# Getting Started Guide

## Agilent Technologies
## ESA Series Performance Verification and Adjustment Software

Agilent Technologies

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**Supersedes: E4401-90348**

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# 1 Introduction

# About the Software Test Environment

Test Management Environment a high performance, 32 bit, component-based calibration platform from Agilent. Agilent Test Management Environment can be expanded by purchasing test packages to test additional HP/Agilent instruments. Agilent Test Management Environment reduces the cost of instrument maintenance by providing quick and accurate automated tests—reducing instrument downtime—and providing a “common look and feel”—reducing operator training.

Agilent Test Management Environment feature highlights:

- Runs on Microsoft ® Windows NT 4.0 with service pack 6A, Microsoft ® Windows 2000 with service pack 3, and Microsoft ® Windows XP Pro with service pack 1
- Provides the ability to perform full calibration and repair
- Simple operator’s user interface
- Provides easy customizing of test sequences
- Supports 17025 calibration solutions
- Allows guard banding using measurement uncertainties
- Provides ANSI Z540 compliant test reports
- Custom report generation
- Results stored in database
- Provides test standard tracking
- Provides administration security to control the test standards used
- Provides comprehensive on-line help

# Getting Started

**NOTE** Refer to the software built-in help documentation for complete information on using the performance verification and adjustment software.

**NOTE** Contact Agilent Technologies for assistance with the Performance Verification and Adjustment Software. For software technical support, contact the Agilent Technologies Test and Measurement Call Center at **1–800–452–4844**.

## Before You Start

Check the following before starting the performance test software.

1. Ensure you have a compatible controller (IBM compatible computer), refer to Tables 1-1 through 1-4 on page 12.
2. Ensure computer has a GPIB Interface Card installed in it before running the software installation. The recommended card is Agilent model part number 82350A. You may also use a National Instruments model part number AT-GPIB/TNT or PCI-GPIB.
3. Install Performance Verification/Adjustment software on the computer.
4. Ensure you have the proper test equipment. Refer to Tables 1-1 through 1-4 on page 12 for a list of test equipment. Let all the test equipment and your instrument warm up in accordance to instrument specifications.

## Software Installation and Configuration

After installation, refer to the online help instructions for configuring the software for performing tests and adjustments.

### Minimum Computer Requirements

— 200 MHz Pentium Processor or higher

— 64 MB RAM or more

— 200 MB available hard drive

— Operating system: Microsoft ® Windows NT 4.0 with service pack 6A, Microsoft ® Windows 2000 with service pack 3, and Microsoft ® Windows XP Pro with service pack 1

— GPIB card installed

— Agilent Visa or NI Visa installed

— IE 4.0 or higher

Ensure computer has a GPIB Interface Card and VISA drivers installed in it before running the software installation. The recommended card is Agilent model part number 82350A. You may also use a National Instruments model part number AT-GPIB/TNT or PCI-GPIB.

Ensure you have the proper test equipment. Let all the test equipment and your instrument warm up in accordance to instrument specifications.

**NOTE**

Agilent Visa & GPIB drivers can be downloaded from the Agilent website at: http://www.agilent.com

National Instruments Visa can be downloaded from the website: http://www.ni.com

### Software Installation Instructions

1. Close all applications
2. Insert CD into your CD-ROM Drive
3. From the **Start** menu, choose **Run**.
4. Type D:\Setup (where "D" is your CD-ROM drive) and click OK
5. Follow the instructions on the screen to install

When the installation is complete, a shortcut is created on your desktop and a program group is added to your Start menu labeled *Agilent Test Management Environment (TME)*.

### To Run the Software

Launch the Agilent Test Management Environment from the Start menu -> Programs -> Agilent Test Management Environment.

*or*

Launch the Agilent Test Management Environment from the Agilent Test Management Environment shortcut on the Desktop.

Follow the instructions from the "Getting Started" section of the Online Help to run the software.

For more information about installation and administration, refer to the readme.txt file on the CDROM.

## Warmup Time

### Test Equipment Warmup

Allow sufficient warmup time for the test equipment. Refer to individual operating and service manuals for warmup specifications.

### Instrument Warmup

The instrument under test (UUT) must be stored at a constant temperature, within the specified operating temperature range, for a minimum of two hours prior to running the performance verification tests or adjustments. Switch on the instrument and let it warm up in accordance with warmup requirements in the instrument specifications.

## Equipment Connections

### GPIB Cables

All test equipment controlled by GPIB should be connected to the internal GPIB connector of the controller (typically GPIB0). If the controller has only one GPIB connector, connect the UUT to it as well. If the controller has dual GPIB connectors, connect the UUT to the second GPIB (typically, GPIB1).

### Test Setups

Complete detailed illustrations are located in the online help supplied with the test software. The program prompts the operator to make appropriate equipment connections.

## Failure to Meet Specifications

If the instrument does not meet one or more of the specifications during testing, check the test setup for proper configuration, check the condition of all connectors, and ensure all connections are tight. After these things have been checked and confirmed correct, run the failed tests again. If the results are still unsatisfactory, complete any remaining tests and refer to the troubleshooting information in the service guide to correct the problem.

## Abnormal Indications during Adjustment

If the indications received during an adjustment do not agree with the normal conditions given in the adjustment procedures, a fault exists in your instrument. The fault should be repaired *before* proceeding with any further adjustments. Refer to the troubleshooting and repair information in the service guide.

## Calibration Cycle

The performance verification tests should be used to check the instrument against the instrument specifications every twelve months.

The instrument requires periodic verification of performance. Under most conditions of use, you should check the instrument against the instrument specifications every twelve months using the complete set of automated performance verification tests located on the *Performance Verification and Adjustment Software* CD.

When test results show proper operation and calibration, no adjustments are necessary.

# Required Test Equipment

The following table identifies the equipment required to run the performance verification tests and adjustments. Some tests can use various models of a particular equipment type. The “Recommended Agilent Model” is the preferred equipment. However, the “Alternative Agilent Model” is an acceptable substitute. Not all of the listed test equipment needs to be connected to perform an individual test. To run a test, only the equipment specified for that test needs to be connected.

**NOTE** The validity of the performance verification and adjustment software measurements depends in part on required test equipment measurement accuracy. Verify proper calibration of test equipment before running tests with this software.

**Table 1-1 Recommended Test Equipment for ESA Series**

| Equipment | Critical Specifications for Equipment Substitution | Recommended Agilent Model | Use[a] |
|---|---|---|---|
| Digital Multimeter | Input Resistance: >10 MΩ<br>Accuracy: ±10 mV on 100 V range | 3458A | P,A,T |
| DVM Test Leads | For use with 3458A Digital Multimeter | 34118B | T |
| Universal Counter | Frequency Range: 10 MHz ±10 Hz<br>Time Interval Range: 25 ms to 100 ms<br>Single Trigger Operation<br>Range: +2.5 Vdc to –2.5 Vdc<br>External Reference Input | 53132A or<br>53131A | P,A,T |
| Frequency Standard | Frequency: 10 MHz<br>Timebase Accuracy (Aging): $<1 \times 10^{-9}$/day | 5071A | P,A |
| Oscilloscope | Bandwidth: >10 MHz<br>Functions: Area, Vp-p, Pulse Width<br>Vertical Scale Factor of 0.5 V to 5 V/Div | 54501A or<br>54820A | P, T |
| Power Meter | Compatible with 8480 series power sensors.<br>dB relative mode.<br>Resolution: 0.01 dB<br>Reference Accuracy: ±1.2%<br>Dual Channel | E4419A/B | P,A,T |
| RF Signal Generator | Capable of generating cdmaOne and GSM formats | E4433B, Options UND, 1E5, UN5, and UN8 | P, T |

**Table 1-1 Recommended Test Equipment for ESA Series (Continued)**

| Equipment | Critical Specifications for Equipment Substitution | Recommended Agilent Model | Use[a] |
|---|---|---|---|
| RF Power Sensor<br>(2 required) | Frequency Range: 100 kHz to 3 GHz Maximum SWR:<br>1.60 (100 kHz to 300 kHz)<br>1.20 (300 kHz to 1 MHz)<br>1.1 (1 MHz to 2.0 GHz)<br>1.18 (2.0 GHz to 3.0 GHz)<br>Amplitude range: –25 dBm to +10 dBm | 8482A | P,A,T |
| Microwave Power Sensor | Frequency Range: 50 MHz to 26.5 GHz Maximum SWR:<br>1.15 (50 MHz to 100 MHz)<br>1.10 (100 MHz to 2 GHz)<br>1.15 (2 GHz to 12.4 GHz)<br>1.20 (12.4 GHz to 18 GHz)<br>1.25 (18 GHz to 26.5 GHz)<br>Amplitude range: –25 dBm to 0 dBm | 8485A | P,A,T |
| 75 Ω Power Sensor<br>(Option 1DP) | Frequency Range: 1 MHz to 1500 MHz Maximum SWR: 1.18 (600 kHz to 1500 MHz)<br>Impedance: 75 Ω<br>Amplitude Range: –30 dBm to +20 dBm | 8483A | P,A,T |
| Power Sensor, Low Power | Frequency Range: 50 MHz to 3.0 GHz<br>Amplitude Range: –20 dBm to –70 dBm<br>Maximum SWR:<br>1.4 (10 MHz to 30 MHz)<br>1.15 (30 MHz to 3.0 GHz) | 8481D | P,A,T |
| Spectrum Analyzer, Microwave<br>(required for Option 1DN or 1DQ) | Frequency Range: 100 kHz to 7 GHz<br>Relative Amplitude Accuracy:<br>100 kHz to 3.0 GHz: < ±1.8 dB<br>Frequency Accuracy: < ±10 kHz @ 7 GHz | 8563E | P,T |
| Synthesized Signal Generator | Frequency Range: 100 kHz to 2500 MHz<br>Amplitude Range: –35 to +16 dBm<br>SSB Noise: <–120 dBc/Hz at 20 kHz offset | 8663A | P,A |
| Synthesized Sweeper<br>*(2 required for all but E4401B and E4411B)* | Frequency Range:<br>E4407B or E4408B: 10 MHz to 26.5 GHz<br>All others: 10 MHz to 13.2 GHz<br>Frequency Accuracy (CW): ±0.02%<br>Leveling Modes: Internal and External<br>Modulation Modes: AM<br>Power Level Range: –35 to +16 dBm | 83630/40/50B<br>83620/30/40/50B | P,A,T |
| Function Generator | Frequency Range: 0.1 Hz to 20 MHz Frequency Accuracy: ±0.02%<br>Waveform: Triangle, Square | 33120A, 3325B, or 33250A | P,A,T |
| Attenuator/Switch Driver | Compatible with 8494G and 8496G Programmable step attenuators | 11713A | P |

**Table 1-1 Recommended Test Equipment for ESA Series (Continued)**

| Equipment | Critical Specifications for Equipment Substitution | Recommended Agilent Model | Use[a] |
|---|---|---|---|
| Attenuator, 1 dB Step | Attenuation Range: 0 to 11 dB<br>Frequency Range: 4 GHz<br>Connectors: Type-N female<br>Calibrated at 50 MHz with accuracy of 1 to 11 dB attenuation: ±0.010 dB. | 8494A/G | P |
| Attenuator, 10 dB Step | Attenuation Range: 0 to 110 dB<br>Frequency Range: 4 GHz<br>Connectors: Type-N female<br>Calibrated at 50 MHz with accuracy of:<br>±(0.005 dB + 0.007 dB/10 dB step) | 8496A/G | P |
| Attenuator, 20 dB Fixed (Option 1DS) | Nominal attenuation: 20 dB<br>Frequency Range: dc to 3.0 GHz<br>Connectors: Type-N (m) and Type-N (f)<br>Maximum SWR: < 1.2 (dc to 3 GHz) | 8491A Option 020 | P,A |
| Attenuator, 10 dB Fixed | Nominal attenuation: 10 dB<br>Frequency Range: dc to 12.4 GHz<br>Connectors: Type-N (m) and Type-N (f) | 8491A Option 010 | P |
| Attenuator, 6 dB Fixed | Nominal attenuation: 6 dB<br>Frequency Range: dc to 12.4 GHz<br>Connectors: Type-N (m) and Type-N (f)<br>Maximum SWR: < 1.15 at 50 MHz | 8491A Option 010 and H47 | P |
| Attenuator Interconnect Kit | Mechanically and electrically connects 8494A/G and 8496A/G | 11716 Series | P |

a. P = Performance Test, A = Adjustment, T = Troubleshooting

**Table 1-2 Recommended Accessories for ESA Series**

| Equipment | Critical Specifications for Accessory Substitution | Recommended Agilent Model | Use [a] |
|---|---|---|---|
| 6 GHz<br>Directional Bridge | Frequency Range: 5 MHz to 3.0 GHz<br>Directivity: > 40 dB<br>Coupling factor: 16 dB nominal<br>Insertion Loss: 2 dB maximum | 86205A | P |
| Power Splitter<br>(E4401B/02B/<br>03B/04B/05B/11B) | Frequency Range: 9 kHz to 13.2 GHz<br>Insertion Loss: 6 dB nominal<br>Output Tracking: < 0.25 dB<br>Equivalent Output SWR: < 1.22:1 | 11667A | P,A |
| Power Splitter<br>(E4407B/E4408B) | Frequency Range: 9 kHz to 26.5 GHz<br>Insertion Loss: 6 dB nominal<br>Output Tracking: <0.25 dB (dc to 18 GHz)<br>< 0.4 dB (18 to 26.5 GHz)<br>Equivalent Output SWR: < 1.22:1 | 11667B | P,A |
| Directional Coupler<br>(E4404B/05B/07B/08B) | Frequency Range: 2 GHz to 8 GHz<br>Directivity > 20 dB<br>Max.VSWR: 1.35:1<br>Transmission Arm Loss: < 1 dB nominal<br>Coupled Arm Loss: ~ 16 dB nominal | 0955-0098 | P |
| Directional Coupler<br>(E4404B/05B/07B/08B) | Frequency Range: 2 GHz to 15 GHz<br>Directivity>14 dB<br>Max.VSWR: 1.35:1<br>Transmission Arm Loss: < 1.5 dB nominal<br>Coupled Arm Loss: ~ 10 dB nominal | 87300B | P |
| Termination, 50 Ω<br>(E4401B/02B/<br>03B/04B/05B/11B)<br>(2 required for<br>Option 1DN) | Impedance: 50 Ω nominal<br>Connector: Type-N (m) | 909A<br>(Option 012) | P,T |
| Termination, 50 Ω<br>(E4407B/ 08B) | Impedance: 50 Ω nominal<br>Connector: APC 3.5 (f) | 909D<br>(Option 011) | P,T |
| Termination, 50 Ω | Impedance: 50 Ω nominal<br>Connector: BNC (m) | 11593A | P,A |
| Termination, 75 Ω<br>(Option 1DQ and 1DP) | Impedance: 75 Ω nominal<br>*(2 required for Option 1DQ)*<br>*(1 required for Option 1DP)* | 909E<br>(Option 201) | P,T |
| Filter,<br>50 MHz Low Pass | Cutoff frequency: 50 MHz<br>Rejection at 65 MHz: > 40 dB<br>Rejection at 75 MHz: > 60 dB | 0955-0306 | P |
| Filter,<br>300 MHz Low Pass | Cutoff frequency: 300 MHz<br>Rejection at > 43 MHz: > 45 dB | 0955-0455 | P |
| Filter,<br>1 GHz Low Pass | Cutoff frequency: 1 GHz<br>Rejection at 2 GHz: > 60 dB | 0955-0487 | P |

**Table 1-2 Recommended Accessories for ESA Series (Continued)**

| Equipment | Critical Specifications for Accessory Substitution | Recommended Agilent Model | Use [a] |
|---|---|---|---|
| Filter,<br>1.8 GHz Low Pass<br>(2 required)<br>(E4404B/05B/07B/08B) | Cutoff frequency: 1.8 GHz<br>Rejection at >3 GHz: > 45 dB | 0955-0491 | P |
| Filter,<br>4.4 GHz Low Pass<br>(2 required)<br>(E4404B/05B/07B/08B) | Cutoff frequency: 4.4 GHz<br>Rejection at > 5.5 GHz: > 42 dB | 9135-0005<br>or 360D | P |

a. P = Performance Test, A = Adjustment, T = Troubleshooting

**Table 1-3 Recommended Adapters for ESA Series**

| Critical Specifications for Adapter Substitution | Recommended Agilent Model | Use [a] |
|---|---|---|
| BNC (m) to BNC (m) | 1250-0216 | P,T |
| BNC tee (f,m,f) | 1250-0781 | A,T |
| Type-N (f) to APC-3.5 (f) | 1250-1745 | P,A,T |
| Type-N (f) to BNC (m) | 1250-1477 | P,T |
| Type-N (f) to BNC (m), 75 Ω<br>*(2 required for* Option 1DQ)<br>*(1 required for* Option 1DP) | 1250-1534 | P,A,T |
| Type-N (m) to BNC (f)*(4 required)* | 1250-1476 | P,A,T |
| Type-N (m) to BNC (m) *(2 required)* | 1250-1473 | P,T |
| Type-N (m) to BNC (m), 75 Ω (Option 1DP) | 1250-1533 | P,A,T |
| Type-N (f) to Type-N (f) | 1250-1472 | P,T |
| Type-N (m) to Type-N (m) | 1250-1475 | P,A,T |
| Type-N (f) to Type-N (f), 75 Ω (Option 1DP) | 1250-1529 | P,A,T |
| Type-N (f), 75 Ω to Type-N (m), 50 Ω (Option 1DP) | 1250-0597 | P,A,T |
| Type-N (m) to SMA (m) | 1250-1636 | P |
| BNC (m) to SMA (f) | 1250-2015 | P |
| 50 Ω to 75 Ω Minimum Loss Pad<br>Frequency Range: dc to 1.5 GHz<br>Insertion Loss: 5.7 dB (Option 1DP) | 11852B | P,A,T |
| Type-N (f) to Type-N (f) | 1250-0777 | P |
| Type-N (f) to BNC (f), 75 Ω (Option 1DP) | 1250-1535 | P,A |
| Type-N (m) to APC-3.5 (f) *(3 required)* | 1250-1744 | P,A |
| APC-3.5 (f) to APC-3.5 (f) | 1250-1749 | P,A |
| Dual Banana to BNC (f) | 1251-2277 | P,A,T |
| Type-N (m) to BNC (f) *(2 required)* | 1250-0780 | P,A,T |

a. P = Performance Test, A = Adjustment, T = Troubleshooting

**Table 1-4 Recommended Cables for ESA Series**

| Critical Specifications for Cable Substitution | Recommended Agilent/HP Model | Use [a] |
|---|---|---|
| Frequency Range: dc to 1 GHz<br>Length: >122 cm (48 in)<br>Connectors: BNC (m) (2) *(4 required)* | 10503A | P,A,T |
| Frequency Range: dc to 310 MHz<br>Length: 23 cm (9 in)<br>Connectors: BNC (m) (2) | 10502A | P,A,T |
| BNC, 75 Ω, 30 cm (12 in) (option 1DP) | 5062-6452 | P,A,T |
| Type-N, Precision 62 cm (24 in) | 11500C | P,A,T |
| Type-N, Precision 152 cm (60 in) *(2 required)* | 11500D | P,A,T |
| APC-3.5 Cable<br>Frequency: 9 kHz to 26.5 GHz<br>Connectors: APC-3.5 (m) (2)<br>Length: >92 cm (36 in) *(2 required)* | 8120-4921 | P,A,T |
| Cable, Test<br>Length: >91 cm (36 in)<br>Connectors: SMB (f) to BNC (m) *(2 required)* | 85680-60093 | T |

a. P = Performance Test, A = Adjustment, T = Troubleshooting

# List of Performance Verification Tests

The performance verification tests are designed to provide the highest level of confidence that the instrument being tested conforms to published, factory-set specifications. The tests are supplied in an automated test software application. The automatic execution of the full set of performance tests will take between two and three hours to complete. The tests are designed to test an instrument operating within the temperature range defined by the instrument specifications. Some repairs require a performance test to be run after the repair. If the instrument is unable to pass any of the performance tests, adjustment tests or further repairs are needed.

1. 10 MHz Reference Frequency Accuracy
2. 10 MHz Precision Reference Frequency Accuracy (Opt 1D5)
3. Frequency Readout Accuracy
4. Frequency Count Accuracy
5. Frequency Span Readout Accuracy
6. Noise Sidebands
7. Noise Sidebands - Wide Offsets
8. System Related Sidebands
9. Residual FM
10. Sweep Time Accuracy
11. Scale Fidelity
12. Scale Fidelity - Narrow RBW
13. Input Attenuation Switching Uncertainty at 50 MHz
14. Reference Level Accuracy
15. Reference Level Accuracy - Narrow RBW
16. Resolution BW Switching Uncertainty
17. Absolute Amplitude Accuracy
18. Overall Amplitude Accuracy
19. Resolution BW Accuracy
20. Frequency Response Low Band
21. Frequency Response High Band
22. Other Input Related Spurious Responses
23. Spurious Responses - TOI

24.Spurious Responses - SHD

25.Gain Compression

26.Displayed Average Noise Level (DANL)

27.Residual Responses

28.Fast Time Domain Amplitude Accuracy (Option AYX & B7D)

29.Tracking Generator Absolute Amplitude and Vernier Accuracy (Option 1DN or 1DQ)

30.Tracking Generator Level Flatness (Option 1DN or 1DQ)

31.Tracking Generator Harmonic Spurious Outputs (Option 1DN or 1DQ)

32.Tracking Generator Non-Harmonic Spurious Outputs (Option 1DN or 1DQ)

33.Tracking Generator LO Feedthrough Amplitude (Option 1DN)

34.Gate Delay and Gate Length Accuracy (Option 1D6)

35.Gate Mode Additional Amplitude Error (Option 1D6)

36.IF Input Accuracy (Option AYZ)

37.LO Output Amplitude Accuracy (Option AYZ)

38.Impulse Bandwidth Accuracy (EMC analyzers)

39.GSM - Phase and Frequency Error (Option BAH with Option B7D/B7E)

40.COMMS - Frequency Response (Option BAH or BAC)

41.COMMS - Absolute Amplitude Accuracy (Option BAH or BAC)

# List of Adjustments

Adjustments should not be used for calibration. These procedures are designed to reset various circuit parameters. In addition, some of the tests reset or calculate correction values associated with some measurements. The adjustments are supplied in an automated test software application. The software is designed to adjust an instrument operating within the temperature range defined by the instrument specifications.

Never perform adjustments as routine maintenance. Adjustments should be performed only after a repair or after a performance test failure.

Supported Adjustments include:

1. Frequency Response Low Band Adjustment
2. Frequency Response High Band Adjustment
3. YTF Adjustment
4. LO Power Adjustment
5. IF Amplitude Adjustment
6. 50 MHz Amplitude Reference Adjustment
7. 10 MHz Reference Adjustment
8. Tracking Generator ALC Adjustment
9. Tracking Generator Frequency Slope Adjustment
10. IF Input Adjustment

## Memory Initialization Utility

The ESA Memory Initialization Utilities listed below will write the default calibration constants into the memory of the board assembly after replacement or installation:

### RF Assembly Initialization

Several parameters stored in the EEROM on the A8 1.5 GHz RF Assembly (E4401B or E4411B) or A8A1 3.0 GHz RF Assembly (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B), or A7A4 Frequency Extension Assembly (E4404B, E4405B, E4407B, or E4408B) are initialized to default values by this procedure. When initializing an analyzer with both an A8A1 and A7A4, you may choose to do an RF Initialization of either assembly or both assemblies. It will be necessary to perform the following adjustments after initializing the RF assembly:

| Adjustment Required | Assembly Initialized | | |
|---|---|---|---|
| | A8 | A8A1 | A7A4 |
| IF Amplitude | X | X | |
| 50 MHz Amplitude Reference | X | X | |
| 10 MHz Reference | X | X | |
| LO Amplitude | | X | X |
| Frequency Response, Low Band | X | X | |
| Frequency Response, High Band | | | X |
| YTF | | | X |

### Processor Initialization

This procedure must be used whenever a new A4 Processor Assembly is installed. The analyzer's product number, and serial number are first downloaded into the analyzer's EEROM.

**NOTE** This procedure can be used to change the analyzer's serial number only from the default serial number stored on replacement A4 Processor Assemblies. It does not allow the serial number to be changed if a valid serial number is already stored in EEROM.

Several parameters are initialized based upon the frequency range of the analyzer and whether the analyzer is an E-Series or L-Series product. The time, date, and amplitude units (for both log and linear scales) are then set. Default values for parameters such as the date mode, printer control language, print orientation, GPIB address

(Option A4H only), baud rate (Option 1AX only), and viewing angle are stored. Lastly, amplitude correction and limitline data is initialized. The analyzer is preset once all this data has been stored in EEROM.

### Flatness Initialization

Default flatness data for the entire analyzer frequency range are stored in EEROM. For the E4401B and E4411B, all the flatness data is stored on the EEROM on the A8 1.5 GHz RF Assembly. For the E4402B and E4403B, all the flatness data is stored on the EEROM on the A8A1A2 Front End/LO Assembly. For the E4404B, E4405B, E4407B, and E4408B, the flatness data for frequencies <= 3 GHz (Band 0) are stored on the EEROM on A8A1A2, and the flatness data for frequencies > 3 GHz (Bands 1, 2, 3, and 4) are stored on the A7A4 Frequency Extension Assembly. When initializing an analyzer with both an A8A1 and A7A4, you may choose to do a Flatness Initialization of either assembly or both assemblies. It will be necessary to perform the Frequency Response adjustment after initializing the flatness data.