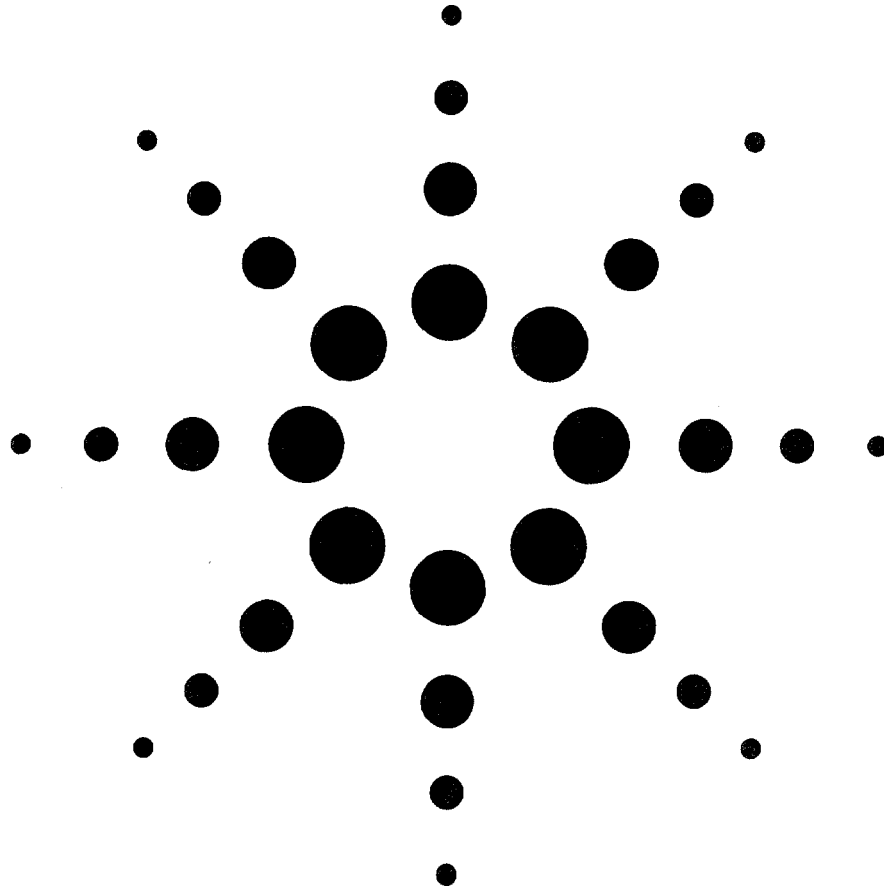


**Agilent ESA Series
Spectrum Analyzers
Instrument Messages
and Functional Tests**



Agilent Technologies

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Instrument Messages and Functional Tests

Agilent Technologies ESA Series Spectrum Analyzers

This manual documents firmware revision A.08.xx

This manual provides documentation for the following instruments:

Agilent Technologies ESA-E Series

**E4401B (9 kHz- 1.5 GHz)
E4402B (9 kHz - 3.0 GHz)
E4404B (9 kHz - 6.7 GHz)
E4405B (9 kHz - 13.2 GHz)
E4407B (9 kHz - 26.5 GHz)**

and

Agilent Technologies ESA-L Series

**E4411B (9 kHz- 1.5 GHz)
E4403B (9 kHz - 3.0 GHz)
E4408B (9 kHz - 26.5 GHz)**



Agilent Technologies

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Contents

1. Instrument Messages

Instrument Messages Introduction	16
Error Message Format	17
Error Message Types	18
Instrument Messages	20
Error Messages	20
Instrument Messages without Numbers	58

2. Functional Testing

What You Will Find in This Chapter	74
What Are the Functional Tests'?	74
Functional Test Versus Performance Verification	74
Test Descriptions	75
Displayed Average Noise Level	78
Test Limits	78
Test Description	79
Required Equipment	79
Procedure (10 MHz to 500 MHz) E4401B and E4411B	80
Procedure (501 MHz to 1.0 GHz) E4401B and E4411B	81
Procedure (1.01 GHz to 1.5 GHz) E4401B and E4411B	82
Procedure (10 MHz to 1 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B	83
Procedure (1.01 GHz to 2 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B	85
Procedure (2.01 GHz to 3.0 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B	86
Procedure (3.01 GHz to 6.0 GHz) E4404B, E4405B, E4407B, and E4408B	87
Procedure (6.01 GHz to 6.7 GHz) E4404B	88
Procedure (6.01 GHz to 12.0 GHz) E4405B, E4407B, and E4408B	90
Procedure (12.01 GHz to 13.2 GHz) E4405B	91
Procedure (12.01 GHz to 22 GHz) E4407B and E4408B	92
Procedure (22.01 GHz to 26.5 GHz) E4407B and E4408B	93
Frequency Readout Accuracy	96
Test Limits	96
Test Description	96
Required Equipment	96
Procedure	97
Marker Count Accuracy	99
Procedure	99
Frequency Response	100
Test Limits	100
Test Description	100

Required Equipment	100
Procedure	102
Reference Level Accuracy	105
Test Limits	105
Test Description	105
Required Equipment	105
Log Mode Procedure	106
Linear Mode Procedure	108
Resolution Bandwidth Switching Uncertainty	110
Test Limits	110
Test Description	110
Required Equipment	110
Procedure	111
Scale Fidelity	113
Test Limits	113
Test Description	113
Required Equipment	113
Procedure	114
Second Harmonic Spurious Responses	116
Test Limits	116
T&Description	116
Required Equipment	116
Procedure	117
Tracking Generator Level Flatness: Models E440 1B and E44 11 B.	
Options 1DN and 1DQ	119
Test Limits	119
Test Description	119
Required Equipment	119
Procedure	120
Tracking Generator Level Flatness:	
E4402B, E4403B, E4404B, E4405B, E4407B and E4408B, Option 1 DN	122
Test Limits	12.
Test Description	12 2
Required Equipment	122
Procedure	123

Instrument Messages

Alphabetical Listing

(50 MHz Osc Unleveled)	58
(Freq Ref Unlocked)	60
(IF/ADC Over Range)	61
(LO Out Unleveled)	61
(no corresponding status bit)	60
(Oversweep)	62
(Source LO Unleveled)	63
(Source Unleveled)	63
(Synth Unlocked)	62
(ADC Align Failure)	58
(FM Demod Align Failure) status bit only, no message	60
(IF Align Failure) status bit only, no message	60
(LO Align Failure) status bit only, no message	61
(RF Align Failure) status bit only, no message	63
(TG Align Failure) status bit only, no message	64
* (Invalid Data)	58
: Reduce Signal and press <ESC> (Input Overload Tripped)	62
<directoryname> directory deleted	65
<directoryname1> directory renamed to <directoryname2>	66
<filename> file copied	66
<filename> file deleted	66
<filename> file loaded	66
<filename> file saved	66
<filename> too many data entries	67
<filename1> file renamed to <filename2>	66
'10101010' pattern not detected - results may be inaccurate.	49
100 spurs found. Additional spurs ignored.	55
10537 Cancellation trace has different X-Scale to Smoothed trace.	57
50MHzOscUnlevel	58
Align Now All Needed (Align Needed)	58
Align Now RF Needed (Align Now RF Needed)	59
Align RF Skipped (Align RF Skipped)	59
Align	70
Atten auto set to 15 dB	64

Instrument Messages

Alphabetical Listing

Auto Align not available when using Calibration Defaults.	32
Autoranging	64
Average Type incompatible for scale.	29
AVG 3	94
Avg Mode changed to Exp for Examine Meas Type.	54
Avg Mode changed to Repeat for Full Meas Type.	54
Awaiting trigger	43
B7D and/or B7E not found. Code Domain not available.	64
B7D and/or B7E not found. Mod Acc not available	64
B7D DSP Code Install Fail Opt.229.Contact your Service Center	52
B7D DSP Code Install Fail Opt.231.Contact your Service Center	53
B7D DSP Code Reload Fail Opt.229.Contact your Service Center.	52
B7D DSP Code Reload Fail. Opt.231.Contact your Service Center.	54
Bad or missing floppy disk	31
Band Measurement, not defined for Out of Band.	41
Block data error	23
'Block data not allowed.	22
Burst not found.	47
Cal Data corrupt. Wideband cal failed. Using previous data.	51
Can't Auto-Couple RBW in Zero Span	31
Can't Auto-Couple Sweep Time in Zero Span.	31
Can't compute result • not enough transitions.	50
Cancellation disabled while measuring DANL Floor.	57
Cancellation trace is not set to Reference or has no data	57
Cannot correlate to input signal	44
Cannot display Trace because it contains no data.	55
Cannot find the Power vs Time Limits File	41
Cannot load a directory, please choose a file	37
Cannot lock to carrier.	53
Cannot open trace file for writing. Save Failed	56
Cannot save Trace because it contains no data	56
Cannot update the list of cable types on drive C:.	42
Cannot update the list of cable types	42
Carrier Not Present. Verify frequency and amplitude settings.	57

Instrument Messages

Alphabetical Listing

Carrier Not Present.....	53
Carrier Not Present.....	65
Carrier Present. Test Stopped!.....	42
Channel frequency outside device's transmit band.....	65
Character data error.....	24
Character data not allowed.....	23
Character data too long.....	23
Command error.....	27
Command header error.....	26
Command not recognized.....	27
Command not valid in this model.....	29
Command not valid when no measurement is active.....	29
Connect Amptd Ref Output to Input.....	32
Connect RF OUT to INPUT.....	31
Corrupted file.....	31
Data corrupt or stale.....	21
Data type error	26
DC Coupled.....	59
Default spur table values loaded.....	65
Demod Format setting does not allow this value for Points/Symbol.....	52
Demod ON: reduce span for audible detection.....	60
Device = Mobile. Code Domain not available.....	65
Device = Mobile. Mod Acc not available.....	65
Device-specific error.....	21
Directory already exists.....	66
DSP algorithm timeout, aborting measurement.....	40
DSP timed out , resetting DSP.....	44
Emission bandwidth not found. Consider increasing span.....	47
Entire trace is below the threshold level.....	66
Entire trace is below threshold level.....	41
Error reading file: CDMASTUN.CS V. Please reinstall cdmaOne	45
Error reading file: CDPDMDA. Please reinstall cdmaOne	46
Error reading file: CDPPMCO. Please reinstall cdmaOne	46
Error reading file: CDPPMDA. Please reinstall cdmaOne	46

Instrument Messages

Alphabetical Listing

Error reading file: OOBSTAB.CSV. Use Edit Table Save Table.	.46
Error reading file: RHODMDA. Please reinstall cdmaOne.	.46
Error reading file: RHOPMCO. Please reinstall cdmaOne.	.46
Error reading file: SPCLIMIT.CSV. Cannot use custom limits.	.45
Execution error.	.22
Exponent too large.	.2
Exponent too large.	.25
Expression data error.	.22
Expression data not allowed.	.22
Ext Ref.	.60
Ext Ref.	.70
Failed to Load trace. Bad file format.	.56
File access is denied.	.30
Filealreadyexists.	.3 0
File Name Error.	.30
File not found.	.30
Flash memory is full.	.31
Flat corr off (no corresponding status bit).	.60
Floppy disk error.	.3 0
Floppy disk full.	.29
Freq corr off (no corresponding status bit).	.60
FreqRefUnlock.	.70
Frequency Reference Error.	.60
Gate option not installed. Results may not be accurate.	.42
GET not allowed.	.26
Hardkeysaredisabled.	.4 3
Header separator error.	.25
Header suffix out of range.	.25
IF Gain fixed.	.6 1
IF Overload.	.61
Illegal write access of Flash memory.	.31
In <command>: bad data count, (<numeric_value>): expected multiple of <numeric-value>.	.33
In <filename>, line <nnn>: separator missing.	.33
In <filename>, line <numeric-value>: <xxx> is not numeric.	.34

Instrument Messages

Alphabetical Listing

In <filename>, line <numeric-value>: error parsing tokens	34
In <filename>, line <numeric-value>: line too long.	33
In <filename>: [DATA] header missing.	33
In <filename>: bad amplitude unit <unit>	34
In <filename>: error reading file	33
Incorrect filename, allowable extensions are .gif or .wmf	36
Incorrect filename, allowable extensions are .trc or .csv	36
Input is internal (no corresponding status bit).	61
Instrument mode requested is not supported.	36
Instrument state may be corrupt, state has been reset to initial values.	35
Interpolation error: cannot compute log of <negative-frequency-value>	34
Invalid Baud Rate.	28
Invalidblockdata	23
Invalid character data	24
Invalid character in number	25
Invalidcharacter	27
Invalidexpression	22
Invalid format: CSV files are not supported by this measurement.	67
Invalid instrument mode	36
Invalid Marker Trace	56
Invalid option, unable to uninstall package	29
Invalid printer response.	32
Invalid separator	26
Invalid string data	23
Invalid suffix	24
Level is low, results may degrade.....	44
LO Out Unlevel.	61
LO Unlevel (LO Unleveled)	61
LO Unlock	62
Log Corr Off (no corresponding status bit)	62
Lost trigger, aborting measurement.	40
Lower Custom Mask is Invalid!.	41
Marker Count:Widen Res BW	62
Meas Type changed to Examine for Exp Avg Mode.	54

Instrument Messages

Alphabetical Listing

Meas Type changed to Full for Repeat Avg Mode.	55
Meas Uncal.	62
Measurement does not support the current radio standard.	43
Measurement failed for unknown reasons.	44
Measurement halted. Press a measurement key to continue.	67
Measurement not defined for Out of Band.	40
Measurement suspended until carrier is turned off.	43
Measurement uncalibrated, symbol rate exceeds +/-10% nominal.	51
Measurement uncalibrated, wideband calibration required.	51
Media is corrupt.	30
Media is not writable.	30
Media is protected	30
Missing parameter	26
No error	20
No Fast ADC hardware installed. Meas unavailable.	40
No Fast ADC hardware installed. Meas unavailable.	67
No Fast ADC hardware installed.	40
No Fundamental > 0 Hz found in given span.	37
No Fundamental > -50 dBm found in given span.	37
Nopeakfound	27
No ranges are defined.	55
No spurs have been found.	55
Not enough frequency range to measure harmonics for channel	67
Numeric data error	25
Numeric data not allowed	24
One or more harmonics beyond freq limit: number decreased	37
One or more harmonics beyond freq limit: number decreased	67
Opt 106 demod hardware required. Meas unavailable.	48
Opt. 106 hardware required. Preamble sync unavailable.	48
Opt 229 DSP algorithm code file requires upgrade	52
Opt 229 DSP algorithm coef. file requires upgrade.	52
Opt 231 DSP algorithm code file requires upgrade	54
Opt 231 DSP algorithm coef. file requires upgrade.	54
Opt AXX hardware required. Meas unavailable.	39

Instrument Messages
Alphabetical Listing

Opt B7D & B7E hardware required. Meas unavailable.	39
Opt B7D bootrom requires upgrade.	39
Opt B7D or AYX FADC hardware required. Meas unavailable.	48
Opt B7E RF hardware required. RF Burst unavailable.	48
Opt BAH DSP algorithm code file requires upgrade..	39
Opt BAH DSP algorithm coef. file requires upgrade..	40
Opt BAH DSP algorithm tiles failed to load, aborting measure.	40
Opt. BAH DSP algorithm files not installed. Meas unavailable.	39
Opt Freq Rcf setting does not match external reference..	45
Option activated.....	67
Optionnotinstalled	27
Option not licensed.	29
Overload	62
Overload	70
Parameter not allowed	26
Parameter unavailable in demod measurements.	48
Payload data pattern '10101010' not present..	49
Peaking Signal (no corresponding status bit)	62
Please set RF input range (INPUT menu) to manual first.	68
Preferred resolution bandwidth not available.	62
Preselector centering failed	28
Printer interface error	33
Printer Type is None.	33
Program mnemonic too long.	25
Query DEADLOCKED	20
Query Error	21
Query INTERRUPTED	20
Query UNTERMINATED after indefinite response.	20
Query UNTERMINATED.	20
Radio standard is not supported by the current measurement.	43
RBW limited to 1 kHz when Span > 5 MHz	28
Required payload data pattern '10101010' not present..	49
Required payload data pattern '11110000' not present.	49
Resolution BW <300 kHz.	41

Instrument Messages

Alphabetical Listing

RF Board could not detect any bursts in signal.	.45
RF Board LO Unlocked. Contact service center.	.44
RF Board RF Osc Unlocked. Contact service center.	.45
RF Board SR Osc Unlocked. Contact service center.	.45
RF Signal not. found.	.44
RS-232 Interface Error	.29
Second harmonic is beyond analyzer frequency limit.....	.37
Settings conflict; parameter currently disabled.	.22
Shutdown in process.	.68
Signal Ident On, Amptd Uncal (Signal Ident On)	.63
Signal level is low.	.63
Signal Tracking disabled when measuring DANL Floor (Removal').	.57
Source LO Unlevel	.63
Source LO Unlock (Source Synth Unlocked)	.63
Source Unlevel	.63
Span limited to 5 MHz when RBW < 1 kHz	.28
Start Marker must be at least 1% < Stop Marker....	.48
Stop Marker must be at least 1% > Start Marker....	.48
Store Ref trace before turning on Normalize	.37
String data error	.23
String data not allowed	.23
Suffix error	.24
Suffix not allowed.	.24
Suffix too long.	.24
Sweep Time too fast (<2 sec)	.42
Sync word not found in frame (Burst Type)	.38
Sync word not found in frame (Ref Burst,)	.38
Sync word not found in frame (TSC).	.50
Sync word not found in specified timeslot (Burst Type!	.38
Sync word not found in specified timeslot (TSC).....	.51
Syntaxerror	.26
System Alignments, Align Now, All Required	.63
System error.	.21
Table could not be loaded.	.47

Instrument Messages

Alphabetical Listing

Tablecouldnotbesaved.	46
Table loaded successfully.. . . .	68
Table saved successfully.	68
TG Frequency Limit	27
TG start freq is less than 1/2 res bw	28
TG start freq is less than 9 kHz.	28
The Cable Fault Measurement is active. Mode Setup is disabled.	42
The calibration data is invalid, and has been cleared.. . . .	68
The file containing the list of cable types has been updated.. . . .	68
The regression portion failed.	44
There are no spurs to inspect.	42
There is no valid result to hold.	49
This measurement does not support the *.CSV file format.	55
This measurement. does nob support the *.CSV file format.	69
This operation requires a measurement to be active.. . . .	52
This operation requires a measurement to be active.. . . .	69
Too many data values at <freq_or_time_value>	34
Too many digits.	25
Too much data; <description of the type of data exceeded>.	21
Trace file contains no compatible traces.. . . .	56
Trace file saved successfully.	57
Trace file was created by incompatible version of Opt. 226	56
Tracking Generator hardware is not present. Meas unavailable.	41
Tracking Peak Needed..	69
Trigger Offset unavailable in swept spans	29
Unable to Calculate Result using Current Setup.	49
Unable to initialize flatness data.	28
Unable to load file.	36
Unable to load state from file.	35
Unable to load state from register.	35
Unabletoloadstate	35
Unable to load user state, factory preset was done	35
Ullabletoquerystate	35
Unable to save file	36

Instrument Messages

Alphabetical Listing

Unable to save state to file	.35
Unable to save state to register.	.35
Unable to save user state	.35
Unable to set state.	.36
Unable to store flatness data.	.28
Unable to uninstall personality, file not deletable.	.58
U n c a l	.71
Undefined header.	.25
Unknown demod status	.39
Unknown printer	.32
Unlevel	.71
Unlock	.71
Unsupported printer	.32
Upper Custom Mask is Invalid!	.41
Use View/Trace menu when loading or saving logarithmic traces	.55
Valid Bluetooth burst not found.(Check Packet Type).	.47
Valid burst not found in frame (Burst Type).	.50
Valid burst not found in specified timeslot (Burst Type).	.50
Valid burst not found.	.53
Valid GSM burst not found in frame (Burst Type).	.38
Valid GSM burst not found in frame (Ref Burst).	.38
Valid GSM burst not found in specified timeslot (Burst Type).	.38
Valid signal not found.	.50
Video shift off (no corresponding status bit).	.64
Volume <name> formatted	.69
WARNING: You are about to delete all of the contents on directory "x: \xxxxx\".	
Press Delete Now again to proceed or any other key to abort	.69
Wideband calibration not valid until Align Now, All performed.	.51
Wrong density floppy inserted.	.31

1 Instrument Messages

Instrument Messages Introduction

The analyzer can generate various messages that appear on the display during operation. There are four types of messages.

- Status Messages, beginning on page 58, appear on the right side of the analyzer display and/or set status bits in the SCPI Status Register system. These messages indicate a condition that may result in erroneous data being displayed. Most messages will only be displayed until the error condition is corrected. Multiple messages can be displayed and will be listed in the display area. In each case the name of the corresponding status bit is indicated in parenthesis. It will be noted if only a status bit is used (no message).
- Informational Messages, beginning on page 64, provide information that requires intervention. These messages appear in the status line at the bottom of the display. If you have a color display and are using the default display colors, the message will appear in green. The message will remain until you preset the analyzer, press **ESC**, or another message is displayed in the status line. The information provided in brackets, for example <filename> or <directory>, is a variable that represents a specific input provided previously.
- Annunciator Bar Messages, beginning on page 70, provide Status Message information and appear on the left or right side of the annunciator bar of the analyzer display when running measurements. Some of the messages appear on the left side of the annunciator bar in red and other appear on the right side of the annunciator bar in green. An annunciator bar message may map to several different status messages, and you should check the related status messages to determine the cause of your annunciator message. For more information on status messages, refer to Status Messages above.
- User Error Messages, beginning on page 20, appear when an attempt has been made to set a parameter incorrectly or an operation has failed (such as saving a file). These messages are often generated during remote operation when an invalid programming command has been entered. These messages appear in the status line at the bottom of the display. If you have a color display and are using the default display colors, the message will appear in yellow. The message will remain until you preset the analyzer, press **ESC**, or another message is displayed in the status line. A summary of the last 30 error messages preceded by an error number may be viewed in the Error Queue by pressing, System then **Show Errors**. Refer to Table 1-1 for more information on the characteristics of the Error Queue. When a remote interface initiates activity that generates an error, the messages are output to the remote bus. When output to the remote interface, they are preceded by an error number.

When a user error condition occurs in the analyzer as a result of SCPI (remote interface) activity, it is reported to both the front panel display error queue and the SCPI error queue. If it is a result of front panel activity, it reports to the front panel display error queue, and depending on the error, may also report to the SCPI error queue. These two queues are viewed and managed separately.

Table 1-1 Characteristics of the Error Queue

Characteristic	Front Panel Display Error Queue	SCPI Remote Interface Error Queue
Capacity (number of errors)	30	30
Overflow Handling	Circular (rotating). Drops oldest error as new error comes in.	Linear, first-in/first-out. Replaces newest error with: -350, Queue overflow
Viewing Entries	Press: System, Show Errors	Use SCPI query SYSTem:ERRor?
Clearing the Queue	Press: System, Show Errors, Clear Error Queue	Power up. Send a *CLS command. Read last item in the queue.

Note that the error number is displayed under the **System, Show Errors** key sequence.

- Pop-up Messages indicate a condition that may require intervention. They appear in the middle of the display in a framed box. The message will remain until the appropriate intervention has taken place or the condition has been corrected.

Error Message Format

The system-defined error numbers are chosen on an enumerated ("1 of N") basis. The error messages are listed in numerical order according to the error message number. Status and Informational messages without numbers will be listed in alphabetical order following the numerical listing.

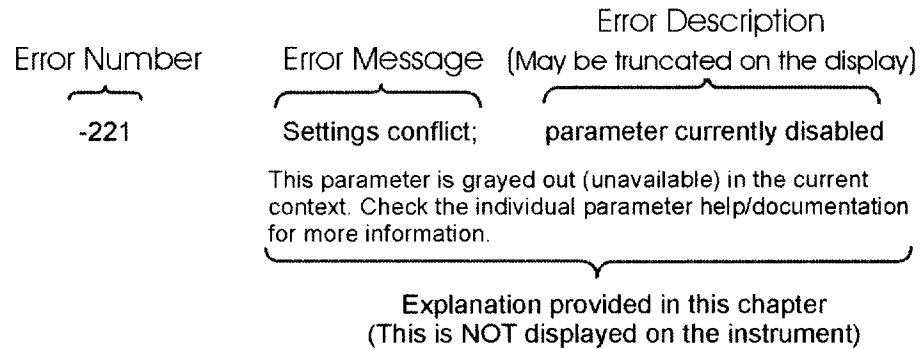
NOTE

To see an error *number*, view the error queue as described on page 17.

In this chapter, an explanation is included with each error to further clarify its meaning. The last error described in each class (for example, -400, -300, -200, -100) is a "generic" error. There are also references to the IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI / IEEE Std 488.1-1987*. New York, NY, 1992.

Error messages are displayed at the bottom of the screen in the status line (yellow on color displays). The error number is available through the remote interface and the show errors screen; it is not displayed in the status line.

Figure 1-1 Error Message Example



pk716b

Error Message Types

Events do not generate more than one type of error. For example, an event that generates a query error will not generate a device-specific, execution, or command error.

–499 to –400: Query Errors

These errors indicate that the analyzer output queue control has detected a problem with the message exchange protocol described in IEEE 488.2, Chapter 6. Errors in this class set the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1). These errors correspond to message exchange protocol errors described in IEEE 488.2, 6.5. In this case:

- Either an attempt is being made to read data from the output queue when no output is either present or pending, or
- data in the output queue has been lost.

–399 to –300: Device-Specific Errors

An error number in the range –399 to –300 indicates that the analyzer has detected an error where some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. This is not a error in response to a SCPI query or command, or command execution. The occurrence of any error in this class will cause the device-specific error bit (bit 3) in the event status register to be set.

–299 to –200: Execution Errors

These errors indicate that an error has been detected during analyzer execution.

- 199 to -100:
Command Errors** These errors indicate that the analyzer parser detected an IEEE 488.2 syntax error. Errors in this class set the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1). In this case:
- Either an IEEE 488.2 syntax error has been detected by the parser (a control-to-device message was received that is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates device listening formats or whose type is unacceptable to the device.), or
 - an unrecognized header was received. These include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.
- 201 to 799:
Device-Specific Errors** These errors indicate that a device operation did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. Errors in this class set the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1).
- The <error_message> string for a positive error is not part of the SCPI standard. A positive error indicates that the analyzer detected an error within the GPIB system, within the analyzer firmware or hardware, during the transfer of block data, or during calibration.
- Greater than 10000:
Measurement Applications Errors** These errors indicate that an error has been detected while executing measurements requiring a personality option such as Option BAH, the GSM Measurement Personality or those measurements found under the **MEASURE** front-panel key in Spectrum Analyzer mode.

Instrument Messages

Error Messages

NOTE

Error numbers are displayed in the error queue, *not* on the display.

To see an error *number*, view the error queue as described on page 17.

0 No error

The queue is empty. Every error in the queue has been read or the queue was purposely cleared by power-on or *CLS.

-499 to -400: Query Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.

To see an error *number*, view the error queue as described on page 17.

-440 Query UNTERMINATED after indefinite response

Indicates that a query was received in the same program message after a query requesting an indefinite response was executed (see IEEE 488.2, 6.3.7.5).

-430 Query DEADLOCKED

Indicates that a condition causing a DEADLOCKED query error occurred (see IEEE 488.2, 6.3.1.7). For example, both the input buffer and the output buffer are full and the analyzer cannot continue. The analyzer automatically discards output to correct the deadlock.

-420 Query UNTERMINATED

Indicates that a condition causing an UNTERMINATED query error occurred (see IEEE 488.2, 6.3.2.2). For example, the device was addressed to talk and an incomplete program message was received.

-410 Query INTERRUPTED

Indicates that a condition causing an INTERRUPTED query error occurred (see IEEE 488.2, 6.3.2.7). For example, a query was followed by DAB or GET before a response was completely sent.

-400 Query Error

This is a generic query error for devices that cannot detect more specific errors. The code indicates only that a query error as defined in IEEE 488.2, 11.5.1.1.7, and 6.3 has occurred.

-399 to -300: Device-Specific Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.
 To see an error *number*, view the error queue as described on page 17.

-310 System error

Indicates that an error, termed “system error” by the device, has occurred.

-300 Device-specific error

This is a generic device-dependent error for devices that cannot detect more specific errors. The code indicates only that a device-dependent error as defined in IEEE 488.2, 11.5.1.1.6 has occurred.

-299 to -200: Execution Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.
 To see an error *number*, view the error queue as described on page 17.

-230 Data corrupt or stale.

Possibly invalid data. A new measurement was started but not completed.

-223 Too much data; <description of the type of data exceeded>

Indicates that a legal program data element of block, expression or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.

-221 Settings conflict; parameter currently disabled

This parameter is grayed out (unavailable) in the current context. Check the individual parameter help/documentation for more information.

-200 Execution error

This is a generic execution error for devices that cannot detect more specific errors. The code indicates only that a execution error as defined in IEEE 488.2, 11.5.1.1.4 has occurred.

-199 to -100: Command Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.

To see an error *number*, view the error queue as described on page 17.

-178 Expression data not allowed

A legal expression data was encountered, but was not allowed by the device at this point in parsing.

-171 Invalid expression

The expression data element was invalid (see IEEE 488.2, 7.7.7.2). For example, unmatched parentheses or an illegal character.

-170 Expression data error

This error, as well as errors -171 through -179, is generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.

-168 Block data not allowed

A legal block data element was encountered, but not allowed by the device at this point in the parsing.

- 161 Invalid block data
- A block data element was expected, but was invalid (see IEEE 488.2, 7.7.6.2). For example, an END message was received before the end length was satisfied.
- 160 Block data error
- This error, as well as errors -161 through -169, is generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error.
- 158 String data not allowed
- A string data element was encountered, but not allowed by the device at this point in the parsing.
- 151 Invalid string data
- A string data element was expected, but was invalid (see IEEE 488.2, 7.7.5.2). For example, an END message was received before the terminal quote character.
- 150 String data error
- This error, as well as errors -151 through -159, is generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error.
- 148 Character data not allowed
- A legal character data element was encountered where prohibited by the device.
- 144 Character data too long
- The character data element contains more than twelve characters (see IEEE 488.2, 7.7.1.4).

- 141 Invalid character data
- Either the character data element contains an invalid character or the particular element received is not valid for the header.
- 140 Character data error
- This error, as well as errors -141 through -149, is generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.
- 138 Suffix not allowed
- A suffix was encountered after a numeric element which does not allow suffixes.
- 134 Suffix too long
- The suffix contained more than twelve characters (see IEEE 488.2, 7.7.3.4).
- 131 Invalid suffix
- The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
- 130 Suffix error
- This error, as well as errors -131 through -139, is generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.
- 128 Numeric data not allowed
- A legal numeric data element was received, but the device does not accept one in this position for the header.

- 124 Too many digits
The mantissa of a decimal-numeric data element contained more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).
- 123 Exponent too large
The magnitude of an exponent was greater than 32000 (see IEEE 488.2, 7.7.2.4.1).
- 121 Invalid character in number
An invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a "9" in octal data.
- 120 Numeric data error
This error, as well as errors -121 through -129, is generated when parsing a data element which appears to be numeric, including non-decimal numeric types. This particular error message is used if the device cannot detect a more specific error.
- 114 Header suffix out of range
The value of a header suffix attached to a program mnemonic makes the header invalid.
- 113 Undefined header
The header is syntactically correct, but it is undefined for this specific device. For example, *XYZ is not defined for any device.
- 112 Program mnemonic too long
The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).
- 111 Header separator error
A character which is not a legal header separator was encountered while parsing the header.

- 110 Command header error
- An error was detected in the header. This message is used when the device cannot detect the more specific errors described for errors -111 through -119.
- 109 Missing parameter
- Fewer parameters were received than required for the header. For example, the *ESE common command requires one parameter, so receiving *ESE is not allowed.
- 108 Parameter not allowed
- More parameters were received than expected for the header. For example, the *ESE common command only accepts one parameter, so receiving *ESE 0,1 is not allowed.
- 105 GET not allowed
- A Group Execute Trigger was received within a program message (see IEEE 488.2, 7.7). Correct the GPIB controller program so that the GET does not occur within a line of GPIB program code.
- 104 Data type error
- The parser recognized a data element that is not allowed. For example, numeric or string data was expected, but block data was encountered.
- 103 Invalid separator
- The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit.
- 102 Syntax error
- An unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.

-101 Invalid character

A syntactic command contains a character which is invalid for that type. For example, a header containing an ampersand, such as "SETUP&". This error might be used in place of error numbers -114, -121, -141, and some others.

-100 Command error

This is a generic syntax error for devices that cannot detect more specific errors. The code indicates only that a command error as defined in IEEE 488.2, 11.5.1.1.4 has occurred.

201 to 799: Device-Specific Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.
To see an error *number*, view the error queue as described on page 17.

201 Option not installed

The desired operation cannot be performed because a required option is not installed. For example, pressing **Source** with no tracking generator installed in the analyzer will generate this error.

202 No peak found

No signal peak was found.

204 TG Frequency Limit

The tracking generator has reached the limit of its allowable frequency range.

205 Command not recognized

Indicates that the command sent from the remote interface was not recognized. Check the programming guide for correct syntax.

- 206 Unable to initialize flatness data
A failure occurred in setting the flatness data in the internal EEROM. Get in touch with your local Agilent Technologies sales and service office.
- 207 Unable to store flatness data
A failure occurred in setting the flatness data in the internal EEROM. Get in touch with your local Agilent Technologies sales and service office.
- 209 Preselector centering failed
An attempt to center the preselector failed.
- 211 RBW limited to 1 kHz when Span > 5 MHz
In spans greater than 5 MHz, narrow (digital) resolution bandwidths, below 1 kHz, are not available.
- 213 Span limited to 5 MHz when RBW < 1 kHz
In narrow (digital) resolution bandwidths, below 1 kHz, spans greater than 5 MHz are not available.
- 214 TG start freq is less than 9 kHz
Tracking generator uncalibrated below 9 kHz.
- 215 TG start freq is less than 1/2 res bw
Tracking generator uncalibrated at start frequencies below 1/2 the current resolution bandwidth.
- 216 Invalid Baud Rate
Attempt to use invalid baud rate. Refer to the programming language chapter of *Agilent Technologies ESA Series Spectrum Analyzer Programmer's Guide* for more information.

- 217 RS-232 Interface Error
An error occurred on the serial interface.
- 219 Command not valid in this model
Indicates that the command sent from the remote interface does not apply to this model number. For example, attempting to center the preselector in an analyzer without a preselector will generate this error.
- 221 Invalid option, unable to uninstall package
You have attempted to remove a personality that is not currently installed. Verify command was entered correctly.
- 222 Command not valid when no measurement is active
Indicates that the command sent from the remote interface must be issued while a measurement is running in the analyzer.
- 223 Trigger Offset unavailable in swept spans
Trigger Offset is only available in Zero Span. Refer to "Trig" in the Agilent ESA Spectrum Analyzer User's Guide for a description of this function.
- 224 Option not licensed.
The selected option requires a license. Refer to the installation procedures in the user's guide available for this particular option.
- 332 Average Type incompatible for scale.
Amplitude Scale command should be sent prior to the Average Type command.
- 601 Floppy disk full
The floppy disk is full. Clear some space by deleting unwanted files.

- 602 Floppy disk error
An unknown error has occurred while accessing the floppy disk.
- 604 File already exists
Attempt to save to a file that already exists. Delete or rename the old file and try again.
- 605 Media is protected
A save was attempted to a write-protected device.
- 606 Media is corrupt
A save was attempted to a corrupt device.
- 607 File Name Error
An invalid file name has been specified. Use filenames with a maximum of 8 characters (letters and digits only) and use a 3 character extension. Note that lowercase and uppercase are perceived as the same. This error will also occur if you attempt to delete a nonexistent file.
- 609 Media is not writable
A save was attempted to a read-only device.
- 610 File access is denied
The file is protected or hidden and cannot be accessed.
- 612 File not found
The analyzer could not find the specified file.

- 613 Flash memory is full
- The internal flash memory is full. Clear some space by deleting unwanted files. If your analyzer has a serial number less than US41440000 or MY41440000 and Option B72 has not been installed, you may also increase the flash memory size by purchasing Option B72.
- 614 Bad or missing floppy disk
- The floppy is not inserted or the directory could not be read. Insert a known good disk and try again.
- 615 Corrupted file
- The file that you were trying to load is corrupt.
- 617 Wrong density floppy inserted
- The floppy disk has the wrong density. It should be 1.44 MB.
- 618 Illegal write access of Flash memory
- Attempt to write to an unavailable area of internal flash memory.
- 619 Can't Auto-Couple RBW in Zero Span
- You sent a remote command to set the RBW into auto while in zero span. (Remote interface only.)
- 620 Can't Auto-Couple Sweep Time in Zero Span
- You sent a remote command to set the sweep time to auto while in zero span. (Remote interface only.)
- 651 Connect RF OUT to INPUT
- Attempt to align the tracking generator without its output connected. Connect the tracking generator RF OUT to the analyzer **INPUT**.

- 652 Connect Amptd Ref Output to Input
- For Agilent Technologies E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only:* you must connect the **AMPTD REF OUTPUT** to the analyzer **INPUT** with the appropriate cable.
- 653 Auto Align not available when using Calibration Defaults
- The Auto Alignment system cannot be used until an **Align Now All** is executed by pressing **System, Alignments, Align Now, All**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.
- 701 Invalid printer response
- In attempting to identify the printer an invalid response was received. Check that you are using a supported printer. Be sure you are using the proper cable and that it is securely fastened.
- 702 Unsupported printer
- A printer which is recognized, but known to be unsupported was identified. This printer cannot be used with the analyzer. For example, a printer only supported by Microsoft Windows will generate this error.
- 703 Unknown printer
- In attempting to identify the printer, a valid response was received but the printer is not known to the analyzer. Use the **Custom** printer menu under **Print Setup** to configure the printer.

- 704 Printer interface error
- An error occurred while trying to print. Make sure the printer is turned on and properly connected.
- 705 Printer Type is None
- The current printer type is set to **None**, so no print operations are possible. Change the type in the **Print Setup** menu and try again.
- 727 In <filename>: [DATA] header missing
- This message indicates that the data section of a file did not begin with the token **[DATA]**.
- 728 In <filename>, line <nnn>: separator missing
- The **[HEADER]** section of a file contains entries requiring an equal (=) sign, such as <keyword> = <value>. This message appears if the equal sign does not appear on the line.
- 729 In <filename>: error reading file
- Appears when loading data from a limit line or corrections disk file and a failure to the file occurs.
- 730 In <filename>, line <numeric_value>: line too long
- When loading data from a limit line or corrections disk file, this message will appear if the length of any line in the file exceeds 255 characters.
- 731 In <command>: bad data count
(<numeric_value>): expected multiple of
<numeric_value>
- This message indicates that the data sent to a corrections or limit table via the **DATA** or **MERGE** commands does not have the expected length for the table. For example, this message would appear if an attempt were made to merge 7 numeric values into a limit table, since each logical entry requires 3 values (frequency, amplitude, and connected).

- 732 In <filename>, line <numeric_value>: error parsing tokens
- This message may appear when loading data from a limit line or corrections disk file. It indicates a problem in the attempt to break a string of text into tokens. There may be too few tokens in the string. In other words, the file content must match the expected format. This typically happens when there are too few numeric values in the **[DATA]** section of a limit or corrections file.
- 733 In <filename>, line <numeric_value>: <xxx> is not numeric
- This message may appear when loading data from a limit line or corrections disk file. It indicates that a non-numeric token <xxx> was found where a numeric token was expected. In other words, the file content must match the expected format.
- 734 Interpolation error: cannot compute log of <negative_frequency_value>
- Occurs when the frequency interpolation of a limit line is set to log and the start frequency of the instrument is negative. The <negative_frequency_value> is limited to – 80 MHz, so it may not match the frequency that caused the error.
- 735 In <filename>: bad amplitude unit <unit>
- This message indicates that unit <unit> is not recognized or supported.
- 736 Too many data values at <freq_or_time_value>
- This message may appear when data is sent to a corrections or limit table using the **DATA** or **MERGE** commands. These tables limit the number of amplitudes associated with a frequency or time to 2 or less. This message will appear if an attempt is made to attach 3 or more values to a frequency or time.

- 751 Instrument state may be corrupt, state has
 been reset to initial values

 An error in the internal instrument state has been
 detected. The state has been reset to a default value.
- 752 Unable to load state from file

 Loading of state from a file failed.
- 753 Unable to save state to file

 Saving of state to a file failed.
- 755 Unable to load state from register

 Loading a state from an internal state register failed.
- 756 Unable to save state to register

 Saving of state to an internal register failed.
- 757 Unable to load user state, factory preset was
 done

 An attempt to perform a **User Preset** failed, so the
 Factory Preset values were used. Save a valid state into
 User Preset and try again.
- 758 Unable to save user state

 An attempt to save to the **User Preset** state failed.
- 759 Unable to load state

 A saved state file from a newer firmware revision was
 attempted to be loaded into an older instrument.
- 760 Unable to query state

 Query of state over the remote interface was
 unsuccessful.

Instrument Messages
Instrument Messages

- 761 Unable to set state

 Attempt to set the state over the remote interface was unsuccessful.
- 762 Incorrect filename, allowable extensions
 are .trc or .csv

 Attempt to save a trace to a file with an incorrect extension.
- 762 Unable to load file

 A failure occurred while loading a file; the file was not loaded.
- 763 Incorrect filename, allowable extensions
 are .gif or .wmf

 Attempt to save a screen image to a file with an incorrect extension.
- 764 Unable to save file

 A failure occurred while saving a file; the file was not saved.
- 769 Invalid instrument mode

 You have attempted to switch to an instrument mode that is currently not installed. Confirm that the mode name (for INST:SEL) or number (for INST:NSEL) was entered correctly and that the requested personality is actually installed in the instrument.
- 770 Instrument mode requested is not supported

 Instrument mode specified with: INST command is not valid. Refer to Chapter 5, "Instrument Subsystem" of *Agilent Technologies ESA Series Spectrum Analyzer Programmer's Guide* for more information.

- 771 Store Ref trace before turning on Normalize
A reference trace must be available for the Normalize function to be activated. Refer to "View/Trace" in the Agilent ESA Spectrum Analyzer User's Guide where the **Normalize** key function is explained in detail.
- 772 Cannot load a directory, please choose a file
You have selected a directory instead of a file when attempting to perform the Load function under the **File** front-panel key.

Greater than 10000: Measurement Applications Errors

NOTE

Error numbers are displayed in the error queue, *not* on the display.
To see an error *number*, view the error queue as described on page 17.

- 10010 One or more harmonics beyond freq limit:
number decreased.

Highest harmonic was past the frequency limit of the analyzer, so the number of measured harmonics was decreased.
- 10011 Second harmonic is beyond analyzer frequency limit.

The frequency range of your analyzer does not include the first multiple of the captured fundamental frequency in internal mixing.
- 10012 No Fundamental > 0 Hz found in given span.

There were no frequencies greater than 0 Hz in the starting span, so the measurement was stopped.
- 10013 No Fundamental > -50 dBm found in given span.

A fundamental was not found, so the measurement was stopped.

- 10138 Valid GSM burst not found in frame (Burst Type).

No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was performed over the complete GSM frame.
- 10139 Valid GSM burst not found in specified timeslot (Burst Type).

No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was only performed over the specified timeslot setting.
- 10140 Valid GSM burst not found in frame (Ref Burst).

No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was performed using the Ref Burst type setting over the complete GSM frame.
- 10141 Sync word not found in frame (Burst Type)

One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was performed over the complete GSM frame.
- 10142 Sync word not found in specified timeslot (Burst Type)

One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed over the specified timeslot setting.
- 10143 Sync word not found in frame (Ref Burst)

One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed using the Reference Burst type and Reference TSC settings over the complete GSM frame.

- 10144 Unknown demod status.
- Demodulation is in an unknown state. Press **Preset**. If the error persists, get in touch with your service center.
- 10145 Opt AYX hardware required. Meas unavailable.
- Option AYX must be installed for this measurement to be enabled.
- 10146 Opt B7D & B7E hardware required. Meas unavailable.
- The RF Communications Hardware (Option B7E) and Digital Signal Fast ADC (Option B7D) cards required to perform the demodulation are not present in the analyzer.
- 10147 Opt B7D bootrom requires upgrade.
- The (Option B7D) bootrom revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use.
- 10148 Opt BAH DSP algorithm files not installed. Meas unavailable.
- The Digital Signal Processor algorithm files required to perform the demodulation are not present in the analyzer.
- 10149 Opt BAH DSP algorithm code file requires upgrade.
- The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use for more information on installation/upgrade.

- 10150** Opt BAH DSP algorithm coef. file requires upgrade.
The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use.
- 10151** Opt BAH DSP algorithm files failed to load, aborting measure.
The Digital Signal Processor algorithm files required to perform the demodulation are corrupt and cannot be loaded properly. Reinstall measurement personality.
- 10152** Lost trigger, aborting measurement.
The selected trigger source was present at the start of the measurement, but timed out before the measurement completed.
- 10153** DSP algorithm timeout, aborting measurement
The Digital Signal Processor demodulation algorithm timed-out for an unknown reason. This message normally indicates a problem with the modulated signal.
- 10154** Measurement not defined for Out of Band.
You have changed to an out-of-band frequency range. The band measurement only operates in the selected band.
- 10155** No Fast ADC hardware installed. Meas unavailable.
The analyzer cannot use sweep times of less than 5 msec when Option B7D or Option AXX is not installed. Therefore the measurement will not be executed.
- 10156** No Fast ADC hardware installed.
The analyzer cannot use sweep times of less than 5 msec when Option B7D or Option AXX is not installed resulting in all the radio standards not being supported.

- 10157 Tracking Generator hardware is not present.
Meas unavailable.

The measurement requires a built-in tracking generator.
- 10159 Entire trace is below threshold level

The measurement cannot operate properly because the trace has completely fallen below the threshold level. Change the threshold level to view trace.
- 10160 Upper Custom Mask is Invalid!

The user-specified upper custom mask cannot be resolved into a limit line. The format is incorrect.
- 10161 Lower Custom Mask is Invalid!

The user-specified lower custom mask cannot be resolved into a limit line.
- 10162 Resolution BW <300 kHz.

This error message is a warning that the resolution bandwidth has been set below 300 kHz. The test results will not meet GSM specifications.
- 10163 Cannot find the Power vs Time Limits File.

The limit line definition file for the GSM standards has been deleted. This message is displayed while the **Measure** key is grayed out. Reinstall the GSM measurement personality.
- 10164 Band Measurement not defined for Out of Band.

You are attempting to monitor the band but have set the frequency outside the band. Reset the band for the particular standard for which you are testing or use the channel setting which does not require a frequency to be set. (**Meas Setup, Method (Channel)**).

- 10166 Cannot update the list of cable types.
The cable file may have been moved or deleted accidentally. Reinstall the measurement personality. This message is applicable to the GSM (Option BAH) and Distance to Fault (Option 226) measurement personality options.
- 10168 Cannot update the list of cable types on drive C:
The file update failed.
- 10170 The Cable Fault Measurement is active. Mode Setup is disabled.
Mode setup is not available in the cable fault utility.
- 10172 Sweep Time too fast (<2 sec)
The sweep time must be set to 2 seconds or longer for the results to be valid.
- 10177 There are no spurs to inspect.
You have attempted to switch the **Inspect Spur** softkey to the **On** position after the measurement has finished, but found no spurs.
- 10179 Carrier Present. Test Stopped!
A carrier was found in the transmit band. Either disable the carrier or insert a bandpass filter for the receive bandwidth.
- 10180 Gate option not installed. Results may not be accurate.
This measurement method requires the use of the time-gate (option 1D6) in order to gate the spectrum during the 50-90% part of the burst. If the gate option is not installed, the measurement will still run although this warning will be displayed.

- 10186 Measurement does not support the current radio standard.
- The measurement you have chosen is currently greyed out. Select a radio standard which is supported (**Mode Setup, Radio Std**) or configure the measurement manually.
- 10187 Radio standard is not supported by the current measurement.
- The standard you have chosen is currently greyed out. Select a radio standard which is supported by the current measurement (**Mode Setup, Radio Std**) or configure the measurement manually.
- 10218 Hardkeys are disabled.
- Some of the forms (for example Receiver Spurious in GSM) do not allow you to close the form without either formally accepting or cancelling the form settings. For this reason, all of the hardkeys are disabled until you terminate the form.
- 10219 Awaiting trigger
- The measurement requires a trigger to be present. If the trigger does not occur or is delayed, this message will be displayed. Check your trigger settings.
- 10227 Measurement suspended until carrier is turned off.
- The receive channel power and the receive spur measurements are specified with the attenuation set to 0 dB. To prevent overload, the frequency spectrum of interest is monitored for signal levels which exceed a specified threshold before setting the attenuator to 0 dB. If a carrier is found, this message is displayed and the completion of the measurement will not occur until the carrier is removed. The carrier check may be turned off using the properties form under the front-panel **Mode Setup** key. You may also change the signal threshold which determines a carrier on the properties form.

- 10228 Cannot correlate to input signal.
- This error is normally generated because of one of the following reasons: 1. There is no carrier signal.
2. Walsh channels other than the pilot are active.
3. There is some other modulation problem that will prevent the measurement from being made.
This problem must be corrected before the measurement can continue.
- 10229 The regression portion failed.
- This message occurs when (Option B7D) is not functioning properly. Demodulation measurements (modulation accuracy and code domain) might fail as a result of this error.
- 10230 DSP timed out, resetting DSP.
- Digital Signal Processor was unable to finish the selected measurement within the given period of time. Restart the measurement.
- 10231 Measurement failed for unknown reasons.
- Check instrument settings and restart measurement.
- 10232 RF Signal not found.
- This message is generated if there is no signal at the center frequency that is greater than 10 dB above the displayed average noise level.
- 10233 Level is low, results may degrade.
- The signal being measured is of low power. The results may not be as accurate as they would be if the signal level was higher.
- 10237 RF Board LO Unlocked. Contact service center.
- This message occurs if the local oscillator on the (Option B7E) is in an unlocked state. This indicates broken hardware.

- 10238 RF Board SR Osc Unlocked. Contact service center.
- This message occurs if the sample rate (SR) oscillator on Option B7E is in an unlocked state. This indicates broken hardware.
- 10239 Opt Freq Ref setting does not match external reference.
- This message is generated if Source is set to External on the properties form under the front-panel **Mode Setup** key and the frequency on the same form is set to a frequency that does not match the frequency of the signal being used as the external reference.
- 10240 RF Board RF Osc Unlocked. Contact service center.
- This message occurs if the reference oscillator on the (Option B7E) is in an unlocked state. This indicates broken hardware.
- 10241 RF Board could not detect any bursts in signal.
- This message is generated when the trigger is set to RF Burst and (Option B7E) cannot detect a burst.
- 10245 Error reading file: SPCLIMIT.CSV. Cannot use custom limits.
- The file could be missing or corrupt. Create a new limits file. Alternatively, the actual limits defined in the file might not allow the measurement to be executed. Redefine the limits or use the default limits. Restart the measurement.
- 10246 Error reading file: CDMASTUN.CSV. Please reinstall cdmaOne.
- The file is missing or corrupt. Please reinstall the cdmaOne personality.

Instrument Messages
Instrument Messages

- 10247 Error reading file: CDPDMDA. Please reinstall cdmaOne.

 The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10248 Error reading file: CDPPMCO. Please reinstall cdmaOne.

 The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10249 Error reading file: CDPPMDA. Please reinstall cdmaOne.

 The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10250 Error reading file: RHODMDA. Please reinstall cdmaOne.

 The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10251 Error reading file: RHOPMCO. Please reinstall cdmaOne.

 The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10256 Error reading file: OOBSTAB.CSV. Use Edit Table | Save Table.

 This error is generated when you try to load a table (using the **Load Table** key on page 2 of the edit table form menu) before a table has been saved. You must first save a table using the **Save Table** key before trying to load a table using the **Load Table** key.
- 10259 Table could not be saved.

 This message occurs if the C: drive is full or corrupt. Check the amount of space left on the drive.

- 10260 Table could not be loaded.
- When trying to load a table, the previous table has been somehow corrupted. Use the **Save Table** key to save a valid table. Then edit the valid table, save it, and try to load it again.
- 10264 Emission bandwidth not found. Consider increasing span.
- This error is normally generated when attempting occupied bandwidth measurements. The “X dB” value you entered (**Meas Setup, X dB**) to calculate the emission bandwidth is the difference between the highest point on the trace and the point “X dB” down on either side of the maximum. If the actual difference is less than the value entered, the emission bandwidth cannot be computed. Some responses to this situation are as follows:
1. Connect a signal to the input. (If there is no signal present, the difference between the trace minimum and maximum will generally be less than “X dB”.)
 2. Increase the span. (If the signal is wide, the shoulders of the signal might not be present on the screen, and again, the difference between the trace minimum and maximum will be less than “X dB”.)
 3. Center the signal. (There must be a point on the trace that is “X dB” down from the maximum on both sides of that maximum.)
- 10286 Burst not found.
- The signal being analyzed has insufficient power, the rising or falling edges cannot be detected, or the burst is less than 120 microseconds.
- 10287 Valid Bluetooth burst not found. (Check Packet Type)
- The burst that has been found does not correspond to the currently selected Bluetooth packet type (the burst length may be too short).

- 10288 Opt B7D or AXX FADC hardware required. Meas
unavailable.
- The measurement you are attempting requires either
the DSP and Fast ADC (Option B7D) or the Fast ADC
(Option AXX) card to perform the demodulation, but
neither are present in the analyzer.
- 10289 Opt 106 demod hardware required. Meas
unavailable.
- A demod measurement was attempted with no
Bluetooth FM demod card present (Option 106).
- 10290 Parameter unavailable in demod measurements.
- You have selected (by remote SCPI command) either RF
Amplitude sync or Video trigger while running one of
the demod measurements.
- 10291 Opt B7E RF hardware required. RF Burst
unavailable.
- You have selected (by remote SCPI command) RF Burst
Trigger with no digital demodulation RF card present
(RF Communications Hardware (Option B7E)).
- 10320 Opt 106 hardware required. Preamble sync
unavailable.
- You have selected (by remote SCPI command) preamble
sync with no Bluetooth FM demodulation card present
(Option 106).
- 10321 Start Marker must be at least 1% < Stop
Marker.
- You have attempted to input a start marker value that
will result in the difference between the start and stop
markers being less than 1%.
- 10322 Stop Marker must be at least 1% > Start
Marker.
- You have attempted to input a stop marker value that
will result in the difference between the start and stop
markers being less than 1%.

- 10323 Unable to Calculate Result using Current Setup.
- You have changed the setup parameters such that the marker lines used to measure the power cannot be displayed therefore accurate measurements cannot be made.
- 10340 '10101010' pattern not detected - results may be inaccurate.
- This message is displayed if the measurement cannot detect the '10101010' pattern in the payload. The measurement will continue and carry out the calculations on the payload data supplied, but may not be correct.
- 10350 Payload data pattern '10101010' not present.
- This message is displayed when the "Payload Data" parameter is set to Auto and the measurement has not detected either of the required patterns in the payload.
- 10351 Required payload data pattern '10101010' not present.
- This message is displayed after successfully measuring and holding the '11110000' pattern if the measurement is restarted and the '10101010' data pattern is not detected.
- 10352 Required payload data pattern '11110000' not present.
- This message is displayed after successfully measuring and holding the '10101010' pattern if the measurement is restarted and the '11110000' data pattern is not detected.
- 10353 There is no valid result to hold.
- You have attempted to hold either $\Delta f1$ or $\Delta f2$ before it has been measured.

- 10360 Can't compute result - not enough transitions.

 This message is displayed when the measurement cannot find either a 111, 000, 101 or 010 pattern and is therefore unable to calculate the low or high frequency deviations.
- 10400 Valid signal not found.

 This error is normally generated because of one of the following reasons:
1. There is no carrier signal.
 2. The carrier signal power has changed during the measurement, causing ADC to over/under range.
 3. There is some other modulation problem that will prevent the measurement from being made. This problem must be corrected before the measurement can continue.
- 10401 Valid burst not found in frame (Burst Type) .

 No active bursts that match the Burst Type have been detected in the RF input signal. The search was performed over the complete frame.
- 10402 Valid burst not found in specified timeslot (Burst Type) .

 No active bursts that match the Burst Type have been detected in the RF input signal. The search was only performed over the specified timeslot setting.
- 10403 Sync word not found in frame (TSC) .

 One or more active EDGE bursts that match the Normal Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was performed over the complete EDGE frame.

- 10404 Sync word not found in specified timeslot (TSC) .
- One or more active EDGE bursts that match the Normal Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed over the specified timeslot setting.
- 10409 Wideband calibration not valid until Align Now, All performed.
- Wideband calibration corrections cannot be applied to current demodulation results. Results will not meet specified demodulation performance levels until an Align Now, All has been performed.
- 10410 Measurement uncalibrated, wideband calibration required.
- Wideband calibration corrections cannot be applied to the current demodulation results. Results will not meet specified demodulation performance levels until **Wideband Cal** has been selected and successfully performed.
- 10411 Measurement uncalibrated, symbol rate exceeds +/-10% nominal.
- Wideband calibration corrections cannot be applied to current demodulation results, due to the **Symbol Rate** setting exceeding +/-10% of the nominal value. Results may not meet specified demodulation performance levels.
- 10412 Cal Data corrupt. Wideband cal failed. Using previous data.
- Wideband calibration procedure failed for an unknown reason. New calibration data was not saved. Previous wideband calibration data is being used, if available. However, it is not acceptable. Before re-attempting Wideband Cal, ensure connection between the **AMPTD REF OUT** and the **INPUT 50 Ω** is in place. If the error persists, get in touch with your service center.

- 10413** B7D DSP Code Install Fail Opt.229.Contact your Service Center.
- The Digital Signal Processor algorithm files required to perform the demodulation are not present in the analyzer. Reinstall the measurement personality and contact your service center.
- 10414** Opt 229 DSP algorithm code file requires upgrade.
- The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use for more information on installation/upgrade.
- 10415** Opt 229 DSP algorithm coef. file requires upgrade.
- The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use for more information on installation/upgrade.
- 10416** B7D DSP Code Reload Fail Opt.229.Contact your Service Center.
- The Digital Signal Processor algorithm files required to perform the demodulation are corrupt and cannot be loaded properly. Reinstall the measurement personality and contact your service center.
- 10417** This operation requires a measurement to be active.
- The analyzer cannot perform this operation, because it requires a measurement to be running and no measurement is running.
- 10418** Demod Format setting does not allow this value for Points/Symbol.
- Invalid Points/Symbol selection attempted for the given Demod Format setting.

- 10419 Carrier Not Present.
- A carrier signal/burst is expected at the analyzer input. This signal cannot be found; however, the measurement will still run. Check input signal connection.
- 10420 Valid burst not found.
- This error only occurs when **RF Amptd** is selected for **Burst Sync**. It indicates that a valid burst envelope which meets the specified Burst Search Threshold was not found within the specified Burst Search Length. Note that the demodulation measurement will proceed by attempting to demodulate the signal without Burst Sync alignment. Possible causes may be:
1. Carrier signal is not actually bursted.
 2. Burst Search Threshold and/or Burst Search Length may need to be adjusted.
- 10421 Cannot lock to carrier.
- This error only occurs when attempting to demodulate OFFSET QPSK signals. It indicates that the demodulation algorithm is unable to lock to your signal. Possible causes may be:
1. There is no carrier signal.
 2. Carrier signal is present, but Demod settings do not match the modulation format of the OFFSET QPSK signal being measured.
 3. OFFSET QPSK signal is too noisy to achieve carrier lock.
- 10425 B7D DSP Code Install Fail Opt.231.Contact your Service Center.
- The Digital Signal Processor algorithm files required to for the 89600 VSA SW are not present in the analyzer. Reinstall the measurement personality and contact your service center.

- 10426 Opt 231 DSP algorithm code file requires upgrade.

 The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use for more information on installation/upgrade.
- 10427 Opt 231 DSP algorithm coef. file requires upgrade.

 The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use for more information on installation/upgrade.
- 10428 B7D DSP Code Reload Fail. Opt.231.Contact your Service Center.

 The Digital Signal Processor algorithm files required for the 89600 VSA SW are corrupt and cannot be loaded properly. Reinstall the measurement personality and contact your service center.
- 10450 Avg Mode changed to Repeat for Full Meas Type.

 Avg Mode and Meas Type are coupled. Selecting Full Meas Type forces Repeat Avg Mode.
- 10451 Avg Mode changed to Exp for Examine Meas Type.

 Avg Mode and Meas Type are coupled. Selecting Examine Meas Type forces Exp Avg Mode.
- 10452 Meas Type changed to Examine for Exp Avg Mode.

 Avg Mode and Meas Type are coupled. Selecting Exp Avg Mode forces Examine Meas Type.

- 10453 Meas Type changed to Full for Repeat Avg Mode.

 Avg Mode and Meas Type are coupled. Selecting Repeat Avg Mode forces Full Meas Type.
- 10511 100 spurs found. Additional spurs ignored.

 The maximum number of spurs have been found. Any additional spurs found during this measurement will not be logged.
- 10512 No spurs have been found.

 There were no spurs found using the current range setup.
- 10513 No ranges are defined.

 All ranges are currently set to off.
- 10524 This measurement does not support the *.CSV file format.

 You cannot load CSV format trace files or save traces in the CSV format in the Log Plot measurement of the Phase Noise Measurement Personality.
- 10525 Use View/Trace menu when loading or saving logarithmic traces.

 You cannot load CSV format trace files or save traces in the CSV format in the Log Plot measurement of the Phase Noise Measurement Personality.
- 10526 Cannot display Trace because it contains no data.

 Reference trace cannot be displayed, as there is currently no data assigned to it - use the functions under the Store Ref Trace menu, or load a trace to assign some data.

- 10527 Invalid Marker Trace.
- Cannot place markers on the reference trace, because the reference trace is currently turned off or has no data.
- 10529 Failed to Load trace. Bad file format.
- The load trace operation could not be completed, as the input file was not in the expected format. You can only load traces that were previously saved using the 'Save Trace' feature.
- 10530 Trace file contains no compatible traces.
- The trace file may have been created by another version of the Phase Noise personality, which uses a different trace format that is incompatible with the version you are running. Please check you are running the most up to date version of the personality.
- 10531 Trace file was created by incompatible version of Opt. 226
- The trace file may have been created by another version of the Phase Noise personality, which uses a different trace format that is incompatible with the version you are running. Please check you are running the most up to date version of the personality.
- 10532 Cannot open trace file for writing. Save Failed.
- Cannot write the trace file to the destination filename. This could be because the disk is full, or possibly due to a filename error. If using a floppy disk, check there is a formatted disk in the drive.
- 10533 Cannot save Trace because it contains no data.
- Check the Ref Trace is turned on, and contains some valid trace data.

- 10534 Trace file saved successfully.
The trace saving operation was successful.
- 10535 Cancellation trace is not set to Reference or
has no data.

When performing phase noise cancellation, you need to
supply a reference trace that will be used to cancel out
the background noise of the analyzer. The reference
trace must be in Reference (View) mode, and selected
by the Ref Trace parameter under the Cancellation
menu.
- 10536 Cancellation disabled while measuring DANL
Floor.

Phase Noise cancellation does not make sense when
measuring the DANL Floor, so for this reason it has
been disabled.
- 10537 10537 Cancellation trace has different X-Scale
to Smoothed trace.

When performing phase noise cancellation, you need to
supply a reference trace that will be used to cancel out
the background noise of the analyzer. The reference
trace must have been measured over the same range of
offsets, and on the same instrument as the current
measurement being performed.
- 10560 Carrier Not Present. Verify frequency and
amplitude settings.

No Carrier > -50 dBm found at the analyzer input
within the search span. Solution: Modify center
frequency to be closer to actual carrier, or alternatively
apply carrier of sufficient amplitude at the current
center frequency.
- 10561 Signal Tracking disabled when measuring
DANL Floor (Removal).

Measuring the DANL Floor with DANL Method set to
Removal requires that the user remove the signal and
attach a load to the analyzer RF Input. Signal Tracking
requires that the carrier be measured many times per
measurement, so the two are inherently incompatible.

Instrument Messages without Numbers

Error Messages

Unable to uninstall personality, file not deletable.

This message occurs when you try to delete a personality which has been marked as non-deletable. The personality is marked non-deletable at the factory. Get in touch with your nearest service center for further assistance.

Status Messages

Status * (Invalid Data)

This indicator is displayed when data on the screen may not match the screen annotation, for example while analyzer settings are changing or when any trace is in view mode.

Status 50 MHz Osc Unlevel (50 MHz Osc Unleveled)

The internal 50 MHz amplitude reference source has become unleveled. This condition must be corrected before a valid alignment can be performed.

Status (ADC Align Failure)

A status bit only, no message. The alignment routine was unable to align the analog-to-digital converter (ADC).

Status Align Now All Needed (Align Needed)

The instrument requires complete alignment. Press **System, Alignments, Align Now, All**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure. If this message recurs, load defaults (**System, Alignments, Load Defaults**) and then perform **Alignment Now, All**.

Status Align Now RF Needed (Align Now RF Needed)

The instrument requires RF alignment. Press **System, Alignments, Align Now, RF (EXT Cable)**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.

Status Align RF Skipped (Align RF Skipped)

The RF alignment has been skipped because a 50 MHz signal was detected at the **INPUT**; alignment will resume when the 50 MHz signal is removed. The alignment will not work when there is too much input power at 50 MHz. The instrument may not continue to measure properly. To remove the message, remove the 50 MHz input signal, then perform an **Align Now, RF**. Press **System, Alignments, Align Now, RF**. On all Agilent Technologies ESA spectrum analyzer models except E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.

If this message occurs and you are going to make a measurement near 50 MHz, select **System, Alignments, Auto Align**, and **All but RF**.

Status DC Coupled

Indicates the input of the analyzer is DC coupled (**Input/Output, Coupling (DC)**). This setting is necessary when measuring frequencies below 100 kHz on E4402B with Option UKB, E4404B, and E4405B analyzers. For E4407B analyzers with Option UKB, you must set the coupling to DC when measuring below 10 MHz. Take care to limit the input level to 0 Vdc and +30 dBm whenever you are in DC coupled mode.

Instrument Messages
Instrument Messages

Status	Demod ON: reduce span for audible detection When the Demod function is active and the speaker is turned on, the ratio of the resolution bandwidth to span must be greater than 0.002 to properly demodulate and listen to the resulting audio signal. You must decrease the span to continue the measurement
Status	Ext Ref (no corresponding status bit) Indicates that the frequency reference is being supplied by an external 10 MHz source.
Status	Flat corr off (no corresponding status bit) Indicates that the flatness corrections have been turned off.
Status	(FM Demod Align Failure) status bit only, no message A failure has occurred during the FM Demod alignment. Measurement results may be invalid.
Status	Freq corr off (no corresponding status bit) Indicates that the frequency corrections have been manually disabled. Press System, Alignments, Freq Correct, (On) to restore.
Status	Frequency Reference Error (Freq Ref Unlocked) The frequency reference has been tuned too far off of 10 MHz. This condition may be corrected by cycling power on the analyzer.
Status	(IF Align Failure) status bit only, no message A failure has occurred during the IF alignment. Measurement results may be invalid.

Status	IF Gain fixed The autoranging function of the analyzer has been turned off (Amplitude, More, More, IF Gain (Fixed)). This setting is useful when measuring signals that require fast measurement time, narrow resolution bandwidths (< 1 kHz), and < 70 dB of display range. For more information on this setting, refer to IF Gain key description in the <i>ESA Spectrum Analyzer User's Guide</i>.
Status	IF Overload (IF/ADC Over Range) The IF section has been overloaded. Measurement results may be invalid.
Status	Input is internal (no corresponding status bit) <i>This message applies to the Agilent Technologies E4401B and E4411B only.</i> Indicates the 50 MHz Amptd Ref selection is On. With the 50 MHz amplitude reference on, the input is routed through an internal signal path.
Status	(LO Align Failure) status bit only, no message A failure has occurred during the alignment of the local oscillator (LO). Measurement results may be invalid.
Status	LO Out Unlevel (LO Out Unleveled) Indicates the output of the local oscillator (LO) has become unleveled. This condition must be corrected to make valid measurements.
Status	LO Unlevel (LO Unleveled) Indicates the internal circuitry of the local oscillator (LO) has become unleveled. This condition must be corrected to make valid measurements.

Status	LO Unlock (Synth Unlocked) Indicates the phase locked circuitry of the local oscillator (LO) has become unlocked. This condition must be corrected to make valid measurements.
Status	Log Corr Off (no corresponding status bit) The log amplifier corrections have been turned off.
Status	Marker Count:Widen Res BW The ratio of the resolution bandwidth to span must be greater than 0.002 for the marker count function to work properly. Increase the resolution bandwidth or decrease the span to continue the measurement.
Status	Meas Uncal (Oversweep) The measurement is uncalibrated. Check the sweep time, span and bandwidth settings, or press Auto Couple and Auto All .
Status	Overload: Reduce Signal and press <ESC> (Input Overload Tripped) <i>This message applies to the Agilent Technologies E4401B and E4411B only.</i> A signal has been applied to the input connector that caused the overload protection circuitry to engage. The input signal must be reduced. After the signal is reduced, press ESC to reset the overload detector so that you can continue using the analyzer.
CAUTION	Exposing the analyzer to high levels of input power over a prolonged period of time can damage the internal circuitry.
Status	Peaking Signal (no corresponding status bit) The instrument is executing a tracking generator peak.
Status	Preferred resolution bandwidth not available. The calculated required resolution bandwidth for this measurement is not available.

Status (RF Align Failure) status bit only, no message
A failure has occurred during the alignment of the RF section. Measurement results may be invalid.

Status Signal Ident On, Amptd Uncal (Signal Ident On)
Indicates that the amplitude measurement could be uncalibrated because the signal identification feature is on.

Status Signal level is low.
Indicates the signal can be correlated, however the level is below that specified to ensure accurate measurement results.

Status Source LO Unlevel (Source LO Unleveled)
The internal circuitry of the local oscillator (LO) in the tracking generator has become unleveled. This condition must be corrected to make valid measurements.

Status Source LO Unlock (Source Synth Unlocked)
The phase-locked circuitry of the local oscillator (LO) in the tracking generator has become unlocked. This condition must be corrected to make valid measurements.

Status Source Unlevel (Source Unleveled)
Indicates the source power is set higher or lower than the analyzer can provide, the frequency span extends beyond the specified frequency range of the tracking generator, or the calibration data for the source is incorrect.

Status System Alignments, Align Now, All Required
Internal alignment correction data has been lost. Press **System, Alignments, Align Now, All** to clear this message from the display.

Instrument Messages
Instrument Messages

Status (TG Align Failure) status bit only, no message
A failure has occurred during the tracking generator (TG) alignment.

Status Video shift off (no corresponding status bit)
Indicates the video shift has been manually disabled; this will impair readings.

Informational Messages

Informational Atten auto set to 15 dB
Indicates that an input signal has been detected which is of sufficient level to damage the input circuitry and the input attenuator has been automatically set to 15 dB. If the signal level is reduced, the attenuator will stay at 15 dB. This overload protection occurs at an input power level of 13 dBm (68 dBmV for Option 1DP) ± 7 dB when the input attenuation is auto coupled and set to <15 dB. To return to the original measurement setup, reduce the input signal level and press **Amplitude**. Then press **Attenuation (Auto)**.
Overload protection is only available in the Agilent Technologies E4401B and E4411B.

Informational Auto ranging...
Displayed during autoranging.

Informational B7D and/or B7E not found. Code Domain not available.
Digital Signal Processing and Fast Analog to Digital Converter (Option B7D) and/or RF Communications Hardware (Option B7E) are not installed options on your analyzer. Code domain is therefore not available.

Informational B7D and/or B7E not found. Mod Acc not available.
Digital Signal Processing and Fast Analog to Digital Converter (B7D) and/or RF Communications Hardware (B7E) are not installed options on your analyzer. Modulation accuracy is therefore not available.

- Informational** Carrier Not Present.
- A carrier signal/burst is expected at the analyzer input. This signal cannot be found; however, the measurement will still run. Check input signal connection.
- Informational** Channel frequency outside device's transmit band.
- Reset channel number or frequency.
- Informational** Default spur table values loaded.
- No spur table has been previously saved when the Out-of-Band Spurious measurement begins. Press **Meas Setup, Edit Table** to enter the frequency ranges of interest and press **Save Table** to save that information. This saved table will be loaded the next time the measurement is run.
- Informational** Device = Mobile. Code Domain not available.
- Code Domain measurement is grayed out when the device is set to mobile under the **Mode Setup** front-panel key. Code Domain measurement is only accessible when the device is set to base and RF Communications Hardware (Option B7E) or Enhanced Memory Upgrade (Option B72) are installed.
- Informational** Device = Mobile. Mod Acc not available.
- Modulation accuracy measurement is grayed out when the device is set to mobile under **Mode Setup**, front-panel key. Modulation accuracy is only accessible when the device is set to base and RF Communications Hardware (Option B7E) or Enhanced Memory Upgrade (Option B72) are installed.
- Informational** <directoryname> directory deleted
- The directory indicated has been successfully deleted.

Informational <directoryname1> directory renamed to
<directoryname2>
Directory name1 has been successfully renamed to
directory name2.

Informational Directory already exists
Each directory and file must have a unique name. The
directory name you have entered is currently being
used on the selected drive. You may either enter a new
name or rename the directory currently existent. Refer
to “File Menu Functions” in the Agilent *ESA Spectrum
Analyzer User’s Guide*.

Informational Entire trace is below the threshold level.
The measurement cannot operate properly because the
trace has fallen completely below the threshold level.
Change the threshold level to view signal.

Informational <filename> file copied
The filename indicated has been successfully copied.

Informational <filename> file deleted
The filename indicated has been successfully deleted.

Informational <filename> file loaded
The filename indicated has been successfully loaded.

Informational <filename1> file renamed to <filename2>
Filename1 has been successfully renamed to filename2.

Informational <filename> file saved
The filename indicated has been successfully saved.

Informational <filename> too many data entries

This message may appear when loading data from a limit line or ampcor disk file. The [DATA] section of such a file can contain at most 200 lines of data. This message is displayed if that limit is exceeded.

Informational Invalid format: CSV files are not supported by this measurement.

When utilizing the Phase Noise Personality: Option 226, the *.CSV file format is not available.

Informational Measurement halted. Press a measurement key to continue.

This error occurs after you choose **Cancel** to refrain from setting the attenuator to 0 dB during the Receive Channel Power and Receive Spur measurements.

Informational No Fast ADC hardware installed. Meas unavailable.

The analyzer cannot use sweep times of less than 5 milliseconds when Option B7D or Option AYX is not installed. Therefore the measurement will not be executed.

Informational Not enough frequency range to measure harmonics for channel.

Selected harmonics are above the frequency range of the analyzer.

Informational One or more harmonics beyond freq limit: number decreased.

The highest harmonic was beyond the frequency limit of the analyzer, so the number of measured harmonics was decreased.

Informational Option activated

This message is displayed after entering the selected option's License Key.

Informational Please set RF input range (INPUT menu) to manual first.

In order to manually set the reference level and/or the attenuation under the **Amplitude** front-panel key, the RF Input Range menu under the **Input** front-panel key must be set to **Man** (manual).

Informational Shutdown in process.

The analyzer is responding to the **Standby** key selection, and is executing the shutdown procedure.

Informational Table loaded successfully.

When the **Load Table** key was pressed on the second page of the edit table form while in the out-of-band spurious measurement, the file was present. The information has been loaded into the measurement where it may be edited again. This message will also appear when the out-of-band spurious measurement is opened if a spur table has been previously saved.

Informational Table saved successfully.

This message appears after you press the **Save Table** key on the second page of the edit table for the out-of-band spurious measurement. It indicates that the current spur table has been written successfully to disk and is available to be loaded by means of the **Load Table** key.

Informational The calibration data is invalid, and has been cleared.

A parameter has changed that affects calibration. Therefore the calibration data has been reset, and for best results recalibration is recommended.

Informational The file containing the list of cable types has been updated.

The file update was successful.

Informational This measurement does not support the *.CSV file format.

When utilizing the Phase Noise Personality: Option 226, *.CSV (comma separated values) file format is not available.

Informational This operation requires a measurement to be active.

The analyzer cannot perform this operation, because it requires a measurement to be running and no measurement is running.

Informational Tracking Peak Needed.

This message is displayed when there has been a change in Resolution Bandwidth, Span, or Alignment since the previous Tracking Peak.

The message does not apply to the E4401B or E4411B Spectrum Analyzer.

Informational WARNING: You are about to delete all of the contents on directory "x:\xxxxx\". Press Delete Now again to proceed or any other key to abort.

If you select a directory or subdirectory to delete, this popup message is displayed when you press **Delete Now**. ("x:\xxxxx\" in the message is the full path and directory name).

Informational Volume <name> formatted

The indicated disk has been successfully formatted.

Annunciator Bar Messages

Annunciator Align

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that has affected the alignment. For the possible conditions and suggested resolutions, refer to Align Now All Needed (Align Needed) on page 58, Align Now RF Needed (Align Now RF Needed) on page 59, Align RF Skipped (Align RF Skipped) on page 59, and System Alignments, Align Now, All Required on page 63.

Annunciator Ext Ref

This message appears in the right side of the annunciator bar in green. When this message appears it indicates that there is one or more condition that affects the reference source. For the possible conditions and suggested resolutions, refer to Ext Ref on page 60.

Annunciator FreqRefUnlock

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that results in a frequency reference error. For the possible conditions and suggested resolutions, refer to Frequency Reference Error on page 60.

Annunciator Overload

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that causes a system overload. For the possible conditions and suggested resolutions, refer to IF Overload on page 61 and Overload on page 62.

Annunciator Uncal

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that results in uncalibrated results. For the possible conditions and suggested resolutions, refer to Meas Uncal on page 62.

Annunciator Unlevel

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that affects the leveling of an internal signal, such as the local oscillator (LO) or the tracking generator (source). For the possible conditions and suggested resolutions, refer to 50 MHz Osc Unlevel on page 58, LO Out Unlevel on page 61, Source LO Unlevel on page 63, and Source Unlevel on page 63.

Annunciator Unlock

This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that affects locking one or more of the local oscillators (LOs). For the possible conditions and suggested resolutions, refer to LO Unlock on page 62.

What You Will Find in This Chapter

This chapter describes the functional tests and provides information on how to perform them.

What Are the Functional Tests?

Functional tests are tests of various instrument parameters that give a high degree of confidence that the analyzer is operating correctly. They are recommended as a check of analyzer operation for incoming inspection or after a repair. Measurement uncertainty analysis is not available for functional tests, and the analyzer is checked against limits that are wider than the published specifications. The functional tests are designed to test an analyzer operating within the temperature range defined by the analyzer specifications using a minimum set of test equipment. If a test does not pass, performance tests must be run to confirm a problem exists.

Functional Test Versus Performance Verification

Performance verification tests check a wide range of analyzer parameters and provide the highest level of confidence that the analyzer is operating satisfactorily. They are used to verify that the analyzer conforms to published specifications. They are time consuming and require extensive test equipment. The functional tests check a much smaller range of parameters and a limited number of data points for each parameter. They require only limited test equipment.

Test Descriptions

Each of the following test descriptions include the test limits (pass/fail criteria), a description of what the test does or what it measures, a list of equipment required for the performance of the test, an illustration of the test setup used, and a step by step test procedure. The tests are designed to be run on an analyzer operating within the operational temperature range defined by the analyzer specifications. Only perform tests after the specified warm-up time.

At the end of each test is a test results worksheet. Copy a worksheet to record your test results for each procedure you'll be conducting.

Table 2-1 on page 76 includes a complete list of test equipment for all procedures in this chapter.

The tests included in this chapter are as follows:

Displayed Average Noise Level	page 78
Frequency Readout Accuracy	page 96
Marker Count Accuracy	page 99
Frequency Response	page 100
Reference Level Accuracy	page 105
Resolution Bandwidth Switching Uncertainty	page 110
Scale Fidelity	page 113
Second Harmonic Spurious Responses	page 116
Tracking Generator Level Flatness (E4401B and E4411B)	page 119
Tracking Generator Level Flatness (E4402B, E4403B, E4404B, E4405B, E4407B, E4408B)	page 122

Table 2-1

Test Equipment for All Procedures in Chapter 3:	Specifications:	Recommended Model:
Signal Sources		
Synthesized Sweeper	10 MHz-to maximum specified frequency of analyzer. Ext Ref Input	8340A/B or 836XX series
Adapters		
Type-N (m), to APC 3.5 (m)		1250-1743
Type-N (m) to BNC (f)		1250-0780
Type-N (f), to APC 3.5 (f)		1250-1745
Termination, 50 Ω Type-N (m)		908A
(2) Type-N (m), to APC 3.5 (f)		1250-1476
3.5 mm (m) to 3.5 mm (m)		5061-5311
SMA (f) to BNC (m)		1250-2015
Cables		
(2) BNC, 122-cm (48-in)		10503A
APC 3.5 mm		11500D
Type-N, 152-cm (60-in)		11500D
BNC, 9 inch		10502A
BNC, 122-cm (48-in)		10503A
APC 3.5 mm	E4407B and E4408B only	11500E
Meters		
Power Meter		438A or E4418A, E4419A
RF Power Sensor	100 kHz to 3.0 GHz	8482A
Microwave Power Sensor	50 MHz to 26.5GHz	8485A
Miscellaneous		
Power Splitter	E4401B, E4402B, E4403B, E4404B, E4405B and E4411B only	11667A

Table 2-1

Power Splitter	E4407B and E4408B only	11667B
50 MHz Low pass filter	Rejection at 80 MHz: >60 dB	0955-0306

Displayed Average Noise Level

Test Limits

Frequency Range	Model (50 Ω Input)	Maximum (50 Ω Input)	TR Entry
10 MHz to 500 MHz	E4401B, E4411B	– 119 dBm	1
501 MHz to 1.0 GHz	E4401B, E4411B	– 117 dBm	2
1.01 GHz to 1.5 GHz	E4401B	– 114 dBm	3
	E4411B	– 113 dBm	3
10 MHz to 1.0 GHz	E4402B, E4403B	– 117 dBm	4
	E4404B, E4405B, E4407B, E4408B	– 116 dBm	5
1.01 GHz to 2.0 GHz	E4402B, E4403B	– 116 dBm	6
	E4404B, E4405B, E4407B	– 116 dBm	7
	E4408B	– 115 dBm	8
2.01 GHz to 3.0 GHz	E4402B, E4403B	– 114 dBm	9
	E4404B, E4405B, E4407B, E4408B	– 112 dBm	10
3.01 GHz to 6.0 GHz	E4404B, E4405B, E4407B, E4408B	– 112 dBm	11
6.01 GHz to 6.7 GHz	E4404B	– 111 dBm	12
6.01 GHz to 12.0 GHz	E4405B, E4407B	– 111 dBm	13
	E4408B	– 110 dBm	14
12.01 GHz to 13.2 GHz	E4405B	– 107 dBm	15
12.01 GHz to 22 GHz	E4407B, E4408B	– 107 dBm	16
22.01 GHz to 26.5 GHz	E4407B	– 106 dBm	17
	E4408B	– 101 dBm	18

Frequency Range	Model (75 Ω Input)	Maximum (75 Ω Input)	TR Entry
10 MHz to 500 MHz	E4401B	– 66 dBmV	19
10 MHz to 500 MHz	E4411B	– 65 dBmV	20
501 MHz to 1.0 GHz	E4401B, E4411B	– 60 dBmV	21
1.01 GHz to 1.5 GHz	E4401B	– 56 dBmV	22

Frequency Range	Model (75 Ω Input)	Maximum (75 Ω Input)	TR Entry
1.01 GHz to 1.5 GHz	E4411B	- 53 dBmV	23

Test Description

The Displayed Average Noise Level is measured within the frequency range specified. The analyzer input is terminated in either 50 Ω or 75 Ω , depending on analyzer options.

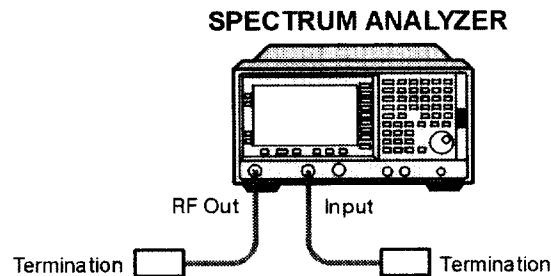
The test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Adapters		
Termination, 50 Ω Type-N (m)		908A
Additional Equipment for 75 Ω Input		
Termination, 75 Ω Type-N (m)		909E
Adapter, Type-N (f), to BNC (m), 75 Ω		1250-1534

Figure 2-1

Equipment Setup



w1719a

Procedure (10 MHz to 500 MHz) *E4401B* and *E4411B*

1. Connect the equipment as shown in Figure 2-1.
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
 - FREQUENCY, Start Freq, 10, MHz**
 - Stop Freq, 500, MHz**
 - AMPLITUDE, -70, dBm (50 Ω Input only)**
 - AMPLITUDE, More, Y Axis Units, dBmV (75 Ω Input only)**
 - AMPLITUDE, Ref Level, -21.24, dBmV (75 Ω Input only)**
 - BW/Avg, Res BW, 1, MHz**
 - Video BW, 10, kHz**
3. Press the following keys on the analyzer:
 - Single**
 - BW/Avg, Average (On), 3, Enter**
 - Single**Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).
4. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (a) or (b) in Table 2-2 on page 95 for 10 MHz to 500 MHz.
5. Press the following keys on the analyzer:
 - Sweep, Sweep (Cont)**
 - BW/Avg, Average (Off)**
 - BW/Avg, Res BW (Auto)**
 - Video BW (Auto)**
 - SPAN, 50, kHz**
 - FREQUENCY**
6. Press **Center Freq**, and set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (a) or (b) of Table 2-2 for 10 MHz to 500 MHz.

7. Press the following keys on the analyzer:

BW/Avg, Res BW, 1, kHz

Video BW, 30, Hz

Single

Wait for the sweep to finish.

8. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display so that it is centered on the average trace noise, ignoring any residual responses.

9. Record the display line amplitude setting as TR Entry 1 (TR Entry 19 or 20 for a 75 Ω Input) in Table 2-2 on page 95. The Average Noise Level should be less than the Maximum for the appropriate input impedance.

Procedure (501 MHz to 1.0 GHz) *E4401B and E4411B*

1. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

FREQUENCY, Start Freq, 501, MHz

Stop Freq, 1.0, GHz

BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).

3. Press **Peak Search**, and record the marker frequency next to your analyzer model in the Measured Frequency column as entry (c) in Table 2-2 on page 95 for 501 MHz to 1.0 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (c) in Table 2-2 on page 95 for 501 MHz to 1.0 GHz.

6. Press the following keys on the analyzer:

BW/Avg, Res BW, 1, kHz

Video BW, 30, Hz

Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 2 (TR Entry 21 for a 75 Ω Input) in Table 2-2 on page 95. The Average Noise Level should be less than the Maximum for the appropriate input impedance.

Procedure (1.01 GHz to 1.5 GHz) *E4401B* and *E4411B*

1. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

FREQUENCY, Start Freq, 1.0 GHz

Stop Freq, 1.5 GHz

BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).

3. Press **Peak Search**, and record the marker frequency next to your analyzer model in the Measured Frequency column as entry (d) or (e) in Table 2-2 for 1.01 GHz to 1.5 GHz.
4. Press the following keys on the analyzer:
Sweep, Sweep (Cont)
BW/Avg, Average (Off)
BW/Avg, Res BW (Auto)
Video BW (Auto)
SPAN, 50, kHz
FREQUENCY
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (d) or (e) in Table 2-2 for 1.01 GHz to 1.5 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single
Wait for the sweep to finish.
7. Press the following keys on the analyzer:
Display, Display Line (On)
Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.
8. Record the display line amplitude setting as TR Entry 3 (TR Entry 22 or 23 for a 75 Ω Input) in Table 2-2. The average noise level should be less than the Maximum for the appropriate input impedance.

Procedure (10 MHz to 1 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 10, MHz
Stop Freq, 1.0, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB

BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take three sweeps, then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (f) or (g) in Table 2-2 for 10 MHz to 1.0 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (f) or (g) in Table 2-2 for 10 MHz to 1.0 GHz.

6. Press the following keys on the analyzer:

BW/Avg, Res BW, 1, kHz

Video BW, 30, Hz

Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. If the analyzer is an E4402B or E4403B, record the display line amplitude setting as TR Entry 4 in Table 2-2. Otherwise, record the display line amplitude setting as TR Entry 5 in Table 2-2. The average noise level should be less than the Maximum.

Procedure (1.01 GHz to 2 GHz) *E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 1.01, GHz
Stop Freq, 2, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz
Video BW, 10, kHz
2. Press the following keys on the analyzer:
Single
BW/Avg, Average (On), 3, Enter
Single
Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).
3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (h), (i) or (j) in Table 2-2 for 1.01 GHz to 2 GHz.
4. Press the following keys on the analyzer:
Sweep, Sweep (Cont)
BW/Avg, Average (Off)
BW/Avg, Res BW (Auto)
Video BW (Auto)
SPAN, 50, kHz
FREQUENCY
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (h), (i) or (j) in Table 2-2 for 1.01 GHz to 2 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. If the analyzer is an E4402B or E4403B, record the display line amplitude setting as TR Entry 6 in Table 2-2. Otherwise, record the display line amplitude setting as TR Entry 7 or 8 in Table 2-2. The average noise level should be less than the Maximum.

Procedure (2.01 GHz to 3.0 GHz) *E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

FREQUENCY, Start Freq, 2.01, GHz

Stop Freq, 3.0, GHz

AMPLITUDE, -70, dBm

Attenuation (Man), 0, dB

BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (k) or (l) in Table 2-2 for 2.01 GHz to 3.0 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (k) or (l) in Table 2-2 for 2.01 GHz to 3.0 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single
Wait for the sweep to finish.
7. Press the following keys on the analyzer:
Display, Display Line (On)
Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.
8. If the analyzer is an E4402B or E4403B, record the display line amplitude setting as TR Entry 9 in Table 2-2. Otherwise, record the display line amplitude setting as TR Entry 10 in Table 2-2. The Average Noise Level should be less than the maximum.

Procedure (3.01 GHz to 6.0 GHz) *E4404B, E4405B, E4407B, and E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 3.01, GHz
Stop Freq, 6.0. GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz
Video BW, 10, kHz
2. Press the following keys on the analyzer:
Single
BW/Avg, Average (On), 3, Enter
Single
Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (m) in Table 2-2 for 3.01 GHz to 6.0 GHz.
4. Press the following keys on the analyzer:
Sweep, Sweep (Cont)
BW/Avg, Average (Off)
BW/Avg, Res BW (Auto)
Video BW (Auto)
SPAN, 50, kHz
FREQUENCY
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (m) in Table 2-2 for 3.01 GHz to 6.0 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single
Wait for the sweep to finish.
7. Press the following keys on the analyzer:
Display, Display Line (On)
Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.
8. Record the display line amplitude setting as TR Entry 11 in Table 2-2. The Average Noise Level should be less than the Maximum.

Procedure (6.01 GHz to 6.7 GHz) *E4404B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 6.01, GHz
Stop Freq, 6.7, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (n) in Table 2-2 for 6.01 GHz to 6.7 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (n) in Table 2-2 for 6.01 GHz to 6.7 GHz.

6. Press the following keys on the analyzer:

BW/Avg, Res BW, 1, kHz

Video BW, 30, Hz

Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 12 in Table 2-2. The Average Noise Level should be less than the Maximum.

Procedure (6.01 GHz to 12.0 GHz) *E4405B*, *E4407B*, and *E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 6.01, GHz
Stop Freq, 12.0, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz
Video BW, 10, kHz
2. Press the following keys on the analyzer:
Single
BW/Avg, Average (On), 3, Enter
Single
Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).
3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (o) or (p) in Table 2-2 for 6.01 GHz to 12.0 GHz.
4. Press the following keys on the analyzer:
Sweep, Sweep (Cont)
BW/Avg, Average (Off)
BW/Avg, Res BW (Auto)
Video BW (Auto)
SPAN, 50, kHz
FREQUENCY
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (o) or (p) in Table 2-2 for 6.01 GHz to 12.0 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 13 or 14 in Table 2-2. The average noise level should be less than the Maximum.

Procedure (12.01 GHz to 13.2 GHz) *E4405B*

1. Press **Preset System, Power On/Preset, Preset Type (Factory), Preset**, on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

FREQUENCY, Start Freq, 12.01, GHz

Stop Freq, 13.2, GHz

AMPLITUDE, -70, dBm

Attenuation (Man), 0, dB

BW/Avg, Res BW, 1, MHz

Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (q) in Table 2-2 for 12.01 GHz to 13.2 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (q) in Table 2-2 for 12.01 GHz to 13.2 GHz.
6. Press the following keys on the analyzer:
BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single
Wait for the sweep to finish.
7. Press the following keys on the analyzer:
Display, Display Line (On)
Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.
8. Record the display line amplitude setting as TR Entry 15 in Table 2-2. The Average Noise Level should be less than the Maximum.

Procedure (12.01 GHz to 22 GHz) *E4407B and E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Start Freq, 12.01, GHz
Stop Freq, 22, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz
Video BW, 10, kHz
2. Press the following keys on the analyzer:
Single
BW/Avg, Average (On), 3, Enter
Single
Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).
3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (r) in Table 2-2 for 12.01 GHz to 22 GHz.

4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)
BW/Avg, Average (Off)
BW/Avg, Res BW (Auto)
Video BW (Auto)
SPAN, 50, kHz
FREQUENCY

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (r) in Table 2-2 for 12.01 GHz to 22 GHz.

6. Press the following keys on the analyzer:

BW/Avg, Res BW, 1, kHz
Video BW, 30, Hz
Single

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 16 in Table 2-2. The Average Noise Level should be less than the Maximum.

Procedure (22.01 GHz to 26.5 GHz) *E4407B* and *E4408B*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

FREQUENCY, Start Freq, 22.01, GHz
Stop Freq, 26.5, GHz
AMPLITUDE, -70, dBm
Attenuation (Man), 0, dB
BW/Avg, Res BW, 1, MHz
Video BW, 10, kHz

2. Press the following keys on the analyzer:

Single

BW/Avg, Average (On), 3, Enter

Single

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (s) or (t) in Table 2-2 for 22.01 GHz to 26.5 GHz.
4. Press the following keys on the analyzer:

Sweep, Sweep (Cont)

BW/Avg, Average (Off)

BW/Avg, Res BW (Auto)

Video BW (Auto)

SPAN, 50, kHz

FREQUENCY

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (s) or (t) in Table 2-2 for 22.01 GHz to 26.5 GHz.
6. Press the following keys on the analyzer:
- BW/Avg, Res BW, 1, kHz**
- Video BW, 30, Hz**
- Single**
- Wait for the sweep to finish.

7. Press the following keys on the analyzer:

Display, Display Line (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 17 or 18 in Table 2-2. The Average Noise Level should be less than the Maximum.

Table 2-2 Display Average Noise Level Worksheet

Model Number	Frequency Range	Measured Frequency	Average Noise Level (TR Entry)	Maximum	
				50 Ω Input	75 Ω Input
E4401B	10 MHz to 500 MHz	(a) _____	(1) or (19) _____	– 119 dBm	– 66 dBmV
E4411B	10 MHz to 500 MHz	(b) _____	(1) or (20) _____	– 119 dBm	– 65 dBmV
E4401B, E4411B	501 MHz to 1.0 GHz	(c) _____	(2) or (21) _____	– 117 dBm	– 60 dBmV
E4401B	1.01 GHz to 1.5 GHz	(d) _____	(3) or (22) _____	– 114 dBm	– 56 dBmV
E4411B	1.01 GHz to 1.5 GHz	(e) _____	(3) or (23) _____	– 113 dBm	– 53 dBmV
E4402B, E4403B	10 MHz to 1.0 GHz	(f) _____	(4) _____	– 117 dBm	N/A
E4404B, E4405B, E4407B, E4408B	10 MHz to 1.0 GHz	(g) _____	(5) _____	– 116 dBm	N/A
E4402B, E4403B	1.01 GHz to 2.0 GHz	(h) _____	(6) _____	– 116 dBm	N/A
E4404B, E4405B, E4407B	1.01 GHz to 2.0 GHz	(i) _____	(7) _____	– 116 dBm	N/A
E4408B	1.01 GHz to 2.0 GHz	(j) _____	(8) _____	– 115 dBm	N/A
E4402B, E4403B	2.01 GHz to 3.0 GHz	(k) _____	(9) _____	– 114 dBm	N/A
E4404B, E4405B, E4407B, E4408B	2.01 GHz to 3.0 GHz	(l) _____	(10) _____	– 112 dBm	N/A
E4404B, E4405B, E4407B, E4408B	3.01 GHz to 6.0 GHz	(m) _____	(11) _____	– 112 dBm	N/A
E4404B	6.01 GHz to 6.7 GHz	(n) _____	(12) _____	– 111 dBm	N/A
E4405B, E4407B	6.01 GHz to 12.0 GHz	(o) _____	(13) _____	– 111 dBm	N/A
E4408B	6.01 GHz to 12.0 GHz	(p) _____	(14) _____	– 110 dBm	N/A
E4405B	12.01 GHz to 13.2 GHz	(q) _____	(15) _____	– 107 dBm	N/A
E4407B, E4408B	12.01 GHz to 22 GHz	(r) _____	(16) _____	– 107 dBm	N/A
E4407B	22.01 GHz to 26.5 GHz	(s) _____	(17) _____	– 106 dBm	N/A
E4408B	22.01 GHz to 26.5 GHz	(t) _____	(18) _____	– 101 dBm	N/A

Frequency Readout Accuracy

Test Limits

Span	Minimum	Maximum
10 MHz	1.48988 GHz	1.49012 GHz
100 kHz	1.4899988 GHz	1.4900012 GHz
Marker Count Accuracy with Counter Resolution at 1 Hz	1.489999999 GHz	1.490000001 GHz

Test Description

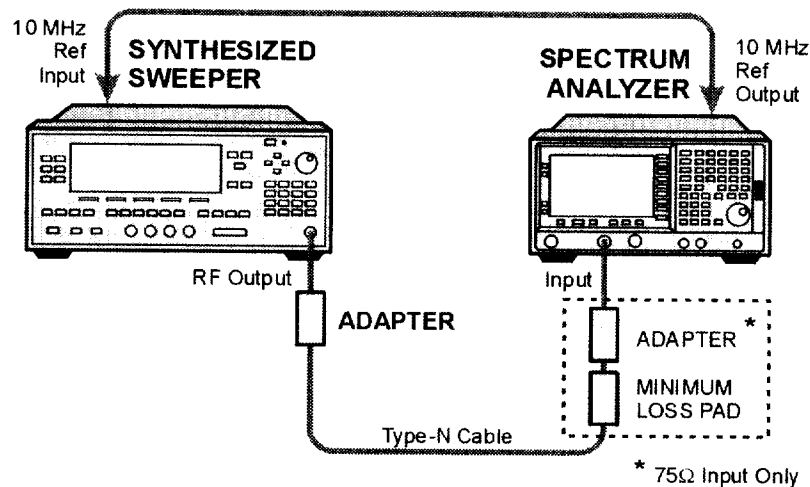
The frequency readout accuracy of the analyzer is tested with an input signal of known frequency. Frequency reference error is eliminated by using the same frequency standard for the analyzer and the synthesized sweeper.

Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Signal Sources		
Synthesized Sweeper	10 MHz to 1.5 GHz External Reference Input	8340A/B or 836XX Series
Adapters		
Type-N (f), to APC 3.5(f)		1250-1745
Cables		
Type-N, 152-cm (60-in)		11500D
BNC, 122-cm (48-in)		10503A
Additional Equipment for 75-Ohm Input		
Pad, minimum loss		11852B
Type-N (f), to BNC (m), 75 Ω		1250-1534

Figure 2-2

Equipment Setup



wi71a

Procedure

1. Connect the equipment as shown in Figure 2-2. Remember to connect the 10 MHz REF OUT of the analyzer to the 10 MHz REF IN of the synthesized sweeper.
2. Perform the following steps to set up the equipment:
 - a. Press **INSTRUMENT PRESET** on the synthesized sweeper, then set the controls as follows:

CW, 1.490, GHz
POWER LEVEL, 10, - dBm
 - b. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:

Frequency, 1.490, GHz
SPAN, 10, MHz
BW/Avg, Res BW, 100, kHz
Video BW, 30, kHz

CAUTION

Use only 75 Ω cables, connectors, or adapters on analyzers with 75 Ω inputs, or damage to connectors will occur.

3. Press **Peak Search** on the analyzer to measure the frequency readout accuracy. Record this in the Marker Frequency Readout column in Table 2-3 on page 99.
4. Press **Span, 100, kHz, BW/Avg, Res BW, 1, kHz, Video BW, 1, kHz**.

Functional Testing
Frequency Readout Accuracy

5. Press **Peak Search** on the analyzer to measure the frequency readout accuracy. Record this in the Marker Frequency Readout column in Table 2-3 on page 99.

NOTE

The Frequency Readout Accuracy is now complete. Continue with the Marker Count Accuracy functional check.

Marker Count Accuracy

Procedure

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer to measure the marker count accuracy by pressing the following keys:

Frequency, 1.490, GHz
SPAN, 10, MHz
BW/Avg, Res BW, 100, kHz
Freq Count, Resolution, 1, Hz

2. Press **Peak Search**, then wait for a count to be taken (it may take several seconds).
3. Record the **Cntr1** frequency as the Marker Frequency Readout in Table 2-3.

Table 2-3

Frequency Readout and Marker Count Accuracy Worksheet

Span	Minimum	Marker Frequency Readout	Maximum
10 MHz	1.48988 GHz		1.49012 GHz
100 kHz	1.4899988 GHz		1.4900012 GHz
Marker Count Accuracy w/Counter Resolution at 1 Hz	1.489999999 GHz		1.490000001 GHz

Frequency Response

Test Limits

ESA Model	Frequency	Minimum (dB)	Maximum (dB)
E4411B & E4401B	9 kHz to 1.5 GHz	-1.5	1.5
E4402B & E4403B	9 kHz to 3 GHz	-1.5	1.5
E4404B	9 kHz to 3 GHz	-1.5	1.5
	3.01 GHz to 6.7 GHz	-3.0	3.0
E4405B	9 kHz to 3 GHz	-1.5	1.5
	3.01 GHz to 6.7 GHz	-3.0	3.0
	6.71 GHz to 13.2 GHz	-3.5	3.5
E4407B & E4408B	9 kHz to 3 GHz	-1.5	1.5
	3.01 GHz to 6.7 GHz	-3.0	3.0
	6.71 GHz to 13.2 GHz	-3.5	3.5
	13.21 GHz to 25 GHz	-4.0	4.0
	25 GHz to 26.5 GHz	-4.5	4.5

Test Description

The output of the synthesized sweeper is fed through a power splitter to a power sensor and the analyzer. The synthesized sweeper's power level is adjusted at 50 MHz to place the displayed signal at the analyzer center horizontal graticule line. Measurements are made at various points depending on the model being tested. The signal source amplitude is measured with a power meter to eliminate errors due to source flatness. The power meter is zeroed and calibrated before starting the measurement.

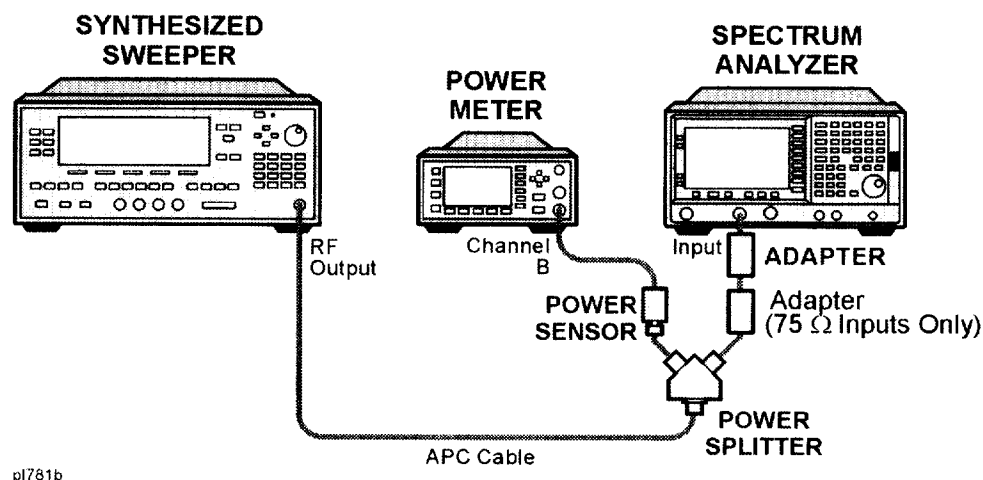
Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Signal Sources		
Synthesized Sweeper		8340A/B or 836xx Series

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Adapters		
Type-N (f) to BNC (f)		1250-1474
APC 3.5 (f) to APC 3.5 (f)		5061-5311
BNC (f) to SMA (m)		1250-1237
Type-N (m), to APC 3.5(m)		1250-1743
Cables		
(2) APC 3.5mm (36 in)	E4407B and E4408B only	8120-4921 or 11500E
BNC (m) both ends, (48 in)		10503A
Additional Equipment for 75-Ohm Input		
Pad, minimum loss		11852B
Type-N (f), to BNC (m)		1250-1534
Miscellaneous		
Power Meter		EPM-441A (E4418A)
Power Sensor, 75 Ω		8483A
Power Sensor, 50 Ω		8485A
Power Splitter		11667B

Figure 2-3

Equipment Setup



pl781b

Procedure

1. Zero and calibrate the power meter and power sensor as described in the power meter operation manual.
2. Connect the equipment as shown in Figure 2-3.

CAUTION

Use only 75 Ω cables, connectors, or adapters on analyzers with 75 Ω connectors, or damage to the connectors will occur.

3. Set the synthesized sweeper controls as follows:

FREQUENCY, Center Freq, 50, MHz

POWER LEVEL, -8, dBm

4. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer and wait for the preset routine to finish. Set the analyzer by pressing the following keys.

FREQUENCY, 50, MHz

CF Step, 50, MHz

SPAN, 20, kHz

AMPLITUDE, More, Y Axis Units, dBm

AMPLITUDE, -10, dBm

AMPLITUDE, Attenuation, 10, dB

Scale/Div, 2, dB

BW/Avg, Res BW, 10, kHz

Video BW, 3, kHz

Peak Search

FREQUENCY, Signal Track (On)

5. Adjust the synthesized sweeper power level for a marker amplitude reading of -14 dBm $\pm$ 0.10 dB.

NOTE

The power level of the synthesized sweeper remains unchanged for the duration of the test. For each new test frequency, the power sensor cal factor should be entered to minimize measurement errors.

6. Refer to Table 2-4, "Frequency Response Worksheet." Enter the marker readout amplitude for 50 MHz as displayed on the analyzer in the Analyzer Amplitude column.
7. Enter the power meter reading in the Power Meter Amplitude column.
8. Compute the flatness error at 50 MHz using the following equation and record the results in the Flatness Error column:
$$\text{Flatness Error} = \text{Analyzer Amplitude} - \text{Power Meter Amplitude}$$
9. Perform the following steps for each center frequency setting listed in Table 2-4.

- a. Tune the source to the next frequency listed in the Center Frequency column.
- b. Enter the power sensor cal factor for the new test frequency.
- c. Tune the analyzer center frequency by pressing the $\uparrow$ key or press **FREQUENCY, Center Freq, "n", and MHz** (where "n" is the next test frequency in Table 2-4).
- d. Press **Peak Search**.
- e. Enter the power meter reading in the Power Meter Amplitude column.
- f. Enter the analyzer reading in the Analyzer Amplitude column.
- g. Compute the flatness error using the following equation and record the results in the Flatness Error column:

$$\text{Flatness Error} = \text{Analyzer Amplitude} - \text{Power Meter Amplitude}$$

The flatness error should be less than the specified amount.

Table 2-4 Frequency Response Worksheet

Model	Center Freq	Analyzer Amplitude	Power Meter Amplitude	Flatness Error	Flatness Error Test Limits (dB)
All Models	50 MHz				± 1.5
	100 MHz				± 1.5
	750 MHz				± 1.5
	1250 MHz				± 1.5
	1500 MHz				± 1.5
E4402B – E4408B	2000 MHz				± 1.5
	2500 MHz				± 1.5
	2999 MHz				± 1.5
E4402B – E4408B	4250 MHz				± 3.0
	5750 MHz				± 3.0
	6699 MHz				± 3.0

Functional Testing
Frequency Response

Table 2-4 Frequency Response Worksheet (Continued)

Model	Center Freq	Analyzer Amplitude	Power Meter Amplitude	Flatness Error	Flatness Error Test Limits (dB)
E4402B – E4408B	8000 MHz				± 3.5
	9000 MHz				± 3.5
	10000 MHz				± 3.5
	11000 MHz				± 3.5
	13199 MHz				± 3.5
E4407B & E4408B	14000 MHz				± 4.0
	19000 MHz				± 4.0
	24000 MHz				± 4.0
	26500 MHz				± 4.5

Reference Level Accuracy

Test Limits

Reference Level		Minimum (dB)	Maximum (dB)
dBm	dBmV		
-30	21.76	Reference	Reference
-20	31.76	-1.40	1.40
-10	41.76	-1.40	1.40
-40	11.76	-1.40	1.40
-50	1.76	-1.40	1.40
-60	-8.24	-1.40	1.40
-70	-18.24	-2.0	2.0

Test Description

A 50 MHz CW signal is applied to the Input of the analyzer. The amplitude of the source and the analyzer's reference level are decreased in 10 dB steps. The analyzer marker functions are used to measure the amplitude difference between steps. Reference Level Accuracy is tested in both Log and Linear Scale Modes. Most of the error is contributed from the output attenuator inaccuracy in the synthesized sweeper and not the analyzer.

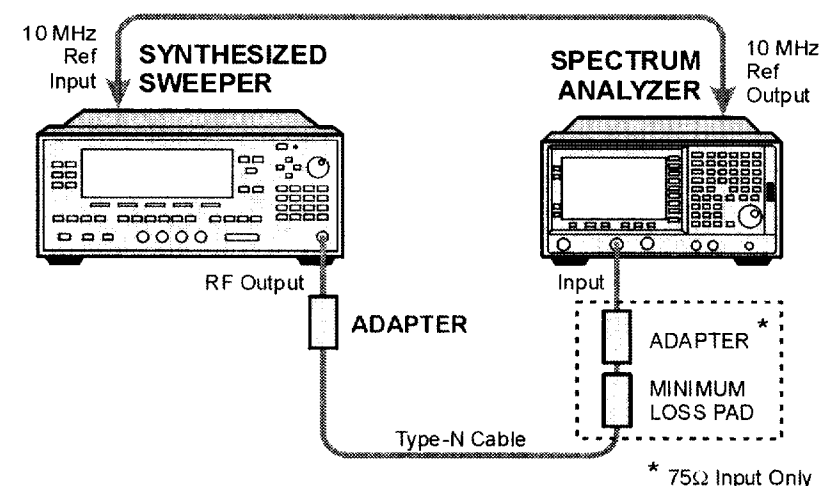
Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Signal Sources		
Synthesized Sweeper	Output Level Accuracy 0 to -15 dBm: ± 1.0 dB -16 dBm to -63 dBm: ± 1.4 dB ≤ -64 dBm: ≥ 2.0 dB	8340A/B or 836XX Series
Adapters		
Type-N (m), to BNC f)		1250-1476
Cables		

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Type-N, 152-cm (60-in)		11500D
BNC, 122-cm (48-in)		10503A
Additional Equipment for 75-Ohm Input		
Pad, minimum loss		11852B
Type-N (f), to BNC (m)		1250-1534

Figure 2-4

Equipment Setup



w171a

Log Mode Procedure

1. Connect the equipment as shown in Figure 2-4.
2. Press **PRESET** on the synthesized sweeper. Set the synthesized sweeper controls as follows:
 - CW, 50, MHz**
 - Power Level, -30, dBm**
3. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Press **System, Alignments, Auto Align, Off**. Set the analyzer by pressing the following keys:
 - FREQUENCY, Center Freq, 50, MHz**
 - SPAN, 50, kHz**
 - AMPLITUDE, -30, dBm (50 Ω Input only)**
 - AMPLITUDE, More, Y Axis Units, dBmV (75 Ω Input only)**
 - AMPLITUDE, 21.76, dBmV (75 Ω Input only)**

Attenuation (Man), 5, dB
BW/Avg, Res BW, 3, kHz
Video BW, 30, Hz

4. Press **Peak Search** on the analyzer. Adjust the amplitude on the synthesized sweeper until the marker amplitude on the analyzer reads $-30 \text{ dBm} \pm 0.10 \text{ dB}$. Enter the synthesized sweeper power level as the Synthesized Sweeper Amplitude reference in Table 2-5 on page 107.

NOTE

Under these analyzer conditions, the sweep time is 1.7 seconds. Therefore, the marker amplitude updates are fairly slow when adjusting the synthesizer output power.

5. Now that the reference has been established in step 4, adjust the synthesized sweeper power level and the analyzer reference level according to Table 2-5 on page 107. (The synthesized sweeper output power and the analyzer's reference level will be changed in 10 dB steps.)
6. On the analyzer, press **Single**, wait for a sweep to finish, and then press **Peak Search, Marker, Delta**.
7. For each new synthesized sweeper power level and analyzer reference level change, press the following keys on the analyzer:

Single

Peak Search

Record the Analyzer Marker Amplitude reading in Table 2-5.

Table 2-5 Reference Level Accuracy Worksheet (Log Mode)

Analyzer Reference Level		Synthesized Sweeper Amplitude (dBm)	Minimum (dB)	Analyzer Marker Δ Amplitude (dB)	Maximum (dB)
dBm	dBmV				
-30	21.76	Reference = _____	0 (Reference)	0 (Reference)	0 (Reference)
-20	31.76	Reference + (10 dB)	8.60		11.40
-10	41.76	Reference + (20 dB)	18.60		21.40
-40	11.76	Reference + (-10 dB)	-11.40		-8.60
-50	1.76	Reference + (-20 dB)	-21.40		-18.60
-60	-8.24	Reference + (-30 dB)	-31.40		-28.60
-70	-18.24	Reference + (-40 dB)	-42.0		-38.0

Linear Mode Procedure

1. Set the power level on the synthesized sweeper to -30 dBm by pressing **Power Level, -30 , dBm**.
2. Set the analyzer by pressing the following keys:
Sweep, Sweep (Cont)
AMPLITUDE, -30 , dBm (50 Ω Input)
AMPLITUDE, More, Y Axis Units, dBmV (75 Ω Input)
AMPLITUDE, $+21.76$, dBmV (75 Ω Input)
Scale Type (Lin)
Marker, Off
3. Adjust the amplitude on the synthesized sweeper until the marker amplitude on the analyzer reads -30 dBm ± 0.10 dB. Enter the synthesized sweeper power level as the Synthesized Sweeper Amplitude reference in Table 2-6.

NOTE

Under these analyzer conditions, the sweep time is 1.7 seconds. Therefore, the marker amplitude updates are fairly slow when adjusting the synthesizer output power.

4. Now that the reference has been established in step 4, adjust the synthesized sweeper power level and the analyzer reference level according to Table 2-6. (The synthesized sweeper output power and the analyzer's reference level will be changed in 10 dB steps.)
5. On the analyzer, press **Single**, wait for a sweep to finish, and then press **Peak Search, Marker, Delta**.
6. For each new synthesized sweeper power level and analyzer reference level change, press the following keys on the analyzer:

Single
Peak Search

Record the Analyzer Marker Amplitude reading in Table 2-6.

Table 2-6 Reference Level Accuracy Worksheet (Linear Mode)

Analyzer Reference Level		Synthesized Sweeper Amplitude (dBm)	Minimum (dB)	Analyzer Marker Δ Amplitude (dB)	Maximum (dB)
dBm	dBmV				
-30	21.76	Reference = _____	0 (Reference)	0 (Reference)	0 (Reference)
-20	31.76	Reference + (10 dB)	8.60		11.40
-10	41.76	Reference + (20 dB)	18.60		21.40
-40	11.76	Reference + (-10 dB)	-11.40		-8.60
-50	1.76	Reference + (-20 dB)	-21.40		-18.60
-60	- 8.24	Reference + (-30 dB)	-31.40		-28.60
-70	-18.24	Reference + (-40 dB)	-42.0		-38.0

Resolution Bandwidth Switching Uncertainty

Test Limits

Resolution Bandwidth	Minimum (dB)	Maximum (dB)
1 kHz	0 (Ref)	0 (Ref)
3 kHz	-0.3 dB	0.3 dB
10 kHz	-0.3 dB	0.3 dB
30 kHz	-0.3 dB	0.3 dB
100 kHz	-0.3 dB	0.3 dB
300 kHz	-0.3 dB	0.3 dB
1 MHz	-0.3 dB	0.3 dB
3 MHz	-0.3 dB	0.3 dB
5 MHz	-0.6 dB	0.6 dB

Test Description

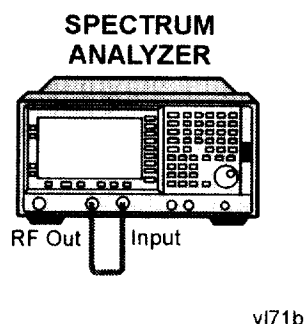
To measure the resolution-bandwidth switching uncertainty, an amplitude reference is taken with the resolution bandwidth set to 1 kHz. The resolution bandwidth is changed to settings between 5 MHz and 3 kHz and the amplitude variation is measured at each setting using the marker delta function and compared to the specification. The span is changed as necessary to maintain approximately the same aspect ratio.

Required Equipment

No equipment required for analyzer models E4401B and E4411B.

Instrument	Critical Specifications (for this test)	Recommended Model
Cables		
BNC, 9 inch		10502A
Adapter		
Type N to BNC		1250-0780 or 1250-1476

Figure 2-5 Equipment Setup



Procedure

NOTE

The 50 MHz reference output will automatically be switched internally on the E4401B and E4411B and will not require any external connections. All other ESA analyzers require that the AMPTD REF OUT be connected to the INPUT to perform this test.

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

Input/Output, Amptd Ref (On) (E4401B and E4411B)

Input/Output, Amptd Ref Out (On) (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B).

Connect a cable from the **AMPTD REF OUT** to the **INPUT 50 Ω** , as shown in Figure 2-5 (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B).

FREQUENCY, 50, MHz

SPAN, 50, kHz

AMPLITUDE, More, Y Axis Units, dBm (75 Ω Input only)

AMPLITUDE, -20, dBm

AMPLITUDE, Scale/Div, 1, dB

BW/Avg, Res BW, 1, kHz

Video BW, 1, kHz

2. Press **AMPLITUDE** and use the knob to adjust the reference level until the signal appears five divisions (mid-screen) below the reference level. Press the following keys on the analyzer:

Peak Search

Marker, Delta

FREQUENCY, Signal Track (On)

3. Set the analyzer Resolution Bandwidth and Span according to Table 2-7 on page 112.

Functional Testing
Resolution Bandwidth Switching Uncertainty

4. Press **Peak Search**, then record the Δ Mkr 1 amplitude reading in Table 2-7.
5. Repeat step 3 and 4 for each of the remaining resolution bandwidth and span settings listed in Table 2-7. The Δ Mkr 1 amplitude reading should be within the range indicated in the table “Test Limits” on page 110.

Table 2-7 Resolution Bandwidth Switching Uncertainty Worksheet

Resolution Bandwidth Setting	SPAN Setting	Δ Mkr 1 Amplitude Reading
1 kHz	50 kHz	0 (Ref)
3 kHz	50 kHz	
10 kHz	50 kHz	
30 kHz	500 kHz	
100 kHz	500 kHz	
300 kHz	5 MHz	
1 MHz	10 MHz	
3 MHz	10 MHz	
5 MHz	50 MHz	

Scale Fidelity

Test Limits

dB from Reference Level	Minimum (dB)	Maximum (dB)
-4	-1.0	1.0
-16	-1.4	1.4
-28	-1.4	1.4
-40	-1.4	1.4
-52	-1.4	1.4
-64	-2.0	2.0

Test Description

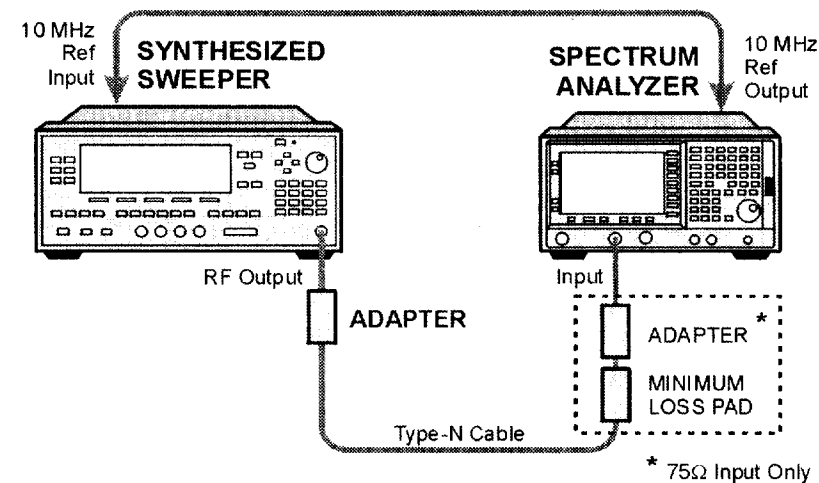
A 50 MHz CW signal is applied from a synthesized sweeper to the input of the analyzer. The source is adjusted for a response at the reference level. The synthesized sweeper amplitude is adjusted to achieve a nominal amplitude below the reference level. The analyzer's amplitude marker is compared to the actual source change to determine the scale fidelity error. Most of the error is the source's output attenuator inaccuracy from the synthesized sweeper.

Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Signal Sources		
Synthesized Sweeper	Output Level Accuracy 0 to -15 dBm: ± 1.0 dB -16 dBm to -63 dBm: ± 1.4 dB ≤ -64 dBm: ≥ 2.0 dB	8340A/B or 836XX Series
Adapters		
Type-N (m), to BNC (f)		1250-1476
Cables		
Type-N, 152-cm (60-in)		11500D
BNC, 122-cm (48-in)		10503A

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Additional Equipment for 75-Ohm Input		
Pad, minimum loss		11852B
Type-N (f), to BNC (m)		1250-1534

Figure 2-6

Equipment Setup

wl71a

Procedure

1. Connect the equipment as shown in Figure 2-6.
2. Preset the synthesized sweeper. Set the synthesized sweeper controls as follows:
 - CW, 50, MHz**
 - Power Level, 0, dBm (50 Ω Input)**
 - Power Level, 4, dBm (75 Ω Input)**
3. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Press **System, Alignments, Auto Align, Off**. Set the analyzer by pressing the following keys:
 - FREQUENCY, Center Freq, 50, MHz**
 - SPAN, 45, kHz**
 - AMPLITUDE, Attenuation, 10, dB**
 - BW/Avg, Res BW, 3, kHz**
 - Video BW, 1, kHz**
 - Peak Search**

4. Adjust the amplitude on the synthesized sweeper until the marker amplitude on the analyzer reads 0 dBm $\pm$ 0.10 dB. Record the synthesized sweeper output level as the reference in Table 2-8 on page 115.

NOTE

75 Ω Input only. Adjust the synthesized sweeper amplitude until the analyzer's marker reads 48.8 dBmV $\pm$ 0.10 dB.

5. On the analyzer, press the following keys:

Single
Peak Search
Marker, Delta

6. Record the marker delta reading in Table 2-8. At each new synthesized sweeper power level, press **Single**, **Peak Search**, and record the marker amplitude level.

Table 2-8

Scale Fidelity Worksheet

Synthesized Sweeper Level	Minimum (dB)	Marker Level (dB)	Maximum (dB)
Reference=_____	0 (Reference)		0 (Reference)
Reference -4 dB	-5.0		-3.0
Reference -16 dB	-17.40		-15.60
Reference -28 dB	-29.40		-26.60
Reference -40 dB	-41.40		-38.60
Reference -52 dB	-53.40		-50.60
Reference -64 dB	-66.0		-62.0

Second Harmonic Spurious Responses

Test Limits

Model Number	Maximum
E4401B	-55 dBc
E4402B	-55 dBc
E4403B	-50 dBc
E4404B	-55 dBc
E4405B	-55 dBc
E4407B	-55 dBc
E4408B	-50 dBc
E4411B	-55 dBc

Test Description

To test second harmonic distortion, a 50 MHz low pass filter is used to filter the source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The source power and input attenuation on the analyzer are adjusted so -20 dBm is the power level at the first mixer.

Required Equipment

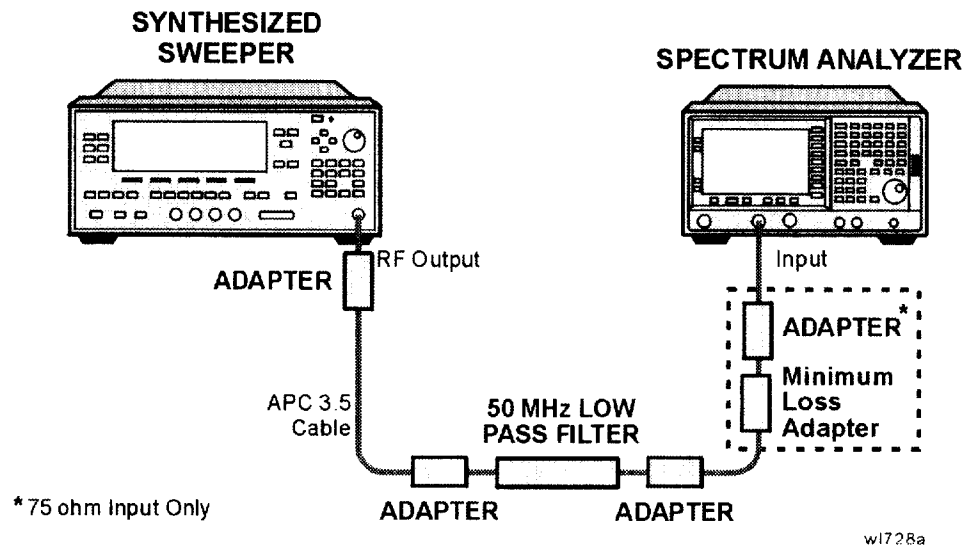
Table 2-9

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Signal Sources		
Synthesized Sweeper		8340A/B or 836XX Series
Miscellaneous		
50 MHz Low pass filter	Rejection at 80 MHz: >60 dB	0955-0306
Adapters		
(2) Type-N (m) to BNC (f)		1250-1476
BNC (f) to BNC (f)		1250-0080

Table 2-9

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Type-N (f), to APC 3.5(f)		1250-1745
Cables		
(2) BNC, 122-cm (48-in)		10503A
Additional Equipment for 75 Ω Input		
Pad, minimum loss		11852B
Type-N (f), to BNC (m)		1250-1534

Figure 2-7 Equipment Setup



Procedure

1. Connect the equipment as shown in Figure 2-7.
2. Set the synthesized sweeper controls as follows:

Frequency, 40, MHz

POWER LEVEL, -10, dBm (50 Ω Input only)

POWER LEVEL, -4.3, dBm (75 Ω Input only)

NOTE

75 Ω Input only. Connect the minimum loss adapter between the low pass filter and 75 Ω Input.

3. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish.
Set the analyzer by pressing the following keys:

FREQUENCY, Center Freq, 40, MHz
SPAN, 1, MHz
AMPLITUDE, -10, dBm (50 Ω Input only)
AMPLITUDE, 44, dBmV (75 Ω Input only)
Attenuation (Man), 10, dB
BW/Avg, Res BW, 30, kHz

4. Adjust the synthesized sweeper power level to place the peak of the signal at the reference level.
5. Set the analyzer by pressing the following keys:

SPAN, 50, kHz
BW/Avg, Res BW, 1, kHz
Video BW, 100, Hz

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

Peak Search
Mkr →
Mkr → CF Step
Marker, Delta
FREQUENCY

7. Press the $\uparrow$ key on the analyzer to step to the second harmonic (at 80 MHz). Press **Peak Search**. The marker delta amplitude reading should be less than the Maximum value listed in the Test Limits Table.

Tracking Generator Level Flatness: Models E4401B and E4411B, Options 1DN and 1DQ

Test Limits

	Minimum	Maximum
Flatness $\leq$ 10 MHz, 50 Ω	-2.5 dB	2.5 dB
Flatness $>$ 10 MHz, 50 Ω	-2.0 dB	2.0 dB
Flatness $>$ 10 MHz, 75 Ω	-3.0 dB	3.0 dB
Flatness $>$ 10 MHz, 75 Ω	-2.5 dB	2.5 dB

Test Description

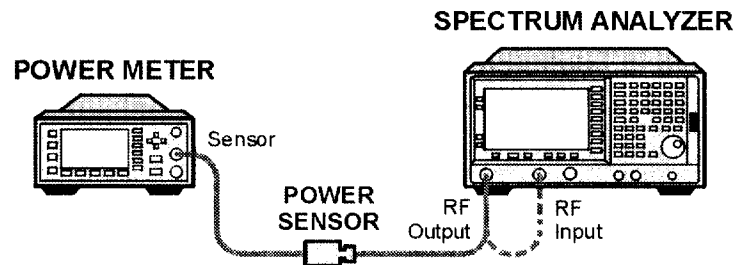
A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 50 MHz is measured at each frequency and recorded. Analyzers with 75 Ω tracking generators are only tested from 1 MHz to 1500 MHz.

Required Equipment

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Meters		
Power Meter		438A or E4418A, E4419A
RF Power Sensor	Frequency Range: 100 kHz to 1.5GHz	8482A
Cables		
BNC, 122-cm (48-in) (2)		10503A
Additional Equipment for 75 Ω Input		
75 Ω Power Sensor	Frequency Range: 1 MHz to 1.5GHz	8483A

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Type-N (f) to BNC (m), 75 Ω Adapter		1250-1534

Figure 2-8

Equipment Setup

wl712a

Procedure

1. Calibrate the tracking generator by pressing **System, Alignments, Align Now, TG**. Connect the RF Out to the Input when prompted.
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Center Freq, 50, MHz
CF Step, 500, MHz
SPAN, Zero Span
Source, Amplitude (On), 0, dBm (50 Ω RF Output only)
Source, Amplitude (On), +42.76, dBmV (75 Ω RF Output only)
3. Zero and calibrate the power meter and RF power sensor. Make sure the power meter is reading out in dBm. Enter the power sensor 50 MHz cal factor into the power meter.

NOTE

75 Ω RF Out only: Zero and calibrate the 75 Ω power sensor.

4. Connect the power sensor to the RF Out on the analyzer as shown in Figure 2-8.

NOTE

75 Ω RF Out only: Connect the 75 Ω power sensor through an adapter to the RF Out 75 Ω

5. Press REL on the power meter. The power meter readout amplitudes are now relative to the power level at 50 MHz.

Tracking Generator Level Flatness: Models E4401B and E4411B, Options 1DN and 1DQ

6. Set the analyzer center frequency to 100 kHz by pressing **FREQUENCY, 100, kHz**.

NOTE

75 Ω RF Out only: Set the analyzer center frequency to 1 MHz.

7. Enter the appropriate power sensor Cal Factor for the test frequency into the power meter as indicated on the label of the power sensor.
8. Record the power level displayed on the power meter as the Level Flatness in Table 2-10.
9. Repeat steps 7 through 8 to measure the flatness at each center frequency setting listed in Table 2-10. The $\uparrow$ may be used to tune to center frequencies above 500 MHz.

NOTE

75 Ω RF Out only: Repeat steps 5 through 7 to measure the flatness at the frequencies above 1 MHz listed in Table 2-10.

Table 2-10**Tracking Generator Level Flatness Worksheet**

Center Frequency	Level Flatness (dB)
100 kHz or 1 MHz ^a	
5 MHz	
40 MHz	
50 MHz	0 (Ref)
80 MHz	
500 MHz	
1000 MHz	
1500 MHz	

- a. This frequency is 100 kHz for analyzers with 50 Ω tracking generators, and 1 MHz for analyzers with 75 Ω tracking generators.

Tracking Generator Level Flatness: E4402B, E4403B, E4404B, E4405B, E4407B and E4408B, Option 1DN

Test Limits

	Minimum	Maximum
Flatness $\leq$ 10 MHz	-3.5 dBm	+3.5 dBm
Flatness $>$ 10 MHz	-2.5 dBm	-2.5 dBm

Test Description

A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 50 MHz is measured at each frequency and recorded.

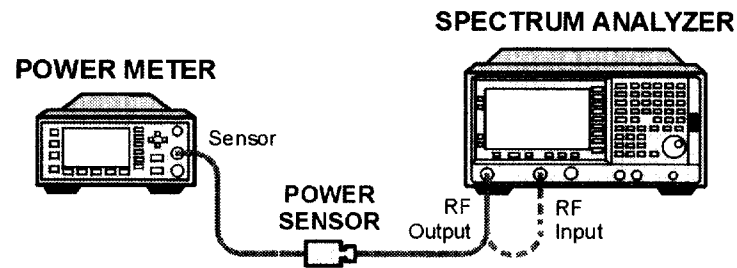
Required Equipment

Table 2-11

Instrument	Critical Specifications (for this test)	Recommended HP/Agilent Model
Meters		
Power Meter		438A or E4418A, E4419A
RF Power Sensor	Frequency Range: 100 kHz to 3.0 GHz	8482A
Adapters		
Type-N (f) to BNC (m), 75-Ohm		1250-1534
Cables		
(2) BNC, 122-cm (48-in)		10503A

Figure 2-9

Equipment Setup



w712a

Procedure

1. Calibrate the tracking generator by pressing **System, Alignments, Align Now, TG**. Connect the RF OUT to the RF INPUT when prompted.
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:
FREQUENCY, Center Freq, 50, MHz
CF Step, 100, MHz
SPAN, Zero Span
Source, Amplitude (On), -20, dBm
System, Alignments, Auto Align, Off
3. Zero and calibrate the power meter and power sensor. Make sure the power meter is reading out in dBm. Enter the power sensor 50 MHz cal factor into the power meter.
4. Connect the power sensor to the RF Out on the analyzer as shown in Figure 2-9.
5. Press REL on the power meter. The power meter readout amplitudes are now relative to the power level at 50 MHz.
6. Set the analyzer center frequency to 100 kHz by pressing **FREQUENCY, 100, kHz**.
7. Enter the appropriate power sensor Cal Factor for the test frequency into the power meter as indicated on the label of the power sensor. This must be done at each test frequency.
8. Record the power level displayed on the power meter as the Level Flatness in Table 2-12 on page 124.
9. Repeat steps 5 through 7 to measure the flatness at each center frequency setting listed in Table 2-12. The $\uparrow$ may be used to tune to center frequencies above 500 MHz.

10. Press **System, Alignments, Auto Align, On.****Table 2-12****Tracking Generator Level Flatness Worksheet**

Center Frequency	Level Flatness (dB)
100 kHz	
5 MHz	
40 MHz	
50 MHz	0 (Ref)
80 MHz	
500 MHz	
1000 MHz	
1500 MHz	
2000 MHz	
2300 MHz	
2500 MHz	
2700 MHz	
3.0 GHz	

Index

C

command error messages, 19, 22

D

device-specific error messages, 18
201 to 702, 19, 27

E

error messages

>10000, 19

-199 to -100, 19, 22

201 to 702, 19, 27

-299 to -200, 18

-399 to -300, 18

-499 to -400, 18, 20, 21

command, 19, 22

device-specific, 18

device-specific (201 to 702), 19,
27

empty error queue, 20

execution, 18

format, 17

GSM, 37

measurement applications, 19

query, 18, 20, 21

types, 18

error queues

empty message, 20

front panel, 16

SCPI remote interface, 17

errors

-499 to -400, 21

execution error messages, 18

F

flatness, 96

frequency response, 96

test description, 96

frequency response, 96

flatness, 96

test description, 96

front panel

error queue characteristics, 16

functional test descriptions, 75

functional testing

introduction, 74

performance verification, 74

test descriptions, 75

test list, 75

M

measurement applications error
messages, 19

Q

queries

error messages, 18, 20, 21

R

remote

interface (SCPI) error queue, 17

S

SCPI remote interface error queue
characteristics, 17

T

test descriptions, 75

frequency response, 96

test list

functional testing, 75

testing, 75