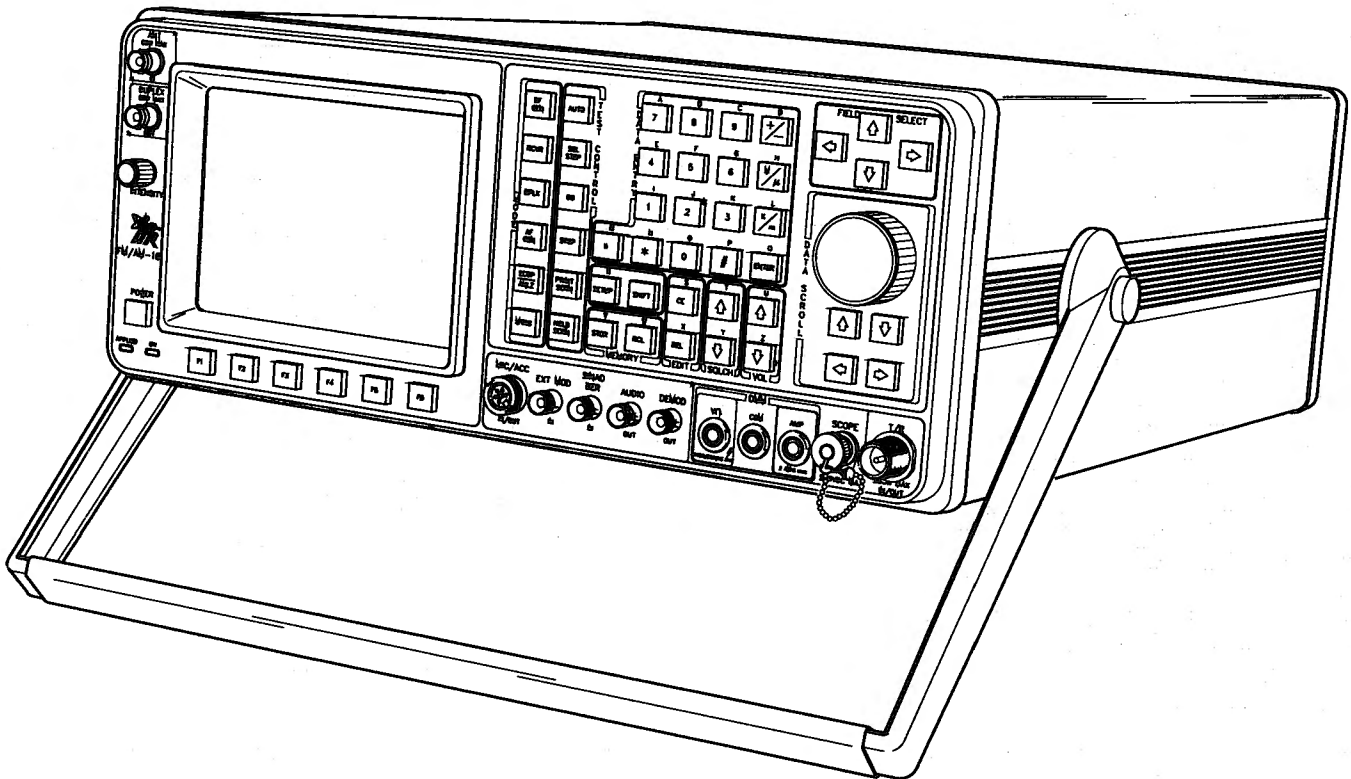




SYSTEMS, INC.

# CALIBRATION PROCEDURE

## TS-4317-2 RADIO TEST SET



10200 West York Street / Wichita, Kansas 67215

1002-3900-900

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## SAFETY FIRST: TO ALL OPERATIONS AND SERVICE PERSONNEL

REFER ALL SERVICING OF UNIT TO QUALIFIED TECHNICAL PERSONNEL.

### SAFETY IDENTIFICATION IN TECHNICAL MANUAL

This manual uses the following terms to draw attention to possible safety hazards, that may exist when operating or servicing this equipment.

**CAUTION:** THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN EQUIPMENT OR PROPERTY DAMAGE (e.g., FIRE).

**WARNING:** THIS TERM IDENTIFIES CONDITIONS OR ACTIVITIES THAT, IF IGNORED, CAN RESULT IN PERSONAL INJURY OR DEATH.

### SAFETY SYMBOLS IN MANUALS AND ON UNITS



**INFORMATION PRECAUTION:** Corresponds with an applicable item on the device and in the manual. This symbol defines specific voltage, current and power requirements or other related information for safe operation or service of equipment.



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



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



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



**SWITCH OFF:** AC line power to the device is OFF.



**SWITCH ON:** AC line power to the device is ON.

### EQUIPMENT GROUNDING PRECAUTION

Improper grounding of equipment can result in electrical shock.

### USE OF PROBES

Check the specifications for the maximum voltage, current and power ratings of any connector on the Test Set before connecting it with a probe from a terminal device. Be sure the terminal device performs within these specifications before using it for measurement, to prevent electrical shock or damage to the equipment.

### POWER CORDS

Power cords are supplied specifically for use with this Test Set. Power cords must not be frayed, broken nor expose bare wiring when operating this equipment.

### USE RECOMMENDED FUSES ONLY

Use only fuses specifically recommended for the equipment at the specified current and voltage ratings.

### CASE, COVER OR PANEL REMOVAL

Removing protective covers, casings or panels from this Test Set exposes the operator to electrical hazards that can result in electrical shock or equipment damage.

**CAUTION:** INTEGRATED CIRCUITS AND SOLID STATE DEVICES ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS, AND IMPROPER STORAGE AND PACKAGING. PROPER ESD PRECAUTIONS MUST BE UTILIZED AS REQUIRED.



### CAUTION:

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

SIGNAL GENERATORS CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE (EMI) TO COMMUNICATION RECEIVERS. SOME TRANSMITTED SIGNALS CAN CAUSE DISRUPTION AND INTERFERENCE TO COMMUNICATION SERVICES OUT TO A DISTANCE OF SEVERAL MILES. USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION THAT RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND SHOULD TAKE NECESSARY PRECAUTIONS TO AVOID POTENTIAL COMMUNICATION INTERFERENCE PROBLEMS.

# **WARNING**

## **HIGH VOLTAGE EQUIPMENT**

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

## **RESCUE OF SHOCK VICTIMS**

1. DO NOT ATTEMPT TO PULL OR GRAB THE VICTIM.
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.
3. IF YOU CANNOT TURN OFF ELECTRICAL POWER, PUSH, PULL OR LIFT THE VICTIM TO SAFETY USING A WOODEN POLE, ROPE OR SOME OTHER DRY INSULATING MATERIAL.

## **FIRST AID**

1. AS SOON AS VICTIM IS FREE OF CONTACT WITH SOURCE OF ELECTRICAL SHOCK, MOVE VICTIM A SHORT DISTANCE AWAY FROM SHOCK HAZARD.
2. CALL FOR DOCTOR AND/OR AMBULANCE, IMMEDIATELY.
3. IF BREATHING HAS STOPPED; ADMINISTER CARDIO-PULMONARY RESUSCITATION (CPR), AS NEEDED.
4. IF VICTIM IS BREATHING, ATTEMPT TO CONTROL ALL SERIOUS BLEEDING.
5. KEEP VICTIM WARM, QUIET AND FLAT ON HIS/HER BACK.

# LIST OF EFFECTIVE PAGES

The manual pages listed below which are affected by a current change or revision, are so identified by revision number.

Date of Issue for original and changed pages are:

Original ..... 0 ..... Feb 1997

**TOTAL NUMBER OF PAGES IN THIS MANUAL IS 172 CONSISTING OF THE FOLLOWING**

Pg. No.	Rev No.	Pg. No.	Rev No.
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Copyright.....	0	2-1 through 2-77 .....	0
Safety .....	0	2-78 Blank.....	0
Caution/Warning.....	0	3-1 through 3-10 .....	0
A .....	0	A-1 through A-2 .....	0
B Blank .....	0	B-1 through B-6 .....	0
i through iii .....	0	C-1 through C-4 .....	0
iv Blank.....	0		



# PREFACE

## SCOPE

This Manual contains Instructions for performing Calibration on the TS-4317-2 Radio Test Set. It is recommended that the Technician be thoroughly familiar with this Manual before attempting to perform any maintenance action on the Equipment.

## ORGANIZATION

The Calibration Procedure is composed of the following Chapters:

### CHAPTER 1 - VERIFICATION

Provides step by step procedures for verifying the Radio Test Set is operating properly. The procedures are to be used in conjunction with the calibration.

### CHAPTER 2 - CALIBRATION

Provides step by step procedures for calibrating the Radio Test Set. The procedures are to be used at normal calibration intervals or after repair or replacement of an assembly.

### CHAPTER 3 - REMOVE/INSTALL INSTRUCTIONS

Provides step by step procedures for removing and installing assemblies within the Radio Test Set.

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# CHAPTER 1 - VERIFICATION

## 1-1 GENERAL

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The Verification should be performed every 12 months.

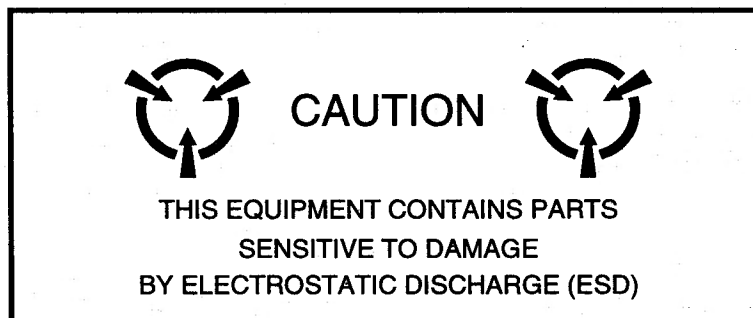
### 1-1-1 SAFETY PRECAUTIONS

As with any piece of electronic equipment, extreme caution should be taken when working with "live" circuits. Certain circuits and/or components within the Test Set contain extremely high voltage potentials, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH (see following WARNINGS)! When performing the Verification, be sure to observe the following precautions:

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

### 1-1-2 ESD PRECAUTIONS

**CAUTION:** THE VERIFICATION SHOULD ONLY BE PERFORMED IN AN ESD ENVIRONMENT AND ALL PERSONNEL PERFORMING THE VERIFICATION SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES OR BE ESD CERTIFIED



## **1-2 TEST EQUIPMENT REQUIREMENTS**

Appendix A contains a comprehensive list of test equipment suitable for performing any of the procedures listed in this manual. Any other equipment meeting the specifications listed in Appendix A may be substituted in place of the recommended models.

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

## **1-3 POWER REQUIREMENTS**

The following procedures are performed with an ac power source connected unless otherwise stated.

## **1-4 CONTROLS, CONNECTORS AND INDICATORS**

Refer to para 2-1 in the Test Set Operation Manual for the location of each Control, Connector or Indicators used in the Verification.

## **1-5 COMPLETION OF VERIFICATION PROCEDURES**

Upon completion of a specific Verification Procedure, the Verification may be terminated. Control settings, operating commands and test equipment do not carry over from one Verification Procedure to another and are not assumed at the beginning of the next Verification Procedure.

## **1-6 FACTORY DEFAULTS**

The Factory Defaults for the Test Set should be reset prior to performing any of the Verification Procedures.

## **1-7 VERIFICATION RECORD**

A Verification Record is provided for recording the results obtained while performing the Verification. It is recommended the technician reproduce copies of the Verification Record, rather than use the copy in this manual.



1-8-3

**OUTPUT LEVEL VERIFICATION (T/R and DUPLEX)**

T/R OUTPUT

5      Verify levels:

TEST FREQ	LEVEL	TOLERANCE	RESULTS
0.4 MHz	0 dB	±1 dB	
0.9 MHz	0 dB	±1 dB	
30.5 MHz	0 dB	±1 dB	
30.5 MHz	-1 dB	±1 dB	
30.5 MHz	-2 dB	±1 dB	
30.5 MHz	-4 dB	±1 dB	
30.5 MHz	-8 dB	±1 dB	
30.5 MHz	-16 dB	±1 dB	
30.5 MHz	-32 dB	±1 dB	
30.5 MHz	-64 dB	±1 dB	
30.5 MHz	-112 dB	±1 dB	
100.5 MHz	0 dB	±1 dB	
150.5 MHz	0 dB	±1 dB	
300 MHz	0 dB	±1 dB	
500.5 MHz	0 dB	±1 dB	
500.5 MHz	-1 dB	±1 dB	
500.5 MHz	-2 dB	±1 dB	
500.5 MHz	-4 dB	±1 dB	
500.5 MHz	-8 dB	±1 dB	
500.5 MHz	-16 dB	±1 dB	
500.5 MHz	-32 dB	±1 dB	
500.5 MHz	-64 dB	±1 dB	
500.5 MHz	-112 dB	±1 dB	
750 MHz	0 dB	±1 dB	
999.9999 MHz	0 dB	±1 dB	
999.9999 MHz	-1 dB	±1 dB	

1-8-3

**OUTPUT LEVEL VERIFICATION (T/R and DUPLEX) (cont)**

5      (cont)

TEST FREQ	LEVEL	TOLERANCE	RESULTS
999.9999 MHz	-2 dB	±1 dB	
999.9999 MHz	-4 dB	±1 dB	
999.9999 MHz	-8 dB	±1 dB	
999.9999 MHz	-16 dB	±1 dB	
999.9999 MHz	-32 dB	±1 dB	
999.9999 MHz	-64 dB	±1 dB	
999.9999 MHz	-112 dB	±1 dB	

**DUPLEX OUTPUT**

10      Verify levels:

TEST FREQ	LEVEL	TOLERANCE	RESULTS
10 MHz	7 dBm	±1.7 dB	
100 MHz	7 dBm	±1.7 dB	
100 MHz	-40 dBm	±1.7 dB	
100 MHz	-100 dBm	±1.7 dB	
500 MHz	7 dBm	±1.7 dB	
999.9999 MHz	7 dBm	±1.7 dB	
999.9999 MHz	-40 dBm	±1.7 dB	
999.9999 MHz	-100 dBm	±1.7 dB	

**1-8-4      DEVIATION METER VERIFICATION**

20      Verify modulation:

RF SIGNAL GENERATOR			MEASURING RECEIVER		TEST SET		TOL	RESIDUAL FM	RESULTS	
FREQ (MHz)	MOD RATE (kHz)	DEV (kHz)	HP (Hz)	LP (kHz)	IF (kHz)	LP (kHz)	(kHz)		+DEV (kHz)	-DEV (kHz)
999.9999	0.1	7.5	<20	3	30	3	±0.575			
32	1.0	7.5	300	3	30	3	±0.575			
75	1.0	15	300	3	300	3	±0.950			
85.02	3.0	15	300	15	300	10	±0.950			
50	10	37.5	300	>200	300	30	±3.875			
455	1.0	75	300	3	300	3	±5.750			

**1-8-5      MODULATION METER VERIFICATION**

19      Verify modulation:

RF SIGNAL GENERATOR			MEASURING RECEIVER		TEST SET		TOL (%)	RESULTS
FREQ (MHz)	MOD RATE (kHz)	MOD (%)	HP (Hz)	LP (kHz)	RANGE	LP (kHz)		MOD (%)
1	0.1	30	<20	3	30	3	±3	
999.9999	1.0	50	300	3	30	3	±6	
12	6.0	50	300	15	30	20	±6	
25	10	50	300	>200	30	30	±6	
32	1.0	90	300	3	30	3	±6	
85.02	3.0	70	300	>20	30	10	±6	



PARA	STEP	DATA	RESULT
------	------	------	--------

**1-8-6 PHASE METER VERIFICATION**

**PHASE METER**

10	Phase reading is within $\pm 0.4$ radians of reading on Measuring Receiver	_____ (✓)
----	--	-----------

**PHASE METER (RMS)**

15	Phase Meter (RMS) reading matches Measuring Receiver reading ( $\pm 0.7$ radians)	_____ (✓)
----	---	-----------

**1-8-7 DISTORTION METER VERIFICATION**

6	0.00 dB is displayed	_____ (✓)
---	----------------------	-----------

8	Record 0 dB Amplitude setting	_____
---	-------------------------------	-------

9	Record Amplitude settings:	
---	----------------------------	--

A.	-14.9 dB (18%)	
B.	-20.0 dB (10%)	
C.	-40.0 dB (1%)	

19	18% ( $\pm 2.1\%$ ) at 770 Hz	_____
----	-------------------------------	-------

21	10% ( $\pm 1.1\%$ ) at 770 Hz	_____
----	-------------------------------	-------

23	1% ( $\pm 1.1\%$ ) at 770 Hz	_____
----	------------------------------	-------

28	18% ( $\pm 2.1\%$ ) at 1000 Hz	_____
----	--------------------------------	-------

30	10% ( $\pm 1.1\%$ ) at 1000 Hz	_____
----	--------------------------------	-------

32	1% ( $\pm 1.1\%$ ) at 1000 Hz	_____
----	-------------------------------	-------

**1-8-8 SINAD METER VERIFICATION**

6	0.00 dB is displayed	_____ (✓)
---	----------------------	-----------

8	Record 0 dB Amplitude setting	_____
---	-------------------------------	-------

9	Record Amplitude settings:	
---	----------------------------	--

	dB RELATIVE	SINAD	
A.	-4.74 dB	6 dB	
B.	-9.54 dB	10 dB	
C.	-11.70 dB	12 dB	
D.	-20.00 dB	20 dB	

19	6 dB ( $\pm 1.1$ dB) at 770 Hz	_____
----	--------------------------------	-------

PARA      STEP      DATA      RESULT

---

**1-8-8      SINAD METER VERIFICATION (cont)**

21	10 dB ( $\pm 2.1$ dB) at 770 Hz	-----
22	12 dB ( $\pm 2.1$ dB) at 770 Hz	-----
25	20 dB ( $\pm 2.1$ dB) at 770 Hz	-----
30	6 dB ( $\pm 2.1$ dB) at 1000 Hz	-----
32	10 dB ( $\pm 2.1$ dB) at 1000 Hz	-----
34	12 dB ( $\pm 2.1$ dB) at 1000 Hz	-----
36	20 dB ( $\pm 2.1$ dB) at 1000 Hz	-----
39	>30 dB (Upper Threshold Limit)	-----
41	3 dB ( $\pm 0.5$ dB) (Lower Threshold Limit)	-----

**1-8-9      GEN MODULATION VERIFICATION**

9      Verify modulation:

TEST SET				MEASURING RECEIVER			TOL	RESULTS
FREQ (MHz)	MOD TYPE	MOD/DEV	MOD RATE (Hz)	MOD MODE	HP (Hz)	LP (kHz)		DIST
10	FM	$\pm 3$ kHz	100 Hz	FM	<20	3	$\pm 150$ Hz	
85	FM	$\pm 10$ kHz	1 kHz	FM	300	3	$\pm 500$ Hz	
121	FM	$\pm 10$ kHz	10 kHz	FM	300	15	$\pm 500$ Hz	
500	FM	$\pm 25$ kHz	20 kHz	FM	300	>20	$\pm 1.25$ kHz	
999.9999	FM	$\pm 75$ kHz	1 kHz	FM	300	3	$\pm 3.75$ kHz	
10	AM	$\pm 30\%$	100 Hz	AM	<20	3	$\pm 1.5\%$	
85	AM	$\pm 70\%$	1 kHz	AM	300	3	$\pm 3.5\%$	
121	AM	$\pm 70\%$	5 kHz	AM	300	15	$\pm 3.5\%$	
500	AM	$\pm 70\%$	10 kHz	AM	300	15	$\pm 3.5\%$	
999.9999	AM	$\pm 90\%$	1 kHz	AM	300	3	$\pm 4.5\%$	
85	PM	$\pm 6$ Rad	1 kHz	PM	300	3	$\pm 0.6$ Rad	

PARA      STEP      DATA      RESULT

1-8-10

**OSCILLOSCOPE TEST**

**OSCILLOSCOPE BANDWIDTH**

10      Peak signal amplitude is >70.7% of value in Step 8      \_\_\_\_\_(√)

**OSCILLOSCOPE VERTICAL ACCURACY**

15      Verify vertical accuracy:

TEST SET	CALIBRATOR	VERTICAL ACCURACY		RESULTS
SCALE (V/Div)	LEVEL (Vrms)	DISPLAY (P-P)	TOL	
0.002	3.54 mV	10 mV	±1 mV	
0.01	17.7 mV	50 mV	±4 mV	
0.1	177 mV	500 mV	±40 mV	
0.2	354 mV	1 V	±80 mV	
0.5	884 mV	2.5 V	±200 mV	
1.0	1.77 V	5 V	±400 mV	
10.0	17.7 V	50 V	±4 mV	

**40 Vdc COUPLING**

20      Signal moves 4 major divisions (±2 minor divisions)      \_\_\_\_\_(√)

**OSCILLOSCOPE HORIZONTAL SWEEP ACCURACY**

27      Verify horizontal sweep accuracy:

TEST SET	MULTIFUNCTION SYNTHESIZER	HORIZONTAL SWEEP ACCURACY	RESULTS
SWEEP (ms)	FREQ		
10	11.1 Hz	90 ms (±3 ms)	
1.0	111.1 Hz	9 ms (±0.3 ms)	
0.1	1.111 kHz	900 μs (±30 μs)	
0.01	11.11 kHz	90 μs (±3 μs)	

**1-8-11      SPECTRUM ANALYZER TEST**

**SPECTRUM ANALYZER SCAN ACCURACY**

10      Verify scan accuracy:

TEST SET	RF SIGNAL GENERATOR	SCAN WIDTH ACCURACY	RESULTS	
			(+) OFFSET	(-) OFFSET
0.001	±4 kHz	0.5 kHz		
0.002	±8 kHz	1.0 kHz		
0.005	±20 kHz	2.5 kHz		
0.01	±40 kHz	5.0 kHz		
0.02	±80 kHz	10 kHz		
0.05	±200 kHz	25 kHz		
0.1	±400 kHz	50 kHz		
0.2	±800 kHz	100 kHz		
0.5	±2 MHz	250 kHz		
1.0	±4 MHz	500 kHz		
10.0	±40 MHz	5 MHz		
100.0	±400 MHz	50 MHz		

**SPECTRUM ANALYZER BANDWIDTH AGREEMENT**

16      Verify bandwidth agreement:

Test Set	ANALYZER LEVEL READING	BANDWIDTH AGREEMENT	RESULTS
<b>BANDWIDTH</b> (selected by Scan Width setting)	(dBm)	<b>MAXIMUM dB ERROR FROM OTHER READINGS</b>	(dBm)
3 MHz (select 10 MHz Scan)		3	
300 kHz (select 1 MHz Scan)		2	
30 kHz (select 50 kHz Scan)		2	
3 kHz (select 5 kHz Scan)		2	
0.3 kHz (select 1 kHz Scan)		3	



1-8-12

**DIGITAL MULTIMETER TEST (cont)**

**DC VOLTS**

12

Verify DC Volts:

TEST SET	CALIBRATOR	TOL	RESULTS
RANGE (Vdc)	LEVEL (Vdc)	(Vdc)	(Vdc)
0.2	0.0025	±0.0021	
0.2	0.15	±0.0021	
2.0	1.5	±0.021	
20	15	±0.21	
200	150	±2.1	
2000	800	±21	
2000	1000	±21	

**OHMS**

16

Verify resistance:

TEST SET	CALIBRATOR	TOL	RESULTS
RANGE (kΩ)	RESISTANCE (kΩ)	(kΩ)	(kΩ)
0.2	0.1	±0.0101	
2.0	1	±0.101	
20	10	±1.01	
200	100	±10.1	
2000	1000	±101	
20000	10000	±1001	

1-8-12

**DIGITAL MULTIMETER TEST (cont)**

**DC CURRENT**

22

Verify DC Current:

TEST SET	CALIBRATOR	TOL	RESULTS
RANGE (AMPS)	LEVEL (AMPS)	(AMPS)	(AMPS)
0.02	0.00105	±0.001	
0.02	0.015	±0.001	
0.2	0.15	±0.0101	
2	1.5	±0.101	
2	1.8	±0.101	

**AC CURRENT**

25

Verify AC Current:

TEST SET	CALIBRATOR	TOL	RESULTS
RANGE (AMPS)	LEVEL (AMPS)	(AMPS)	(AMPS)
2	1.8	±0.101	

**INPUT LOAD**

31

Verify input loads:

TEST SET	TOL	RESULTS
LOAD (Ω)	(Ω)	(Ω)
1E6	±50000	
150	±7.5	
600	±30	





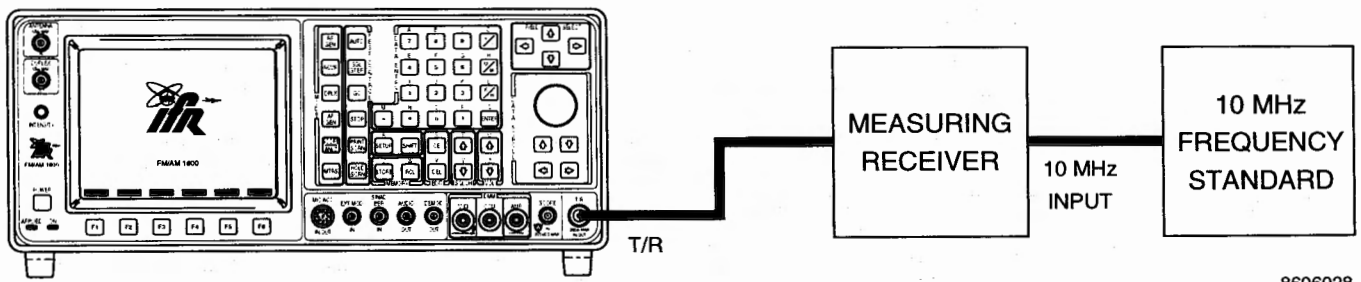
## 1-8 VERIFICATION PROCEDURES

### 1-8-1 VCXO VERIFICATION

EQUIPMENT REQUIRED:                    1    10 MHz Frequency Standard  
    1    Measuring Receiver with Sensor

FIGURE REFERENCES:                Figure 1-1

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Connect test equipment as shown in Figure 1-1.



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Figure 1-1 VCXO Verification Test Setup

4. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
5. Use FIELD SELECT Keys to select RF data field. Press ENTER Key. Use DATA ENTRY Keypad to set RF data field to **900.0000 MHz**. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **0.0**. Press ENTER Key.
7. On Measuring Receiver, press 7.1 SPCL to enable 10 Hz frequency resolution.
8. Verify frequency displayed on Measuring Receiver is 900.0000 MHz ( $\pm 900$  Hz).
  - If reading is correct, go to Step 9.
  - If reading is out of tolerance, go to VCXO Calibration Procedure (para 2-10-2).

**STEP****PROCEDURE**

---

9. Perform one of the following:
  - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-2.

## 1-8-2 FUNC GEN LEVEL AND VRMS METER VERIFICATION

EQUIPMENT REQUIRED:	1	150 $\Omega$ Load (1%)
	1	600 $\Omega$ Load (1%)
	1	Audio Analyzer
	1	Digital Multimeter (DMM)

FIGURE REFERENCES: Figure 1-2

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Press AF GEN Key. AF Generator Operation Screen is displayed on CRT.
4.	Connect test equipment as shown in Figure 1-2. (Refer to Step 6 for appropriate Load.)

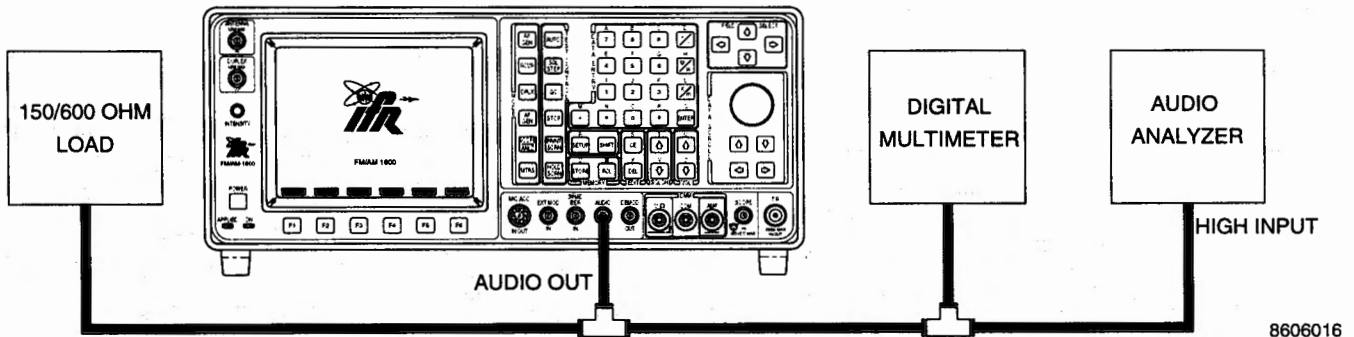


Figure 1-2 Func Gen Level and VRMS Meter Verification Setup

5. Set DMM to VAC RMS and Auto Ranging.

6. Verify levels in Table 1-1 with the appropriate frequency and load applied.
- If reading is correct, go to Step 7.
  - If reading is out of tolerance, go to Func Gen Level and VRMS Meter Calibration Procedure (para 2-10-4).

TONE	FREQ (Hz)	LOAD	LEVEL	TOLERANCE	VRMS METER	DIST	FREQ
1	1000	150	10 mV	±0.3 mV	10% of DVM Reading	<0.7%	±25 Hz
1	1000	150	2.5 V	±0.075 V			
1	25000	150	10 mV	±0.5 mV		<1%	
1	25000	150	2.5 V	±0.125 V			
1	25000	600	Maximum	>3 V			
2	1000	150	10 mV	±0.3 mV		<0.7%	
2	1000	150	2.5 V	±0.075 V			
2	25000	150	10 mV	±0.5 mV			
2	25000	150	2.5 V	±0.125 V			
2	25000	600	Maximum	>3 V			
2	25000	600	Maximum	>3 V			

Table 1-1 Func Gen Level and VRMS Meter Verification

7. Perform one of the following:
- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-3.

### 1-8-3 OUTPUT LEVEL VERIFICATION (T/R AND DUPLEX)

EQUIPMENT REQUIRED: 1 Measuring Receiver w/ Sensor

FIGURE REFERENCES: None

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

**T/R OUTPUT**

3. Connect Measuring Receiver Sensor to T/R Connector. Use RF Power and Tuned RF Level modes as required.

**NOTE:** Test frequency and level may be varied to desired user needs.

4. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
5. Verify levels in Table 1-2 with the appropriate frequency selected.
  - If reading is correct, go to Step 6.
  - If reading is out of tolerance, go to GEN Output Level Calibration Procedure (para 1-10-5 in TS-4317-1 Calibration Procedure).

TEST FREQ	LEVEL	TOLERANCE
0.4 MHz	0 dB	±1 dB
0.9 MHz	0 dB	±1 dB
30.5 MHz	0 dB	±1 dB
30.5 MHz	-1 dB	±1 dB
30.5 MHz	-2 dB	±1 dB
30.5 MHz	-4 dB	±1 dB
30.5 MHz	-8 dB	±1 dB
30.5 MHz	-16 dB	±1 dB
30.5 MHz	-32 dB	±1 dB
30.5 MHz	-64 dB	±1 dB
30.5 MHz	-112 dB	±1 dB
100.5 MHz	0 dB	±1 dB
150.5 MHz	0 dB	±1 dB

Table 1-2 T/R Output Level Test

TEST FREQ	LEVEL	TOLERANCE
300 MHz	0 dB	±1 dB
500.5 MHz	0 dB	±1 dB
500.5 MHz	-1 dB	±1 dB
500.5 MHz	-2 dB	±1 dB
500.5 MHz	-4 dB	±1 dB
500.5 MHz	-8 dB	±1 dB
500.5 MHz	-16 dB	±1 dB
500.5 MHz	-32 dB	±1 dB
500.5 MHz	-64 dB	±1 dB
500.5 MHz	-112 dB	±1 dB
750 MHz	0 dB	±1 dB
999.9999 MHz	0 dB	±1 dB
999.9999 MHz	-1 dB	±1 dB
999.9999 MHz	-2 dB	±1 dB
999.9999 MHz	-4 dB	±1 dB
999.9999 MHz	-8 dB	±1 dB
999.9999 MHz	-16 dB	±1 dB
999.9999 MHz	-32 dB	±1 dB
999.9999 MHz	-64 dB	±1 dB
999.9999 MHz	-112 dB	±1 dB

Table 1-2 T/R Output Level Test (cont)

**DUPLEX OUTPUT**

6. Disconnect Measuring Receiver Sensor from T/R Connector.
7. Connect Measuring Receiver Sensor to DUPLEX IN Connector.
8. Press DPLX Key. Duplex Operation Screen is displayed on Test Set.
9. Use FIELD SELECT Keys to move cursor to T/R. Press ENTER Key to select **DPL**.
10. Verify levels in Table 1-3 with the appropriate frequency selected.
  - If reading is correct, go to Step 11.
  - If reading is out of tolerance, go to GEN Output Level Calibration Procedure (para 1-10-5 in TS-4317-1 Calibration Procedure).

TEST FREQ	LEVEL	TOLERANCE
10 MHz	7 dBm	±1.7 dB
100 MHz	7 dBm	±1.7 dB
100 MHz	-40 dBm	±1.7 dB
100 MHz	-100 dBm	±1.7 dB
500 MHz	7 dBm	±1.7 dB
999.9999 MHz	7 dBm	±1.7 dB
999.9999 MHz	-40 dBm	±1.7 dB
999.9999 MHz	-100 dBm	±1.7 dB

Table 1-3 Duplex Output Level Test

**STEP****PROCEDURE**

---

11. Perform one of the following:

- If this test is performed as a stand-alone test, remove power from Test Set and disconnect test equipment.
- If this test is performed as part of a complete Recommended Test Procedure, disconnect test equipment and proceed at Step 2 of para 1-8-4.

## 1-8-4 DEVIATION METER VERIFICATION

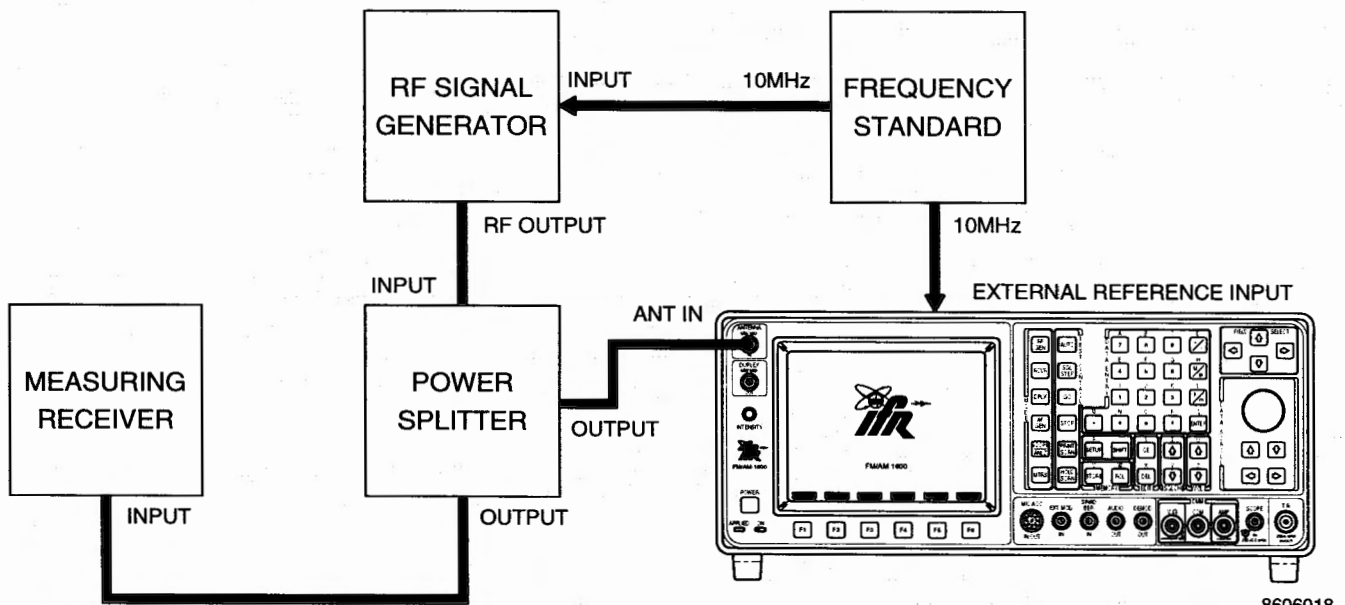
EQUIPMENT REQUIRED:                    1    10 MHz Frequency Standard  
   1    Measuring Receiver  
   1    Power Splitter  
   1    RF Signal Generator

FIGURE REFERENCES:                    Figure 1-3

### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 1-3.



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Figure 1-3 Deviation Meter Verification Test Setup

4. Set Signal Generator to 120.1000 MHz at 0 dBm with no modulation.



## STEP

## PROCEDURE

5. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector Measurement	Peak+ FM

6. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
7. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys to set data field to **40 dB**. Press ENTER Key.
8. Press SETUP Key.
9. Use FIELD SELECT Keys to move cursor to "2. Select Mod" data field. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to "11. User Defined" data field. Press ENTER Key.
11. Press 1 (I) Key to access "Modulation" submenu. Press 1 (I) to select "1. FM."
12. Press 2 (J) Key to access "IF Filters" submenu. Set IF Filters on Test Set per Table 1-4.
13. Press 3 (K) Key to access "Post Detection" submenu. Set Post Detection filtering on Test Set per Table 1-4.
14. Press "Ret" F5 Key to return to Receive Operation Screen.
15. Set Frequency on Test Set as per Table 1-4 (RF Signal Generator frequency).
16. Use FIELD SELECT Keys to move cursor to DEV. Press ENTER Key. Use FIELD SELECT Keys to move cursor to AVERAGE. Press ENTER Key.
17. Set Deviation Meter Range on Test Set per Table 1-4.
18. Press "FM Z" F3 Key.
19. Set RF Signal Generator and Measuring Receiver per Table 1-4.

**STEP****PROCEDURE**

20. Verify modulation in Table 1-4, comparing the Measuring Receiver and the Test Set. (For each reading, the Residual FM needs to be subtracted.)
- If reading is correct, go to Step 21.
  - If reading is out of tolerance, go to Deviation Meter Calibration Procedure (para 2-10-8).

RF SIGNAL GENERATOR			MEASURING RECEIVER		TEST SET		TOL
FREQ (MHz)	MOD RATE (kHz)	DEV (kHz)	HP (Hz)	LP (kHz)	IF (kHz)	LP (kHz)	(kHz)
999.9999	0.1	7.5	<20	3	30	3	±0.575
32	1.0	7.5	300	3	30	3	±0.575
75	1.0	15	300	3	300	3	±0.950
85.02	3.0	15	300	15	300	10	±0.950
50	10	37.5	300	>200	300	30	±3.875
455	1.0	75	300	3	300	3	±5.750

Table 1-4 Deviation Meter Verification

21. Perform one of the following:
- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, proceed at Step 2 of para 1-8-5.

### 1-8-5 MODULATION METER VERIFICATION

EQUIPMENT REQUIRED:            1    Measuring Receiver  
    1    Power Splitter  
    1    RF Signal Generator

FIGURE REFERENCES:            Figure 1-4

STEP	PROCEDURE
------	-----------

- |    |   |
|----|---|
| 1. | Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.   |
| 2. | Set Test Set to Factory Defaults: <ul style="list-style-type: none"> <li>• Press MTRS MODE Key.</li> <li>• Press "AUX" F6 Key.</li> <li>• Press RCL Key.</li> <li>• Press SHIFT Key.</li> <li>• Press 7 (A) Key.</li> <li>• Press ENTER Key.</li> </ul> |
| 3. | Connect test equipment as shown in Figure 1-4.  |

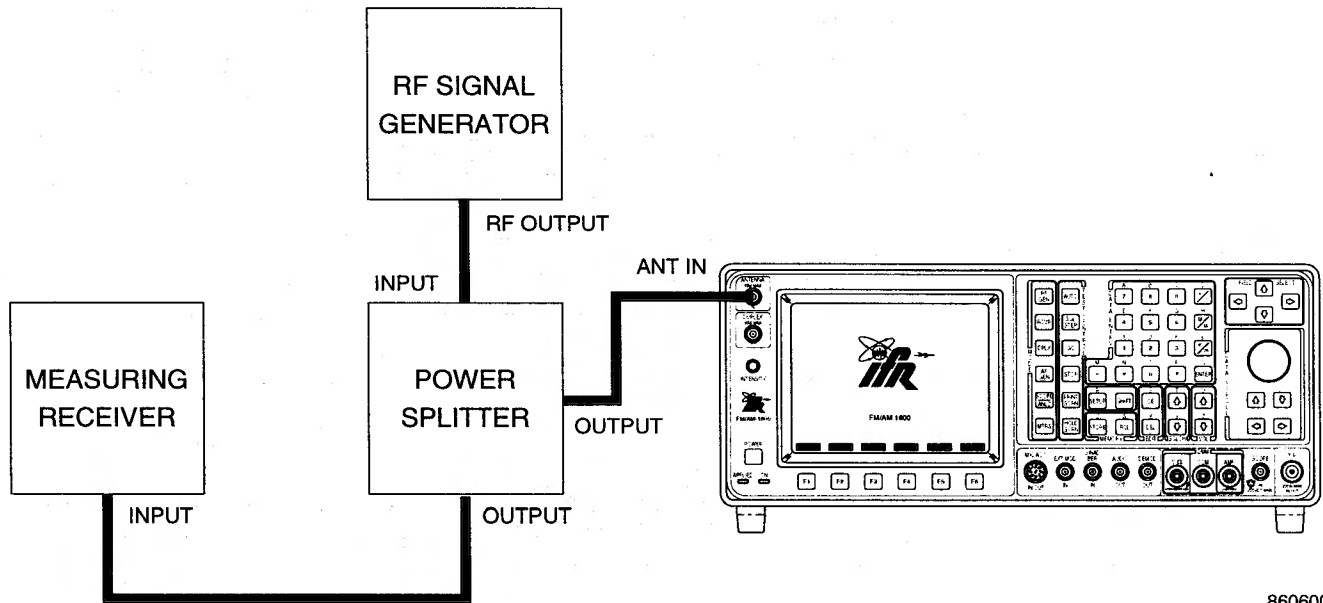


Figure 1-4 Modulation Meter Verification Test Setup

4. Set Signal Generator to 120.1000 MHz at 0 dBm.
5. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector Measurement	Peak+ AM

## STEP

## PROCEDURE

6. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
7. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys to set data field to **40 dB**. Press ENTER Key.
8. Press SETUP Key.
9. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type" data field. Press 1 (I) Key to access "User Defined" submenu. Press 1 (I) Key to select "1. Measurement."
10. Use FIELD SELECT Keys to move cursor to "2. Select Mod" data field. Press ENTER Key.
11. Use FIELD SELECT Keys to move cursor to "11. User Defined" data field. Press ENTER Key.
12. Press 1 (I) Key to access "Modulation" submenu. Press 2 (J) Key to select "2. AM."
13. Press 2 (J) Key to access "IF Filters" submenu. Press 2 (J) to select "2. 30 kHz."
14. Press 3 (K) Key to access "Post Detection" submenu. Set Post Detection filtering on Test Set per Table 1-5.
15. Press "Ret" Soft Function Key F5 to return to Receive Operation Screen.
16. Set Frequency on Test Set as per Table 1-5 (RF Signal Generator frequency).
17. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Set Modulation Meter Range on Test Set per Table 1-5.
18. Set RF Signal Generator and Measuring Receiver per Table 1-5.
19. Verify modulation in Table 1-5, comparing the Measuring Receiver and the Test Set.
  - If reading is correct, go to Step 20.
  - If reading is out of tolerance, go to Modulation Meter Calibration Procedure (para 2-10-9).

RF SIGNAL GENERATOR			MEASURING RECEIVER		TEST SET		TOL (%)
FREQ (MHz)	MOD RATE (kHz)	MOD (%)	HP (Hz)	LP (kHz)	IF (kHz)	LP (kHz)	
1	0.1	30	<20	3	30	3	±3
999.9999	1.0	50	300	3	30	3	±6
12	6.0	50	300	15	30	20	±6
25	10	50	300	>200	30	30	±6
32	1.0	90	300	3	30	3	±6
85.02	3.0	70	300	>20	30	10	±6

Table 1-5 Modulation Meter Verification

19. Perform one of the following:
  - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, proceed at Step 2 of para 1-8-6.

## 1-8-6 PHASE METER VERIFICATION

EQUIPMENT REQUIRED:           1   Measuring Receiver  
  1   Power Splitter  
  1   RF Signal Generator

FIGURE REFERENCES:         Figure 1-5

### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 1-5.

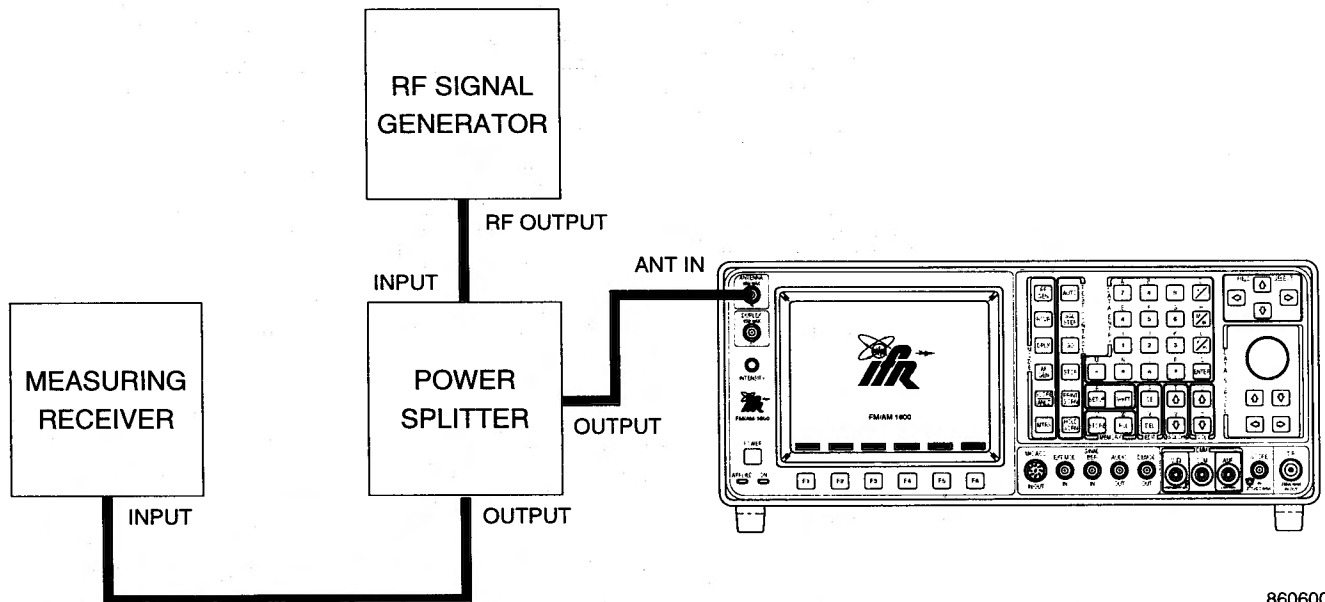


Figure 1-5 Phase Meter Verification Test Setup

### PHASE METER

4. Press RCVR Key (27). Receive Operation Screen is displayed on Test Set.
5. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys (3) to set data field to **40 dB**. Press ENTER Key.

## STEP

## PROCEDURE

6. Set Signal Generator to 121.100000 MHz at 0 dBm with 6 radians of peak deviation at a 1 kHz rate.
7. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	Peak+
Low-Pass Filter	3 kHz
High-Pass Filter	300 Hz
Measurement	$\Phi$ M (Phase)

8. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad (29) to set data field to **121.1000 MHz**. Press ENTER Key.
9. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys (3) to set data field to **PM**. Press ENTER Key.
10. Verify phase reading is within  $\pm 0.4$  radians of reading on Measuring Receiver.
  - If reading is correct, go to Step 11.
  - If reading is out of tolerance, go to Phase Meter Calibration Procedure (para 2-10-10).

**PHASE METER (RMS)**

11. Set Signal Generator output for 8.5 radians peak deviation.
12. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	RMS
Low-Pass Filter	3 kHz
High-Pass Filter	300 Hz
Measurement	$\Phi$ M (Phase)

13. Press MTRS Key. Meters Screen is displayed on Test Set.
14. Use FIELD SELECT Keys to highlight "13. Phase Meter (RMS)." Press ENTER Key.
15. Verify Phase Meter (RMS) reading matches Measuring Receiver reading ( $\pm 0.7$  radians RMS).
  - If reading is correct, go to Step 16.
  - If reading is out of tolerance, go to Phase Meter Calibration Procedure (para 2-10-10).
16. Perform one of the following:
  - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-7.

## 1-8-7 DISTORTION METER VERIFICATION

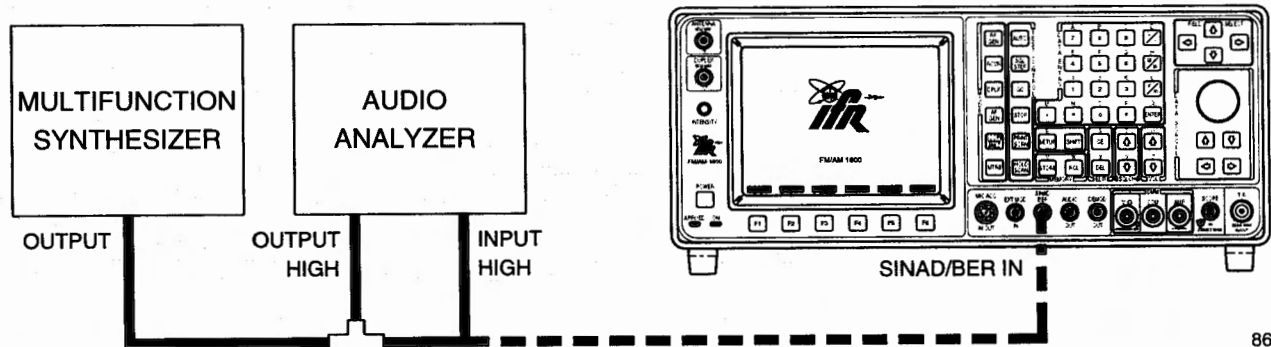
EQUIPMENT REQUIRED:                   1 Audio Analyzer  
   1 Multifunction Synthesizer

FIGURE REFERENCES:                 Figure 1-6

### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 1-6.



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Figure 1-6 Distortion Meter Verification Test Setup

4. Set Multifunction Synthesizer controls as follows:

CONTROL	SETTING
Channel A	ON
Frequency	3000 Hz
Level	1 $\mu$ V

5. Set Audio Analyzer controls as follows:

CONTROL	SETTING
Source Frequency	770 Hz
Source Amplitude	6 V
Log/Linear	LOG
Input Float	GND
Output Float	GND
Source Impedance	50 $\Omega$

6. Press **RATIO** on Audio Analyzer and verify 0.00 dB is displayed.
7. Set Audio Analyzer Source Amplitude to 1 mV.
8. Set Multifunction Synthesizer Amplitude to 8.5 V initially and adjust Multifunction Synthesizer Amplitude until 0.00 dB is displayed on Audio Analyzer. Record Amplitude setting.
9. Adjust Multifunction Synthesizer Amplitude until following values are displayed on Audio Analyzer. Record Amplitude settings.

A.	-14.9 dB (18%)
B.	-20.0 dB (10%)
C.	-40.0 dB (1%)

10. Set Audio Analyzer Amplitude to 6.0 V.
11. Press **MTRS** Key to access Meter Menu.
12. Press **6 (G)** Key to access "DISTORTION METER" operation screen.
13. Use **FIELD SELECT** Keys to move cursor to **INPUT**. Press **ENTER** Key. Use **DATA SCROLL** Keys to set data field to **SINAD/BER**. Press **ENTER** Key.
14. Use **FIELD SELECT** Keys to move cursor to **NOTCH FREQ**. Use **DATA ENTRY** Keypad to set data field to **770 Hz**. Press **ENTER** Key.
15. Use **FIELD SELECT** Keys to move cursor to **FILTER**. Press **ENTER** Key to select "Low Pass Filter Freq" field.
16. Use **FIELD SELECT** Keys to move cursor to "Low Pass Filter Freq" field. Use **DATA ENTRY** Keypad to enter **10.000 kHz**. Press **ENTER** Key.
17. Set Multifunction Synthesizer Amplitude to "A" value recorded in Step 9.
18. Disconnect coaxial cable from Audio Analyzer High Input and connect to Test Set **SINAD/BER IN** Connector.
19. Verify distortion on Test Set is 18% ( $\pm 2.1\%$ ).
- If reading is correct, go to Step 20.
  - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
20. Set Multifunction Synthesizer Amplitude to "B" value recorded in Step 9.



## STEP

## PROCEDURE

- 
21. Verify distortion on Test Set is 10% ( $\pm 1.1\%$ ).
    - If reading is correct, go to Step 22.
    - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
  22. Set Multifunction Synthesizer Amplitude to "C" value recorded in Step 9.
  23. Verify distortion on Test Set is 1% ( $\pm 1.1\%$ ).
    - If reading is correct, go to Step 24.
    - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
  24. Set Multifunction Synthesizer Frequency to 2400 Hz.
  25. Set Audio Analyzer Frequency to 1000 Hz.
  26. Use FIELD SELECT Keys to move cursor to NOTCH FREQ. Use DATA ENTRY Keypad to set data field to **1000 Hz**. Press ENTER Key.
  27. Set Multifunction Synthesizer Amplitude to "A" value recorded in Step 9.
  28. Verify distortion on Test Set is 18% ( $\pm 2.1\%$ ).
    - If reading is correct, go to Step 29.
    - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
  29. Set Multifunction Synthesizer Amplitude to "B" value recorded in Step 9.
  30. Verify distortion on Test Set is 10% ( $\pm 1.1\%$ ).
    - If reading is correct, go to Step 31.
    - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
  31. Set Multifunction Synthesizer Amplitude to "C" value recorded in Step 9.
  32. Verify distortion on Test Set is 1% ( $\pm 1.1\%$ ).
    - If reading is correct, go to Step 33.
    - If reading is out of tolerance, go to Distortion Meter Calibration Procedure (para 2-10-11).
  33. Perform one of the following:
    - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
    - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-8.

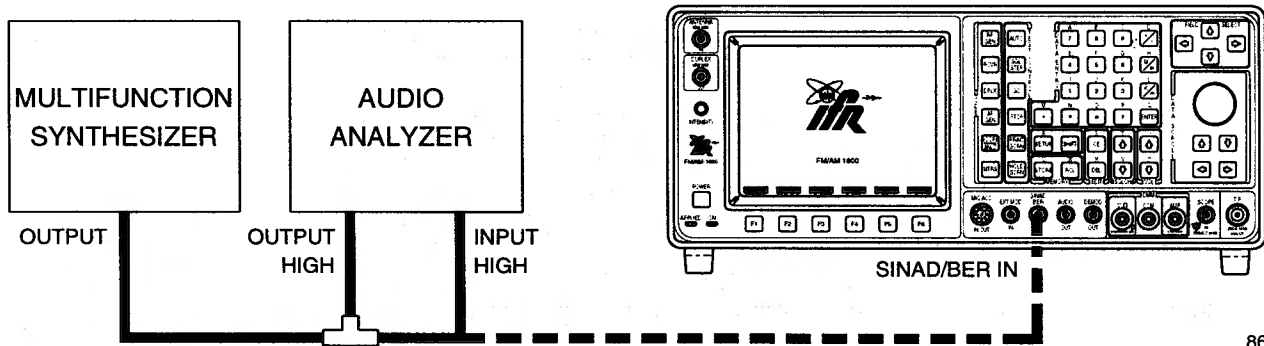
### 1-8-8 SINAD METER VERIFICATION

EQUIPMENT REQUIRED:                   1   Audio Analyzer  
   1   Multifunction Synthesizer

FIGURE REFERENCES:                 Figure 1-7

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 1-7.



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Figure 1-7 SINAD Meter Verification Test Setup

4. Set Multifunction Synthesizer controls as follows:

CONTROL	SETTING
Channel A	ON
Frequency	3000 Hz
Level	1 $\mu$ V

## STEP

## PROCEDURE

5. Set Audio Analyzer controls as follows:

CONTROL	SETTING
Source Frequency	770 Hz
Source Amplitude	6 V
Log/Linear	LOG
Input Float	GND
Output Float	GND
Source Impedance	50 $\Omega$

6. Press **RATIO** on Audio Analyzer and verify 0.00 dB is displayed.
7. Set Audio Analyzer Source Amplitude to 1 mV.
8. Set Multifunction Synthesizer Amplitude to 8.5 V initially and adjust Multifunction Synthesizer Amplitude until 0.00 dB is displayed on Audio Analyzer. Record Amplitude setting.
9. Adjust Multifunction Synthesizer Amplitude until following values are displayed on Audio Analyzer. Record Amplitude settings.

A.	-4.74 dB (6 dB SINAD)
B.	-9.54 dB (10 dB SINAD)
C.	-11.70 dB (12 dB SINAD)
D.	-20.00 dB (20 dB SINAD)

10. Set Audio Analyzer Amplitude to 6.0 V.
11. Press **MTRS** Key to access Meter Menu.
12. Press **7 (A)** Key to access "SINAD METER" submenu.
13. Use **FIELD SELECT** Keys to move cursor to **INPUT**. Press **ENTER** Key. Use **DATA SCROLL** Keys to set data field to **SINAD/BER**. Press **ENTER** Key.
14. Use **FIELD SELECT** Keys to move cursor to **NOTCH FREQ**. Use **DATA ENTRY** Keypad to set data field to **770 Hz**. Press **ENTER** Key.
15. Use **FIELD SELECT** Keys to move cursor to **FILTER**. Press **ENTER** Key to select "Low Pass Filter Freq" field.
16. Use **FIELD SELECT** Keys to move cursor to "Low Pass Filter Freq" field. Use **DATA ENTRY** Keypad to enter **10.000 kHz**. Press **ENTER** Key.
17. Set Multifunction Synthesizer Amplitude to "A" value recorded in Step 9.
18. Disconnect coaxial cable from Audio Analyzer High Input and connect to Test Set **SINAD/BER IN** Connector.
19. Verify SINAD on Test Set is 6 dB ( $\pm 2.1$  dB).
- If reading is correct, go to Step 20.
  - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).

## STEP

## PROCEDURE

- 
20. Set Multifunction Synthesizer Amplitude to "B" value recorded in Step 9.
  21. Verify SINAD on Test Set is 10 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 22.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  22. Set Multifunction Synthesizer Amplitude to "C" value recorded in Step 9.
  23. Verify SINAD on Test Set is 12 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 24.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  24. Set Multifunction Synthesizer Amplitude to "D" value recorded in Step 9.
  25. Verify SINAD on Test Set is 20 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 26.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  26. Set Multifunction Synthesizer Frequency to 2400 Hz.
  27. Set Audio Analyzer Frequency to 1000 Hz.
  28. Use FIELD SELECT Keys to move cursor to NOTCH FREQ. Use DATA ENTRY Keypad to set data field to **1000 Hz**. Press ENTER Key.
  29. Set Multifunction Synthesizer Amplitude to "A" value recorded in Step 9.
  30. Verify SINAD on Test Set is 6 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 31.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  31. Set Multifunction Synthesizer Amplitude to "B" value recorded in Step 9.
  32. Verify SINAD on Test Set is 10 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 33.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  33. Set Multifunction Synthesizer Amplitude to "C" value recorded in Step 9.
  34. Verify SINAD on Test Set is 12 dB ( $\pm 2.1$  dB).
    - If reading is correct, go to Step 35.
    - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
  35. Set Multifunction Synthesizer Amplitude to "D" value recorded in Step 9.

**STEP****PROCEDURE**

---

36. Verify SINAD on Test Set is 20 dB ( $\pm 2.1$  dB).
  - If reading is correct, go to Step 37.
  - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
37. Disconnect Multifunction Synthesizer from test equipment setup.
38. Set Audio Analyzer Amplitude to 50 mV.
39. Verify SINAD on Test Set is  $>30$  dB.
  - If reading is correct, go to Step 40.
  - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
40. Disconnect Audio Analyzer from Test Set SINAD/BER IN Connector.
41. Verify SINAD on Test Set is 3 dB ( $\pm 0.5$  dB).
  - If reading is correct, go to Step 42.
  - If reading is out of tolerance, go to SINAD Meter Calibration Procedure (para 2-10-12).
42. Perform one of the following:
  - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-9.

## 1-8-9 GEN MODULATION VERIFICATION

EQUIPMENT REQUIRED: 1 Measuring Receiver with Sensor

FIGURE REFERENCES: None

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul data-bbox="215 583 613 863" style="list-style-type: none"><li data-bbox="215 583 613 615">● Press MTRS MODE Key.</li><li data-bbox="215 632 553 663">● Press "AUX" F6 Key.</li><li data-bbox="215 680 488 711">● Press RCL Key.</li><li data-bbox="215 728 516 760">● Press SHIFT Key.</li><li data-bbox="215 777 500 808">● Press 7 (A) Key.</li><li data-bbox="215 825 532 856">● Press ENTER Key.</li></ul>
3.	Connect Measuring Receiver Sensor to T/R Connector.
4.	Set Measuring Receiver Detector to Peak+.
5.	Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
6.	Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA SCROLL Keys to set data field to <b>0.0</b> . Press ENTER Key.
7.	Use FIELD SELECT Keys to move cursor to SOURCE. Set Frequency and Modulation on Test Set per Table 1-6.
8.	Set Measuring Receiver per Table 1-6.
9.	Verify modulation in Table 1-6. (For each reading, the Residual FM needs to be subtracted.) <ul data-bbox="215 1312 1325 1423" style="list-style-type: none"><li data-bbox="215 1312 769 1344">● If reading is correct, go to Step 10.</li><li data-bbox="215 1360 1325 1423">● If reading is out of tolerance, go to GEN Modulation Calibration Procedure (para 2-10-13).</li></ul>

## STEP

## PROCEDURE

TEST SET				MEASURING RECEIVER			TOL
FREQ (MHz)	MOD TYPE	MOD/ DEV	MOD RATE	MOD MODE	HP (Hz)	LP (kHz)	
10	FM	±3 kHz	100 Hz	FM	<20	3	±150 Hz
85	FM	±10 kHz	1 kHz	FM	300	3	±500 Hz
121	FM	±10 kHz	10 kHz	FM	300	15	±500 Hz
500	FM	±25 kHz	20 kHz	FM	300	>20	±1.25 kHz
999.9999	FM	±75 kHz	1 kHz	FM	300	3	±3.75 kHz
10	AM	±30%	100 Hz	AM	<20	3	±1.5%
85	AM	±70%	1 kHz	AM	300	3	±3.5%
121	AM	±70%	5 kHz	AM	300	15	±3.5%
500	AM	±70%	10 kHz	AM	300	15	±3.5%
999.9999	AM	±90%	1 kHz	AM	300	3	±4.5%
85	PM	±6 Rad	1 kHz	PM	300	3	±0.6 Rad

Table 1-6 Gen Modulation Verification

## 10. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
- If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-10.

## 1-8-10 OSCILLOSCOPE VERIFICATION

EQUIPMENT REQUIRED:                   1   50  $\Omega$  Termination  
   1   Calibrator  
   1   Multifunction Synthesizer

FIGURE REFERENCES:                 Figure 1-8

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

### OSCILLOSCOPE BANDWIDTH

3. Connect Calibrator (Wide Band Output) and 50  $\Omega$  Termination to SCOPE IN Connector.
4. Press SCOPE/ANLZ Key. Oscilloscope Operation Screen is displayed.
 

**NOTE:** If Analyzer Operation Screen is displayed, press SCOPE/ANLZ Key to access Oscilloscope Operation Screen.
5. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Press 7 (A) Key to set data field to **AC**.
6. Press "Sweep" F3 Key to select Sweep data field. Use DATA SCROLL Keys to set data field to **1 ms**. Press ENTER Key.
7. Set Calibrator to:

CONTROL	SETTING
Level	1 kHz
Amplitude	1.414 Vrms
Wide Band	ON

8. Adjust Calibrator level and Test Set vertical offset until the positive peak touches the line two major divisions up from the center and the negative peak is two major divisions down from the center.
9. Set Calibrator frequency to 1 MHz.
10. Verify peak signal amplitude is >70.7% of setting in Step 8. (Each minor division is  $\approx 10\%$ .)
  - If reading is correct, go to Step 11.
  - If reading is out of tolerance, go to Oscilloscope Calibration Procedure (para 2-10-14).



## STEP

## PROCEDURE

11. Disconnect Calibrator (Wide Band Output) and 50  $\Omega$  Termination from SCOPE IN Connector. Connect Calibrator (High/Low Output) to SCOPE IN Connector.

**OSCILLOSCOPE VERTICAL ACCURACY**

12. Set Oscilloscope Scale on Test Set per Table 1-7.
13. Set Level on Calibrator per Table 1-7.
14. Set Frequency on Calibrator to 1 kHz.
15. Verify vertical accuracy in Table 1-7.
- If reading is correct, go to Step 16.
  - If reading is out of tolerance, go to Oscilloscope Calibration Procedure (para 2-10-14).

TEST SET	CALIBRATOR	VERTICAL ACCURACY	
SCALE (V/Div)	LEVEL (Vrms)	DISPLAY (P-P)	TOL
0.002	3.54 mV	10 mV	$\pm 1$ mV
0.01	17.7 mV	50 mV	$\pm 4$ mV
0.1	177 mV	500 mV	$\pm 40$ mV
0.2	354 mV	1 V	$\pm 80$ mV
0.5	884 mV	2.5 V	$\pm 200$ mV
1.0	1.77 V	5 V	$\pm 400$ mV
10.0	17.7 V	50 V	$\pm 4$ V

Table 1-7 Oscilloscope Vertical Accuracy Verification

**40 Vdc COUPLING**

16. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Press 9 (C) Key to set data field to **GND**.
17. Use FIELD SELECT Keys to move cursor to VERT. Press ENTER Key. Use DATA SCROLL Spinner to set ground reference 2 divisions from bottom graticule line. Press ENTER Key.
18. Set Calibrator level to 40 Vdc.
19. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Press 8 (B) Key to set data field to **DC**.
20. Verify signal moves 4 major divisions ( $\pm 2$  minor divisions).
- If reading is correct, go to Step 21.
  - If reading is out of tolerance, go to Oscilloscope Calibration Procedure (para 2-10-14).

**OSCILLOSCOPE HORIZONTAL SWEEP ACCURACY**

21. Disconnect Calibrator from SCOPE IN Connector and connect Multifunction Synthesizer to SCOPE IN Connector.

**STEP****PROCEDURE**

22. Press "Scale" F1 Key. Use DATA SCROLL Keys to set data field to **1 V/div**. Press ENTER Key.
23. Use FIELD SELECT Keys to move cursor to VERT. Press ENTER Key. Use DATA SCROLL Spinner to center trace. Press ENTER Key.
24. Set Oscilloscope Sweep on Test Set per Table 1-8.
25. Set Level on Multifunction Synthesizer to 5 Vp-p (2.5 Vp).
26. Set Frequency on Multifunction Synthesizer per Table 1-8.
27. Using Test Set Oscilloscope Markers on the left edge and the next equal crossing ( $\approx 9$  divisions to the right), verify horizontal sweep accuracy in Table 1-8.
  - If reading is correct, go to Step 28.
  - If reading is out of tolerance, refer Test Set to Maintenance.

TEST SET	MULTIFUNCTION SYNTHESIZER	HORIZONTAL SWEEP ACCURACY
<b>SWEEP (ms)</b>	<b>FREQ</b>	
10	11.1 Hz	90 ms ( $\pm 3$ ms)
1.0	111.1 Hz	9 ms ( $\pm 0.3$ ms)
0.1	1.111 kHz	900 $\mu$ s ( $\pm 30$ $\mu$ s)
0.01	11.11 kHz	90 $\mu$ s ( $\pm 3$ $\mu$ s)

Table 1-8 Oscilloscope Horizontal Accuracy Verification

28. Perform one of the following:
  - If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
  - If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-11.

## 1-8-11 SPECTRUM ANALYZER VERIFICATION

EQUIPMENT REQUIRED:                    1    10 MHz Frequency Standard  
    1    RF Signal Generator

FIGURE REFERENCES:                 Figure 1-8

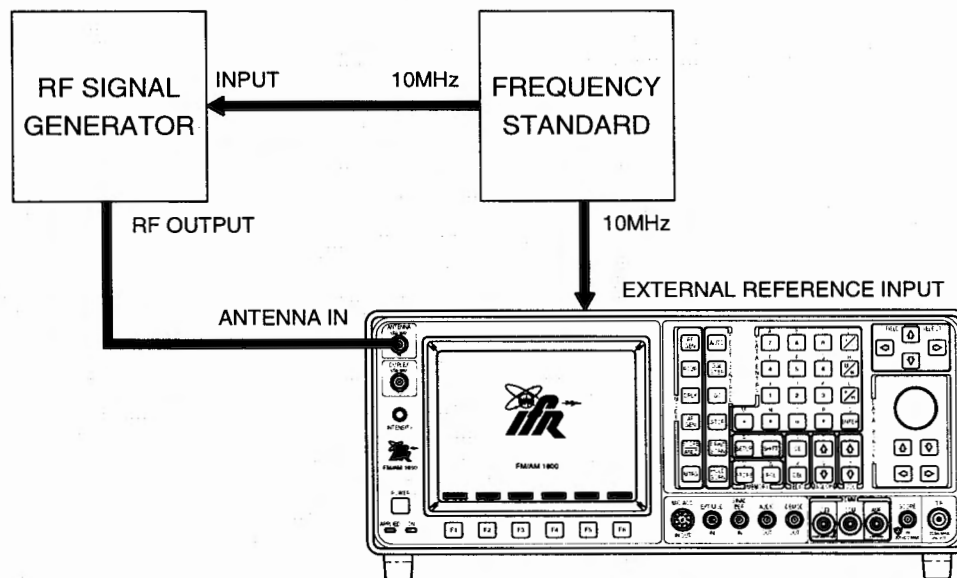
### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

### SPECTRUM ANALYZER SCAN WIDTH ACCURACY

3. Connect test equipment as shown in Figure 1-8.



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Figure 1-8 Spectrum Analyzer Verification Test Setup

3. Connect RF Signal Generator to ANTENNA IN Connector.

## STEP

## PROCEDURE

4. Set RF Signal Generator to:

CONTROL	SETTING
Center Frequency	500 MHz
Level	-40 dBm

5. Press SCOPE/ANLZ Key. Analyzer Operation Screen is displayed.

**NOTE:** If Oscilloscope Operation Screen is displayed, press SCOPE/ANLZ Key to access Analyzer Operation Screen.

6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to 500 MHz. Press ENTER Key.
7. Set Scan Width on Test Set per Table 1-9.
8. Press "More" F6 Key until "Norm" F1 Key appears. Press "Norm" F1 Key.
9. Set Offset Frequency on RF Signal Generator per Table 1-9.
10. Verify scan width accuracy in Table 1-9.
- If reading is correct, go to Step 11.
  - If reading is out of tolerance, go to Spectrum Analyzer Calibration Procedure (para 2-10-15).

TEST SET	RF SIGNAL GENERATOR	SCAN WIDTH ACCURACY
SCAN WIDTH (MHz/DIV)	OFFSET FREQUENCY	TOL
0.001	±4 kHz	±0.5 kHz
0.002	±8 kHz	±1 kHz
0.005	±20 kHz	±2.5 kHz
0.01	±40 kHz	±5 kHz
0.02	±80 kHz	±10 kHz
0.05	±200 kHz	±25 kHz
0.1	±400 kHz	±50 kHz
0.2	±800 kHz	±100 kHz
0.5	±2 MHz	±250 kHz
1.0	±4 MHz	±500 kHz
10.0	±40 MHz	±5 MHz
100.0	±400 MHz	±50 MHz

Table 1-9 Spectrum Analyzer Scan Accuracy Verification

### SPECTRUM ANALYZER BANDWIDTH AGREEMENT

11. Set RF Signal Generator center frequency to 400 MHz.
12. Set Bandwidth on Test Set per Table 1-10.
13. Press "More" F6 Key until "2 dB" F2 Key appears. Press "2 dB" F2 Key. ("10 dB" is displayed on F2.)

## STEP

## PROCEDURE

14. Set RF Signal Generator level to -40 dBm.
15. Press "Ref lvl" F4 Key. Use DATA SCROLL Spinner to adjust display, as required, for a center screen reference.
16. Verify bandwidth agreement in Perform Verification per Table 1-10.
  - If reading is correct, go to Step 17.
  - If reading is out of tolerance, go to Spectrum Analyzer Calibration Procedure (para 2-10-15).

TEST SET	BANDWIDTH AGREEMENT
BANDWIDTH (selected by Scan Width setting)	TOL (dB)
3 MHz (select 10 MHz Scan)	3
300 kHz (select 1 MHz Scan)	2
30 kHz (select 50 kHz Scan)	2
3 kHz (select 5 kHz Scan)	2
0.3 kHz (select 1 kHz Scan)	3

Table 1-10 Spectrum Analyzer Bandwidth Agreement Verification

**SPECTRUM ANALYZER LEVEL ACCURACY**

17. Press "More" F6 Key until "Norm" F1 Key appears. Press "Norm" F1 Key.
18. Press "More" F6 Key until "Scan" F3 Key appears. Press "Scan" F3 Key. Use DATA SCROLL Keys to select **50 kHz**. Press ENTER Key.
19. Press "More" F6 Key until "10 dB" F2 Key appears. Press "10 dB" F2 Key. ("2 dB" is displayed on F2.)
20. Set Level on RF Signal Generator per Table 1-11.

21. Verify level accuracy in Table 1-11.

**NOTE:** Frequency may be varied to desired user needs.

- If reading is correct, go to Step 22.
- If reading is out of tolerance, go to Spectrum Analyzer Calibration Procedure (para 2-10-15).

RF SIGNAL GENERATOR	LEVEL ACCURACY
LEVEL (dBm)	TOL (dB)
-30	±4
-40	±4
-50	±4
-60	±4
-70	±4
-80	±4

Table 1-11 Spectrum Analyzer Level Accuracy Verification

22. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
- If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-12.

## 1-8-12 DIGITAL MULTIMETER VERIFICATION

EQUIPMENT REQUIRED:                   1   Calibrator  
  1   Digital Multimeter (DMM)

FIGURE REFERENCES:               None

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>● Press MTRS MODE Key.</li><li>● Press "AUX" F6 Key.</li><li>● Press RCL Key.</li><li>● Press SHIFT Key.</li><li>● Press 7 (A) Key.</li><li>● Press ENTER Key.</li></ul>
	<b>AC VOLTS</b>
3.	Connect Calibrator (Output High) to DMM V $\Omega$ Connector and Calibrator (Output Low) to DMM COM Connector.
4.	Set Frequency and Level on Calibrator per Table 1-12.
5.	Press MTRS Key. Meter Menu is displayed on Test Set.
6.	Use FIELD SELECT Keys to move cursor to "10. Digital Multimeter (DMM)." Press ENTER Key. Multimeter Operation Screen is displayed on CRT.
7.	Set Meter Range on Test Set per Table 1-12.

8. Verify AC Volts in Table 1-12.
  - If reading is correct, go to Step 9.
  - If reading is out of tolerance, go to Digital Multimeter Calibration Procedure (para 2-10-16).

CALIBRATOR		TEST SET	TOL
FREQ (Hz)	LEVEL (VAC)	RANGE (VAC)	(VAC)
50	0.0105	0.2	±0.0101
1000	0.15	0.2	±0.0101
1000	1.5	2.0	±0.101
1000	15	20	±1.01
1000	100	200	±10.1
50	450	2000	±101
50	7	20	±1.01
400	7	20	±1.01
1000	7	20	±1.01
3000	7	20	±1.01
10000	7	20	±1.01
20000	7	20	±1.01
20000	0.0105	0.2	±0.0101

Table 1-12 AC Volts Verification

**DC VOLTS**

9. Set Level on Calibrator per Table 1-13.
10. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to **DCV**. Press ENTER Key.
11. Set Meter Range on Test Set per Table 1-13.
12. Verify DC Volts in Table 1-13.
  - If reading is correct, go to Step 13.
  - If reading is out of tolerance, go to Digital Multimeter Calibration Procedure (para 2-10-16).



## STEP

## PROCEDURE

TEST SET	CALIBRATOR	TOL
RANGE (Vdc)	LEVEL (Vdc)	(Vdc)
0.2	0.0025	±0.0021
0.2	0.15	±0.0021
2.0	1.5	±0.021
20	15	±0.21
200	150	±2.1
2000	800	±21
2000	1000	±21

Table 1-13 DC Volts Verification

**OHMS**

13. Set Resistance on Calibrator per Table 1-14.
14. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to *Ohm*. Press ENTER Key.
15. Set Meter Range on Test Set per Table 1-14.
16. Verify resistance in per Table 1-14.
  - If reading is correct, go to Step 17.
  - If reading is out of tolerance, go to Digital Multimeter Calibration Procedure (para 2-10-16).

TEST SET	CALIBRATOR	TOL
RANGE (kΩ)	RESISTANCE (kΩ)	(kΩ)
0.2	0.1	±0.0101
2.0	1	±0.101
20	10	±1.01
200	100	±10.1
2000	1000	±101
20000	10000	±1001

Table 1-14 Ohms Verification

**DC CURRENT**

17. Disconnect Calibrator (Output High) from DMM VΩ Connector.
18. Connect Calibrator (Output High) to DMM AMP Connector.
19. Set DC Current Level on Calibrator per Table 1-15.
20. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to *DCC*. Press ENTER Key.
21. Set Meter Range on Test Set per Table 1-15.

22. Verify DC Current in Table 1-15.
- If reading is correct, go to Step 23.
  - If reading is out of tolerance, go to Digital Multimeter Calibration Procedure (para 2-10-16).

TEST SET	CALIBRATOR	TOL
RANGE (AMPS)	LEVEL (AMPS)	(AMPS)
0.02	0.00105	±0.001
0.02	0.015	±0.001
0.2	0.15	±0.0101
2	1.5	±0.101
2	1.8	±0.101

Table 1-15 DC Current Verification

**AC CURRENT**

23. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to **ACC**. Press ENTER Key.
24. Set Frequency on Calibrator to 60 Hz.
25. Verify AC Current in Table 1-16.
- If reading is correct, go to Step 26.
  - If reading is out of tolerance, go to Digital Multimeter Calibration Procedure (para 2-10-16).

TEST SET	CALIBRATOR	TOL
RANGE (AMPS)	LEVEL (AMPS)	(AMPS)
2	1.8	±0.101

Table 1-16 AC Current Verification

**INPUT LOAD**

26. Disconnect Calibrator from DMM COM Connector and DMM AMP Connector.
27. Connect external Digital Multimeter to DMM COM Connector and DMM VΩ Connector.
28. Set Load on Test Set per Table 1-17.
29. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to **ACV**. Press ENTER Key.
30. Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to **2.0 V**. Press ENTER Key.

31. Verify input loads in Table 1-17.

- If reading is correct, go to Step 32.
- If reading is out of tolerance, refer Test Set to Maintenance.

TEST SET	TOL
LOAD ( $\Omega$ )	( $\Omega$ )
1E6	$\pm 50000$
150	$\pm 7.5$
600	$\pm 30$

Table 1-17 Input Load Verification

32. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
- If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-13.

### 1-8-13 POWER METER VERIFICATION

- EQUIPMENT REQUIRED:
- 1 10 W RF Amplifier
  - 1 10 dB (100 W) Attenuator
  - 1 50 Ω Termination
  - 1 100 MHz Low-Pass Filter
  - 1 100 W RF Amplifier
  - 1 500 MHz Low-Pass Filter
  - 1 1000 MHz Low-Pass Filter
  - 1 Digital Multimeter (DMM)
  - 1 Directional Coupler
  - 1 Measuring Receiver with Sensor
  - 1 RF Signal Generator

- FIGURE REFERENCES:
- Figure 1-9
  - Figure 1-10
  - Figure 1-11
  - Figure 1-12

**NOTE:** Equipment used to present power to the Test Set for Verification must comply with the following criteria:

- Source must present >20 dB return loss to the Test Set input.
- All spurious signals, other than the desired (harmonic or non-harmonic), must be ≤-40 dBc relative to the desired signal.

Using the RF Signal Generator and the Measuring Receiver with Sensor, the following loss characterizations in Table 1-18 must be accomplished prior to performing the Power Meter Verification.

The Reflected Connector on the Directional Coupler should be terminated to 50 Ω when this procedure is being performed.

EQUIPMENT	85 MHz	400 MHz	750 MHz
DIRECTIONAL COUPLER - FORWARD	•	•	•

Table 1-18 Directional Coupler Loss Characterizations

## STEP

## PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
4. Use FIELD SELECT Keys to move cursor to RF IN. Press ENTER Key to select *T/R*.
5. Press MTRS Key. Meter Menu is displayed on Test Set.
6. Use FIELD SELECT Keys to move cursor to "3. Pwr Meter (Pulse/CW)." Press ENTER Key. Power Meter Operation Screen is displayed on Test Set.
7. Calibrate Measuring Receiver Power Meter.
8. Press Zero Key on Measuring Receiver.
9. Connect test equipment as shown in Figure 1-9.
10. Set RF Signal Generator frequency to 85 MHz and output to Off.
11. Set appropriate external attenuation offsets, from Table 1-18, for 85 MHz on Measuring Receiver. (Measuring Receiver should read actual power supplied to the Test Set.)
12. Set Measuring Receiver frequency to 85 MHz.
13. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **20 mW**. Press ENTER Key.
14. Press "Zero" F4 Key.
15. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **100 mW**. Press ENTER Key.
16. Set RF Signal Generator output to On and increase output level until 50 mW is displayed on Measuring Receiver.
17. Verify 85 MHz at 50 mW ( $\pm 6$  mW) on Test Set Power Meter.
  - If reading is correct, go to Step 18.
  - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
18. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **2 W**. Press ENTER Key.
19. Increase output level on Measuring Receiver until 1 W is displayed on Measuring Receiver.

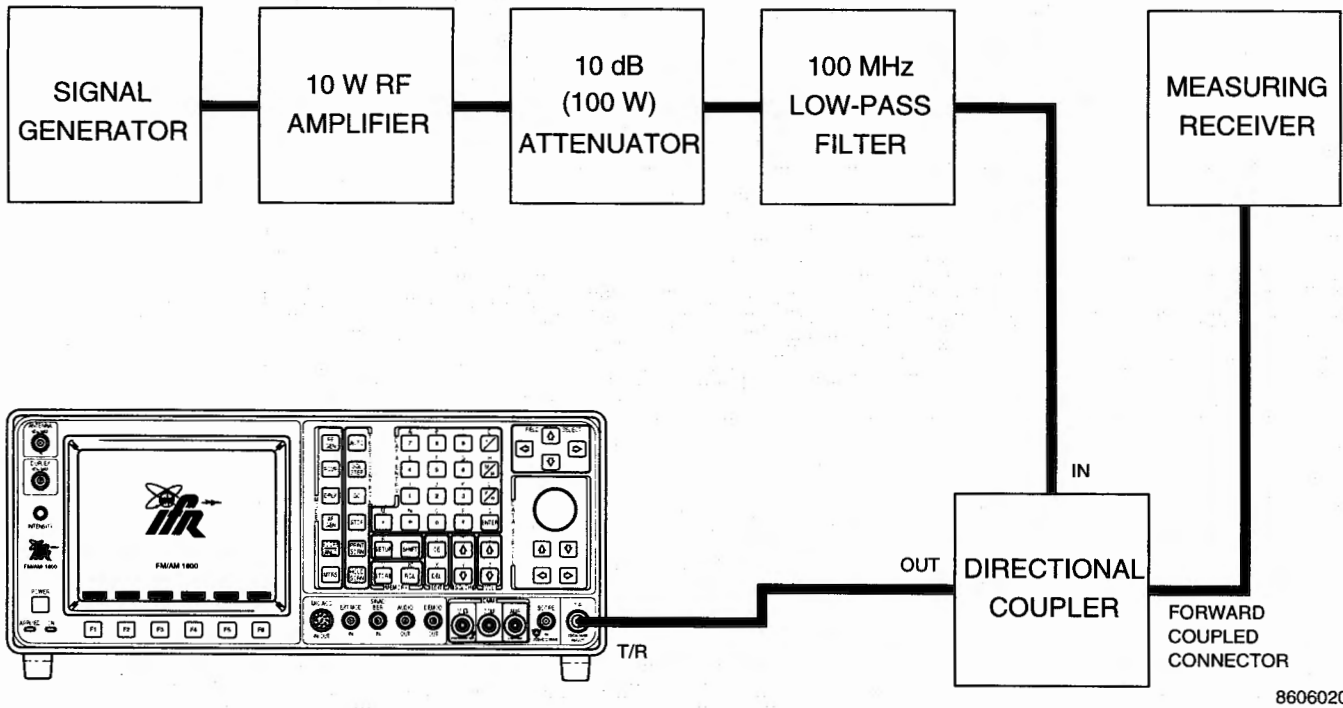


Figure 1-9 Power Meter Verification Test Setup #1

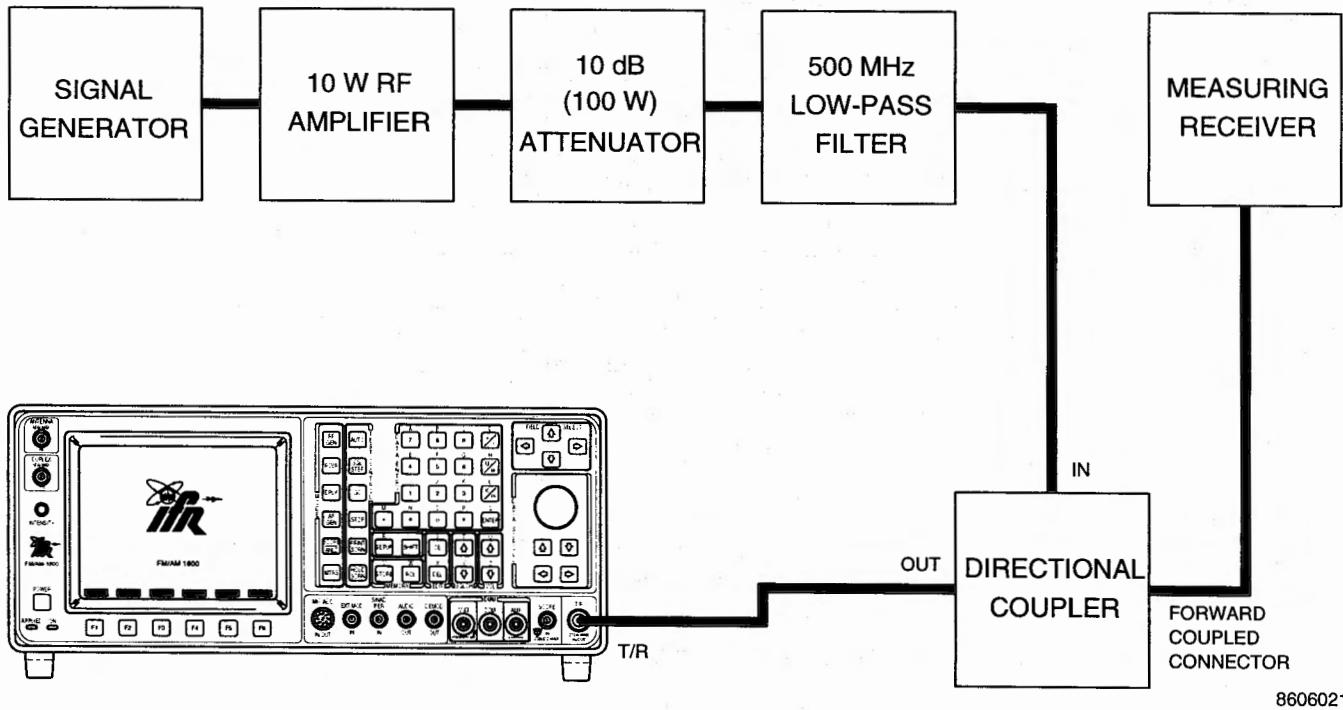
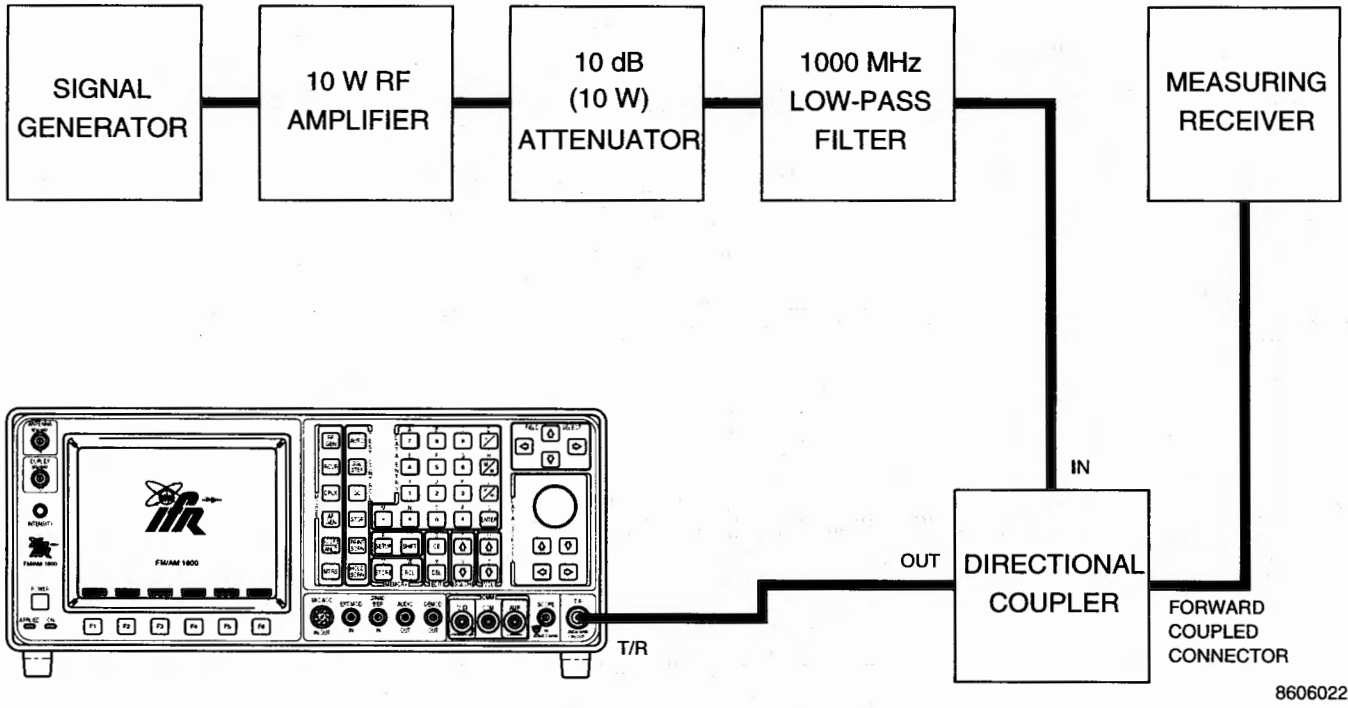


Figure 1-10 Power Meter Verification Test Setup #2

## STEP

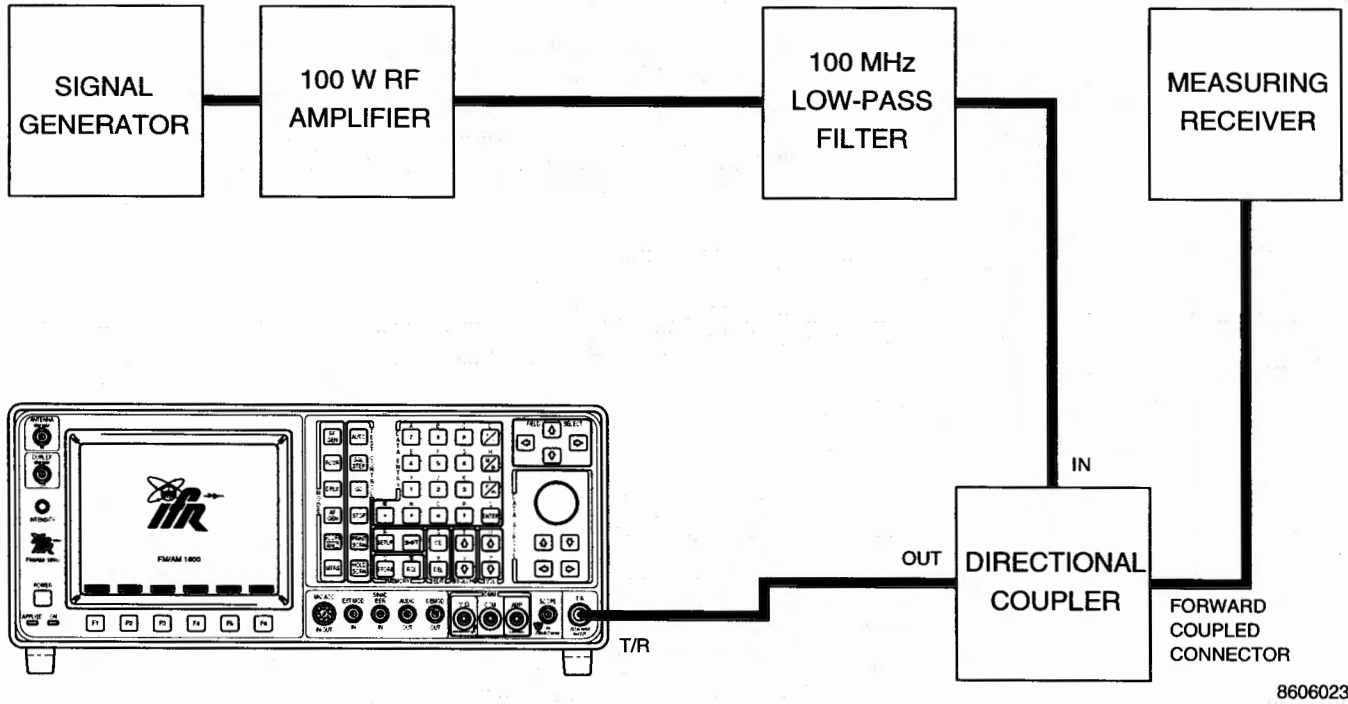
## PROCEDURE

- 
20. Verify 85 MHz at 1 W ( $\pm 0.11$  W) on Test Set Power Meter.
    - If reading is correct, go to Step 21.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  21. Connect test equipment as shown in Figure 1-10.
  22. Set RF Signal Generator frequency to 400 MHz and output to Off.
  23. Set appropriate external attenuation offsets, from Table 1-18, for 400 MHz on Measuring Receiver. (Measuring Receiver should read actual power supplied to the Test Set.)
  24. Set Measuring Receiver frequency to 400 MHz.
  25. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **20 mW**. Press ENTER Key.
  26. Press "Zero" F4 Key.
  27. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **100 mW**. Press ENTER Key.
  28. Set RF Signal Generator output to On and increase output level until 50 mW is displayed on Measuring Receiver.
  29. Verify 400 MHz at 50 mW ( $\pm 6$  mW) on Test Set Power Meter.
    - If reading is correct, go to Step 30.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  30. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **2 W**. Press ENTER Key.
  31. Increase output level on Measuring Receiver until 1 W is displayed on Measuring Receiver.
  32. Verify 400 MHz at 1 W ( $\pm 0.11$  W) on Test Set Power Meter.
    - If reading is correct, go to Step 33.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  33. Connect test equipment as shown in Figure 1-11.
  34. Set RF Signal Generator frequency to 750 MHz and output to Off.
  35. Set appropriate external attenuation offsets, from Table 1-18, for 750 MHz on Measuring Receiver. (Measuring Receiver should read actual power supplied to the Test Set.)
  36. Set Measuring Receiver frequency to 750 MHz.
  37. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **20 mW**. Press ENTER Key.
  38. Press "Zero" F4 Key.
  39. Set RF Signal Generator output to On and increase output level until 50 mW is displayed on Measuring Receiver.



8606022

Figure 1-11 Power Meter Verification Test Setup #3



8606023

Figure 1-12 Power Meter Verification Test Setup #4



## STEP

## PROCEDURE

- 
40. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **100 mW**. Press ENTER Key.
  41. Verify 750 MHz at 50 mW ( $\pm 6$  mW) on Test Set Power Meter.
    - If reading is correct, go to Step 42.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  42. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **2 W**. Press ENTER Key.
  43. Increase output level on Measuring Receiver until 1 W is displayed on Measuring Receiver.
  44. Verify 750 MHz at 1 W ( $\pm 0.11$  W) on Test Set Power Meter.
    - If reading is correct, go to Step 45.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  45. Connect test equipment as shown in Figure 1-12.
  46. Set RF Signal Generator frequency to 85 MHz and output to Off.
  47. Set appropriate external attenuation offsets, from Table 1-18, for 85 MHz on Measuring Receiver. (Measuring Receiver should read actual power supplied to the Test Set.)
  48. Set Measuring Receiver frequency to 85 MHz.
  49. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **20 W**. Press ENTER Key.
  50. Press "Zero" F4 Key.
  51. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **5 W**. Press ENTER Key.
  52. Set RF Signal Generator output to On and increase output level until 2 W is displayed on Measuring Receiver.
  53. Verify 85 MHz at 2 W ( $\pm 0.21$  W) on Test Set Power Meter.
    - If reading is correct, go to Step 54.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).
  54. Press "Range" F1 Key. Use DATA SCROLL Keys to set data field to **100 W**. Press ENTER Key.
  55. Increase output level on Measuring Receiver until 50 W is displayed on Measuring Receiver.
  56. Verify 85 MHz at 50 W ( $\pm 6$  W) on Test Set Power Meter.
    - If reading is correct, go to Step 57.
    - If reading is out of tolerance, go to Power Meter Calibration Procedure (para 2-10-17).

**STEP****PROCEDURE**

---

57. Perform one of the following:

- If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.
- If this procedure is performed as part of a complete Verification, disconnect test equipment and proceed at Step 2 of para 1-8-14.

## 1-8-14 FREQUENCY AGILITY VERIFICATION (OPTIONAL)

EQUIPMENT REQUIRED:                    1    MIC/ACC Test Cable (0021-AAJ1-100)  
   1    Modulation Domain Analyzer  
   1    Oscilloscope  
   1    Signal Generator

FIGURE REFERENCES:                Figure 1-13  
   Figure 1-14  
   Figure 1-15  
   Figure 1-16  
   Figure 1-17

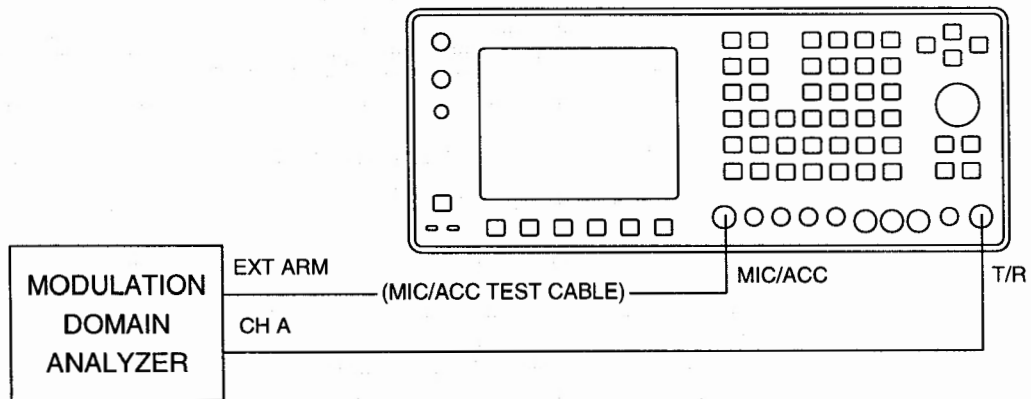
### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 20 Minute warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

#### GENERATE FREQUENCY AGILITY

3. Connect external test equipment as shown in Figure 1-13.



8606024

Figure 1-13 Generate Frequency Agility Test Setup

4. Set Modulation Domain Analyzer controls as follows:

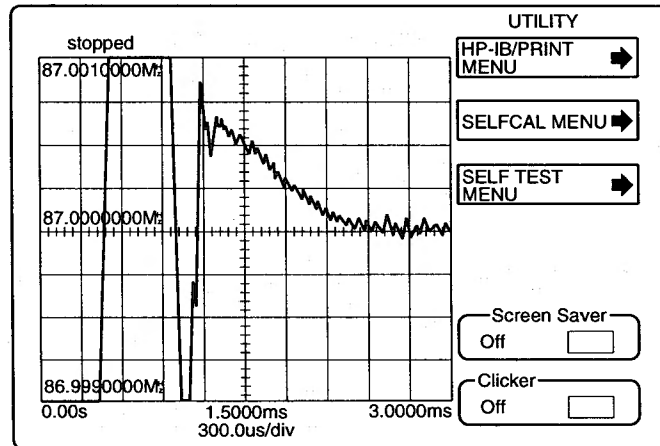
CONTROL	SETTING
Function	Frequency Channel A
Vertical	Center/Span
Center	87 MHz
Span	2 kHz
Display	vs Time, Axes, Real Time
Connect Data	On
Persistence	Single
Histogram Accumulate	Off
Trigger	Triggered, Ext Edge, Arm Only, Rising Edge
Time Base	300 $\mu$ s
Reference	Left
Delay	0 sec
Panorama	Off
Time Markers	Off
Freq Markers	Off
Sampling	Auto
Interval at Ctr	Auto
Utility - Clicker	(Push RUN under System Control) On

5. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
6. Use FIELD SELECT Keys to move cursor to Deviation Meter field. Press ENTER Key. Use DATA SCROLL Keys to select **10 kHz**. Press ENTER Key.
7. Press "Ret" F6 Key.
8. Press SETUP Key to access Receiver Menu.
9. Use FIELD SELECT Keys to move cursor to "1. Set Rcvr Freq." Press ENTER Key. Use DATA ENTRY Keypad (29) to enter **87.0000 MHz**. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor "2. Select Mod." Press ENTER Key.
11. Use FIELD SELECT Keys to move cursor to "11. User Defined." Press ENTER Key.
12. Use FIELD SELECT Keys to move cursor to "2. IF Filters." Press ENTER Key.
13. Use FIELD SELECT Keys to move cursor to "3. 300 kHz." Press ENTER Key.
14. Press "ESC" F6 Key.
15. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type." Press ENTER Key.
16. Use FIELD SELECT Keys to move cursor to "2. Manual." Press ENTER Key. Use DATA ENTRY Keypad to enter **255**. Press ENTER Key.
17. Press RF GEN Key (27). RF Generator Operation Screen is displayed on Test Set.
18. Press SETUP Key to access RF Generator Menu.
19. Use FIELD SELECT Keys to move cursor to "5. RF Gen Setup." Press ENTER Key.
20. Use FIELD SELECT Keys to move cursor to "1. RF Gen Freq." Press ENTER Key. Use DATA ENTRY Keypad to enter **30.0000 MHz**. Press ENTER Key.

STEP

PROCEDURE

21. Use FIELD SELECT Keys to move cursor to "2. RF Gen Level." Press ENTER Key. Use DATA ENTRY Keypad to enter **0.0**. Press ENTER Key.
22. Press "ESC" F6 Key.
23. Press "AUX" F6 Key.
24. Press "S.R." F1 Key.
25. Verify signal is within  $\pm 1$  kHz of 87 MHz in  $< 1.5$  ms from Trigger (Figure 1-14).
  - If reading is correct, go to Step 26.
  - If reading is out of tolerance, go to Generate Frequency Agility Calibration Procedure (para 2-10-18).



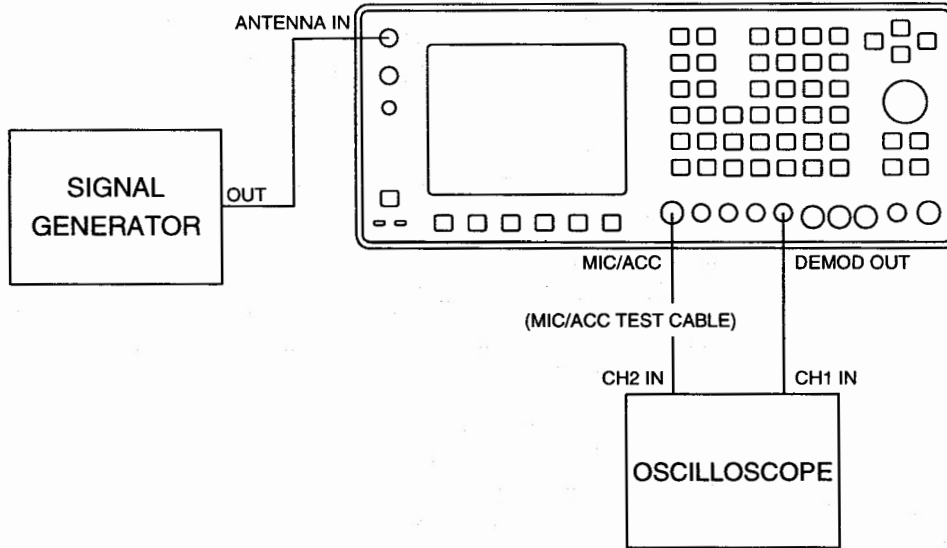
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Figure 1-14 Generate Frequency Agility Test Signal

26. Press "\*" F1 Key.

**RECEIVE FREQUENCY AGILITY**

27. Connect external test equipment as shown in Figure 1-15.



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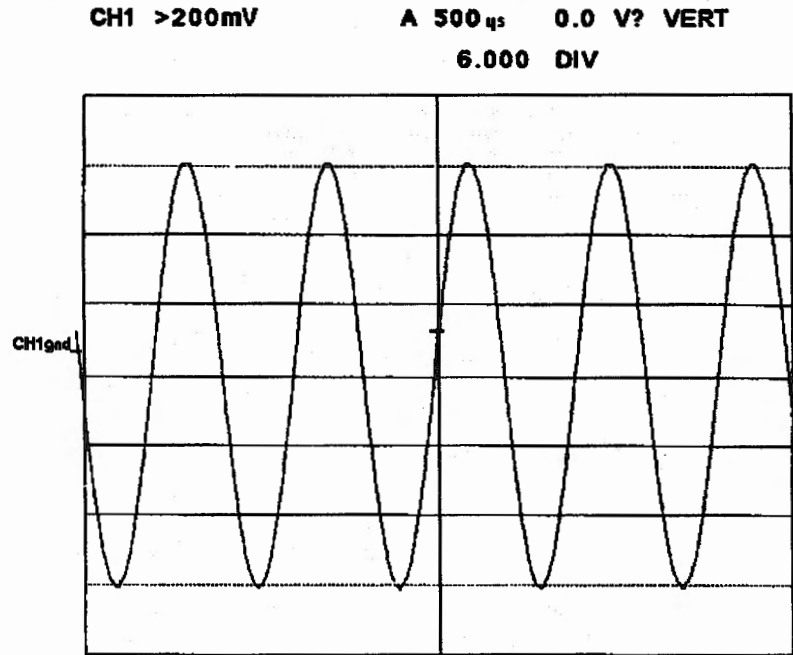
Figure 1-15 Receive Frequency Agility Test Setup

28. Set Signal Generator for 87.000 MHz signal at -30 dBm with 3 kHz deviation and 1 kHz tone.
29. Set Oscilloscope controls as follows:

CONTROL	SETTING
Channel 1 Vertical Scale	200 mV/Div
Channel 2 Vertical Scale	5 V/Div
Horizontal Sweep	500 $\mu$ s/Div
Trigger Source	Channel 1
Trigger Mode	Auto
Trigger Slope	Negative
Trigger Coupling	DC
Channel 1 Coupling	DC
Channel 2 Coupling	DC
Bandwidth	20 MHz
Trigger Position	1/4

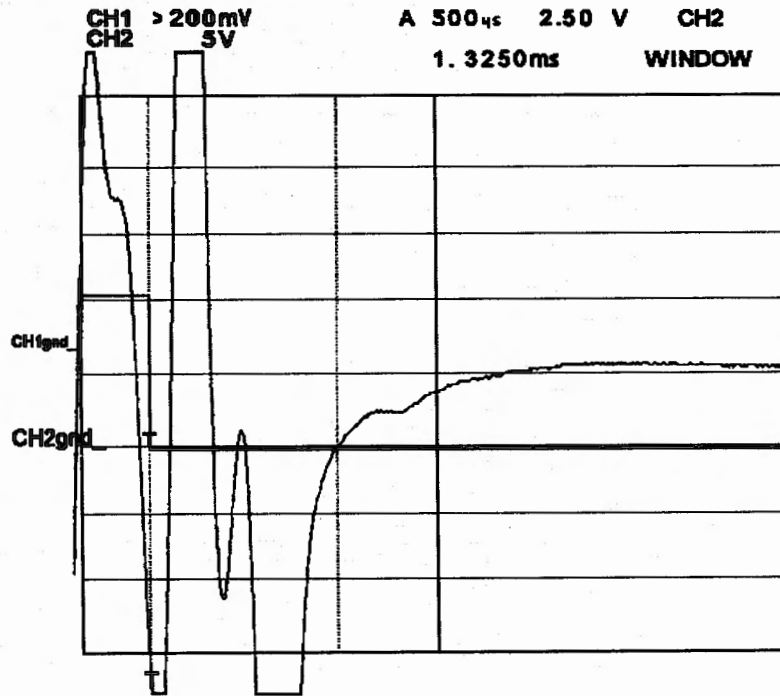
30. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
31. Press "More" F6 Key until "FM Z" F3 Key appears. Press "FM Z" F3 Key.
32. Center signal vertically on Oscilloscope, then remove the vertical gain from the calibrated position and adjust the vertical height so the positive peak is +3 divisions from center and negative peak is -3 divisions (Figure 1-16). (Oscilloscope is calibrated so each major division represents 1 kHz of peak deviation.)

**NOTE:** Moving the vertical gain or vertical offset after this point affects the calibration of this measurement and invalidates this verification.



8616029

Figure 1-16 Calibrated Signal on Oscilloscope



8616030

Figure 1-17 Receive Frequency Agility Test Signal

STEP

PROCEDURE

33. Set Oscilloscope controls as follows:

<u>CONTROL</u>	<u>SETTING</u>
Trigger Source	Channel 2
Trigger Mode	Normal
Trigger Level	2.5 V

34. Set Signal Generator modulation to Off.

35. Press SETUP Key and "AUX" F6 Key. Auxiliary Function Menu is displayed on Test Set.

36. Press "S.R." F1 Key.

37. Set Oscilloscope to view both Channel 1 and 2 as shown in Figure 1-17.

38. Verify demodulated signal level settles within  $\pm 1$  major vertical division or  $\pm 1$  kHz within 1.5 ms of trigger (falling edge of TTL signal on Oscilloscope Channel 2) (Figure 1-17).

- If reading is correct, go to Step 39.
- If reading is out of tolerance, go to Receive Frequency Agility Calibration Procedure (para 2-10-19).

39. Press "\*" F1 Key.

40. Remove power from Test Set and disconnect test equipment.



# CHAPTER 2 - CALIBRATION

## 2-1 GENERAL

PROCEDURE	TITLE	PAGE
2-10-1	Power Supply Calibration .....	2-14
2-10-2	VCXO Calibration .....	2-18
2-10-3	Metering DVM Calibration .....	2-20
2-10-4	Func Gen Level and VRMS Meter Calibration .....	2-21
2-10-5	GEN Output Level Calibration .....	2-25
2-10-6	RF Null Adjustment .....	2-27
2-10-7	Signal Meter Calibration .....	2-29
2-10-8	Deviation Meter Calibration .....	2-30
2-10-9	Modulation Meter Calibration .....	2-34
2-10-10	Phase Meter Calibration .....	2-36
2-10-11	Distortion Meter Calibration .....	2-38
2-10-12	SINAD Meter Calibration .....	2-40
2-10-13	GEN Modulation Calibration .....	2-43
2-10-14	Oscilloscope Calibration .....	2-48
2-10-15	Spectrum Analyzer Calibration .....	2-52
2-10-16	Digital Multimeter Calibration .....	2-58
2-10-17	Power Meter Calibration .....	2-61
2-10-18	Generate Frequency Agility Calibration .....	2-66
2-10-19	Receive Frequency Agility Calibration .....	2-72

The Calibration procedures are performed as an unit or individually.

These procedures should be performed as a result of one or more of the following conditions:

- If a defective module is replaced.
- If the Test Set fails any of the Verification Procedures.

Figure 2-1 lists the calibration procedures required based on the replacement of a specific module.

### 2-1-1 SAFETY PRECAUTIONS

As with any piece of electronic equipment, extreme caution should be taken when working with "live" circuits. Certain circuits and/or components within the Test Set contain extremely high voltage potentials, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH (see following WARNINGS)! When performing the Calibration, be sure to observe the following precautions:

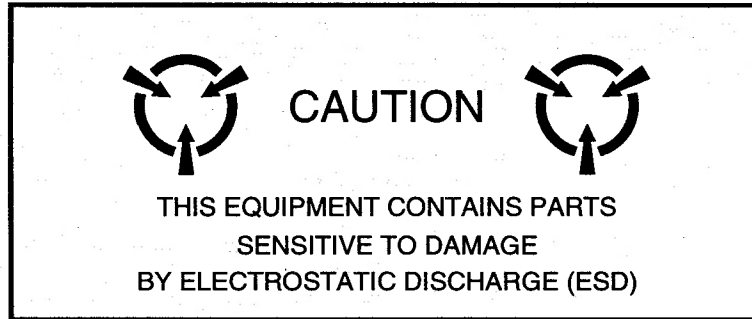
**WARNING: THE CRT ASSEMBLY CARRIES A VOLTAGE POTENTIAL OF OVER 18000 VDC WHEN THE TEST SET IS ENERGIZED.**

**REMOVE ALL JEWELRY OR OTHER COSMETIC APPAREL BEFORE PERFORMING ANY CALIBRATION PROCEDURES INVOLVING LIVE CIRCUITS.**

**HEED ALL WARNINGS AND CAUTIONS CONCERNING MAXIMUM VOLTAGES AND POWER INPUTS.**

### 2-1-2 ESD PRECAUTIONS

**CAUTION: THE CALIBRATION SHOULD ONLY BE PERFORMED IN AN ESD ENVIRONMENT AND ALL PERSONNEL PERFORMING THE CALIBRATION SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES OR BE ESD CERTIFIED.**



## **2-2 TEST EQUIPMENT REQUIREMENTS**

Appendix A contains a comprehensive list of test equipment suitable for performing any of the procedures listed in this manual. Any other equipment meeting the specifications listed in Appendix A may be substituted in place of the recommended models.

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

## **2-3 POWER REQUIREMENTS**

The following procedures are performed with an ac power source connected unless otherwise stated.

## **2-4 DISASSEMBLY REQUIREMENTS**

To perform the Calibration, the Top and Bottom Case Assemblies must be removed from the Test Set (refer to para 3-2-1 and 3-2-2).

## **2-5 CALIBRATION ADJUSTMENTS**

Before making any calibration adjustments, always observe the measurement. If the measurement is within the tolerances given, do not proceed with that adjustment. When an adjustment is required, attempt to obtain a precise measurement, instead of just within tolerance.

If settings are changed in the Calibration Screens, an on-screen message prompts the operator to backup the cal data factors in the backup RAM. Pressing "Y" is recommended.

## **2-6 CONTROLS, CONNECTORS AND INDICATORS**

Refer to para 2-1 in the Test Set Operation Manual for the location of each Control, Connector or Indicator used in the Calibration.

## **2-7 COMPLETION OF CALIBRATION PROCEDURES**

Upon completion of a specific Calibration Procedure, the Calibration may be terminated. Control settings, operating commands and test equipment do not carry over from one Calibration Procedure to another and are not assumed at the beginning of the next Calibration Procedure.

## **2-8 FACTORY DEFAULTS**

The Factory Defaults for the Test Set should be reset prior to performing any of the Calibration Procedures.

## **2-9 CALIBRATION RECORD**

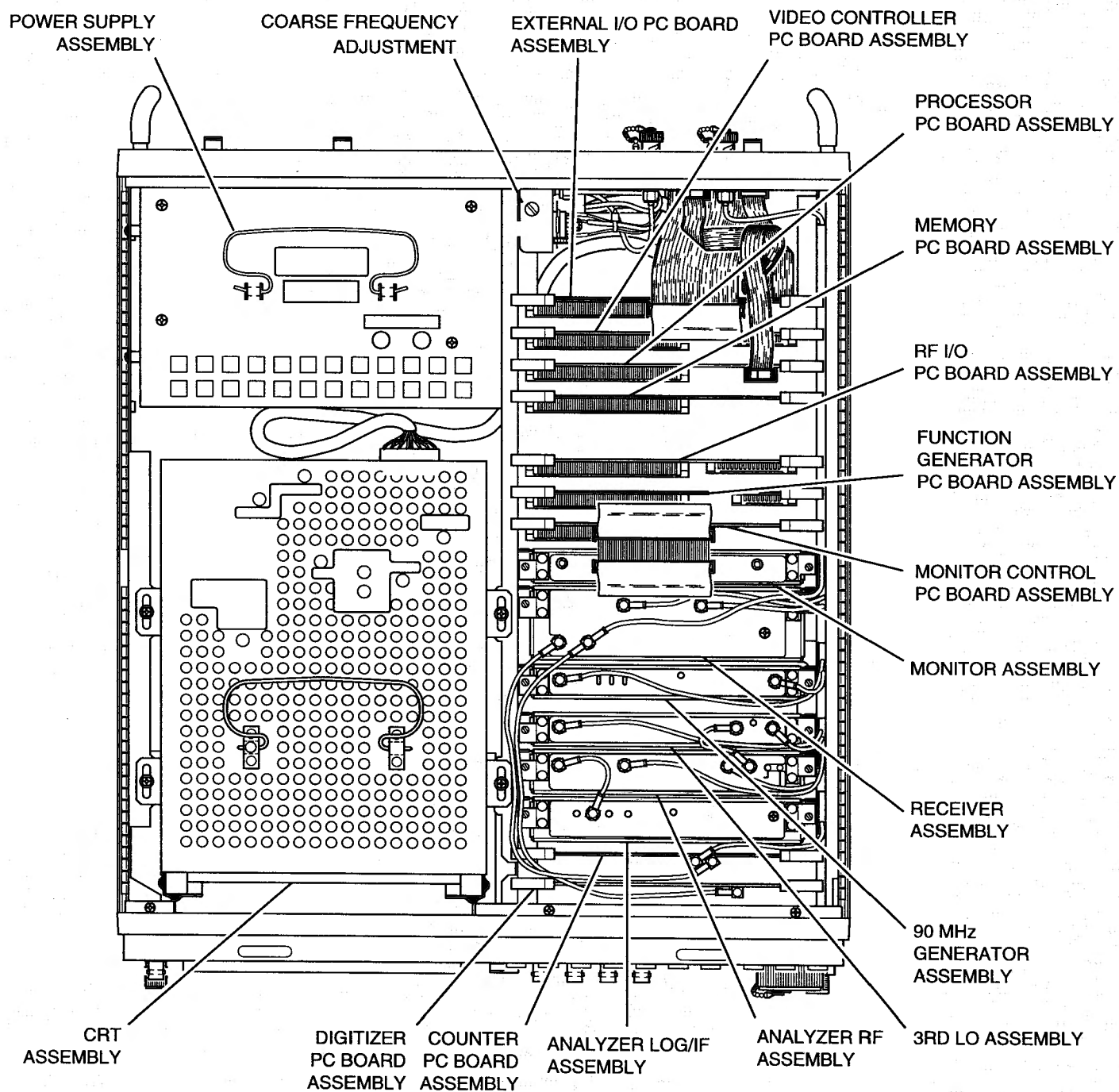
A Calibration Record is provided for recording the results obtained while performing the Calibration. It is recommended the technician reproduce copies of the Calibration Record, rather than use the copy in this manual.

IF THIS ASSEMBLY IS REPAIRED OR REPLACED	THE FOLLOWING CALIBRATION PROCEDURES MUST BE PERFORMED									
	POWER SUPPLY CALIBRATION 2-10-1	VCO CALIBRATION 2-10-2	METERING DVM CALIBRATION 2-10-3	FUNC GEN LEVEL AND VRMS METER CALIBRATION 2-10-4	GEN OUTPUT LEVEL CALIBRATION 2-10-5	RF NULL ADJUSTMENT 2-10-6	SIGNAL METER CALIBRATION 2-10-7	DEVIATION METER CALIBRATION 2-10-8	MODULATION METER CALIBRATION 2-10-9	PHASE METER CALIBRATION 2-10-10
DIGITIZER PC BOARD ASSEMBLY										
COUNTER PC BOARD ASSEMBLY										
ANALYZER LOG/IF ASSEMBLY										
ANALYZER RF ASSEMBLY										
3rd LO ASSEMBLY							•	•	•	•
90 MHz GENERATOR ASSEMBLY					•					
RECEIVER ASSEMBLY							•	•	•	•
MONITOR ASSEMBLY				•			•	•	•	•
MONITOR CONTROL PC BOARD ASSEMBLY			•	•			•	•	•	•
FUNCTION GENERATOR PC BOARD ASSEMBLY				•						
RF I/O PC BOARD ASSEMBLY		•								
MEMORY PC BOARD ASSEMBLY	•	•	•	•	•		•	•	•	•
PROCESSOR PC BOARD ASSEMBLY										
VIDEO CONTROLLER PC BOARD ASSEMBLY										
EXTERNAL I/O PC BOARD ASSEMBLY										
CRT ASSEMBLY										
POWER SUPPLY ASSEMBLY	•	•	•	•	•	•	•	•	•	•
FRONT PANEL ASSEMBLY										
REAR PANEL CONNECTOR PC BOARD ASSEMBLY										
REAR PANEL ASSEMBLY										
DMM ASSEMBLY										
2nd LO ASSEMBLY		•			•					
1st LO ASSEMBLY					•	•	•			
AUXILIARY POWER SUPPLY PC BOARD ASSEMBLY	•									
RECEIVE IF ASSEMBLY						•	•	•	•	•
GENERATOR IF ASSEMBLY					•					
ATTENUATOR PC BOARD ASSEMBLY					•					
POWER TERMINATION ASSEMBLY					•					
MOTHERBOARD PC BOARD ASSEMBLY										

IF THIS ASSEMBLY IS REPAIRED OR REPLACED	THE FOLLOWING CALIBRATION PROCEDURES MUST BE PERFORMED									APPENDIX B
	DISTORTION METER CALIBRATION 2-10-11	SINAD METER CALIBRATION 2-10-12	GEN MODULATION CALIBRATION 2-10-13	OSCILLOSCOPE CALIBRATION 2-10-14	SPECTRUM ANALYZER CALIBRATION 2-10-15	DIGITAL MULTIMETER CALIBRATION 2-10-16	POWER METER CALIBRATION 2-10-17	GENERATE FREQUENCY AGILITY CALIBRATION 2-10-18	RECEIVE FREQUENCY AGILITY CALIBRATION 2-10-19	
DIGITIZER PC BOARD ASSEMBLY				•	•					
COUNTER PC BOARD ASSEMBLY					•					
ANALYZER LOG/IF ASSEMBLY					•					
ANALYZER RF ASSEMBLY					•					
3rd LO ASSEMBLY								•		
90 MHz GENERATOR ASSEMBLY			•					•	•	
RECEIVER ASSEMBLY										
MONITOR ASSEMBLY	•	•					•			
MONITOR CONTROL PC BOARD ASSEMBLY	•	•					•			
FUNCTION GENERATOR PC BOARD ASSEMBLY			•							
RF I/O PC BOARD ASSEMBLY										
MEMORY PC BOARD ASSEMBLY	•	•	•		•		•			
PROCESSOR PC BOARD ASSEMBLY										
VIDEO CONTROLLER PC BOARD ASSEMBLY										
EXTERNAL I/O PC BOARD ASSEMBLY										
CRT ASSEMBLY										
POWER SUPPLY ASSEMBLY	•	•	•	•	•	•	•			
FRONT PANEL ASSEMBLY										
REAR PANEL CONNECTOR PC BOARD ASSEMBLY										
REAR PANEL ASSEMBLY										
DMM ASSEMBLY						•				
2nd LO ASSEMBLY			•							
1st LO ASSEMBLY			•					•	•	
AUXILIARY POWER SUPPLY PC BOARD ASSEMBLY										
RECEIVE IF ASSEMBLY					•					
GENERATOR IF ASSEMBLY			•							•
ATTENUATOR PC BOARD ASSEMBLY										
POWER TERMINATION ASSEMBLY							•			
MOTHERBOARD PC BOARD ASSEMBLY										

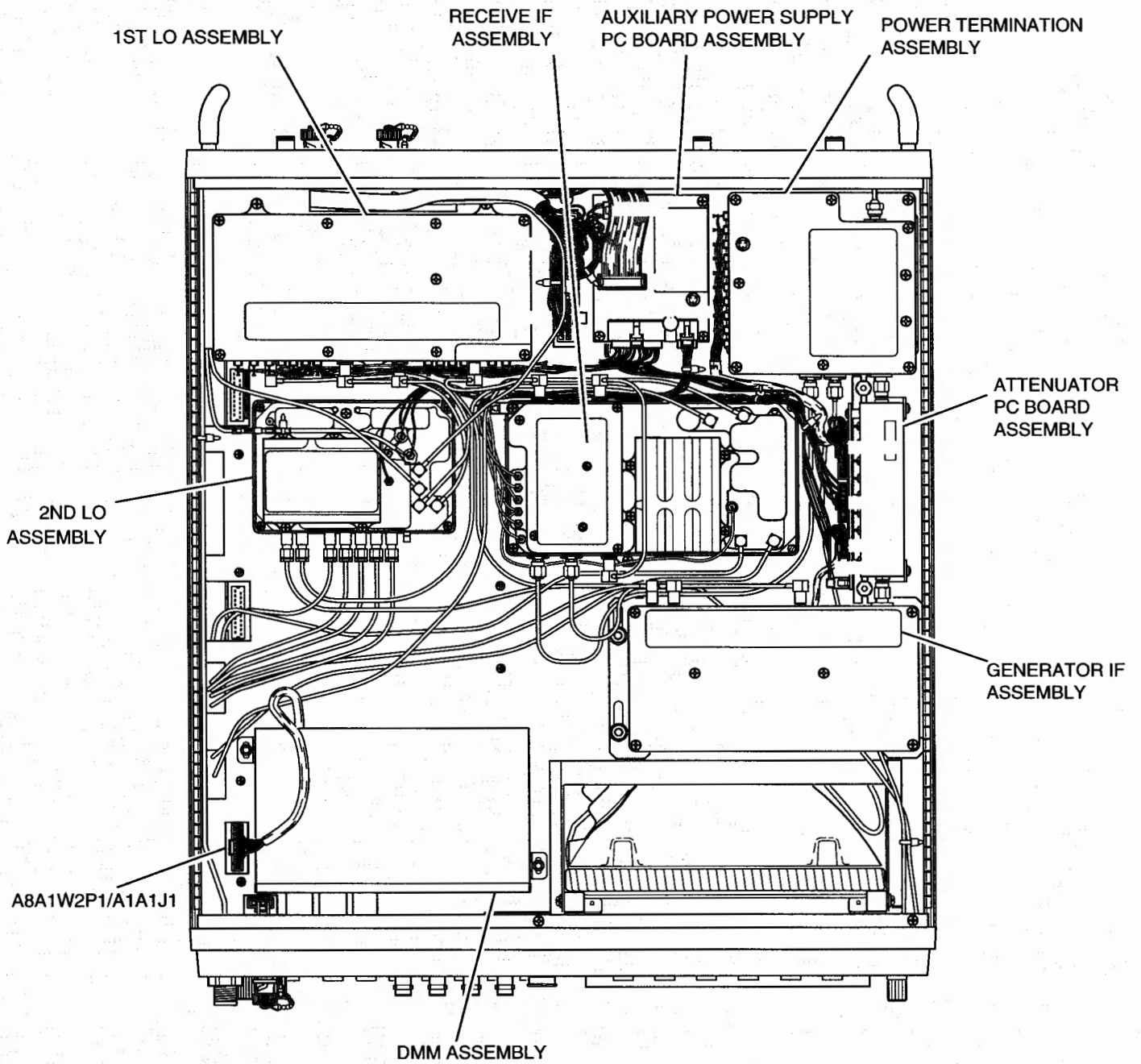
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Figure 2-1 Module Replacement and Calibration Requirements



8607343

Figure 2-2 Calibration Adjustments and Test Points - Top View



8607344

Figure 2-3 Calibration Adjustments and Test Points - Bottom View

TS-4317-2 CALIBRATION RECORD

Technician: \_\_\_\_\_ S/N: \_\_\_\_\_

Date: \_\_\_\_\_

PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-1</b>		<b>POWER SUPPLY CALIBRATION</b>		
	5	+5 Vdc (+5.0 to +5.1 Vdc)	_____	_____ (√)
	7	+15 Vdc (+15.0 to +15.1 Vdc)	_____	_____ (√)
	8	-15 Vdc (-14.25 to -15.75 Vdc)	_____	
	9	+12 Vdc (+11.8 to +12.1 Vdc)	_____	
	10	+34 Vdc (+32.5 to +35.5 Vdc)	_____	
<b>2-10-2</b>		<b>VCXO CALIBRATION</b>		
	12	Soft Cal	_____	_____ (√)
	15	Hard Cal	_____	_____ (√)
<b>2-10-3</b>		<b>METERING DVM CALIBRATION</b>		
	4	4.0960 V (±10 mV)	_____	
		4.0960 V (±0.002 V)		_____ (√)
<b>2-10-4</b>		<b>FUNC GEN LEVEL AND VRMS METER CALIBRATION</b>		
		<b>FUNC GEN LEVEL</b>		
	16	199.9 mV (±1 mV)	_____	_____ (√)
	18	2.500 V (±10 mV)	_____	_____ (√)
	28	0.000 V (±10 mV)	_____	_____ (√)
	31	0.000 V (±10 mV)	_____	_____ (√)
	35	Record GEN1 reading	_____	
	38	GEN2 reading matches GEN1 reading (±5 mV)	_____	_____ (√)
		<b>VRMS METER</b>		
	42	VRMS Meter Soft Cal	_____	_____ (√)

PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-5</b>		<b>GEN OUTPUT LEVEL CALIBRATION</b>		
	9	Range 1: 250 kHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		499 kHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 1 Soft Cal	_____	_____ (√)
		Range 2: 500 kHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		999 kHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 2 Soft Cal	_____	_____ (√)
		Range 3: 1 MHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		49 MHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 3 Soft Cal	_____	_____ (√)
		Range 4: 50 MHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		124 MHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 4 Soft Cal	_____	_____ (√)
		Range 5: 125 MHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		199 MHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 5 Soft Cal	_____	_____ (√)
		Range 6: 200 MHz RF Low Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		399 MHz RF High Frequency	_____ (√)	
		0 dBm (<±1.0 dB)	_____	
		Range 6 Soft Cal	_____	_____ (√)

PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-5</b>		<b>GEN OUTPUT LEVEL CALIBRATION (cont)</b>		
	9	Range 7: 400 MHz RF Low Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		599 MHz RF High Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		Range 7 Soft Cal	_____	_____ (✓)
		Range 8: 600 MHz RF Low Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		799 MHz RF High Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		Range 8 Soft Cal	_____	_____ (✓)
		Range 9: 800 MHz RF Low Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		999 MHz RF High Frequency	_____ (✓)	
		0 dBm (<±1.0 dB)	_____	
		Range 9 Soft Cal	_____	_____ (✓)
<b>2-10-6</b>		<b>RF NULL ADJUSTMENT</b>		
	7	1st LO signal amplitude is <10 dBm as displayed on Analyzer Screen	_____	
	8	1st LO signal amplitude <0 dBm	_____	_____ (✓)
<b>2-10-7</b>		<b>SIGNAL METER CALIBRATION</b>		
	6	Signal is <100 at -33 dBm	_____	
	7	Signal is >97 at -30 dBm	_____	
	11	Signal Meter Soft Cal	_____	_____ (✓)



PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-8</b>		<b>DEVIATION METER CALIBRATION</b>		
		<b>DEVIATION METER</b>		
	20	Plus (+) and Minus (-) deviation is within 200 Hz	_____	
	26	10 kHz (+) Deviation Meter Soft Cal		_____ (✓)
	28	10 kHz (-) Deviation Meter Soft Cal		_____ (✓)
	29	10 kHz Deviation readings are within 3% ( $\pm 1$ Count) of reading on Measuring Receiver	_____ (✓) (Positive) _____ (✓) (Negative)	
	33	20 kHz (+) Deviation Meter Soft Cal		_____ (✓)
	35	20 kHz (-) Deviation Meter Soft Cal		_____ (✓)
	36	20 kHz Deviation readings are within 3% ( $\pm 1$ Count) of reading on Measuring Receiver	_____ (✓) (Positive) _____ (✓) (Negative)	
	40	50 kHz (+) Deviation Meter Soft Cal		_____ (✓)
	42	50 kHz (-) Deviation Meter Soft Cal		_____ (✓)
	43	50 kHz Deviation readings are within 3% ( $\pm 1$ Count) of reading on Measuring Receiver	_____ (✓) (Positive) _____ (✓) (Negative)	
	47	100 kHz (+) Deviation Meter Soft Cal		_____ (✓)
	49	100 kHz (-) Deviation Meter Soft Cal		_____ (✓)
	50	100 kHz Deviation readings are within 3% ( $\pm 1$ Count) of reading on Measuring Receiver	_____ (✓) (Positive) _____ (✓) (Negative)	
		<b>DEVIATION METER (RMS)</b>		
	60	FM (RMS) Deviation Meter Soft Cal		_____ (✓)
<b>2-10-9</b>		<b>MODULATION METER CALIBRATION</b>		
	24	AM Soft Cal		_____ (✓)
	25	Modulation reading is within 5% of reading on Measuring Receiver ( $\pm 1$ Count)	_____ (✓)	

PARA	STEP	DATA	RESULT	CAL ADJ?
------	------	------	--------	----------

**2-10-10 PHASE METER CALIBRATION**

	14	PM Soft Cal		_____ (✓)
	18	PM (RMS) Soft Cal		_____ (✓)

**2-10-11 DISTORTION METER CALIBRATION**

	6	0.00 dB is displayed	_____ (✓)	
	8	Record 0 dB Amplitude setting	_____	
	9	Record Amplitude settings:		

-20.0 dB (10%)	
----------------	--

	20	Distortion Soft Cal		_____ (✓)
--	----	---------------------	--	-----------

**2-10-12 SINAD METER CALIBRATION**

	6	0.00 dB is displayed	_____ (✓)	
	8	Record 0 dB Amplitude setting	_____	
	9	Record Amplitude settings:		

dB RELATIVE	SINAD	
-9.54 dB	10 dB	

	20	SINAD Soft Cal		_____ (✓)
	35	Set Threshold		_____ (✓)

**2-10-13 GEN MODULATION CALIBRATION**

	12	Peak Residual AM	_____	
	17	AM Modulation reading is within $\pm 5\%$ of Test Set setting less Peak Residual AM	_____ (✓)	
	22	AM Soft Cal	_____	_____ (✓)
		AM Hard Cal		_____ (✓)
	27	Peak Residual FM Residual FM is <140 Hz	_____	
	31	5 kHz deviation reading is within 5% of deviation setting less Peak Residual FM (122.0000 MHz)	_____ (✓)	

PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-13</b>		<b>GEN MODULATION CALIBRATION (cont)</b>		
	34	5 kHz deviation reading is within 5% of deviation setting less Peak Residual FM (122.0001 MHz)	_____ (✓)	
	38	FM Narrow Soft Cal	_____	_____ (✓)
	39	FM Hard Cal	_____	_____ (✓)
	45	FM Wide Soft Cal	_____	_____ (✓)
	46	80 kHz deviation reading is within 5% of deviation setting less Peak Residual FM	_____ (✓)	
	50	Residual PM	_____	
		Residual PM is <0.05 Rad peak	_____ (✓)	
	54	6 Rad reading is within 5% of Rad setting less Residual PM reading	_____ (✓)	
	58	PM Soft Cal	_____	_____ (✓)
<b>2-10-14</b>		<b>OSCILLOSCOPE CALIBRATION</b>		
	8	Oscilloscope Offset 0.000 Vdc ( $\pm 0.01$ Vdc)	_____	_____ (✓)
	10	Oscilloscope Preamp Offset 0.000 Vdc ( $\pm 0.01$ Vdc)	_____	_____ (✓)
	32	Amplitude Cal 120 mVp-p ( $\pm 8$ mV)	_____	_____ (✓)
	39	Square Wave Shape (500 mV)	_____	_____ (✓)
	41	Square Wave Shape (1 V)	_____	_____ (✓)
<b>2-10-15</b>		<b>SPECTRUM ANALYZER CALIBRATION</b>		
		<b>LOGARITHMIC AMPLIFIER</b>		
	12	-48 dBm	_____	_____ (✓)
	14	1.38 V ( $\pm 5$ mV) (Log Amp Gain)	_____	_____ (✓)
	16	0.4 V ( $\pm 5$ mV) (Log Amp Offset)	_____	_____ (✓)
		<b>NORMALIZER</b>		
	17	Eight Division Lines meet appropriate Values ( $\pm 20$ mV, 1 dB)	_____ (✓)	
	26	Analyzer System Gain Hard Cal	_____	_____ (✓)
		<b>DISPERSION</b>		
	32	Analyzer Dispersion Center Hard Cal	_____	_____ (✓)
	37	Analyzer Dispersion Gain Hard Cal	_____	_____ (✓)

PARA	STEP	DATA	RESULT	CAL ADJ?
------	------	------	--------	----------

**2-10-15 SPECTRUM ANALYZER CALIBRATION (cont)**

	40	Analyzer Horizontal Offset Soft Cal	_____	(√)
		<b>SPECTRUM ANALYZER BANDWIDTH AGREEMENT</b>		
	44	3 MHz Bandwidth (Appendix C) required	_____	(√)
		30 kHz Bandwidth Hard Cal	_____	(√)
		3 kHz Bandwidth Hard Cal	_____	(√)
		300 Hz Bandwidth Hard Cal	_____	(√)

**2-10-16 DIGITAL MULTIMETER CALIBRATION**

	10	1.000 Vdc ( $\pm 0.05$ Vdc) (Ref Adjust)	_____	(√)
	13	100 mV ( $\pm 0.5$ mV) (Ref Adjust)	_____	(√)
	17	100 k $\Omega$ ( $\pm 10$ k $\Omega$ )	_____	
	19	1 k $\Omega$ ( $\pm 100$ $\Omega$ )	_____	
	20	Ohms Adjustment Hard Cal	_____	(√)
	24	7 V ( $\pm 1$ V) (Freq Compensation)	_____	(√)
	27	1 V ( $\pm 0.1$ V) (Freq Compensation)	_____	(√)

**2-10-17 POWER METER CALIBRATION**

Record following:

EQUIPMENT	85 MHz
DIRECTIONAL COUPLER - FORWARD	

	12	20 mV ( $\pm 2$ mV) (2 W Range Zero)	_____	(√)
	14	10 mV ( $\pm 2$ mV) (20 W Range Zero)	_____	(√)
	19	4.00 V ( $\pm 100$ mV) (2 W Range Gain)	_____	(√)
	22	1.97 V ( $\pm 100$ mV) (20 W Range Gain)	_____	(√)
	25	Raw Data Zero Value ( $\approx 270$ )	_____	(√)
	27	Raw Data Zero Value ( $\approx 130$ )	_____	(√)
	31	Power reading is displayed	_____	(√)
	32	2 W Range (Raw Data Zero Value $\approx 46000$ )	_____	(√)
	35	Power reading is displayed	_____	(√)
	36	200 W Range (Raw Data Zero Value $\approx 46000$ )	_____	(√)

PARA	STEP	DATA	RESULT	CAL ADJ?
<b>2-10-18</b>		<b>GENERATE FREQUENCY AGILITY CALIBRATION</b>		
	11	1 kHz of 90 MHz in <1.5 ms from Trigger	-----	
		<b>FINE LOOP ADJUST</b>		
	17	-8 V ( $\pm 200$ mV) (90 MHz Fine Loop Oscillator Adjust)	-----	----- (✓)
	19	Voltage in Step 17 ( $\pm 5$ mV) (90 MHz Fine Loop Pre-Position)	-----	----- (✓)
		<b>COARSE LOOP ADJUST</b>		
	23	-7.5 V ( $\pm 1.25$ V)	-----	
	25	Voltage in Step 23 ( $\pm 5$ mV) (90 MHz Coarse Loop Pre-Position)	-----	----- (✓)
<b>2-10-19</b>		<b>RECEIVE FREQUENCY AGILITY CALIBRATION</b>		
	10	1 kHz of 87 MHz in <1.5 ms from Trigger	-----	
		<b>COARSE LOOP ADJUST</b>		
	16	0.0 V ( $\pm 5$ mV) (3rd LO Pre-Position Zero Adjust)	-----	----- (✓)
	18	-7.5 V ( $\pm 1.25$ V)	-----	
	20	Voltage in Step 18 ( $\pm 5$ mV) (3rd LO Coarse Loop Pre-Position Gain)	-----	----- (✓)
		<b>FINE LOOP ADJUST</b>		
	25	-6 V ( $\pm 200$ mV) (3rd LO Fine Loop Oscillator Adjust)	-----	----- (✓)
	27	Voltage in Step 25 ( $\pm 5$ mV) (3rd LO Fine Loop Pre-Position)	-----	----- (✓)
		<b>SUMMING LOOP</b>		
	32	-6 V ( $\pm 200$ mV) (3rd LO Summing Loop Oscillator Adj)	-----	----- (✓)
	36	Voltage in Step 32 ( $\pm 5$ mV) 3rd LO Summing Loop Pre-Position)	-----	----- (✓)

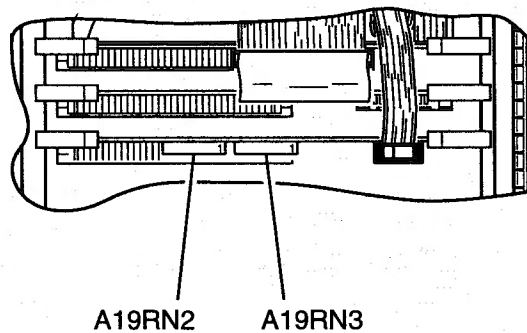
## 2-10 CALIBRATION PROCEDURES

### 2-10-1 POWER SUPPLY CALIBRATION

**NOTE:** If the Power Supply is adjusted, the complete Verification and any resultant Calibration procedures should be performed.

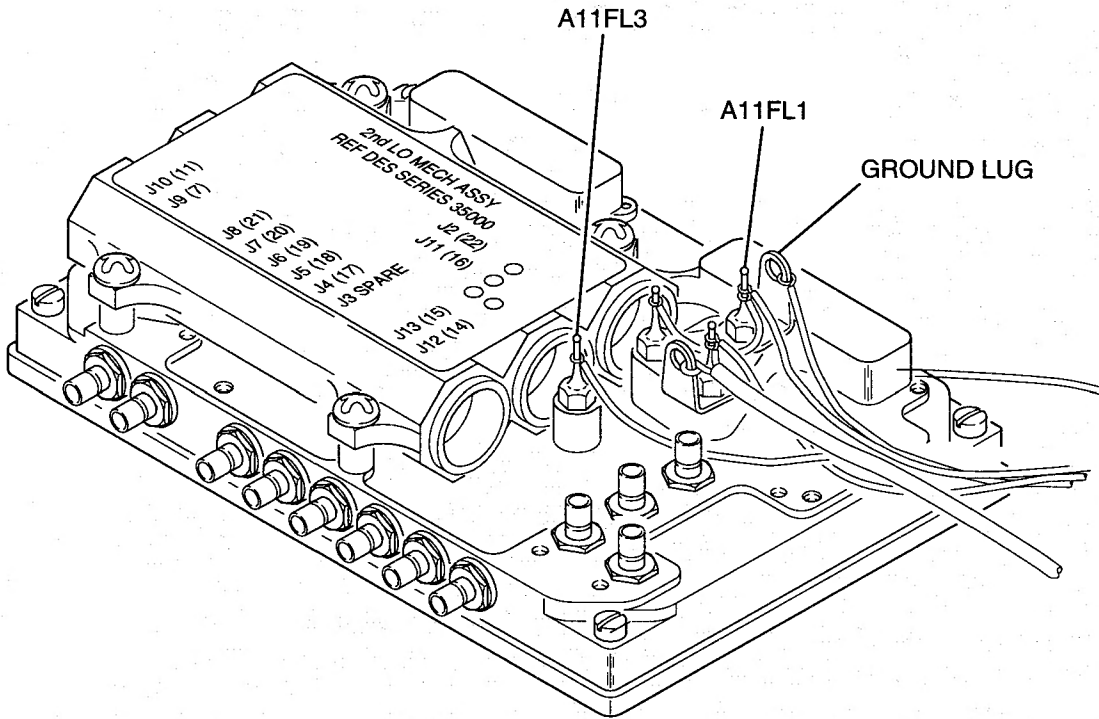
PREREQUISITES:	None
EQUIPMENT REQUIRED:	1 Digital Multimeter (DMM)
FIGURE REFERENCES:	Figure 2-5 Figure 2-6 Figure 2-7

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>● Press MTRS MODE Key.</li><li>● Press "AUX" F6 Key.</li><li>● Press RCL Key.</li><li>● Press SHIFT Key.</li><li>● Press 7 (A) Key.</li><li>● Press ENTER Key.</li></ul>
3.	Connect Digital Multimeter ground lead to chassis ground.
4.	Connect Digital Multimeter positive lead to A19RN2, Pin 1 (Figure 2-4).
5.	Verify +5 Vdc (+5.0 to +5.1 Vdc). Adjust A16A3R37 (Figure 2-7) only if required.
6.	Connect Digital Multimeter positive lead to A11FL1 (Red Wire) (Figure 2-5) and Digital Multimeter negative lead to ground lug (Black Wire) (Figure 2-5).
7.	Verify +15 Vdc (+15 to +15.1 Vdc). Adjust A16A3R25 (Figure 2-7) only if required.
8.	Connect Digital Multimeter positive lead to A11FL3 (Yellow Wire) (Figure 2-5). Verify -15 Vdc (-14.25 to -15.75 Vdc).
9.	Connect Digital Multimeter positive lead to A16A2J2, Pin 6 (Blue Wire) (Figure 2-7). Verify +12 Vdc (+11.8 to +12.1 Vdc).
10.	Connect Digital Multimeter positive lead to A10FL16 (Violet Wire) (Figure 2-6). Verify +34 Vdc (+32.5 to +35.5 Vdc).
11.	Perform one of the following: <ul style="list-style-type: none"><li>● If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.</li><li>● If this procedure is performed as part of a complete Calibration, disconnect test equipment and proceed at Step 2 of para 2-10-2.</li></ul>



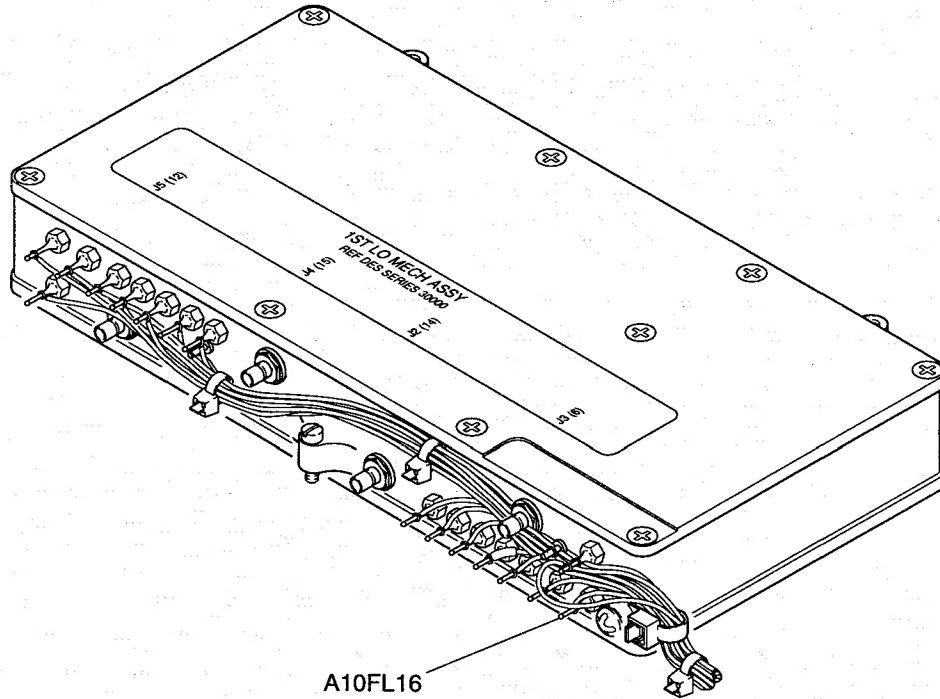
8619004

Figure 2-4 Processor PC Board Assembly (78A1A19) Test Points



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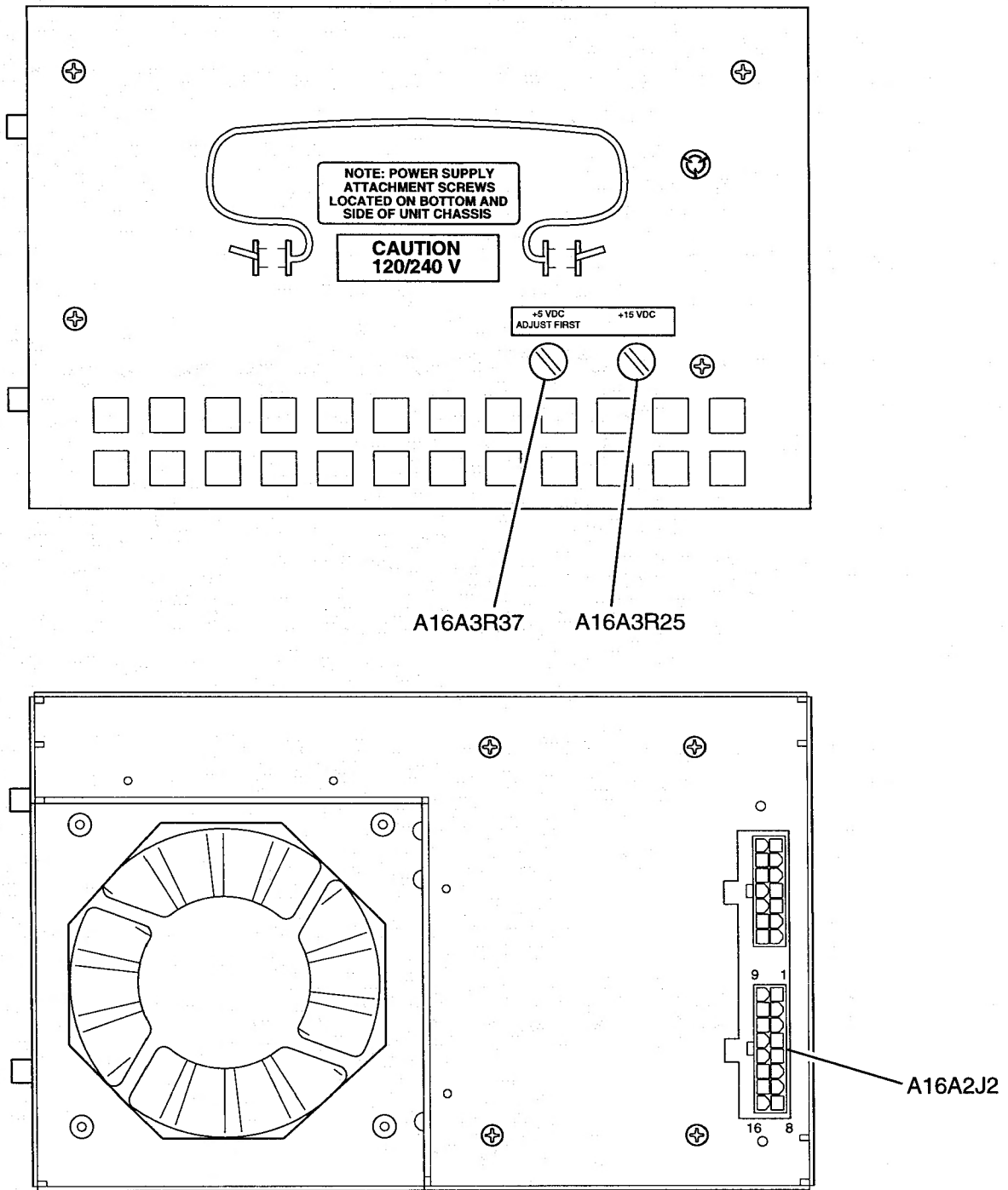
Figure 2-5 2nd LO Assembly (78A1A11) Calibration Points



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Figure 2-6 1st LO Assembly (78A1A10) Test Points





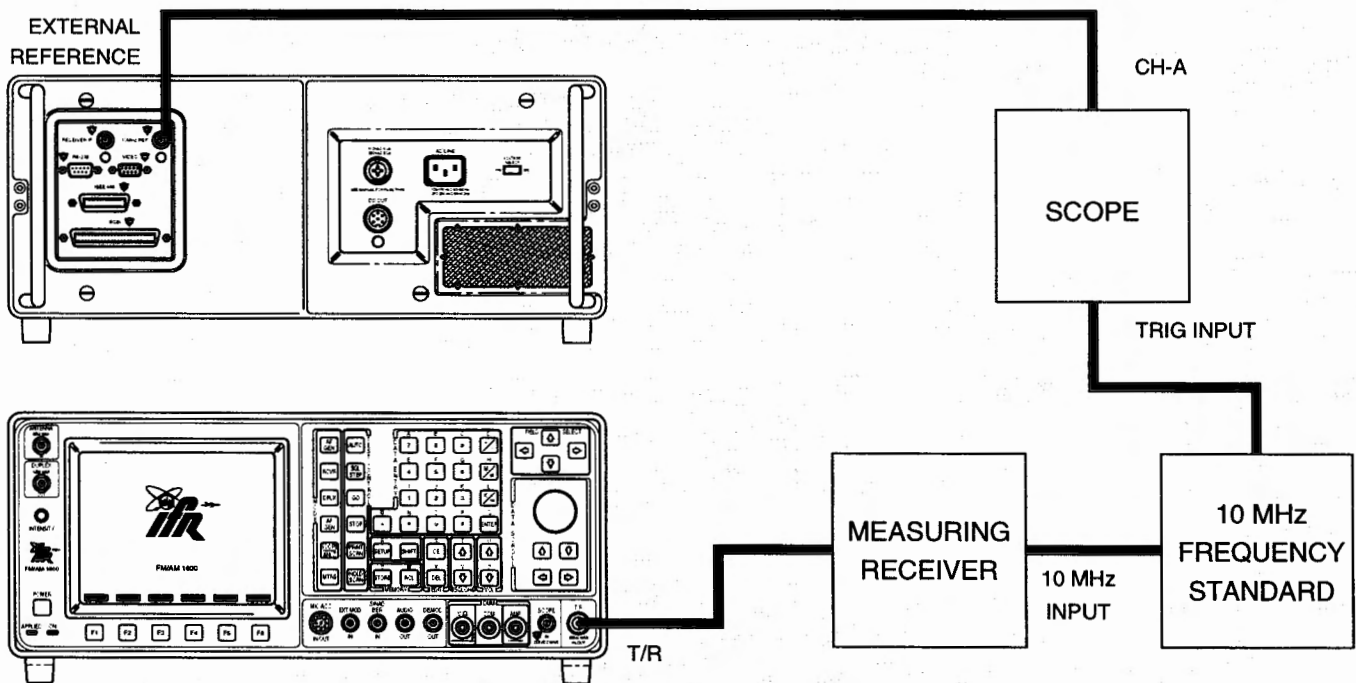
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Figure 2-7 Power Supply Assembly (78A1A16) Calibration Points

## 2-10-2 VCXO CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	1 10 MHz Frequency Standard 1 Measuring Receiver with Sensor 1 Oscilloscope
FIGURE REFERENCES:	Figure 2-8

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Connect test equipment as shown in Figure 2-8.



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Figure 2-8 VCXO Calibration Test Setup

4. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.

## STEP

## PROCEDURE

5. Use FIELD SELECT Keys to select RF data field. Press ENTER Key. Use DATA ENTRY Keypad to set RF data field to **900.0000 MHz**. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **0.0**. Press ENTER Key.
7. On Measuring Receiver, press 7.1 SPCL Key to enable 10 Hz frequency resolution.
8. Set Oscilloscope controls as follows:

CONTROL	SETTING
V/Div	As required for Stable Display
Sweep	50 ns
Trigger	Ext

9. Insert Lockout Key in MIC/ACC IN/OUT Connector.
  10. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
  11. Use FIELD SELECT Keys to move cursor to "12. VCXO Calibration." Press ENTER Key. Select Attn submenu appears with highlighted data field.
  12. Using DATA SCROLL Keys, slew cursor to least significant digit in Select Attn field.
- NOTE:** Before performing Steps 13-16, the Test Set should be temperature stable for 2 Hours.
13. Observing the frequency on Measuring Receiver for coarse frequency reference, use DATA SCROLL Spinner to adjust waveform on Oscilloscope for minimum motion and/or rotation. Press ENTER Key. If adjustment range is **<0** or **>4095**, set Select Attn field to **2048** and perform Steps 14 through 16; otherwise continue at Step 17.
  14. Remove screw on top of 10 MHz Frequency Standard to access coarse frequency adjustment (Figure 2-2).
  15. Adjust for minimum motion of waveform on Oscilloscope.
  16. Replace screw in 10 MHz Frequency Standard and repeat Steps 10-13.
  17. Perform associated Verification Procedure in Chapter 1.

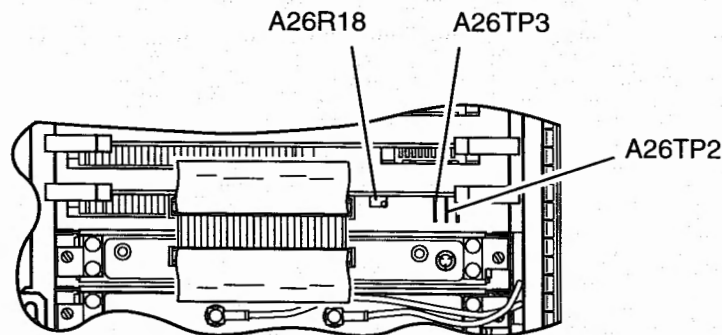
## 2-10-3 METERING DVM CALIBRATION

PREREQUISITES: Power Supply Calibration (para 2-10-1)

EQUIPMENT REQUIRED: 1 Digital Multimeter (DMM)

FIGURE REFERENCES: Figure 2-9

- | STEP         | PROCEDURE  |
|--------------|--|
| 1.           | Connect DMM negative lead to A26TP3 (Figure 2-9) and positive lead to A26TP2 (Figure 2-9).   |
| 2.           | Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.   |
| 3.           | Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>   |
| <b>NOTE:</b> | If reading in Step 4 requires adjustment, paragraphs 2-10-7, 2-10-8, 2-10-9, 2-10-10, 2-10-11, 2-10-12, 2-10-13 and 2-10-17 are required to be performed.  |
| 4.           | Verify Digital Multimeter displays 4.0960 V ( $\pm 10$ mV). Adjust A26R18 (Figure 2-9), if necessary, until Digital Multimeter displays 4.0960 V ( $\pm 0.002$ V).   |
| 5.           | Perform one of the following: <ul style="list-style-type: none"><li>• If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.</li><li>• If this procedure is performed as part of a complete Calibration, disconnect test equipment and proceed at Step 2 of para 2-10-4.</li></ul> |



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Figure 2-9 Monitor Control PC Board Assembly (78A1A26) Calibration Points

## 2-10-4 FUNC GEN LEVEL AND VRMS METER CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1) Metering DVM Calibration (para 2-10-3)
EQUIPMENT REQUIRED:	1 Audio Analyzer 1 Digital Multimeter (DMM) 1 Extender Board (7010-7839-900)
FIGURE REFERENCES:	Figure 2-10 Figure 2-11

### STEP

### PROCEDURE

1. Install Function Generator PC Board Assembly (78A1A24) on Extender Board:
    - Remove Function Generator PC Board Assembly (78A1A24) (para 3-2-8).
    - Install Extender Board.
    - Install Function Generator PC Board Assembly (78A1A24) on Extender Board.
  2. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
  3. Set Test Set to Factory Defaults:
    - Press MTRS MODE Key.
    - Press "AUX" F6 Key.
    - Press RCL Key.
    - Press SHIFT Key.
    - Press 7 (A) Key.
    - Press ENTER Key.
  4. Connect test equipment as shown in Figure 2-10.
  5. Set DMM to VAC RMS and Auto Ranging.
- FUNC GEN LEVEL**
6. Insert Lockout Key in MIC/ACC IN/OUT Connector.
  7. Press "AUX" F5 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
  8. Press SHIFT Key and 5 (F) Key. Func Gen Level Calibrations submenu is displayed.
  9. Press 1 (I) Key to highlight "1. 199.9 mV" data field.
  10. Use DATA SCROLL Keys to edit value in highlighted data field until reading on Digital Multimeter equals 199.9 mV ( $\pm 1$  mV). Press ENTER Key.
  11. Press 2 (J) Key to highlight "2. 2.5 V" data field.
  12. Use DATA SCROLL Keys to enter value in highlighted data field until reading on Digital Multimeter equals 2.500 V ( $\pm 10$  mV). Press ENTER Key.
  13. Press "ESC" F6 Key.
  14. Press AF GEN Key. AF Generator Operation Screen is displayed on Test Set.

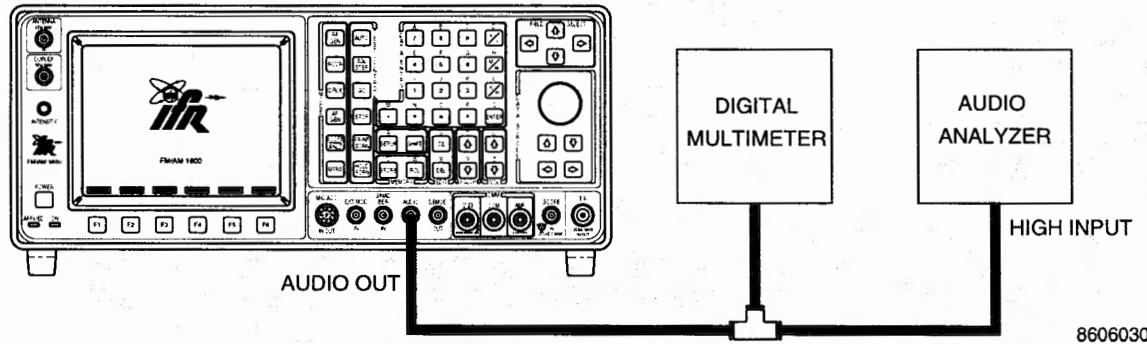


Figure 2-10 Func Gen Level and VRMS Meter Calibration Setup

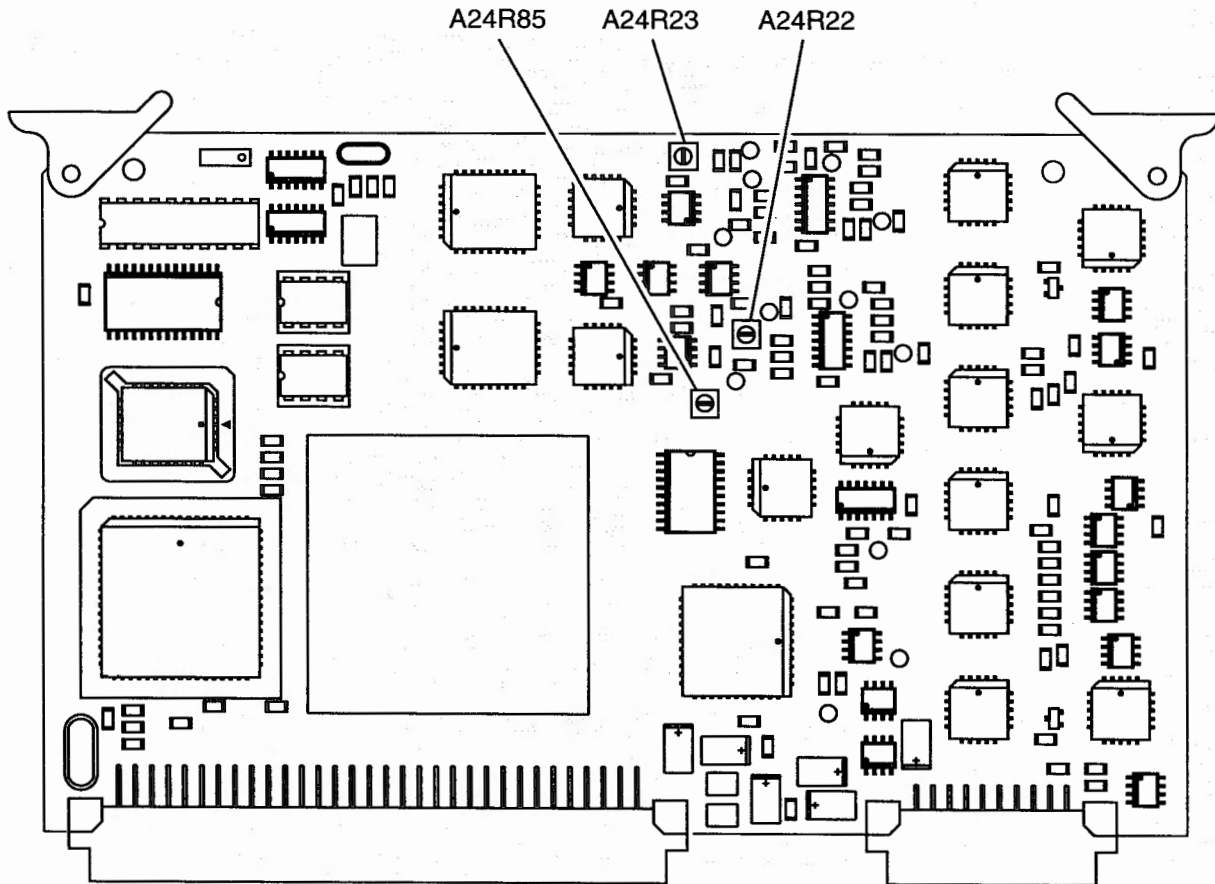


Figure 2-11 Function Generator PC Board Assembly (78A1A24) Calibration Points

## STEP

## PROCEDURE

15. Press SETUP Key. AF Generator Menu is displayed and "1. AF Gen #1 Setup" is highlighted.
16. Press ENTER Key. Func Gen 1 submenu appears. Press ENTER Key to set "1. Func Gen 1" to **Off**.
17. Press 2 (J) Key to highlight Freq data field. Use DATA ENTRY Keypad to set frequency to **1000.0 Hz**. Press ENTER Key.
18. Press 3 (K) Key. Waveform submenu is displayed. Press 7 (A) Key to set waveform to **0 Lvl**.
19. Press "ESC" F6 Key.
20. Press 2 (J) Key to access AF Gen 2 submenu.
21. Press 1 (I) Key to set AF Gen 2 to **On**.
22. Press 2 (J) Key to highlight Freq data field. Use DATA ENTRY Keypad to set frequency to **1000.0 Hz**. Press ENTER Key.
23. Press 3 (K) Key. Waveform submenu is displayed. Press 7 (A) Key to set waveform to **0 Lvl**.
24. Press "ESC" F6 Key.
25. Press 5 (F) Key to access AF Gen Setup submenu.
26. Press 1 (I) Key to set "1. To Audio Out Conn" to **On**.
27. Press 2 (J) Key to set "2. To Speaker" to **On**.
28. Press 5 (F) Key to set "5. Proportional Output" to **Off**.
29. Press "ESC" F6 Key.
30. Press AF GEN Key. AF Generator Operation Screen is displayed on Test Set.
31. Connect Digital Multimeter to AUDIO OUT Connector.
32. Set Digital Multimeter to Vdc and Auto Ranging.
33. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set level to **3.1**. Press ENTER Key.
34. Verify 0.000 V ( $\pm 10$  mV) is displayed on Digital Multimeter. Adjust A26R22 (GEN2 OFFSET) (Figure 2-11) if necessary.
35. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key to set GEN 2 to **Off**.
36. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to set GEN 1 to **On**.
37. Verify 0.000 V ( $\pm 10$  mV) is displayed on Digital Multimeter. Adjust A26R23 (GEN1 OFFSET) (Figure 2-11) if necessary.
38. Use FIELD SELECT Keys to move cursor to GEN 1. WAVE. Press ENTER Key. Use DATA SCROLL Keys to select **Sine**. Press ENTER Key.
39. Use FIELD SELECT Keys to move cursor to GEN 2. WAVE. Press ENTER Key. Use DATA SCROLL Keys to select **Sine**. Press ENTER Key.

**STEP****PROCEDURE**

---

40. Set DMM to VAC.
41. Record GEN1 reading as reference.
42. Use FIELD SELECT Keys to move cursor to GEN 1. Press ENTER Key to set GEN 1 to **Off**.
43. Use FIELD SELECT Keys to move cursor to GEN 2. Press ENTER Key to set GEN 2 to **On**.
44. Adjust A26R85 (GEN2 GAIN BALANCE) (Figure 2-11), if necessary, to match GEN2 reading to GEN1 reading ( $\pm 5$  mV) recorded in Step 41.

**VRMS METER**

45. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
46. Press 8 (B) Key to access METER Cal VRMS Screen. Press ENTER Key to access "Proper Reading" data field.
47. Use DATA ENTRY Keypad to enter digits of DMM Vrms reading. Press ENTER Key.
48. Press "Ret" F5 Key and "AUX" F6 Key.
49. Perform associated Verification Procedure in Chapter 1.
50. Perform the following:
  - Remove power from Test Set and disconnect test equipment.
  - Remove Function Generator PC Board Assembly (78A1A24) from Extender Board.
  - Remove Extender Board.
  - Install Function Generator PC Board Assembly (78A1A24) (para 3-2-8).



## 2-10-5 GEN OUTPUT LEVEL CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	1 Measuring Receiver w/ Sensor
FIGURE REFERENCES:	Figure 2-12

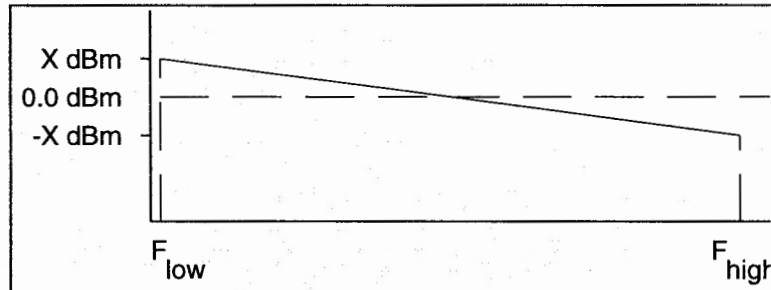
- | STEP | PROCEDURE   |
|------|---|
| 1.   | Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.  |
| 2.   | Set Test Set to Factory Defaults: <ul style="list-style-type: none"> <li>• Press MTRS MODE Key.</li> <li>• Press "AUX" F6 Key.</li> <li>• Press RCL Key.</li> <li>• Press SHIFT Key.</li> <li>• Press 7 (A) Key.</li> <li>• Press ENTER Key.</li> </ul> |
| 3.   | Connect T/R Connector to Measuring Receiver input.  |
| 4.   | Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.   |
| 5.   | Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key to highlight data field. Use DATA SCROLL Keys to set data field to 0. Press ENTER Key.   |
| 6.   | Insert Lockout Key in MIC/ACC IN/OUT Connector.   |
| 7.   | Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.  |
| 8.   | Use FIELD SELECT Keys to move cursor to "14. Gen Output Lvl Cal" data field. Press ENTER Key.   |
| 9.   | Perform Steps 9 to 12 as required for Ranges 1 to 9 listed in Table 2-1.  |

RANGE	LOW FREQUENCY	HIGH FREQUENCY
1	250 kHz	499 kHz
2	500 kHz	999 kHz
3	1 MHz	49 MHz
4	50 MHz	124 MHz
5	125 MHz	199 MHz
6	200 MHz	399 MHz
7	400 MHz	599 MHz
8	600 MHz	799 MHz
9	800 MHz	999 MHz

Table 2-1 Output Level Range Chart

- Move Cursor to data field listing Low Frequency for current Range. Verify Low Frequency. Verify output level is 0 dBm ( $\pm 1.0$  dB) using Measuring Receiver.

- Press "High" F1 Key. Verify High Frequency. Verify output level is 0 dBm ( $\pm 1.0$  dB) using Measuring Receiver. Press "Low" F1 Key.
- Adjust Soft Cals, if necessary, so Low Frequency output is as much above 0.0 dBm as High Frequency output is below 0.0 dBm. (Refer to Figure 2-12.) If no adjustments are required, continue with next Range. If adjustments are required, go to Step 10.



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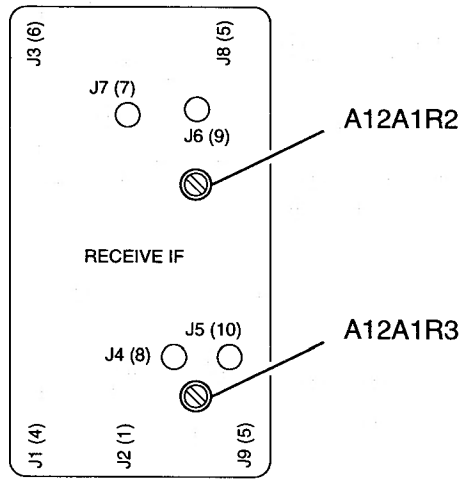
Figure 2-12 Low Frequency and High Frequency Location

10. Press ENTER Key.
11. Use DATA SCROLL Keys to move cursor to least significant digit in data field and edit data. If magnitude of Low Frequency output is greater than magnitude of High Frequency output, decrease value. If magnitude of Low Frequency output is less than magnitude of High Frequency output, increase value. Press ENTER Key.
12. Return to Steps 9-11 sequence until all nine ranges are verified and/or adjusted.
13. Perform associated Verification Procedure in Chapter 1.

## 2-10-6 RF NULL ADJUSTMENT

PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	None
FIGURE REFERENCES:	Figure 2-13

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Press SCOPE/ANLZ Key. Analyzer Operation Screen is displayed. <b>NOTE:</b> If Oscilloscope Operation Screen is displayed, press SCOPE/ANLZ Key to access Analyzer Operation Screen.
4.	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter <b>0.2500 MHz</b> . Press ENTER Key.
5.	Use FIELD SELECT Keys to move cursor to RF ATTEN. Press ENTER Key. Use DATA SCROLL Keys to set data field to <b>40 dB</b> . Press ENTER Key.
6.	Use FIELD SELECT Keys to move cursor to Scan Width (kHz/Div). Press ENTER Key. Use DATA SCROLL Keys to set data field to <b>1 MHz</b> . Press ENTER Key.
7.	Verify 1st LO signal amplitude is <10 dBm as displayed on Analyzer Operation Screen. If signal amplitude is correct, go to Step 9. If signal amplitude is out of tolerance, go to Step 8.
8.	Alternately adjust A12A1R2 (Figure 2-13) and A12A1R3 (Figure 2-13) for 1st LO signal amplitude <0 dBm as displayed on Analyzer Operation Screen. <b>NOTE:</b> A12A1R2 and A12A1R3 are interactive and adjustment is extremely sensitive.
9.	Perform one of the following: <ul style="list-style-type: none"><li>• If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.</li><li>• If this procedure is performed as part of a complete Calibration, disconnect test equipment and proceed at Step 2 of para 2-10-7.</li></ul>



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Figure 2-13 Receive IF Assembly (78A1A12) Calibration Adjustments

## 2-10-7 SIGNAL METER CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1) Metering DVM Calibration (para 2-10-3)
EQUIPMENT REQUIRED:	1 RF Signal Generator
FIGURE REFERENCES:	None

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Press RCVR Key. Receive Operation Screen is displayed on Test Set.
4.	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter <b>121.1000 MHz</b> into data field. Press ENTER Key. <b>NOTE:</b> RF Signal Generator frequency may be varied to desired user needs.
5.	Connect Signal Generator output to ANTENNA IN Connector.
6.	Set Signal Generator output for 121.100000 MHz at -33 dBm. Verify signal is <100. If correct, go to Step 7. If out of tolerance, go to Step 8.
7.	Set Signal Generator output for 121.100000 MHz at -30 dBm. Verify signal is >97. If correct, go to Step 13. If out of tolerance, go to Step 8.
8.	Insert Lockout Key in MIC/ACC IN/OUT Connector.
9.	Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
10.	Press 7 (A) Key. METER Cal Signal Menu is displayed.
11.	Press ENTER Key to highlight data field. Use DATA ENTRY Keypad to enter <b>100</b> . Press ENTER Key.
12.	Press "RET" F5 Key and "AUX" F6 Key.
13.	Perform one of the following: <ul style="list-style-type: none"><li>• If this procedure is performed as a stand-alone procedure, remove power from Test Set and disconnect test equipment.</li><li>• If this procedure is performed as part of a complete Calibration, disconnect test equipment and proceed at Step 2 of para 2-10-8.</li></ul>

## 2-10-8 DEVIATION METER CALIBRATION

PREREQUISITES: Power Supply Calibration (para 2-10-1)  
Metering DVM Calibration (para 2-10-3)

EQUIPMENT REQUIRED: 1 Measuring Receiver  
1 Power Splitter  
1 RF Signal Generator

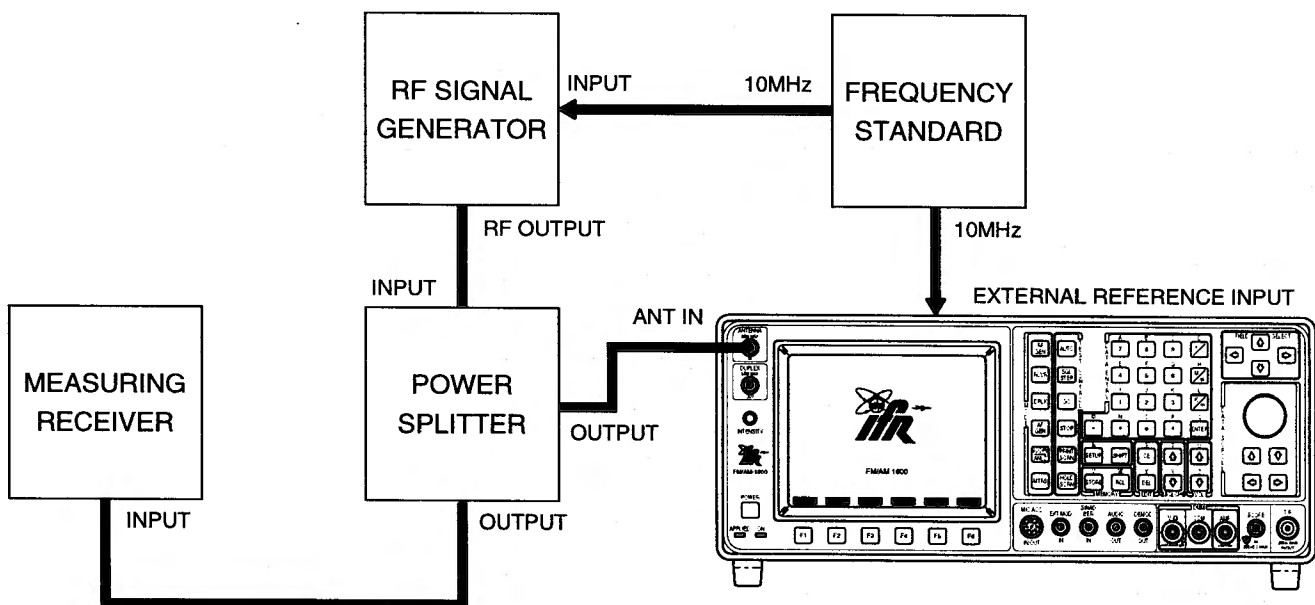
FIGURE REFERENCES: Figure 2-14

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

### DEVIATION METER

3. Connect test equipment as shown in Figure 2-14.



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Figure 2-14 Deviation Meter Calibration Test Setup

4. Set Signal Generator to 0 dBm with no modulation.

## STEP

## PROCEDURE

5. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	Peak+
Measurement	FM
High-Pass Filter	<20 Hz
Low-Pass Filter	15 kHz

6. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
7. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys to set data field to **40 dB**. Press ENTER Key.
8. Press SETUP Key.
9. Use FIELD SELECT Keys to move cursor to "2. Select Mod" data field. Press ENTER Key.
10. Use FIELD SELECT Keys to move cursor to "11. User Defined" data field. Press ENTER Key.
11. Press 1 (I) Key to access "Modulation" submenu. Press 1 (I) Key to select "1. FM."
12. Press 2 (J) Key to access "Filters" submenu. Press 3 (K) Key to select "3. 300 kHz."
13. Press 3 (K) Key to access "Post Detection" submenu. Press 2 (J) Key to select "2. Low-Pass" data field. Use DATA ENTRY Keypad to enter **15.000 kHz**. Press ENTER Key.
14. Press "Ret" F5 Key to return to Receive Operation Screen.
15. Set RF Signal Generator to 121.100000 MHz with no modulation.
16. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **121.1000 MHz**. Press ENTER Key.
17. Use FIELD SELECT Keys to move cursor to DEV Meter. Press ENTER Key.
18. Press "Range" F1 Key. Use DATA SCROLL Keys to select **2 kHz**. Press ENTER Key.
19. Press "Ret" F6 Key to return to Receive Operation Screen.
20. Press "More" F6 Key until "FM Z" F3 Key appears. Press "FM Z" F3 Key and verify plus (+) and minus (-) deviation is within 200 Hz. If >200 Hz, press "FM Z" F3 Key again.
21. Insert Lockout Key in MIC/ACC IN/OUT Connector.
22. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
23. Press 2 (J) Key to access "DEV METER (Peak)" submenu.
24. Set Signal Generator output to 8 kHz deviation at a 3 kHz rate.
25. Press "Range" F1 Key until **+10 kHz** Range is displayed with AR (Auto Range) OFF. Press ENTER Key to highlight "Proper Reading" data field.
26. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.

## STEP

## PROCEDURE

27. Set Measuring Receiver Detector to Peak-.
28. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver in highlighted data field. Press +/- Key and ENTER Key.  
**NOTE:** A negative value is displayed.
29. Verify positive and negative deviation readings are within 3% ( $\pm 1$  Count) of reading on Measuring Receiver.
30. Press "Range" F1 Key to select **20 kHz**.
31. Set Signal Generator output for 16 kHz deviation.
32. Set Measuring Receiver Detector to Peak+.
33. Press ENTER Key. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.
34. Set Measuring Receiver Detector to Peak-.
35. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver in highlighted data field. Press +/- Key and ENTER Key.
36. Verify positive and negative deviation readings are within 3% ( $\pm 1$  Count) of reading on Measuring Receiver.
37. Press "Range" F1 Key to select **50 kHz**.
38. Set Signal Generator output for 40 kHz deviation.
39. Set Measuring Receiver Detector to Peak+.
40. Press ENTER Key. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.
41. Set Measuring Receiver Detector to Peak-.
42. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver in highlighted data field. Press +/- Key and ENTER Key.
43. Verify positive and negative deviation readings are within 3% ( $\pm 1$  Count) of reading on Measuring Receiver.
44. Press "Range" F1 Key to select **100 kHz**.
45. Set Signal Generator output for 80 kHz deviation.
46. Set Measuring Receiver Detector to Peak+.
47. Press ENTER Key. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.
48. Set Measuring Receiver Detector to Peak-.
49. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver in highlighted data field. Press +/- Key and ENTER Key.



**STEP****PROCEDURE**

- 
50. Verify positive and negative deviation readings are within 3% ( $\pm 1$  Count) of reading on Measuring Receiver.
  51. Press RCVR Key. Receive Operation Screen is displayed on Test Set.

**DEVIATION METER (RMS)**

52. Set Signal Generator output for 11.312 kHz deviation at a 1 kHz rate.
53. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	RMS
Low-Pass Filter	3 kHz
Measurement	FM

54. Press MTRS Key. Meters Screen is displayed on Test Set.
55. Use FIELD SELECT Keys to highlight "12. Dev Meter (RMS)" field. Press ENTER Key.
56. Press "Range" F1 Key. Use DATA SCROLL Keys to select **10 kHz**. Press ENTER Key.
57. Press MTRS Key. Meters Screen is displayed on Test Set.
58. Press "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
59. Press 3 (K) Key to access "3. Dev Meter (RMS) Cal" field.
60. Press ENTER Key. Enter value displayed on Measuring Receiver into data field using DATA ENTRY Keypad. Press ENTER Key.
61. Press "Ret" F5 Key and "AUX" F6 Key.
62. Perform associated Verification Procedure in Chapter 1.

## 2-10-9 MODULATION METER CALIBRATION

PREREQUISITES: Power Supply Calibration (para 2-10-1)  
Metering DVM Calibration (para 2-10-3)

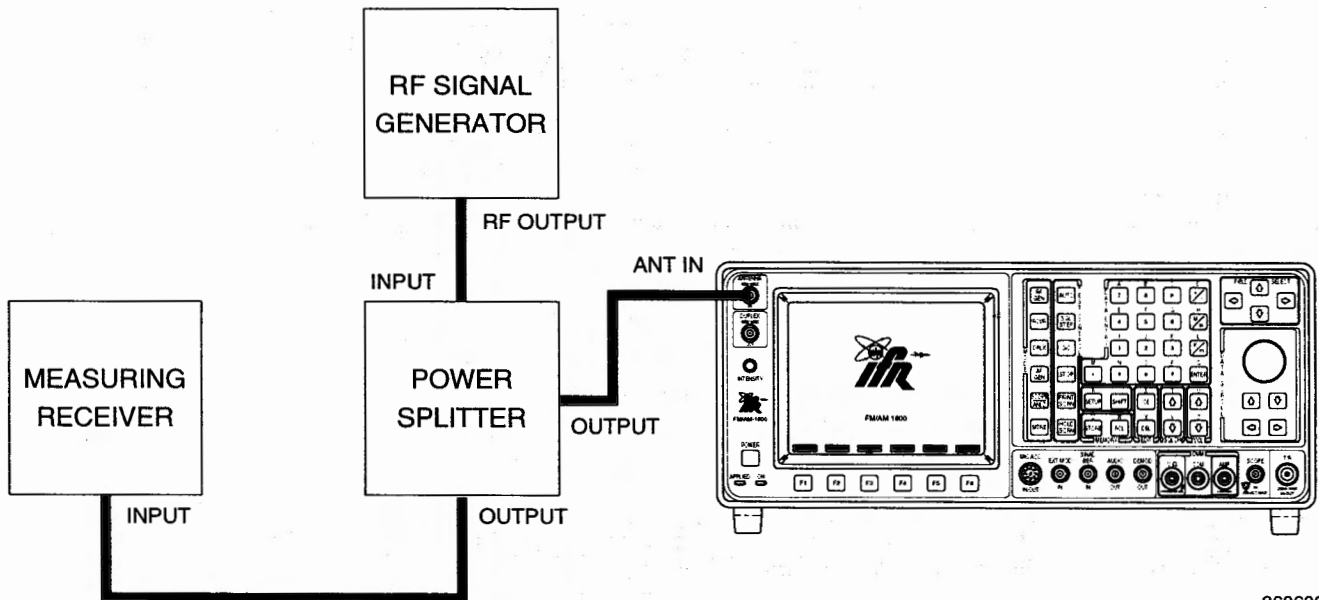
EQUIPMENT REQUIRED: 1 Measuring Receiver  
1 Power Splitter  
1 RF Signal Generator

FIGURE REFERENCES: Figure 2-15

### STEP

### PROCEDURE

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 2-15.



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Figure 2-15 Modulation Meter Calibration Test Setup

4. Set Signal Generator to 0 dBm.
5. Press RCVR Key. Receive Operation Screen is displayed on Test Set.

## STEP

## PROCEDURE

6. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys to set data field to **40 dB**. Press ENTER Key.

7. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	Peak+
Measurement	AM
High-Pass Filter	300 Hz
Low-Pass Filter	3 kHz

8. Press SETUP Key.

9. Use FIELD SELECT Keys to move cursor to "5. Select AGC Type" data field. Press ENTER Key. Press 1 (I) Key to access "User Defined" submenu. Press 1 (I) Key to select "1. Measurement."

10. Use FIELD SELECT Keys to move cursor to "2. Select Mod" data field. Press ENTER Key.

11. Use FIELD SELECT Keys to move cursor to "11. User Defined" data field. Press ENTER Key.

12. Press 1 (I) Key to access "Modulation" submenu. Press 2 (J) Key to select "2. AM."

13. Press 2 (J) Key to access "IF Filters" submenu. Press 2 (J) to select "2. 30 kHz."

14. Press 3 (K) Key to access "Post Detection" submenu. Press 2 (J) Key to select "2. Low-Pass" data field. Use DATA ENTRY Keypad to enter **10.000 kHz**. Press ENTER Key.

15. Press "Ret" F5 Key to return to Receive Operation Screen.

16. Set RF Signal Generator to 121.100000 MHz with 80% AM modulation at a 1 kHz rate.

17. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **121.1000 MHz**. Press ENTER Key.

18. Use FIELD SELECT Keys to move cursor to MOD Meter. Press ENTER Key.

19. Press "Range" F1 Key. Use DATA SCROLL Keys to select **100%**. Press ENTER Key.

20. Insert Lockout Key in MIC/ACC IN/OUT Connector.

21. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.

22. Press 4 (E) Key to access METER CAL MODULATION Screen.

23. Press ENTER Key to highlight "Proper Reading" data field.

24. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.

25. Verify modulation reading is within 5% of reading on Measuring Receiver ( $\pm 1$  Count).

26. Press "Ret" F5 Key and "AUX" F6 Key.

27. Perform associated Verification Procedure in Chapter 1.

## 2-10-10 PHASE METER CALIBRATION

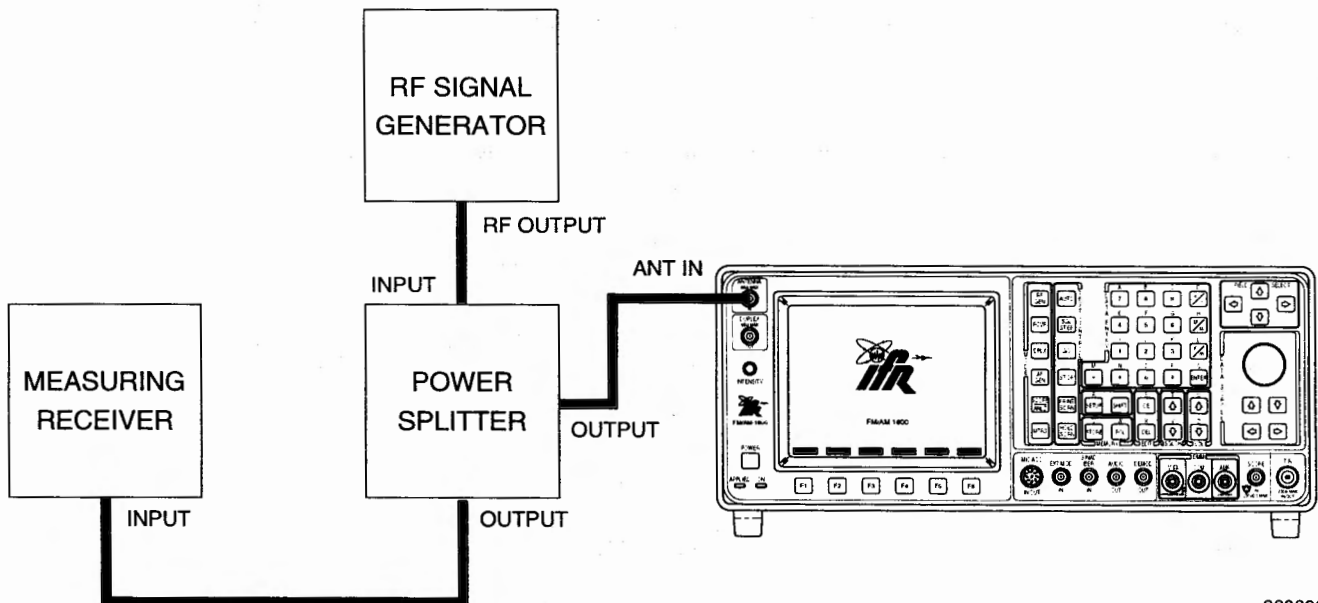
PREREQUISITES:	Power Supply Calibration (para 2-10-1) Metering DVM Calibration (para 2-10-3)
EQUIPMENT REQUIRED:	1 Measuring Receiver 1 Power Splitter 1 RF Signal Generator
FIGURE REFERENCES:	Figure 2-14

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

### PHASE METER

3. Connect test equipment as shown in Figure 2-16.



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Figure 2-16 Phase Meter Calibration Test Setup

4. Press RCVR Key. Receive Operation Screen is displayed on Test Set.

## STEP

## PROCEDURE

5. Use FIELD SELECT Keys to move cursor to RF ATTN field. Press ENTER Key. Use DATA SCROLL Keys to set data field to **40 dB**. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to MOD. Press ENTER Key. Use DATA SCROLL Keys to set data field to **PM**. Press ENTER Key
7. Set Signal Generator to 121.100000 MHz at 0 dBm with 6 radians of deviation at a 1 kHz rate.
8. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	Peak+
High-Pass Filter	<20 Hz
Low-Pass Filter	15 kHz
Measurement	$\Phi$ M (Phase)

9. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **121.1000 MHz**. Press ENTER Key.
10. Insert Lockout Key in MIC/ACC IN/OUT Connector.
11. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
12. Press 9 (C) Key to access Phase Meter submenu.
13. Use ENTER Key to highlight "Proper Reading" field. Use DATA ENTRY Keypad to enter value displayed on Measuring Receiver into data field. Press ENTER Key.
14. Press "Ret" F5 Key.

**PHASE METER (RMS)**

15. Set Signal Generator output for 8.5 radians deviation.
16. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Detector	RMS
High-Pass Filter	<20 Hz
Low-Pass Filter	15 kHz
Measurement	$\Phi$ M (Phase)

17. Use FIELD SELECT Keys to move cursor to "10 Phase Meter (RMS)" field.
18. Press ENTER Key. Enter value displayed on Measuring Receiver into data field using DATA ENTRY Keypad. Press ENTER Key.
19. Press "Ret" F5 Key and "AUX" F6 Key.
20. Perform associated Verification Procedure in Chapter 1.

## 2-10-11 DISTORTION METER CALIBRATION

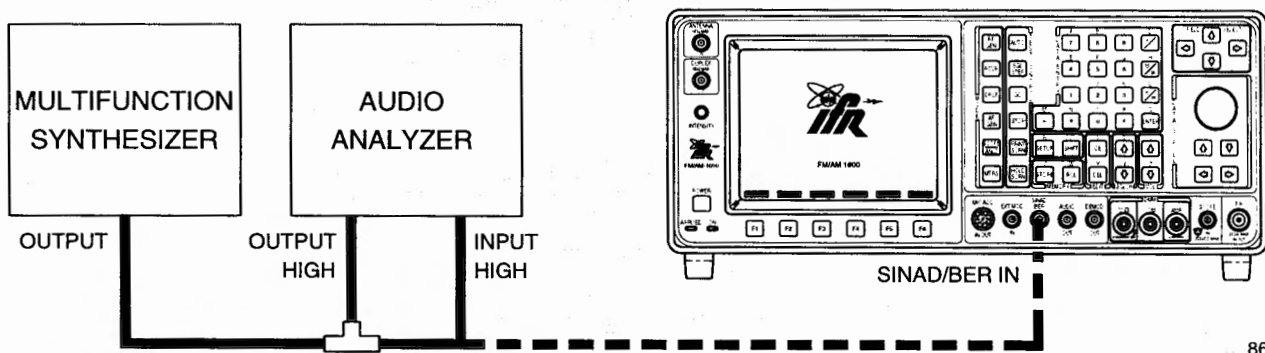
PREREQUISITES: Power Supply Calibration (para 2-10-1)  
 Metering DVM Calibration (para 2-10-3)  
 Func Gen Level and VRMS Meter Calibration (para 2-10-4)

EQUIPMENT REQUIRED: 1 Audio Analyzer  
 1 Multifunction Synthesizer

FIGURE REFERENCES: Figure 2-17

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect test equipment as shown in Figure 2-17.



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Figure 2-17 Distortion Meter Calibration Test Setup

4. Set Multifunction Synthesizer controls as follows:

CONTROL	SETTING
Channel A	ON
Frequency	1800 Hz
Level	1 $\mu$ V

## STEP

## PROCEDURE

5. Set Audio Analyzer controls as follows:

CONTROL	SETTING
Source Frequency	1000 Hz
Source Amplitude	6 V
Log/Linear	LOG
Input Float	GND
Output Float	GND
Source Impedance	50 $\Omega$

6. Press RATIO on Audio Analyzer and verify 0.00 dB is displayed.
7. Set Audio Analyzer Source Amplitude to 1 mV.
8. Set Multifunction Synthesizer Amplitude to 8.5 V initially and adjust Multifunction Synthesizer Amplitude until 0.00 dB is displayed on Audio Analyzer. Record Amplitude setting.
9. Adjust Multifunction Synthesizer Amplitude until -20.0 dB (10%) is displayed on Audio Analyzer. Record Amplitude setting.
10. Set Audio Analyzer Amplitude to 6.0 V.
11. Press MTRS Key to access Meter Menu.
12. Press 6 (G) Key to access "DISTORTION METER" submenu.
13. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use DATA SCROLL Keys to set data field to **SINAD/BER**. Press ENTER Key.
14. Use FIELD SELECT Keys to move cursor to FILTER. Press ENTER Key to select "Low Pass Filter Freq" field.
15. Use FIELD SELECT Keys to move cursor to "Low Pass Filter Freq" field. Use DATA ENTRY Keypad to enter **10.000 kHz**. Press ENTER Key.
16. Disconnect coaxial cable from Audio Analyzer High Input and connect to Test Set SINAD/BER IN Connector.
17. Insert Lockout Key in MIC/ACC IN/OUT Connector.
18. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
19. Press 5 (F) to access Distortion Meter submenu.
20. Press ENTER Key to highlight "Proper Reading" field. Use DATA ENTRY Keypad to enter 10.0% into data field. Press ENTER Key.
21. Press "Ret" F5 Key and "AUX" F6 Key.
22. Perform associated Verification Procedure in Chapter 1.

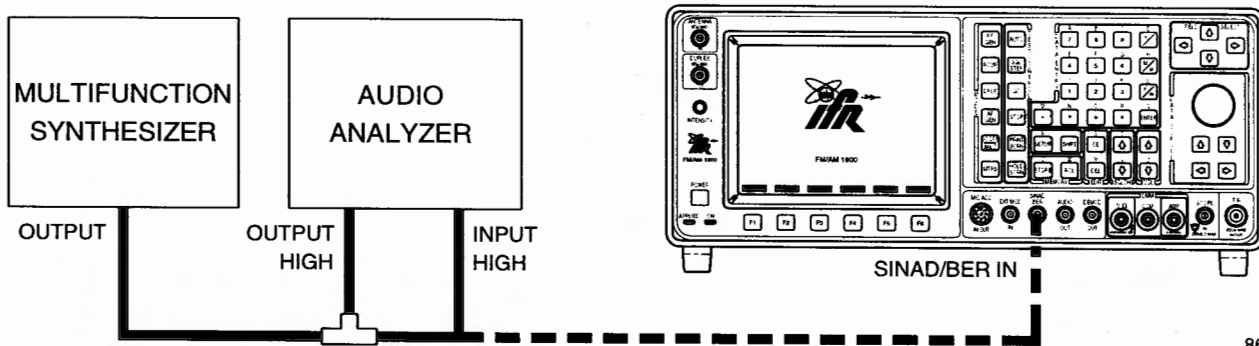
## 2-10-12 SINAD METER CALIBRATION

**PREREQUISITES:** Power Supply Calibration (para 2-10-1)  
 Metering DVM Calibration (para 2-10-3)  
 Func Gen Level and VRMS Meter Calibration (para 2-10-4)

**EQUIPMENT REQUIRED:** 1 Audio Analyzer  
 1 Multifunction Synthesizer  
 1 Personal Computer (RS-232 Interface)

**FIGURE REFERENCES:** Figure 2-18

- | STEP | PROCEDURE   |
|------|---|
| 1.   | Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.  |
| 2.   | Set Test Set to Factory Defaults: <ul style="list-style-type: none"> <li>• Press MTRS MODE Key.</li> <li>• Press "AUX" F6 Key.</li> <li>• Press RCL Key.</li> <li>• Press SHIFT Key.</li> <li>• Press 7 (A) Key.</li> <li>• Press ENTER Key.</li> </ul> |
| 3.   | Connect test equipment as shown in Figure 2-18.   |



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Figure 2-18 SINAD Meter Calibration Test Setup

4. Set Multifunction Synthesizer controls as follows:

CONTROL	SETTING
Channel A	ON
Frequency	1800 Hz
Level	1 $\mu$ V



## STEP

## PROCEDURE

5. Set Audio Analyzer controls as follows:

CONTROL	SETTING
Source Frequency	1000 Hz
Source Amplitude	6 V
Log/Linear	LOG
Input Float	GND
Output Float	GND
Source Impedance	50 $\Omega$

6. Press RATIO on Audio Analyzer and verify 0.00 dB is displayed.
7. Set Audio Analyzer Source Amplitude to 0.0 V.
8. Set Multifunction Synthesizer Amplitude to 8.5 V initially and adjust Multifunction Synthesizer Amplitude until 0.00 dB is displayed on Audio Analyzer. Record Amplitude setting.
9. Adjust Multifunction Synthesizer Amplitude until -9.54 dB (10 dB SINAD) is displayed on Audio Analyzer. Record Amplitude setting.
10. Set Audio Analyzer Amplitude to 6.0 V.
11. Press MTRS Key to access Meter Menu.
12. Press 7 (A) Key to access "SINAD METER" submenu.
13. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Use DATA SCROLL Keys to set data field to **SINAD/BER**. Press ENTER Key.
14. Use FIELD SELECT Keys to move cursor to FILTER. Press ENTER Key to select "Low Pass Filter Freq" field.
15. Use FIELD SELECT Keys to move cursor to "Low Pass Filter Freq" field. Use DATA ENTRY Keypad to enter **10.000 kHz**. Press ENTER Key.
16. Disconnect coaxial cable from Audio Analyzer High Input and connect to Test Set SINAD/BER IN Connector.
17. Insert Lockout Key in MIC/ACC IN/OUT Connector.
18. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
19. Press 6 (G) Key to access SINAD Meter submenu.
20. Press ENTER Key to highlight "Proper Reading" field. Use DATA ENTRY Keypad to enter 10 dB into data field. Press ENTER Key.
21. Press "Ret" F5 Key and "AUX" F6 Key.
22. Disconnect Multifunction Synthesizer from test equipment setup.
23. Set Audio Analyzer Amplitude to 2 mV.
24. Connect Personal Computer RS-232 Interface to Test Set RS-232 Connector.
25. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set.
26. Use FIELD SELECT Key to move cursor to "5. External I/O." Press ENTER Key twice to display Configure RS-232 submenu.

**STEP****PROCEDURE**

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27. Press ENTER Key. Use DATA SCROLL Keys to set data field to **Host**. Press ENTER Key.
28. Use FIELD SELECT Key to move cursor to "2. Baud Rate." Press ENTER Key. Use DATA SCROLL Keys to set data field to **9600**. Press ENTER Key.
29. Use FIELD SELECT Key to move cursor to "3. Data Bits." Press ENTER Key. Use DATA SCROLL Keys to set data field to **8**. Press ENTER Key.
30. Use FIELD SELECT Key to move cursor to "4. Stop Bits." Press ENTER Key. Use DATA SCROLL Keys to set data field to **1**. Press ENTER Key.
31. Use FIELD SELECT Key to move cursor to "5. Parity." Press ENTER Key. Use DATA SCROLL Keys to set data field to **None**. Press ENTER Key.
32. Use FIELD SELECT Key to move cursor to "6. Handshake." Press ENTER Key. Use DATA SCROLL Keys to set data field to **Xon/Xoff**. Press ENTER Key.
33. Use FIELD SELECT Key to move cursor to "7. Echo." Press ENTER Key. Use DATA SCROLL Keys to set data field to **ON**. Press ENTER Key.
34. Set Personal Computer RS-232 Interface settings to match RS-232 settings in Test Set.
35. Input command "CAL:SDLEV" to set Test Set Threshold.
36. Perform associated Verification Procedure in Chapter 1.

## 2-10-13 GEN MODULATION CALIBRATION

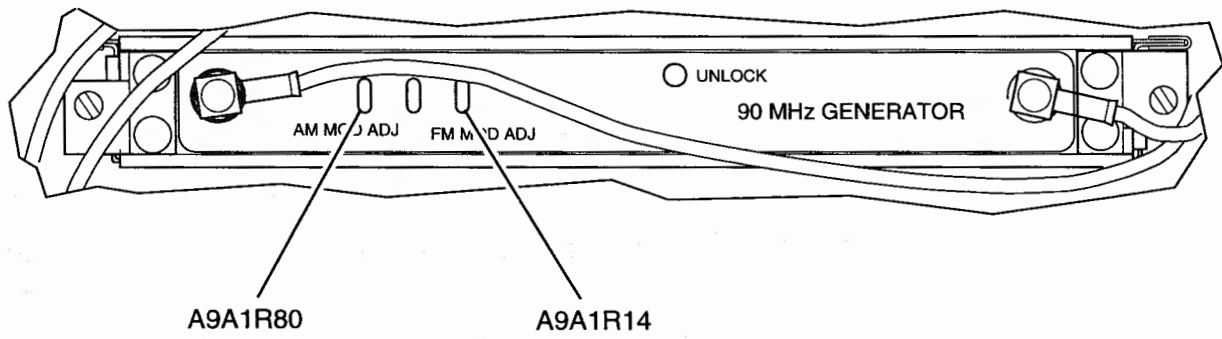
PREREQUISITES:	Power Supply Calibration (para 2-10-1) VCXO Calibration (para 2-10-2) Metering DVM Calibration (para 2-10-3) Func Gen Level and VRMS Meter Calibration (para 2-10-4) Gen Output Level Calibration (para 2-10-5) Deviation Meter Calibration (para 2-10-8) Modulation Meter Calibration (para 2-10-9)
EQUIPMENT REQUIRED:	1 Measuring Receiver with Sensor
FIGURE REFERENCES:	Figure 2-19

STEP	PROCEDURE								
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.								
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"> <li>• Press MTRS MODE Key.</li> <li>• Press "AUX" F6 Key.</li> <li>• Press RCL Key.</li> <li>• Press SHIFT Key.</li> <li>• Press 7 (A) Key.</li> <li>• Press ENTER Key.</li> </ul>								
3.	Connect Measuring Receiver to T/R Connector. Set Measuring Receiver controls as follows: <table border="1" style="margin-left: 40px; margin-top: 10px;"> <thead> <tr> <th>CONTROL</th> <th>SETTING</th> </tr> </thead> <tbody> <tr> <td>Measurement</td> <td>AM</td> </tr> <tr> <td>Low-Pass Filter</td> <td>15 kHz</td> </tr> <tr> <td>Detector</td> <td>Peak+</td> </tr> </tbody> </table>	CONTROL	SETTING	Measurement	AM	Low-Pass Filter	15 kHz	Detector	Peak+
CONTROL	SETTING								
Measurement	AM								
Low-Pass Filter	15 kHz								
Detector	Peak+								
4.	Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.								
5.	Press "More" F6 Key until "Disp" F1 Key appears. Press "Disp" F1 Key.								
6.	Use FIELD SELECT Keys to select "2. Full Anlz."								
7.	Press "Scan" F5 Key.								
8.	Use DATA SCROLL Keys to select <b>1 kHz</b> . Press ENTER Key.								
9.	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to <b>122.0000 MHz</b> . Press ENTER Key.								
10.	Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to <b>0.0 dBm</b> . Press ENTER Key.								
11.	Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Set all MOD fields to OFF.								
12.	Record Peak Residual AM displayed on Measuring Receiver. Verify Residual AM is <0.1%.								

## STEP

## PROCEDURE

13. Use DATA SCROLL Keys to set MOD field 1 to AM. Press ENTER Key.
14. Use FIELD SELECT Keys to move cursor to MODULATION. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **90%**. Press ENTER Key.
15. Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **1000.0 Hz**. Press ENTER Key.
16. Use FIELD SELECT Keys to move cursor to WAVE. Press ENTER Key. Use DATA SCROLL Keys to set data field to **Sine**. Press ENTER Key.
17. Verify AM Modulation reading on Measuring Receiver is within  $\pm 5\%$  of Test Set setting less Peak Residual AM. If reading is within tolerance, continue at Step 24.
18. Insert Lockout Key in MIC/ACC IN/OUT Connector.
19. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
20. Use DATA SCROLL Keys to move cursor to "13. Gen Modulation." Press ENTER Key to access Gen Modulation Cal submenu.
21. Press 1 on DATA ENTRY Keypad to highlight "AM Modulation (90%)" data field.
22. Use DATA SCROLL Keys to set modulation reading on Measuring Receiver to "90%" plus Peak Residual AM reading recorded in Step 12. If AM Modulation setting is out of tolerance and adjustment range is  $<175$  or  $>180$ , perform following:
  - Use DATA ENTRY Keypad to set data field to **180**.
  - Adjust A9A1R80 (AM MOD ADJ) (Figure 2-19), and set modulation reading on Measuring Receiver to 90% plus Residual AM recorded in Step 12.
23. Proceed at Step 17.
24. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
25. Set Measuring Receiver to measure FM and activate 3 kHz low-pass filter.
26. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select **1**. Use DATA SCROLL Keys to set MOD to **OFF**. Press ENTER Key.
27. Record Peak Residual FM displayed on Measuring Receiver. Verify Residual FM is  $<140$  Hz.
28. Use DATA SCROLL Keys to set MOD field to **FM**. Press ENTER Key.
29. Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **12.5 kHz**. Press ENTER Key.
30. Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **2264.5 Hz** (selects 2nd Carrier Bessel Null). Press ENTER Key.
31. Verify 12.5 kHz deviation reading on Measuring Receiver is within 5% of deviation setting less Peak Residual FM. If deviation is not within tolerance, go to Step 35.
32. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
33. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **122.0001 MHz**. Press ENTER Key.



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Figure 2-19 90 MHz Generator PC Board Assembly (78A1A9A1) Calibration Points

STEP	PROCEDURE
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34. Verify 12.5 kHz deviation reading on Measuring Receiver is within 5% of deviation setting less Peak Residual FM. If deviation is within tolerance, go to Step 42.
35. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
36. Use DATA SCROLL Keys to move cursor to "13. Gen Modulation Cal." Press ENTER Key to highlight data field.
37. Press 2 (J) Key to select "2. FM Deviation (20 kHz)." Use DATA ENTRY Keypad to set data field to **200**. Press ENTER Key.
38. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
39. Adjust, as necessary, A9A1R14 (FM MOD ADJ) (Figure 2-19) for minimum amplitude of carrier (<-35 dBc on Analyzer Display). (Null at 122.0000 MHz then balance Null at 122.0001 MHz.)
40. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **122.0000 MHz**. Press ENTER Key.
41. Proceed at Step 31.
42. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
43. Use DATA SCROLL Keys to move cursor to "13. Gen Modulation Cal." Press ENTER Key to highlight data field.
44. Use FIELD SELECT Keys to move cursor to "3. FM Deviation (80 kHz)." Press ENTER Key to highlight data field.
45. Use DATA SCROLL Keys to set FM Deviation on Measuring Receiver to 80 kHz plus Peak Residual FM reading recorded in Step 27. Press ENTER Key.
46. Verify 80 kHz deviation reading on Measuring Receiver is within 5% of deviation setting less Peak Residual FM. If deviation is within tolerance, go to Step 48.
47. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
48. Set Measuring Receiver controls as follows:

CONTROL	SETTING
Measurement	PM
High-Pass Filter	300 Hz
Low-Pass Filter	3 kHz

49. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select **1**. Use DATA SCROLL Keys to set to **OFF**. Press ENTER Key.
50. Record Residual PM displayed on Measuring Receiver. Verify Residual PM is <0.05 Rad peak.
51. Use DATA SCROLL Keys to set MOD field to **PM**. Press ENTER Key.
52. Use FIELD SELECT Keys to move cursor to MODULATION. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **6.0 Rad**. Press ENTER Key.
53. Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **1000.0 Hz**. Press ENTER Key.

**STEP****PROCEDURE**

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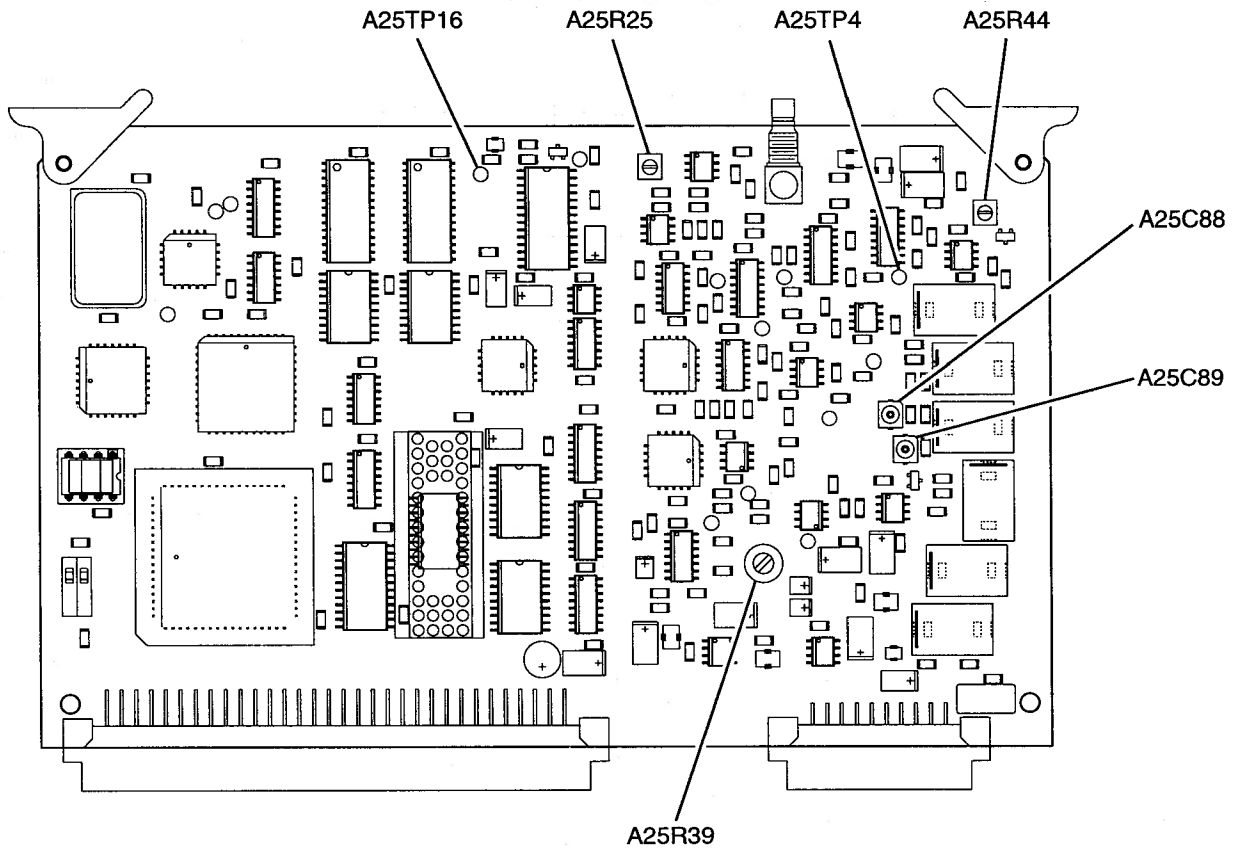
54. Verify 6 Rad reading on Measuring Receiver is within 5% of Rad setting less Residual PM reading from Step 50. If within tolerance, go to Step 61.
55. Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
56. Use DATA SCROLL Keys to move cursor to "13. Gen Modulation Cal." Press ENTER Key to highlight data field.
57. Press 4 (E) Key to select "4. Phase Modulation (6 Rad)."
58. Use DATA SCROLL Keys to adjust data value until Phase Modulation on Measuring Receiver is 6 Rad plus Residual PM recorded in Step 50. Press ENTER Key.
59. Press "ESC" F6 Key twice.
60. Repeat Step 54.
61. Perform associated Verification Procedure in Chapter 1.

## 2-10-14 OSCILLOSCOPE CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1) Func Gen Level and VRMS Meter Calibration (para 2-10-4)
EQUIPMENT REQUIRED:	1 600 $\Omega$ Load 1 Digital Multimeter (DMM) 1 Extender Board (7010-7839-900)
FIGURE REFERENCES:	Figure 2-20 Figure 2-21

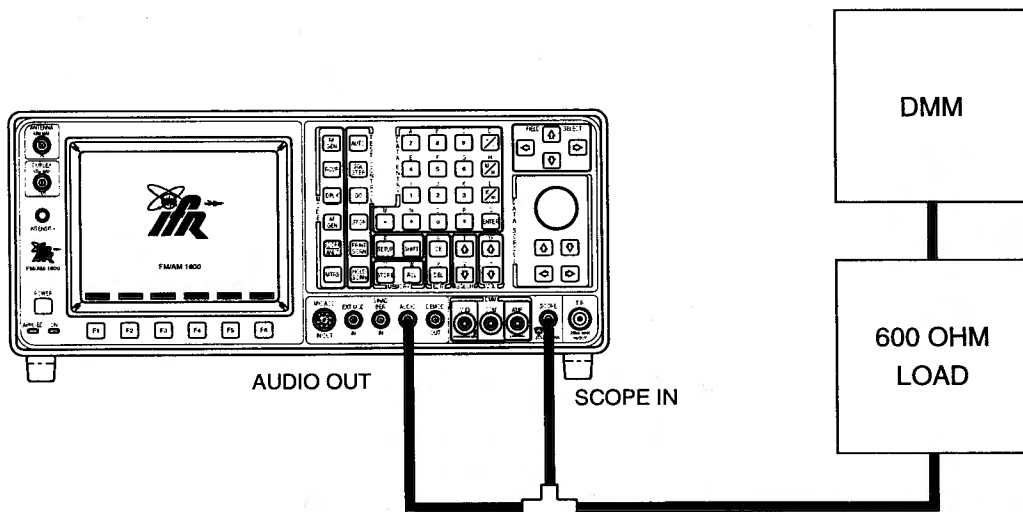
STEP	PROCEDURE
1.	Install Digitizer PC Board Assembly (78A1A25) on Extender Board: <ul style="list-style-type: none"><li>• Remove Digitizer PC Board Assembly (78A1A25) (para 3-2-3).</li><li>• Install Extender Board.</li><li>• Install Digitizer PC Board Assembly (78A1A25) on Extender Board.</li></ul>
2.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
3.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
4.	Press SCOPE/ANLZ Key. Oscilloscope Operation Screen is displayed. <b>NOTE:</b> If Analyzer Operation Screen is displayed, press SCOPE/ANLZ Key to access Oscilloscope Operation Screen.
5.	Connect Digital Multimeter positive lead to A25TP4 (Figure 2-20) and negative lead to A25TP16 (Figure 2-20).
6.	Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Press 9 (C) Key to set data field to <b>GND</b> .
7.	Press "Scale" F1 Key to select Scale data field. Use DATA SCROLL Keys to set data field to <b>10 mV</b> . Press ENTER Key.
8.	Adjust, if needed, A25R44 (Figure 2-20) for 0.000 Vdc ( $\pm 0.01$ V) on Digital Multimeter.
9.	Press ENTER Key to highlight "Scale" data field. Use DATA SCROLL Keys to set data field to <b>2 mV</b> . Press ENTER Key.
10.	Adjust, if needed, A25R39 (Figure 2-20) for 0.000 Vdc ( $\pm 0.01$ V) on Digital Multimeter.
11.	Connect test equipment as shown in Figure 2-21.
12.	Press AF GEN Key. AF Generator Operation Screen is displayed on Test Set.
13.	Press SETUP Key.





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Figure 2-20 Digitizer PC Board Assembly (78A1A25) Calibration Points



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Figure 2-21 Oscilloscope Calibration Setup

## STEP

## PROCEDURE

14. Press 5 (F) Key to access data field. Press 5 (F) to select Proportional Output. Press ENTER Key to set data field to **Off**.
15. Press "ESC" F6 Key.
16. Press AF GEN Key. AF Generator Operation Screen is displayed on Test Set.
17. Use FIELD SELECT Keys to move cursor to GEN1. Press ENTER Key to set data field to **On**.
18. Use FIELD SELECT Keys to move cursor to WAVE. Press ENTER Key to set data field to **Sine**.
19. Use FIELD SELECT Keys to move cursor to AF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **1000.0 Hz**. Press ENTER Key.
20. Use FIELD SELECT Keys to move cursor to GEN2. Press ENTER Key to set data field to **Off**.
21. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **0.0424 V**. Press ENTER Key.
22. Use DATA SCROLL Keys to move cursor to least significant digit. Use DATA SCROLL Keys to adjust output for 42.43 mVrms ( $\pm 0.12$  mV) on Digital Multimeter. Press ENTER Key.
23. Press SCOPE/ANLZ Key. Oscilloscope Operation Screen is displayed on Test Set.
24. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to set data field to **20 mV**. Press ENTER Key.
25. Use FIELD SELECT Keys to move cursor to INPUT. Press ENTER Key. Press 7 (A) Key to set data field to **AC**.
26. Use FIELD SELECT Keys to move cursor to Sweep. Press ENTER Key. Use DATA SCROLL Keys to set data field to **100  $\mu$ s**. Press ENTER Key.
27. Use FIELD SELECT Keys to move cursor to TRIG. Press ENTER Key. Use DATA SCROLL Keys to set data field to **Auto**. Press ENTER Key.
28. Use FIELD SELECT Keys to move cursor to HORIZ. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **0 div**. Press ENTER Key.
29. Use FIELD SELECT Keys to move cursor to VERT. Press ENTER Key. Use DATA SCROLL Spinner to center waveform. Press ENTER Key.
30. Use FIELD SELECT Keys to move cursor to TRIG LVL. Press ENTER Key. Use DATA SCROLL Spinner to position trace start on center graticule.
31. One cycle is displayed on Test Set. Press ENTER Key.
32. Verify 120 mVp-p ( $\pm 8$  mV). If necessary, adjust A25R25 (Figure 2-20) to correct for vertical amplitude.
33. Press AF GEN Key. AF Generator Operation Screen is displayed on Test Set.
34. Use FIELD SELECT Keys to move cursor to WAVE. Press ENTER Key to set data field to **Square**.
35. Use FIELD SELECT Keys to move cursor to AF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **1000.0 Hz**. Press ENTER Key.

## STEP

## PROCEDURE

- 
36. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **1.0605 V (rms)**. Press ENTER Key.
  37. Press SCOPE/ANLZ Key. Oscilloscope Operation Screen is displayed on Test Set.
  38. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to set data field to **500 mV**. Press ENTER Key.
  39. Adjust A25C88 (Figure 2-20) until square wave shape is displayed with no overshoot or undershoot.
  40. Use FIELD SELECT Keys to move cursor to Scale. Press ENTER Key. Use DATA SCROLL Keys to set data field to **1 V**. Press ENTER Key.
  41. Adjust A25C89 (Figure 2-20) until square wave shape is displayed with no overshoot or undershoot.
  42. Repeat Steps 38-41 until no further adjustments are required.
  43. Perform the following:
    - Remove power from Test Set and disconnect test equipment.
    - Remove Digitizer PC Board Assembly (78A1A25) from Extender Board.
    - Remove Extender Board.
    - Install Digitizer PC Board Assembly (78A1A25) (para 3-2-3).
  44. Perform associated Verification Procedure in Chapter 1.

## 2-10-15 SPECTRUM ANALYZER CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1) Oscilloscope Calibration (para 2-10-14)
EQUIPMENT REQUIRED:	1 Digital Multimeter (DMM) 1 Extender Board (7010-7839-600) 1 Measuring Receiver 1 RF Signal Generator
FIGURE REFERENCES:	Figure 2-22 Figure 2-23 Figure 2-24

### STEP

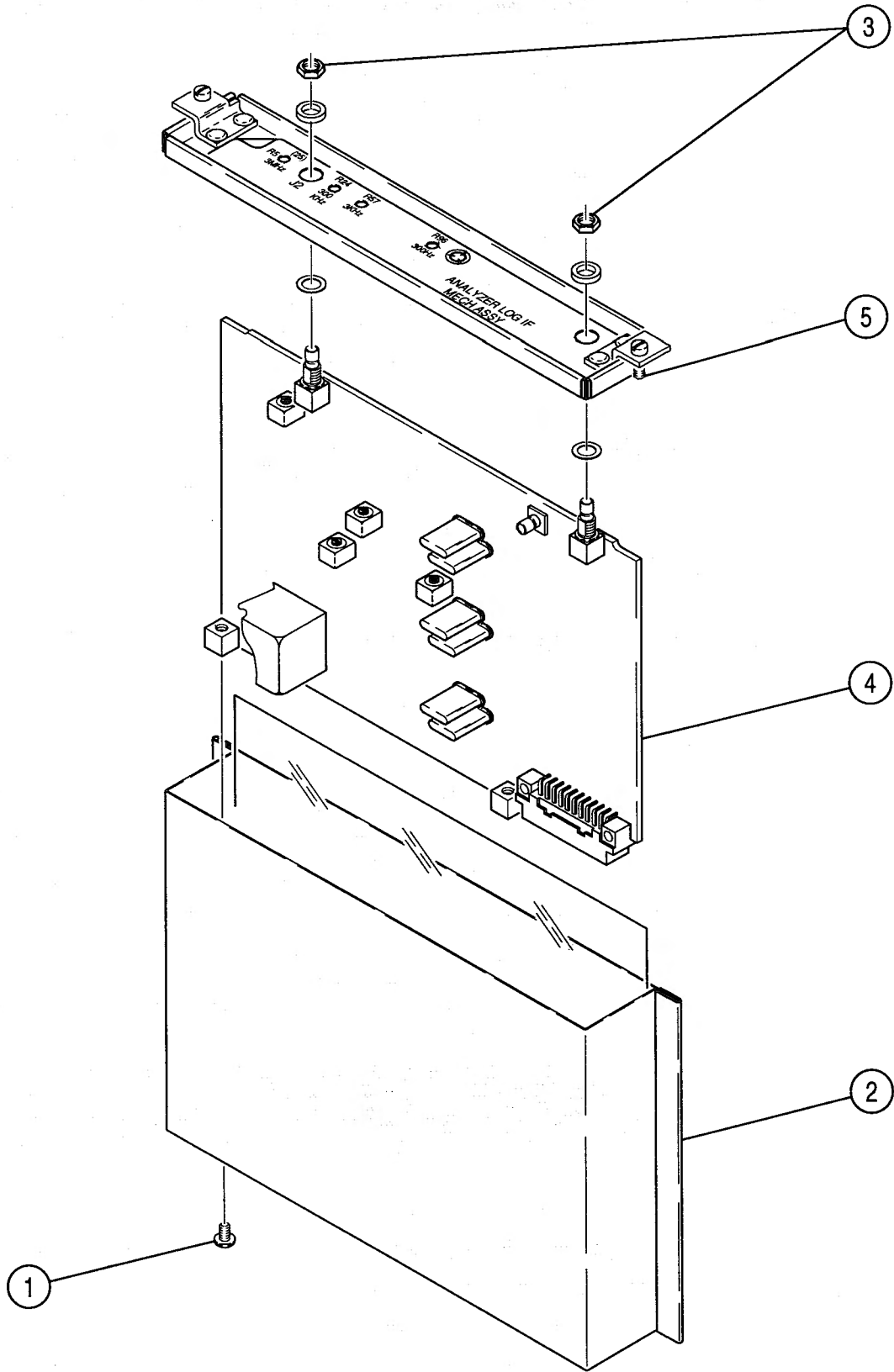
### PROCEDURE

1. Install Analyzer Log/IF PC Board Assembly (78A1A4A1) on Extender Board:
  - Remove Analyzer Log/IF Assembly (78A1A4) (para 3-2-5).
  - Remove 2 screws (1) from enclosure (2) (Figure 2-22).
  - Remove Analyzer Log/IF PC Board Assembly (78A1A4A1) (4) from enclosure (2) (Figure 2-22).
  - Remove two nuts and washers (3) (Figure 2-22).
  - Remove enclosure cover (5) (Figure 2-22).
  - Install Extender Board.
  - Install Analyzer Log/IF PC Board Assembly (78A1A4A1) on Extender Board.
2. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
3. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.

#### LOGARITHMIC AMPLIFIER

4. Calibrate Measuring Receiver RF Power Meter and Tuned RF Level Meter at 10.7000 MHz.
5. Connect RF Signal Generator to A4J2 (Figure 2-23).
6. Set RF Signal Generator to 10.7 MHz at -30 dBm with no modulation.
7. Press SCOPE/ANLZ Key. Analyzer Operation Screen is displayed on Test Set.

**NOTE:** If Oscilloscope Operation Screen is displayed, press SCOPE/ANLZ Key to access Analyzer Operation Screen.



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Figure 2-22 Analyzer Log/IF PC Board Assembly (78A1A4A1) Removal

**STEP****PROCEDURE**

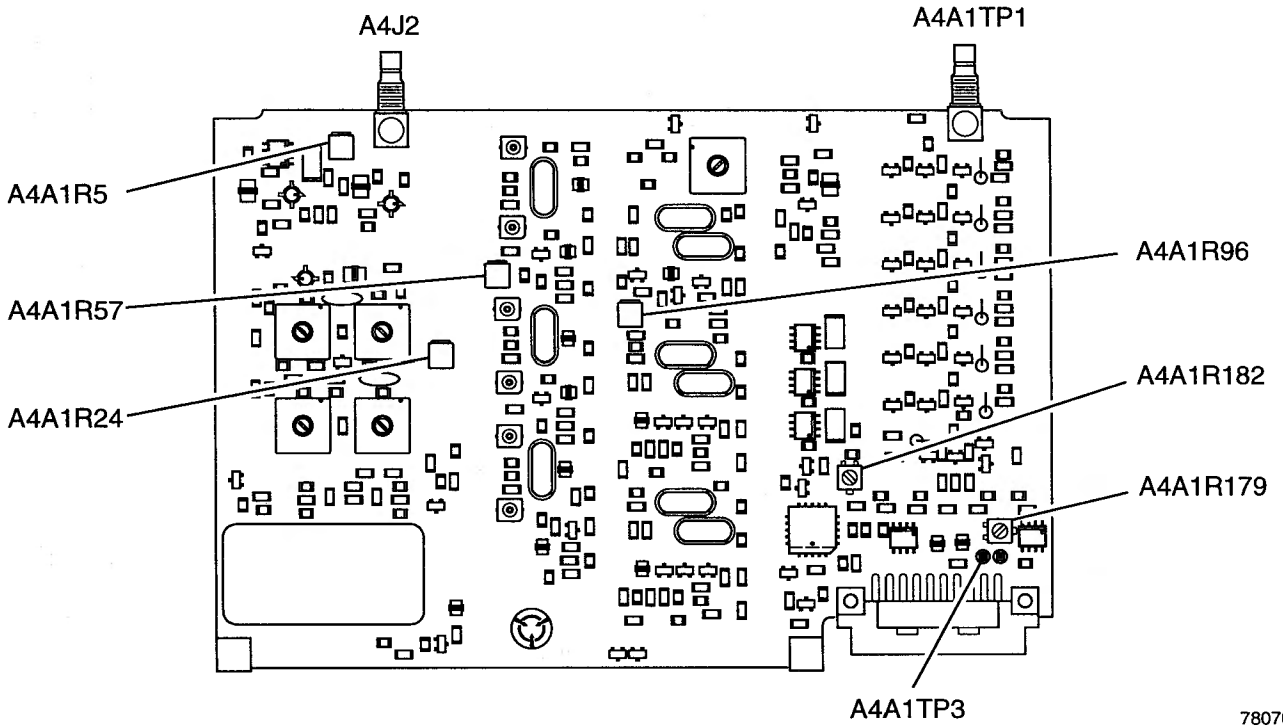
8. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **120.00000 MHz**. Press ENTER Key.
9. Press "More" F6 Key until "Scan" F3 Key appears. Press "Scan" F3 Key.
10. Use DATA SCROLL Keys to set data field to **50 kHz**. Press ENTER Key.
11. Connect Measuring Receiver to A4A1TP1 (Figure 2-23).
12. Adjust A4A1R5 (Figure 2-23), as necessary, until -48 dBm is displayed on Measuring Receiver.
13. Connect Digital Multimeter to A4A1TP3 (Figure 2-23).
14. Adjust A4A1R179 (ANALYZER VIDEO GAIN) (Figure 2-23), as necessary, until 1.38 V ( $\pm 5$  mV) is displayed on Digital Multimeter. (Normally 1.4 V; this point is characteristically 1 dB low.)
15. Set RF Signal Generator level to -80 dBm.
16. Adjust A4A1R182 (ANALYZER VIDEO OFFSET) (Figure 2-23), as necessary, until 0.4 V ( $\pm 5$  mV) is displayed on Digital Multimeter.
17. Repeat Steps 13-16 until the top eight major division lines meet the appropriate value ( $\pm 20$  mV, 1 dB). (Each 10 dB step represents 0.2 dB.)

**NORMALIZER**

18. Adjust RF Signal Generator level until 1.4 V ( $\pm 1$  mV) is displayed on Digital Multimeter.
19. Press "More" F6 Key until "Norm" F1 Key appears. Press "Norm" F1 Key.
20. Disconnect RF Signal Generator from A4J2 (Figure 2-23).
21. Disconnect coaxial cable from A5J3 (Figure 2-24).
22. Connect extended coaxial cable between A4J2 (Figure 2-23) and A5J3 (Figure 2-24).
23. Set RF Signal Generator to 120.0000 MHz at -40 dBm with no modulation.
24. Calibrate Measuring Receiver Tuned RF Power Meter at 120.0000 MHz. Check level in Step 24 on Measuring Receiver.
25. Connect RF Signal Generator to ANTENNA IN Connector.
26. Adjust A4A1R5 (Figure 2-23), as necessary, until signal is displayed on the -40 dBm line (first major division from top).

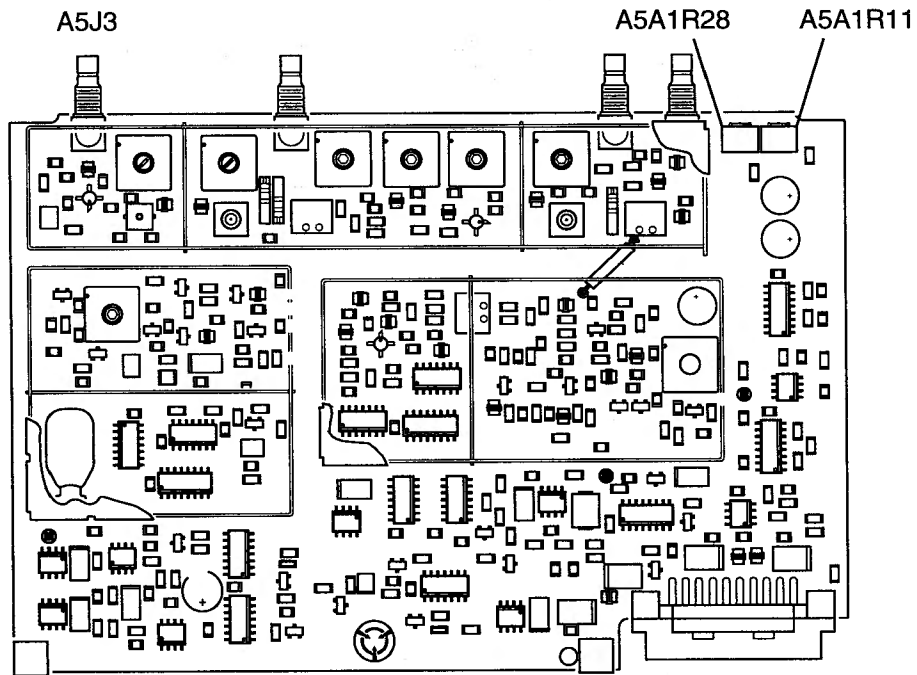
**DISPERSION**

27. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
28. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **0.0 dBm**. Press ENTER Key.
29. Press "More" F6 Key until "Disp" F1 Key appears. Press "Disp" F1 Key.
30. Press 2 on DATA ENTRY Keypad to select **2. Full Anlz.**
31. Press "More" F6 Key until "Scan" F5 Key appears. Press "Scan" F5 Key.
32. Use DATA SCROLL Keys and ENTER Key to set Scan Width data field to **20 kHz** and then **200 kHz**, compromising the centering error between the two settings with A5A1R11 (Figure 2-24).



7807021

Figure 2-23 Analyzer Log/IF PC Board Assembly (78A1A4A1) Calibration Points



7807022

Figure 2-24 Analyzer RF Assembly (78A1A5A1) Calibration Points

## STEP

## PROCEDURE

- 
33. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select **1**. Use DATA SCROLL Keys to set MOD to **FM**. Press ENTER Key.
  34. Use FIELD SELECT Keys to move cursor to DEVIATION. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **65.0 kHz**. Press ENTER Key.
  35. Use FIELD SELECT Keys to move cursor to AF FREQ. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **20.0 kHz**. Press ENTER Key.
  36. Press "More" F6 Key until "Scan" F5 Key appears. Press "Scan" F5 Key.
  37. Use DATA SCROLL Keys and ENTER Key to set Scan Width data field to **10 kHz** and then **20 kHz**, compromising the dispersion error between the two settings with A5A1R28 (Figure 2-24). (On 10 kHz, the displayed spurs are every other division; on 20 kHz, displayed spurs are every division.)
  38. Use FIELD SELECT Keys to move cursor to SOURCE. Press ENTER Key. Use DATA SCROLL Keys to select **1**. Use DATA SCROLL Keys to set MOD to **OFF**. Press ENTER Key.
  39. Press "Scan" F5 Key. Use DATA SCROLL Keys to set data field to **1 kHz**. Press ENTER Key.
  40. Alternate between RF Generator Operation Screen and Calibration Screen (16. Anlz Horz Offset) until signal is centered on RF Generator Operation Screen:
    - Press SETUP Key and "AUX" F6 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
    - Press ENTER Key. Password Window is displayed. Use DATA ENTRY Keypad to press the following keys and access the Calibration Menu: SHIFT, **C**, **S**, **M**, **A**, **T**, **E**, SHIFT and ENTER.
    - Use DATA SCROLL Keys to move cursor to "16. Anlz Horz Offset." Press ENTER Key to highlight data field. Use DATA SCROLL Keys to set data field to desired level. Press ENTER Key.
    - Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
    - Verify signal is centered on RF Generator Operation Screen.
    - Repeat as required.

**SPECTRUM ANALYZER BANDWIDTH AGREEMENT**

41. Press SCOPE/ANLZ Key. Analyzer Operation Screen is displayed on Test Set.  
**NOTE:** If Oscilloscope Operation Screen is displayed, press SCOPE/ANLZ Key to access Analyzer Operation Screen.
42. Press "More" F6 Key until "Scan" F3 Key appears. Press "Scan" F3 Key.
43. Use DATA SCROLL Keys to set data field to **50 kHz**. Press ENTER Key.



**STEP****PROCEDURE**

44. Using the 50 kHz/Div range (30 kHz Resolution Bandwidth) as a reference, change scan widths and compare displayed amplitude differences. Perform adjustments as shown in Table 2-2 to achieve <1 dB agreement between the other resolution bandwidths and the displayed 30 kHz resolution bandwidth reference amplitude.

<b>TEST SET</b>		<b>ADJUSTMENT (Figure 2-23)</b>
<b>RESOLUTION BANDWIDTH (MHz)</b>	<b>SCAN WIDTH (/DIV)</b>	
3 MHz	10 MHz	Appendix C A4A1R24 (Reference) A4A1R57 A4A1R96
300 kHz	1 MHz	
30 kHz	50 kHz	
3 kHz	5 kHz	
300 Hz	1 kHz	

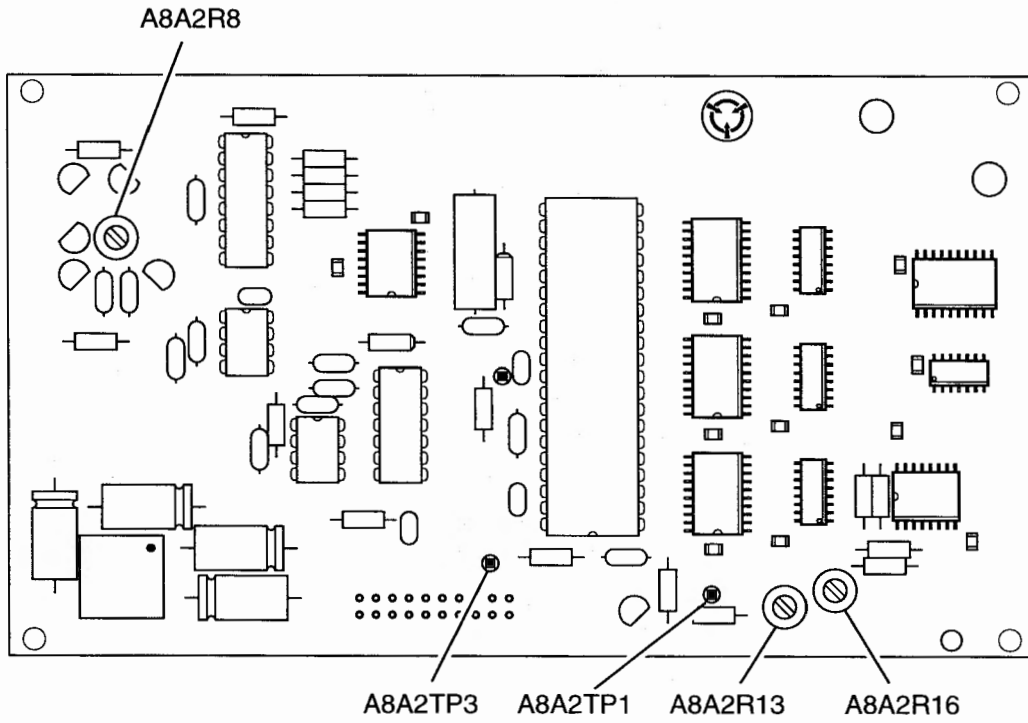
Table 2-2 Spectrum Analyzer Bandwidth Adjustments

45. Perform the following:
- Remove power from Test Set and disconnect test equipment.
  - Remove Analyzer Log/IF PC Board Assembly (78A1A4A1) from Extender Board.
  - Remove Extender Board.
  - Install Analyzer Log/IF PC Board Assembly in enclosure. (Reverse procedure as shown in Step 1.)
  - Install Analyzer Log/IF Assembly (para 3-2-5).
46. Perform associated Verification Procedure in Chapter 1.

## 2-10-16 DIGITAL MULTIMETER CALIBRATION

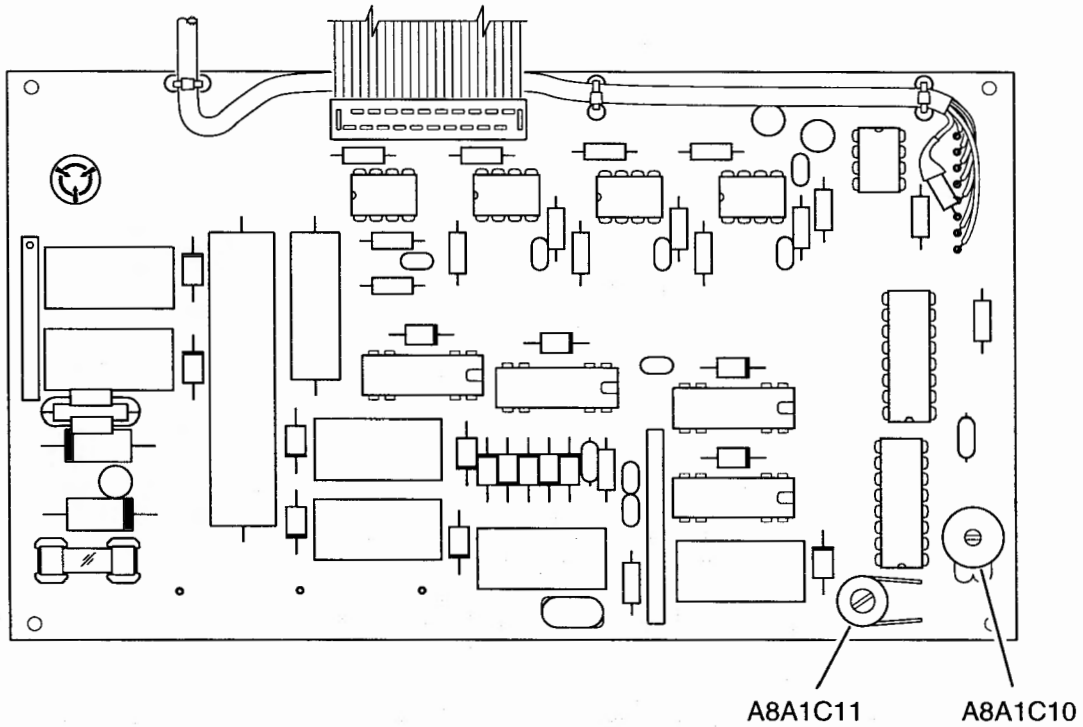
PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	1 Calibrator 1 Digital Multimeter (DMM)
FIGURE REFERENCES:	Figure 2-25 Figure 2-26

STEP	PROCEDURE
1.	Remove DMM Assembly (78A1A8) from Test Set (para 3-2-9).
2.	Remove cover from DMM Assembly (78A1A8) and reconnect A8A1W2P1/A1A1J1 (Figure 2-3).
3.	Connect external Digital Multimeter positive lead to A8A2TP1 (Figure 2-25) and negative lead to A8A2TP3 (Figure 2-25).
4.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
5.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
6.	Press MTRS Key. Meter Menu is displayed on Test Set.
7.	Use FIELD SELECT Keys to move cursor to "10. Digital Multimeter (DMM)" field. Press ENTER Key.
8.	Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to <b>Ohm</b> . Press ENTER Key.
9.	Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to <b>20 kΩ</b> . Press ENTER Key.
10.	Verify 1.000 Vdc ( $\pm 0.05$ Vdc) is displayed on external Digital Multimeter. Adjust A8A2R13 (Figure 2-25) if needed.
11.	Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to <b>DCV</b> . Press ENTER Key.
12.	Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to <b>20 V</b> . Press ENTER Key.
13.	Verify 100 mV ( $\pm 0.5$ mV) is displayed on external Digital Multimeter. Adjust A8A2R16 (Figure 2-25) if needed.
14.	Disconnect external Digital Multimeter positive lead from A8A2TP1 (Figure 2-25) and negative lead from A8A2TP3 (Figure 2-25). Connect Calibrator to DMM VΩ Connector.
15.	Set Calibrator output to 100 kΩ.



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Figure 2-25 DMM Digital PC Board Assembly (78A1A8A2) Calibration Points



8607349

Figure 2-26 DMM Relay PC Board Assembly (78A1A8A1) Calibration Points

## STEP

## PROCEDURE

- 
16. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to **Ohm**. Press ENTER Key.
  17. Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to **200 kΩ**. Press ENTER Key. Verify meter reading is 100 kΩ ( $\pm 10$  kΩ).
  18. Set Calibrator output to 1 kΩ.
  19. Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to **2 kΩ**. Press ENTER Key. Verify meter reading is 1 kΩ ( $\pm 100$  Ω).
  20. Adjust, if needed, A8A2R8 (Figure 2-25) to obtain proper measurement between both ranges.
  21. Press "Func" F1 Key. Use DATA SCROLL Keys to set MULTIMETER to **ACV**. Press ENTER Key.
  22. Press "Range" F2 Key. Use DATA SCROLL Keys to set RANGE to **20 V**. Press ENTER Key.
  23. Set Calibrator output to 20 kHz Sine Wave at 7 Vrms.
  24. Verify meter reading is 7 V ( $\pm 1$  V). Adjust, if necessary, A8A1C11 (Figure 2-26) to obtain proper level.  
**NOTE:** AC V accuracy applies for AC Volts multiplied by kHz frequency product. Resultant should be  $<140$ .
  25. Set Calibrator output to 20 kHz Sine Wave at 1 Vrms.
  26. Use "Range" F2 Key to set RANGE to **2 V**. Press ENTER Key.
  27. Verify meter reading is 1 V ( $\pm 0.1$  V). Adjust, if necessary, A8A1C10 (Figure 2-26) to obtain proper level.  
**NOTE:** AC V accuracy applies for AC Volts multiplied by kHz frequency product. Resultant should be  $<140$ .
  28. Repeat Steps 21-27 for best overall response.
  29. Perform the following:
    - Remove power from Test Set and disconnect test equipment.
    - Disconnect A8A1W2P1/A1A1J1 (Figure 2-3).
    - Install cover on DMM Assembly (78A1A8).
    - Install DMM Assembly (78A1A8) (para 3-2-9).
  30. Perform associated Verification Procedure in Chapter 1.

## 2-10-17 POWER METER CALIBRATION

**PREREQUISITES:** Power Supply Calibration (para 2-10-1)  
Metering DVM Calibration (para 2-10-3)

**EQUIPMENT REQUIRED:**

- 1 50  $\Omega$  Termination
- 1 100 MHz Low-Pass Filter
- 1 100 W RF Amplifier
- 1 Digital Multimeter (DMM)
- 1 Directional Coupler
- 1 Measuring Receiver with Sensor
- 1 RF Signal Generator

**FIGURE REFERENCES:** Figure 2-27  
Figure 2-28

**NOTE:** Equipment used to present power to the Test Set for Calibration must comply with the following criteria:

- Source must present >20 dB return loss to the Test Set input.
- All spurious signals, other than the desired (harmonic or non-harmonic), must be  $\leq$ -40 dBc relative to the desired signal.

Using the RF Signal Generator and the Measuring Receiver with Sensor, the following loss characterization must be accomplished prior to performing the Power Meter Calibration:

<b>EQUIPMENT</b>	<b>85 MHz</b>
DIRECTIONAL COUPLER - FORWARD	●

The Reflected Connector on the Directional Coupler should be terminated to 50  $\Omega$  when this procedure is being performed.

## STEP

## PROCEDURE

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect Digital Multimeter positive lead to A14FL9 (Figure 2-28) and Digital Multimeter negative lead to A14GL1 (Figure 2-28).
4. Connect test equipment as shown in Figure 2-27.  
**NOTE:** If adjustments are required on the Power Termination Assembly (Figure 2-28), the aluminum tape needs to be removed in order to access the calibration adjustments.
5. Set appropriate external attenuation offsets, from Figure 2-27, for 85 MHz in Measuring Receiver. (Measuring Receiver should read actual power supplied to the Test Set.)
6. Set Signal Generator RF output to OFF.
7. Set 100 W RF Amplifier to OFF:
8. Insert Lockout Key in MIC/ACC IN/OUT Connector.
9. Press "AUX" F5 Key. Auxiliary Functions Menu is displayed on Test Set and "1. Calibrations" is highlighted. Press ENTER Key.
10. Press 1 (I) Key to access "Power Meter" submenu.
11. Press "Range" F1 Key to set data field to **20 mW**.
12. Verify 20 mV ( $\pm 2$  mV) is displayed on Digital Multimeter. Adjust, if necessary, A14A1R21 (Figure 2-28).
13. Press "Range" F1 Key to set data field to **20 W**.
14. Verify 10 mV ( $\pm 2$  mV) is displayed on Digital Multimeter. Adjust, if necessary, A14A1R18 (Figure 2-28).
15. Press "Range" F1 Key to set data field to **2 W**.
16. Set 100 W RF Amplifier to ON.
17. Set Signal Generator RF output to ON.
18. Adjust Signal Generator RF output level until the adjusted reading on the Measuring Receiver displays 2000 mW is sent to the Test Set.

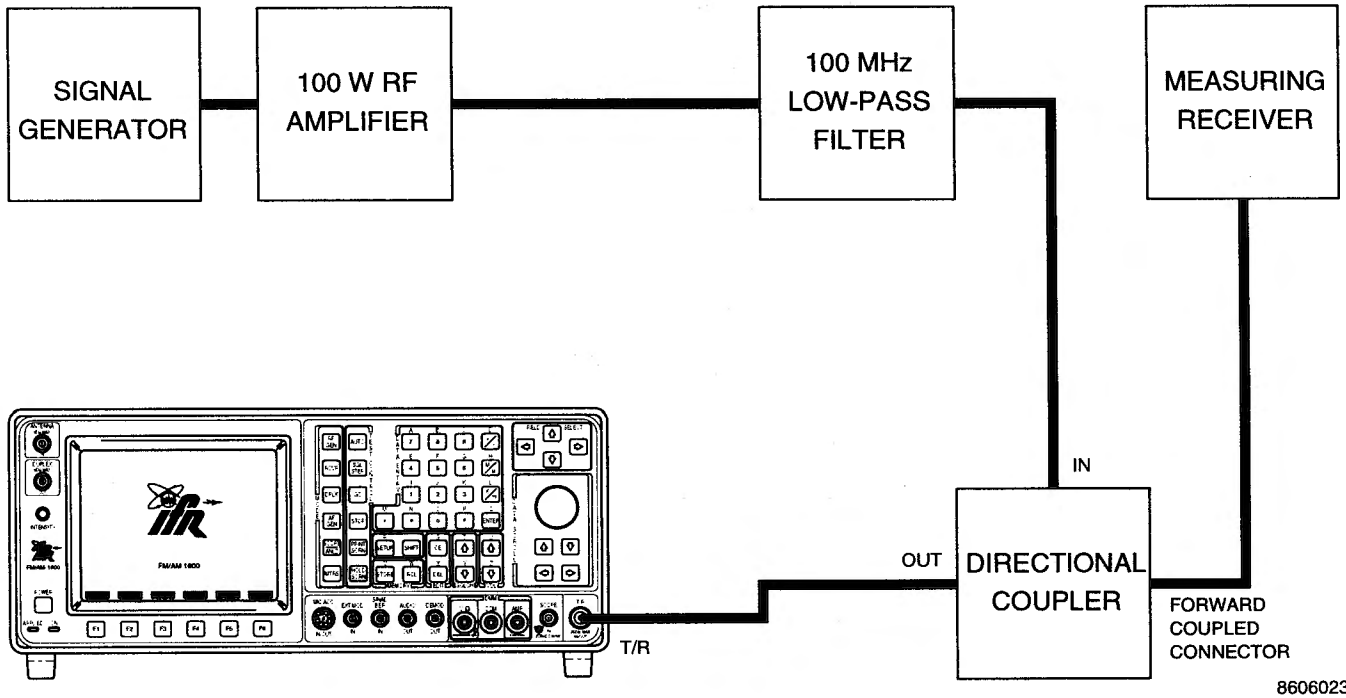


Figure 2-27 Power Termination Calibration Test Setup

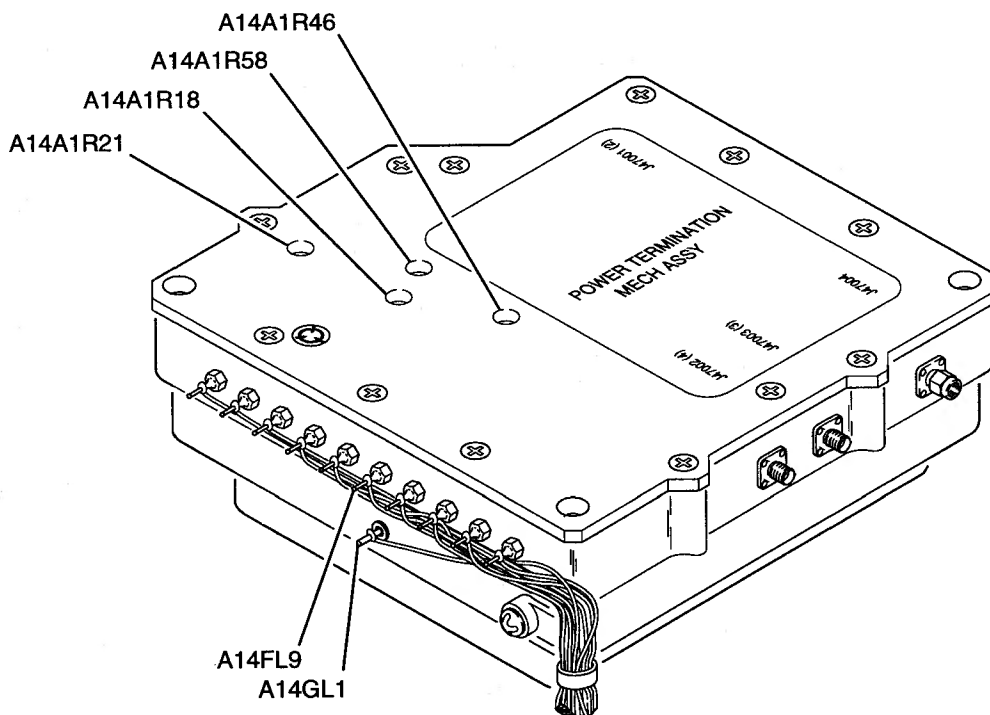


Figure 2-28 Power Termination Assembly (78A1A14) Calibration Points

## STEP

## PROCEDURE

19. Verify 4.00 V ( $\pm 100$  mV) is displayed on Digital Multimeter. Adjust, if necessary, A14A1R58 (Figure 2-28). If detected voltage is not within tolerance, alternately adjust, if necessary, A14A1R21 (Figure 2-28) and A14A1R58 (Figure 2-28) until the proper voltage levels are obtained.  
**NOTE:** A14A1R21 and A14A1R58 are interactive, so it is necessary to verify 20 mV ( $\pm 2$  mV) is displayed on Digital Multimeter with aluminum tape installed on Power Termination Assembly and Signal Generator RF output set to OFF. When readjusting the Power Termination Assembly, a 2 minute cooling period should be used between adjustments.
20. Press "Range" F1 Key to set data field to **100 W**.
21. Adjust Signal Generator RF output level until the adjusted reading on the Measuring Receiver displays 50000 mW is sent to the Test Set.
22. Verify 1.97 V ( $\pm 100$  mV) is displayed on Digital Multimeter. Adjust, if necessary, A14A1R46 (Figure 2-28). If detected voltage is not within tolerance, alternately adjust, if necessary, A14A1R18 (Figure 2-28) and A14A1R46 (Figure 2-28) until the proper voltage levels are obtained.  
**NOTE:** A14A1R18 and A14A1R46 are interactive, so it is necessary to verify 10 mV ( $\pm 2$  mV) is displayed on Digital Multimeter with aluminum tape installed on Power Termination Assembly and Signal Generator RF output set to OFF. When readjusting the Power Termination Assembly, a 2 minute cooling period should be used between adjustments.
23. Allow a 3 minute cooling period on the Power Termination Assembly.
24. Press "Range" F1 Key to select **20 mW**.
25. With Signal Generator RF output set to OFF, press "Zero" F2 Key. (Raw value reading is  $\approx 270$ .)
26. Press "Range" F1 Key to select **20 W**.
27. With Signal Generator RF output set to OFF, press "Zero" F2 Key. (Raw value reading is  $\approx 130$ .)
28. Press "Range" F1 Key to select **2 W**.
29. Set Signal Generator RF output to ON.
30. Adjust Signal Generator RF output level until the adjusted reading on the Measuring Receiver displays 1600 mW is sent to the Test Set.
31. Verify power reading is displayed on Test Set Power Meter. Press ENTER Key.
32. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key. (Raw value reading is  $\approx 46000$ .)
33. Press "Range" F1 Key to select **100 W**.
34. Adjust Signal Generator RF output level until the adjusted reading on the Measuring Receiver displays 50 W is sent to the Test Set.
35. Verify power reading is displayed on Test Set Power Meter. Press ENTER Key.
36. Use DATA ENTRY Keypad to enter value from Measuring Receiver. Press ENTER Key. (Raw value reading is  $\approx 25800$ .)



**STEP**

**PROCEDURE**

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**NOTE:** If aluminum tape was removed in order to access the calibration adjustments, the aluminum tape needs to be replaced.

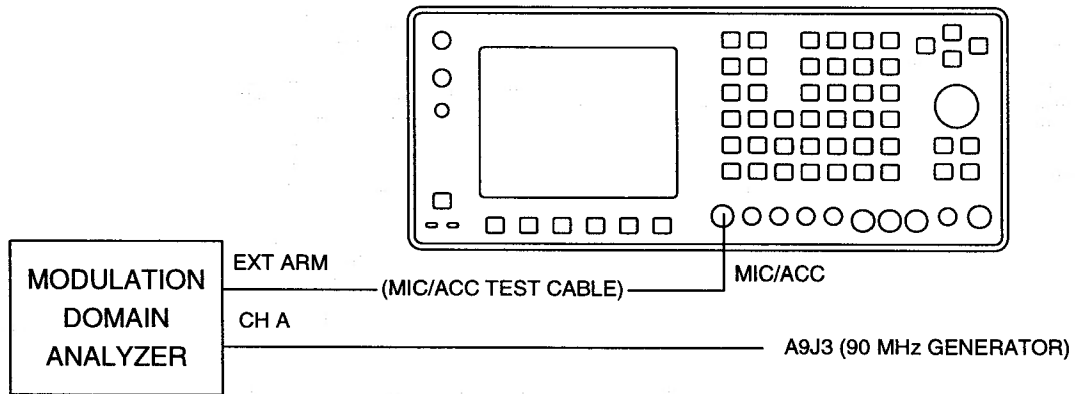
37. Perform associated Verification Procedure in Chapter 1.

## 2-10-18 GENERATE FREQUENCY AGILITY CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	1 MIC/ACC Test Cable (0021-AAJ1-100) 1 Modulation Domain Analyzer
FIGURE REFERENCES:	Figure 2-29 Figure 2-30 Figure 2-31 Figure 2-32

**NOTE:** The Frequency Agility Verification Procedure should be performed prior to performing this procedure if a module has been replaced.

STEP	PROCEDURE
1.	Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>• Press MTRS MODE Key.</li><li>• Press "AUX" F6 Key.</li><li>• Press RCL Key.</li><li>• Press SHIFT Key.</li><li>• Press 7 (A) Key.</li><li>• Press ENTER Key.</li></ul>
3.	Connect external test equipment as shown in Figure 2-29.



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Figure 2-29 Generate Frequency Agility Test Setup

## STEP

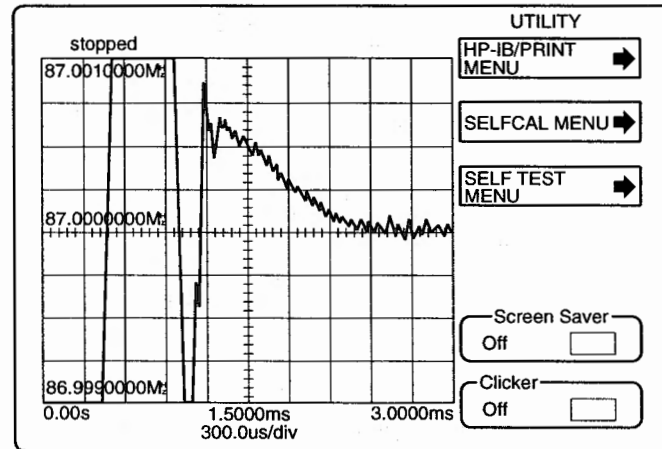
## PROCEDURE

4. Set Modulation Domain Analyzer controls as follows:

CONTROL	SETTING
Function	Frequency Channel A
Vertical	Center/Span
Center	90 MHz
Span	2 kHz
Display	vs Time, Axes, Real Time
Connect Data	On
Persistence	Single
Histogram Accumulate	Off
Trigger	Triggered, Ext Edge, Arm Only, Trailing Edge
Time Base	300 $\mu$ s
Reference	Left
Delay	0 sec
Panorama	Off
Time Markers	Off
Freq Markers	Off
Sampling	Auto
Interval at Ctr	Auto
Utility - Clicker	(Push RUN under System Control) On

5. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter **11.0000 MHz** into data field. Press ENTER Key.
7. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
8. Press MTRS Key. Meters Menu is displayed on Test Set.
9. Press "AUX" F5 Key.
10. Press "S.R." F1 Key.

11. Verify signal is within 1 kHz of 90 MHz in <1.5 ms from Trigger with Modulation Domain Analyzer as shown to verify the frequency hopping characteristics of the 90 MHz Generator (Figure 2-30). If reading is correct, 1st LO Assembly is potential failure. If reading is out of tolerance, go to Step 12.



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Figure 2-30 Generate Frequency Agility Test Signal

12. Install 90 MHz Generator PC Board Assembly (78A1A9A1) on Extender Board:
- Remove 90 MHz Generator Assembly (78A1A9) (para 3-2-7).
  - Remove 2 screws (1) from enclosure (2) (Figure 2-31).
  - Remove 90 MHz Generator PC Board Assembly (78A1A9A1) (5) from enclosure (2) (Figure 2-31).
  - Remove two nuts and washers (3) (Figure 2-31).
  - Remove enclosure cover (4) (Figure 2-31).
  - Remove RF Shields.
  - Install Extender Board.
  - Install 90 MHz Generator PC Board Assembly (78A1A9A1) on Extender Board.
13. Apply power to Test Set. Allow 5 minute warm-up period. Insure IFR Logo, with no error message, is displayed on Test Set.

#### FINE LOOP ADJUST

14. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
15. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0001 MHz**. Press ENTER Key.
16. Connect Digital Multimeter to A9A1TP1 (Figure 2-32).
17. Verify -8 V ( $\pm 200$  mV). Adjust A9A1L5 (Figure 2-32) if necessary.

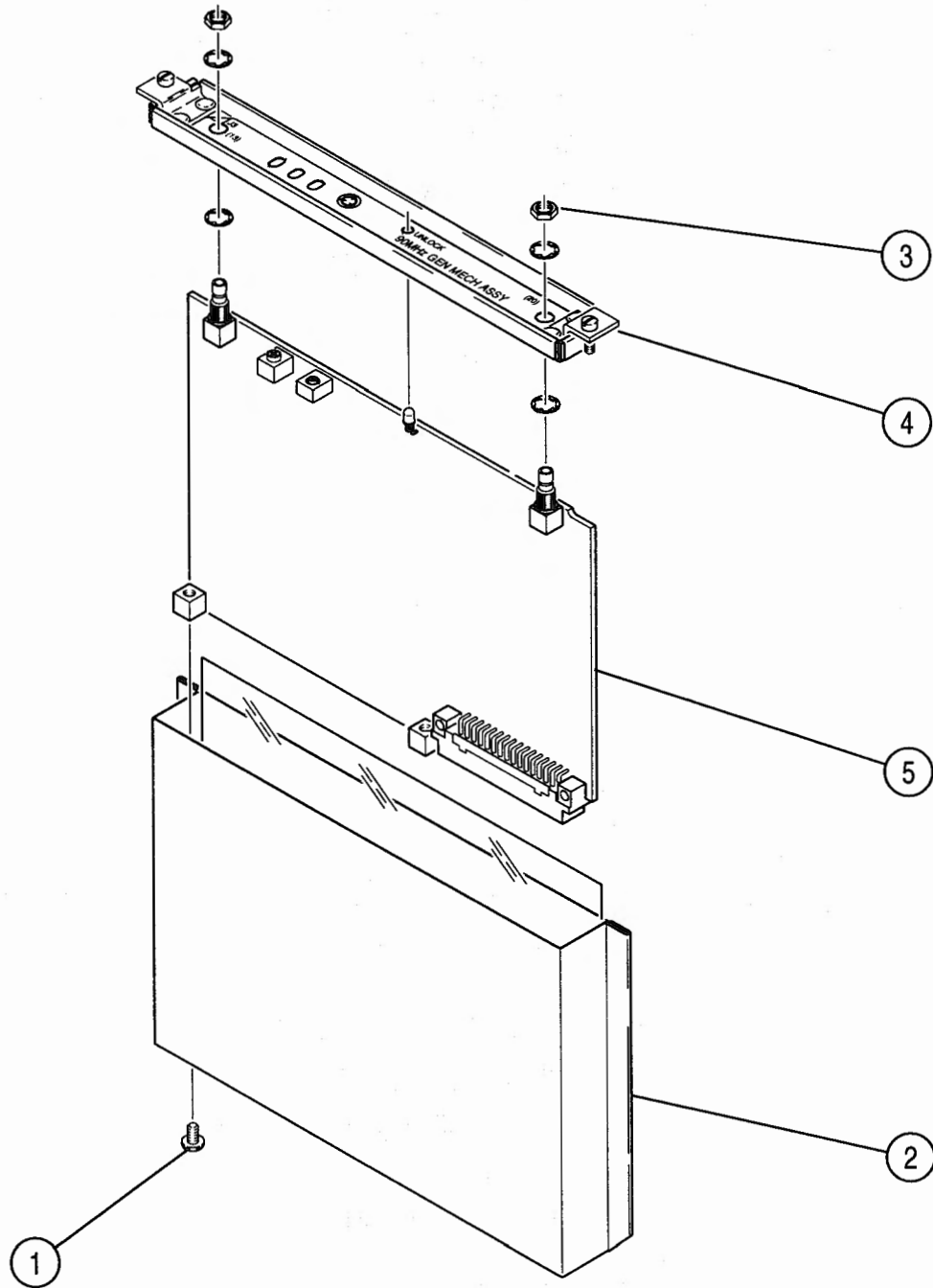
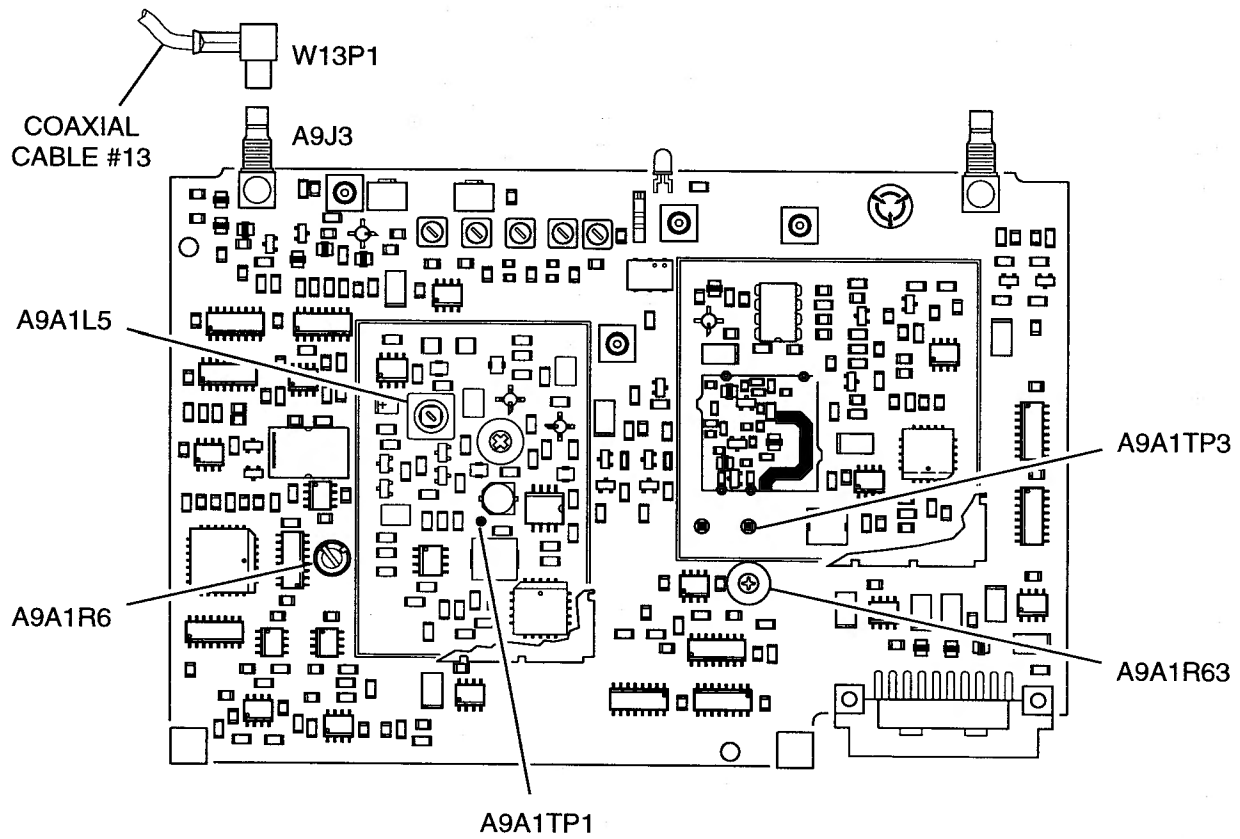


Figure 2-31 90 MHz Generator PC Board Assembly (78A1A9A1) Removal

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Figure 2-32 90 MHz Generator PC Board Assembly (78A1A9A1) Calibration Points

**STEP****PROCEDURE**

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18. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
19. Verify voltage in Step 17 ( $\pm 5$  mV). Adjust A9A1R106 (FINE LOOP PREPOSITION) (Figure 2-32) if necessary.
20. Repeat Steps 15-19 until no further adjustments are required.

**COARSE LOOP ADJUST**

21. Disconnect Digital Multimeter from A9A1TP1 (Figure 2-32).
22. Connect Digital Multimeter to A9A1TP3 (Figure 2-32).
23. Verify -7.5 V ( $\pm 1.25$  V).
24. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **99.9999 MHz**. Press ENTER Key.
25. Verify voltage in Step 23 ( $\pm 5$  mV). Adjust A9A1R63 (COARSE LOOP PREPOSITION) (Figure 2-32) if necessary.
26. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
27. Repeat Steps 22-26 until no further adjustments are required.
28. Perform the following:
  - Remove power from Test Set and disconnect test equipment.
  - Remove 90 MHz Generator PC Board Assembly (78A1A9A1) from Extender Board.
  - Remove Extender Board.
  - Install 90 MHz Generator PC Board Assembly (78A1A9A1) in enclosure. (Reverse procedure as shown in Step 12.)
  - Install 90 MHz Generator Assembly (78A1A9) (para 3-2-7).
29. Perform associated Verification Procedure in Chapter 1.

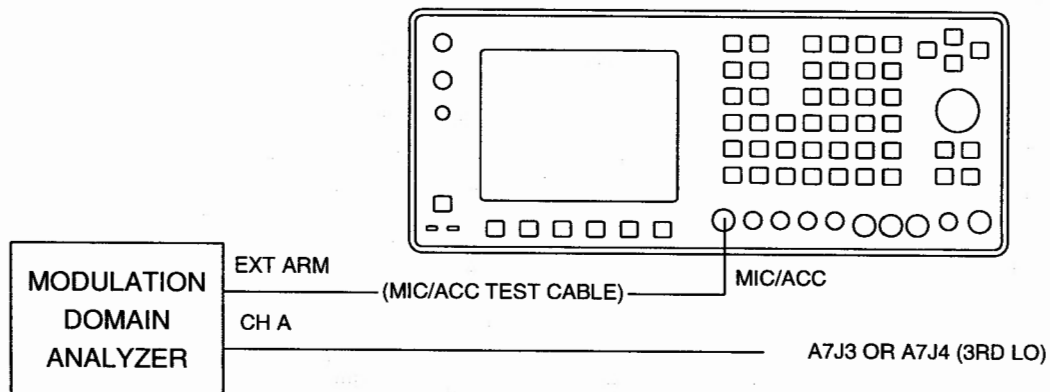
## 2-10-19 RECEIVE FREQUENCY AGILITY CALIBRATION

PREREQUISITES:	Power Supply Calibration (para 2-10-1)
EQUIPMENT REQUIRED:	1 MIC/ACC Test Cable (0021-AAJ1-100) 1 Modulation Domain Analyzer
FIGURE REFERENCES:	Figure 2-33 Figure 2-34 Figure 2-35 Figure 2-36

**NOTE:** The Frequency Agility Verification Procedure should be performed prior to performing this procedure if a module has been replaced.

STEP	PROCEDURE
------	-----------

1. Apply power to Test Set. Allow 2 Hour warm-up period. Insure IFR Logo Menu, with no error message, is displayed on Test Set.
2. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
3. Connect external test equipment as shown in Figure 2-33.



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Figure 2-33 Receive Frequency Agility Test Setup



## STEP

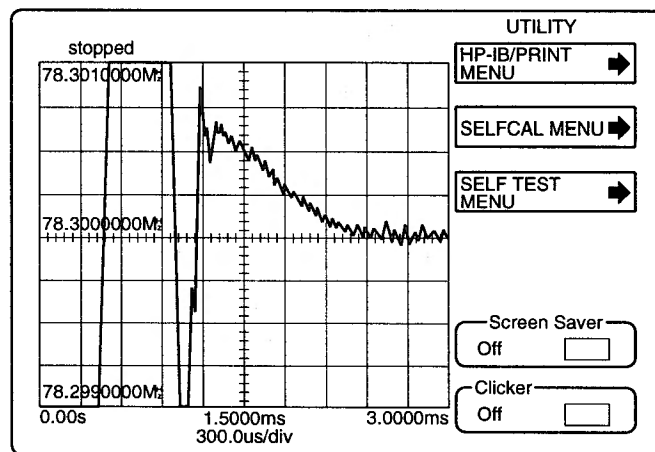
## PROCEDURE

4. Set Modulation Domain Analyzer controls as follows:

CONTROL	SETTING
Function	Frequency Channel A
Vertical	Center/Span
Center	78.3 MHz
Span	2 kHz
Display	vs Time, Axes, Real Time
Connect Data	On
Persistence	Single
Histogram Accumulate	Off
Trigger	Triggered, Ext Edge, Arm Only, Falling Edge
Time Base	300 $\mu$ s
Reference	Left
Delay	0 sec
Panorama	Off
Time Markers	Off
Freq Markers	Off
Sampling	Auto
Interval at Ctr	Auto
Utility - Clicker	(Push RUN under System Control) On

5. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
6. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to enter **11.0000 MHz** into data field. Press ENTER Key.
7. Press MTRS Key. Meters Menu is displayed on Test Set.
8. Press "AUX" F5 Key.
9. Press "S.R." F1 Key.

10. Verify signal is within 1 kHz of 87 MHz in <1.5 ms from Trigger with Modulation Domain Analyzer as shown to verify the frequency hopping characteristics of the 3rd LO (Figure 2-34). If reading is correct, 1st LO Assembly is potential failure. If reading is out of tolerance, go to Step 11.



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Figure 2-34 Receive Frequency Agility Test Signal

11. Install 3rd LO PC Board Assembly (78A1A7A1) on Extender Board:
- Remove 3rd LO Assembly (78A1A7) (para 3-2-6).
  - Remove 2 screws (1) from enclosure (2) (Figure 2-35).
  - Remove 3rd LO PC Board Assembly (78A1A7A1) (4) from enclosure (2) (Figure 2-35).
  - Remove one nut and washer (8) from 3 coaxial connectors (5) (Figure 2-35).
  - Remove enclosure cover (7) and 3 washers (6) (Figure 2-35).
  - Remove covers (3) from 3 shields (as required) (Figure 2-35).
  - Install Extender Board.
  - Install 3rd LO PC Board Assembly (78A1A7A1) on Extender Board.
12. Apply power to Test Set. Allow 5 minute warm-up period. Insure IFR Logo, with no error message, is displayed on Test Set.

#### COARSE LOOP ADJUST

13. Press RCVR Key. Receive Operation Screen is displayed on Test Set.
14. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
15. Connect Digital Multimeter to A7A1TP1 (Figure 2-36).
16. Verify 0.0 V ( $\pm 5$  mV). Adjust A7A1R9 (PREPOSITION ZERO ADJUST) (Figure 2-36) if necessary.

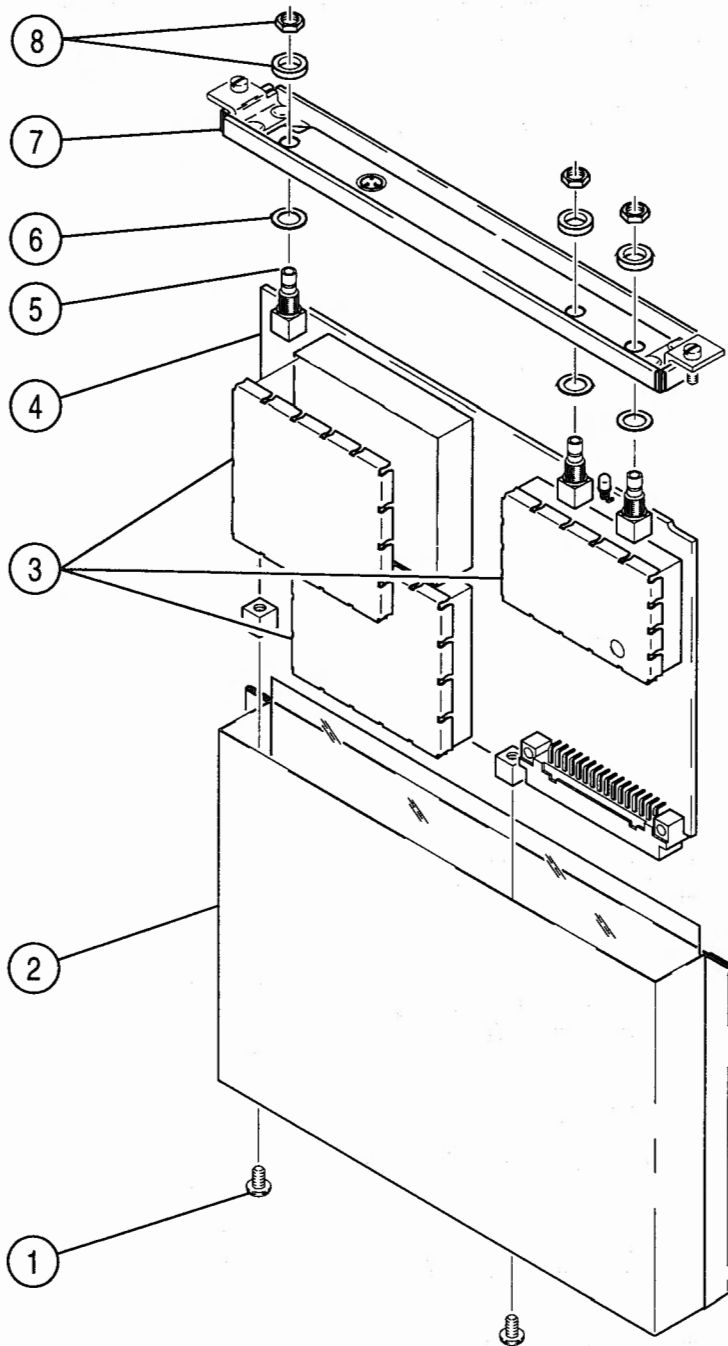
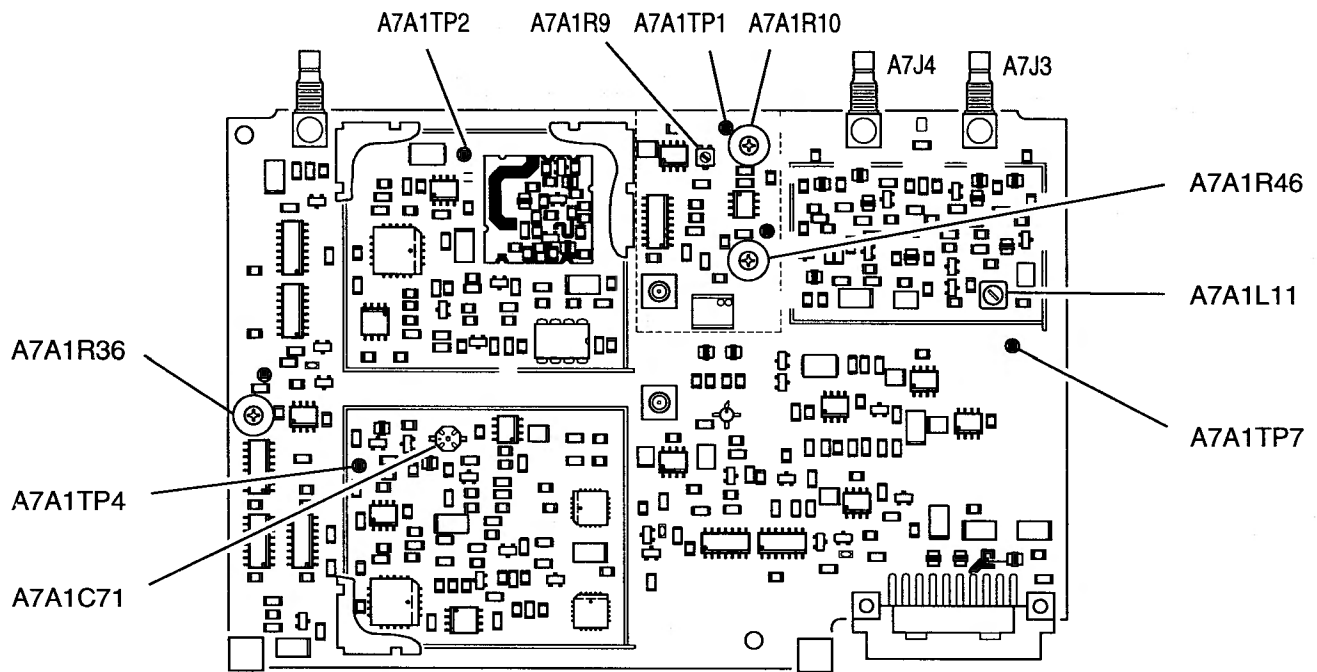


Figure 2-35 3rd LO PC Board Assembly (78A1A7A1) Removal

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Figure 2-36 3rd LO PC Board Assembly (78A1A7A1) Calibration Points

## STEP

## PROCEDURE

17. Connect Digital Multimeter to A7A1TP2 (Figure 2-36).
18. Verify -7.5 V ( $\pm 1.25$  V).
19. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **99.9999 MHz**. Press ENTER Key.
20. Verify voltage in Step 18 ( $\pm 5$  mV). Adjust A7A1R10 (PREPOSITION GAIN) (Figure 2-36) if necessary.
21. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
22. Repeat Steps 18-21 until no further adjustments are required.

**FINE LOOP ADJUST**

23. Disconnect Digital Multimeter from A7A1TP2 (Figure 2-36).
24. Connect Digital Multimeter to A7A1TP4 (Figure 2-36).
25. Verify -6 V ( $\pm 200$  mV). Adjust A7A1C71 (FINE LOOP OSCILLATOR ADJUST) (Figure 2-36) if necessary.
26. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0001 MHz**. Press ENTER Key.
27. Verify voltage in Step 25 ( $\pm 5$  mV). Adjust A7A1R36 (FINE LOOP PREPOSITION) (Figure 2-36) if necessary.
28. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
29. Repeat Steps 25-28 until no further adjustments are required.

**SUMMING LOOP**

30. Disconnect Digital Multimeter from A7A1TP4 (Figure 2-36).
31. Connect Digital Multimeter to A7A1TP7 (Figure 2-36).
32. Verify 6 V ( $\pm 200$  mV). Adjust A7A1L11 (SUMMING LOOP OSCILLATOR ADJUSTMENT) (Figure 2-36) if necessary.
33. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **99.9999 MHz**. Press ENTER Key.
34. Verify voltage in Step 32 ( $\pm 5$  mV). Adjust A7A1R46 (SUMMING LOOP PREPOSITION GAIN ADJUST) (Figure 2-36) if necessary.
35. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to **100.0000 MHz**. Press ENTER Key.
36. Repeat Steps 32-36 until no further adjustments are required.

**STEP****PROCEDURE**

---

37. Perform the following:
- Remove power from Test Set and disconnect test equipment.
  - Remove 3rd LO PC Board Assembly (78A1A7A1) from Extender Board.
  - Remove Extender Board.
  - Install 3rd LO PC Board Assembly (78A1A7A1) in enclosure. (Reverse procedure as shown in Step 11.)
  - Install 3rd LO Assembly (78A1A7) (para 3-2-6).
38. Perform associated Verification Procedure in Chapter 1.

# CHAPTER 3 - REMOVE/INSTALL INSTRUCTIONS

## 3-1 GENERAL

PROCEDURE	TITLE	PAGE
3-2-1	Top Case Assembly (78A2).....	3-2
3-2-2	Bottom Case Assembly (78A3).....	3-3
3-2-3	Digitizer PC Board Assembly (78A1A25).....	3-4
3-2-4	Analyzer RF Assembly (78A1A5).....	3-5
3-2-5	Analyzer Log/IF Assembly (78A1A4).....	3-6
3-2-6	3rd LO Assembly (78A1A7).....	3-7
3-2-7	90 MHz Generator Assembly (78A1A9).....	3-8
3-2-8	Function Generator PC Board Assembly (78A1A24).....	3-9
3-2-9	DMM Assembly (78A1A8).....	3-10

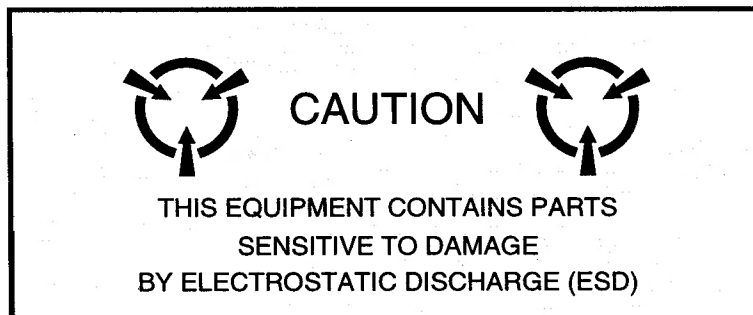
### 3-1-1 SAFETY PRECAUTIONS

Power should be removed from the Test Set before any replacement procedure is initiated.

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

### 3-1-2 ESD PRECAUTIONS

**CAUTION:** THE REMOVE/INSTALL PROCEDURES FOR THE TEST SET SHOULD ONLY BE PERFORMED IN AN ESD ENVIRONMENT AND ALL PERSONNEL PERFORMING THE REMOVE/INSTALL PROCEDURES SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.



## 3-2 REMOVE/INSTALL PROCEDURES

### 3-2-1 TOP CASE ASSEMBLY (78A2)

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#### DESCRIPTION

This procedure covers: Remove. Install.

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#### WARNING

Dangerous voltages are present with case assemblies removed.

#### CAUTION

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

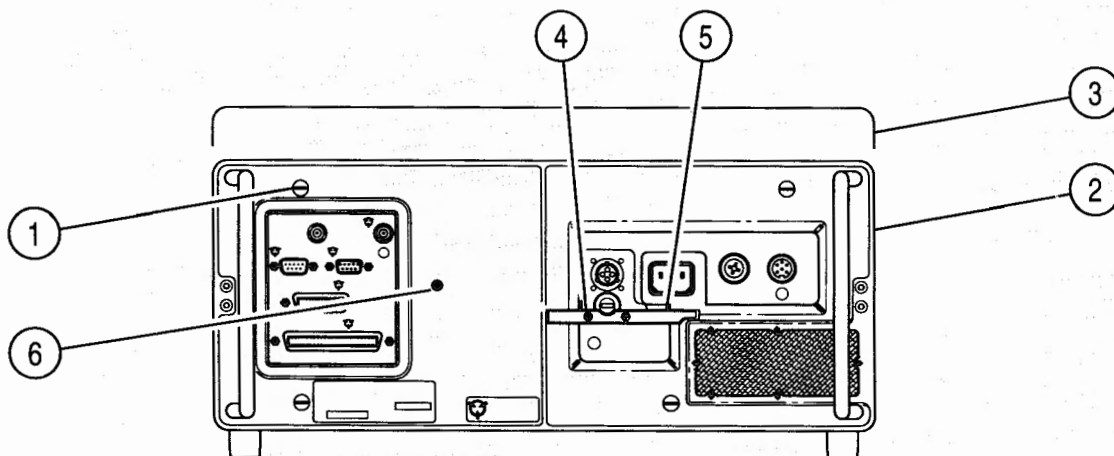
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#### REMOVE

1. Loosen 4 captive screws (1).
2. Remove 2 screws (4) and drawbar (5).
3. Remove screw (6).
4. Slide Rear Panel Assembly (78A1A2) (2) toward rear.
5. Remove Top Case Assembly (78A2) (3).

#### INSTALL

1. Install Top Case Assembly (78A2) (3).
2. Slide Rear Panel Assembly (78A1A2) (2) toward front.
3. Tighten 4 captive screws (1).
4. Install screw (6).
5. Install 2 screws (4) and drawbar (5).



CE2FM501

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END OF TASK

---



## 3-2-2 BOTTOM CASE ASSEMBLY (78A3)

### DESCRIPTION

This procedure covers: Remove. Install.

### WARNING

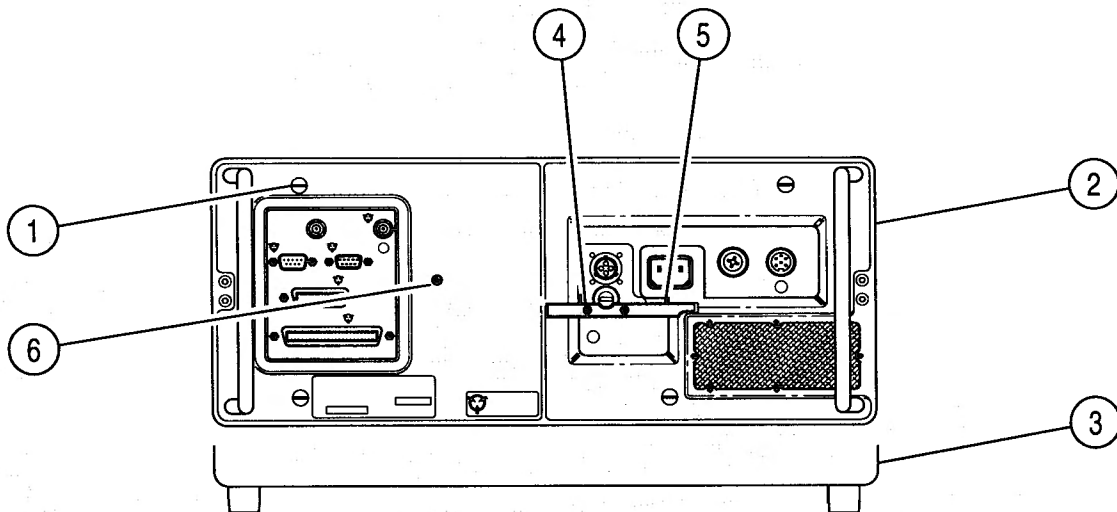
Dangerous voltages are present with case assemblies removed.

### REMOVE

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

### INSTALL

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



CE2FM503

END OF TASK

### 3-2-3 DIGITIZER PC BOARD ASSEMBLY (78A1A25)

---

#### DESCRIPTION

This procedure covers: Remove. Install.

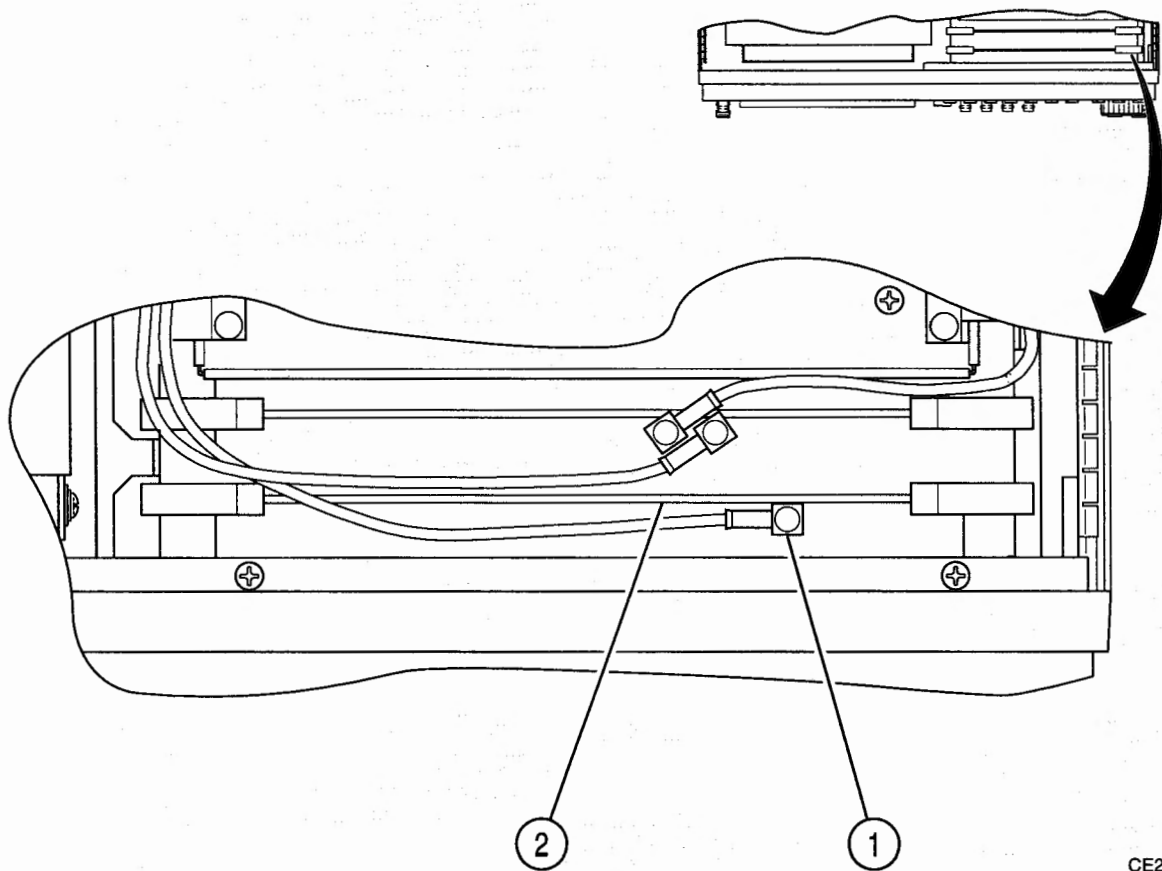
---

#### REMOVE

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

#### INSTALL

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



CE2FO017

---

END OF TASK

---

### 3-2-4 ANALYZER RF ASSEMBLY (78A1A5)

---

#### DESCRIPTION

This procedure covers: Remove. Install.

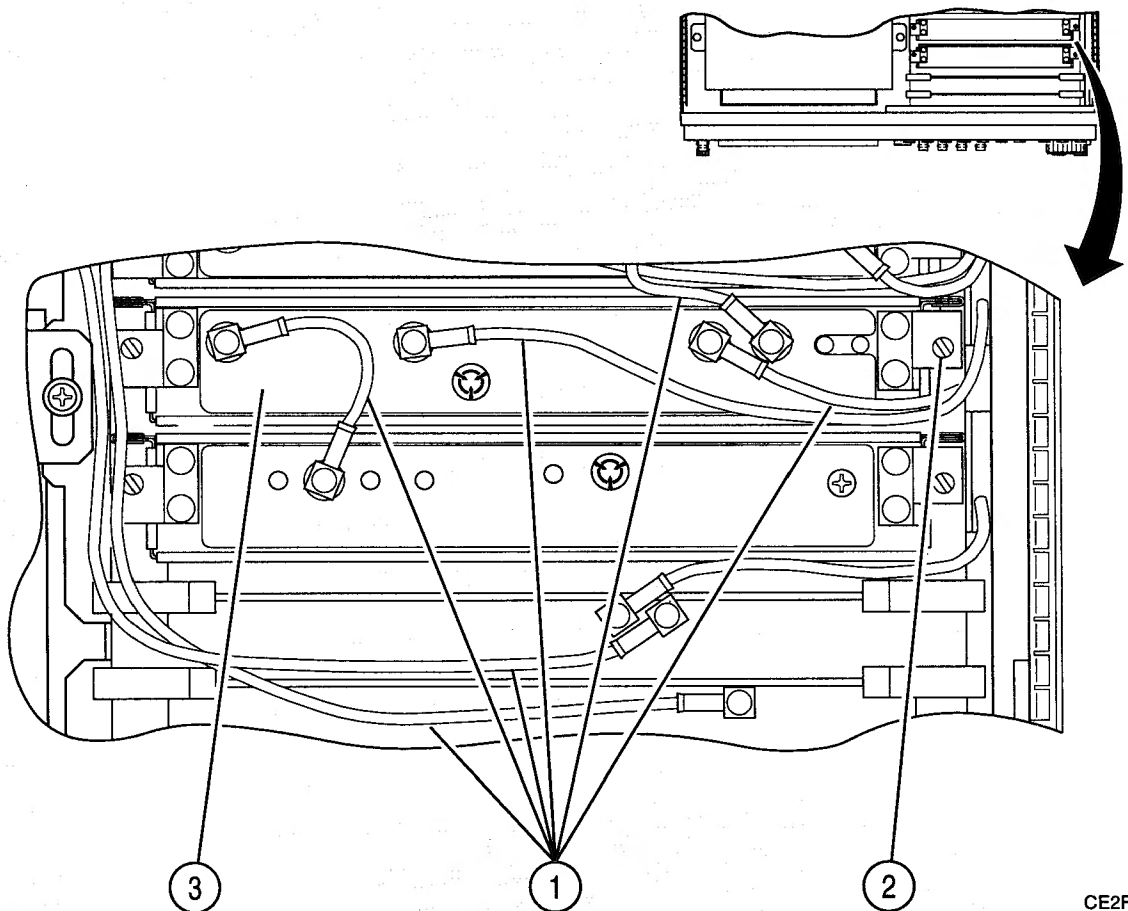
---

#### REMOVE

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

#### INSTALL

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



CE2FO020

---

END OF TASK

---

### 3-2-5 ANALYZER LOG/IF ASSEMBLY (78A1A4)

#### DESCRIPTION

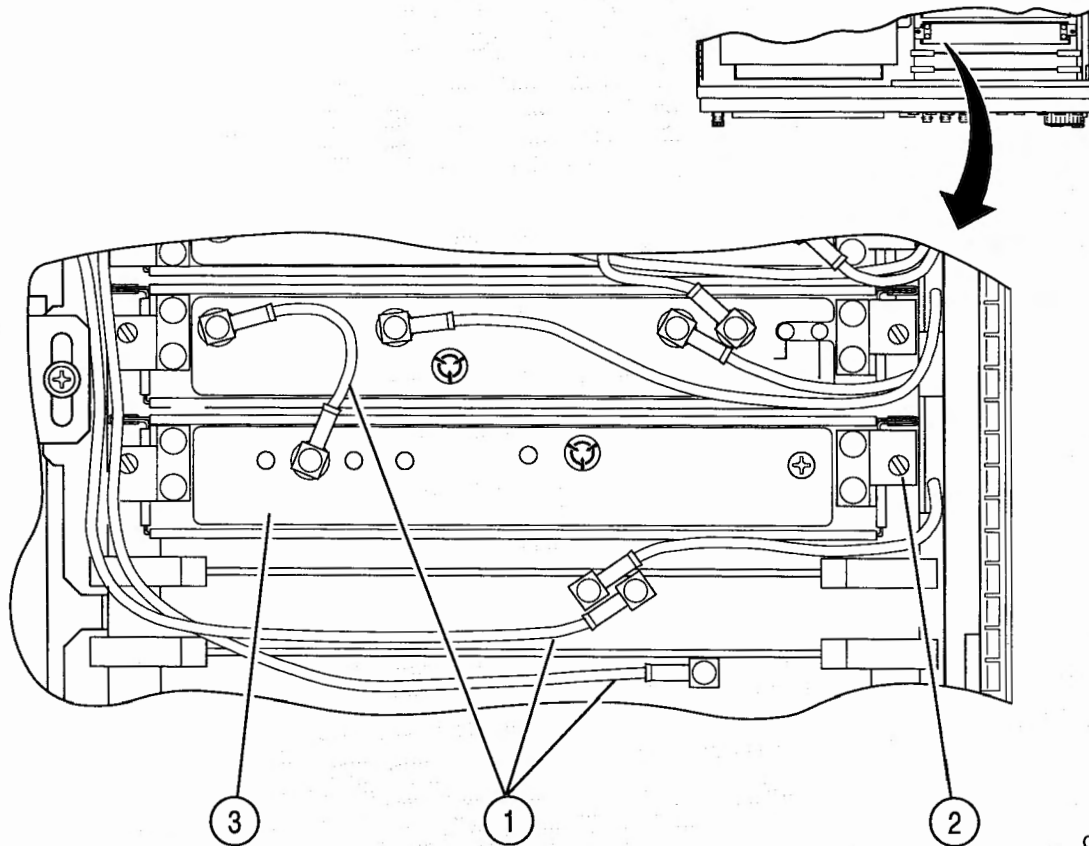
This procedure covers: Remove. Install.

#### REMOVE

1. Remove Analyzer RF Assembly (78A1A5) (para 3-2-4).
2. Disconnect 3 coaxial cables (1).
3. Loosen 2 captive screws (2).
4. Remove Analyzer Log/IF Assembly (78A1A4) (3).

#### INSTALL

1. Install Analyzer Log/IF Assembly (78A1A4) (3).
2. Tighten 2 captive screws (2).
3. Reconnect 3 coaxial cables (1).
4. Install Analyzer RF Assembly (78A1A5) (para 3-2-4).



CE2FO019

END OF TASK

### 3-2-6 3RD LO ASSEMBLY (78A1A7)

#### DESCRIPTION

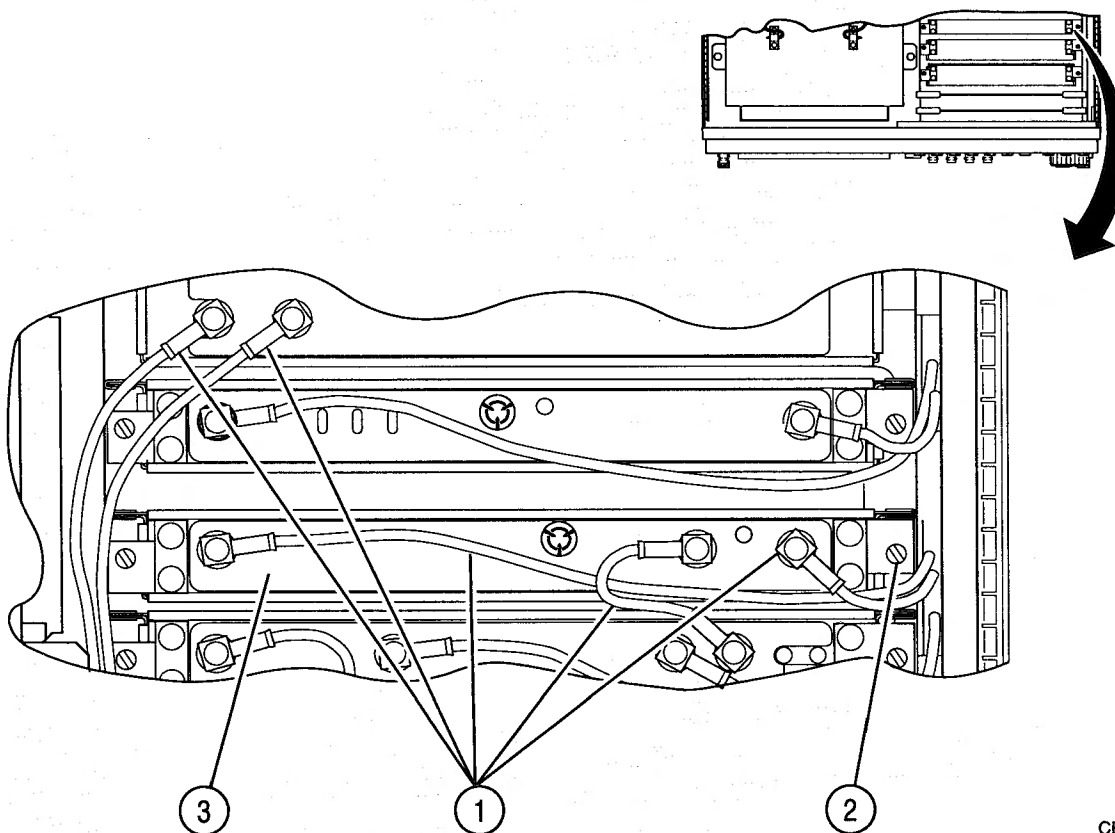
This procedure covers: Remove. Install.

#### REMOVE

1. Remove Analyzer RF Assembly (78A1A5) (para 3-2-4).
2. Disconnect 5 coaxial cables (1).
3. Loosen 2 captive screws (2).
4. Remove 3rd LO Assembly (78A1A7) (3).

#### INSTALL

1. Install 3rd LO Assembly (78A1A7) (3).
2. Tighten 2 captive screws (2).
3. Reconnect 5 coaxial cables (1).
4. Install Analyzer RF Assembly (78A1A5) (para 3-2-4).



CE2FO021

END OF TASK

### 3-2-7 90 MHz GENERATOR ASSEMBLY (78A1A9)

#### DESCRIPTION

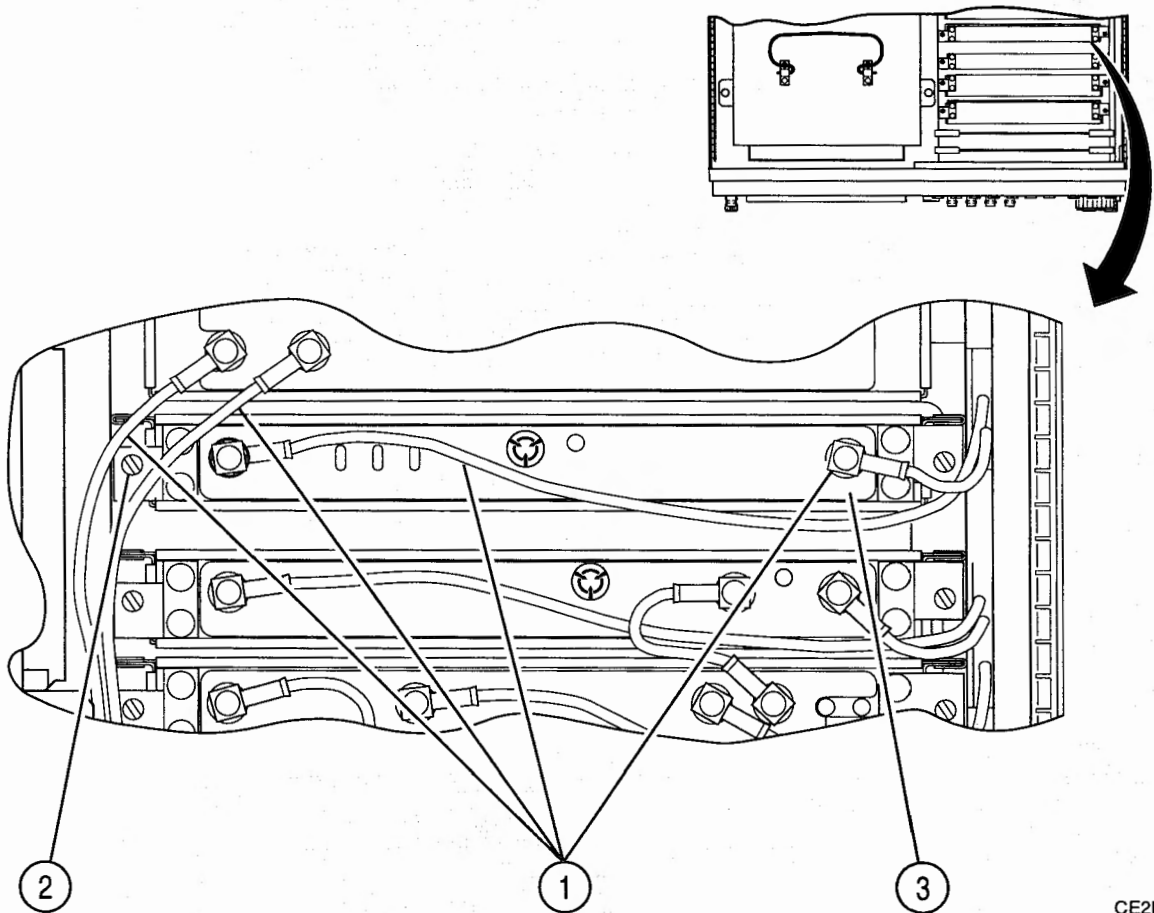
This procedure covers: Remove. Install.

#### REMOVE

1. Disconnect 4 coaxial cables (1).
2. Loosen 2 captive screws (2).
3. Remove 90 MHz Generator Assembly (78A1A9) (3).

#### INSTALL

1. Install 90 MHz Generator Assembly (78A1A9) (3).
2. Tighten 2 captive screws (2).
3. Reconnect 4 coaxial cables (1).



CE2FO022

END OF TASK

### 3-2-8 FUNCTION GENERATOR PC BOARD ASSEMBLY (78A1A24)

#### DESCRIPTION

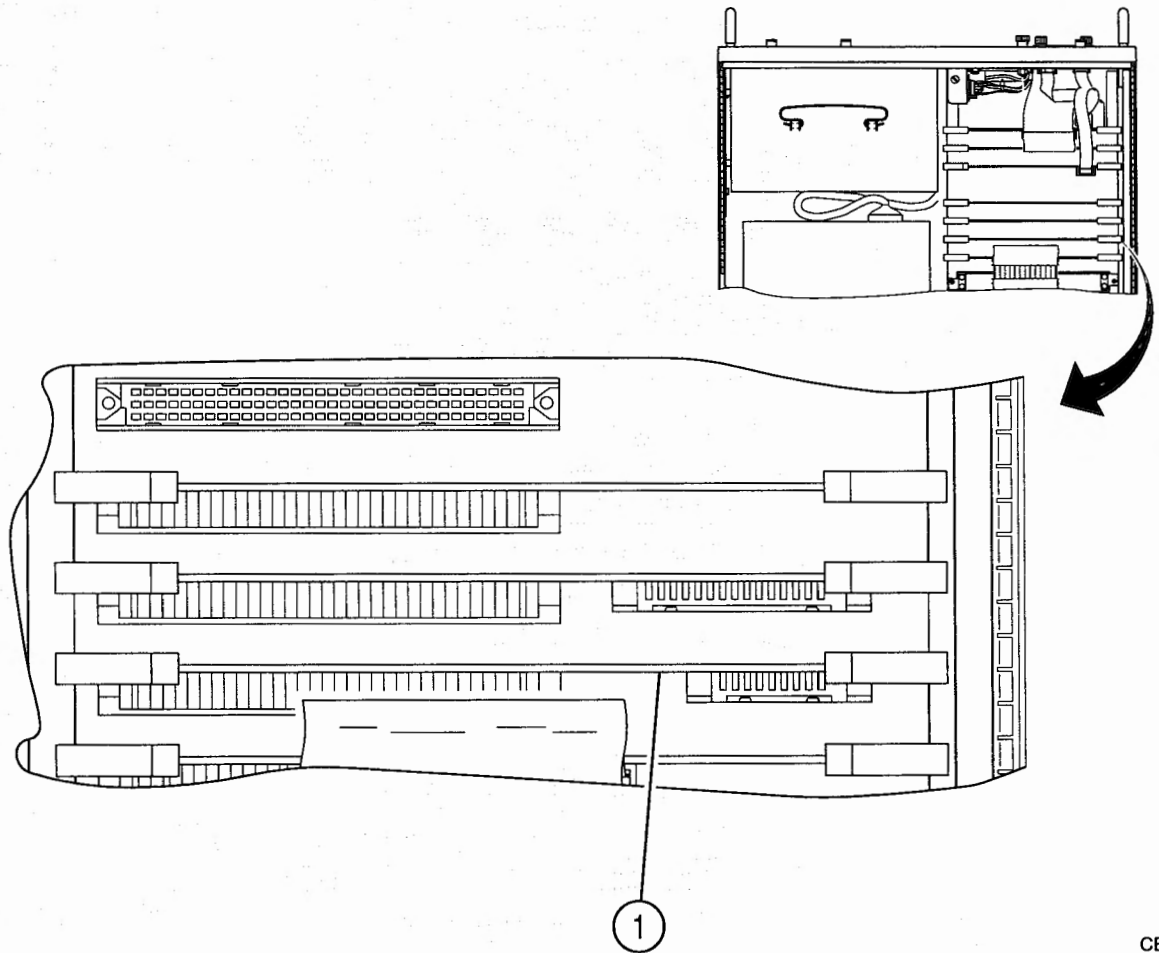
This procedure covers: Remove. Install.

#### REMOVE

Raise card ejectors and remove Function Generator PC Board Assembly (78A1A24) (1).

#### INSTALL

Install Function Generator PC Board Assembly (78A1A24) (1) in guides and close card ejectors.



CE2FO026

END OF TASK

### 3-2-9 DMM ASSEMBLY (78A1A8)

#### DESCRIPTION

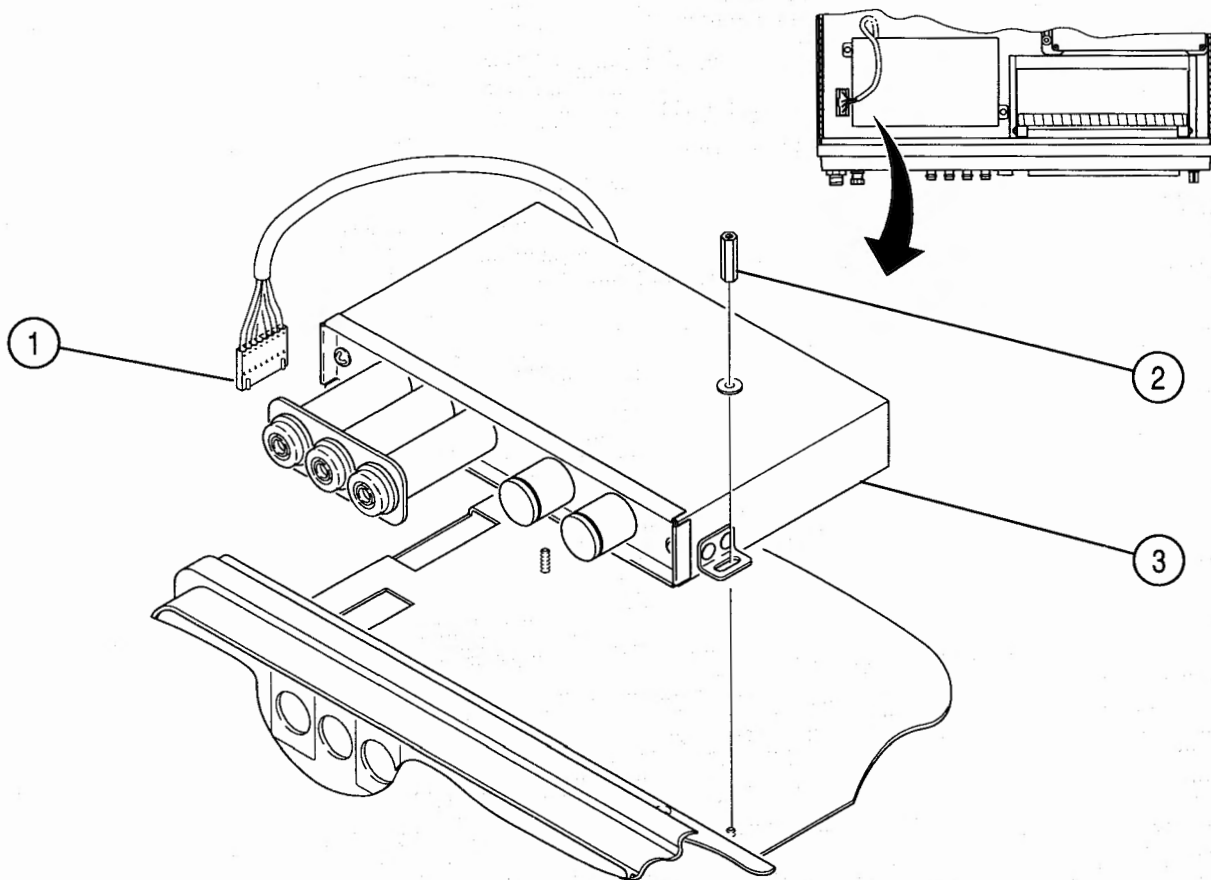
This procedure covers: Remove. Install.

#### REMOVE

1. Disconnect wire cable connector (1).
2. Remove 2 spacer nuts and 2 washers (2).
3. Slide DMM Assembly (78A1A8) (3) to rear and remove.

#### INSTALL

1. Install DMM Assembly (78A1A8) (3) and slide forward until tight against Front Panel Assembly (78A1A17).
2. Reconnect wire cable connector (1).
3. Install 2 spacer nuts and 2 washers (2).



CE2FO040

END OF TASK



## APPENDIX A - TEST EQUIPMENT REQUIREMENTS

TYPE	MODEL	SPECIFICATIONS
RF Signal Generator	HP8643A or Equivalent	Frequency Range: 150 kHz to 1 GHz Resolution: 10 Hz RF Output Range: 0 to -127 dBm Resolution: 0.1 dB Accuracy: $\pm 1.0$ dB Modulation: Modes: FM, AM, PM Resolution: 0.01 kHz, 1%
Measuring Receiver  Measuring Receiver Sensor	HP8902A with Opt 003 or Equivalent  HP11722A or Equivalent	RF Power: Range: -20 to +30 dBm Freq Range: 0.001 to 1 GHz Accuracy: $\pm 0.1$ dB RF Tuned: 0 to -127 dBm Relative Accuracy: $\pm 0.1$ dB FM and PM Meter Range: $\pm 50$ Hz to $\pm 100$ kHz Accuracy: $\pm 1\%$ AM Meter Range: 1% to 95% Accuracy: $\pm 1\%$
Digital Multimeter (DMM)	FLUKE 8840A/AF or Equivalent	Resolution: 5.5 Digit, 0.01 mV Accuracy: $\leq 0.4\%$ ac, $\pm 1$ count
Calibrator	FLUKE 5100B AF or Equivalent	AC, DC, Ohms, Current Accuracy: $\pm 0.1\%$ of setting
Power Splitter	HP11667A AF or Equivalent	DC to 1 GHz: 6 dB Nominal Insertion Loss
Audio Analyzer	HP8903B or Equivalent	Frequency Range: 20 Hz to 20 kHz Accuracy: $\pm 0.5$ dB
RF Amplifier	ENI 5100L or Equivalent  Amplifier Research 10W1000 or Equivalent	Gain: $\leq 50$ dB Minimum Output: 100W Linear Bandwidth: 1.5 to 400 MHz  Gain: $\leq 40$ dB Minimum Output: 10 W Bandwidth: 1 MHz to 1 GHz

TYPE	MODEL	SPECIFICATIONS
Directional Coupler	NARDA 3020A or Equivalent	Coupler Attenuation: 20 dB Directivity: 35 dB Frequency Range: 50 MHz to 1 GHz
Oscilloscope	TEK2430A or Equivalent	Bandwidth: 150 MHz Digital
Power Attenuator	NARDA Model 766 or Equivalent	'N' Male to 'N' Female VSWR <1.1 Power: 20 W Attenuation: 20 dB
10 MHz Frequency Standard	HP58503A or Equivalent	Accuracy: 1 X 10 <sup>-5</sup> NIST
Multifunction Synthesizer	HP8904A or Equivalent	Frequency Range: 0.1 Hz to 600 kHz Resolution: 0.1 Hz Accuracy: ±50 ppm Amplitude: Range: 0 to 10 Vp-p Resolution: 3.5 digits Accuracy: ±1% Spectral Purity: 0.1%
Modulation Domain Analyzer	HP53310A or Equivalent	N/A
Personal Computer		RS-232 Interface
MIC/ACC Test Cable	IFR 0021-AAJ1-100	N/A
Extender Boards	IFR 7010-7839-600 IFR 7010-7839-900	N/A

## APPENDIX B - LEVELER/AM MODULATOR VERIFICATION

EQUIPMENT REQUIRED:

- 1 Broadband Power Meter
- 1 Digital Multimeter (DMM)
- 1 Extender Board (7010-7839-600)
- 1 RF Signal Generator

FIGURE REFERENCES:

- Figure B-1
- Figure B-2
- Figure B-3

A	SOURCE POWER - FRONT END TEST	
B	Test Set OUTPUT LEVEL - FRONT END TEST	
C	FRONT END ERROR [(B) - (A) - 22.48]	
D	INITIAL CLOSED LOOP VOLTAGE	
E	21 dB ATTENUATOR DEPTH - VOLTAGE	
F	21 dB ATTENUATOR DEPTH INPUT POWER	
G	ERROR FROM CLOSED LOOP - INPUT POWER	
H	dB ERROR FROM CLOSED LOOP [(F) - (G)]	
I	OUTPUT LEVEL - CLOSED LOOP	
J	TRUE MODULE ALIGNMENT ERROR [(H) - (C) + (I)]	

PARA	STEP	DATA	RESULT	ADJ REQ'D?
	29	Old Value of A9A1R27	-----	
		New Value of A9A1R27	-----	
	34	Adjusted Attenuator Target Voltage	-----	

**STEP****PROCEDURE**

---

1. Install 90 MHz Generator PC Board Assembly (78A1A9A1) on Extender Board:
  - Remove 90 MHz Generator Assembly (78A1A9) (para 3-2-7).
  - Remove 90 MHz Generator PC Board Assembly (78A1A9A1) from enclosure (Figure B-1).
  - Remove 2 screws (1) from enclosure (2) (Figure B-1).
  - Remove 90 MHz Generator PC Board Assembly (78A1A9A1) (5) from enclosure (2) (Figure B-1).
  - Remove two nuts and washers (3) (Figure B-1).
  - Remove enclosure cover (4) (Figure B-1).
  - Install Extender Board.
  - Install 90 MHz Generator PC Board Assembly (78A1A9A1) on Extender Board.
2. Apply power to Test Set. Allow 5 minute warm-up period. Insure IFR Logo, with no error message, is displayed on Test Set.
3. Set Test Set to Factory Defaults:
  - Press MTRS MODE Key.
  - Press "AUX" F6 Key.
  - Press RCL Key.
  - Press SHIFT Key.
  - Press 7 (A) Key.
  - Press ENTER Key.
4. Press RF GEN Key. RF Generator Operation Screen is displayed on Test Set.
5. Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set frequency to **999.9999 MHz**. Press ENTER Key.
6. Use FIELD SELECT Keys to move cursor to LEVEL. Press ENTER Key. Use DATA ENTRY Keypad to set level to **0.0 dBm**. Press ENTER Key.
7. Calibrate Broadband Power Meter.
8. Set RF Signal Generator to 88.0001 MHz at -20 dBm with no modulation.
9. Connect Broadband Power Meter to RF Signal Generator output. Record RF Signal Generator output level as Source Power - Front End Test (A).
10. Disconnect coaxial cable #13 from A9J3 (Figure B-2 or B-3). Disconnect Broadband Power Meter from RF Signal Generator output. Connect RF Signal Generator to W13P1 (coaxial cable #13) (Figure B-2 or B-3).
11. Connect Broadband Power Meter to T/R Connector. Record as Test Set Output Level - Front End Test (B).
12. Record Test Set Output Level (Front End Test) (B) from Step 11 minus RF Signal Generator Output Level (A) in Step 9 minus 22.48 dB as Front End Error (C). Verify absolute value of Front End Error (C) is <4.25 dB.

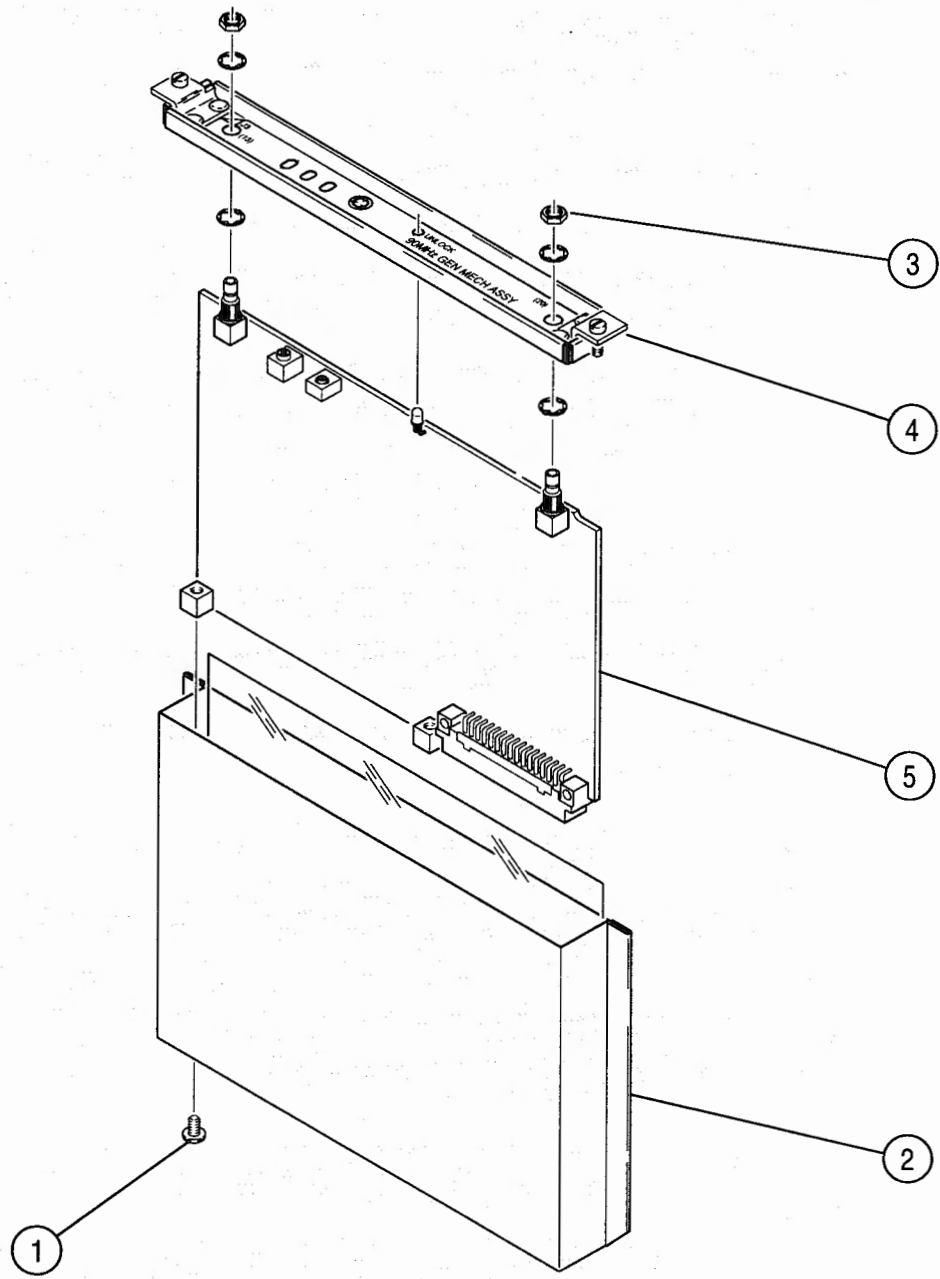


Figure B-1 90 MHz Generator PC Board Assembly (78A1A9A1) Removal

8607340

STEP	PROCEDURE
13.	Disconnect RF Signal Generator from W13P1 (Figure B-2 or B-3). Connect W13P1 (coaxial cable #13) to A9J3 (Figure B-2 or B-3). With Digital Multimeter on A9A1U22, Pin 7, record reading as Initial Closed Loop Voltage (D).
14.	Set RF Signal Generator to 88.0001 MHz at -30 dBm with no modulation.
15.	Connect RF Signal Generator to A9A1TP6 (Figure B-2 or B-3).
16.	Set A9A1SW1 (Figure B-2 or Figure B-3) to TEST.
17.	Press "More" F6 Key until "Disp" F1 Key appears. Press "Disp" F1 Key and "2" F2 Key to select Full Screen Spectrum Analyzer on the Generate Screen.
18.	Reduce RF Signal Generator level until output signal on Generate Screen Spectrum Analyzer drops out of leveling ( $\geq 3$ dB) and then raise the RF Signal Generator level until the output signal on Generate Screen Spectrum Analyzer just begins to come back into leveling (RF output is stable again). (Resolve to 0.1 dB accuracy.)
19.	Set RF Signal Generator to 21 dB above signal level in Step 18.
20.	With Digital Multimeter on A9A1U22, Pin 7, record reading as 21 dB Attenuator Depth - Voltage (E).
21.	Record RF Signal Generator level as 21 dB Attenuator Depth Input Power (F).
22.	With Digital Multimeter on A9A1U22, Pin 7, increase or decrease RF Signal Generator level until leveler voltage equals voltage (D) in Step 13 ( $\pm 1$ mV). Record current RF Signal Generator level as Error from Closed Loop - Input Power (G).
23.	Record RF Signal Generator level (F) in Step 21 minus RF Signal Generator level (G) in Step 22 as dB Error from Closed Loop (H).
24.	Disconnect RF Signal Generator from A9A1TP6 (Figure B-2 or B-3).
25.	Set A9A1SW1 (Figure B-2 or Figure B-3) to ACTIVE.
26.	Record reading as Output Level - Closed Loop (I).
27.	Verify True Module Alignment Error (J) (Column H - Column C + Column I) is $\pm 2.0$ dB. If reading is correct, go to Step 39. If reading is out of tolerance, go to Step 28.
28.	Perform one of the following: <ul style="list-style-type: none"> <li data-bbox="199 1398 1463 1467">• If 90 MHz Generator PC Board Assembly (78A1A9A1) (7010-7838-800) is Revision C, perform Steps 29-30.</li> <li data-bbox="199 1478 1463 1547">• If 90 MHz Generator PC Board Assembly (78A1A9A1) (7010-7838-800) is Revision E or later, perform Steps 31-38.</li> </ul>

**STEP****PROCEDURE**

29. If True Module Alignment Error (J) in Step 27 is >2 dB:
- Record value of A9A1R27 (Figure B-2).
  - Refer to Table B-1 and reduce or increase SAT Resistor value by the opposite number of steps as the dB Error in Step 27. (i.e., if True Error is +3 dB and value of SAT Resistor is 681, lower A9A1R27 [Figure B-2] to 432  $\Omega$ .)

VALUES	PART NUMBER	VALUES	PART NUMBER
196	4722-1960-001	866	4722-8660-001
267	4722-2670-001	1000	4722-1001-001
301	4722-3010-001	1150	4722-1151-001
348	4722-3480-001	1300	4722-1301-001
432	4722-4320-001	1540	4722-1541-001
499	4722-4990-001	1780	4722-1781-001
562	4722-5620-001	2000	4722-2001-001
681	4722-6810-001	2210	4722-2211-001
750	4722-7500-001		

Table B-1 A9A1R27 SAT Values

30. Repeat Steps 13-27.
31. Connect RF Signal Generator to A9A1TP6 (Figure B-3). Set RF Signal Generator to level in Step 22 (G).
32. Set A9A1SW1 (Figure B-3) to TEST.
33. Reduce or increase RF Signal Generator level by the same number of steps as the dB Error (J) in Step 27. (i.e., if True Error indicates +3 dB, increase level by 3 dB.)
34. Record attenuator voltage.
35. Disconnect RF Signal Generator from A9A1TP6 (Figure B-3).
36. Set A9A1SW1 (Figure B-3) to ACTIVE.
37. Adjust A9A1R27 (Figure B-3) until voltage equals level in Step 34.
38. Repeat Steps 13-27.
39. Perform the following:
- Remove power from Test Set and disconnect test equipment.
  - Remove 90 MHz Generator PC Board Assembly (78A1A9A1) from Extender Board.
  - Remove Extender Board.
  - Install 90 MHz Generator PC Board Assembly (78A1A9A1) in enclosure. (Reverse procedure as shown in Step 1.)
  - Install 90 MHz Generator Assembly (para 3-2-7).

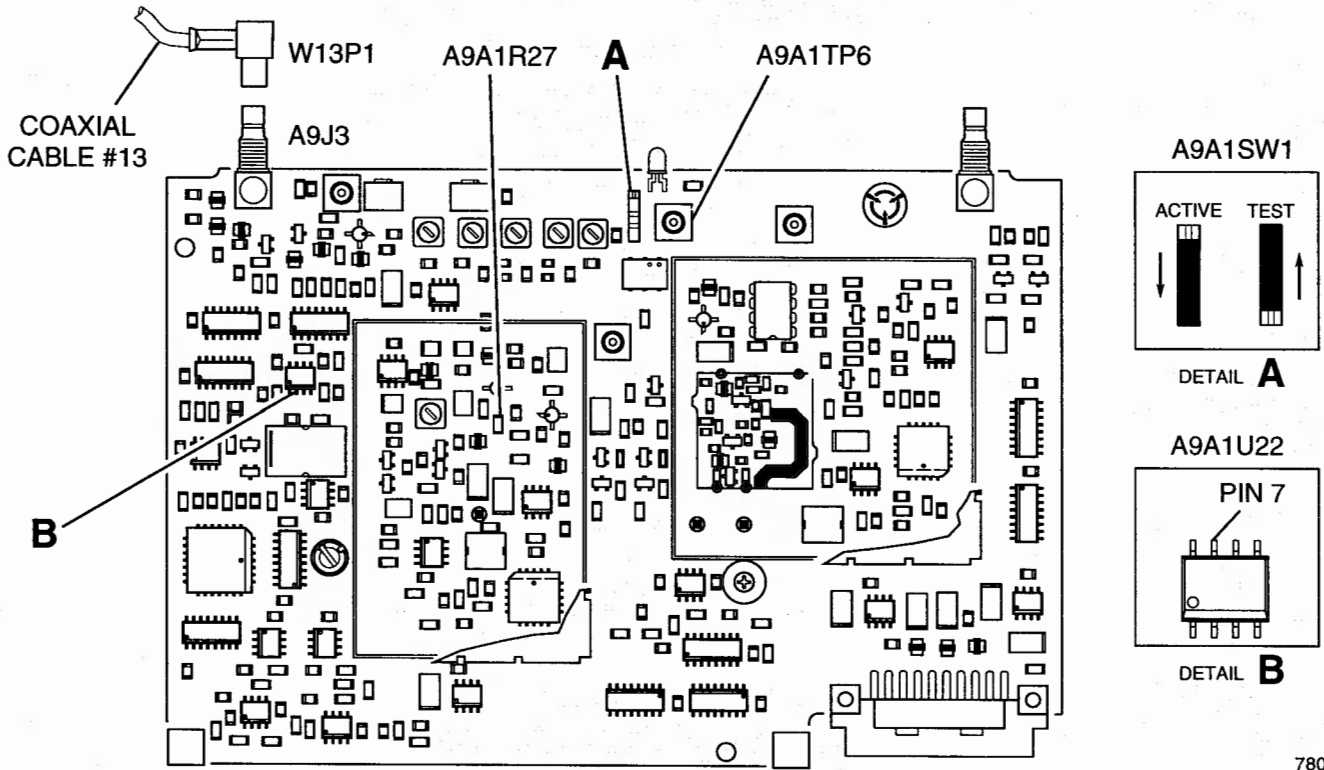


Figure B-2 90 MHz Generator PC Board Assembly (78A1A9A1), Revision C

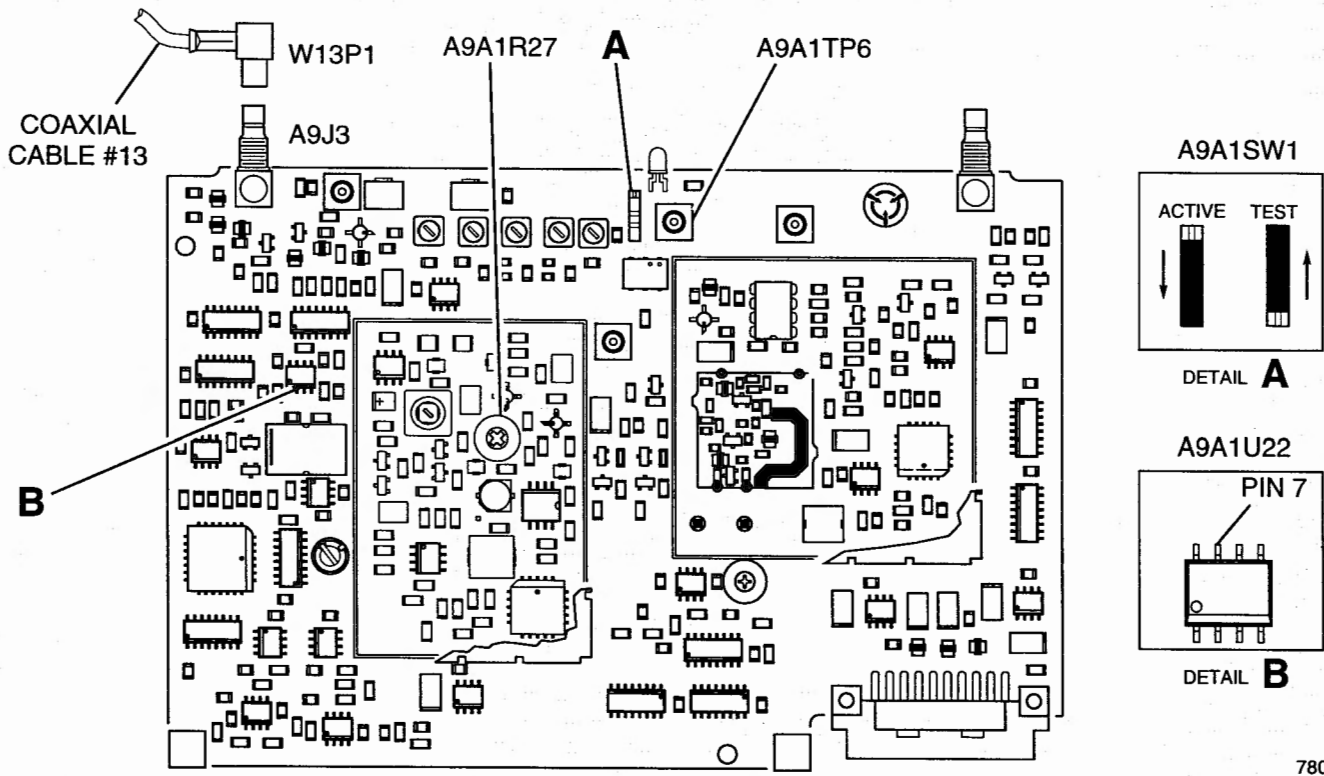


Figure B-3 90 MHz Generator PC Board Assembly (78A1A9A1), Revision E

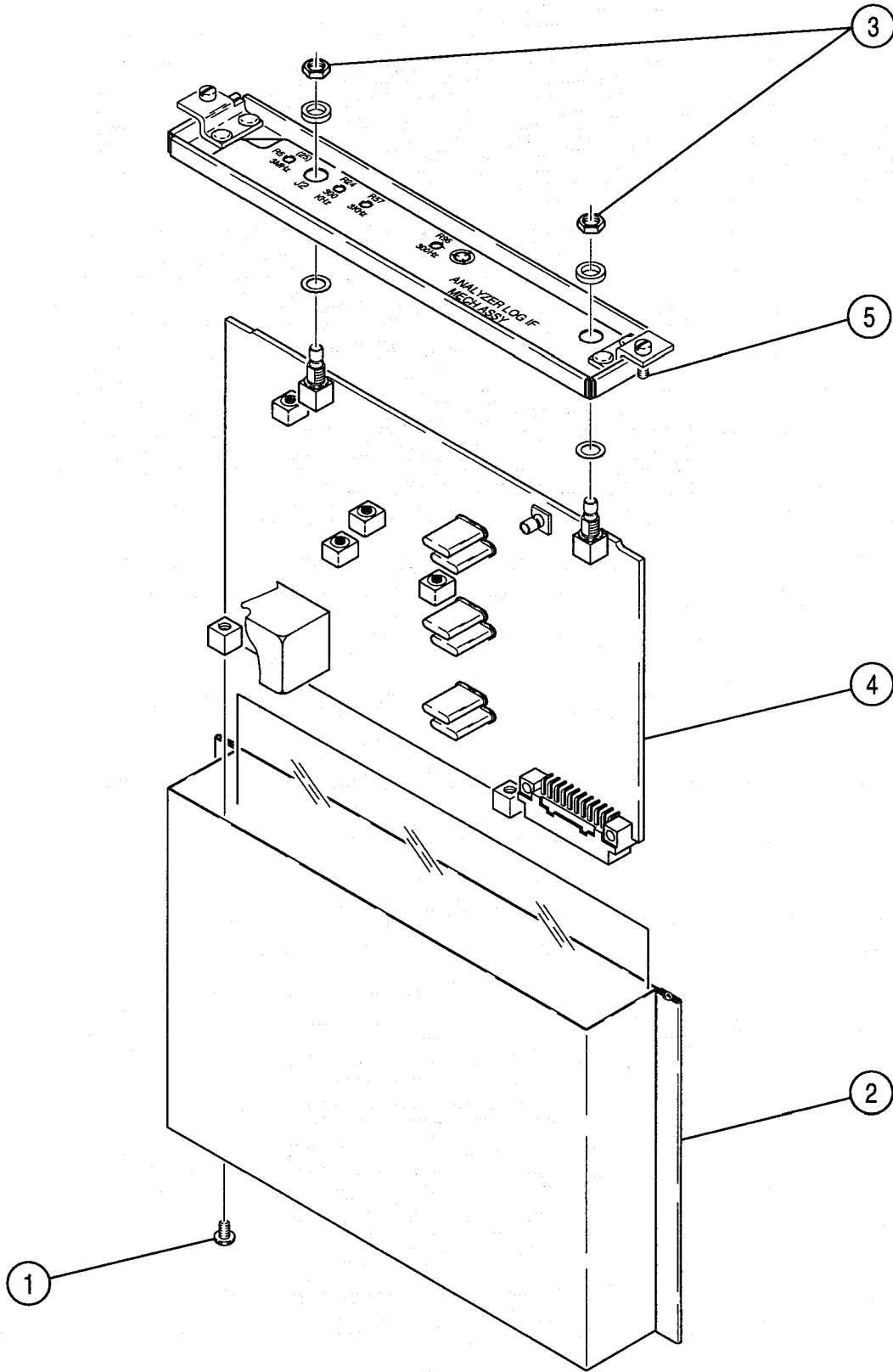


## APPENDIX C - 3 MHz RESOLUTION BANDWIDTH ADJUSTMENT

EQUIPMENT REQUIRED:                    1    Extender Board (7010-7839-600)  
   1    RF Signal Generator

FIGURE REFERENCES:                Figure C-1  
   Figure C-2

STEP	PROCEDURE
1.	Set Test Set to Factory Defaults: <ul style="list-style-type: none"><li>● Press MTRS MODE Key.</li><li>● Press "AUX" F6 Key.</li><li>● Press RCL Key.</li><li>● Press SHIFT Key.</li><li>● Press 7 (A) Key.</li><li>● Press ENTER Key.</li></ul>
2.	Connect RF Signal Generator to ANTENNA IN Connector.
3.	Set RF Signal Generator to 500 MHz RF at -40 dBm with no modulation.
4.	Press SCOPE/ANLZ Key. Analyzer Operation Screen is displayed on Test Set. <b>NOTE:</b> If Oscilloscope Operation Screen is displayed, press SCOPE/ANLZ Key to access Analyzer Operation Screen.
5.	Use FIELD SELECT Keys to move cursor to RF. Press ENTER Key. Use DATA ENTRY Keypad to set data field to <b>120.00000 MHz</b> . Press ENTER Key.
6.	Use FIELD SELECT Keys to move cursor to Scan Width data field. Press ENTER Key. Use DATA SCROLL Keys to select <b>10 kHz</b> . Press ENTER Key.
7.	Use FIELD SELECT Keys to move cursor to Unit/Division Factor data field. Press ENTER Key. Use DATA SCROLL Keys to select <b>2 dB</b> . Press ENTER Key.
8.	Press "More" F6 Key until "Trk Gen" F2 Key appears. Press "Trk Gen" F2 Key.
9.	Use FIELD SELECT Keys to move cursor to TRK RES. Press ENTER Key. Press ENTER Key to select <b>Hi</b> .
10.	Press "More" F6 Key until "Ref Lvl" F4 Key appears. Press "Ref Lvl" F4 Key.
11.	Use FIELD SELECT Keys to display signal at mid-screen. Press ENTER Key.
12.	Press "More" F6 Key until "Res bw" F1 Key appears. Press "Res bw" F1 Key. Use DATA SCROLL Keys to select <b>30 kHz</b> . Press ENTER Key.
13.	Record signal peak level (30 kHz Filter).
14.	Use FIELD SELECT Keys to move cursor to Scan Width data field. Press ENTER Key. Use DATA SCROLL Keys to select <b>1 MHz</b> . Press ENTER Key.
15.	Press "Res bw" F1 Key. Use DATA SCROLL Keys to select <b>3 MHz</b> . Press ENTER Key.
16.	Record error between current displayed signal (3 MHz Filter) and level in Step 13. If signal error is <3 dB, perform Spectrum Analyzer Verification (para 1-8-11). If signal error is ≥3 dB, go to Step 17.



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Figure C-1 Analyzer Log/IF PC Board Assembly (78A1A4A1) Removal

## STEP

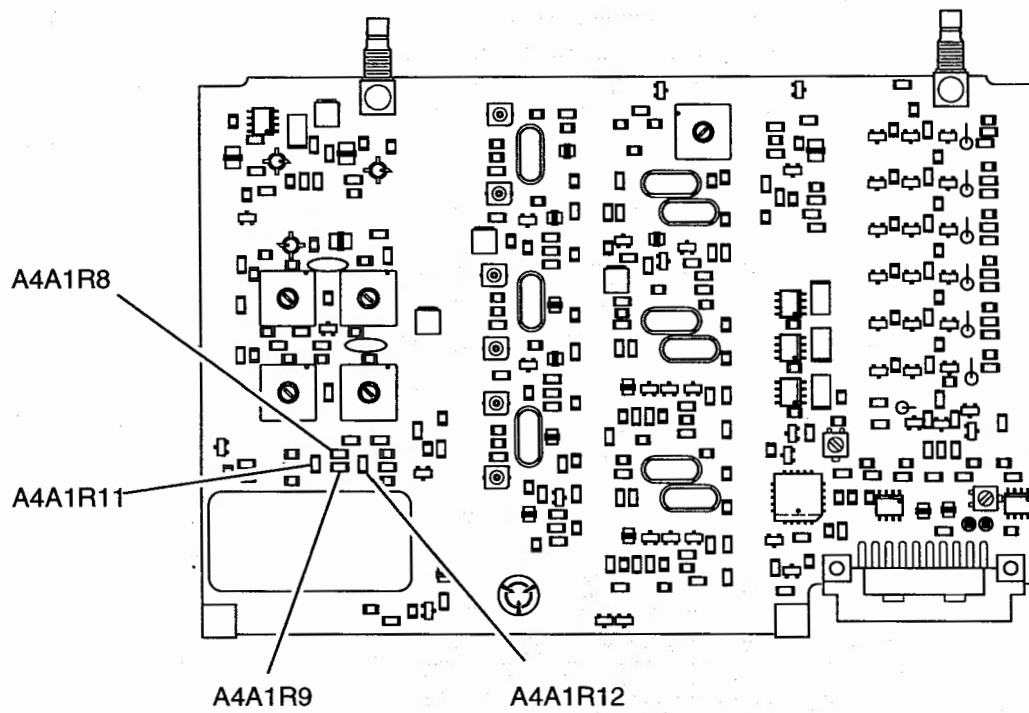
## PROCEDURE

17. Remove Analyzer Log/IF PC Board Assembly (78A1A4A1) from enclosure (Figure C-1):
- Remove power from Test Set.
  - Remove Analyzer Log/IF Assembly (78A1A4) (para 3-2-5).
  - Remove 2 screws (1) from enclosure (2) (Figure C-1).
  - Remove Analyzer Log/IF PC Board Assembly (78A1A4A1) (4) from enclosure (2) (Figure C-1).
  - Remove two nuts and washers (3) (Figure C-1).
  - Remove enclosure cover (5) (Figure C-1).
18. Compare A4A1R8, A4A1R9, A4A1R11 and A4A1R12 to the values in the following table:

	A4A1R8 ( $\Omega$ )	A4A1R9 ( $\Omega$ )	A4A1R11 ( $\Omega$ )	A4A1R12 ( $\Omega$ )
1 dB	12.1	12.1	909	909
2 dB	12.1	*	432	432
3 dB	18.2	*	301	301
4 dB	24.3	*	221	221
5 dB	30.1	*	182	182
6 dB	36.5	*	150	150
7 dB	45.3	*	130	130

\* NOT INSTALLED

19. Increase or decrease 3 MHz Pad values, found in Step 18, by amount of error found in Step 16 (to allow the 3 MHz Filter to correctly exhibit the insertion loss of the 30 kHz Resolution Bandwidth Filter).
20. Perform the following:
- Remove power from Test Set.
  - Install Analyzer Log/IF PC Board Assembly (78A1A4A1) in enclosure. (Reverse procedure as shown in Step 17.)
  - Install Analyzer Log/IF Assembly (78A1A4) (para 3-2-5).
21. Apply power to Test Set. Allow 5 minute warm-up period. Insure IFR Logo, with no error message, is displayed on Test Set.
22. Repeat Steps 2-16.



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Figure C-2 Analyzer Log/IF PC Board Assembly (78A1A4A1) Calibration Points