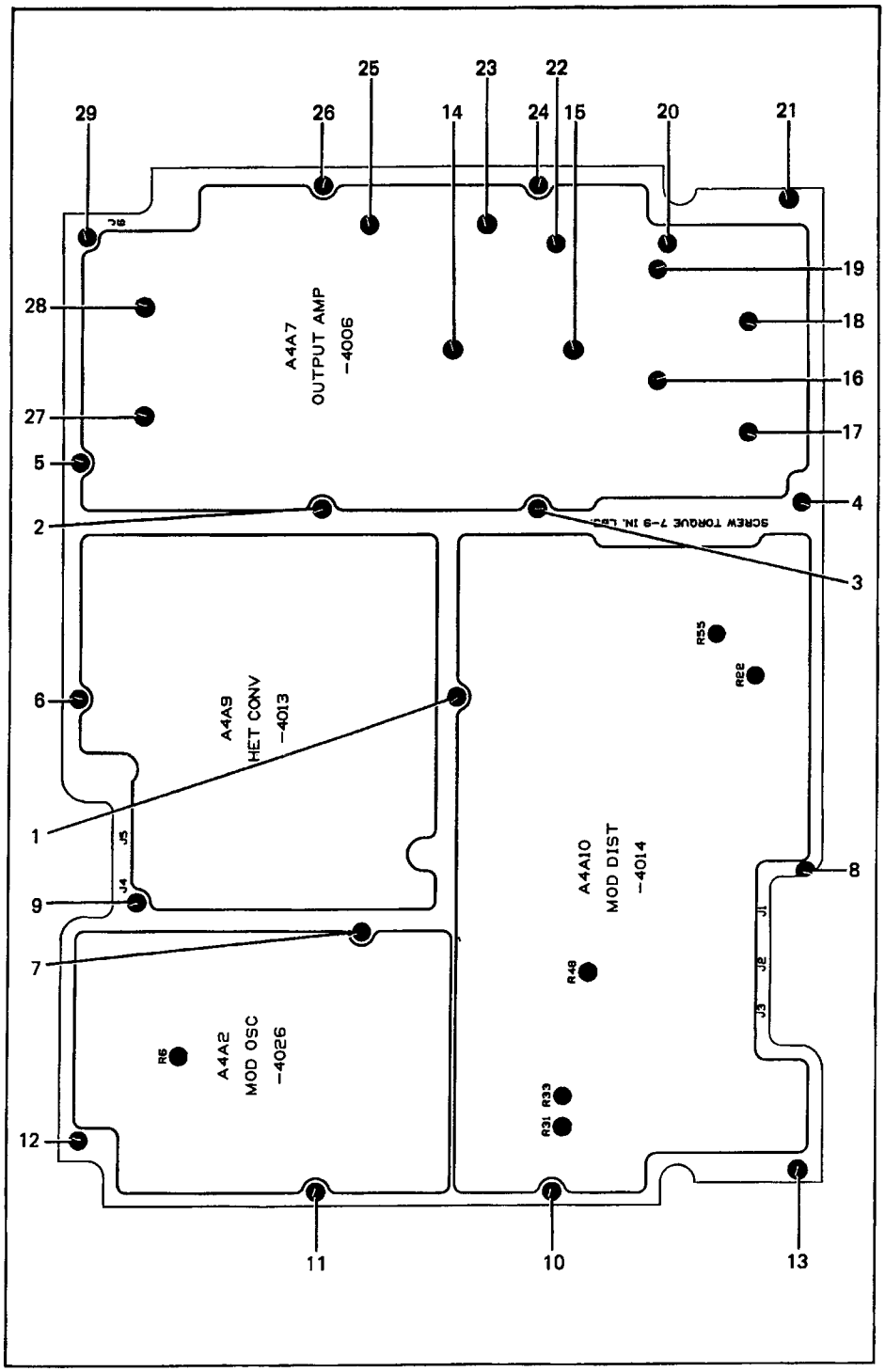


Figure 3-8. Output Module, Bottom Cover

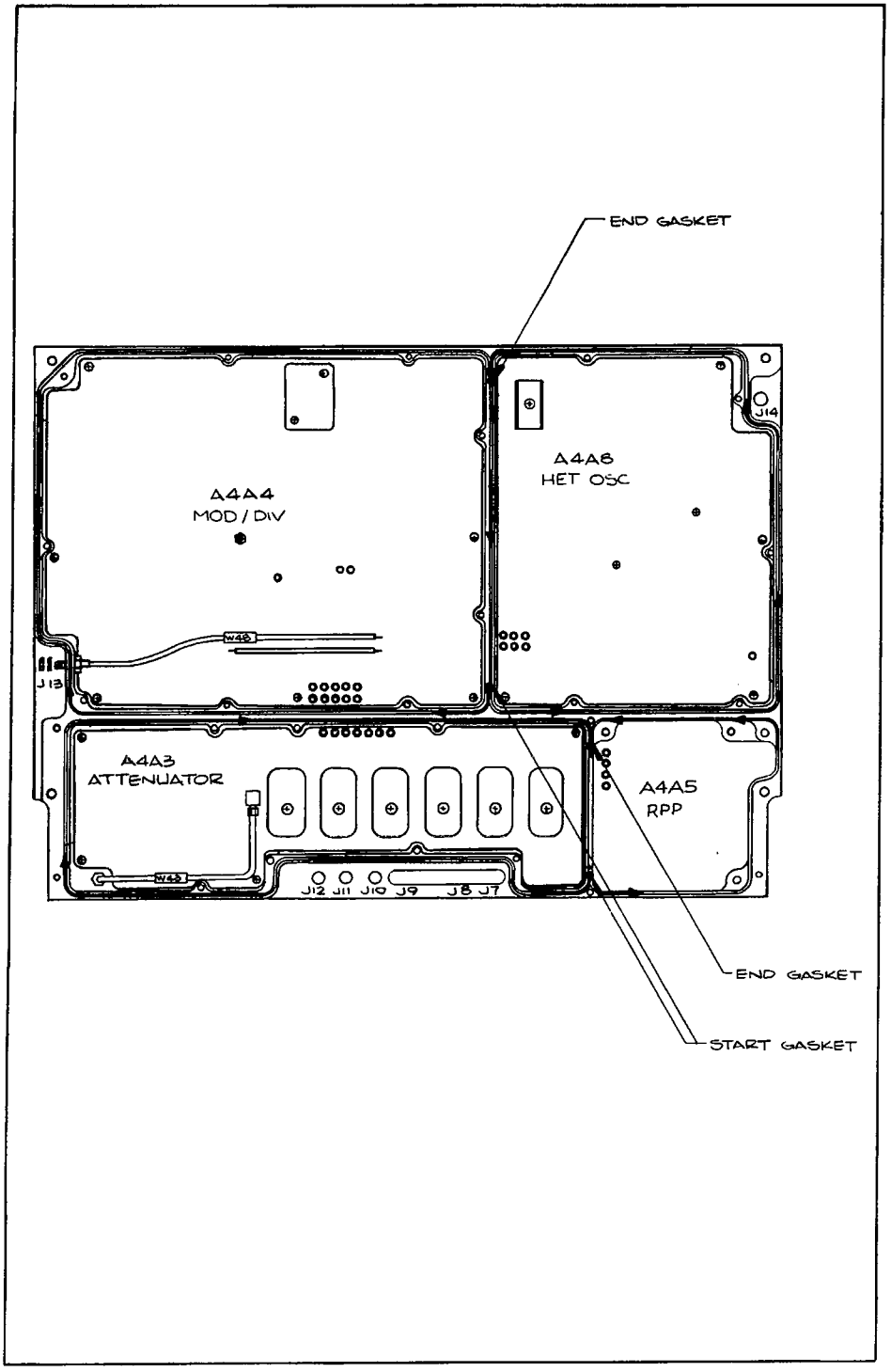


Figure 3-9. RF Gasket Positions - Top of Output Module

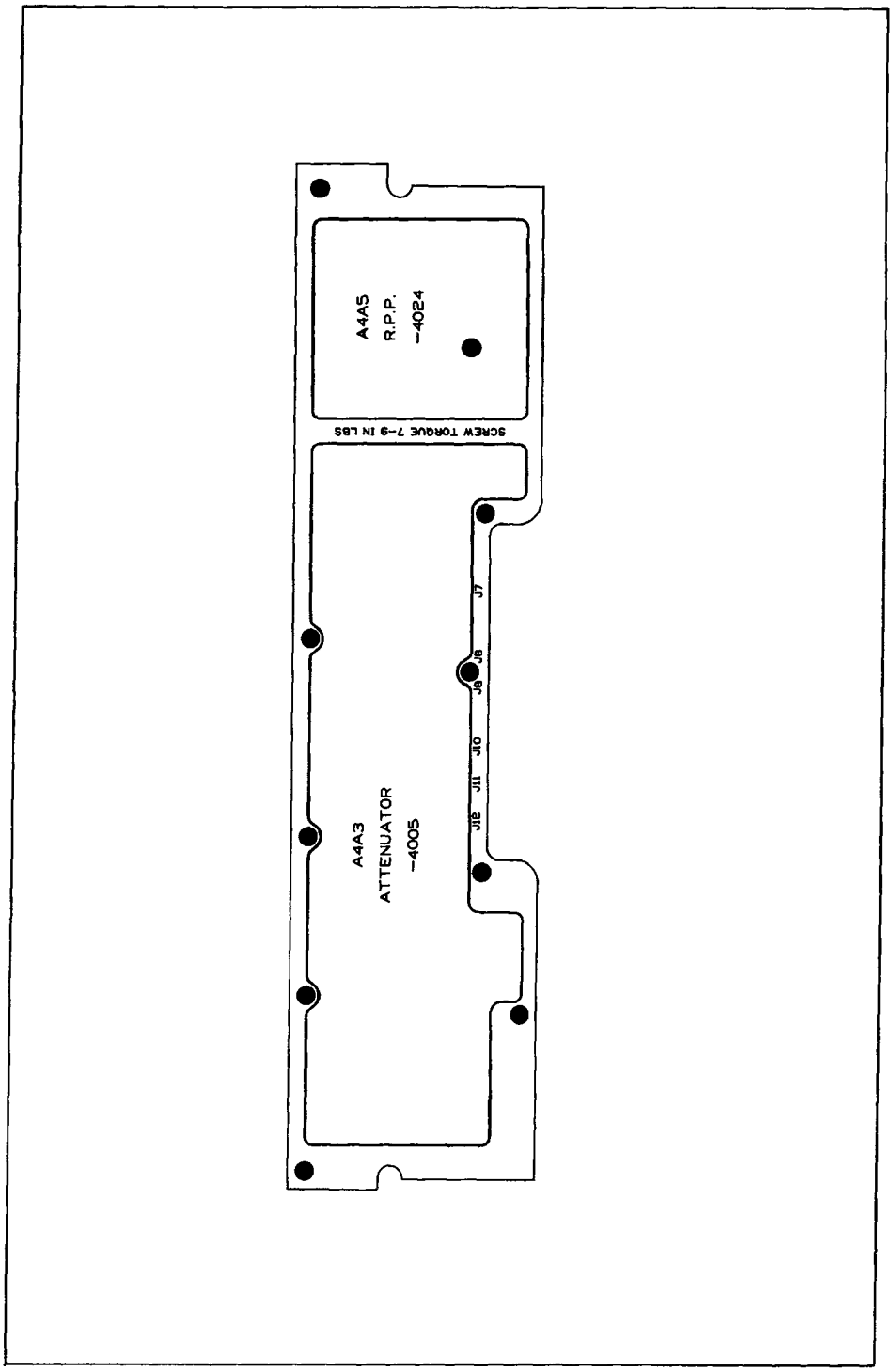


Figure 3-10. A4A5 RPP PCB Cover

Section 4
General Maintenance Procedure

4-1. INTRODUCTION

4-2. The information in this section describes the general maintenance procedures for the 6070A and the 6071A RF Synthesized Signal Generators. The procedures should be completed only the qualified personnel.

4-3. CLEANING PROCEDURE

4-4. Clean the instrument periodically to remove dust, grease, and other contamination. Use the following procedure:

1. Clean the interior with clean, dry, low pressure air (<20 psi).

2. Clean the front panel and exterior surfaces with a soft cloth dampened in a mild solution of detergent and water.

4-5. LINE POWER SELECTION PROCEDURE

4-6. The 6070A and the 6071A can operate in a 90 to 132V ac rms line voltage environment or in a 180 to 264V ac rms line voltage environment. Use the following procedure to select the desired line voltage:

1. Set the POWER control (front panel) to STBY, set the MAIN POWER switch (rear panel) to the OFF position, and disconnect line power.

2. Remove the six screws that hold the rfi shield over the main power fuse and the line voltage selection switch. This rfi shield is located just beneath the line power receptacle on the rear panel of the instrument. Figure 4-1 shows the main power fuse and the line voltage selection switch with the rfi shield removed.

3. Set the line voltage selection switch to the range of operation desired. The white window on the switch shows 115 for the 90 to 132V ac rms range and 230 for the 180 to 264V ac rms range. Figure 4-1 shows the 90 to 132V ac rms range selected.

4-7. FUSE REPLACEMENT PROCEDURES

4-8. Introduction

4-9. The instrument has two fuses: the main power fuse and the auxiliary power supply fuse. The main power fuse can be replaced from the rear panel. The auxiliary power supply fuse is located inside the instrument on the Power Supply Assembly.

4-10. Main Power Fuse Replacement Procedure

4-11. Use the following procedure to replace the main power fuse.

1. Set the POWER control (front Panel) to STBY, set the MAIN POWER switch (rear panel) to OFF, and disconnect line power.

2. Remove the six screws that hold the rfi shield over the main power fuse and the line voltage selection switch. This rfi shield is located just beneath the line power receptacle on the rear panel of the instrument. Figure 4-1 shows the main power fuse and the line voltage selection switch with the rfi shield removed.

3. Replace the main power fuse only with a 3A, 250V, FAST BLO fuse. Substitution of a different type fuse may result in damage to the instrument.

4-12. Auxiliary Power Supply Fuse Replacement Procedure

4-13. Use the following procedure to replace the Auxiliary Power Supply Fuse:

1. Set the POWER control (front panel) to STBY, set the MAIN POWER switch (rear panel) to OFF, and disconnect line power.

2. Remove the instrument covers using the Interior Access Procedure in Section 3.

3. Remove the Power Supply Assembly and access the auxiliary power fuse using the Power Supply Access Procedure in Section 3.

4. Replace this fuse only with a 0.6A SLOW BLO type. Substitution of a different type fuse may result in damage to the instrument.

5. Assemble the instrument using the access procedures in Section 3.

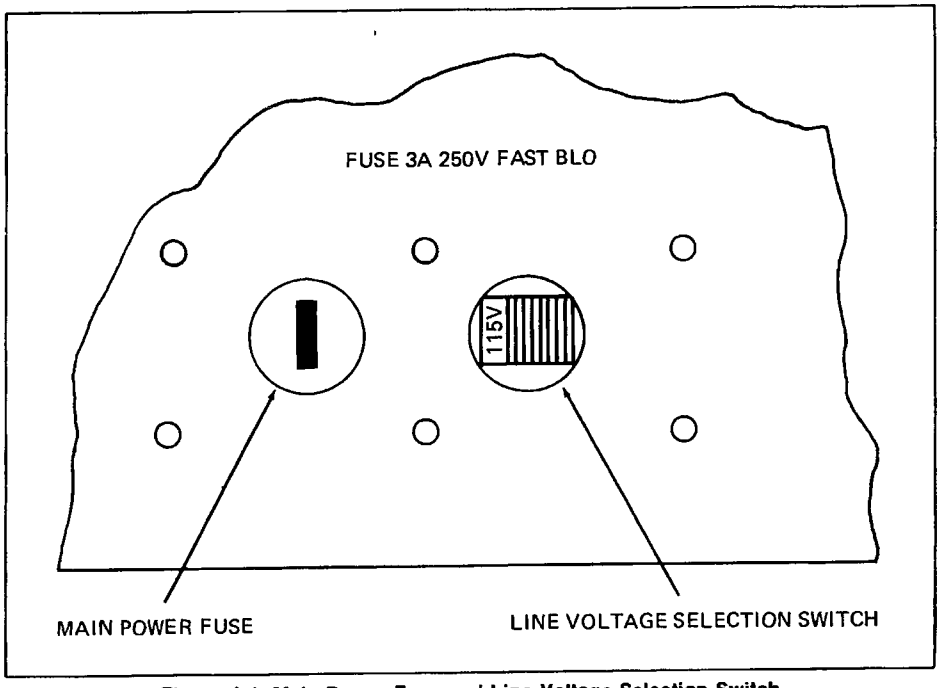


Figure 4-1. Main Power Fuse and Line Voltage Selection Switch

Section 5
Performance Checks

5-1. INTRODUCTION

5-2. The information in this section describes the performance checks for the 6070A and the 6071A Synthesized RF Signal Generator (the specifications in Table 1-2 are the performance standard). Use these checks at least once a year to verify the instrument performance. These performance checks also can be used as an acceptance check or for performance verification after completing repairs or routine maintenance on the instrument. It is recommended that the performance checks be completed in the order presented, but individual performance checks can be used as troubleshooting aids. The instrument being tested, the Unit Under Test (UUT), should be warmed up (POWER control at the ON position) with all covers in place for at least 30 minutes before starting the performance checks. The test equipment required for the performance checks is listed in Section 1 (Table 1-1) of this manual. If an out-of-range result is obtained, the instrument requires calibration adjustment and/or troubleshooting and repair.

5-3. POWER ON CHECK

PURPOSE:	Verify that the instrument turns on correctly and is functional.
TEST EQUIPMENT:	None
REMARKS:	1. The check is begun each time the POWER control is set to the ON position. 2. Press one of the FUNCTION controls to abort the check.

5-4. Complete the following steps to verify that the instrument turns on correctly and is functional.

1. Start with the instrument in standby (STBY indicator on).

2. Set the POWER control to ON.

3. The instrument starts the self tests and turns on all lighted controls, annunciators, indicators and every segment of each display for about 5 seconds.

4. After about 5 seconds, the front panel is set to the standard power on setup that follows unless one or more self tests fail. If the instrument has the 607XA-570 Non-Volatile Memory Option installed, the front panel is returned to the same setup that existed when the instrument was placed in standby or was turned off.

	ITEM	CONDITION
a.	RF OUTPUT Control	On (Lit)
b.	FREQUENCY Display	300 000 000
	Bright Digit Location	1 MHz Position
	Bright Digit is on.	
c.	REL FREQ	Off (Dark)
d.	AMPLITUDE Display	-10.0 dBm
	Bright Digit Location	1 dB Position
e.	REL AMPL	Off (Dark)
f.	Internal Amplitude Correction	Enabled
g.	MODULATION Controls	All Off (Dark)
h.	MODULATION Display	1.0 kHz
	Bright Digit Location	1.0 kHz Position
i.	Programmed Parameters:	
	Frequency Step (FREQ STEP)	25.000 kHz
	AM Depth (AM)	30%
	FM Deviation (FM/ØM)	5.0 kHz DEV
	TOP Memory Location (TOP)	9*
	Sweep Increment (SWP INCR)	1 MHz
	Sweep Width (SWP WDTH)	100 MHz
	Sweep Speed	Normal
j.	SWEEP Controls	Off
k.	IEEE-488 Interface Status:	
	LOCAL BUS STATUS CONTROL	Dark (LOCAL) Deferred mode (@0) RQS Mask is 11000000* Status Byte is Cleared. Trigger Configuration is Null.

*If the 6070XA-570 Non-Volatile Memory Option is installed, the front panel set up and the IEEE-488 bus parameters will be the same as when the instrument was placed in the standby except that the instrument will be in local.

5. If the instrument fails one of the self tests, the instrument model number (6070 or 6071) appears in the FREQUENCY Display and an error code indicating the test (s) failed appears in the AMPLITUDE Display. The display remains in this state until one of the FUNCTION controls is pressed. When one of the FUNCTION controls is pressed, the remainder of the front panel is set up as described in step 4. The self test error code can be interpreted using Table 5-1.

5-5. FRONT PANEL CONTROLS CHECK

PURPOSE:	Verify proper operation of all the front panel controls except for the POWER control, the Edit Knob, and the MOD OUT level control.
TEST EQUIPMENT:	None
REMARKS:	1. Select special function 04 to enable the check. 2. Press the CLEAR control to abort the check.

Table 5-1. Self Test Error Code Interpretation

The self test error codes are additive. For example, if the instrument failed the ROM test, the scratch pad memory RAM test, and the angle modulation test, the AMPLITUDE Display would be 0205:

ROM test failed	= 0 0 0 1
Scratch pad memory RAM test failed	= 0 0 0 4
Angle modulation test failed	= 0 2 0 0
AMPLITUDE Display	= 0 2 0 5

SELF TEST ERROR CODES (AMPLITUDE DISPLAY)	INTERPRETATION
blank	All tests passed.
0 0 0 1	ROM test failed.
0 0 0 2	Calibration PROM Test failed.
0 0 0 4	Scratch Pad Memory RAM Test failed.
0 0 1 0	Non-volatile Memory Test failed.
0 0 2 0	Mod/Divider Test failed.
0 0 4 0	Delay Discriminator Not Read Test failed.
0 1 0 0	Amplitude Modulation Test failed.
0 2 0 0	Angle Modulation Test failed.
0 4 0 0	Control Cable Continuity Test Error (Subsynthesizer, Mod Distribution, N/1)
1 0 0 0	Frequency Doubler (6071A only) Test failed.
2 0 0 0	Power On Template Recall failure.
4 0 0 0	Sub-synthesizer Test failed.
1 0 0 0 0	IEEE-488 Interface Test failed.
(-)X X X X X	Self Test was aborted with the partial result, (-)X X X X X.

5-6. Complete the following steps to verify proper operation of all the front panel controls except the POWER control, the Edit Knob, and the MOD OUT level control:

1. Select special function 04.
2. Press each of the front panel controls in the sequence listed in Table 5-2, and verify that the indicated two-digit code appears in the 10 kHz and 100 kHz positions of the FREQUENCY Display.
3. Press CLEAR UNITS. The instrument return to normal operation.

5-7. LED CHECK

PURPOSE: Verify proper operation of all segments of each display, the LED in each lighted control, and every indicator and annunciator.

TEST EQUIPMENT: None

REMARKS:

1. Select special function 03 to enable the check.
2. The check is automatic and will return the instrument to normal operation at the end of the check.
3. Press the CLEAR control to abort the check.

Table 5-2. Front Panel Controls Check

PRESS		CODE
CONTROL	CONTROL GROUP	
INT AM	MODULATION	00
INT FM/0M	MODULATION	01
EXT AM	MODULATION	02
EXT FM/0M	MODULATION	05
DC COUPLED	MODULATION	07
LOCAL (BUS ADDRS)	BUS STATUS	10
FREQ	FUNCTION	11
AMPL	FUNCTION	12
MOD FREQ (FREQ STEP)	FUNCTION	13
AM (SWP WDTH)	FUNCTION	14
SHIFT	FUNCTION	15
INTERROGATE		16
STORE (INSERT)	MEMORY	20
TOP	MEMORY	21
RECALL (DELETE)	MEMORY	22
NEXT ↓	MEMORY LOCATION	25
NEXT ↑	MEMORY LOCATION	26
TOP	MEMORY LOCATION	27
0	DATA	30
1	DATA	31
2	DATA	32
3	DATA	33
4	DATA	34
5	DATA	35
6	DATA	36
7	DATA	37
8	DATA	40
9	DATA	41
.	DATA	42
+/-	DATA	43
MHz/V	UNITS	44
kHz/mV	UNITS	45
Hz/uV	UNITS	46
Rad/dB(m)	UNITS	47
%	UNITS	50
	FREQ STEP	52
	FREQ STEP	53
AMPL	EDIT	54
MOD	EDIT	55
FREQ	EDIT	56
OFF	EDIT	57
MANUAL	SWEEP	61
SINGLE	SWEEP	62
AUTO	SWEEP	63
SLOW	SWEEP	64
OFF	SWEEP	65
REL FREQ		66
REL AMPL		67
ON	RF OUTPUT	70

5-8. Complete the following steps to verify proper operation of all front panel LEDS.

1. Select special function 03.

2. The instrument lights the front panel LEDs in the following sequence:

a. Every segment of each display digit turns on, then off. Only one segment should be lit at a time.

b. All segments of the MODULATION Display light, then turn off.

c. All annunciators and indicators in the INTERROGATE display light, then turn off.

d. All segments of the FREQUENCY Display light, then turn off.

e. All segments of the AMPLITUDE Display light, then turn off.

f. The remainder of the front panel annunciators and indicators turn on, then off, one at a time from top to bottom and left to right.

3. The instrument returns to normal operation.

5-9. SWP OUT, PEN LIFT, AND OUT VALID CHECK

PURPOSE:	Verify proper levels and timing of the instrument outputs: SWP OUT, PEN LIFT, and OUT VALID
TEST EQUIPMENT:	Oscilloscope, DVM
REMARKS:	The UUT and all test equipment must be a room temperature and must beoperating for at least 30 minutes before this check is started.

5-10. Complete the following steps to verify the proper levels and timing relationships of the OUT VALID, SWP OUT, and PEN LIFT outputs.

1. Connect the DVM input and Channel A of the oscilloscope to the SWP OUT connector on the UUT. Connect Channel B of the oscilloscope to the PEN LIFT connector on the UUT.

2. Set the oscilloscope for 2 V/division, dc coupled, and 2 msec/division.

3. Set the DVM to the 2V range.

4. Program the UUT to recall memory location 98 (standard power-on setup). Verify that the penlift output (Channel B of the oscilloscope) is at a TTL high.

5. Press and hold MANUAL SWEEP for 3 seconds or longer. Verify that the penlift output remains at a TTL high while MANUAL SWEEP is pressed, and that the penlift output goes to a TTL low when MANUAL SWEEP is released.

6. Press and release MANUAL SWEEP. Verify that the penlift output goes to a RRL high for approximately 2 seconds then returns to a TTL low.

7. Verify that the DVM is reading 0 ±0.01V at this time.

8. Use the UUT Edit Knob to manually sweep frequency up. Verify that the Channel A trace rises smoothly without any jumps. When the end of the sweep range is reached, frequency stops increasing. Verify that the DVM reading is 10 ±0.06V at this time.

9. Disconnect the oscilloscope and the DVM from the UUT SWP OUT connector and connect Channel A of the oscilloscope to the UUT OUT VALID connector.

10. Set the oscilloscope for 10 msec/division and press the OFF SWEEP control on the UUT. Verify that the penlift output (oscilloscope Channel B) goes to a TTL high.

11. Press and release MANUAL SWEEP and spin the Edit Knob past the end of the sweep range. Verify that as the knob is turned past the end of the sweep range, that the output valid signal (oscilloscope Channel A) pulses to a TTL low for approximately 6 msec.

5-11. SYNTHESIS AND DCFM SHIFT CHECK

PURPOSE:	1. Verify that the frequency of the signal at the RF OUTPUT connector is the same as the programmed frequency. 2. Verify that the frequency of the signal at the RF OUTPUT connector does not change excessively when the DCFM Mode is selected.
TEST EQUIPMENT:	Frequency Counter
REMARKS:	The UUT and all test equipment must be at room temperature and must be operating for at least 30 minutes before this check is started.

5-12. Complete the following steps to verify the frequency of the RF OUTPUT.

1. Connect the counter and the UUT as follows: counter 10 MHz REF IN connector to the UUT REF OUT connector and the UUT RF OUTPUT connector to the counter CHANNEL C input connector.

2. Program the UUT for an output level of 100 mV.

3. Program the UUT for the frequencies listed in Table 5-3 and verify that the counter displays the programmed frequency ±1 Hz.

5-13. Complete the following steps to verify that the frequency of the signal at the RF OUTPUT connector does not change excessively when the UUT shifts into the DCFM Mode.

1. Program the UUT for FM of 0 kHz DEV and an RF output frequency of 50 MHz.

2. Press EXT FM/0M and DC COUPLED MODULATION controls so that they light.

Table 5-3. Synthesis Check

100.000 000 MHz	
211.111 111 MHz	
322 222.222 kHz	
433 333.333 kHz	
444 444 444 Hz	
455 555 555 Hz	
466 666 666 Hz	
477 777 777 Hz	
488 888 888 Hz	
499 999 999 Hz	
250.001 000 MHz	
250.201 000 MHz	
250.309 999 MHz	
525.999 998 MHz	
519.999 999 MHz	(6071A ONLY)
50.000 000 MHz	

3. Verify that the DCFM MODE indicator lights and that the counter display is between 50.001 000 and 49.999 000 MHz.

5-14. FREQUENCY ACCURACY CHECK

PURPOSE:

1. Verify that the frequency of the UUT timebase is within specified limits.

2. Verify that the UUT remains locked onto a 10 MHz external reference while the reference varies up to ±80 Hz from the UUT standard timebase reference frequency.

3. Verify that the UUT loses lock, the FREQ UNCAL annunciator turns on.

TEST EQUIPMENT: Frequency Standard, Frequency Counter, and Low Frequency Synthesized Signal Generator (LF SSG)

REMARKS:

1. This procedure is for a UUT with a standard timebase. If the UUT has the 607XA-130 Oven Reference Option installed, also use the procedure in Section 7A to verify that the optional timebase frequency is within specified limits.

2. The UUT and all test equipment must be at room temperature and must be warmed up for at least 30 minutes before this check is started.

5-15. Complete the following steps to verify that the frequency of the UUT timebase is within specified limits. (If the 607XA-130 Optiuon is installed, use the procedure in Section 7A instead of this procedure, and go to paragraph 5-16.)

1. Connect the frequency standard output to the 10 MHZ REF IN connector on the counter.

2. Connect the UUT REF OUT connector to the counter CHANNEL A input connector.

3. Verify that the counter display is 10 MHz ±25 Hz.

4. Record the counter display (this 10 MHz frequency is referred to as Fo through the remainder of the Frequency Accuracy Check).

5-16. Complete the following steps to verify that the UUT remains locked onto a 10 MHz external reference while the reference varies up to ±80 Hz.

1. Connect the frequency standard output to the LF SSG EXT REF connector.

2. Connect the LF SSG output to the UUT REF IN connector.

3. Disable the UUT wideband reference (special function 60). Push SHIFT, then 6 DATA, then 0 DATA.

4. If the standard timebase is installed, continue to Step 5. If the 607XA-130 Oven Reference Option is installed, go to Step 7.

5. Program the LF SSG for Fo (Step 4, paragraph 5-15) at a level of 110 mV, VRMS, TERMINATED.

6. Edit the LF SSG output in 10 Hz steps up to Fo + 80 Hz and down to Fo -80 Hz. Verify at each step that the FREQ UNCAL annunciator does not turn on and that the counter reading agrees with the LF SSG frequency setting. Go to 5-17.

7. Program the LF SSG for a 10 MHz output at a level of 110 mV, VRMS, TERMINATED.

8. Edit the LF SSG in 10 Hz steps up from 10 MHz until the FREQ UNCAL annunciator lights. Record this LF SSG frequency as Fplus.

9. Edit the LF SSG in 10 Hz steps down from 10 MHz until the FREQ UNCAL annunciator lights. Record this LF SSG frequency as Fminus.

10. Verify that Fplus - Fo and Fo - Fminus are both greater than 60 Hz and that Fplus - Fminus is greater that 160 Hz.

5-17. Verify that as the UUT loses lock the FREQ UNCAL annunciator turns on.

1. Begin this procedure at the end of the last procedure.

2. Edit the LF SSG frequency first above and then below 10 MHz until the FREQ UNCAL annunciator lights (typically 130 Hz above and below 10 MHz).

5-18. RF HARMONIC CHECK

PURPOSE: Verify that the RF harmonics produced by the instrument are within specified limits.

TEST EQUIPMENT: High Frequency Spectrum Analyzer

REMARKS:

1. If the UUT is a 6070A, complete only the steps that check both the 6070A and the 6071A (first paragraph in the procedure).

2. If the UUT is a 6071A, complete all steps of the procedure.

3. The UUT and all test equipment must be at room temperature and must be operating for at least 30 minutes before this check is started.

5-19. Complete the following steps to check the harmonics of both the 6070A and the 6071A.

1. Connect the UUT RF OUTPUT to the High Frequency Spectrum Analyzer input.

2. Set the High Frequency Spectrum Analyzer controls to +20 dBm full scale, 10 dB log, and the remainder for convenient viewing.

3. Program the UUT for the outputs listed in Table 5-4 and set up the High Frequency Spectrum Analyzer as required. Verify that the RF harmonics are better than or equal to the listed limits.

Table 5-4. RF Harmonics Check

PROGRAMMED UUT OUTPUT		HARMONICS LIMIT (dBc)			
FREQUENCY	LEVEL (dBm)	WITHOUT 607XA-870 RPP OPTION		WITH 607XA-870 RPP OPTION	
		6070A	6071A	6070A	6071A
200 kHz	+13	-35		-35	-35
	+19			-30	-30
10 MHz	+13			-35	-35
	+19			-30	-30
124 MHz	+13			-35	-35
	+19			-30	-30
249 MHz	+13			-35	-35
	+19	-35	-30	-30	-25
519 MHz	+13	-35	-35	-35	-35
	+19	-35	-25	-25	-20
6071A ONLY					
521 MHz	+6.9		-25		-25
	+13				

5-20. Complete the following steps to check the RF harmonics of the 6071A only:

1. If the UUT is a 6070A, go to the next performance check. If the UUT is a 6071A, go to the next step of this procedure.

2. Set the High Frequency Spectrum Analyzer controls to +20 dBm full scale, 10 dB log, and the remainder for convenient viewing.

3. Program the UUT for the outputs listed in Table 5-5 and set up the HF Spectrum Analyzer as required. Verify that the RF harmonics are better than or equal to the listed limits.

4. Set the High Frequency Spectrum Analyzer controls to +10 dBm full scale, full scan, and maximum bandwidth.

5. Program the UUT for an RF output of 520 MHz at a level of +6.9 dBm with all MODULATION controls off (dark). Press EDIT FREQUENCY and use the DIGIT controls to place the Bright Digit in the 1MHz position of the FREQUENCY Display.

6. Rotate the Edit Knob so that the RF output frequency increases to 1040 MHz while observing the High Frequency Spectrum Analyzer for F/2 and 3F/2 harmonics. Verify that all harmonics are less than -35 dBc.

Table 5-5. 6071A Harmonics Check

PROGRAMMED UUT OUTPUT		HARMONICS LIMIT (dBc)	
FREQUENCY (MHz)	LEVEL (dBm)	WITHOUT 607XA-870 RPP OPTION	WITH 607XA-870 RPP OPTION
		6071A	6071A
750	+6.9 +13	-25	-25
1000	+6.9 +13		

5-21. GENERATOR SOURCE IMPEDANCE (SWR) CHECK

PURPOSE: Verify the Source SWR performance of the UUT.

TEST EQUIPMENT: Y6002, NARDA 3020 Coupler, High Frequency Spectrum Analyzer

REMARKS:

1. The SWR test limits in this procedure account for the specific loss of the Y6002 SWR Test Cable. If another cable is used in the place of the Y6002, the loss versus frequency for the replacement cable must be measured and taken into account as explained in the Y6002 Replacement material at the end of this procedure.

2. The UUT and all test equipment must be at room temperature and must be operating for at least 30 minutes before this check is started.

5-22. The Check

5-23. Complete the following steps to verify the SWR performance of the UUT.

1. Connect the UUT and test equipment as shown in Figure 5-1.

2. Set the High Frequency Spectrum Analyzer controls as follows:

CENTER FREQUENCY	Table 5-6
FREQUENCY SPAN/DIV	20 MHz
LOG	2 dB/DIV
PERSISTANCE	MAX

Set the rest of the controls for convenient viewing.

3. On the UUT, use the EDIT FREQ and DIGIT controls to place the Bright Digit in the 100 kHz position of the FREQUENCY Display.

4. Verify SWR performance using Table 5-6.

a. For each line in Table 5-6, set the CENTER FREQUENCY of the High Frequency Spectrum Analyzer to the indicated value and program the UUT RF output to the listed START FREQUENCY at the corresponding LEVEL.

b. Rotate the Edit Knob to increase the UUT RF output to the stop frequency while watching the High Frequency Spectrum Analyzer for adjacent maximum and minimum amplitude ratio encountered.

c. Verify that the largest maximum/minimum amplitude ratio is within the appropriate limit listed in Table 5-6.

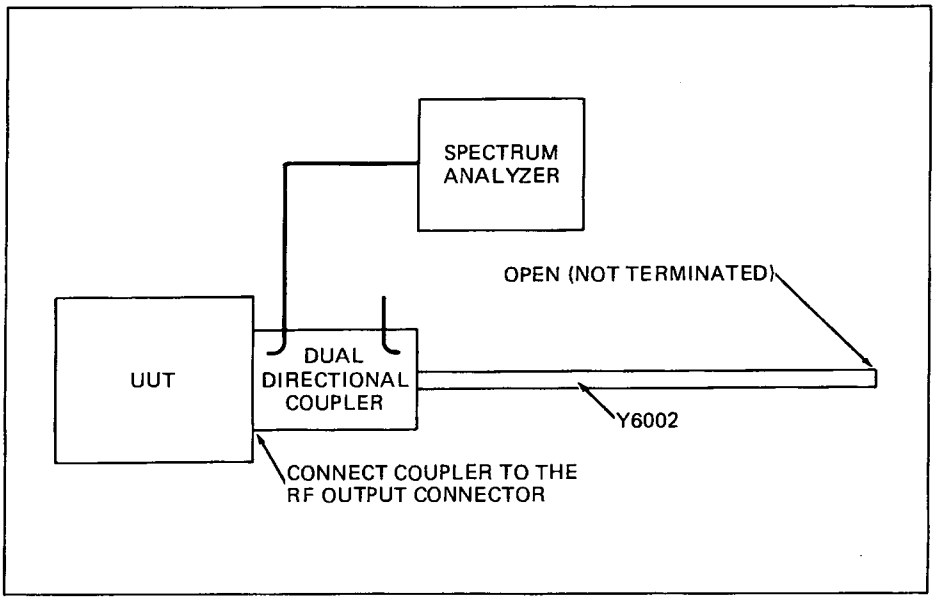


Figure 5-1. SWR Check

Table 5-6. SWR Check

PROGRAMMED UUT OUTPUT			HIGH FREQUENCY SPECTRUM ANALYZER CENTER FREQUENCY (MHz)	MAXIMUM ALLOWABLE MAX/MIN AMPLITUDE AMPLITUDE RATIO (dB)	SWR SPECIFI-CATIONS
FREQUENCY (MHz)		LEVEL (dBm)			
START	STOP				
120	320	+13.1 +7.0 +6.9	220	4.8	2.0:1
				2.8	1.5:1
320	520	+13.1 +7.0 +6.9	420	4.2	2.0:1
				2.6	1.5:1
6071A ONLY					
520	720	+7.0 +1.0 +0.9	620	5.4	2.5:1
				4.0	2.0:1
720	920	+7.0 +1.0 +0.9	820	5.0	2.5:1
				3.7	2.0:1
920	1040	+7.0 +1.0 +0.9	1020	4.8	2.5:1
				3.7	2.0:1

5-24. Test Cable Alternate

5-25. The Y6002 SWR Test Cable should be used for the Generator Source Impedance (SWR) Check because the SWR test limits (Table 5-6) account for the specific loss of the Y6002. If a test cable other than the Y6002 is used, the loss of the replacement cable versus frequency must be measured and must be taken into account in determining the correct values for the Maximum Allowable Max/Min Ratio column in Table 5-6. The replacement cable should be approximately 25 feet log and, preferable, have less the 2.0 dB loss at 1 GHz. Use the following procedure to calculate the correct Maximum Allowable Max/Min Ratio value for a specific frequency band:

1. Measure the one-way loss of the cable at the center of the frequency band. Let this loss be represented by L.

2. Use the following formula to calculate the Maximum Allowable Max/Min Ratio in dB:

$$\text{Maximum Allowable Max/Min Ration} = 20 \log_{10} \frac{1+rk}{1-rk}$$

Where: $r = \frac{S-1}{S+1}$ where S is the SWR specification listed in Table 5-6.

$k = 10^{(L/10)}$ where L is from Step 1.

5-26. For an example of Y6002 replacement, assume that the SWR Specification from Table 5-6 is 2.0:1 and the measured one-way cable loss is 2 dB at the frequency of interest:

$$r = \frac{S-1}{S+1} = \frac{1}{3} = 0.333$$

$$k = 10^{-(L/10)} = 10^{-0.2} = 0.631$$

Therefore:
Maximum Allowable Max/Min Ratio $= 10 \log_{10} \frac{1+rk}{1-rk}$

$$= 20 \log_{10} \frac{1+.333(.631)}{1-.333(.631)}$$

$$= 3.71 \text{ dB}$$

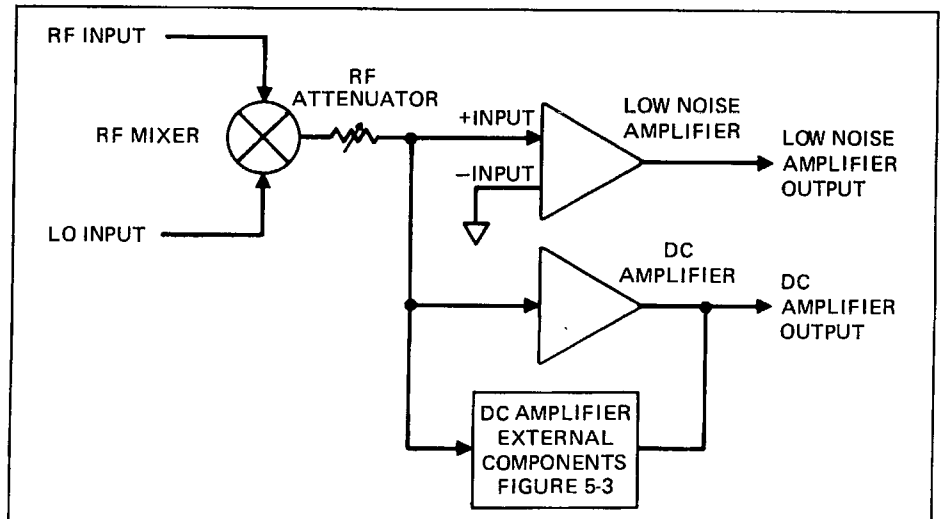
5-27. SPURIOUS OUTPUT CHECKS

5-28. Introduction

5-29. The following information describes a spur test system and three methods that check for spurious output signals (spurs): Direct Spur Check, the Direst Through Low Pass/High Pass Filter Spur Check, and the Mixer Carrier Null Spur Check. It is recommended that these checks be completed in the sequence listed.

5-30. Spur Test System

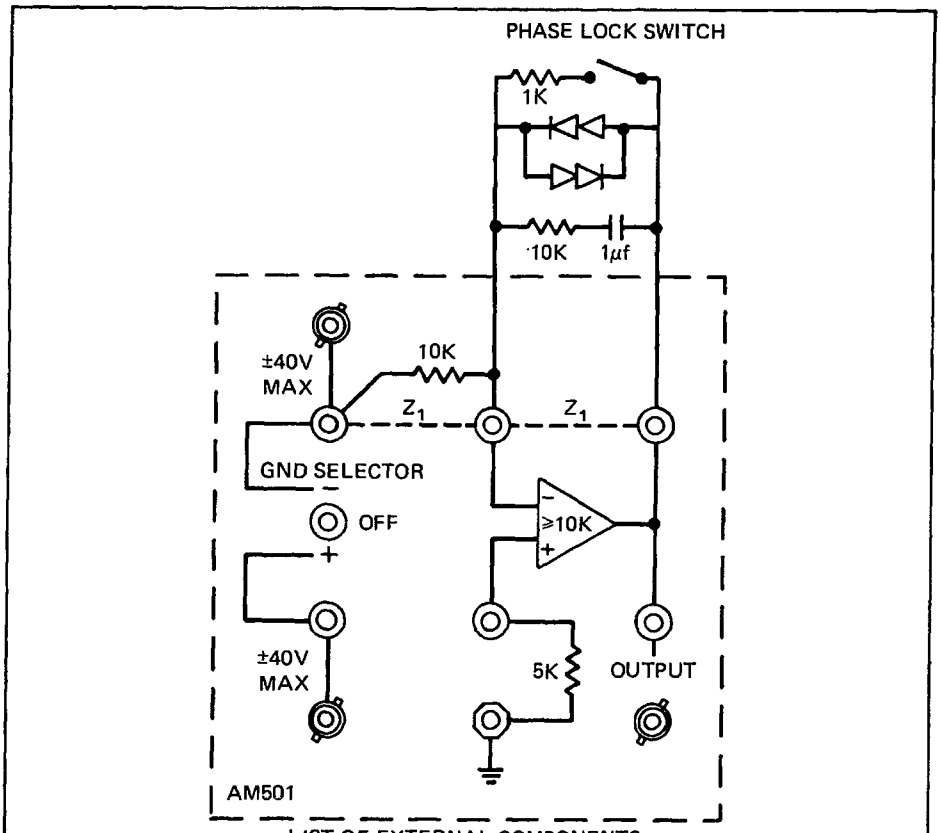
5-31. Figure 5-2 is a block diagram of the spur test system. Figure 5-3 shows the circuit and lists the components required for the DC Amplifier. The recommended DC Amplifier, the TEK AM501, has front panel connections for external components. This spur test system is used for both the Surious Output Checks and the Phase Noise Check.



SET THE LOW NOISE AMPLIFIER CONTROLS AS FOLLOWS:

STEP GAIN	MIDDLE OF RANGE OF TRAVEL
OUT: NORMAL	NORMAL
GAIN	200
GAIN CAL	CAL
HF-3 dB	1 MHz
LF-3 dB	10 Hz
+INPUT, AC	IN
–INPUT, GND	IN

Figure 5-2. Spur Test System



LIST OF EXTERNAL COMPONENTS

DESCRIPTION	FLUKE STOCK NO.	MFG. PART NO.	QTY.
Capacitor, 1uf, polysterene	105924	Electron Product, E6-105	1
Diode, multipellet	375477	GE, MPD 200	2
Resistor, 1 kOhm	14B023		1
Resistor, 5 kOhm	47937B		1
Resistor, 10 kOhm	148106		2
Switch, Momentary Contact	157156	Grayhill, 4000	1

Figure 5-3. DC Amplifier External Circuit

5-32. Direct Observation Spur Check

PURPOSE:	Verify spur performance by direct observation.
TEST EQUIPMENT:	Low Frequency Spectrum Analyzer
REMARKS:	The UUT and all test equipment must be at room temperature and must be operating for at least 30 minutes before this check is started.

5-33. Complete the following steps to verify spur performance by direct observation:

1. Observe the power line related, display related, and fan related spurs.

a. Connect the UUT RF OUTPUT to the Low Frequency Spectrum Analyzer input.

b. Program the UUT for an Rf output of 1 MHz at a level of 0 dBm.

c. Set the Low Frequency Spectrum Analyzer controls as follows:

DISPLAY STORAGE	A and B on (all others off)
REFERENCE LEVEL	
LOG 10 dB/DIV	On
INPUT BUFFER	Off
TRIGGERING	
FREE RUN	On
NORM	On
DIGITAL STORAGE	
BASELINE CLIPPER	Top of screen
DOT FREQUENCY	1 MHz
FREQUENCY SPAN/DIV	50 Hz/DIV
RESOLUTION (Hz)	10
TIME/DIV	10 SEC/DIV
(tune) REFERENCE LEVEL	0 dBm
Input Termination	50 Ohm
Input Ref dBm 50 Ohms	

d. On the Low Frequency SpectrumAnalyzer, rotate DOT MARKER so that the displayed signal is at the left edge reference line, and rotate LEVEL so that the peak of the displayed signal is at the top amplitude.

e. Carefully examine the Low Frequency Spectrum Analyzer display for spurs at the frequencies listed in Table 5-7 and verify that all spurs are at least -56 dBc. To differentiate power line related spurs from display related spurs, turn off the UUT displays by selecting special function 05 (press SHIFT and then the 0 and 5 DATA controls). This is an instrument self test. One LED flashes while the test is in progress and the instrument returns to Power On setup once the test has been completed. If you need more time, select the test again.

Table 5-7. Line Power, Display, and Fan Spurs

SPUR SOURCE	FREQUENCY OFFSETS (In Hz) FROM 1 MHz CARRIER			
LINE POWER/ DISPLAY	60	120	180	
FAN	75 to 95	150 to 190	225 to 285	300 to 380

2. Observe the display related and microprocessor related spurs:

a. Set the Low Frequency Spectrum Analyzer FREQUENCY SPAN/DIV control to 200 Hz/DIV and set the TIME/DIV control to 10 SEC/DIV. Rotate