About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual is the best copy we could find; it may be incomplete or contain dated information. If we find a more recent copy in the future, we will add it to the Agilent website.

Support for Your Product

Agilent no longer sells or supports this product. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available. You will find any other available product information on the Agilent Test & Measurement website, www.tm.agilent.com.

HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. In other documentation, to reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product number/name was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

Calibration Guide

HP 8592L Spectrum Analyzer

HEWLETT
PACKARD

HP Part No. 08592-90082
Printed in USA November 1995

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The specifications and characteristics chapter in this manual contain regulatory information.

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Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Caution	The ***caution*** sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a ***caution*** sign until the indicated conditions are fully understood and met.
Warning	**The *warning* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a *warning* sign until the indicated conditions are fully understood and met.**

General Safety Considerations

Warning **This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**

Warning **No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**

Caution Before switching on this instrument, make sure that the line voltage selector switch is set to the voltage of the power supply and the correct fuse is installed.

Warning **These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.**

Warning **The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

Warning **The power cord is connected to internal capacitors that may remain live for 10 seconds after disconnecting the plug from its power supply.**

Warning **For continued protection against fire hazard replace line fuse only with same type and rating (F 5A/250V). The use of other fuses or material is prohibited.**

HP 8592L Spectrum Analyzer Documentation Description

Manuals Shipped with Your HP 8592L Spectrum Analyzer:

HP 85920 Spectrum Analyzer Calibration Guide

Tells you how to test your spectrum analyzer to determine if the spectrum analyzer meets its specifications.

HP 8590 Series Spectrum Analyzer User's Guide

- Tells you how to make measurements with your spectrum analyzer.
- Describes the spectrum analyzer features.
- Tells you what to do in case of a failure.

HP 8590 Series Spectrum Analyzer Quick Reference Guide

- Describes how to make a simple measurement with your spectrum analyzer.
- Briefly describes the spectrum analyzer functions.
- Lists all the programming commands.

Documentation Options

Option 041 or 043: Programmer's Guide

Describes analyzer operation via a remote controller (computer) for the RS-232 or HP-IB interface.

Option 910: Additional User's Documentation

Provides an additional copy of the user's guide, the calibration guide, and the quick reference guide.

Option 9 15: Assembly-Level and Component-Level Information

Describes troubleshooting and repair of the spectrum analyzer.
Option 915 consists of two manuals:

HP 85900 Spectrum Analyzer Service Guide

- Describes adjustment and assembly level repair of the analyzer.

HP 8590 Series Spectrum Analyzer Component-Level Information

- Provides information for component-level repair of the spectrum analyzer.

How to Order Guides

Each of the guides listed above can be ordered individually. To order, contact your local HP Sales and Service Office.

How to Use This Guide

Where to Start

If you have just received your analyzer and want to get ready for use for the first time, do the following:

- Read Chapters 1 and 2 of your analyzer user's guide.
- Perform the initial self-calibration routines described in Chapter 2 of the analyzer user's guide (these are automatic self-checks and require no test equipment).
- If you need to verify the unit is operating within its specifications, perform the performance verification tests in this guide.

After completing the performance verification, use your user's guide to learn how to use the analyzer and to find more detailed information about the analyzer, its applications, and key descriptions.

This guide uses the following conventions:

Front-Panel Key	A boxed, uppercase name in this typeface represents a key physically located on the instrument.
Softkey	A boxed word written in this typeface indicates a "softkey," a key whose label is determined by the instrument's firmware.
Screen Text	Text printed in this typeface indicates text displayed on the spectrum analyzer screen.

Contents

Figures

Tables

Calibrating

This chapter contains performance verification test procedures which test the electrical performance of the spectrum analyzer.

Allow the spectrum analyzer to warm up in accordance with the Temperature Stability specification in Chapter 2 before performing the tests in this chapter.

None of the test procedures involve removing the cover of the spectrum analyzer.

Calibration

Calibration verifies that the spectrum analyzer performance is within all specifications listed in Chapter 2. It is time consuming and requires extensive test equipment. Calibration consists of *all* the performance verification tests. See Table l-l for a complete listing of the performance verification tests.

Operation Verification

Operation verification consists of a subset of the performance verification tests. See Table l-l. Operation verification tests only the most critical specifications of the spectrum analyzer. These tests are recommended for incoming inspection, troubleshooting, or after repair. Operation verification requires less time and equipment than the calibration.

The following table lists the performance verification tests included in this chapter. Select the spectrum analyzer option being calibrated and perform the tests marked in the option column. Note that some of the tests are used for both calibration and operation verification (marked with (•)).

Table 1-1. Performance Verification Tests

Performance Verification Test Name	Calibration for Instrument Option:		
	Std[1]	026	027
1. 10 MHz Reference Output Accuracy	⊡	⊡	⊡
2. Comb Generator Frequency Accuracy	•	•	•
3. Frequency Readout and Marker Count Accuracy	⊡	⊡	⊡
4. Noise Sidebands	⊡	⊡	⊡
5. System Related Sidebands	•	•	•
6. Frequency Span Readout Accuracy	⊡	⊡	⊡
7. Residual FM	.	.	.
8. Sweep Time Accuracy	•	•	•
9. Scale Fidelity	⊡	⊡	⊡
10. Reference Level Accuracy	⊡	⊡	⊡
11. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties	⊡	⊡	⊡
12. Resolution Bandwidth Accuracy	•	•	•
13. Calibrator Amplitude	⊡	⊡	⊡
14. Frequency Response	⊡	⊡	⊡
15. Other Input Related Spurious Responses	•	•	•
16. Spurious Response[2]	⊡	⊡	⊡
17. Gain Compression	•	•	•
18. Displayed Average Noise Level	⊡	⊡	⊡
19. Residual Responses	.	.	.

1 Use this column for all other options not listed in this table.

2 Parts 3 and 4, Third Order Intermodulation Distortion, are not required for operation verification.

Safety

Familiarize yourself with the safety symbols marked on the spectrum analyzer, and read the general safety instructions and the symbol definitions given in the front of this guide before you begin verifying the performance of the spectrum analyzer.

Before You Start

There are four things you should do before starting a performance verification test:

- Switch the spectrum analyzer on and let it warm up in accordance with the Temperature Stability specification in Chapter 2.
- Read "Making a Measurement" in Chapter 2 of the ***HP 8590 Series Spectrum Analyzer User's Guide.***
- After the spectrum analyzer has warmed up as specified, perform the Self-Calibration Procedure documented in "Improving Accuracy With Self-Calibration Routines" in Chapter ***2*** of the ***HP 8590 Series Spectrum Analyzer*** User's *Guide*. The performance of the spectrum analyzer is only specified after the spectrum analyzer calibration routines have been run and if the spectrum analyzer is autocoupled.
- Read the rest of this section before you start any of the tests, and make a copy of the Performance Verification Test Record described in "Recording the Test Results."

Test equipment you will need

Tables 1-2 through 1-4 list the recommended test equipment for the performance verification tests. The tables also lists recommended equipment for the spectrum analyzer adjustment procedures which are located in the ***HP 85900 Spectrum Analyzer Service Guide.*** Any equipment that meets the critical specifications given in the table can be substituted for the recommended model.

Recording the test results

A performance verification test record is provided at the end of this chapter.

Each test result is identified as a ***TR Entry*** in the performance tests and on the performance verification test record. We recommend that you make a copy of the performance verification test record, record the test results on the copy, and keep the copy for your calibration test record. This record could prove valuable in tracking gradual changes in test results over long periods of time.

If the spectrum analyzer doesn't meet specifications

If the spectrum analyzer fails a test, rerun the frequency calibration and amplitude calibration routines by pressing CAL FREQ & AMPTD , and CAL YTF . Press CAL STORE, then repeat the verification test. If the spectrum analyzer still fails one or more specifications, complete any remaining tests and record all test results on a copy of the test record. Then refer to Chapter 3, "If You Have a Problem," for instructions on how to solve the problem.

Periodically verifying operation

The spectrum analyzer requires periodic verification of operation. Under most conditions of use, you should test the spectrum analyzer at least once a year with either operation verification or the complete set of performance verification tests.

Table 1-2. Recommended Test Equipment

Equipment	Critical Specifications for Equipment Substitution	Recommended Model	Use[1]
Digital Voltmeter	Input Resistance: ≥ 10 megohms Accuracy: ± 10 mV on 100 V range	HP 3456A	P,A,T
DVM Test Leads	For use with HP 3456A	HP 34118	A,T
Frequency Counter	Frequency: 10 MHz Resolution: ±0.002 Hz External Timebase	HP 5334A/B	P,A,T
Frequency Standard	Frequency: 10 MHz Timebase Accy (Aging): < 1 x 10^{-9}/day	HP 5061B	P,A
Measuring Receiver	Compatible with Power Sensors dB Relative Mode Resolution: 0.01 dB Reference Accuracy: ± 1.2%	HP 8902A	P,A,T
Microwave Frequency Counter	Frequency Range: 9 MHz to 7 GHz Timebase Accy (Aging): <5 x 10^{-10}/day	HP 5343A	P,A,T
Oscilloscope	Bandwidth: dc to 100 MHz Vertical Scale Factor of 5 V/Div External Trigger Mode	HP 54501A	T
Power Meter	Power Range: Calibrated in dBm and dB relative to reference power -70 dBm to + 44 dBm, sensor dependent	HP 436A	P,A,T
Power Sensor	Frequency Range: 1 MHz to 350 MHz Maximum SWR: 1.60 (100 kHz to 300 kHz) 1.20 (300 kHz to 1 MHz) 1.1 (1 MHz to 2.0 GHz) 1.30 (2.0 to 2.9 GHz)	HP 8482A	P,A,T
Power Sensor	Frequency Range: 50 MHz to 26.5 GHz Maximum SWR: 1.15 (50 MHz to 100 MHz) 1.10 (100 MHz to 2 GHz) 1.15 (2.0 GHz to 12.4 GHz) 1.20 (12.4 GHz to 18.0 GHz) 1.25 (18 GHz to 26.5 GHz)	HP 8485A	P,A,T
Power Sensor, Low-Power	Frequency Range: 300 MHz Amplitude Range: -20 dBm to -70 dBm Maximum SWR: 1.1 (300 MHz)	HP 8484A	P,A,T
Signal Generator	Frequency Range: 1 MHz to 1000 MHz Amplitude Range: -35 to + 16 dBm SSB Noise: <−120 dBc/Hz at 20 kHz offset	HP 8640B, Option 002 *or* HP 8642A	P,A,T

1 P = Performance verification test, A = Adjustment, T = Troubleshooting

Table 1-2. Recommended Test Equipment (continued)

Equipment	Critical Specifications for Equipment Substitution	Recommended Model	Use[1]
Spectrum Analyzer, Microwave	Frequency Range: 1 MHz to 7 GHz	HP 8566A/B	P,A,T
Synthesized Sweeper	Frequency Range: 10 MHz to 22 GHz Frequency Accuracy (CW): ±0.02% Leveling Modes: Internal and External Modulation Modes: AM Power Level Range: -35 to + 16 dBm	HP 8340A/B or HP 83630A	P,A,T
Synthesizer/Function Generator	Frequency Range: 0.1 Hz to 500 Hz Frequency Accuracy: ±0.02% Waveform: Triangle	HP 3325B	P,T
Synthesizer/Level Generator	Frequency Range: 500 Hz to 80 MHz Amplitude Range: + 12 to -85 dBm Flatness: ±0.15 dB Attenuator Accuracy: ±0.09 dB	HP 3335A	P,A,T

Table 1-3. Recommended Cables

Equipment	Critical Specifications for Cable Substitution	Recommended Model	Use'
Cable	Frequency Range: 10 MHz to 22 GHz Maximum SWR: < 1.4 at 22 GHz Length: ≥91 cm (36 in) Connectors: APC 3.5 (m) both ends Maximum Insertion Loss: 2 dB *(2 required)*	8120-4921	P,A
Cable	Frequency Range: 50 MHz to 7 GHz Length: ≥91 cm (36 in) Connectors: SMA (m) both ends	5061-5458	P,A,T
Cable	Frequency Range: dc to 1 GHz Length: ≥91 cm (36 in) Connectors: BNC (m) both ends *(4 required)*	HP 10503A	P,A,T
Cable	Frequency Range: dc to 310 MHz Length: 20 cm (9 in) Connectors: BNC (m) both ends	HP 10502A	P,A,T
Cable Assembly	Length: approximately 15 cm (6 in) Connectors: BNC (f) to Alligator Clips	8120-1292	A
Cable Assembly	Length: ≥91 cm (36 in) Connectors: Banana Plug to Alligator Clips	HP 11102A	A
Cable, Test	Length: ≥91 cm (36 in) Connectors: SMB (f) to BNC (m) *(2 required)*	85680-60093	A,T

1 P = Performance verification test, A = Adjustment, T = Troubleshooting

Table 1-4. Recommended Accessories

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use[1]
Adapter	APC 3.5 (f) to APC 3.5 (f)	5061-5311	P,A,T
Adapter	BNC (m) to BNC (m)	1250-0216	P,A,T
Adapter	BNC (f) to SMB (m)	1250-1237	A,T
Adapter	BNC tee (m) (f) (f)	1250-0781	T
Adapter	Type N (m) to APC 3.5 (m)	1250-1743	P,A,T
Adapter	Type N (m) to APC 3.5 (f)	1250-1744	P,A,T
Adapter	Type N (f) to APC 3.5 (f)	1250-1745	P,A,T
Adapter	Type N (f) to BNC (m)	1250-1477	P,A,T
Adapter	Type N (m) to BNC (f) *(4 required)*	1250-1476	P,A,T
Adapter	Type N (m) to BNC (m) (2 *required)*	1250-1473	P,A,T
Adapter	Type N (f) to N (f)	1250-1472	P,A,T
Adapter	Type N (f) to SMA (f)	1250-1772	P,A,T
Adapter	SMA (f) to SMA (f)	1250-1158	P,A,T
Adapter	SMA (m) to SMA (m)	1250-1159	P,A,T
Adapter	SMB (m) to SMB (m)	1250-0813	A,T
Adapter	SMC (m) to SMC (m)	1250-0827	A,T
Attenuator, 10 dB	Type N (m to f) Frequency: 300 MHz	HP 8491A Option 010	P,A,T
Attenuator, 20 dB	Attenuation: 20 dB Frequency dc to 12.4 GHz	HP 8491A Option 020	A
Attenuator, 1 dB Step	Attenuation Range: 0 to 12 dB Frequency Range: 50 MHz Connectors: BNC female	HP 355C	P A

1 P = Performance verification test, A = Adjustment, T = Troubleshooting

Table 1-4. Recommended Accessories (continued)

Equipment	Critical Specifications for Accessory Substitution	Recommended Model	Use[1]
Attenuator, 10 dB Step	Attenuation Range: 0 to 30 dB Frequency Range: 50 MHz Connectors: BNC female	HP 355D	P,A
Digital Current Tracer	Sensitivity: 1 mA to 500 mA Frequency Response: Pulse trains to 10 MHz Minimum Pulse Width: 50 ns Pulse Rise Time: <200 ns	HP 547A	T
Directional Bridge	Frequency Range: 0.1 to 110 MHz Directivity: >40 dB Maximum VSWR: 1.1:1 Transmission Arm Loss: 6 dB (nominal) Coupling Arm Loss: 6 dB (nominal)	HP 8721A	P,T
Directional Coupler	Frequency Range: 1.7 GHz to 8 GHz Coupling: 16 dB (nominal) Max. Coupling Deviation: ±1 dB Directivity: 14 dB minimum Flatness: 0.75 dB maximum VSWR: <1.45 Insertion Loss: <1.3 dB	0955-0125	P,T
Logic Pulser	TTL voltage and current drive levels	HP 546A	T
Logic Clip	TTL voltage and current drive levels	HP 548A	T
Low Pass Filter, 50 MHz	Cutoff Frequency: 50 MHz Rejection at 80 MHz: >50 dB	0955-0306	P,T
Low Pass Filter, 300 MHz	Cutoff Frequency: 300 MHz Bandpass Insertion Loss: <0.9 dB at 300 MHz Stopband Insertion Loss: >40 dB at 435 MHz	0955-0455	P,A,T
Low Pass Filter, 4.4 GHZ	Cutoff Frequency: 4.4 GHz Rejection at 5.5 GHz: >40 dB	HP 11689A	P
Power Splitter	Frequency Range: 50 kHz to 22 GHz Insertion Loss: 6 dB (nominal) Output Tracking: <0.25 dB Equivalent Output SWR: < 1.22: 1	HP 11667B	P,A
Termination, 50 Ω	Impedance: 50 Ω (nominal)	HP 909A	P,T

1. 10 MHz Reference Output Accuracy

The settability is measured by changing the setting of the digital-to-analog converter (DAC) which controls the frequency of the timebase. The frequency difference per DAC step is calculated and compared to the specification.

The related adjustment for this performance test is the “10 MHz Frequency Reference Adjustment. ”

Equipment Required

Frequency counter
Frequency standard
Cable, BNC, 122 cm (48 in) (2 required)

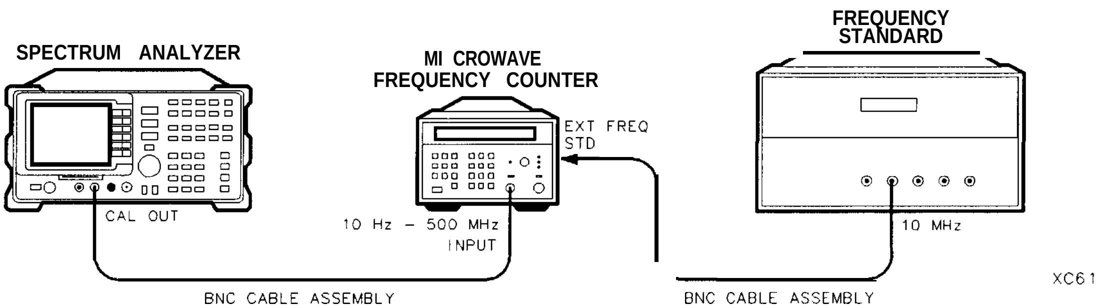


Figure l-l. 10 MHz Reference Test Setup

Procedure

The test results will be invalid if REF UNLK is displayed at any time during this test. REF UNLK will be displayed if the internal reference oscillator is unlocked to the 10 MHz reference. a REF UNLK might occur if there is a hardware failure or if the jumper between 10 MHz REF OUTPUT and EXT REF IN on the rear panel is removed.

1. Connect the equipment as shown in Figure l-l.
2. Set the frequency counter controls as follows:

   SAMPLE RATE . . . . Midrange
   50 Ω/1Ω SWITCH 5062
   10Hz-500MHz/500MHz-26.5GHz SWITCH 10Hz-500MHz
   FREQUENCY STANDARD (Rear panel) . . . . EXTERNAL

3. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in the 10 MHz Reference Accuracy Worksheet as Counter Reading 1.
4. Set the spectrum analyzer by pressing the following keys:

   [FREQUENCY] -37 [Hz]
   (CAL) More 1 of 4 More 2 of 4
   VERIFY TIMEBASE

5. Record the number in the active function block of the spectrum analyzer in the 10 MHz Reference Accuracy Worksheet as the Timebase DAC Setting.

6. Add one to the Timebase DAC Setting recorded in step 5, then enter this number using the DATA keys on the spectrum analyzer. For example, if the timebase DAC setting is 105, press 1,0,6 [Hz).
7. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in the 10 MHz Reference Accuracy Worksheet as Counter Reading 2.
8. Subtract one from the Timebase DAC Setting recorded in step 5, then enter this number using the DATA keys on the spectrum analyzer. For example, if the timebase DAC setting is 105, press 1, 0, 4, (Hz).
9. Wait for the frequency counter reading to stabilize. Record the frequency counter reading in the 10 MHz Reference Accuracy Worksheet as Counter Reading 3.

10 MHz Reference Accuracy Worksheet

Description	Measurement
Counter Reading 1	______ HZ
Timebase DAC Setting	______
Counter Reading 2	______ Hz
Counter Reading 3	______ Hz

10. Calculate the frequency settability by performing the following steps:
    - Calculate the frequency difference between Counter Reading 2 and Counter Reading 1.
    - Calculate the frequency difference between Counter Reading 3 and Counter Reading 1.
    - Divide the difference with the greatest absolute value by two and record the value as TR Entry 1 of the performance test record. The settability should be less than ±150
      (PRESET) on the spectrum analyzer. The timebase DAC will be reset automatically to the value recorded in step 5.

2. Comb Generator Frequency Accuracy

A 100 MHz signal from a synthesized source and the output from a comb generator are applied to the input of the spectrum analyzer. The source frequency is adjusted until the two signals appear at the same frequency. The frequency setting of the source is then equal to the comb generator frequency and this frequency is compared to the specification.

The related adjustment procedure for this performance verification test is "Comb Generator Frequency Adjustment."

Equipment Required

Synthesized sweeper
Power splitter
Cable, APC mm (m) 91 cm (36 in)
Cable, SMA 61 cm (18 in) (m) to (m)
Adapter, Type N (m) to APC 3.5 (m)
Adapter, 3.5 mm (f) to 3.5 mm (f)

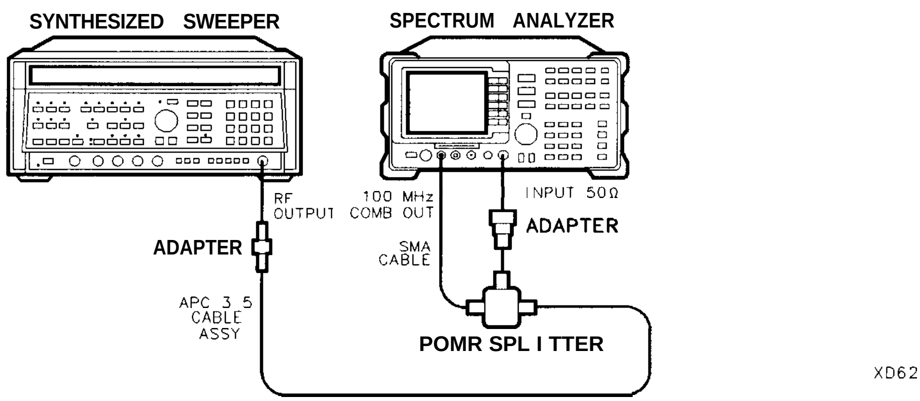


Figure 1-2. Comb Generator Frequency Accuracy Test Setup

Procedure

1. Connect the equipment as shown in Figure 1-2.

   Option 026 ***only:*** Omit the Type N to APC adapter.

2. Press instrument preset on the synthesized sweeper, then set the controls as follows:

   CW . . . . 100.025 MHz
   POWERLEVEL . . . .OdBm
   RF . . . .OFF

3. Press (PRESET' on the spectrum analyzer, then wait for preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 100 (MHz)
   (AUX CTRL) COMB GEM ON OFF (ON)
   (SPAN) 12 (MHz)
   (AMPLITUDE) REF LVL 10 (dB)
   (BW) RES BW AUTO MAN 10 (kHz)

4. On the spectrum analyzer, press the following keys:

   (PEAK SEARCH)
   (MKR FCTN) *MK* TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

5. Press (AMPLITUDE) and adjust the reference-level setting until the signal peak is 10 dB below the reference level.
6. Set the synthesized sweeper RF on. Adjust the synthesized sweeper power level until the two signals are the same amplitude.
7. Set SCALE LOG LIN (LOG) to 2 dB on the spectrum analyzer.
8. If necessary, readjust the synthesized sweeper power level until the two signals are the same amplitude.
9. Set the synthesized sweeper CW to 100 MHz. A very unstable signal will probably appear. The peak amplitude should be at least 3 dB greater in amplitude than either of the individual signals.
10. Adjust the synthesized sweeper CW setting until a single signal appears to rise and fall in amplitude at the slowest rate (1 Hz frequency resolution will be necessary). The signal peak should be displayed approximately 6 dB above the amplitude of the individual signals.
11. Record the synthesized sweeper CW frequency setting as TR Entry 1 of the performance verification test record. The frequency should be between 99.993 MHz and 100.007 MHz.

3. Frequency Readout and Marker Count Accuracy

The frequency readout accuracy of the spectrum analyzer is tested with an input signal of known frequency. By using the same frequency standard for the spectrum analyzer and the synthesized sweeper, the frequency reference error is eliminated.

The related adjustments for this performance verification test are:

Sampler Match Adjustment
Frequency Reference Adjustment

Equipment Required

Synthesized sweeper
Adapter, Type N (f) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f)
Cable, APC 3.5, 91 cm (36 in)
Cable, BNC, 122 cm (48 in)

Additional Equipment for Option 026

Adapter, 3.5 mm (f) to 3.5 mm (f)

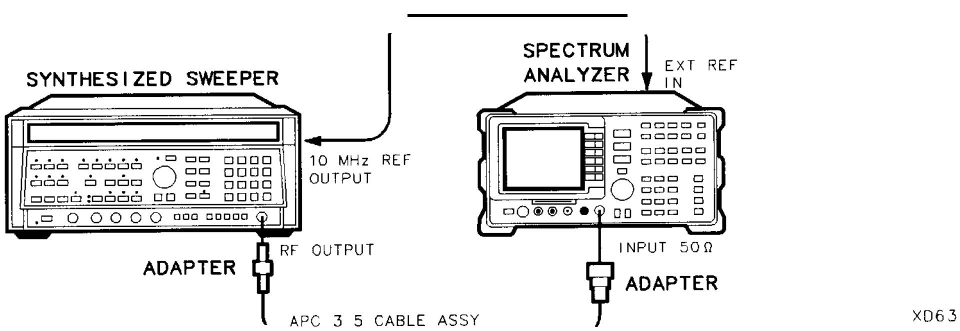


Figure 1-3. Frequency Readout Accuracy Test Setup

Procedure

This performance verification test consists of two parts:

Part 1: Frequency Readout Accuracy
Part 2: Marker Count Accuracy

Perform "Part 1: Frequency Readout Accuracy" before "Part 2: Marker Count Accuracy."

Part 1: Frequency Readout Accuracy

1. Connect the equipment as shown in Figure 1-3. Remember to connect the 10 MHz REF OUT of the synthesized sweeper to the EXT REF IN of the spectrum analyzer.

   Option 026 ***only:*** Use the 3.5 mm adapter to connect the cable to the spectrum analyzer input.

2. Perform the following steps to set up the equipment:

   - Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

     CW .... 1.5 GHz
     POWER LEVEL . . . . -10 dBm

   - Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

     (FREQUENCY) 1.5 (GHz)
     (SPAN) 20 (MHz)

3. Press (PEAK SEARCH) on the spectrum analyzer to measure the frequency readout accuracy.
4. Record the MKR frequency reading in the performance verification test record as indicated in Table 1-5. The reading should be within the limits shown.
5. Change to the next spectrum analyzer span setting listed in Table 1-5.
6. Repeat steps 3 through 5 for each spectrum analyzer span setting listed in Table 1-5.

"Part 1: Frequency Readout Accuracy" is now complete. Continue with "Part 2: Marker Count Accuracy."

3. Frequency Readout and Marker Count Accuracy

Table 1-5. Frequency Readout Accuracy

Synthesized Sweeper CW Frequency (MHz)	Spectrum Analyzer Span (MHz)	Spectrum Analyzer Center Frequency (GHz)	Min. Frequency (GHz)	TR Entry Frequency (GHz)	Max. Frequency (GHz)
1500	20	1.5	1.49918	1	1.50082
1500	10	1.5	1.49958	2	1.50042
1500	1	1.5	1.499968	3	1.500032
4000	20	4.0	3.99918	4	4.00082
4000	10	4.0	3.99958	5	4.00042
4000	1	4.0	3.999968	6	4.000032
9000	20	9.0	8.99918	7	9.00082
9000	10	9.0	8.99958	8	9.00042
9000	1	9.0	8.999968	9	9.000032
16000	20	16.0	15.99918	10	16.00082
16000	10	16.0	15.99958	11	16.00042
16000	1	16.0	15.999968	12	16.000032
21000	20	21.0	20.99918	13	21.00082
21000	10	21.0	20.99958	14	21.00042
21000	1	21.0	20.999968	15	21.000032

Part 2 : Marker Count Accuracy

Perform "Part 1: Frequency Readout Accuracy" before performing this procedure.

1. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish.
2. Set the spectrum analyzer to measure the marker count accuracy by pressing the following keys:

   (FREQUENCY) 1.5 (GHz)
   (SPAN) 20 (MHz)
   (BW) RES BW AUTO MAN 300 (kHz)
   (MKR FCTN) MK COUNT ON OFF (ON)
   More 1 of 2
   CNT RES AUTO MAN 100 (Hz)

3. Press (PEAK SEARCH), then wait for a count be taken (it may take several seconds).
4. Record the CNTR frequency reading as TR Entry 16 of the performance verification test record. The reading should be within the limits shown in Table 1-6.

5. Change the spectrum analyzer settings by pressing the following keys:

   (SPAN) 1 (MHz)
   (MKR FCTN) MK COUNT ON OFF (ON)
   More 1 of 2
   CNT RES AUTO MAN 10 (Hz)

6. Press [PEAK SEARCH], then wait for a count be taken (it may take several seconds).
7. Record the CNTR frequency reading as TR Entry 18 of the performance verification test record. The reading should be within the limits shown in Table 1-6.
8. Repeat step 2 through step 7 for each spectrum analyzer setting listed in Table 1-6.

Performance verification test "Frequency Readout Accuracy and Marker Count Accuracy" is now complete.

Table 1-6. Marker Count Accuracy

Synthesized Sweeper CW Frequency	Spectrum Analyzer Center Frequency	Spectrum Analyzer Span	Spectrum Analyzer Counter Resolution	CNT MKR Frequency		
MHz	GHz	MHz	HZ	Min. (GHz)	TR Entry	Max. (GHz)
1500	1.5	20	100	1.4999989	16	1.5000011
1500	1.5	1	10	1.49999989	17	1.50000011
4000	4.0	20	100	3.9999989	18	4.0000011
4000	4.0	1	10	3.99999989	19	4.00000011
9000	9.0	20	100	8.9999979	20	9.0000021
9000	9.0	1	10	8.999999979	21	9.00000021
16000	16.0	20	100	15.9999969	22	16.0000031
16000	16.0	1	10	15.99999969	23	16.00000031
21000	21.0	20	100	20.9999959	24	21.0000041
21000	21.0	1	10	20.99999959	25	21.00000041

4. Noise Sidebands

A 500 MHz CW signal is applied to the input of the spectrum analyzer. The marker functions are used to measure the amplitude of the carrier and the noise level 10 kHz, 20 kHz, and 30 kHz above and below the carrier. The difference between these two measurements is compared to specification after the result is normalized to 1 Hz.

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator
Cable, Type N, 183 cm (72 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

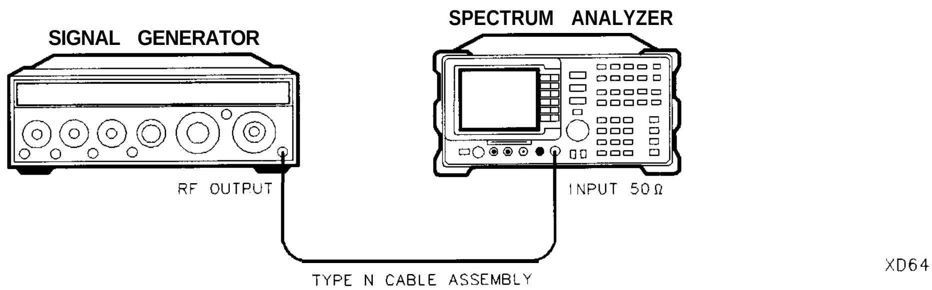


Figure 1-4. Noise Sidebands Test Setup

Procedure

This performance test consists of three parts:

Part 1: Noise Sideband Suppression at 10 kHz
Part 2: Noise Sideband Suppression at 20 kHz
Part 3: Noise Sideband Suppression at 30 kHz

Perform part 1 before performing part 2 or part 3 of this procedure.

A worksheet is provided at the end of this procedure for calculating the noise sideband suppression.

Part 1: Noise Sideband Suppression at 10 kHz

1. Perform the following steps to set up the equipment:

   - Set the signal generator controls as follows:

     FREQUENCY . . . . 500 MHz
     OUTPUT LEVEL.. . . . . .O dBm
     AM . . . . OFF
     FM . . . . OFF
     COUNTER . . . . INT
     RF . . . . ON

   - Connect the equipment as shown in Figure 1-4.
   - Press [PRESET] on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

     (FREQUENCY) 500 (MHz)
     (SPAN) 10 (MHz)

2. Press the following spectrum analyzer keys to measure the carrier amplitude.

   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)
   (BW) 1 (kHz)
   VID BW AUTO MAM 30 (Hz)
   (MKR FCTN) MK TRACK ON OFF (OFF)
   (SGL SWP)

   Wait for the completion of a sweep, then press (PEAK SEARCH).

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Carrier Amplitude.

3. Press the following spectrum analyzer keys to measure the noise sideband level at + 10 kHz:

   MARKER A 10 (kHz)
   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at + 10 kHz.

4. Press the following spectrum analyzer keys to measure the noise sideband level at -10 kHz:

   (PEAK SEARCH)
   MARKER A -10 (kHz)
   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at -10 kHz.

5. Record the more positive value, either Noise Sideband Level at + 10 kHz or Noise Sideband Level at -10 kHz from the Noise Sideband Worksheet as the Maximum Noise Sideband Level.

6. Subtract the Carrier Amplitude from the Maximum Noise Sideband Level at 10 kHz using the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level – Carrier Amplitude

7. Record the Noise Sideband Suppression at 10 kHz in the performance verification test record as TR Entry 1. The suppression should be ≤ -60 dBc.

Part 2: Noise Sideband Suppression at 20 kHz

1. Press the following spectrum analyzer keys to measure the noise sideband level at + 20 kHz:

   (MKR) MARKER A 20 (kHz)
   MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at +20 kHz.

2. Press the following spectrum analyzer keys to measure the noise sideband level at -20 kHz:

   (PEAK SEARCH)
   MARKER A -20 (kHz)
   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at -20 kHz.

3. Record the more positive value, either Noise Sideband Level at + 20 kHz or Noise Sideband Level at -20 kHz from the Noise Sideband Worksheet as the Maximum Noise Sideband Level.

4. Subtract the Carrier Amplitude from the Maximum Noise Sideband Level at 20 kHz using the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level – Carrier Amplitude

5. Record the Noise Sideband Suppression at 20 kHz in the performance verification test record as TR Entry 2. The suppression should be ≤ -70 dBc.

Part 3: Noise Sideband Suppression at 30 kHz

1. Press the following spectrum analyzer keys to measure the noise sideband level at + 30 kHz:

   (MKR) MARKER Δ 30 (kHz)

   MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at +30 kHz.

2. Press the following spectrum analyzer keys to measure the noise sideband level at -30 kHz:

   (PEAK SEARCH)

   MARKER Δ -30 (kHz)

   (MKR) MARKER NORMAL

   Record the MKR amplitude reading in the Noise Sideband Worksheet as the Noise Sideband Level at -30 kHz.

3. Record the more positive value, either Noise Sideband Level at +30 kHz or Noise Sideband Level at -30 kHz from the Noise Sideband Worksheet as the Maximum Noise Sideband Level.

4. Subtract the Carrier Amplitude from the Maximum Noise Sideband Level at 30 kHz using the equation below.

   Noise Sideband Suppression = Maximum Noise Sideband Level – Carrier Amplitude

5. Record the Noise Sideband Suppression at 30 kHz in the performance verification test record as TR Entry 3. The suppression should be ≤ -75 dBc.

Noise Sideband Worksheet

Description	Measurement
Carrier Amplitude	________dBm or dBmV
Noise Sideband Level at +10 kHz	________dBm or dBmv
Noise Sideband Level at – 10 kHz	________dBm or dBmv
Maximum Noise Sideband Level at ±10 kHz	________dBm or dBmv
Noise Sideband Level at + 20 kHz	________dBm or dBmv
Noise Sideband Level at -20 kHz	________dBm or dBmv
Maximum Noise Sideband Level at ±20 kHz	________dBm or dBmv
Noise Sideband Level at + 30 kHz	________dBm or dBmv
Noise Sideband Level at -30 kHz	________dBm or dBmv
Maximum Noise Sideband Level at ±30 kHz	________dBm or dBmv

Note that the resolution bandwidth is normalized to 1 Hz as follows:

1 Hz noise-power = (noise-power in dBc) - (10 x log[RBW])

For example, -60 dBc in a 1 kHz resolution bandwidth is normalized to -90 dBc/Hz.

5. System Related Sidebands

A 500 MHz CW signal is applied to the input of the spectrum analyzer. The marker functions are used to measure the amplitude of the carrier and the amplitude of any system related sidebands >30 kHz above and below the carrier. System related sidebands are any internally generated line related, power supply related or local oscillator related sidebands.

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator
Cable, Type N, 183 cm (72 in)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

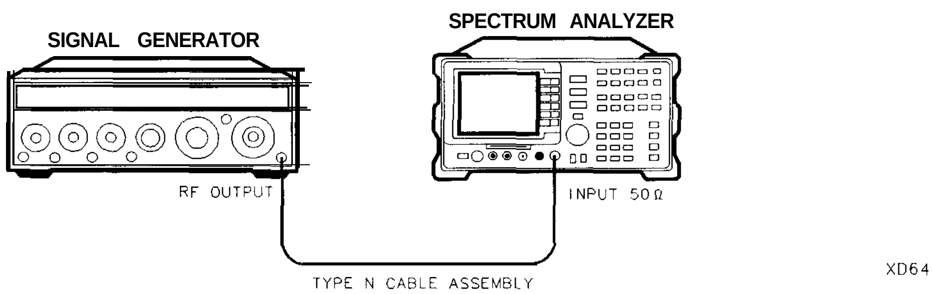


Figure 1-5. System Related Sidebands Test Setup

Procedure

1. Perform the following steps to set up the equipment:
   - Set the signal generator controls as follows:

     FREQUENCY . . . . 500 MHz
     OUTPUT LEVEL . . . . 0 dBm
     AM . . . . OFF
     FM . . . . OFF
     COUNTER . . . . INT
     RF . . . . ON

   - Connect the equipment as shown in Figure 1-5.

     Option 026 only: Use the APC adapter to connect the cable to the spectrum analyzer input.

   - Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

     (FREQUENCY) 50 *(MHz)*
     (SPAN) 10 (MHz)

2. Set the spectrum analyzer to measure the system related sideband above the signal by performing the following steps:

   a Press the following keys:

     (PEAK SEARCH)
     (MKR FCTN) MK TRACK ON OFF (ON)
     (SPAN) 200 (kHz)
     (BW) 1 (kHz)
     VID BW AUTO MAN 30 (Hz)

   Allow the spectrum analyzer to stabilize for approximately 1 minute. Then press the following keys:

     (MKR FCTN) MK TRACK ON OFF (OFF)
     (FREQUENCY) CF STEP AUTO MAN 130 (kHz)

   - Press (SGL SWP) and wait for the completion of the sweep. Press (PEAK SEARCH), then MARKER Δ.

   - Press the following spectrum analyzer keys:

     (FREQUENCY)
     (⇧) (step-up key)

5. System Related Sidebands

3. Measure the system related sideband above the signal by pressing (SGL SWP) on the spectrum analyzer. Wait for the completion of a new sweep, then press (PEAK SEARCH).
4. Record the Marker-A Amplitude as TR Entry 1 of the performance verification test record.

   The system related sideband above the signal should be <-65 dB.
5. Set the spectrum analyzer to measure the system related sideband below the signal by pressing the following spectrum analyzer keys:

   (⇩) (step-down key)
   (⇩) (step-down key)
6. Measure the system related sideband below the signal by pressing (SGL SWP). Wait for the completion of a new sweep, then press (PEAK SEARCH).

   Record the Marker-A Amplitude as TR Entry 2 of the performance verification test record.

   The system related sideband below the signal should be <-65 dB.

6. Frequency Span Readout Accuracy

For testing each frequency span, two synthesized sources are used to provide two precisely-spaced signals. The spectrum analyzer marker functions are used to measure this frequency difference and the marker reading is compared to the specification.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper
Synthesizer/level generator
Signal generator
Power splitter
Adapter, Type N (m) to Type N (m)
Adapter, Type N (f) to APC 3.5 (f)
Cable, Type N, 183 cm (72 in)
Cable, Type N, 152 cm (60 in) *or*
Adapter, APC 3.5 (f) to Type N (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

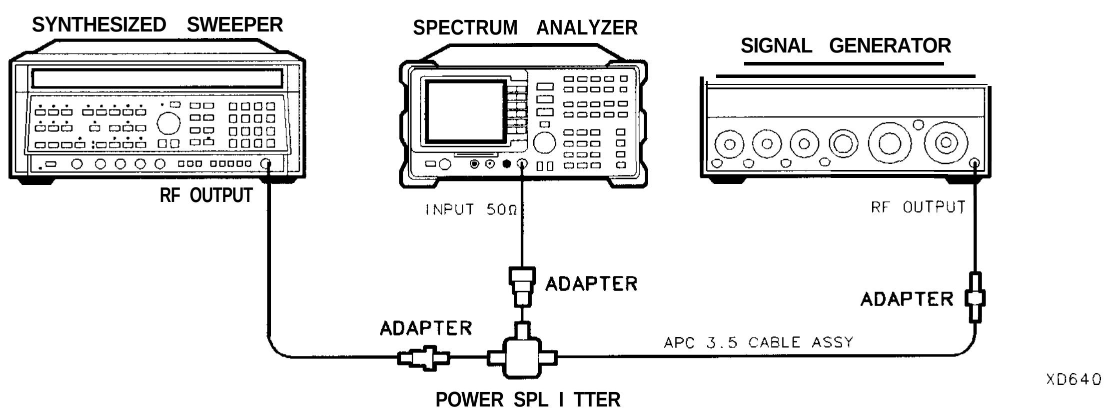


Figure 1-6. 1800 MHz Frequency Span Readout Accuracy Test Setup

Procedure

This performance verification test consists of two parts:

Part 1: 1800 MHz Frequency Span Readout Accuracy
Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform "Part 1: 1800 MHz Frequency Span Readout Accuracy" before "Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy."

6. Frequency Span Readout Accuracy

Part 1: 1800 MHz Frequency Span Readout Accuracy

1. Connect the equipment as shown in Figure 1-6. Note that the Power Splitter is used as a combiner.
2. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 900 (MHz)
   (SPAN) 1800 (MHz)

3. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

   CW .... 1700 MHz
   POWER LEVEL .... −5 dBm

4. On the signal generator, set the controls as follows:

   FREQUENCY (LOCKED MODE) .... 200 MHz
   CW OUTPUT .... 0 dBm

5. Adjust the spectrum analyzer center frequency, if necessary, to place the lower frequency on the second vertical graticule line (one division from the left-most graticule line).
6. On the spectrum analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press (PEAK SEARCH) (MARKER Δ) (NEXT PEAK).

   The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).

7. Press MARKER Δ, then continue pressing NEXT PK RIGHT. The marker Δ should be on the right-most signal.
8. Record the MKR Δ frequency reading as TR Entry 1 of the performance verification test record.

   The MKR reading should be within the 1446 MHz and 1554 MHz.

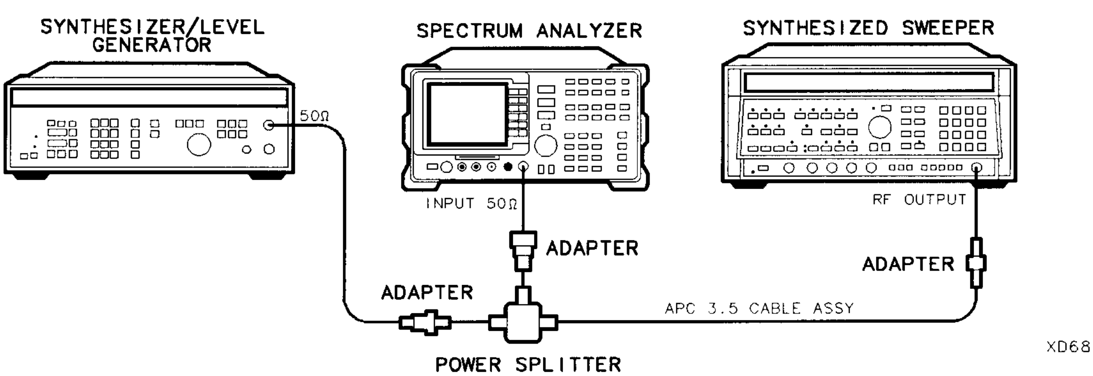


Figure 1-7. 10.1 MHz to 10 kHz Frequency Span Readout Accuracy Test Setup

Part 2: 10.1 MHz to 10 kHz Frequency Span Readout Accuracy

Perform "Part 1: 1800 MHz Frequency Span Readout Accuracy" before performing this procedure.

1. Connect the equipment as shown in Figure 1-7. Note that the Power Splitter is used as a combiner.
2. Press [PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 70 (MHz), (SPAN) 10.1 (MHz)
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

   CW . . . . .74 MHz
   POWER LEVEL . . . . -5 dBm
4. Set the synthesizer/level generator controls as follows:

   FREQUENCY . . . . 66 MHz
   AMPLITUDE . . . . 0 dBm
5. Adjust the spectrum analyzer center frequency to center the two signals on the display.
6. On the spectrum analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

   [PEAK SEARCH) **MARKER Δ NEXT PEAK**

   The two markers should be on the signals near the second and tenth vertical graticule lines (the first graticule line is the left-most).
7. Record the MKR-A frequency reading in the performance verification test record as TR Entry 2. The MKR-A frequency reading should be within the limits shown.
8. Press (MKR), MARKER 1 ON OFF (OFF) on the spectrum analyzer.
9. Change to the next equipment settings listed in Table 1-7.
10. On the spectrum analyzer, press (SGL SWP). Wait for the completion of a new sweep, then press the following keys:

    (PEAK SEARCH] **MARKER Δ NEXT PEAK**
11. Record the MKR-A frequency reading in the performance verification test record.
12. Repeat steps 8 through 11 for the remaining spectrum analyzer span settings listed in Table 1-7.

6. Frequency Span Readout Accuracy

Table 1-7. Frequency Span Readout Accuracy

Spectrum Analyzer Span Setting	Synthesizer/Level Generator Frequency	Synthesized Sweeper Frequency	MKR-Δ Reading		
	MHZ	MHz	Min.	TR Entry	Max.
10.10 MHz	66.000	74.000	7.70 MHz	2	8.30 MHz
10.00 MHz	66.000	74.000	7.80 MHz	3	8.20 MHz
100.00 kHz	69.960	70.040	78.00 kHz	4	82.00 kHz
99.00 kHz	69.960	70.040	78.00 kHz	5	82.00 kHz
10.00 kHz	69.996	70.004	7.80 kHz	6	8.20 kHz

7. Residual FM

This test measures the inherent short-term instability of the spectrum analyzer LO system. With the analyzer in zero span, a stable signal is applied to the input and slope-detected on the linear portion of the IF bandwidth filter skirt. Any instability in the LO transfers to the IF signal in the mixing process. The test determines the slope of the IF filter in Hz/dB and then measures the signal amplitude variation caused by the residual FM. Multiplying these two values yields the residual FM in Hz. The narrow bandwidth options use a 300 Hz span. This span is not specified, however, it is tested in "Frequency Span Accuracy."

There are no related adjustment procedures for this performance test.

Equipment Required

Signal generator
Cable, Type N, 183 cm (72 in)

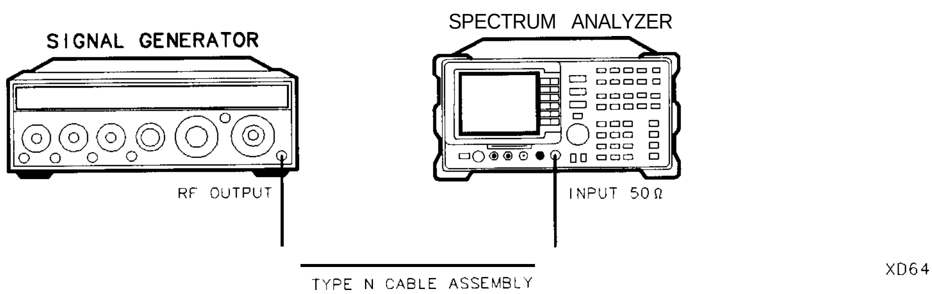


Figure 1-8. Residual FM Test Setup

Procedure

This performance test consists of two parts:

Part 1: Determining the IF Filter Slope
Part 2: Measuring the Residual FM

7. Residual FM

Part 1: Determining the IF Filter Slope

1. Connect the equipment as shown in Figure 1-8.
2. Set the signal generator controls as follows:

   FREQUENCY . . . . 500 MHz
   CW OUTPUT . . . . -10 dBm

3. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 500 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) -9 (dBm)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) 1 (kHz)

4. On the spectrum analyzer, press the following keys:

   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 10 (kHz)

   Wait for the AUTO ZOOM message to disappear. Press the following spectrum analyzer keys:

   (MKR →) MARKER →REF LVL
   (MKR) MARKER 1 ON OFF (OFF)

5. On the spectrum analyzer, press the following keys:

   (SGL SWP)
   (PEAK SEARCH) MARKER Δ

   If you have difficulty achieving the fO.l dB setting, then make the following spectrum analyzer settings:

   (SPAN) 5 (kHz)
   (BW) VID BW AUTO MAN 30 (Hz)

6. Rotate the spectrum analyzer knob counterclockwise until the MKR-A amplitude reads – 1 dB ±0. 1 dB. Press MARKER Δ . Rotate the knob counterclockwise until the MKR-A amplitude reads -4 dB ±0.1 dB.
7. Divide the MKR-A frequency in hertz by the MKR-A amplitude in dB to obtain the slope of the resolution bandwidth filter. For example, if the MKR-A frequency is 1.08 kHz and the MKR-A amplitude is 3.92 dB, the slope would be equal to 275.5 Hz/dB. Record the result below:

   Slope ________ Hz/ dB

Part 2: Measuring the Residual FM

8. On the spectrum analyzer, press (MKR), More 1 of 2, MARKER ALL OFF , (PEAK SEARCH), then MARKER Δ . Rotate the knob counterclockwise until the MKR-Δ amplitude reads -3 dB ±0.1 dB.

9. On the spectrum analyzer, press the following keys:

   (MKR) MARKER NORMAL
   (MKR →) MARKER→CF
   (SGL SWP)
   (BW) VID BW AUTO MAN 1 (kHz)
   (SPAN) 0 (Hz)
   (SWEEP) 100 (ms)

   Press (SGL SWP).

Note The displayed trace should be about three divisions below the reference level. If it is not, press (TRIG), SWEEP CONT SGL (CONT), (FREQUENCY), and use the knob to place the displayed trace about three divisions below the reference level. Press (SGL SWP).

---

10. On the spectrum analyzer, press (MKR →), MORE 1 of 2 , MARKER →PK-PK . Read the MKR-Δ amplitude, take its absolute value, and record the result as the Deviation.

Deviation _________ dB

11. Calculate the Residual FM by multiplying the Slope recorded in step 7 by the Deviation recorded in step 10.

    Record this value as TR Entry 1 of the performance verification test record. The residual FM should be less than 250 Hz.

8. Sweep Time Accuracy

This test uses a synthesizer function generator to amplitude modulate a 500 MHz CW signal from another signal generator. The analyzer demodulates this signal in zero span to display the response in the time domain. The marker delta frequency function on the analyzer is used to read out the sweep time accuracy.

There are no related adjustment procedures for this performance verification test.

Equipment Required

Synthesizer/function generator
Signal generator
Cable, Type N, 152 cm (60 in)
Cable, BNC, 120 cm (48 in)

Additional Equipment Required for Option 026

Adapter, APC 3.5 (f) to Type N (f)

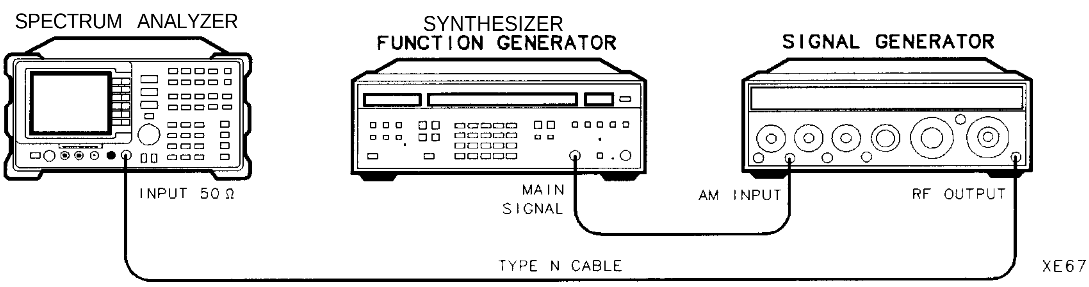


Figure 1-9. Sweep Time Accuracy Test Setup

Procedure

1. Set the signal generator to output a 500 MHz, -10 dBm, CW signal. Set the AM and FM controls to OFF.
2. Set the synthesizer/function generator to output a 500 Hz, +5 dBm triangle waveform signal.
3. Connect the equipment as shown in Figure 1-9.

4. Press (PRESET) on the spectrum analyzer and wait for the preset to finish. Set the controls as follows:

   (FREQUENCY) 5C0 (MHz)
   (SPAN) 10 (MHz)
   [PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)

   Wait for the AUTO ZOOM routine to finish, then press (SPAN) and ZERO SPAN .

   Set the controls as follows:

   (BW) 3 (MHz)
   (AMPLITUDE] SCALE LOG LIN (LIN)
   (SWEEP) SWP TIME AUTO MAN 20 (ms)

   Adjust the signal amplitude for a mid-screen display.

5. Set the signal generator AM switch to the AC position.
6. On the spectrum analyzer, press (TRIG) then VIDEO . Adjust the video trigger so that the analyzer is sweeping.
7. Press (SGL SWP). After the completion of the sweep, press (PEAK SEARCH). If necessary, press NEXT PK LEFT or NEXT PK RIGHT until the marker is on the left most signal. This is the "marked signal."
8. Press MARKER A , MARKER A , then NEXT PK RIGHT until the marker delta is on the eighth signal peak. Record the marker delta reading in the performance verification test record as indicated in Table 1-8.
9. Repeat steps 6 through 9 for the remaining sweep time settings listed in Table 1-8.

Table 1-8. Sweep Time Accuracy

Spectrum Analyzer Sweep Time Setting	Synthesizer/Function Generator Frequency	Minimum Reading	TR Entry (MKR A)	Maximum Reading
20 ms	500.0 Hz	15.4 ms	1	16.6 ms
100 ms	100.0 Hz	77.0 ms	2	83.0 ms
1 s	10.0 Hz	770.0 ms	3	830.0 ms
10 s	1.0 Hz	7.7 s	4	8.3 s

9. Scale Fidelity

A 50 MHz CW signal is applied to the INPUT 50 Ω of the analyzer through two step attenuators. The attenuators increase the effective amplitude range of the source. The amplitude of the source is decreased in 10 dB steps and the analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

The related adjustment for this performance test is "Log and Linear Amplitude Adjustment."

Equipment Required

Synthesizer/level generator
Attenuator, 1 dB step
Attenuator, 10 dB step
Cable, BNC, 122 cm (48 in)
Cable, BNC, 20 cm (9 in)
Adapter, Type N (m) to BNC (f)
Adapter, Type BNC (m) to BNC (m)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

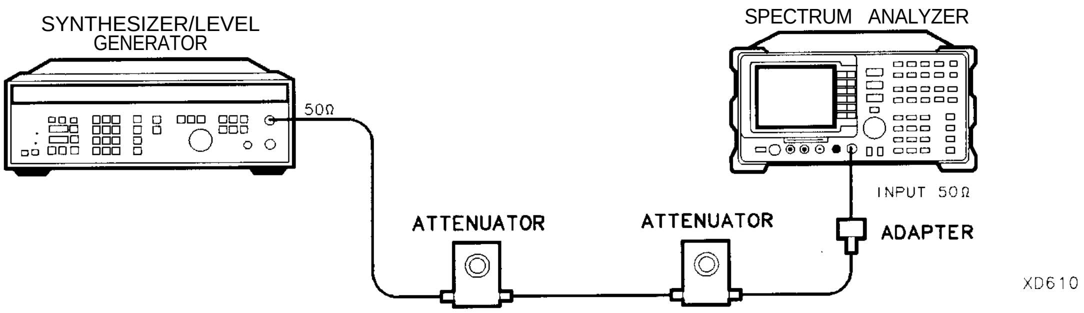


Figure 1-10. Scale Fidelity Test Setup

Procedure

Log Scale

1. Set the synthesizer/level generator controls as follows:

   FREQUENCY . . . . 50 MHz
   AMPLITUDE . . . . + 10 dBm
   AMPTD INCR . . . . 0.05 dB
   OUTPUT . . . . 50 Ω

2. Connect the equipment as shown in Figure 1-10. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

3. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 50 (MHz)
   (SPAN) 10 (MHz)
   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)

   Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

   (BW)
   RES BW AUTO MAN 3 (kHz)
   VID BW AUTO MAN 30 (Hz)

4. If necessary, adjust the 1 dB step attenuator attenuation until the MKR amplitude reads between 0 dBm and -1 dBm.

5. On the synthesizer/level generator, press AMPLITUDE and use the increment keys to adjust the amplitude until the spectrum analyzer MKR amplitude reads 0 dBm ±0.05 dB.

   It may be necessary to decrease the resolution of the amplitude increment of the synthesizer/level generator to 0.01 dB to obtain a MKR reading of 0 dBm ±0.05 dB.

6. On the spectrum analyzer, press (PEAK SEARCH), then MARKER Δ.

7. Set the synthesizer/level generator AMPTD INCR to 4 dB.

8. On the synthesizer/level generator, press AMPLITUDE, then increment down to step the synthesizer/level generator to the next lowest nominal amplitude listed in Table 1-9.

9. Record the Actual MKR Δ amplitude reading in the performance verification test record as indicated in Table 1-9. The MKR amplitude should be within the limits shown.

9. **Scale Fidelity**

10. Repeat steps 8 and 9 for the remaining synthesizer/level generator Nominal Amplitudes listed in Table 1-9.

11. For each Actual MKR A reading recorded in Table 1-9, subtract the previous Actual MKR A reading. Add 4 dB to the number and record the result as the incremental error in the performance verification test record as indicated in Table 1-9. The incremental error should not exceed 0.4 dB/4 dB.

Table 1-9. Cumulative and Incremental Error, Log Mode

Synthesizer/Level Generator Uominal Amplitude	dB from Ref Level (nominal)	TR Entry Cumulative Error (MKR A Reading)			TR Entry (Incremental Error)
		Min. (dB)	Actual (dB)	Max. (dB)	TR Entry
+10 dBm	0	0 (Ref)	0 (Ref)	0 (Ref)	0 (Ref)
+6 dBm	-4	-4.34	1	-3.66	18
+2 dBm	-8	-8.38	2	-7.62	19
-2 dBm	-12	-12.42	3	-11.58	20
-6 dBm	-16	-16.46	4	-15.54	21
-10 dBm	-20	-20.50	5	-19.50	22
-14 dBm	-24	-24.54	6	-23.46	23
-18 dBm	-28	-28.58	7	-27.42	24
-22 dBm	-32	-32.62	8	-31.38	25
-26 dBm	-36	-36.66	9	-35.34	26
-30 dBm	-40	-40.70	10	-39.30	27
-34 dBm	-44	-44.74	11	-43.26	28
-38 dBm	-48	-48.78	12	-47.22	29
-42 dBm	-52	-52.82	13	-51.18	30
-46 dBm	-56	-56.86	14	-55.14	31
-50 dBm	-60	-60.90	15	-59.10	32
-54 dBm	-64	-64.94	16	-63.06	N/A
-58 dBm	-68	-68.98	17	-67.02	N/A

Linear Scale

12. Set the synthesizer/level generator controls as follows:

AMPLITUDE . . . . + 10 dBm
AMPTD INCR . . . . 0.05 dB

13. Set the 1 dB step attenuator to 0 dB attenuation.

14. Press (PRESET] on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

    (AMPLITUDE) SCALE LOG LIN (LIN)
    (FREQUENCY) 5C (MHz)
    (SPAN) 10 (MHz)
    [PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)
    (SPAN) 50 (kHz)

    Wait for the auto zoom routine to finish, then set the resolution bandwidth and the video bandwidth by pressing the following keys:

    (BW)
    RES BW AUTO MAN 3 (kHz)
    VID BW AUTO MAN 30 (Hz)

15. If necessary, adjust the 1 dB step attenuator attenuation until the MKR reads approximately 223.6 mV. It may be necessary to decrease the resolution of the amplitude increment of the synthesizer/level generator to 0.01 dB to obtain a MKR reading of 223.6 mV ± 0.4 mV.
16. On the synthesizer/level generator, press AMPLITUDE, then use the increment keys to adjust the amplitude until the spectrum analyzer MKR amplitude reads 223.6 mV ±0.4 mV.
17. On the spectrum analyzer, press (PEAK SEARCH), (MKR FCTN), MK TRACK ON OFF (OFF).
18. Set the synthesizer/level generator amplitude increment to 3 dB.
19. On the synthesizer/level generator, press AMPLITUDE, then increment down to step the synthesizer/level generator to the next lowest Nominal Amplitude listed in Table 1-10.
20. Record the MKR amplitude reading in the performance verification test record as indicated in Table 1-10. The MKR amplitude should be within the limits shown.
21. Repeat steps 19 and 20 for the remaining synthesizer/level generator Nominal Amplitudes listed in Table 1-10.

Table 1-10. Scale Fidelity, Linear Mode

Synthesizer/Level Generator Nominal Amplitude	% of Ref Level (nominal)	MKR Reading		
		Min. (mV)	TR Entry	Max. (mV)
+10 dBm	100	0 (Ref)	0 (Ref)	0 (Ref)
+7 dBm	70.7	151.59	65	165.01
+4 dBm	50	105.36	66	118.78
+1 dBm	35.48	72.63	67	86.05
-2 dBm	25	49.46	68	62.88

Log to Linear Switching

22. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.
23. Set the synthesizer controls as follows:

    FREQUENCY . . . . 50 MHz
    AMPLITUDE . . . . +6 dBm

24. On the spectrum analyzer, press (PRESET), then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (BW) 300 (kHz)

25. On the spectrum analyzer, press the following keys:

    (PEAK SEARCH)
    (MKR →) MARKER →REF LVL
    (PEAK SEARCH)

26. Record the peak marker reading in Log mode below.

    Log Mode Amplitude Reading- dBm

27. Press (AMPLITUDE) SCALE LOG LIN (LIN) to change the scale to linear, then press Mare 1 of 2, Amptd Units , and dBm to set the amplitude units to dBm.
28. Press (PEAK SEARCH), then record the peak marker amplitude reading in linear mode.

    Linear Mode Amplitude Reading. dBm

29. Subtract the Linear Mode Amplitude Reading from the Log Mode Amplitude Reading, then record this value as the Log/Linear Error.

    Log/Linear Error_________ dB

30. If the Log/Linear Error is less than 0 dB, record this value as TR Entry 73 in the performance verification test record. The absolute value of the reading should be less than 0.25 dB. If the Log/Linear Error is greater than 0 dB, continue with the next step.
31. On the spectrum analyzer, press the following keys:

    (MKR →) MARKER →REF LVL
    (PEAK SEARCH)

32. Record the peak marker amplitude reading in linear mode.

Linear Mode Amplitude Reading- dBm

33. On the spectrum analyzer, press the following keys:

    (AMPLITUDE) SCALE LOG LIN (LOG)
    (PEAK SEARCH)

34. Record the peak marker reading in Log mode below.

Log Mode Amplitude Reading- dBm

35. Subtract the Log Mode Amplitude Reading from the Linear Mode Amplitude Reading, then record this value as the Linear/Log Error.

Linear/Log Error__________ dB

36. Record the Linear/Log Error as TR Entry 73 in the performance verification test record. The absolute value of the reading should be less than 0.25 dB.

10. Reference Level Accuracy

A 50 MHz CW signal is applied to the INPUT 50 Ω of the spectrum analyzer through two step attenuators. The attenuators increase the effective amplitude range of the source. The amplitude of the source is decreased in 10 dB steps and the spectrum analyzer marker functions are used to measure the amplitude difference between steps. The source's internal attenuator is used as the reference standard. The test is performed in both log and linear amplitude scales.

It is only necessary to test reference levels as low as -90 dBm (with 10 dB attenuation) since lower reference levels are a function of the spectrum analyzer microprocessor manipulating the trace data. There is no error associated with the trace data manipulation.

The related adjustment for this procedure is "A12 Cal Attenuator Error Correction."

Equipment Required

Synthesizer/level generator
Attenuator, 1 dB steps
Attenuator, 10 dB steps
Cable, BNC 122 cm (48 in) ***(two required)***
Adapter, Type N (m) to BNC (f)
Adapter, BNC (m) to BNC (m)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)
Adapter, BNC (f) to SMA (m)

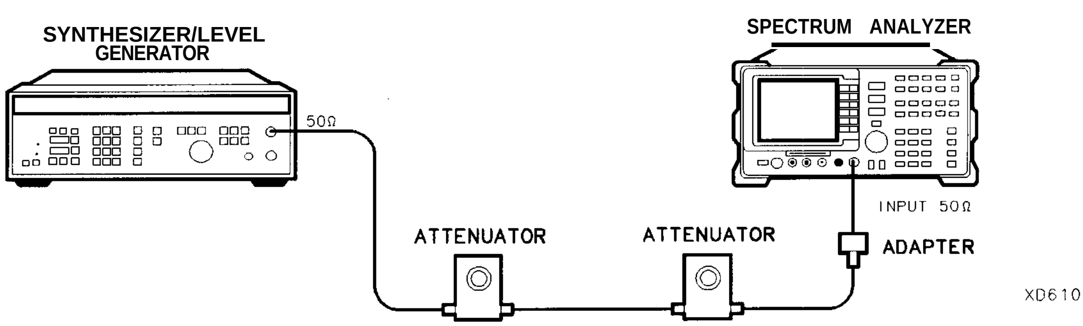


Figure 1-11. Reference Level Accuracy Test Setup

Procedure

Log Scale

1. Set the synthesizer/level generator controls as follows:

   FREQUENCY .... 50 MHz
   AMPLITUDE .... −10 dBm
   AMPTDINCR .... 10 dB
   OUTPUT .... 50 Ω

2. Connect the equipment as shown in Figure 1-11. Set the 10 dB step attenuator to 10 dB attenuation and the 1 dB step attenuator to 0 dB attenuation.

3. Press (PRESET] on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY] 50 (MHz)
   (SPAN) 12 (MHz)
   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)
   (AMPLITUDE) –20 (dBm) SCALE LOG LIM (LOG) 1 (dB)
   (BW) 3 (kHz) VID BW AUTO MAN 30 (Hz)

4. Set the 1 dB step attenuator to place the signal peak one to two dB (one to two divisions) below the reference level.
5. On the spectrum analyzer, press the following keys:

   (SGL SWP)
   [PEAK SEARCH] MARKER Δ

6. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to Table 1-11. At each setting, press (SGL SWP), then [PEAK SEARCH) on the spectrum analyzer.
7. Record the MKR Δ amplitude reading in the performance verification test record as indicated in Table 1-11. The MKR Δ reading should be within the limits shown.

Table 1-11. Reference Level Accuracy, Log Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR Δ Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	1	+ 0.4
+ 10	0	-0.5	2	+ 0.5
-20	-30	-0.4	3	+ 0.4
-30	-40	-0.5	4	+ 0.5
-40	-50	-0.8	5	+0.8
-50	-60	-1.0	6	+ 1.0
-60	-70	-1.1	7	+ 1.1
-70	-80	-1.2	8	+ 1.2
-80	-90	-1.3	9	+1.3

Linear Scale

8. Set the synthesizer/level generator amplitude to -10 dBm.
9. Set the 1 dB step attenuator to 0 dB attenuation.
10. Set the spectrum analyzer controls as follows:

   (AMPLITUDE) -20 (dBm)
   SCALE LOG LIN (LIN)

   (AMPLITUDE) More 1 of 2 Amptd Units dBm

   (SWEEP) SWEEP CONT SGL (CONT)

   (MKR) MARKER 1 ON OFF (OFF)

11. Set the 1 dB step attenuator to place the signal peak one to two divisions below the reference level.
12. On the spectrum analyzer, press the following keys:

   (SGL SWP)
   (PEAK SEARCH)
   (MKR →) MKR → CF

   (PEAK SEARCH) MARKER A

   (MKR FCTN) MK TRACK ON OFF (OFF)

13. Set the synthesizer/level generator amplitude and spectrum analyzer reference level according to Table 1-12. At each setting, press (SGL SWP), then (PEAK SEARCH) on the spectrum analyzer.
14. Record the MKR A amplitude reading in Table 1-12. The MKR A reading should be within the limits shown.

Table 1-12. Reference Level Accuracy, Linear Mode

Synthesizer/Level Generator Amplitude	Spectrum Analyzer Reference Level	MKR A Reading (dB)		
(dBm)	(dBm)	Min.	TR Entry	Max.
-10	-20	0 (Ref)	0 (Ref)	0 (Ref)
0	-10	-0.4	10	+ 0.4
+ 10	0	-0.5	11	+ 0.5
-20	-30	-0.4	12	+ 0.4
-30	-40	-0.5	13	+ 0.5
-40	-50	-0.8	14	+ 0.8
-50	-60	-1.0	15	+ 1.0
-60	-70	-1.1	16	+ 1.1
-70	-80	-1.2	17	+ 1.2
-80	-90	-1.3	18	11.3

11. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties

To measure the absolute amplitude calibration uncertainty the input signal is measured after the self-cal routine is finished.

To measure the resolution bandwidth switching uncertainty an amplitude reference is taken with the resolution bandwidth set to 3 kHz using the marker-delta function. The resolution bandwidth is changed to settings between 3 MHz and 1 kHz and the amplitude variation is measured at each setting and compared to the specification. The span is changed as necessary to maintain approximately the same aspect ratio.

The related adjustment procedure for this performance test is "Crystal and LC Bandwidth Adjustment."

Equipment Required

Cable, BNC, 23 cm (9 in)
Adapter, Type N (m) to BNC (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

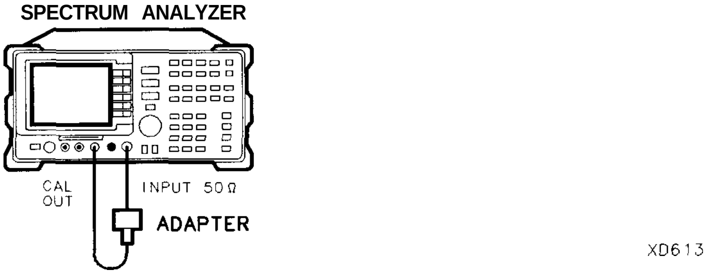


Figure 1-12. Uncertainty Test Setup

Absolute Amplitude Uncertainty

1. Connect the CAL OUT to the spectrum analyzer input using the BNC cable and adapter, as shown in Figure 1-12.
2. Press [PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer controls by pressing the following keys:

   (SPAN) 10 (MHz)
   (PEAK SEARCH]
   (MKR FCTN) MK TRACK ON OFF (ON)
   (FREQUENCY) 300 (MHz)
   (SPAN) 50 (kHz)
   (BW) 3 (kHz)
   (VID BW AUTO MAN) 300 (Hz)
   (AMPLITUDE) −20 (dBm)

3. Press (PEAK SEARCH], then record the marker reading in TR Entry 1 of the performance verification test record.

   The marker reading should be within -20.15 and -19.85 dB.

Resolution Bandwidth Switching Uncertainty

4. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer controls by pressing the following keys:

   (FREQUENCY) 300 (MHz)
   (SPAN) 10 (MHz)
   (PEAK SEARCH]
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 50 (kHz)
   (AMPLITUDE) −20 (dBm)
   SCALE LOG LIM (LOG) 1 (dB)
   (BW) 3 (kHz)
   VID BW AUTO MAN 1 (kHz)

5. Press (AMPLITUDE) and use the knob to adjust the reference level until the signal appears one division below the reference level, then press the following keys:

   [PEAK SEARCH) MARKER Δ

   (MKR FCTN) MK TRACK ON OFF (ON)

6. Set the spectrum analyzer resolution bandwidth and span according to Table 1-13.
7. Press [PEAK SEARCH], then record the MKR Δ TRK amplitude reading in the performance verification test record as indicated in Table 1-13.

   The amplitude reading should be within the limits shown.
8. Repeat steps 6 through 7 for each of the remaining resolution bandwidth and span settings listed in Table 1-13.

Table 1-13. Resolution Bandwidth Switching Uncertainty

Spectrum Analyzer		MKR Δ TRK Amplitude Reading		
RES BW Setting	SPAN Setting	Min. (dB)	TR Entry	Max. (dB)
3 kHz	50 kHz	0 (Ref)	0 (Ref)	0 (Ref)
1 kHz	50 kHz	-0.5	2	+0.5
9 kHz	50 kHz	-0.4	3	+ 0.4
10 kHz	50 kHz	-0.4	4	+ 0.4
30 kHz	500 kHz	-0.4	5	+ 0.4
100 kHz	500 kHz	-0.4	6	+ 0.4
120 kHz	500 kHz	-0.4	7	+ 0.4
300 kHz	5 MHz	-0.4	8	+ 0.4
1 MHz	10 MHz	-0.4	9	+ 0.4
3 MHz	10 MHz	-0.4	10	+ 0.4

12. Resolution Bandwidth Accuracy

The output of a synthesizer/level generator is connected to the input of the spectrum analyzer. Measurements are performed in zero span to reduce the measurement uncertainty.

The frequency of the synthesizer/level generator is set to the center of the bandwidth-filter response. The synthesizer output is then reduced in amplitude by either 3 dB or 6 dB to determine the reference point. A marker reference is set and the synthesizer output is increased to its previous level.

The frequency of the synthesizer is reduced, then recorded when the resulting marker amplitude matches the previously set marker reference. The synthesizer frequency is increased so that it is tuned on the opposite point on the skirt of the filter response. The frequency is once again recorded and the difference between the two frequencies is compared to the specification.

The related adjustments for this performance test are:

CAL AMPTD and CAL FREQ Self-Cal Routines
Crystal and LC Filter Adjustments

Equipment Required

Synthesizer/level generator
Cable, BNC, 122 cm (48 in)
Adapter, Type N (m) to BNC (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to Type N (f)

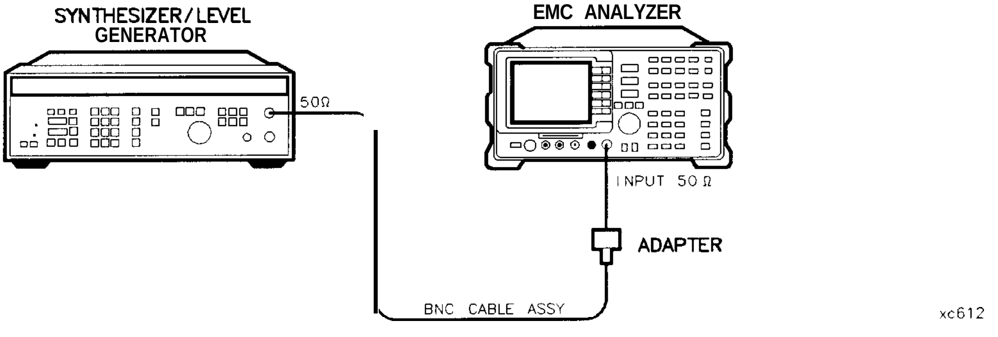


Figure 1-13. Resolution Bandwidth Accuracy Test Setup

Procedure

1. Connect the equipment as shown in Figure 1-13.

3 dB Bandwidths

2. Set the synthesizer/level generator controls as follows:

   AMPLITUDE . . . . 0 dBm
   AMPTD INCR . . . . 3 dB
   FREQUENCY . . . . 50 MHz

3. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 50 (MHz)
   (SPAN) ZERO SPAN
   (BW) 3 (MHz)
   VID BW AUTO MAN 30 (Hz)
   (AMPLITUDE- SCALE LOG LIN (LOG) 1 (dB)

4. On the synthesizer/level generator set MANUAL TUNE ON/OFF to ON.
5. On the spectrum analyzer press (MKR).
6. Adjust the frequency of the synthesizer/level generator for a maximum marker reading.

   It will be necessary to adjust the MANUAL TUNE DIGIT resolution on the synthesizer/level generator for the best compromise between tuning speed and resolution.

   Adjust the synthesizer/level generator amplitude to place the peak of the signal at or below the top graticule.

7. On the synthesizer/level generator, press AMPLITUDE and INCR (⇩) (step-down key).
8. Press (MARKER Δ) on the spectrum analyzer.
9. On the synthesizer/level generator, press INCR (⇧) (step-up key).
10. On the synthesizer/level generator, press FREQUENCY. Lower the frequency of the synthesizer/level generator by adjusting the knob until the marker delta amplitude is ***0.0*** ± ***0.05*** dB.
11. Record the synthesizer/level generator frequency readout in column 1 of Table 1-14.
12. Using the synthesizer/level generator knob, raise the frequency so that the marker-delta amplitude is maximum. Continue increasing the frequency until the marker reads ***0.0*** ± ***0.05*** dB.
13. Record the synthesizer/level generator frequency readout in column 2 of Table 1-14.
14. Adjust the synthesizer/level generator frequency for maximum amplitude.
15. Repeat steps 5 through 14 for each of the RES BW settings listed in Table 1-14.
16. Subtract the Synthesizer Lower Frequency from the Synthesizer Upper Frequency. Record the difference as the Resolution Bandwidth Accuracy, in the performance verification test record as indicated in Table 1-14.

    RES BW Accuracy = Upper Frequency − Lower Frequency

12. Resolution Bandwidth Accuracy

Table 1-14. 3 dB Resolution Bandwidth Accuracy

Spectrum Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry (Resolution Bandwidti Accuracy)
3 MHz			1
1 MHz			2
300 kHz			3
100 kHz			4
30 kHz			5
10 kHz			6
3 kHz			7
1 kHz			8

6 dB EMI Bandwidths

17. Set the synthesizer/level generator AMPTD INCR to 6 dB.
18. On the spectrum analyzer, press the following keys:

    (BW) **EMI BW MENU** 9 **kHz EMI** BW

    (MKR) MARKER **NORMAL**

19. On the synthesizer/level generator, press FREQUENCY. Adjust the frequency for a maximum marker reading.
20. On the synthesizer/level generator, press AMPLITUDE and INCR (⇩) (step-down key).
21. Press [MARKER DELTA] on the spectrum analyzer.
22. On the synthesizer/level generator, press INCR (⇧) (step-up key).
23. On the synthesizer/level generator, press FREQUENCY. Lower the frequency of the synthesizer/level generator by adjusting the knob until the marker-delta amplitude is 0.0 ± 0.05 dB.
24. Record the synthesizer/level generator frequency readout in column 1 of Table 1-15.
25. Using the synthesizer/level generator knob, increase the frequency so that the marker-delta amplitude is maximum. Continue increasing the frequency until the marker reads 0.0 ± 0.05 dB.

26. Record the synthesizer/level generator frequency readout in column 2 of Table 1-15.
27. Adjust the synthesizer/level generator frequency for maximum marker amplitude.
28. Repeat steps 18 through 26 for the 120 kHz EMI RES BW ,
29. Subtract the Synthesizer Lower Frequency from the Synthesizer Upper Frequency. Record the difference as the Resolution Bandwidth Accuracy, in the performance verification test record as indicated in Table 1-15.

RES BW Accuracy = Upper Frequency – Lower Frequency

Table 1-15. EMI Resolution Bandwidth Accuracy

Spectrum Analyzer RES BW	Column 1 Synthesizer Lower Frequency	Column 2 Synthesizer Upper Frequency	TR Entry (Resolution Bandwidth Accuracy)
9 kHz			9
120kHz			10

6 dB EMI 200 Hz Bandwidths

It is normal for the 200 Hz resolution bandwidth shape to have a dip in the center of the response.

30. Press the following spectrum analyzer keys:

    (MEAS/USER) N dB PTS ON OFF 6 (dB)
    (BW) 200 (Hz)

31. Press (SGL SWP). Record the -6 dB POINTS: readout in the performance verification test record as TR Entry 14.

13. Calibrator Amplitude Accuracy

This test measures the accuracy of the spectrum analyzer CAL OUT signal. The first part of the test characterizes the insertion loss of a Low Pass Filter (LPF) and 10 dB Attenuator. The harmonics of the CAL OUT signal are suppressed with the LPF before the amplitude accuracy is measured using a power meter.

Calibrator Frequency is not included in this procedure because it is a function of the Frequency Reference (CAL OUT Frequency = 300 MHz ± [300 MHz x Frequency Reference]). Perform the 10 MHz Frequency Reference Output Accuracy test (Test 1 for standard or Test 2 for an Option 004) to verify the CAL OUT frequency.

The related adjustment for this performance test is the "Calibrator Amplitude Adjustment."

Equipment Required

Synthesized sweeper
Measuring receiver ***(used as a power meter)***
Power meter
Power sensor, low power with a 50 MHz reference attenuator
Power sensor, 100 kHz to 1800 MHz
Power splitter
10 dB Attenuator, Type N (m to f), dc-12.4 GHz
Filter, low pass (300 MHz)
Cable, Type N, 152 cm (60 in)
APC 3.5 (f) to Type N (f)
Adapter, Type N (f) to BNC (m) ***(two required)***
Adapter, Type N (m) to BNC (f)

Procedure

This performance test consists of two parts:

Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization
Part 2: Calibrator Amplitude Accuracy

Perform "Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization" before "Part 2: Calibrator Amplitude Accuracy."

A worksheet is provided at the end of this procedure for calculating the corrected insertion loss and the calibrator amplitude accuracy.

Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization

1. Zero and calibrate the measuring receiver and 100 kHz to 1800 MHz power sensor in LOG mode as described in the measuring receiver operation manual.

Caution Do not attempt to calibrate the low-power power sensor without the reference attenuator or damage to the low-power power sensor will occur.

---

2. Zero and calibrate the power meter and low-power power sensor, as described in the power meter operation manual.
3. Press INSTRUMENT PRESET on the synthesized sweeper, then set the controls as follows:

CW . . . . 300 MHz
POWER LEVEL . . . . -15 dBm

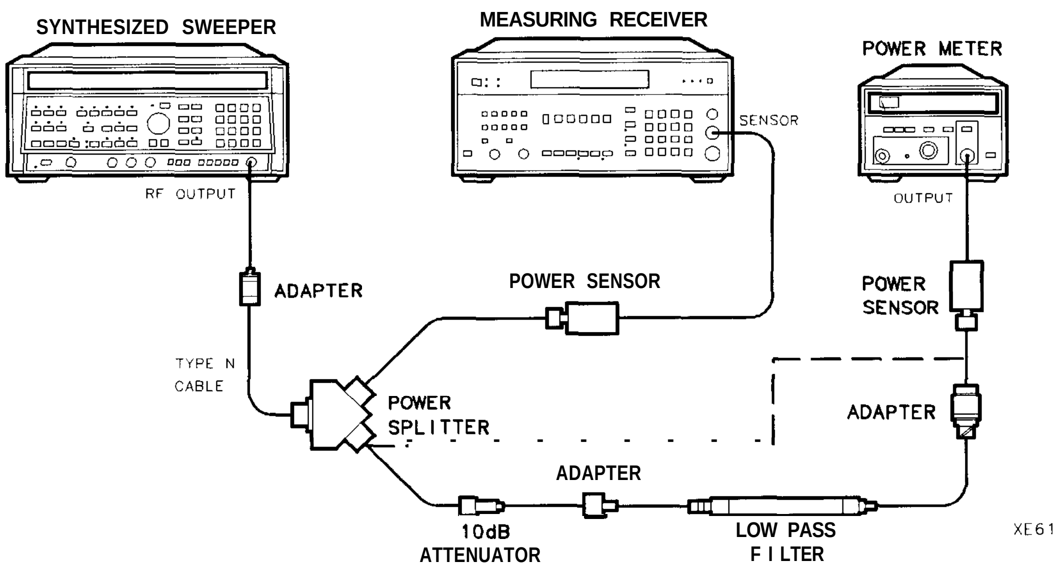


Figure 1-14. LPF Characterization

4. Connect the equipment as shown in Figure 1-14. Connect the low-power power sensor directly to the power splitter (bypass the LPF, attenuator, and adapters). Wait for the power sensor to settle before proceeding with the next step.
5. On the measuring receiver, press RATIO mode. The power indication should be 0 dB.
6. On the power meter, press the dB REF mode key. The power indication should be 0 dB.
7. Connect the LPF, attenuator and adapters as shown in Figure 1-14.
8. Record the measuring receiver reading in dB in the worksheet as the Mismatch Error. This is the relative error due to mismatch.
9. Record the power meter reading in dB in the worksheet as the Uncorrected Insertion Loss. This is the relative uncorrected insertion loss of the LPF, attenuator and adapters.
10. Subtract the Mismatch Error (step 8) from the Uncorrected Insertion Loss (step 9). This is the corrected insertion loss. Record this value in the worksheet as the Corrected Insertion Loss.

    Example: If the Mismatch Error is +0.3 dB and the Uncorrected Insertion Loss is -10.2 dB, subtract the mismatch error from the insertion loss to yield a corrected reading of -10.5 dB.

Part 2: Calibrator Amplitude Accuracy

Perform "Part 1: LPF, Attenuator and Adapter Insertion Loss Characterization" before performing this procedure.

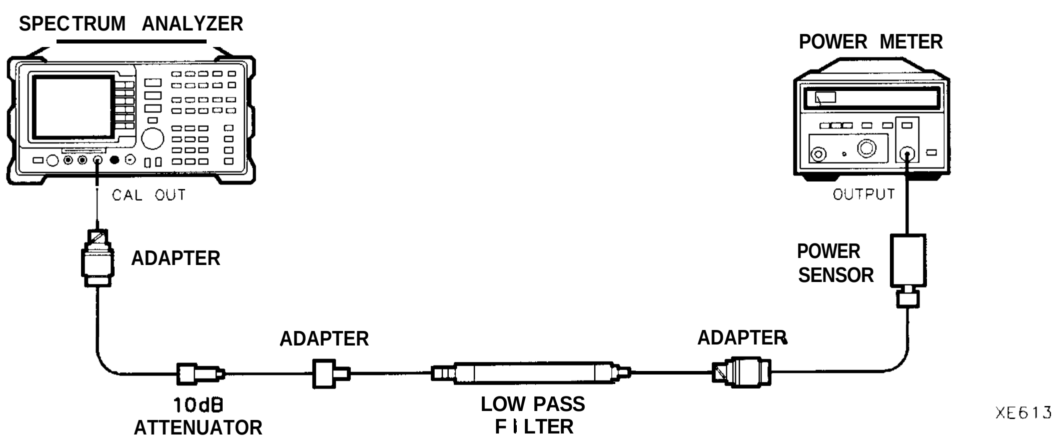


Figure 1-15. Calibrator Amplitude Accuracy Test Setup

1. Connect the equipment as shown in Figure 1-15. The spectrum analyzer should be positioned so that the setup of the adapters, LPF and attenuator do not bind. It may be necessary to support the center of gravity of the devices.
2. On the power meter, press the dBm mode key. Record the Power Meter Reading in dBm in the worksheet as the Power Meter Reading.
3. Subtract the Corrected Insertion Loss (step 10) from the Power Meter Reading (step 9).

   CAL OUT Power = Power Meter Reading – Corrected Insertion Loss

   Example: If the Corrected Insertion Loss is -10.0 dB, and the measuring receiver reading is -30 dB, then (-30 dB) – (-10.0 dB) = -20 dB
4. Record this value as TR Entry 1 of the performance verification test record as the CAL OUT power. The CAL OUT should be -20 dBm ±0.4 dB.

Calibrator Amplitude Accuracy Worksheet

Description	Measurement
Mismatch Error	______dB
Uncorrected Insertion Loss	______dB
Corrected Insertion Loss	______dB
Power Meter Reading	______dBm

14. Frequency Response

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the spectrum analyzer. The synthesized sweeper's power level is adjusted at 300 MHz to place the displayed signal at the analyzer's center horizontal graticule line. The measuring receiver, used as a power meter, is placed in RATIO mode. At each new sweeper frequency and analyzer center frequency setting, the sweeper's power level is adjusted to place the signal at the center horizontal graticule line. The measuring receiver displays the inverse of the frequency response relative to 300 MHz (CAL OUT frequency).

The related adjustments for this performance verification test are:

YTF Adjustment
Dual Mixer Bias Adjustment
Frequency Response Adjustment

Equipment Required

Synthesized sweeper
Measuring receiver ***(used as a power meter)***
Frequency synthesizer
Power sensor, 50 MHz to 26.5 GHz
Power splitter
Termination, 50 Ω
Adapter, Type N (m) to APC 3.5 (m)
Adapter, Type N (f) to BNC (f)
Adapter, 3.5 mm (f) to 3.5mm (f)
Adapter, Type BNC (f) to SMA (m)
Cable, BNC, 122 cm (48 in)
Cable, APC 3.5, 91 cm (36 in)

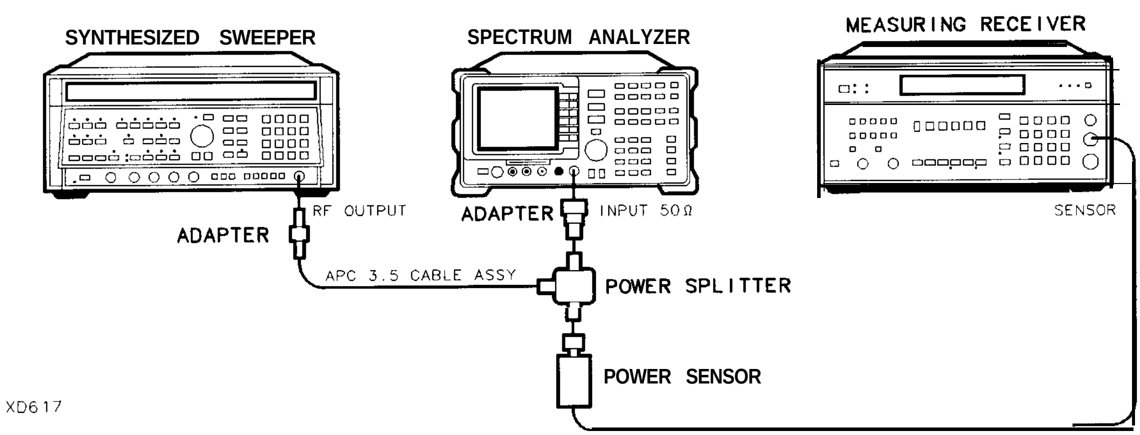


Figure 1-16. Frequency Response Test Setup, ≥50 MHz

Procedure

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in LOG mode as described in the measuring receiver operation manual.
2. Connect the equipment as shown in Figure 1-16.

   Option 026 only: Connect the output of the power splitter to the analyzer input directly.
3. Press instrument preset on the synthesized sweeper. Set the synthesized sweeper controls as follows:

   CW . . . . 300 MHz
   FREQSTEP . . . . 100 MHz
   POWER LEVEL . . . . -8 dBm
4. On the spectrum analyzer, press (PRESET), then wait for the preset routine to finish. Press the following analyzer keys:

   [FREQUENCY] Band Lock 0-2.9 Gz BAND 0
   [FREQUENCY] 300 (MHz)
   CF STEP AUTO MAN 100 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL 10 (-dBm)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) RES BW AUTO MAN 1 (MHz)
   VID BW AUTO NAN 10 (kHz)
5. On the spectrum analyzer, press [PEAK SEARCH], (MKR FCTN), then MK TRACK ON OFF (ON).
6. Adjust the synthesized sweeper power level for a MKR-TRK amplitude reading of -14 dBm ±0.1 dB.
7. Press RATIO on the measuring receiver.

Frequency Response, Band 0, ≥50 MHz

8. Set the synthesized sweeper CW frequency to 50 MHz.
9. Set the spectrum analyzer center frequency to 50 MHz.
10. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of – 14 dBm ±0. 1 dB.
11. Record the negative of the power ratio displayed on the measuring receiver in column 2 of Table 1-16 as the Measuring Receiver Reading at 50 MHz.
12. Set the synthesized sweeper CW frequency to 100 MHz.
13. Set the spectrum analyzer center frequency to 100 MHz.
14. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of – 14 dBm ±0.1 dB.
15. Record the negative of the power ratio displayed on the measuring receiver in Table 1-16 as the measuring receiver Reading.
16. On the synthesized sweeper, press (CW), and (⇑) (step up) key and on the spectrum analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 1-16.

17. At each new frequency repeat steps 13 through 15, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 1-16.

Frequency Response, Band 1

18. Press the following spectrum analyzer keys:

   (FREQUENCY) Band Lock 2.75-6.5 BAND 1
   (FREQUENCY) 2.75 (GHz)
   (SPAN) 10 (MHz)
   (BW) RES BW AUTO MAN 1 (MHz)
   VID BW AUTO MAN 10 (kHz)
   (PEAK SEARCH) (MKR FCTN) MK TRACK ON OFF (ON)

19. Set the synthesized sweeper CW to 2.75 GHz.
20. On the spectrum analyzer, press (AMPLITUDE) then PRESEL PEAK .
21. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of -14 dBm fO.l dB.
22. Record the negative of the power ratio displayed on the measuring receiver in Table 1-17, column 2.
23. Set the synthesized sweeper CW and the spectrum analyzer center frequency to 2.8 GHz. Repeat steps 20 through 22.
24. On the synthesized sweeper, press CW, and (⇑) (step up) key, then on the spectrum analyzer, press (FREQUENCY), (⇑) (step up) key to step through the remaining frequencies listed in Table 1-17.
25. At each new frequency repeat steps 19 through 21, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 1-17.

Frequency Response, Band 2

26. Press the following spectrum analyzer keys:

   (FREQUENCY) Band Lock 6.0-12.8 BAND 2
   (FREQUENCY) 6.0 (GHz)
   CF STEP AUTO MAN 200 (MHz)
   (SPAN) 10 (MHz)
   (BW) RES BW AUTO MAN 1 (MHz)
   VID BW AUTO MAN 10 (kHz)
   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)

27. Set the synthesized sweeper CW to 6.0 GHz.
28. On the spectrum analyzer, press (AMPLITUDE) PRESEL PEAK .
29. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of – 14 dBm ±0.1 dB.
30. Record the negative of the power ratio displayed on the measuring receiver in Table 1-18, column 2.

31. On the synthesized sweeper, press (CW), and (⇧) (step up) key, then on the spectrum analyzer, press (FREQUENCY), and (⇧) (step up) key to step through the remaining frequencies listed in Table 1-18.

32. At each new frequency repeat steps 28 through 30, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 1-18.

Frequency Response, Band 3

33. On the spectrum analyzer, press the following keys:

    (FREQUENCY) Band Lock 12.4-19. BAND 3
    (FREQUENCY) 12.4 (GHz)
    (SPAN) 10 (MHz)
    (BW) RES BW AUTO MAN 1 (MHz)
    VID BW AUTO NAN 10 (kHz)
    (PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)

34. Set the synthesized sweeper CW to 12.4 GHz.

35. On the spectrum analyzer, press (AMPLITUDE) then PRESEL PEAK .

36. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of – 14 dBm ±0. 1 dB.

37. Record the negative of the power ratio displayed on the measuring receiver in Table 1-19, column 2.

38. On the synthesized sweeper, press CW, and (⇧) (step up), then on the spectrum analyzer, press (FREQUENCY), (⇧) (step up) to step through the remaining frequencies listed in Table 1-19.

39. At each new frequency repeat steps 35 through 37, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 1-19.

Frequency Response, Band 4

40. On the spectrum analyzer, press the following keys:

    [FREQUENCY] Band Lock 19.1-22 BAND 4
    (FREQUENCY) 19.1 (GHz)
    CF STEP AUTO MAN 100 (MHz)
    CF STEP AUTO MAN *(Option 026) 200* (MHz)
    (SPAN) 10 (MHz)
    (BW) RES BW AUTO MAN 1 (MHz)
    VID BW AUTO MAN 10 (kHz)
    [PEAK SEARCH]
    (MKR FCTN) MK TRACK ON OFF (ON)

41. Set the synthesized sweeper CW to 19.1 GHz.
42. On the spectrum analyzer, press (AMPLITUDE), then PRESEL PEAK .
43. Adjust the synthesized sweeper power level for a spectrum analyzer MKR-TRK amplitude reading of -14 dBm fO.l dB.
44. Record the negative of the power ratio displayed on the measuring receiver in Table 1-20, column 2 (*Option* 026 ***only:*** use Table 1-21, column 2.)
45. On the synthesized sweeper, press CW, and (⇑) (step up) key, then on the spectrum analyzer, press [FREQUENCY], (⇑) (step up) key to step through the remaining frequencies listed in Table 1-20.
46. At each new frequency repeat steps 42 through 44, entering the power sensor's Cal Factor into the measuring receiver as indicated in Table 1-20, column 2.

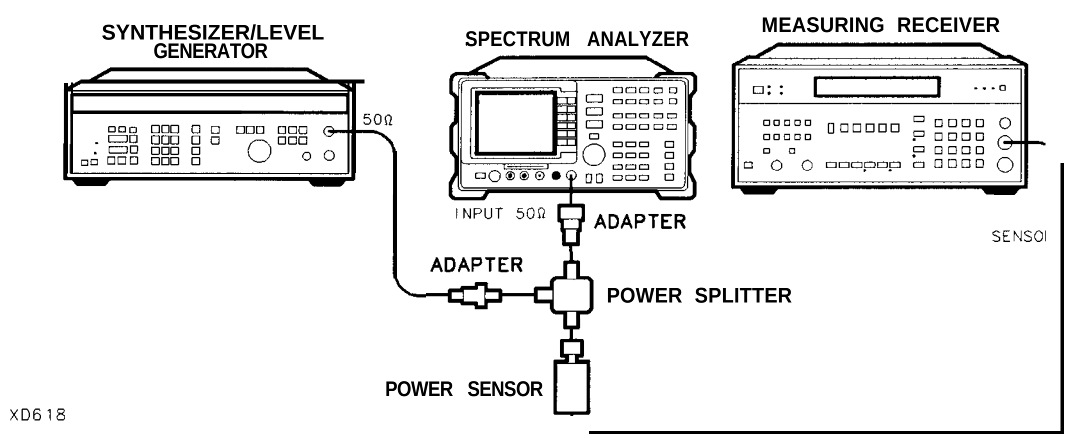


Figure 1-17. Frequency Response Test Setup (<50 MHz)

FrequencyResponse,BandO, <50 MHz

47. Set the synthesizer/level generator controls as follows:

    FREQUENCY .... 50 MHz
    AMPLITUDE .... −8 dBm
    AMPTDINCR .... 0.05 dB

48. On the spectrum analyzer, press the following keys:

    (MKR) MARKER 1 ON OFF (OFF)
    (FREQUENCY) Band Lock BND LOCK ON OFF (OFF)
    (FREQUENCY) 50 (MHz)
    (SPAN) 10 (MHz)
    (PEAK SEARCH)
    (MKR FCTN) MKR TRACK ON OFF (ON)
    (SPAN) 100 (kHz)
    (BW) RES BW AUTO MAN 3 (kHz)

49. Connect the equipment as shown if Figure 1-17, with the power sensor connected to power splitter.

    Option 026 *or* 027 ***only:*** Connect the power splitter to the analyzer input directly.

50. Enter the power sensor's 50 MHz Cal Factor into the measuring receiver.
51. Adjust the frequency synthesizer amplitude until the measuring receiver display reads the same value as recorded in step 11. Record the frequency synthesizer amplitude in Table 1-22.
52. Replace the 50 MHz to 26.5 GHz power sensor with the 50 Ω termination.
53. On the spectrum analyzer, press the following key:

    [FREQUENCY) CF STEP AUTO MAN 30 [MHz)
    [FREQUENCY) (⇩) (step down key)

54. Set the synthesizer/level generator to 20 MHz.
55. Set the spectrum analyzer Center Frequency (using the CF STEP AUTO MAN softkey) and the synthesizer/level generator frequency to the frequencies listed in Table 1-22.

    Note that when measuring the 50 kHz center frequency flatness, there will be two signals on screen, the LO feedthrough and the signal from the synthesizer/level generator. Be sure that the marker is on the signal from the synthesizer/level generator (to the right of the LO feedthrough).

56. At each frequency, adjust the frequency synthesizer amplitude for a MKR A-TRK amplitude reading of 0.00 ±0.05 dB. Record the frequency synthesizer Amplitude Setting in Table 1-22 as the frequency synthesizer Amplitude.
57. For each of the frequencies in Table 1-22, subtract the frequency synthesizer Amplitude Reading (column 2) from the frequency synthesizer Amplitude Setting (50 MHz) recorded in step 50. Record the result as the Response Relative to 50 MHz (column 3) of Table 1-22.
58. Add to each of the Response Relative to 50 MHz entries in Table 1-22 the measuring receiver Reading for 50 MHz listed in Table 1-16. Record the results as the Response Relative to 300 MHz (column 4) in Table 1-22.

Test Results

Frequency Response, Band 0

1. Enter the most positive number from Table 1-22, column 4: ________ dB

2. Enter the most positive number from Table 1-16, column 2: ________ dB

3. Enter the more positive of numbers from step 1 and step 2 as TR Entry 1 of the performance verification test record (absolute referenced to 300 MHz).

4. Enter the most negative number from Table 1-22, column 4: ________ dB

5. Enter the most negative number from Table 1-16, column 2: ________ dB

6. Enter the more negative of numbers from step 4 and step 5 as TR Entry 2 of the performance verification test record.

7. Subtract step 6 from step 3. Enter this value as TR Entry 3 of the performance verification test record (relative flatness).

Frequency Response, Band 1

1. Enter the most positive number from Table 1-17, column 2, as TR Entry 4 of the performance verification test record.

2. Enter the most negative number from Table 1-17, column 2, as TR Entry 5 of the performance verification test record.

3. Subtract step 2 from step 1. Enter this value as TR Entry 6 of the performance verification test record.

Frequency Response, Band 2

1. Enter the most positive number from Table 1-18, column 2, as TR Entry 7 of the performance verification test record.

2. Enter the most negative number from Table 1-18, column 2, as TR Entry 8 of the performance verification test record.

3. Subtract step 2 from step 1. Enter this value as TR Entry 9 of the performance verification test record.

Frequency Response, Band 3

1. Enter the most positive number from Table 1-19, column 2, as TR Entry 10 of the performance verification test record.

2. Enter the most negative number from Table 1-19, column 2, as TR Entry 11 of the performance verification test record.

3. Subtract step 2 from step 1. Enter this value as TR Entry 12 of the performance verification test record.

Frequency Response, Band 4

Option 026 *or* 027 ***only:*** Proceed to "Frequency Response, Band 4 for Option 026 or 027" if the spectrum analyzer is equipped with Option 026 or 027.

1. Enter the most positive number from Table 1-20, column 2, as TR Entry 13 of the performance verification test record.

2. Enter the most negative number from Table 1-20, column 2, as TR Entry 14 of the performance verification test record.

3. Subtract step 2 from step 1. Enter this value as TR Entry 15 of the performance verification test record.

Frequency Response, Band 4 for Option 026 or 027

1. Enter the most positive number from Table 1-21, column 2, as TR Entry 13 of the performance verification test record.

2. Enter the most negative number from Table 1-21, column 2, as TR Entry 14 of the performance verification test record.

3. Subtract step 2 from step 1. Enter this value as TR Entry 15 of the performance verification test record.

14. Frequency Response

Table 1-16. Frequency Response Rand 0 (≥50 MHz)

Column 1 Frequency (MHz)	Column 2 Measuring Receiver Reading (dB)	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
50	______	0.05	+0.29/-0.31 dB
100	______	0.05	+0.29/−0.31 dB
200	______	0.05	+0.29/−0.31 dB
300	______	0.05	0 (Ref)
400	______	0.05	+0.29/−0.31 dB
500	______	0.05	+0.29/−0.31 dB
600	______	0.05	+0.29/−0.31 dB
700	______	0.05	+0.29/−0.31 dB
800	______	0.05	+0.29/−0.31 dB
900	______	0.05	+0.29/−0.31 dB
1000	______	0.05	+0.29/−0.31 dB
1100	______	2.0	+0.29/−0.31 dB
1200	______	2.0	+0.29/−0.31 dB
1300	______	2.0	+0.29/−0.31 dB
1400	______	2.0	+0.29/−0.31 dB
1500	______	2.0	+0.29/−0.31 dB
1600	______	2.0	+0.29/−0.31 dB
1700	______	2.0	+0.29/−0.31 dB
1800	______	2.0	+0.29/−0.31 dB
1900	______	2.0	+0.29/−0.31 dB
2000	______	2.0	+0.29/−0.31 dB
2100	______	2.0	+0.29/−0.31 dB
2200	______	2.0	+0.29/−0.31 dB
2300	______	2.0	+0.29/−0.31 dB
2400	______	2.0	+0.29/−0.31 dB
2500	______	3.0	+0.29/−0.31 dB
2600	______	3.0	+0.29/−0.31 dB
2700	______	3.0	+0.29/−0.31 dB
2800	______	3.0	+0.29/−0.31 dB
2900	______	3.0	+0.29/−0.31 dB

Table 1-17. Frequency Response Band 1

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
2.75	________	3.0	+0.43/−0.47 dB
2.8	________	3.0	+0.43/−0.47 dB
2.9	________	3.0	+0.43/−0.47 dB
3.0	________	3.0	+0.43/−0.47 dB
3.1	________	3.0	+0.43/−0.47 dB
3.2	________	3.0	+0.43/−0.47 dB
3.3	________	3.0	+0.43/−0.47 dB
3.4	________	3.0	+0.43/−0.47 dB
3.5	________	4.0	+0.43/−0.47 dB
3.6	________	4.0	+0.43/−0.47 dB
3.7	________	4.0	+0.43/−0.47 dB
3.8	________	4.0	+0.43/−0.47 dB
3.9	________	4.0	+0.43/−0.47 dB
4.0	________	4.0	+0.43/−0.47 dB
4.1	________	4.0	+0.43/−0.47 dB
4.2	________	4.0	+0.43/−0.47 dB
4.3	________	4.0	+0.43/−0.47 dB
4.4	________	4.0	+0.43/−0.47 dB
4.5	________	5.0	+0.43/−0.47 dB
4.6	________	5.0	+0.43/−0.47 dB
4.7	________	5.0	+0.43/−0.47 dB
4.8	________	5.0	+0.43/−0.47 dB
4.9	________	5.0	+0.43/−0.47 dB
5.0	________	5.0	+0.43/−0.47 dB
5.1	________	5.0	+0.43/−0.47 dB
5.2	________	5.0	+0.43/−0.47 dB
5.3	________	5.0	+0.43/−0.47 dB
5.4	________	5.0	+0.43/−0.47 dB
5.5	________	6.0	+0.43/−0.47 dB
5.6	________	6.0	+0.43/−0.47 dB

Table 1-17. Frequency Response Band 1 (continued)

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
5.7	________	6.0	+0.43/−0.47 dB
5.8	________	6.0	+0.43/−0.47 dB
5.9	________	6.0	+0.43/−0.47 dB
6.0	________	6.0	+0.43/−0.47 dB
6.1	________	6.0	+0.43/−0.47 dB
6.2	________	6.0	+0.43/−0.47 dB
6.3	________	6.0	+0.43/−0.47 dB
6.4	________	6.0	+0.43/−0.47 dB
6.5	________	6.0	+0.43/−0.47 dB

Table 1-18. Frequency Response Band 2

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
6.0	______	6.0	+0.43/−0.48 dB
6.2	______	6.0	+0.43/−0.48 dB
6.4	______	6.0	+0.43/−0.48 dB
6.6	______	7.0	+0.43/−0.48 dB
6.8	______	7.0	+0.43/−0.48 dB
7.0	______	7.0	+0.43/−0.48 dB
7.2	______	7.0	+0.43/−0.48 dB
7.4	______	7.0	+0.43/−0.48 dB
7.6	______	8.0	+0.43/−0.48 dB
7.8	______	8.0	+0.43/−0.48 dB
8.0	______	8.0	+0.43/−0.48 dB
8.2	______	8.0	+0.43/−0.48 dB
8.4	______	8.0	+0.43/−0.48 dB
8.6	______	9.0	+0.43/−0.48 dB
8.8	______	9.0	+0.43/−0.48 dB
9.0	______	9.0	+0.43/−0.48 dB
9.2	______	9.0	+0.43/−0.48 dB
9.4	______	9.0	+0.43/−0.48 dB
9.6	______	10.0	+0.43/−0.48 dB
9.8	______	10.0	+0.43/−0.48 dB

Table 1-18. Frequency Response Band 2 (continued)

olumn 1 equency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
10.0	________	10.0	+0.43/−0.48 dB
10.2	________	10.0	+0.43/−0.48 dB
10.4	________	10.0	+0.43/−0.48 dB
10.6	________	11.0	+0.43/−0.48 dB
10.8	________	11.0	+0.43/−0.48 dB
11.0	________	11.0	+0.43/−0.48 dB
11.2	________	11.0	+0.43/−0.48 dB
11.4	________	11.0	+0.43/−0.48 dB
11.6	________	12.0	+0.43/−0.48 dB
11.8	________	12.0	+0.43/−0.48 dB
12.0	________	12.0	+0.43/−0.48 dB
12.2	________	12.0	+0.43/−0.48 dB
12.4	________	12.0	+0.43/−0.48 dB
12.6	________	13.0	+0.43/−0.48 dB
12.8	________	13.0	+0.43/−0.48 dB

Table 1-19. Frequency Response Band 3

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
12.4	________	12.0	+0.43/−0.48 dB
12.6	________	13.0	+0.43/−0.48 dB
12.8	________	13.0	+0.43/−0.48 dB
13.0	________	13.0	+0.43/−0.48 dB
13.2	________	13.0	+0.43/−0.48 dB
13.4	________	13.0	+0.43/−0.48 dB
13.6	________	14.0	+0.43/−0.48 dB
13.8	________	14.0	+0.43/−0.48 dB
.14.0	________	14.0	+0.43/−0.48 dB
14.2	________	14.0	+0.43/−0.48 dB
14.4	________	14.0	+0.43/−0.48 dB
14.6	________	15.0	+0.43/−0.48 dB
14.8	________	15.0	+0.43/−0.48 dB
15.0	________	15.0	+0.43/−0.48 dB
15.2	________	15.0	+0.43/−0.48 dB
15.4	________	15.0	+0.43/−0.48 dB
15.6	________	16.0	+0.43/−0.48 dB
15.8	________	16.0	+0.43/−0.48 dB
16.0	________	16.0	+0.43/−0.48 dB
16.2	________	16.0	+0.43/−0.48 dB
16.4	________	16.0	+0.43/−0.48 dB
16.6	________	17.0	+0.43/−0.48 dB
16.8	________	17.0	+0.43/−0.48 dB
17.0	________	17.0	+0.43/−0.48 dB
17.2	________	17.0	+0.43/−0.48 dB

Table 1-19. Frequency Response Band 3 (continued)

lumn 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
17.4	________	17.0	+0.43/−0.48 dB
17.6	________	18.0	+0.43/−0.48 dB
17.8	________	18.0	+0.43/−0.48 dB
18.0	________	18.0	+0.43/−0.48 dB
18.2	________	18.0	+0.43/−0.48 dB
18.4	________	18.0	+0.43/−0.48 dB
18.6	________	19.0	+0.43/−0.48 dB
18.8	________	19.0	+0.43/−0.48 dB
19.0	________	19.0	+0.43/−0.48 dB
19.2	________	19.0	+0.43/−0.48 dB
19.4	________	19.0	+0.43/−0.48 dB

Table 1-20. Frequency Response Band 4

Column 1 Frequency GHz	Column 2 Measuring Receive Reading (dB) Preselector Peake	Column 3 CAL FACTO Frequency (GHz)	Column 4 Measurement Uncertainty
19.1	________	19.0	+0.55/−0.59 dB
19.2	________	19.0	+0.55/−0.59 dB
19.3	________	19.0	+0.55/−0.59 dB
19.4	________	19.0	+0.55/−0.59 dB
19.5	________	20.0	+0.55/−0.59 dB
19.6	________	20.0	+0.55/−0.59 dB
19.7	________	20.0	+0.55/−0.59 dB
19.8	________	20.0	+0.55/−0.59 dB
19.9	________	20.0	+0.55/−0.59 dB
20.0	________	20.0	+0.55/−0.59 dB
20.1	________	20.0	+0.55/−0.59 dB
20.2	________	20.0	+0.55/−0.59 dB
20.3	________	20.0	+0.55/−0.59 dB
20.4	________	20.0	+0.55/−0.59 dB
20.5	________	21.0	+0.55/−0.59 dB
20.6	________	21.0	+0.55/−0.59 dB
20.7	________	21.0	+0.55/−0.59 dB
20.8	________	21.0	+0.55/−0.59 dB
20.9	________	21.0	+0.55/−0.59 dB
21.0	________	21.0	+0.55/−0.59 dB
21.1	________	21.0	+0.55/−0.59 dB
21.2	________	21.0	+0.55/−0.59 dB
21.3	________	21.0	+0.55/−0.59 dB
21.4	________	21.0	+0.55/−0.59 dB
21.5	________	22.0	+0.55/−0.59 dB
21.6	________	22.0	+0.55/−0.59 dB
21.7	________	22.0	+0.55/−0.59 dB
21.8	________	22.0	+0.55/−0.59 dB
21.9	________	22.0	+0.55/−0.59 dB
22.0	________	22.0	+0.55/−0.59 dB

14. Frequency Response

Table 1-21. Frequency Response Band 4, Option 026 or 027

l - l Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
19.1	______	19.0	+0.55/−0.59 dB
19.3	______	19.0	+0.55/−0.59 dB
19.5	______	20.0	+0.55/−0.59 dB
19.7	______	20.0	+0.55/−0.59 dB
19.9	______	20.0	+0.55/−0.59 dB
20.1	______	20.0	+0.55/−0.59 dB
20.3	______	20.0	+0.55/−0.59 dB
20.5	______	21.0	+0.55/−0.59 dB
20.7	______	21.0	+0.55/−0.59 dB
20.9	______	21.0	+0.55/−0.59 dB
21.1	______	21.0	+0.55/−0.59 dB
21.3	______	21.0	+0.55/−0.59 dB
21.5	______	22.0	+0.55/−0.59 dB
21.7	______	22.0	+0.55/−0.59 dB
21.9	______	22.0	+0.55/−0.59 dB
22.1	______	22.0	+0.55/−0.59 dB
22.3	______	22.0	+0.55/−0.59 dB
22.5	______	23.0	+0.55/−0.59 dB
22.7	______	23.0	+0.55/−0.59 dB
22.9	______	23.0	+0.55/−0.59 dB
23.1	______	23.0	+0.55/−0.59 dB
23.3	______	23.0	+0.55/−0.59 dB
23.5	______	24.0	+0.55/−0.59 dB
23.7	______	24.0	+0.55/−0.59 dB
23.9	______	24.0	+0.55/−0.59 dB
24.1	______	24.0	+0.55/−0.59 dB
24.3	______	24.0	+0.55/−0.59 dB
24.5	______	25.0	+0.55/−0.59 dB
24.7	______	25.0	+0.55/−0.59 dB

Table 1-21. Frequency Response Band 4, Option 026 or 027 (continued)

Column 1 Frequency (GHz)	Column 2 Measuring Receiver Reading (dB) Preselector Peaked	Column 3 CAL FACTOR Frequency (GHz)	Column 4 Measurement Uncertainty
24.9	________	25.0	+0.55/−0.59 dB
25.1	________	25.0	+0.55/−0.59 dB
25.3	________	25.5	+0.55/−0.59 dB
25.5	________	25.5	+0.55/−0.59 dB
25.7	________	25.5	+0.55/−0.59 dB
25.9	________	26.0	+0.55/−0.59 dB
26.1	________	26.0	+0.55/−0.59 dB
26.3	________	26.5	+0.55/−0.59 dB
26.5	________	26.5	+0.55/−0.59 dB

Table 1-22. Frequency Response Band 0 (<50 MHz)

Column 1 Spectrum Analyzer Frequency Synthesizer Frequency	Column 2 Frequency Synthesizer Amplitude (dBm)	Column 3 Response Relative to 50 MHz	Column 4 Response Relative to 300 MHz	Column 5 Measurement Uncertainty
50 MHz	________	0 (ref)	________	+0.34/−0.37
20 MHz	________	________	________	+0.34/−0.37
10 MHz	________	________	________	+0.34/−0.37
5 MHz	________	________	________	+0.34/−0.37
1 MHz	________	________	________	+0.34/−0.37
200 kHz	________	________	________	+0.34/−0.37
50 kHz	________	________	________	+0.34/−0.37

15. Other Input Related Spurious Responses

A synthesized source and the spectrum analyzer are set to the same frequency and the amplitude of the source is set to 0 dBm. A marker-amplitude reference is set on the spectrum analyzer. The source is then tuned to several different frequencies which should generate image, multiple, and out-of-band responses. At each source frequency, the source amplitude is set to 0 dBm and the amplitude of the response, if any, is measured using the spectrum analyzer marker function. The marker-amplitude difference is then compared to the specification.

There are no related adjustment procedures for this performance verification test.

Equipment Required

Synthesized sweeper
Measuring receiver ***(used as a Power meter)***
Power sensor, 50 MHz to 26.5 GHz
Power splitter
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f)
Cable, APC 3.5, 91 cm (36 in)

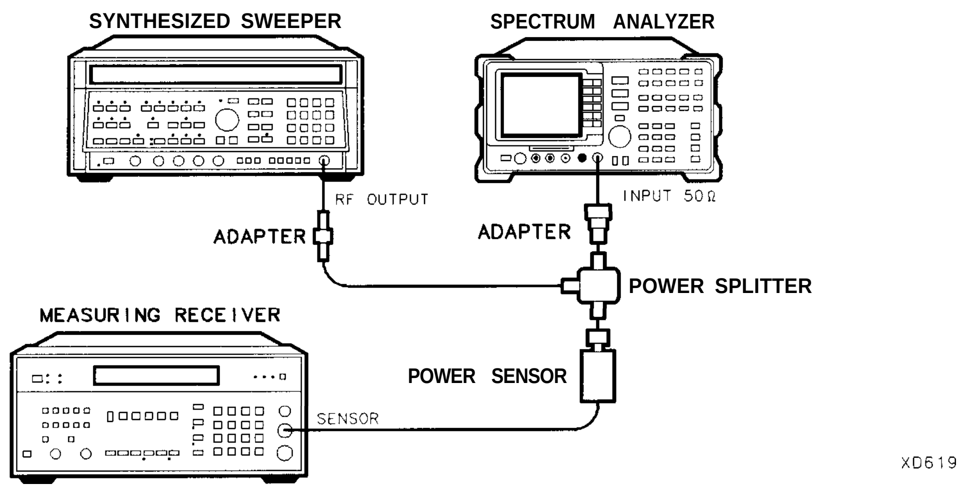


Figure 1-18. Other Input Related Spurious Responses Test Setup

Procedure

Band 0

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor's 2 GHz Cal Factor into the measuring receiver.
2. Press INSTRUMENT PRESET on the synthesized sweeper and set the controls as follows:

   CW .... 2000 MHz
   POWERLEVEL .... −4 dBm

3. Connect the equipment as shown in Figure 1-18. Connect the output of the synthesizer to the 50 MHz to 26.5 GHz power sensor using adapters.

   Option 026 ***only:*** Connect the power splitter to the spectrum analyzer input directly.

4. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 0 ____ (−dBm)
   ATTEN AUTO MAN 0 (dB)

5. Adjust the synthesized sweeper power level for a -10 dBm ±0.1 dB reading on the measuring receiver.
6. On the spectrum analyzer, press the following keys:

   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 200 (kHz)

   Wait for the AUTO ZOOM message to disappear. Press the following spectrum analyzer keys:

   (PEAK SEARCH)
   (MKR →) MARKER →REF LVL
   (MKR FCTN) MK TRACK ON OFF (OFF)
   (PEAK SEARCH) MARKER Δ
   (AMPLITUDE) (⇩) (step-down) .
   (SGL SWP)

7. For each of the frequencies listed in Table 1-23, do the following:
   a. Set the synthesized sweeper to the listed CW frequency.
   b. Enter the appropriate power sensor CAL Factor into the measuring receiver.
   c. Set the synthesized sweeper power level for -10 dBm reading on the measuring receiver.
   d. Press (SGL SWP) and wait for the completion of a new sweep.
   e. On the spectrum analyzer, press (PEAK SEARCH) and record the marker-delta amplitude reading in Table 1-23 as the Actual MKR Δ Amplitude.

   The Actual MKR Δ Amplitude should be less than the Maximum MKR Δ Amplitude listed in Table 1-23.

   Note that the Maximum MKR Δ Amplitude is 10 dB more positive than the specification. This is due to the 10 dB change in reference level made in step 6.

8. Press the following spectrum analyzer keys:

   (MKR) MARKER 1 ON OFF (OFF)
   (HOLD)
   (AUTO COUPLE) AUTO ALL
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 0 ____ (−dBm)
   ATTEN AUTO MAN 0 (dB)
   (SWEEP) SWEEP CONT SGL (CONT)

Band 1

9. On the spectrum analyzer, press (FREQUENCY), 4, (GHz).
10. Set the synthesized sweeper CW to 4 GHz.
11. Enter the power sensor 4 GHz CAL Factor into the measuring receiver.
12. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press (MKR), MARKER 1 ON OFF (OFF).
13. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 1-23 for Band 1.

Band 2

14. On the spectrum analyzer, press (FREQUENCY), 9, (GHz).
15. Set the synthesized sweeper CW to 9 GHz.
16. Enter the power sensor 9 GHz CAL Factor into the measuring receiver.
17. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press (MKR), MARKER 1 ON OFF (OFF).
18. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 1-23 for Band 2.

Band 3

19. On the spectrum analyzer, press (FREQUENCY), 15, (GHz).
20. Set the synthesized sweeper CW to 15 GHz.
21. Enter the power sensor 15 GHz CAL Factor into the measuring receiver.

22. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear, then press (MKR), MARKER 1 ON OFF (OFF).

23. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 1-23 for Band 3.

Band 4

24. On the spectrum analyzer, press (FREQUENCY), 21, (GHz).
25. Set the synthesized sweeper CW to 21 GHz.
26. Enter the power sensor 21 GHz CAL Factor into the measuring receiver.
27. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL : PEAKING message to disappear, then press (MKR), MARKER1 ON OFF (OFF).

28. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 1-23 for Band 4.

Band 4 for Option 026 or 027

Perform this section only if you spectrum analyzer is equipped with Option 026 or 027.

29. On the spectrum analyzer, press (FREQUENCY), 24, (GHz).
30. Set the synthesized sweeper CW to 24 GHz.
31. Enter the power sensor 24 GHz CAL Factor into the measuring receiver.
32. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL : PEAKING message to disappear, then press (MKR), MARKER 1 ON OFF (OFF).

33. Repeat steps 5 through 8 for the synthesized sweeper CW frequencies listed in Table 1-23 for Band 4 for Option 026 or 027.

Specification Summary

1. Record the maximum Actual MKR A Amplitude from Table 1-23 for Band 0 as TR Entry 1 of the performance verification test record.
2. Record the maximum Actual MKR A Amplitude from Table 1-23 for Band 1 as TR Entry 2 of the performance verification test record.
3. Record the maximum Actual MKR A Amplitude from Table 1-23 for Band 2 as TR Entry 3 of the performance verification test record.

15. Other Input Related Spurious Responses

4. Record the maximum Actual MKR A Amplitude from Table 1-23 for Band 3 as TR Entry 4 of the performance verification test record.
5. Record the maximum Actual MKR A Amplitude from Table 1-23 for Band 4 as TR Entry 5 of the performance verification test record.

   Option 026 ***or*** 027 ***only:*** Record the maximum Actual MKR ΔAmplitude from Table 1-23 for band 4, Option 026 or 027 as TR Entry 5 of the performance verification test record.

Table 1-23. Other Input Related Spurious Worksheet

Band	Spectrum Analyzer Center Frequency	Synthesized Sweeper cw Frequency	MKR A Amplitude	
	GHz	MHz	Actual (dBc)	Max. (dBc
0	2.0	2042.8*		-55
	2.0	2642.8*		-55
	2.0	9842.8†		-55
	2.0	7921.4†		-55
	2.0	1820.8‡		-55
	2.0	278.5‡		-55
1	4.0	4042.8*		-55
	4.0	4642.8'		-55
	4.0	8321.4†		-55
	4.0	3742.9‡		-55
2	9.0	9042.8'		-55
	9.0	9642.8'		-55
	9.0	4982.1†		-55
	9.0	9342.81		-55
3	15.0	15042.8'		-55
	15.0	15642.8'		-55
	15.0	4785.8†		-55
	15.0	15669.65‡		-55
4	21.0	21042.8"		-50
	21.0	21642.8*		-50
	21.0	5008.95†		-55
	21.0	21342.8‡		-50
4	24	24042.8'		-50
Option 026	24	24642.8*		-50
or	24	11839.3†		-55
?7 only	24	20019.65‡		-50

mage Response
but-of-Band Response
Multiple Response

16. Spurious Response

This test is performed in four parts. The first two parts measure the second harmonic distortion; the last two parts measure the third order intermodulation distortion. Second harmonic distortion and third order intermodulation distortion is checked in both low band (50 kHz to 2.9 GHz) and high band (2.75 to 22 GHz).

To test second harmonic distortion, 50 MHz and 4.4 GHz low pass filters are used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The distortion products are measured using the spectrum analyzer marker functions.

For third order intermodulation distortion, two signals are combined in a directional coupler (for isolation) and are applied to the analyzer input. The power level of the two signals is 8 dB higher than specified, so the distortion products should be suppressed by 16 dB less than specified. In this manner, the equivalent Third Order Intercept (TOI) is measured.

With two -30 dBm signals at the input mixer and the distortion products suppressed by 70 dBc, the equivalent TOI is +5 dBm (-30 dBm + 70 dBc/2). However, if two -22 dBm signals are present at the input mixer and the distortion products are suppressed by 54 dBc, the equivalent TOI is also +5 dBm (-22 dBm + 54 dBc/2).

Performing the test with a higher power level maintains the measurement integrity while reducing both test time and the dependency upon the source noise sideband performance.

There are no related adjustments for this performance test.

Equipment Required

Synthesized sweeper ***(two required)***
Measuring receiver ***(used as a power meter)***
Power sensor, 50 MHz to 26.5 GHz
Power splitter
Low pass filter, 50 MHz
Low pass filter, 4.4 GHz ***(two required)***
Directional coupler
Cable, APC 3.5 91 cm (36 in)
Cable, BNC 120 cm (48 in)
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) ***(two required)***
Adapter, Type N (f) to APC 3.5 (f)
Adapter, Type N (m) to BNC (f) ***(two required)***
Adapter, Type N (m) to APC 3.5 (f)
Adapter, Type N (f) to BNC (m)

Additional Equipment for Option 026

Adapter, BNC (f) to SMA (m)

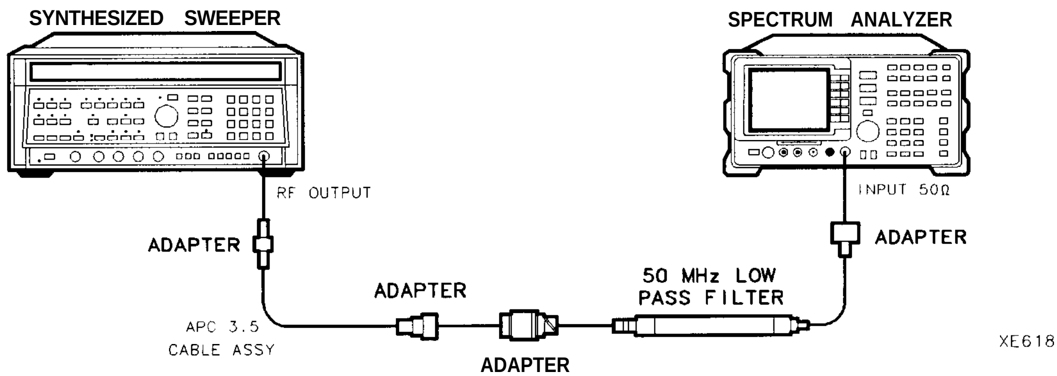


Figure 1-19. Second Harmonic Distortion Test Setup, <2.9 GHz

Procedure

This performance verification test consists of four parts:

Part 1: Second Harmonic Distortion, <2.9 GHz
Part 2: Second Harmonic Distortion, >2.9 GHz
Part 3: Third Order Intermodulation Distortion, <2.9 GHz
Part 4: Third Order Intermodulation Distortion, >2.9 GHz

Note Parts 3 and 4, Third Order Intermodulation Distortion, are not required when performing the operation verification.

Part 1: Second Harmonic Distortion, <2.9 GHz

1. Press (PRESET) on the synthesized sweeper, then set the controls as follows:

   CW . . . . 30 MHz
   POWER LEVEL . . . . -30 dBm

2. Connect the equipment as shown in Figure 1-19.

   Option 026 ***only:*** Use the BNC to SMA adapter with an APC 3.5 (f) to (f) adapter.

3. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 30 (MHz)
   (SPAN) 1 (MHz)
   (AMPLITUDE) REF LVL 0 ____ (−dBm)
   (BW) RES BW AUTO NAN 30 (kHz)

4. Adjust the synthesized sweeper power level to place the peak of the signal displayed on the spectrum analyzer at the reference level (-30 dBm).

5. Press the following spectrum analyzer keys:

   (BW) RES BW AUTO MAN 1 (kHz)
   VID BW AUTO MAN 100 (Hz)

6. Wait for two sweeps to finish, then press the following spectrum analyzer keys:

   [PEAK SEARCH]
   (MKR →) MKR → CF STEP
   (MKR) MARKER A
   (FREQUENCY)

7. Press the (⇧) (step up) key on the spectrum analyzer to step to the second harmonic (at 60 MHz). Set the reference level to -50 dBm.
8. Wait for one full sweep, then press (PEAK SEARCH).
9. Record the MKR A Amplitude reading as TR Entry 1 of the performance verification test record. The amplitude reading should be less than the specified limit.

Note that the Max. MKR A Amplitude Reading is 20 dB higher than the specification. This is a result of changing the reference level from -30 dBm to -50 dBm.

Part 2: Second Harmonic Distortion, >2.9 GHz

10. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.
11. Measure the noise level at 5.6 GHz using the following steps:
    a. Remove any cable or adapters from the spectrum analyzer INPUT 50 0.
    b. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

       (FREQUENCY) 5.6 (GHz)
       (SPAN) 0 (Hz)
       [AMPLITUDE) REF LVL 40 (−dBm)
       (BW) RES BW AUTO MAN 1 (kHz)
       VID BW AUTO MAN 30 (Hz)
       VID AVG ON OFF (ON) 10 (ENTER)
       (SWEEP) SWP TIME AUTO MAN 5.0 (sec)

    c. Press (SGL SWP). Wait until AVG 10 is displayed along the left side of the CRT display.
    d. Press [PEAK SEARCH] on the spectrum analyzer and record the marker amplitude reading as the Noise Level at 5.6 GHz in Table 1-24.
12. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

    [SPAN) Band Lock 2.75-6.5 BAND 1
    (FREQUENCY) 2.8 (GHz)
    (SPAN) 10 (MHz)

13. Connect the equipment as shown in Figure 1-20, with the output of the synthesized sweeper connected to the input of the power splitter, and the power splitter outputs connected to the spectrum analyzer and the power sensor.

    Option* 026 *only: Use the BNC to SMA adapter with an APC 3.5 (f) to (f) adapter.

14. On the synthesized sweeper, press preset, then set the controls as follows:

    CW . . . . 2.8 GHz
    POWER LEVEL . . . . 0 dBm

15. On the spectrum analyzer, press the following keys:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

16. Press (PEAK SEARCH), MARKER Δ , then record the power meter reading at 2.8 GHz in Table 1-24.
17. Set the synthesized sweeper CW to 5.6 GHz.
18. Press the following spectrum analyzer keys:

    (FREQUENCY) 5.6 (GHz)
    [PEAK SEARCH)
    [AMPLITUDE) PRESEL PEAK .

    Wait for the CAL: PEAKING message to disappear.

    [PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)

19. Adjust the synthesized sweeper power level until the Marker A Amplitude reads 0 dB ±0.20 dB.
20. Enter the power sensor 6 GHz Cal Factor into the power meter.
21. Record the Power Meter Reading at 5.6 GHz in Table 1-24.
22. Subtract the Power Meter Reading at 5.6 GHz from the Power Meter Reading at 2.8 GHz, then record this value as the Frequency Response Error (FRE) in Table 1-24. For example, if the Power Meter Reading at 5.6 GHz is -6.45 dBm and the Power Meter Reading at 2.8 GHz is -7.05 dBm, the Frequency Response Error would be -7.05 dBm – (-6.45 dBm) = -0.60 dB.

    Power Meter Reading at 2.8 GHz - Power Meter Reading at 5.6 GHz = FRE

Table 1-24. Second Harmonic Distortion Worksheet

Description	Measurement
Noise Level at 5.6 GHz	____________dBm
Power Meter Reading at 2.8 GHz	____________dBm
Power Meter Reading at 5.6 GHz	____________dBm
Frequency Response Error (FRE)	____________dB
Distortion-limited Specification	____________dBc
Noise-limited Specification	____________dBc

23. Calculate the desired maximum marker amplitude reading as follows:
    a. Add the Frequency Response Error (FRE) to -60 dBc (specification is -100 dBc, but reference level will be changed by 40 dB to yield the required dynamic range), then record as the Distortion-limited Specification in Table 1-24.

       Distortion-limited Specification = -60 dBc + FRE

    b. Subtract -40 dBm (reference level setting) from Noise Level at 5.6 GHz, then record in Table 1-24.

       Noise-limited Specification = Noise Level at 5.6 GHz + 40 dBm

    c. Record the more positive of the values recorded in a and b above as TR Entry 2 of the performance verification test record. For example, if the value in a is -59 dBc and the value in b is -61 dBc, record -59 dBc.

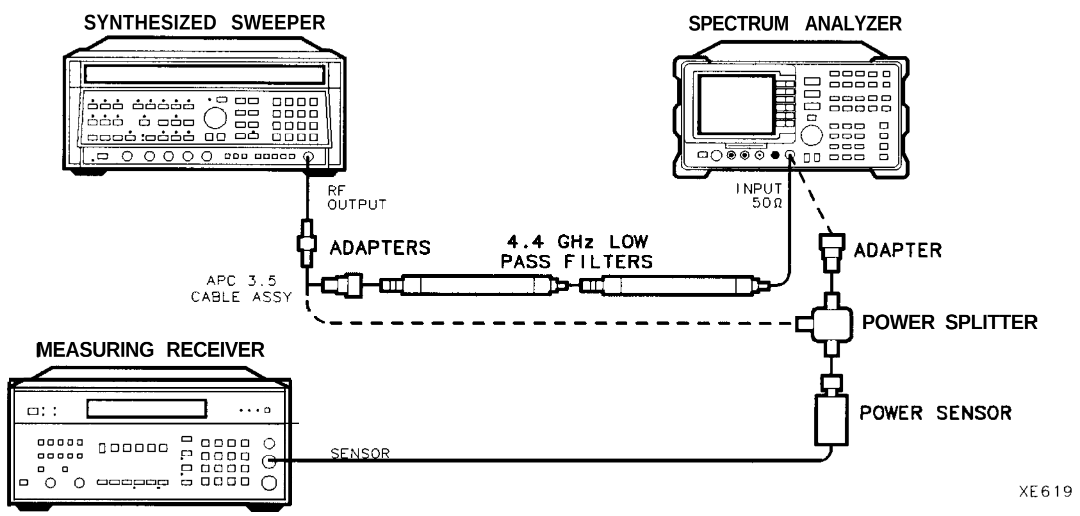


Figure 1-20. Second Harmonic Distortion Test Setup, >2.9 GHz

24. Connect the equipment as shown in Figure 1-20 with the filters in place.
25. Set the synthesized sweeper controls as follows:

    CW . . . . 2.8 GHz
    POWER LEVEL . . . . 0 dBm

26. Set the spectrum analyzer by pressing the following keys:

    (FREQUENCY) 2.8 (GHz)
    (MKR) MARKERS OFF
    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (MKR FCTN) MK TRACK ON OFF (ON)
    (SPAN) 100 (kHz)

27. Adjust the synthesized sweeper power level for a spectrum analyzer marker amplitude reading of 0 dBm ±0.2 dB.

28. On the spectrum analyzer, press the following keys:

    (MKR FCTN) MK TRACK ON OFF (OFF)

    [PEAK SEARCH) MARKER A

    (FREQUENCY) 5.3 (GHz)

    (SPAN) 10 (MHz)

29. Remove the filters and connect the synthesized sweeper output directly to the spectrum analyzer INPUT 50 Ω.

30. On the spectrum analyzer, press the following keys:

    [PEAK SEARCH)

    [AMPLITUDE_) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (MKR FCTN) MK TRACK ON OFF (ON)

    (SPAN) 100 (kHz)

31. Reinstall the filters between the synthesized sweeper output and the spectrum analyzer INPUT 50 Ω.

32. Set the spectrum analyzer by pressing the following keys:

    [AMPLITUDE) REF LVL 40 (−dBm)

    (BW) VID BW AUTO MAN 30 [Hz)

    VID AVG ON OFF (ON) 10 (ENTER)

    (SGL SWP)

    Wait until AVG 10 is displayed along the left side of the CRT display.

33. Press (PEAK SEARCH), then record the Marker Amplitude Reading as TR Entry 3 of the performance verification test record.

    The Marker Amplitude Reading should be more negative than the Specification previously recorded as TR Entry 2 of the performance verification test record.

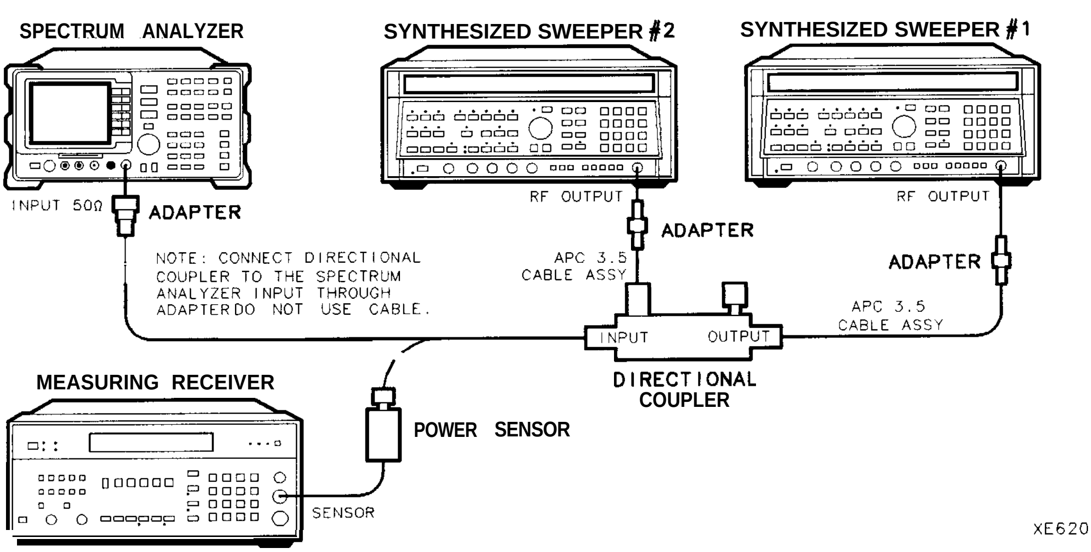


Figure 1-2 1. Third-Order Intermodulation Distortion Test Setup

Part 3: Third Order Intermodulation Distortion, <2.9 GHz

34. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor in log mode (power reads out in dBm), as described in the measuring receiver operation manual. Enter the power sensor 3 GHz Cal Factor into the measuring receiver.

35. Connect the equipment as shown in Figure 1-21 with the input of the directional coupler connected to the power sensor.

36. Press instrument preset on each synthesized sweeper. Set each of the synthesized sweeper controls as follows:

    POWER LEVEL . . . . -15 dBm
    CW (synthesized sweeper #1) . . . . 2.800 GHz
    CW (synthesized sweeper #2) . . . . 2.80005 GHz
    RF . . . . OFF

37. On the spectrum analyzer, press (PRESET), then wait until the preset routine is finished. Set the controls as follows:

    (FREQUENCY) 2.8 (GHz)
    (SPAN) 1 (MHz)
    (AMPLITUDE) REF LVL 0 ____ (−dBm)
    (PEAK SEARCH) PEAK EXCURSN 3 (dB)
    (DISPLAY) THRESHLD ON OFF (ON) 90 (−dBm)

38. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads -12 dBm ±0.05 dB.

39. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).

    Option 026 ***only:*** Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω.

40. On the spectrum analyzer, press the following keys:

    (PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear.

    (MKR FCTN) MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇧) (step-up key)
    (PEAK SEARCH)
    (MKR →) MARKER → REF LVL

41. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

    If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

42. Set the spectrum analyzer by pressing the following keys:

    (BW) RES BW AUTO MAN 1 (kHz)
    VID BW AUTO MAN 100 (Hz)

16. Spurious Response

43. Press the following analyzer keys:

    (PEAK SEARCH) **MARKER Δ**

    (DISPLAY) DSP LINE ON OFF (ON)

    Set the display line to a value 54 dB below the current reference level setting.

44. The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See Figure 1-22.

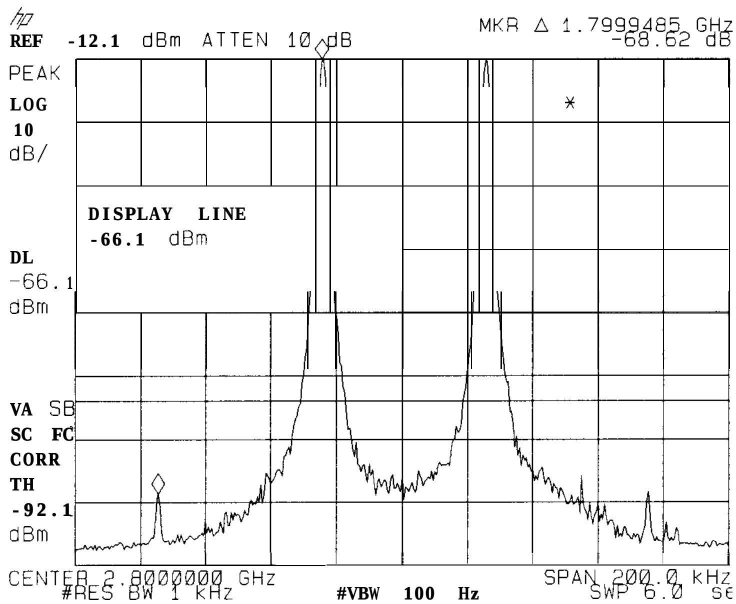


Figure 1-22. Third Order Intermodulation Distortion

45. If the distortion products can be seen, proceed as follows:
    a. On the spectrum analyzer, press (MKR →) and Peak Menu.
    b. Repeatedly press NEXT PEAK until the active marker is on the desired distortion product.
    c. Record the MKR A amplitude reading as TR Entry 4 in the performance verification test record. The MKR A reading should be less than the specified limit.

46. If the distortion products cannot be seen, proceed as follows:
    a. On each synthesized sweeper, increase the power level by 5 dB. Distortion products should now be visible at this higher power level.
    b. On the spectrum analyzer, press (MKR →) and Peak Menu.
    c. Repeatedly press NEXT PEAK until the active marker is on one of the distortion products.
    d. On each synthesized sweeper, reduce the power level by 5 dB and wait for completion of a new sweep.
    e. Record the MKR A amplitude reading in as TR Entry 4 in the performance verification test record. The MKR A reading should be less than the specified limit.

Part 4: Third Order Intermodulation Distortion, >2.9 GHz

47. Enter the Power Sensor 4 GHz Cal Factor into the measuring receiver.
48. Disconnect the directional coupler from the spectrum analyzer, then connect the power sensor to the output of the directional coupler.
49. Set each of the synthesized sweeper controls as follows:

    POWER LEVEL . . . . -15 dBm
    CW (synthesized sweeper #1) . . . . 4.000 GHz
    CW (synthesized sweeper #2) . . . . 4.00005 GHz
    RF . . . . OFF

50. On the spectrum analyzer, press [PRESET], then wait until the preset routine is finished. Set the spectrum analyzer by pressing the following keys:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 1 (MHz)
    (BW) REF LVL 10 (-dBm)
    [PEAK SEARCH] PEAK EXCURSN 3 (dB)
    (DISPLAY) THRESHLD ON OFF 90 (-dBm)

51. On synthesized sweeper #1, set RF on. Adjust the power level until the measuring receiver reads -12 dBm ±0.05 dB.
52. Disconnect the power sensor from the directional coupler. Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω using an adapter (do not use a cable).

    Option 026 ***only:*** Connect the directional coupler directly to the spectrum analyzer INPUT 50 Ω.

53. On the spectrum analyzer, press the following key:

    (PEAK SEARCH)
    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (MKR FCTN) MK TRACK ON OFF (ON)
    (SPAN) 200 (kHz)

    Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

    (MKR FCTN) MK TRACK ON OFF (OFF)
    (FREQUENCY) (⇑) (step-up key)
    [PEAK SEARCH]
    (MKR →) MARKER → REF LVL

54. On synthesized sweeper #2, set RF on. Adjust the power level until the two signals are displayed at the same amplitude.

    If necessary, adjust the spectrum analyzer center frequency until the two signals are centered on the display.

55. Set the spectrum analyzer by pressing the following keys:

    (BW) RES BW AUTO MAN 1 (kHz)
    VID BW AUTO MAN 100 (Hz)

56. Press PEAK SEARCH, MARKER Δ then set the DISPLAY LINE to a value 54 dB below the current reference level setting.

    The third-order intermodulation distortion products should appear 50 kHz below the lower frequency signal and 50 kHz above the higher frequency signal. Their amplitude should be less than the display line. See Figure 1-22.

57. If the distortion products can be seen, proceed as follows:
    a. On the spectrum analyzer, press MKR → and Peak Menu.
    b. Repeatedly press NEXT PEAK until the active marker is on the desired distortion product.
    c. Record the MKR Δ amplitude reading as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

58. If the distortion products cannot be seen, proceed as follows:
    a. On each synthesized sweeper, increase the power level by 5 dB.

       Distortion products should now be visible at this higher power level.
    b. On the spectrum analyzer, press MKR → and Peak Menu.
    c. Repeatedly press NEXT PEAK until the active marker is on one of the distortion products.
    d. On each synthesized sweeper, reduce the power level by 5 dB, then wait for completion of a new sweep.
    e. Record the MKR Δ amplitude reading in as TR Entry 5 of the performance verification test record. The MKR Δ reading should be less than the specified limit.

17. Gain Compression

This performance verification test measures gain compression in both low band and high band. Two signals, separated by 3 MHz, are used. First, the test places a -30 dBm signal at the input of the spectrum analyzer (the spectrum analyzer reference level is also set to -30 dBm). Then, a 0 dBm signal is applied to the spectrum analyzer, overdriving its input. The decrease in the first signal's amplitude (gain compression) caused by the second signal is the measured gain compression.

For spectrum analyzers equipped with Option 130 the signals are separated by 10 kHz, then the first signal is kept 10 dB below the reference level.

There are no related adjustment procedures for this performance test.

Equipment Required

Synthesized sweeper ***(two required)***
Measuring receiver ***(used as a power meter)***
Power sensor, 50 MHz to 26.5 GHz
Directional coupler
Cable, APC 3.5, 91 cm (36 in) ***(two required)***
Adapter, Type N (m) to APC 3.5 (m)
Adapter, APC 3.5 (f) to APC 3.5 (f) ***(two required)***

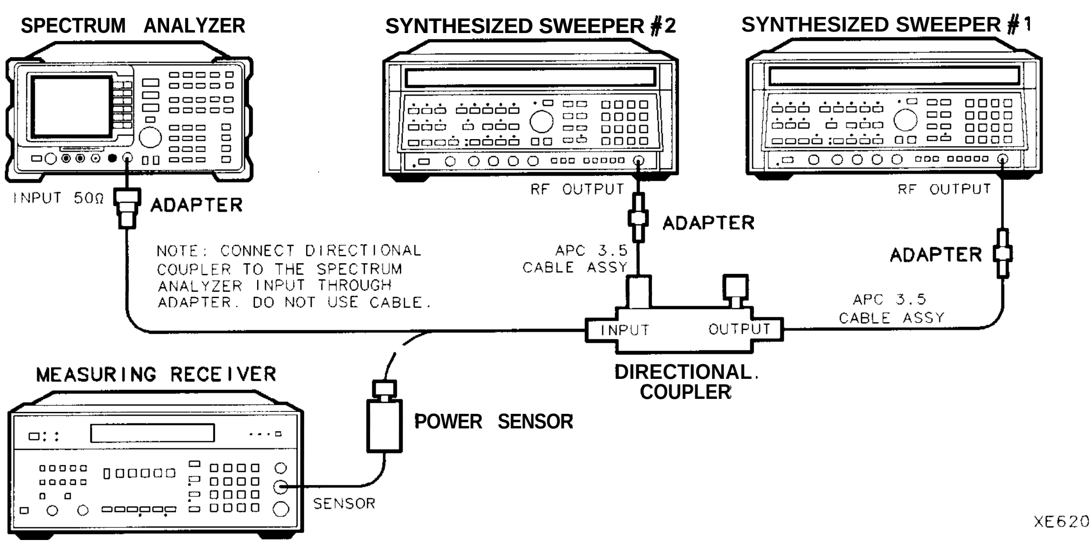


Figure 1-23. Gain Compression Test Setup

Procedure

Gain Compression, <2.9 GHz

1. Zero and calibrate the measuring receiver and 50 MHz to 26.5 GHz power sensor combination in log mode (power reads out in dBm) as described in the measuring receiver operation manual. Enter the power sensor 2 GHz Cal Factor into the measuring receiver.

2. Connect the equipment as shown in Figure 1-23, with the output of the directional coupler connected to the power sensor.

   Option 026 ***only:*** Connect the directional coupler to the spectrum analyzer directly.

3. Press INSTRUMENT PRESET on both synthesized sweepers.

4. Set synthesized sweeper #1 controls as follows:

   CW . . . . 2.003 GHz
   POWER LEVEL . . . . 0 dBm

5. Set synthesized sweeper #2 controls as follows:

   CW . . . . 2.0 GHz
   AMPLITUDE . . . . -14 dBm

6. On the spectrum analyzer, press (PRESET), then wait for the preset routine to finish. Press the spectrum analyzer keys as follows:

   (FREQUENCY) 2.0 (GHz)
   (SPAN) 20 (MHz)
   (AMPLITUDE) REF LVL 30 (-dBm)
   SCALE LOG LIN (LOG) 1 (dB)
   (BW) RES BW AUTO MAN 300 (kHz)

7. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to off.

   The power level applied to the spectrum analyzer input is 10 dB greater than the specification to account for the 10 dB attenuation setting. A power level of 0 dBm at the spectrum analyzer input yields -10 dBm at the input mixer.

8. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.

9. On the spectrum analyzer, press the following keys:

   [PEAK SEARCH]
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 10 (MHz)

   Wait for the **AUTO ZOOM** routine to finish.

10. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.

11. On the spectrum analyzer, press [PEAK SEARCH], then MARKER ***h*** **.**

12. On synthesized sweeper #1, set RF to ON.

13. On the spectrum analyzer, press [PEAK SEARCH], then NEXT **PEAK.**

    The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

14. Read the MKR A amplitude and record in the performance verification test record as TR Entry 1. The absolute value of this amplitude should be less than 0.5 dB.

Gain Compression, >2.9 GHz

15. Disconnect the directional coupler from the spectrum analyzer input, then connect the directional coupler to the power sensor.
16. Set the spectrum analyzer by pressing the following key:

    (FREQUENCY) 4.0 (GHz)
    (SPAN) 20 (MHz)
    (MKR) MARKERS OFF

17. Set synthesized sweeper #1 controls as follows:

    CW . . . . 4.003 GHz
    POWER LEVEL . . . . 2 dBm

18. Set synthesized sweeper #2 controls as follows:

    CW . . . . 4.0 GHz
    POWER LEVEL . . . . -14 dBm

19. Enter the power sensor CAL Factor into the measuring receiver.
20. On synthesized sweeper #1, adjust the power level for a 0 dBm reading on the measuring receiver. Set RF to off.
21. Disconnect the power sensor from the directional coupler and connect the directional coupler to the INPUT 50 Ω connector of the spectrum analyzer using an adapter. Do not use a cable.
22. On the spectrum analyzer, press the following keys:

    (PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)

    Wait for the signal to be centered on screen.

    (AMPLITUDE) PRESEL PEAK

    Wait for the CAL: PEAKING message to disappear.

    (SPAN) 10 (MHz)

    Wait for the AUTO ZOOM message to disappear.

23. On synthesized sweeper #2, adjust the power level to place the signal 1 dB below the spectrum analyzer reference level.
24. On the spectrum analyzer, press [PEAK SEARCH], then MARKER *h* .
25. On synthesized sweeper #1, set RF to ON.
26. On the spectrum analyzer, press [PEAK SEARCH], then NEXT PEAK.

    The active marker should be on the lower amplitude signal and not on the signal that is off the top of the screen. If it is not on the lower amplitude signal, reposition the marker to this peak using the spectrum analyzer knob.

27. Read the MKR A amplitude and record in the performance verification test record as TR Entry 2. The absolute value of this amplitude should be less than or equal to 0.5 dB.

18. Displayed Average Noise Level

This test measures the displayed average noise level in all five frequency bands. The spectrum analyzer input is terminated in 50 Ω. In Band 0 (9 kHz to 2.9 GHz), the test first measures the average noise at 400 kHz and 1 MHz in zero span. The LO feedthrough is used as a frequency reference for these measurements. For the rest of Band 0 and for all of the remaining bands, the test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

To reduce measurement uncertainty due to input attenuator switching and resolution bandwidth switching, a reference level offset is added. The CAL OUT signal is used as the amplitude reference for determining the amount of offset required. The offset is removed at the end of the test by pressing (PRESET).

There are no related adjustments for this performance verification test.

Equipment Required

Cable, BNC, 23 cm (9 in)
Termination, 50 Ω
Adapter, Type N (m) to BNC (f)
Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to APC 3.5 (f)
Adapter, BNC (m) to SMA (f)
Cable, Cal Comb

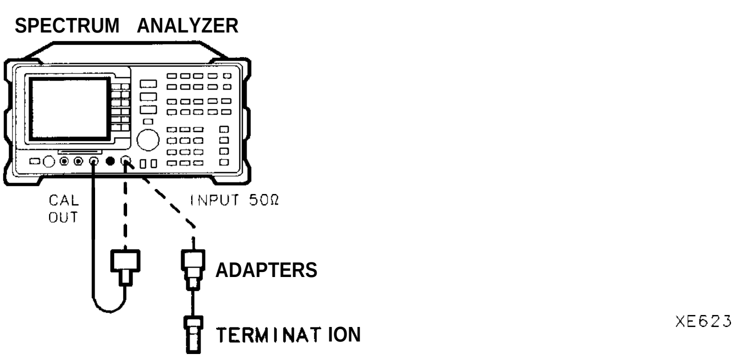


Figure 1-24. Displayed Average Noise Level Test Setup

Procedure

1. Connect a cable from the CAL OUT to the INPUT 50 Ω of the spectrum analyzer as shown in Figure 1-24.

   Option 026 ***only:*** Use the BNC to SMA adapter to connect the cal comb cable to CAL OUT. Use the APC 3.5 adapter to connect the cal cable to the INPUT 50 Ω.

2. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Set the spectrum analyzer by pressing the following keys:

   (FREQUENCY) 3C (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) −20 (dBm)
   ATTEN AUTO MAN 0 (dB)

3. Press the following spectrum analyzer keys:

   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 100 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following keys:

   (BW) VID BW AUTO MAN 30 (Hz)
   (MKR FCTN) MK TRACK ON OFF (OFF)

4. Press (SGL SWP), then wait for the completion of a new sweep. Press the following spectrum analyzer keys:

   (PEAK SEARCH)
   (AMPLITUDE) More 1 of 3 REF LVL OFFSET

   Subtract the MKR amplitude reading from -20 dBm and enter the result as the REF LVL OFFSET. For example, if the marker reads -20.21 dBm, enter +0.21 dB (-20 dBm − (-20.21 dBm) = +0.21 dB).

   REF LVL OFFSET ________ dB

5. Disconnect the cable from the INPUT 50 Ω connector of the spectrum analyzer. Connect the 50 Ω termination to the spectrum analyzer INPUT 50 Ω connector.

400 kHz

6. Press the following spectrum analyzer keys:

   (BW) VID BW AUTO MAN (AUTO)
   (FREQUENCY) 0 (Hz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL −10 (dBm)
   (TRIG) SWEEP CONT SGL (CONT)

7. Press the following spectrum analyzer keys:

   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 800 (kHz)

   Wait for the AUTO ZOOM message to disappear, then press the following spectrum analyzer keys:

   (MKR FCTN) MK TRACK ON OFF (OFF)
   (BW) 3 (kHz)

8. Press (FREQUENCY) and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line. Set the spectrum analyzer by pressing the following keys:

   [SPAN)50 (kHz)
   (AMPLITUDE) REF LVL −50 (dBm)
   (BW) RES BW AUTO MAN 1 (kHz)
   VID BW AUTO MAN 30 (Hz)
   (SWEEP] SWP TIME AUTO MAN 5 (sec)
   (TRACE] More 1 of 3 DETECTOR PK SP NG (SP)
   (SGL SWP)

   Wait for the completion of a new sweep.

9. Press the following spectrum analyzer keys:

   (DISPLAY) DSP LIME ON OFF (ON)

   Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

10. Record the display line amplitude setting as TR Entry 1 of the performance verification test record as the noise level at 400 kHz. The average noise level should be less than the specified limit.

1 MHz

11. Set the spectrum analyzer by pressing the following keys:

    (AUTO COUPLE) RES BW AUTO MAN (AUTO)
    VID BW AUTO MAN (AUTO)
    (FREQUENCY) 0 (Hz)
    (SPAN) 10 (MHz)
    (AMPLITUDE) REF LVL -10 (dBm)
    (TRIG) SWEEP CONT SGL (CONT)

12. Press the following spectrum analyzer keys:

    (PEAK SEARCH)
    (MKR FCTN) MK TRACK ON OFF (ON)
    (SPAN) 2 (MHz)

    Wait for the AUTO ZOOM message to disappear, then press (MKR FCTN) and MK TRACK ON OFF (OFF).

13. Press (FREQUENCY) and adjust the center frequency until the LO feedthrough peak is on the left-most graticule line, then press the following spectrum analyzer keys:

    (SPAN) 50 (kHz)
    [AMPLITUDE) REF LVL -50 (dBm)
    (BW) RES BW AUTO MAN 1 (kHz)
    VID BW AUTO MAN 30 (Hz)
    (SGL SWP)

    Wait for the completion of a new sweep.

14. Press the following spectrum analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses (refer to the Residual Responses verification test for any suspect residuals).

15. Record the display line amplitude setting as TR Entry 2 of the performance verification test record as the noise level at 1 MHz. The average noise level should be less than the specified limit.

1 MHz to 2.9 GHz

16. Press the following spectrum analyzer keys:

    (SPAN) Band Lock 0-2.9 Gz BAND 0

    (BW) RES BW AUTO MAN 1 (MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

    Adjust the START FREQ setting, if necessary, to place the LO feedthrough just off-screen to the left.

17. Press the following spectrum analyzer keys:

    (SGL SWP)

    (TRACE) CLEAR WRITE A More 1 of 3

    VID AVG ON OFF (ON) 10 (Hz)

    Wait until AVG 10 is displayed to the left of the graticule (the analyzer will take ten sweeps, then stop).

18. Press (PEAK SEARCH) and record the MKR frequency as the Measurement Frequency in the appropriate band under test in Table 1-25.

19. Press the following spectrum analyzer keys:

    (TRACE) More 1 of 3 VID AVG (OFF)

    (AUTO COUPLE) RES BW AUTO MAN (AUTO)

    VID BW AUTO MAN (AUTO)

    (SPAN) 50 (kHz)
    (FREQUENCY)

    Set CENTER FREQ to the Measurement Frequency recorded in Table 1-25 in the previous step, then press the following keys:

    (BW) RES BW AUTO MAN 1 (kHz)

    VID BW AUTO MAN 30 (Hz)

20. Press (SGL SWP) on the spectrum analyzer, then wait for a new sweep to finish. Press the following spectrum analyzer keys:

    (DISPLAY) DSP LINE ON OFF (ON)

    Adjust the display line so that it is centered on the average noise trace, ignoring any residual responses (refer to Residual Response verification test for any suspected residuals).

    Record the display line amplitude setting in the performance verification test record as indicated in Table 1-25. The average noise level should be less than the specified limit.

21. Press (MKR) and MARKER 1 ON OFF (OFF) to turn the marker off.

2.75 to 6.5 GHz

22. Press the following spectrum analyzer keys:

    (SPAN) Band Lock 2.75-6.5 BAND 1

    (BW) RES BW AUTO IAN 1 [MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

23. Repeat steps 17 through 21 above for Band 1 (2.75 to 6.5 GHz).

6.0 to 12.8 GHz

24. Press the following spectrum analyzer keys:

    (FREQUENCY) Band Lack 6.0-12.8 BAND 2

    (BW) RES BW AUTO MAN 1 (MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

25. Repeat steps 17 through 21 above for Band 2 (6.0 to 12.8 GHz).

12.4 to 19.4 GHz

26. Press the following spectrum analyzer keys:

    (FREQUENCY) Band Lock 12.4-19. BAND 3

    (BW) RES BW AUTO MAN 1 (MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

27. Repeat steps 17 through 21 above for Band 3 (12.4 to 19.4 GHz).

19.1 to 22 GHz

28. Press the following spectrum analyzer keys:

    (FREQUENCY) Band Lock 19.1-22 BAND 4

    Option 026 or 027 only: (FREQUENCY) START FREQ 19.1 (GHz) STOP FREQ 22 (GHz)

    (BW) RES BW AUTO HAN 1 (MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

29. Repeat steps 17 through 21 above for Band 4.

22 GHz to 26.5 GHz (Option 026 or 027)

30. Press the following spectrum analyzer keys:

    (FREQUENCY) Band Lock 19.1 - 22 BAND 4

    (FREQUENCY) START FREQ 22 (GHz)

    STOP FREQ 26.5 (GHz)

31. Set the spectrum analyzer by pressing the following keys:

    (BW) RES BW AUTO MAN 1 (MHz)

    VID BW AUTO MAN 10 (kHz)

    (TRIG) SWEEP CONT SGL (CONT)

32. Repeat steps 17 through 21 for frequencies from 22 to 26.5 GHz.
33. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish.

Table 1-25. Displayed Average Noise Level Worksheet

Frequency Range	Measurement Frequency	Displayed Average Noise Level TR Entry
400 kHz	400 kHz	1
1MHz	1 MHz	2
1 MHz to 2.9 GHz		3
2.75 to 6.5 GHz		4
6.0 to 12.8 GHz		5
12.4 to 19.4 GHz		6
19.1 to 22 GHz		7
19.1 to 26.5 GHz[1]		8

1 Option 026 or 027 only

19. Residual Responses

The spectrum analyzer input is terminated and the spectrum analyzer is swept from 150 kHz to 5 MHz. Then the spectrum analyzer is swept in 10 MHz spans throughout the 5 MHz to 6.5 GHz range. Any responses above the specification are noted.

There are no related adjustment procedures for this performance verification test.

Equipment Required

Termination, 50 Ω
Adapter, Type N (m) to APC 3.5 (f)

Additional Equipment for Option 026

Adapter, APC 3.5 (f) to APC (f)

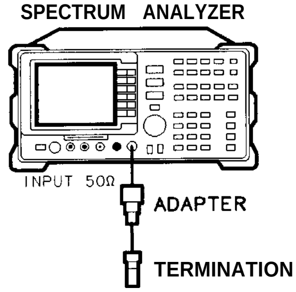


Figure 1-25. Residual Response Test Setup

Procedure

150 kHz to 5 MHz

1. Connect the termination to the spectrum analyzer input as shown in Figure 1-25.
2. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Press the following spectrum analyzer keys:

   (FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   (PEAK SEARCH)
   (MKR FCTN) MK TRACK ON OFF (ON)
   (SPAN) 6 (MHz)

   Wait for the AUTO ZOOM message to disappear, then press (MKR FCTN) and MK TRACK ON OFF (OFF).

3. Press (FREQUENCY), then adjust the center frequency until the LO feedthrough peak is on the leftmost vertical graticule line. Set the spectrum analyzer by pressing the following keys:

   [PEAK SEARCH]
   (MKR) MARKER Δ 150 (kHz)
   MARKER NORMAL
   [AMPLITUDE) REF LVL -60 (dBm)
   ATTEN AUTO MAN 0 (dB)
   (BW) RES BW AUTO MAN 3 (kHz)
   VID BW AUTO MAN 1 (kHz)
   (DISPLAY) DSP LINE ON OFF (ON) -90 (dBm)

4. Press (SGL SWP) and wait for a new sweep to finish. Look for any residual responses at or above the display line, to the right of the marker.

   If a residual is suspected, press (SGL SWP) again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line and to the right of the marker in Table 1-26.

5 MHz to 2.75 GHz

5. Press (PRESET) on the spectrum analyzer, then wait for the preset routine to finish. Press the following keys:

   [FREQUENCY) Band Lock 0-2.9 Gz BAND 0
   (FREQUENCY) 10 (MHz)
   [FREQUENCY] CF STEP AUTO MAN 9.8 (MHz)
   (SPAN) 10 (MHz)
   (AMPLITUDE) REF LVL -60 (dBm)
   ATTEN AUTO MAN 0 (dBm)
   (BW) RES BW AUTO MAN 10 (kHz)
   VID BW AUTO MAN 3 (kHz)
   (DISPLAY) DSP LINE ON OFF -90 (dBm)

6. Press (SGL SWP) and wait for a new sweep to finish. Look for any residual responses at or above the display line.

   If a residual is suspected, press (SGL SWP) again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in Table 1-26.

7. Press [FREQUENCY], (⇑) (step-up key), to step to the next frequency and repeat step 6.
8. Repeat step 7 until the range from 5 MHz to 2.9 GHz has been checked. (This requires 295 additional frequency steps.)

2.75 GHz to 6.5 GHz

9. Press the following spectrum analyzer keys:

   (FREQUENCY) Band Lock 2.75-6.5 BAND 1
   (FREQUENCY) 2755 (MHz)
   (DISPLAY) DSP LINE ON OFF -90 (dBm)
   (SPAN) 10 (MHz)
   (BW) RES BW AUTO MAN 10 (kHz)
   VID BW AUTO MAN 3 (kHz)

10. Press (SGL SWP) and wait for a new sweep to finish. Look for any residual responses at or above the display line.

    If a residual is suspected, press (SGL SWP) again. A residual response will persist on successive sweeps, but a noise peak will not. Note the frequency and amplitude of any residual responses above the display line in Table 1-26.

11. Press (FREQUENCY), (⇑) (step-up key), to step to the next frequency and repeat step 10.

12. Repeat step 11 until the range from 2.75 GHz to 6.5 GHz has been checked. (This requires 372 additional frequency steps.)

13. Record the highest residual from Table 1-26 as TR Entry 1 in the performance verification test record. If no residuals are found, then record "N/A" in the performance verification test record.

Table 1-26. Residual Responses above Display Line Worksheet

Frequency (MHz)	Amplitude (dBm)
________	________
________	________
________	________
________	________
________	________

Performance Verification Test Record

Table 1-27. Performance Verification Test Record

Hewlett-Packard Company

Address: ____________________

____

____

Report No. ____________________

Date ____________________
(e.g. 10 SEP 1989)

Model HP 8592L

Serial No. ____________________

Options ____________________

Firmware Revision ____________________

Customer ____________________

Tested by ____________________

Ambient temperature ____________ °C

Relative humidity ____________ %

Power mains line frequency ____________ Hz (nominal)

Test Equipment Used:

Description	Model No.	Trace No.	Cal Due Date
500 Termination			
Digital Voltmeter			
Low Pass Filter, 50 MHz			
Low Pass Filter, 300 MHz			
Measuring Receiver			
Microwave Frequency Counter			
Microwave Spectrum Analyzer			
Power Meter			
Power Sensor, 100 kHz to 1800 MHz			
Power Sensor, 50 MHz to 26.5 GHz			
Power Sensor, Low Power			
Power Splitter			
Signal Generator			
Synthesized Sweeper			
Synthesizer/Function Generator			
Synthesizer/Level Generator			

Notes/Comments:

____

____

____

Performance Verification Test Record (page 2 of 9)

Hewlett-Packard Company Model HP 8592L	Report No. ______
Serial No. ______	Date ______

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
1. 10 MHz Reference Accuracy		Frequency Error		
Settability	-150 Hz	(1) ______	+ 150 Hz	±4.2 x 10⁻⁹
2. Comb Generator Frequency Accuracy		Frequency (MHz)		
Comb Generator Frequency	99.993	(1) ______	100.007	
3. Frequency Readout Accuracy and Marker Count Accuracy				
Frequency Readout Accuracy		Frequency (MHz)		
Frequency = 1.5 GHz				
SPAN				
20 MHz	1.49918	(1) ______	1.50082	f1.O Hi
10 MHz	1.49958	(2) ______	1.50042	f1.O Hi
1 MHz	1.4999680	(3) ______	1.500032	f1.O Hi
Frequency = 4.0 GHz				
SPAN				
20 MHz	3.99918	(4) ______	4.00082	f1.O Hi
10 MHz	3.99958	(5) ______	4.00042	f1.O Hz
1 MHz	3.9999680	(6) ______	4.000032	f1.O Hz
Frequency = 9.0 GHz				
SPAN				
20 MHz	8.99918	(7) ______	9.00082	±2.0 Hz
10 MHz	8.99958	(8) ______	9.00042	±2.0 Hz
1 MHz	8.9999680	(9) ______	9.000032	±2.0 Hz
Frequency = 16.0 GHz				
SPAN				
20 MHz	15.99918	(10) ______	16.00082	±3.0 Hz
10 MHz	15.99958	(11) ______	16.00042	±3.0 Hz
1 MHz	15.9999680	(12) ______	16.000032	±3.0 Hz
Frequency = 2 1 .0 GHz				
SPAN				
20 MHz	20.99918	(13) ______	21.00082	±4.0 Hz
10 MHz	20.99958	(14) ______	21.00042	±4.0 Hz
1 MHz	20.9999680	(15) ______	21.000032	±4.0 Hz

Performance Verification Test Record (page 3 of 9)

Hewlett-Packard Company Model HP 8592L	Report No. ______
Serial No. ______	Date ______

Test Description	Results Measured			Measurement
	Min.	(TR Entry)	Max.	Uncertainty
3. Frequency Readout and Marker Count Accuracy (continued)				
Marker Count Accuracy				
Frequency = 1.5 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	1.4999989	(16)______	1.5000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	1.49999989	(17)______	1.50000011	±1 Hz
Frequency = 4.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	3.9999989	(18)______	4.0000011	±1 Hz
(CNT RES = 10 Hz) 1 MHz	1.99999989	(19)______	1.0000001 I	±1 Hz
Frequency = 9.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	8.9999989	(20)______	9.0000011	±2 Hz
(CNT RES = 10 Hz) 1 MHz	8.99999989	(21)______	9.00000011	±2 Hz
Frequency = 16.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	15.9999989	(22)______	16.0000011	±3 Hz
(CNT RES = 10 Hz) 1 MHz	15.99999989	(23)______	16.00000011	±3 Hz
Frequency = 21.0 GHz				
SPAN				
(CNT RES = 100 Hz) 20 MHz	20.9999989	(24)______	21.0000011	±4 Hz
(CNT RES ≈ 10 Hz) 1 MHz	20.99999989	(25)______	21.00000011	±4 Hz
4. Noise Sidebands				
Suppression at 10 kHz		(1) ______	– 60 dBc	fl.O dB
Suppression at 20 kHz		(2) ______	-70 dBc	fl.O dB
Suppression at 30 kHz		(3) ______	-75 dBc	fl.O dB
5. System Related Sidebands				
Sideband Below Signal		(1) ______	-65 dBc	±1.0 dB
Sideband Above Signal		(2) ______	-65 dBc	fl.O dB

Performance Verification Test Record (page 4 of 9)

Hewlett-Packard Company
Model HP 8592L

Report No. ______

Serial No. ______

Date ______

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
3. Frequency Span Readout Accuracy				
SPAN		MKRA Reading		
1800 MHz	1446.00 MHz	(1) ______	1554.00 MHz	±6.37 MHz
10.10 MHz	7.70 MHz	(2) ______	8.30 MHz	±35.4 kHz
10.00 MHz	7.80 MHz	(3) ______	8.20 MHz	±35.4 kHz
100.00 kHz	78.00 kHz	(4) ______	82.00 kHz	±354 Hz
99.00 kHz	78.00 kHz	(5) ______	82.00 kHz	±354 Hz
10.00 kHz	7.80 kHz	(6) ______	8.20 kHz	±3.54 Hz
7. Residual FM		(1) ______	250 Hz	±45.8 Hz
5. Sweep Time Accuracy				
SWEEP TIME		MKRA Reading		
20 ms	15.4 ms	(1) ______	16.6 ms	±0.057 me
100 ms	77.0 ms	(2) ______	83.0 ms	±0.283 ms
1 s	770.0 ms	(3) ______	830.0 ms	±2.83 ms
10 s	7.7 s	(4) ______	8.3 s	±23.8 ms
9. Scale Fidelity				
Log Mode		Cumulative Error		
dB from Ref Level				
0	0 (Ref)	0 (Ref)	0 (Ref)	
-4	-4.34 dB	(1) ______	+ 3.66 dB	±0.06 dB
-8	-8.38 dB	(2) ______	-7.62 dB	±0.06 dB
-12	– 12.42 dB	(3) ______	-11.58 dB	±0.06 dB
-16	-16.46 dB	(4) ______	– 15.54 dB	±0.06 dB
-20	-20.50 dB	(5) ______	-19.50 dB	±0.06 dB
	-24.54 dB	(6) ______	-23.46 dB	±0.06 dB
-28	-28.58 dB	(7) ______	-27.42 dB	±0.06 dB
-32	-32.62 dB	(8) ______	-31.38 dB	±0.06 dB
-36	-36.66 dB	(9) ______	-35.34 dB	±0.06 dB
-40	-40.70 dB	(10) ______	-39.30 dB	±0.06 dB
-44	-44.74 dB	(11) ______	-43.26 dB	±0.06 dB
-48	-48.78 dB	(12) ______	-47.22 dB	±0.06 dB
-52	-52.82 dB	(13) ______	-51.18 dB	±0.06 dB
-56	-56.86 dB	(14) ______	-55.14 dB	±0.06 dB
-60	-60.90 dB	(15) ______	-59.10 dB	±0.11 dB
-64	-64.94 dB	(16) ______	-63.06 dB	±0.11 dB
-68	-68.98 dB	(17) ______	-67.02 dB	±0.11 dB

Hewlett-PackardCompany Model HP 8592L	Report No. ____________
Serial No. ____________	Date ____________

Test Description	Results Measured Min.	(TR Entry)	Max.	Measurement Uncertainty
9. Scale Fidelity (continued)				
Log Mode		Incremental Error		
dB from Ref Level				
0	O(Ref)	O(Ref)	0 (Ref)	
-4	-0.4 dB	**(18)** ______	+0.4 dB	±0.06 dB
-8	-0.4 dB	**(19)** ______	+0.4 dB	±0.06 dB
-12	-0.4 dB	**(20)** ______	+0.4 dB	±0.06 dB
-16	-0.4 dB	**(21)** ______	+0.4 dB	±0.06 dB
-20	-0.4 dB	**(22)** ______	+0.4 dB	±0.06 dB
-24	-0.4 dB	(23) ______	+0.4 dB	±0.06 dB
-28	-0.4 dB	(24) ______	+0.4 dB	±0.06 dB
-32	-0.4 dB	(25) ______	+0.4 dB	±0.06 dB
-36	-0.4 dB	**(26)** ______	+0.4 dB	±0.06 dB
-40	-0.4 dB	(27) ______	+0.4 dB	±0.06 dB
-44	-0.4 dB	**(28)** ______	+0.4 dB	±0.06 dB
-48	-0.4 dB	**(29)** ______	+0.4 dB	±0.06 dB
-52	-0.4 dB	**(30)** ______	+0.4 dB	±0.06 dB
-56	-0.4 dB	(31) ______	+0.4 dB	±0.06 dB
-60	-0.4 dB	(32) ______	+0.4 dB	fO.ll dB
Linear Mode				
% of Ref Level				
100.00	0 (Ref)	O(Ref)	0 (Ref)	
70.70	151.59 mV	(65) ______	165.01 mV	±1.84 mV
50.00	105.36 mV	**(66)** ______	118.78 mV	±1.84 mV
35.48	72.63 mV	(67) ______	86.05 mV	±1.84 mV
25.00	49.46 mV	**(68)** ______	82.88 mV	±1.84 mV
Log-to-Linear Switching				
	-0.25 dB	(73) ______	+0.25 dB	±0.05 dB

Hewlett-Packard Company Model HP 8592L	Report No. ______________
Serial No. ______________	Date ______________

Test Description	Results Measured			Measurement Uncertainty
	Min.	(TR Entry)	Max.	
0. Reference Level Accuracy				
Log Mode				
Reference Level (dBm)				
-20	O(Ref)	0 (Ref)	O(Ref)	
-10	-0.40 dB	(1) ______	+0.40 dB	±0.06 dB
0	-0.50 dB	(2) ______	+0.50 dB	±0.06 dB
-30	-0.40 dB	(3) ______	+0.40 dB	±0.06 dB
-40	-0.50 dB	(4) ______	+0.50 dB	±0.08 dB
-50	-0.80 dB	(5) ______	+0.80 dB	±0.08 dB
-60	-1.00 dB	(6) ______	+1.00 dB	±0.12 dB
-70	-1.10 dB	(7) ______	+1.10 dB	±0.12 dB
-80	-1.20 dB	(8) ______	+1.20 dB	±0.12 dB
-90	-1.30 dB	(9) ______	+1.30 dB	±0.12 dB
Linear Mode				
Reference Level (dBm)				
-20	O(Ref)	O(Ref)	0 (Ref)	
-10	-0.40 dB	(10) ______	+0.40 dB	±0.06 dB
0	-0.50 dB	(11) ______	+0.50 dB	±0.06 dB
-30	-0.40 dB	(12) ______	+0.40 dB	±0.06 dB
-40	-0.50 dB	(13) ______	+0.50 dB	±0.08 dB
-50	-0.80 dB	(14) ______	+0.80 dB	±0.08 dB
-60	-1.00 dB	(15) ______	+1.00 dB	±0.12 dB
-70	-1.10 dB	(16) ______	+1.10 dB	±0.12 dB
-80	-1.20 dB	(17) ______	+1.20 dB	±0.12 dB
-90	-1.30 dB	(18) ______	+1.30 dB	±0.12 dB
1. Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties				
Absolute Amplitude Uncertainty	-20.15 dB	(1) ______	-19.85 dB	N/A
Resolution Bandwidth Switching Uncertainty				
Resolution Bandwidth				
3 kHz	O(Ref)	O(Ref)	O(Ref)	
1 kHz	-0.5 dB	(2) ______	+0.5 dB	+0.07/−0.08 dB
9 kHz	-0.4 dB	(3) ______	+0.4 dB	+0.07/−0.08 dB
10 kHz	-0.4 dB	(4) ______	+0.4 dB	+0.07/−0.08 dB
30 kHz	-0.4 dB	(5) ______	+0.4 dB	+0.07/−0.08 dB
100 kHz	-0.4 dB	(6) ______	+0.4 dB	+0.07/−0.08 dB

Performance Verification Test Record (page 7 of 9)

Hewlett-Packard Company Model HP 8592L	Report No. ______
Serial No. ______	Date ______

Test Description	Results Measured			Measurement
	Min.	(TR Entry)	Max.	Uncertainty
11. **Absolute Amplitude Calibration and Resolution Bandwidth Switching Uncertainties (continued)**				
Resolution Bandwidth				
120 kHz	-0.4 dB	(7) ______	+ 0.4 dB	+ 0.07/−0.08 dB
300 kHz	-0.4 dB	(8) ______	+ 0.4 dB	+ 0.07/−0.08 dB
1 MHz	-0.4 dB	(9) ______	+ 0.4 dB	+ 0.07/−0.08 dB
3 MHz	-0.4 dB	(10) ______	+ 0.4 dB	+ 0.07/−0.08 dB
12. **Resolution Bandwidth Accuracy**				
3 dB Resolution Bandwidth				
3 MHz	2.4 MHz	(1) ______	3.6 MHz	±138 kHz
1 MHz	0.8 MHz	(2) ______	1.2 MHz	±46 kHz
300 kHz	240 kHz	(3) ______	360 kHz	±13.8 kHz
100 kHz	80 kHz	(4) ______	120 kHz	±4.6 kHz
30 kHz	24 kHz	(5) ______	36 kHz	±1.38 kHz
10 kHz	8 kHz	(6) ______	12 kHz	±460 Hz
3 kHz	2.4 kHz	(7) ______	3.6 kHz	±138 Hz
1 kHz	0.8 kHz	(8) ______	1.2 kHz	±46 Hz
6 dB EMI Bandwidth				
9 kHz	7.2 kHz	(9) ______	10.8 kHz	±333 Hz
120 kHz	96 kHz	(10) ______	144 kHz	±4.44 kHz
6 dB EMI Bandwidth				
200 Hz	160 Hz	(14) ______	240 Hz	±24 Hz
3. **Calibrator Amplitude Accuracy**				
Amplitude	-20.4 dBm	(1) ______	−19.6 dBm	±0.2 dB

Performance Verification Test Record (page 8 of 9)

Hewlett-Packard Company Model HP 8592L	Report No. ______________
Serial No. ______________	Date ______________

Test Description	Min.	Results Measured (TR Entry)	Max.	Measurement Uncertainty
4. Frequency Response				
Band 0				
Max. Positive Response		(1) ______	+ 1.5 dB	+ 0.32/−0.33 dB
Max. Negative Response	-1.5 dB	(2) ______		+ 0.32/−0.33 dB
Peak-to-Peak Response		(3) ______	2.0 dB	+ 0.32/−0.33 dB
Band 1				
Max. Positive Response		(4) ______	+2.0 dB	+ 0.40/−0.42 dB
Max. Negative Response	-2.0 dB	(5) ______		+ 0.40/−0.42 dB
Peak-to-Peak Response		(6) ______	3.0 dB	+ 0.40/−0.42 dB
Band 2				
Max. Positive Response		(7) ______	+2.5 dB	+ 0.42/−0.43 dB
Max. Negative Response	-2.5 dB	(8) ______		+ 0.42/−0.43 dB
Peak-to-Peak Response		(9) ______	4.0 dB	+ 0.42/−0.43 dB
Band 3				
Max. Positive Response		(10) ______	+ 3.0 dB	+ 0.52/−0.55 dB
Max. Negative Response	-3.0 dB	(11) ______		+ 0.52/−0.55 dB
Peak-to-Peak Response		(12) ______	15.0 dB	+ 0.52/−0.55 dB
Band 4				
Max. Positive Response		(13) ______	+ 3.0 dB	+ 0.54/−0.57 dB
Max. Negative Response	-3.0 dB	(14) ______		+ 0.54/−0.57 dB
Peak-to-Peak Response		(15) ______	4.0 dB	+ 0.54/−0.57 dB
Band 4 for Option 026 or 027				
Max. Positive Response		(13) ______	+ 5.0 dB	+ 0.54/−0.57 dB
Max. Negative Response	-5.0 dB	(14) ______		+ 0.54/−0.57 dB
Peak-to-Peak Response		(15) ______	4.0 dB	+ 0.54/−0.57 dB
15. Other Input Related Spurious Responses				
50 kHz to 2.9 GHz		(1) ______	-55 dBc	+ 1.12/−1.21 dB
≤18 GHz		(2) ______	-55 dBc	+ 1.13/−1.22 dB
≤22 GHz		(3) ______	-50 dBc	+ 1.15/−1.25 dB
Option 026 or 027 only:				
≤26.5 GHz		(3) ______	-50 dBc	+1.15/− 1.25 dB

Performance Verification Test Record (page 9 of 9)

Hewlett-Packard Company Model HP 8592L	Report No. ______
Serial No. ______	Date ______

Test Description	Results Measured			Measurement Uncertainty
	Min.	(TR Entry)	Max.	
16. Spurious Responses				
Second Harmonic Distortion				
Applied Frequency				
40 MHz		(1) ______	-50 dBc	+1.86/−2.27 dB
2.8 GHz		(3) ______	(2) ______	+2.24/−2.72 dB
			(Step 23c)	
Third Order Intermodulation Distortion				
Frequency				
2.8 GHz		(4) ______	−54 dBc	+2.07/−2.42 dB
4.0 GHz		(5) ______	−54 dBc	+2.07/−2.42 dB
17. Gain Compression				
<2.9 GHz		(1) ______	0.5 dB	+0.21/−0.22 dB
>2.9 GHz		(2) ______	0.5 dB	+0.21/−0.22 dB
18. Displayed Average Noise				
Frequency				
400 kHz		(1) ______	-112 dBm	+1.15/−1.25 dB
1 MHz		(2) ______	-112 dBm	+1.15/−1.25 dB
1 MHz to 2.9 GHz		(3) ______	-112 dBm	+1.15/−1.25 dB
2.75 to 6.5 GHz		(4) ______	-114 dBm	+1.15/−1.25 dB
6.0 to 12.8 GHz		(5) ______	−102 dBm	+1.15/−1.25 dB
12.4 to 19.4 GHz		(6) ______	-98 dBm	+1.15/−1.25 dB
19.1 to 22 GHz		(7) ______	-92 dBm	+1.15/−1.25 dB
Option 026 or 027 only:				
19.1 to 26.5 GHz		(8) ______	−87 dBm	+1.15/−1.25 dB
19. Residual Responses				
150 kHz to 6.5 GHz		(1) ______	-90 dBm	+1.09/−1.15 dB

2

Specifications and Characteristics

This chapter contains specifications and characteristics for the HP 8592D spectrum analyzer.

The specifications and characteristics in this chapter are listed separately. The specifications are described first, then followed by the characteristics.

General	General specifications and characteristics.
Frequency	Frequency-related specifications and characteristics.
Amplitude	Amplitude-related specifications and characteristics.
Option	Option-related specifications and characteristics.
Physical	Input, output and physical characteristics.

The distinction between specifications and characteristics is described as follows.

- Specifications describe warranted performance over the temperature range 0 °C to + 55 °C (unless otherwise noted). The spectrum analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the spectrum analyzer is turned on and after the CAL frequency, and CAL amplitude routines have been run.
- Characteristics provide useful, but nonwarranted information about the functions and performance of the spectrum analyzer. Characteristics are specifically identified.
- Typical Performance, where listed, is not warranted, but indicates performance that most units will exhibit.
- Nominal Value indicates the expected, but not warranted, value of the parameter.

General Specifications

All specifications apply over 0 °C to +55 °C unless equipped with Option 015 or 016. The analyzer will meet its specifications after 2 hours of storage at a constant temperature, within the operating temperature range, 30 minutes after the analyzer is turned on and after CAL FREQ, CAL AMPTD and CAL YTF have been run.

Temperature Range	
Operating	0 °C to +55 °C*
Storage	-40 °C to + 75 °C
* 0 °C to + 50 °C with Option 015 or Option 016 operating and carrying case.	

EMI Compatibility	Conducted and radiated emission is in compliance with CISPR Pub. 1111990 Group 1 Class A.

Audible Noise	<37.5 dBA pressure and <5.0 Bels power (ISODP7779)

Power Requirements	
ON (LINE 1)	90 to 132 V rms, 47 to 440 Hz
	195 to 250 V rms, 47 to 66 Hz
	Power consumption <500 VA; < 180 W
Standby (LINE 0)	Power consumption <7 W

Environmental Specifications	Type tested to the environmental specifications of Mil-T-28800 class 5

Frequency Specifications

Frequency Range		9 kHz to 22.0 GHz
	(Options 026 or 027)	9 kHz to 26.5 GHz
Hand	**LO Harmonic (N)**	
0	1—	9 kHz to 2.9 GHz
1	1—	*2.75* GHz to 6.5 GHz
2	*2 -*	*6.0* GHz to 12.8 GHz
3	*3 -*	*12.4* GHz to 19.4 GHz
4	4—	19.1 GHz to 22.0 GHz
(Options 026 or 027)		
4	*4 -*	19.1 GHz to 26.5 GHz

Frequency Reference	
Aging	$\pm 2 \times 10^{-6}$/year
Settability	$\pm 0.5 \times 10^{-6}$
Temperature Stability	$\pm 5 \times 10^{-6}$

Frequency Readout Accuracy	
(Start, Stop, Center, Marker)	*(frequency readout x frequency reference error* + span accuracy + 1% of span + 20% of RBW + 100 Hz x N††)‡

* frequency reference error = (aging rate x period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."
†† N = LO harmonic. See "Frequency Range."
‡ See "Drift" under "Stability" in Frequency Characteristics.

Marker Count Accuracy†	
Frequency Span ≤10 MHz x N††	±(marker frequency x frequency reference error* + counter resolution + 100 Hz x N††)
Frequency Span >10 MHz x N††	±(marker frequency x frequency reference error' + counter resolution + 1 kHz x N††)
Counter Resolution	
Frequency Span ≤ 10 MHz x N††	Selectable from 10 Hz to 100 kHz
Frequency Span > 10 MHz x N††	Selectable from 100 Hz to 100 kHz

* frequency reference error = (aging rate x period of time since adjustment + initial achievable accuracy and temperature stability). See "Frequency Characteristics."
† Marker level to displayed noise level > 25 dB, RBW/Span ≥ 0.01. Span ≤ 300 MHz. Reduce SPAN annotation is displayed when RBW/Span < 0.01.
†† N = LO harmonic. See "Freauencv Range."

Frequency Specifications

Frequency Span	
Range	0 Hz (zero span), (10 kHz x $N^{\dagger\dagger}$) to 19.25 GHz**
*(Option 130)****	0 Hz (zero span), (1 kHz x $N^{\dagger\dagger}$) to 19.25 GHz**
Resolution	Four digits or 20 Hz x $N^{\dagger\dagger}$, whichever is greater.
Accuracy (single band spans)	
Span ≤10 MHz x $N^{\dagger\dagger}$	±2% of span§
Span >10 MHz x $N^{\dagger\dagger}$	±3% of span

** Maximum span is 23.25 GHz for Option 026 or 027.
*** Not available in 8592L.
†† N = LO harmonic. See "Frequency Range."
§ (Option *130)* For spans < 10 kHz x $N^{\dagger\dagger}$, add an additional 10 Hz x $N^{\dagger\dagger}$ resolution error.

Frequency Sweep Time	
Range	
	20 ms to 100 s
(Option *101)****	20 μs to 100 s for span = 0 Hz
Accuracy	
20 ms to 100 s	±3%
20 μs to <20 ms *(Option 101)****	±2%
Sweep Trigger	Free Run, Single, Line, Video, External

*** Not available in 8590L, 8592L.

Resolution Bandwidth	
Range	1 kHz to 3 MHz, 8 selectable resolution (3 dB) bandwidths in 1-3-10 sequence. 9 kHz and 120 kHz (6 dB) EMI bandwidths.
*(Option 130)****	Adds 30, 100 and 300 Hz (3 dB) bandwidths and 200 Hz (6 dB) EMI bandwidth.
Accuracy	
3 dB bandwidths	±20%

*** Not available in 8590L 8592L.

Stability	
Noise Sidebands	(1 kHz RBW, 30 Hz VBW and sample detector)
> 10 kHz offset from CW signal	≤−90 dBc/Hz + 20 Log $N^{\dagger\dagger}$
>20 kHz offset from CW signal	≤ − 100 dBc/Hz + 20 Log $N^{\dagger\dagger}$
>30 kHz offset from CW signal	≤ − 105 dBc/Hz + 20 Log $N^{\dagger\dagger}$
Residual FM	
1 kHz RBW, 1 kHz VBW	≤(250 x $N^{\dagger\dagger}$) Hz pk-pk in 100 ms
30 Hz RBW, 30 Hz VBW *(Option 130)****	≤(30 x $N^{\dagger\dagger}$) Hz pk-pk in 300 ms
System-Related Sidebands	
>30 kHz offset from CW signal	≤−65 dBc + 20 Log $N^{\dagger\dagger}$

†† N = LO harmonic. See "Frequency Range."
*** Not available in 8592L.

Calibrator Output Frequency	300 MHz ±(freq. ref. error* x 300 MHz)

* frequency reference error = (aging rate x period of time since adjustment + initial achievable accuracy + temperature stability). See "Frequency Characteristics."

Comb Generator Frequency	100 MHz fundamental frequency
Accuracy	±0.007% of comb tooth frequency

Amplitude Specifications

Amplitude Range	−114 dBm to +30 dBm
(Option *130*)***	− 129 dBm to + 30 dBm
*** Not available in 8592L.	

Maximum Safe Input Level	
Average Continuous Power	+30 dBm (1 W, 7.1 V rms), input attenuation ≥10 dB.
Peak Pulse Power	+ 50 dBm (100 W) for < 10 μs pulse width and < 1% duty cycle, input attenuation ≥30 dB.
dc	0 Vdc

Gain Compression‡	
>10 MHz	≤0.5 dB (total power at input mixer* = − 10 dBm)

* Mixer Power Level (dBm) = Input Power (dBm) − Input Attenuation (dB).
‡ (Option 130) If RBW < 300 Hz, this applies only if signal separation ≥ 4 kHz and signal amplitudes ≤ Reference Level + 10 dB. Not available in 8590L 8592L.

Displayed Average Noise Level	(Input terminated, 0 dB attenuation, 30 Hz VBW, sample detector)	
	1 kHz RBW	**30 Hz RBW** (Option *130*)***
400 kHz to 2.9 GHz	≤−112 dBm	≤- 127 dBm
2.75 GHz to 6.5 GHz	≤-114 dBm	≤−129 dBm
6.0 GHz to 12.8 GHz	≤−102 dBm	≤−117 dBm
12.4 GHz to 19.4 GHz	≤−98 dBm	≤−113 dBm
19.1 GHz to 22 GHz	≤-92 dBm	≤−107 dBm
19.1 GHz to 26.5 GHz (Options 026 and 027)	≤−87 dBm	≤−102 dBm
*** Not available in 8592L.		

Spurious Responses	
Second Harmonic Distortion	
10 MHz to 2.9 GHz	<-70 dBc for -40 dBm tone at input mixer.*
> 2.75 GHz	< − 100 dBc for −10 dBm tone at input mixer* (or below displayed average noise level).
Third Order Intermodulation Distortion	
>10 MHz	<-70 dBc for two -30 dBm tones at input mixer* and >50 kHz separation.
Other Input Related Spurious	
9 kHz to 18 GHz	<-65 dBc at ≥30 kHz offset, for -20 dBm tone at input mixer ≤18 GHz.
18 GHz to 22 GHz	<-60 dBc at ≥30 kHz, for -20 dBm tone at input mixer ≤22 GHz.
* Mixer Power Level (dBm) = Input Power (dBm) − Input Attenuation (dB).	

Residual Responses	(Input terminated and 0 dB attenuation)
150 kHz to 2.9 GHz (Band 0)	<-90 dBm
2.75 GHz to 6.5 GHz (Band 1)	<−90 dBm

Display Range	
Log Scale	0 to -70 dB from reference level is calibrated; 0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps. eight divisions displayed.
Linear Scale	eight divisions
Scale Units	dBm, dBmV, dBμV, mV, mW, nV, nW, pW, μV, μW, V, and W

Marker Readout Resolution	**0.05 dB for** log scale 0.05% of reference level for linear scale
Fast Sweep Times for Zero Span	
20 μs to 20 ms ***(Option 101 or 301)****	
Frequency ≤ 1 GHz	0.7% of reference level for linear scale
Frequency > 1 GHz	1 .O% of reference level for linear scale
*** Not available in 8590L 8592L.	

Reference Level	
Range	
Log Scale	Minimum amplitude to maximum amplitude **
Linear Scale	-99 dBm to maximum amplitude **
Resolution	
Log Scale	±0.01 dB
Linear Scale	±0.12% of reference level
Accuracy	(referenced to -20 dBm reference level, 10 dB input attenuation, at a single frequency, in a fixed RBW)
0 dBm to -59.9 dBm	±(0.3 dB + .01 x dB from -20 dBm)
-60 dBm and below	
1 kHz to 3 MHz RBW	±(0.6 dB + .01 x dB from -20 dBm)
30 Hz to 300 Hz RBW ***(Option 130)****	±(0.7 dB + .01 x dB from -20 dBm)

** See "Amplitude Range."
*** Not available in 8590L 8592L.

Frequency Response	(10 dB input attenuation)	
Preselector peaked in band > 0	**Absolutes**	**Relative Flatness**†
9 kHz to 2.9 GHz	±1.5 dB	fl.O dB
2.75 GHz to 6.5 GHz	±2.0 dB	±1.5 dB
6.0 GHz to 12.8 GHz	±2.5 dB	±2.0 dB
12.4 GHz to 19.4 GHz	±3.0 dB	±2.0 dB
19.1 GHz to 22 GHz	±3.0 dB	±2.0 dB
19.1 GHz to 26.5 GHz ***(Options 026 and 027)***	±5.0 dB	±2.0 dB

† Referenced to midpoint between highest and lowest frequency response deviations.
§ Referenced to 300 MHz CAL OUT.

Calibrator Output	
Amplitude	-20 dBm ±0.4 dB

Amplitude Specifications

Absolute Amplitude Calibration Uncertainty[‡‡]	±0.15 dB

‡‡ Uncertainty in the measured absolute amplitude of the CAL OUT signal at the reference settings after CAL FREQ and CAL AMPTD self-calibration. Absolute amplitude reference settings are: Reference Level -20 dBm; Input Attenuation 10 dB; Center Frequency 300 MHz; Res BW 3 kHz; Video BW 300 Hz; Scale Linear; Span 50 kHz; Sweep Time Coupled, Top Graticule (reference level), Corrections ON.

Input Attenuator	
Range	0 to 70 dB, in 10 dB steps

Resolution Bandwidth Switching Uncertainty	(At reference level, referenced to 3 kHz RBW)
3 kHz to 3 MHz RBW	±0.4 dB
1 kHz RBW	±0.5 dB
30 Hz to 300 Hz (Option *130*)***	±0.6 dB

*** Not available in 8590L 8592L.

Linear to Log Switching	±0.25 dB at reference level

Display Scale Fidelity	
Log Maximum Cumulative	
0 to -70 dB from Reference Level	
3 kHz to 3 MHz RBW	± (0.3 dB + 0.01 x dB from reference level)
RBW ≤ 1 kHz	± (0.4 dB + 0.01 x dB from reference level)
Log Incremental Accuracy	
0 to -60 dB from Reference Level	±0.4 dB/4 dB
Linear Accuracy	● 3% of reference level

Frequency Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Frequency Reference	
Initial Achievable Accuracy	$\pm 0.5 \times 10^{-6}$
Aging	$\pm 1.0 \times 10^{-7}$/day

Stability	
Drift" (after warmup at stabilized temperature)	
Frequency Span $\leq$ (10 x N†) MHz	$\leq$(2 x N††) kHz/minute of sweep time*

* Because the analyzer is locked at the center frequency before each sweep, drift occurs only during the time of one sweep. For Line, Video, or External trigger, additional drift occurs while waiting for the appropriate trigger signal.
†† N = LO harmonic. See "Frequency Range."

Resolution Bandwidth (-3 dB)	
Range	1 kHz to 3 MHz, selectable in 1, 3 and 10 increments, and 5 MHz. Resolution bandwidths may be selected manually, or coupled to frequency span.
*(Option 130)****	Adds 30 Hz, 100 Hz, and 300 Hz bandwidths.
Shape	Synchronously tuned four poles. Approximately Gaussian shape.
60 dB/3 dB Bandwidth Ratio	
Resolution Bandwidth	
100 kHz to 3 MHz	15:1
30 kHz	16:1
3 kHz to 10 kHz	15:1
1 kHz	16:1
40 dB/3 dB Bandwidth Ratio *(Option 130)****	
Resolution Bandwidth	
30 Hz to 300 Hz	

*** Not available in 8590L 8592L.

Video Bandwidth (-3 dB)	
Range	30 Hz to 1 MHz, selectable in 1, 3, 10 increments, accuracy ±30% and 3 MHz. Video bandwidths may be selected manually, or coupled to resolution bandwidth and frequency span.
*(Option 130)****	Adds 1, 3, and 10 Hz bandwidths.
Shape	Post detection, single pole low-pass filter used to average displayed noise.
(Option *130)****	Bandwidths below 30 Hz are digital bandwidths with anti-aliasing filtering.

*** Not available in 8590L 8592L.

Frequency Characteristics

FFT Handwidth Factors	FLATTOP	HANNING	UNIFORM
Noise Equivalent Bandwidth†	3.63x	1.5x	1x
3 dB Bandwidth†	3.60x	1.48x	1x
Sidelobe Height	<-90 dB	-32 dB	-13 dB
Amplitude Uncertainty	0.10 dB	1.42 dB	3.92 dB
Shape Factor (60 dB BW/3 dB BW)	2.6	9.1	>300

† Multiply entry by one-divided-by-sweep time.

Input Level	> (-60 dBm + attenuator setting)
Signal Level	0 to -30 dB below reference level
FM Offset	
Resolution	400 Hz nominal
FM Deviation (FM GAIN)	
Resolution	1 kHz nominal
Range	10 kHz to 1 MHz
Bandwidth	FM deviation/2
FM Linearity (for modulating frequency < bandwidth/100)	≤ 1% of FM deviation + 290 Hz

Amplitude Characteristics

These are not specifications. Characteristics provide useful but nonwarranted information about instrument performance.

Log Scale Switching Uncertainty	Negligible error

Input Attenuation Uncertainty*			
Attenuator Setting	**9 kHz to 12.4 GHz**	**12.4 to 19 GHz**	**19 to 22 GHz**
0 dB	±0.75 dB	±1.0 dB	fl.O dB
10 dB	Reference	Reference	Reference
20 dB	±0.75 dB	±0.75 dB	fl.O dB
30 dB	±0.75 dB	±1.0 dB	±1.25 dB
40 dB	±0.75 dB	±1.25 dB	±2.0 dB
50 dB	fl.O dB	±1.5 dB	±2.5 dB
60 dB	±1.5 dB	±2.0 dB	±3.0 dB
70 dB	±2.0 dB	±2.5 dB	±3.5 dB

* Referenced to 10 dB input attenuator setting. See the "Specifications" table under "Frequency Response."

Input Attenuator 10 dB Step Uncertainty	(Attenuator setting 10 to 70 dB)
Center Frequency	
9 kHz to 19 GHz	±1.0 dB/10 dB
19 GHz to 22 GHz	±1.5 dB/10 dB

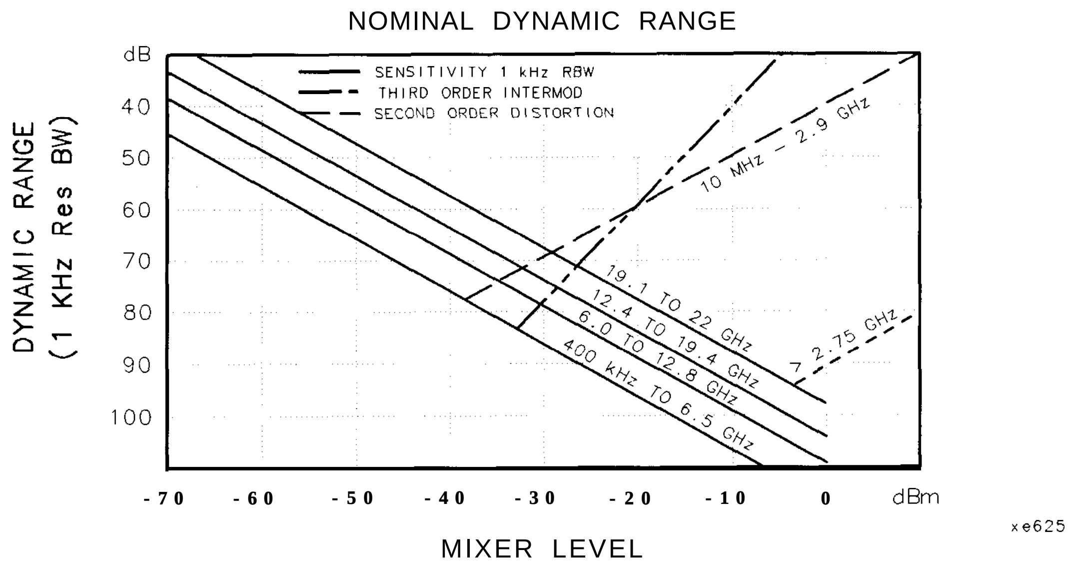
Input Attenuator Repeatability	±0.05 dB

RF Input SWR	
10 dB attenuation	
Frequency	
300 MHz	1.15:1
10 dB to 70 dB attenuation	
Band	
9 kHz to 2.9 GHz	1.3:1
2.75 GHz to 6.5 GHz	1.5:1
6.0 GHz to 12.8 GHz	1.6:1
12.4 GHz to 19.4 GHz	2.0:1
19.1 GHz to 22.0 GHz	3.0:1

Unpeaked Frequency Response	(10 dB input attenuation)	
Without Preselector Peaking, Span ≤ 50 MHz	**Absolutes**	**Relative Flatness†**
2.75 GHz to 6.5 GHz	±4.0 dB	±3.5 dB
6.0 GHz to 12.8 GHz	±4.5 dB	±4.0 dB
12.4 GHz to 19.4 GHz	±6.0 dB	±5.0 dB
19.1 GHz to 22 GHz	±6.0 dB	±5.0 dB

† Referenced to midpoint between highest and lowest frequency response deviations.
§ Referenced to 300 MHz CAL OUT.

DYNAMIC RANGE



Dynamic Range

mmunity Testing	
Radiated Immunity	When tested at 3 V/m according to IEC 801-3/1984 the displayed average noise level will be within specifications over the full immunity test frequency range of 27 to 500 MHz except that at immunity test frequencies of 278.6 MHz ± selected resolution bandwidth and 321.4 MHz ± selected resolution bandwidth the displayed average noise level may be up to -45 dBm. When the analyzer tuned frequency is identical ta the immunity test signal frequency there may be signals of up to -70 dBm displayed on the screen.
Electrostatic Discharge	When an air discharge of up to 8 kV according to IEC 801-2/1991 occurs to the shells of the BNC connectors on the rear panel of the instrument spikes may be seen on the CRT display. Discharges to center pins of any of the connectors may cause damage to the associated circuitry.

Physical Characteristics

Front-Panel Inputs and Outputs

INPUT 50Ω	
Connector	Type N female
Impedance	50 Ω nominal
INPUT 50Ω (Option 026)	
Connector	APC 3.5 male
Impedance	50 Ω nominal
INPUT 50Ω (Option 027)	
Connector	Type N female with adapter to SMA female
Impedance	50 Ω nominal

100 MHz COMB OUT	
Connector	SMA female
Output Level	+ 27 dBm
Frequency	100 MHz fundamental

PROBE POWER‡	
Voltage/Current	+ 15 Vdc, ±7% at 150 mA max. -12.6 Vdc ±10% at 150 mA max.

‡ Total current drawn from the + 15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the -12.5 Vdc on the PROBE POWER and the -15 Vdc on the AUX INTERFACE cannot exceed 150 mA.

Rear-Panel Inputs and Outputs

10 MHz REF OUTPUT	
Connector	BNC female
Impedance	50 Ω nominal
Output Amplitude	>0 dBm

EXT REF IN	
Connector	BNC female Note: Analyzer noise sideband and spurious response performance may be affected by the quality of the external reference used.
Input Amplitude Range	-2 to + 10 dBm
Frequency	10 MHz

AUX IF OUTPUT	
Frequency	21.4 MHz
Amplitude Range	-10 to -60 dBm
Impedance	50 Ω nominal

Physical Characteristics

AUX VIDEO OUTPUT	
Connector	BNC female
Amplitude Range	0 to 1 V (uncorrected)

EXT KEYBOARD *(Option 041 or 043)*	Interface compatible with HP part number C1405B using adapter C1405-60015 and most IBM/AT non-auto switching keyboards.

EXT TRIG INPUT	
Connector	BNC female
Trigger Level	Positive edge initiates sweep in EXT TRIG mode (TTL).

HI-SWEEP IN/OUT	
Connector	BNC female
output	High = sweep, Low = retrace (TTL)
Input	Open collector, low stops sweep.

MONITOR OUTPUT *(Spectrum Analyzer Display)*	
Connector	BNC female
Format	
SYNC NRM	Internal Monitor
SYNC NTSC	NTSC Compatible 15.75 kHz horizontal rate 60 Hz vertical rate
SYNC PAL	PAL Compatible 15.625 kHz horizontal rate 50 Hz vertical rate

REMOTE INTERFACE	
HP-IB and Parallel *(Option 041)*	HP 10833A, B, C or D and 25 pin subminiature D-shell, female for parallel
HP-IB Codes	SH1, AH1, T6, SR1, RL1, PPO, DC1, Cl, C2, C3 and C28
RS-232 and Parallel *(Option 043)*	9 pin subminiature D-shell, male for RS-232 and 25 pin subminiature D-shell, female for parallel

SWEEP OUTPUT	
Connector	BNC female
Amplitude	0 to +10 V ramp

AUX INTERFACE				
Connector Type: 9 Pin Subminiature "D" **Connector Pinout**				
Pin #	Function	Current	"Logic" Mode	"Serial Bit" Mode
1	Control A	—	TTL Output Hi/Lo	TTL Output Hi/Lo
2	Control B	—	TTL Output Hi/Lo	TTL Output Hi/Lo
3	Control C	—	TTL Output Hi/Lo	Strobe
4	Control D	—	TTL Output Hi/Lo	Serial Data
5	Control I	—	TTL Input Hi/Lo	TTL Input Hi/Lo
6	Gnd	—	Gnd	Gnd
7†	-15 Vdc ±7%	150 mA		—
8*	+ 5 Vdc ±5%	150 mA	—	—
9†	+ 15 Vdc ±5%	150 mA	—	—

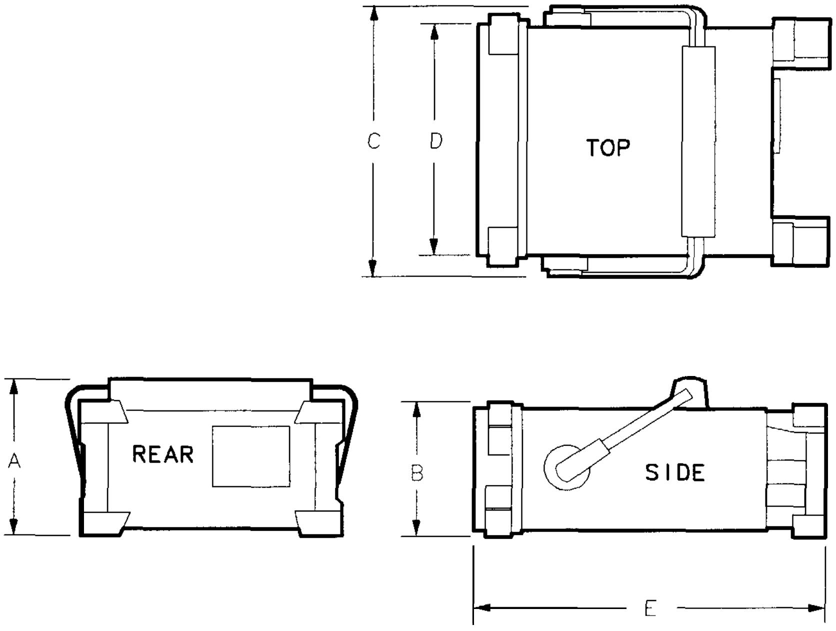
* Exceeding the + 5 V current limits may result in loss of factory correction constants.
† Total current drawn from the + 15 Vdc on the PROBE POWER and the AUX INTERFACE cannot exceed 150 mA. Total current drawn from the – 12.6 Vdc on the PROBE POWER and the – 15 Vdc on the AUX INTERFACE cannot exceed 150 mA.

WEIGHT	
Net	
HP 8592L	16.4 kg (36 lb)
Shipping	
HP 8592L	19.1 kg (42 lb)

Physical Characteristics

DIMENSIONS

= 8 in (200 mm)
= 7.25 in **(184** mm)
= 14.69 in (373 mm)
= 12.8 in (325 mm)
= 18.12 in (460.5 mm)



Regulatory Information

The information on the following pages apply to the HP 8590L and the HP 8592L spectrum analyzer products.

IEC Compliance

This instrument has been designed and tested in accordance with IEC Publication 348, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Instrument Markings

“CE” The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)

“ISMl-A” This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.

“CSA” The CSA mark is a registered trademark of the Canadian Standards Association.

Declaration of Conformity

DECLARATION OF CONFORMITY
according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.

Manufacturer's Address: 1212 Valleyhouse Drive
Rohnert Park, California 94928-4999
U.S.A.

Manufacturer's Name: Hewlett-Packard Ltd.

Manufacturer's Address: South Queesferry
West Lothian, EH30 9TG
Scotland, United Kingdom

Declares that the **product:**

Product Name: Spectrum Analyzer

Model Numbers: HP 8590L and HP 8592L

Product Options: This declaration covers all options of the above products.

Conforms to the **following product specifications:**

Safety: IEC 348:1978/HD 401:1980
CAN/CSA-22.2 No. 231 Series M89

EMC: CISPR 11: 1990 /EN 55011: 199 1, Group 1 Class A
IEC 801-2:1991 /EN 50082-1:1992, 4 kV CD, 8 kV AD
IEC 801-3:1984 /EN 50082-1:1992, 3V/m, 27-500 MHz
IEC 801-4: 1988 /EN 50082-1:1992, 500 V signal, 1000 V AC

Supplementary Information:

The product herewith complies with the requirements of the Low **Voltage** Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Rohnert Park, California	Jan 28, 1994	
Location	**Date**	**Dixon Browder / Quality Manager**
South Queensferry, Scotland	Feb 4, 1994	
Location	**Date**	**Peter Rigby / Quality Manager**

European Contact:
Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department QA/Standards Europe, Herrenberger Straße 130, D-7030 Böblingen (FAX: +49-7031-143143)

Notice for Germany: Noise Declaration

LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

3

If You Have a Problem

Your spectrum analyzer is built to provide dependable service. It is unlikely that you will experience a problem. However, Hewlett-Packard's worldwide sales and service organization is ready to provide the support you need.

Calling HP Sales and Service Offices

Sales and service offices are located around the world to provide complete support for your spectrum analyzer. To obtain servicing information or to order replacement parts, contact the nearest Hewlett-Packard Sales and Service office listed in Table 3-1. In any correspondence or telephone conversations, refer to the spectrum analyzer by its model number and full serial number. With this information, the HP representative can quickly determine whether your unit is still within its warranty period.

Before calling Hewlett-Packard

Before calling Hewlett-Packard or returning the spectrum analyzer for service, please make the checks listed in "Check the basics."

If you still have a problem please read the warranty printed at the front of this guide. If your spectrum analyzer is covered by a separate maintenance agreement, please be familiar with its terms.

Hewlett-Packard offers several maintenance plans to service your spectrum analyzer after warranty expiration. Call your HP Sales and Service Office for full details.

If you want to service the spectrum analyzer yourself after warranty expiration, contact your HP Sales and Service Office to obtain the most current test and maintenance information.

Check the basics

In general, a problem can be caused by a hardware failure, a software error, or a user error. Often problems may be solved by repeating what was being done when the problem occurred. A few minutes spent in performing these simple checks may eliminate time spent waiting for instrument repair.

- ❑ Check that the spectrum analyzer is plugged into the proper ac power source.
- ❑ Check that the line socket has power.
- ❑ Check that the rear-panel voltage selector switch is set correctly.
- ❑ Check that the line fuse is good.
- ❑ Check that the spectrum analyzer is turned on.
- ❑ Check that the light above (LINE) is on, indicating that the power supply is on.
- ❑ Check that the other equipment, cables, and connectors are connected properly and operating correctly.
- ❑ Check the equipment settings in the procedure that was being used when the problem occurred.
- ❑ Check that the test being performed and the expected results are within the specifications and capabilities of the spectrum analyzer. Refer to Chapter 2 of this guide.
- ❑ Check the spectrum analyzer display for error messages. Refer to the ***HP 8590 Series Spectrum Analyzer User's Guide.***
- ❑ Check operation by performing the verification procedures in Chapter 1 of this guide. Record all results in the performance test record.
- ❑ Check for problems similar to those described in the ***HP 8590 Series Spectrum Analyzer User's Guide.***

Table 3-1. Hewlett-Packard Sales and Service Offices

US FIELD OPERATIONS

Headquarters Hewlett-Packard Co. 19320 Pruneridge Avenue Cupertino, CA 95014 (800) 752-0900	**California, Northern** Hewlett-Packard Co. 301 E. Evelyn Mountain View, CA 94041 (415) 694-2000	**California, Southern** Hewlett-Packard Co. 1421 South Manhattan Ave. Fullerton, CA 92631 (714) 999-6700
Colorado Hewlett-Packard Co. 24 Inverness Place, East Englewood, CO 80112 (303) 649-5512	**Georgia** Hewlett-Packard Co. 2000 South Park Place Atlanta, GA 30339 (404) 955-1500	**Illinois** Hewlett-Packard Co. 5201 lbllview Drive Rolling Meadows, IL 60008 (708) 255-9800
New Jersey Hewlett-Packard Co. 150 Green Pond Rd. Rockaway, NJ 07866 (201) 586-5400	**Texas** Hewlett-Packard Co. 930 E. Campbell Rd. Richardson, TX 75081 (214) 231-6101	

EUROPEAN FIELD OPERATIONS

Headquarters Hewlett-Packard S.A. 150, Route du Nant-d'Avril 1217 Meyrin X/Geneva Switzerland (41 22) 780.8111	**France** Hewlett-Packard France 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60	**Germany** Hewlett-Packard GmbH Hewlett-Packard Strasse 61352 Bad Homburg v.d.H Germany (49 6172) 16-0
Great Britain Hewlett-Packard Ltd. Eskdale Road, Winnersh Triangle Wokingham, Berkshire RG41 5DZ England (44 734) 696622		

INTERCON FIELD OPERATIONS

Headquarters Hewlett-Packard Company 3495 Deer Creek Road Palo Alto, California, USA 94304-1316 (415) 857-5027	**Australia** Hewlett-Packard Australia Ltd. 31-41 Joseph Street Blackbum, Victoria 3130 (61 3) 895-2895	**Canada** Hewlett-Packard (Canada) Ltd. 17500 South Service Road Trans-Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232
China China Hewlett-Packard Company 38 Bei San Huan Xl Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888	**Japan** Hewlett-Packard Japan, Ltd. 1-27-15 Yabe, Sagamihara Kanagawa 229, Japan (81 427) 59-1311	**Singapore** Hewlett-Packard Singapore (Pte.) Ltd. 150 Beach Road #29-00 Gateway West Singapore 0718 (65) 291-9088
Taiwan Hewlett-Packard Taiwan 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404		

Returning the Spectrum Analyzer for Service

Use the information in this section if it is necessary to return the spectrum analyzer to Hewlett-Packard.

Package the spectrum analyzer for shipment

Use the following steps to package the spectrum analyzer for shipment to Hewlett-Packard for service:

1. Fill in a service tag (available in the ***HP 8590 Series Spectrum Analyzer User's Guide)*** and attach it to the instrument. Please be as specific as possible about the nature of the problem. Send a copy of any or all of the following information:

   - Any error messages that appeared on the spectrum analyzer display.
   - A completed Performance Test record. Located in Chapter 1 of this guide.
   - Any other specific data on the performance of the spectrum analyzer.

Caution Spectrum analyzer damage can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the instrument or prevent it from shifting in the carton.

Styrene pellets cause equipment damage by generating static electricity and by lodging in the spectrum analyzer fan.

2. Use the original packaging materials or a strong shipping container that is made of double-walled, corrugated cardboard with 159 kg (350 lb) bursting strength. The carton must be both large enough and strong enough to accommodate the spectrum analyzer and allow at least 3 to 4 inches on all sides of the spectrum analyzer for packing material.
3. If you have a front-panel cover, install it on the instrument; if not, protect the front panel with cardboard.
4. Surround the instrument with at least 3 to 4 inches of packing material, or enough to prevent the instrument from moving in the carton. If packing foam is not available, the best alternative is SD-240 Air Cap™ from Sealed Air Corporation (Commerce, CA 90001). Air Cap looks like a plastic sheet covered with 1-1/4 inch air-filled bubbles. Use the pink Air Cap to reduce static electricity. Wrap the instrument several times in the material to both protect the instrument and prevent it from moving in the carton.
5. Seal the shipping container securely with strong nylon adhesive tape.
6. Mark the shipping container "FRAGILE, HANDLE WITH CARE" to ensure careful handling.
7. Retain copies of all shipping papers.