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)


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Contents

Contents

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

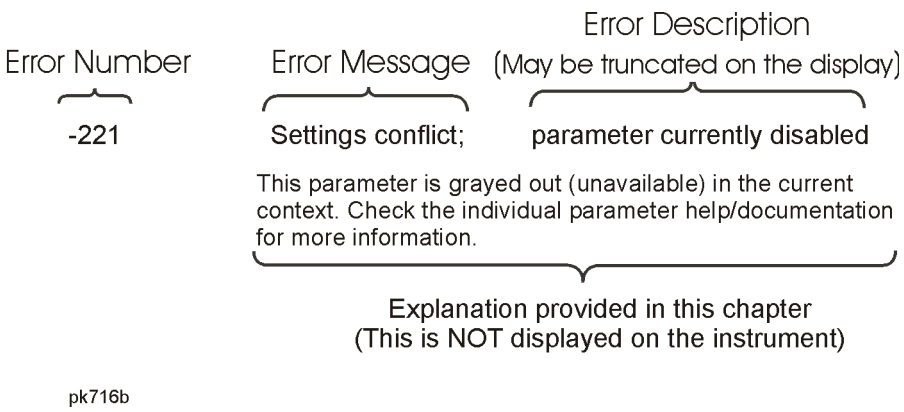
The system–defined error numbers are chosen on an enumerated (“1 of N”) basis. The error messages are listed in numerical order according to the error message number. Status and Informational messages without numbers will be listed in alphabetical order following the numerical listing.

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



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 MY41440000and 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.

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 AYX 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 AYX 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.

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 AYX FADC hardware required. Meas unavailable.`

The measurement you are attempting requires either the DSP and Fast ADC (Option B7D) or the Fast ADC (Option AYX) 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 Δ f1 or Δ 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.

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 *ESA Spectrum Analyzer User's Guide*.

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)`

This message applies to the Agilent Technologies E4401B and E4411B only. 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)`

This message applies to the Agilent Technologies E4401B and E4411B only. 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.

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.

2 Functional Testing

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:

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

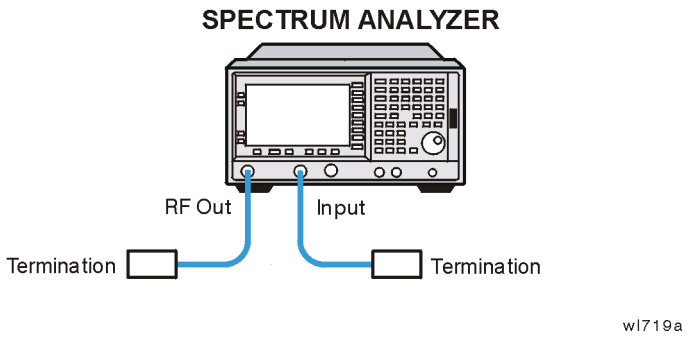
The Displayed Average Noise Level is measured within the frequency range specified. The analyzer input is terminated in either 50 Ω or 75 Ω, depending on analyzer options.

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



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

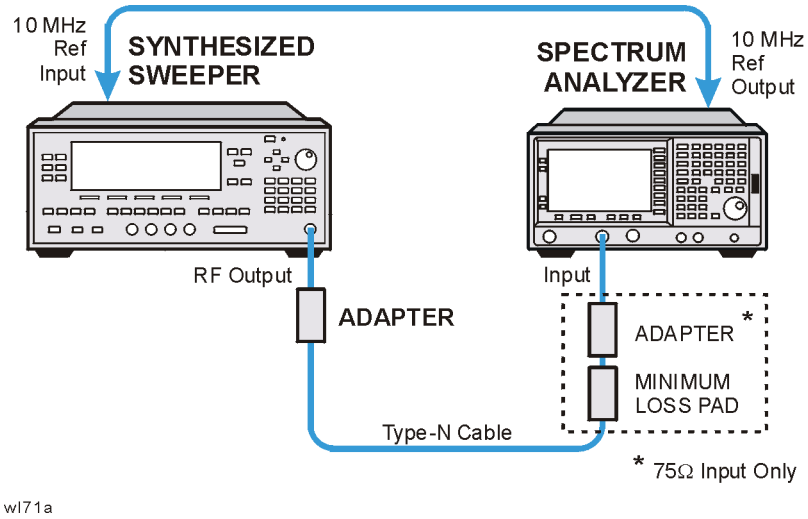
Test Description

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**



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**.

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 in 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

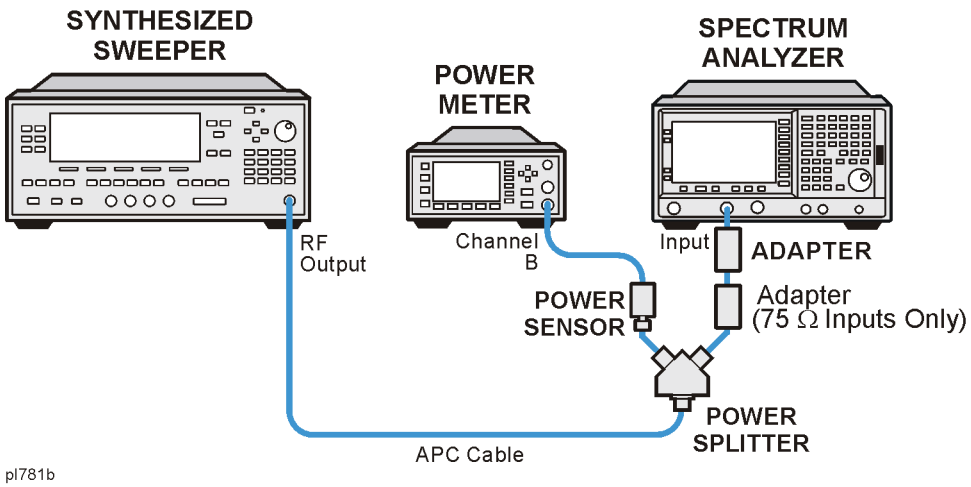
The output of the synthesized sweeper is fed through a power splitter to a power sensor and the analyzer. The synthesized sweeper's power level is adjusted at 50 MHz to place the displayed signal at the analyzer center horizontal graticule line. Measurements are made at various points depending on the 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



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 +/– 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:

   Flatness Error = Analyzer Amplitude – 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 ⇑ 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:

Flatness Error = Analyzer Amplitude – 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

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

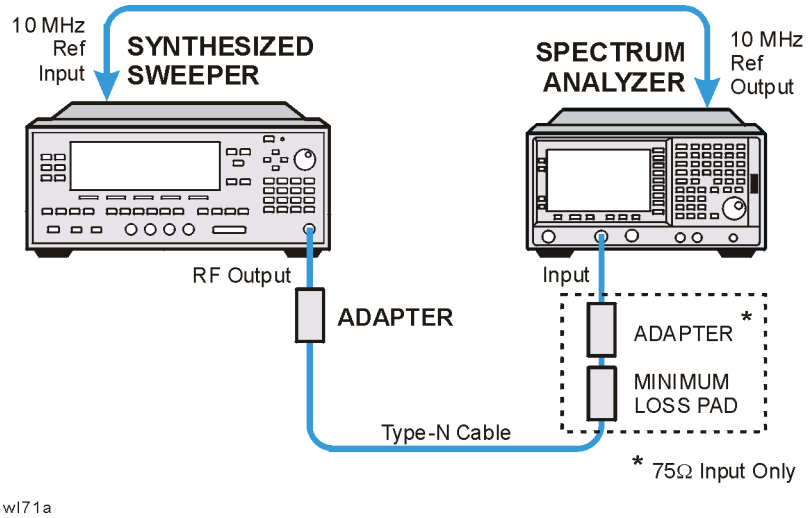
A 50 MHz CW signal is applied to the Input of the analyzer. The amplitude of the source and the analyzer's reference level are decreased in 10 dB steps. The analyzer marker functions are used to measure the amplitude difference between steps. Reference Level Accuracy is tested in both Log and Linear 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**



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 dBm +/– 0.10 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

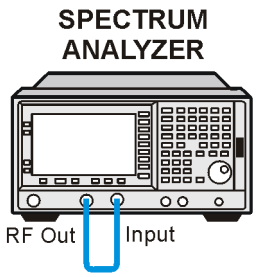
To measure the resolution-bandwidth switching uncertainty, an amplitude reference is taken with the resolution bandwidth set to 1 kHz. The resolution bandwidth is changed to settings between 5 MHz and 3 kHz and the amplitude variation is measured at each setting using the marker delta function and compared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



vl71b

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.

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

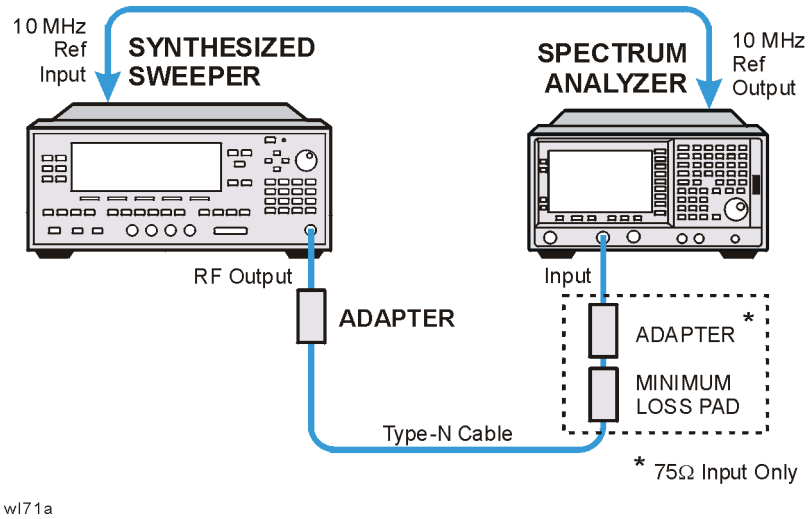
A 50 MHz CW signal is applied from a synthesized sweeper to the input of the analyzer. The source is adjusted for a response at the reference level. The synthesized sweeper amplitude is adjusted to achieve a nominal amplitude below the reference level. The analyzer's amplitude marker is compared to the 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**



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 sythesized sweeper until the marker amplitude on the analyzer reads 0 dBm +/– 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 +/– 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

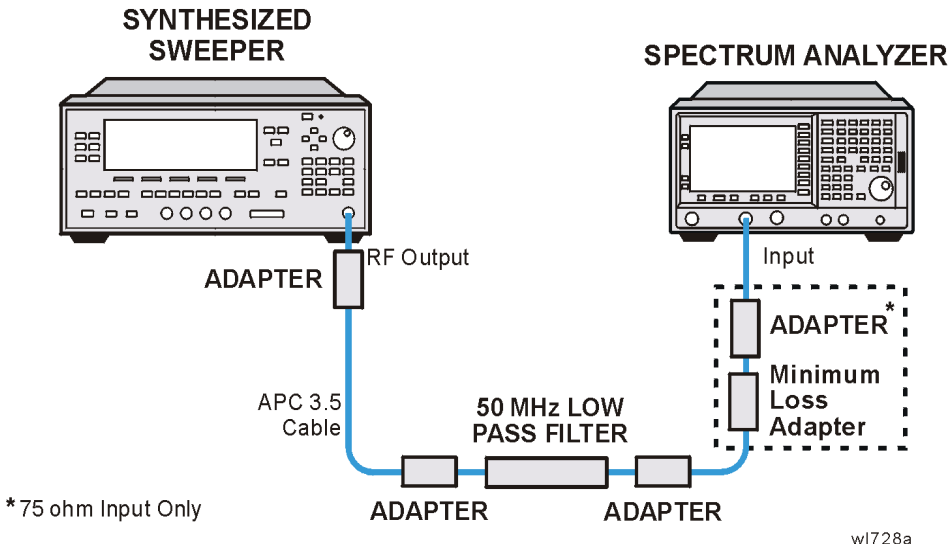
Table 2-9

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 ⇑ 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 ≤ 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

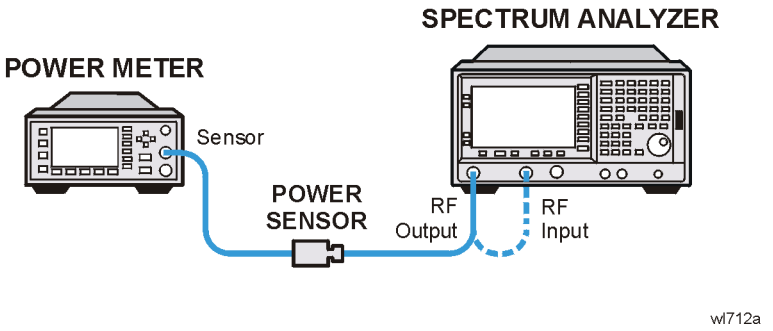
A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout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



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.

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 ⇑ 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 ≤ 10 MHz	–3.5 dBm	+3.5 dBm
Flatness > 10 MHz	–2.5 dBm	–2.5 dBm

Test Description

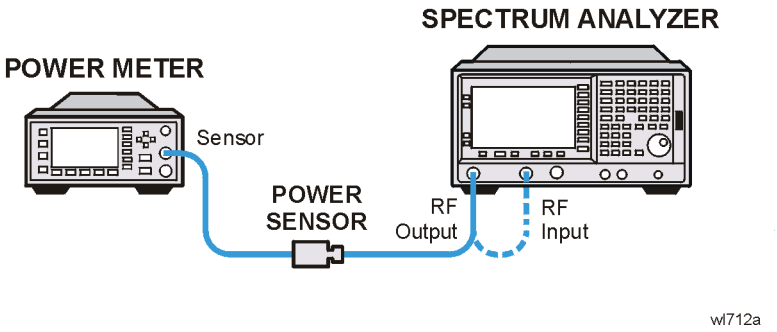
A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout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



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 ⇑ 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