

Agilent Technologies E444xAU

**Options H20, H25, and H70
Installation Guide**

Agilent Technologies E444xAU

Options H20, H25, and H70 Installation Guide

Retrofit Kit for the PSA Instruments

Use this manual with the following products:
E4440A/E4443A/E4445A/E4446A/E4448A



Agilent Technologies

Manufacturing Part Number: E4440-90214

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WARNING	Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.
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Definitions

- Specifications describe the performance of parameters covered by the product warranty (temperature – 0 to 55 °C, unless otherwise noted.)
- *Typical* describes additional product performance information that is not covered by the product warranty. It is performance beyond specification that 80% of the units exhibit with a 95% confidence level over the temperature range 20 to 30 °C. Typical performance does not include measurement uncertainty.
- *Nominal* values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

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Installing Options

Introduction

This manual incorporates the installation of the following similar instrument models E4440A, E4443A, E4445A, E4446A, E4448A with Option H20, H25 or H70.

Only one of the options can be installed per instrument due to the 321.4 MHz IF being required as the input. When the Option IF Output is installed with Option H7L or HNQ, the 321.4 MHz IF Output must be jumpered (8120-5066) to the H7L IN, HNQ IN, or Option IF IN (H20 IN, H25 IN or H70 IN) for any one of the options to function properly.

Description

The Agilent model numbers E4440AU, E4443AU, E4445AU, E4446AU and E4448AU are referred to as the E444xAU through out this document. Options H20, H25, and H70 are referred to as the Option IF Output.

The E444xAU Option IF Output is a retrofit kit that provides the components necessary to install a down converted IF Output connector to the rear panel of the PSA Performance Spectrum Analyzer. The Option IF Output can be installed with Options H7L and HNQ.

Verifying the Shipment

Check the items received in the following option specific Tables on the following pages to ensure that you have received all the items in your shipment. If there are any signs of damage that may have occurred during shipment, or any accessories appear to be damaged or missing, call your nearest Agilent Technologies sales or service office. See [“Contacting Agilent” on page 32](#) for more information.

Table 1 E4440xAU Option H20 Content List

Description	Agilent Part Number	Quantity
Plug Hole .25D NYL	6960-0076	3
Plug Hole .5D NY	6960-0149	3
Option Label (H20)	7120-8080	1
Panel Rear Dress	E4440-00059	1
Cable AY (W40)	E4440-60411	1
Cable AY (W51)	E4440-60412	1
Cable AY (W41)	E4440-60395 ¹	1
IF Output Board	E4440-60414	1
Label (20 MHz)	E4440-80541	1
Label (H20 IN)	E4440-80552	1
Installation Guide	E4440-90214	1
Product Note	E4440-90545	1
Wire Marker Clip 1 (brown)	7121-5601	2
Wire Marker Clip 2 (red)	7121-5602	2
Wire Marker Clip 4 (yellow)	7121-5604	2

1. Earlier versions of this upgrade kit may include the cable assembly (E4440-90413).

Table 2 E4440xAU Option H25 Content List

Description	Agilent Part Number	Quantity
Plug Hole .25D NYL	6960-0076	3
Plug Hole .5D NY	6960-0149	3
Option Label (H25)	7120-8080	1
Panel Rear Dress	E4440-00059	1
Cable AY (W40)	E4440-60411	1
Cable AY (W51)	E4440-60412	1
Cable AY (W41)	E4440-60395 ¹	1
IF Output Board	E4440-60429	1

Table 2 E4440xAU Option H25 Content List

Description	Agilent Part Number	Quantity
Label (H25 IN)	E4440-80553	1
Label (25 MHz)	E4440-80554	1
Product Note	E4440-90575	1
Installation Guide	E4440-90214	1
Wire Marker Clip 1 (brown)	7121-5601	2
Wire Marker Clip 2 (red)	7121-5602	2
Wire Marker Clip 4 (yellow)	7121-5604	2

1. Earlier versions of this upgrade kit may include the cable assembly (E4440-90413).

Table 3 E4440xAU Option H70 Content List

Description	Agilent Part Number	Quantity
Plug Hole .25D NYL	6960-0076	3
Plug Hole .5D NY	6960-0149	3
Option Label	7120-8080	1
Panel Rear Dress	E4440-00059	1
IF Output Board	E4440-60424 ¹	1
Cable AY (W40)	E4440-60411	1
Cable AY (W51)	E4440-60412	1
Cable AY (W41)	E4440-60395 ²	1
Product Note	E4440-90213	1
Installation Guide	E4440-90214	1
Wire Marker Clip 1 (brown)	7121-5601	2
Wire Marker Clip 2 (red)	7121-5602	2
Wire Marker Clip 4 (yellow)	7121-5604	2

1. Earlier versions of this upgrade kit may include the IF Output Board (E4440-90410).

2. Earlier versions of this upgrade kit may include the cable assembly (E4440-90413).

Installation Procedure

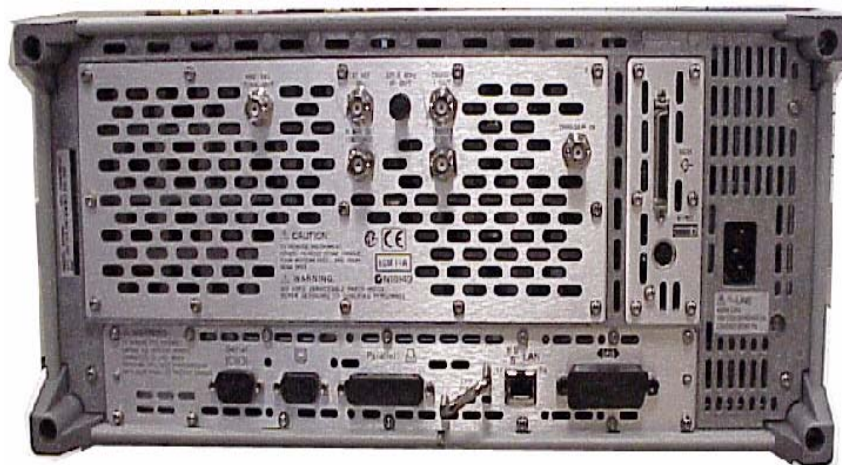
Removing the Feet, Handles and Covers

NOTE Keep all of the hardware (screws, nuts, etc.) for re-use when installing the assemblies.

Follow the steps outlined below to install the Option IF Output retrofit kit.

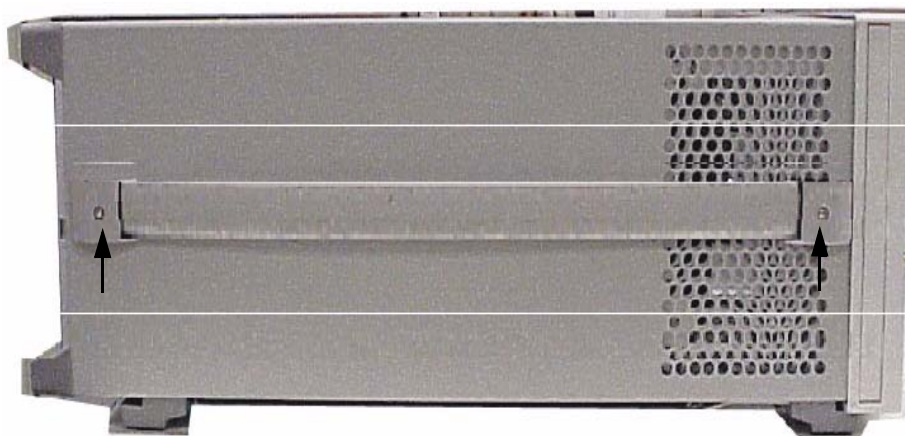
1. Remove the four rear panel feet on the PSA by using a #20 Torx driver. Refer to [Figure 1](#). Upon re-installation torque to 21 in-lb.

Figure 1 Rear Panel Feet



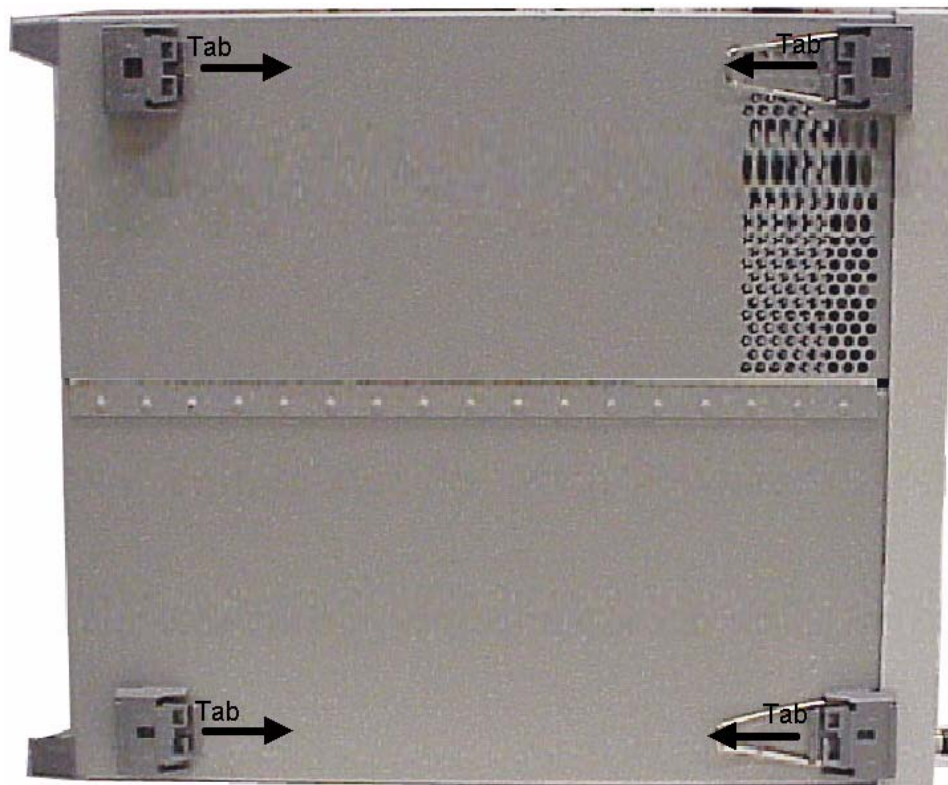
2. Remove the two side handles on the PSA by using a #20 Torx driver. Refer to [Figure 2](#). Upon re-installation torque to 21 in-lb.

Figure 2 Side Handles



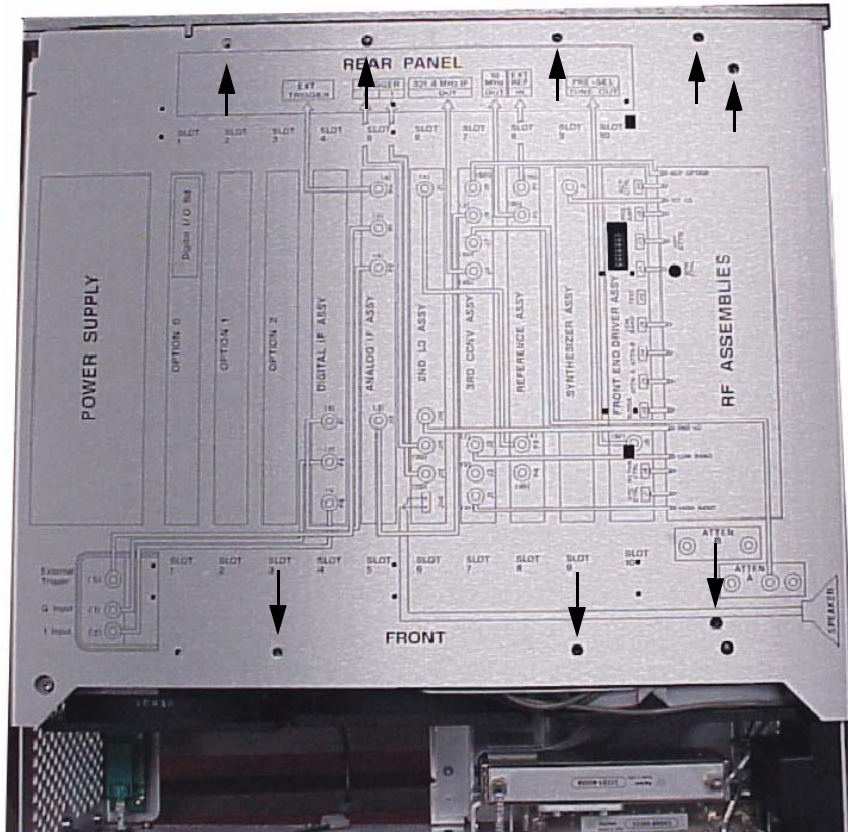
3. Remove the four feet from the bottom of the PSA instrument by pulling the tabs away from the instrument and sliding the feet toward the center of the instrument. Refer to [Figure 3](#).
4. Remove the outside cover by sliding it toward the rear of the instrument.

Figure 3 Bottom Feet Orientation



5. Remove the chassis cover using a #10 Torx driver. Refer to [Figure 4](#) for location of top screws. There are ten screws to remove from the “speaker” side of the chassis cover and two crews from the “power supply” side of the chassis cover. Place all hardware in a safe location for re-installation.

Figure 4 Chassis Cover Screw Location



6. Remove the rear panel plate by removing the following components. Refer to [Figure 5](#).
 - BNC (f) connectors nuts
 - SMA connector nut
 - thirteen rear plate screws
7. Carefully pull the rear panel plate away from the BNC and SMA connectors. Insure that the cables are labeled so that the BNC and SMA connectors are inserted into the correct holes when re-installing them on the new rear panel plate. Discard the old rear panel plate.

Figure 5 Rear Panel Plate Connectors and Hardware



Instruments with H7L or HNQ

1. Remove the brown (1) wire marker clip from the E4440-60412 cable and add a red marker clip (2) to each end of the cable. The wire marker will now read 52 (reference designator W52).
2. Add the yellow (4) and brown (1) wire marker clips to the new cable (E4440-60395). The wire marker will now read 41 (reference designator W41).
3. Assemble the rear panel plate (E4440-00059), cables (E4440-60412 and E4440-60395) and hole plug(s) as per the specific option configuration. See [Figure 6](#), [Figure 7](#) and [Figure 8](#).
4. Apply the option specific label to cover the 70 MHz silk screen with the frequency for the specific option being installed (20 MHz or 25 MHz). The Option H70 does not require a label.
5. Apply the label to cover the “H70 IN” silk screen with the specific option being installed (H20 IN or H25 IN). The Option H70 does not require a label.

Figure 6 Rear Panel Plate with Option H7L

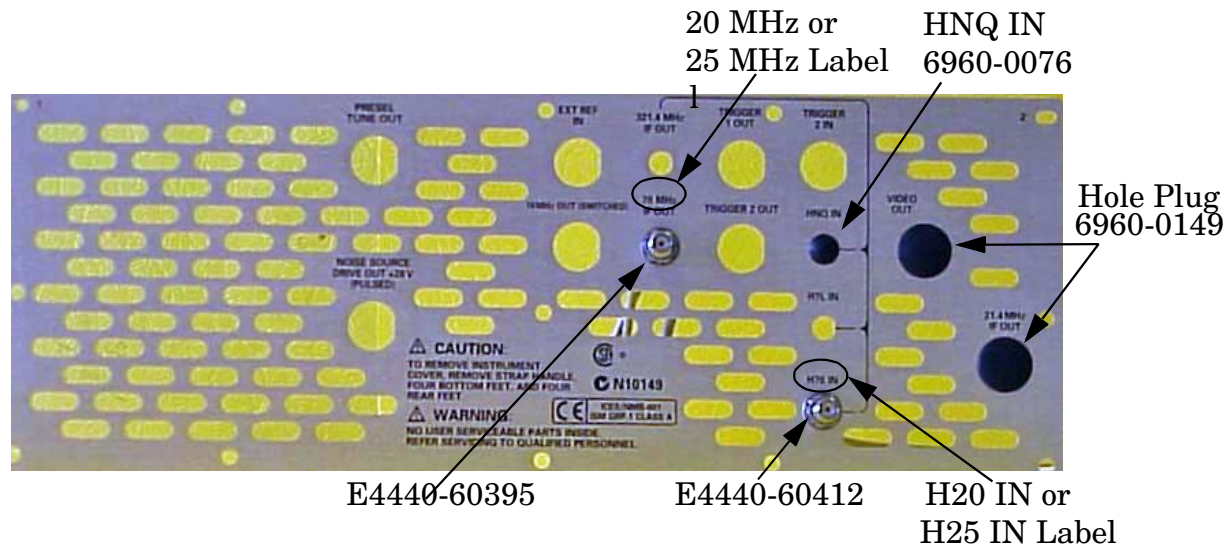


Figure 7 Rear Panel Plate with Option HNQ

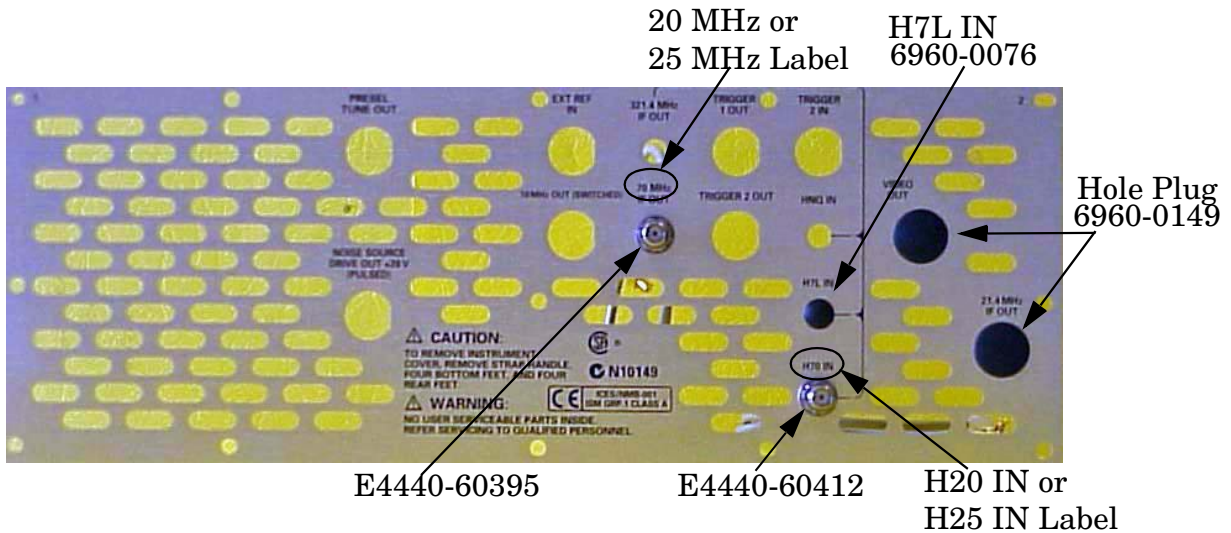
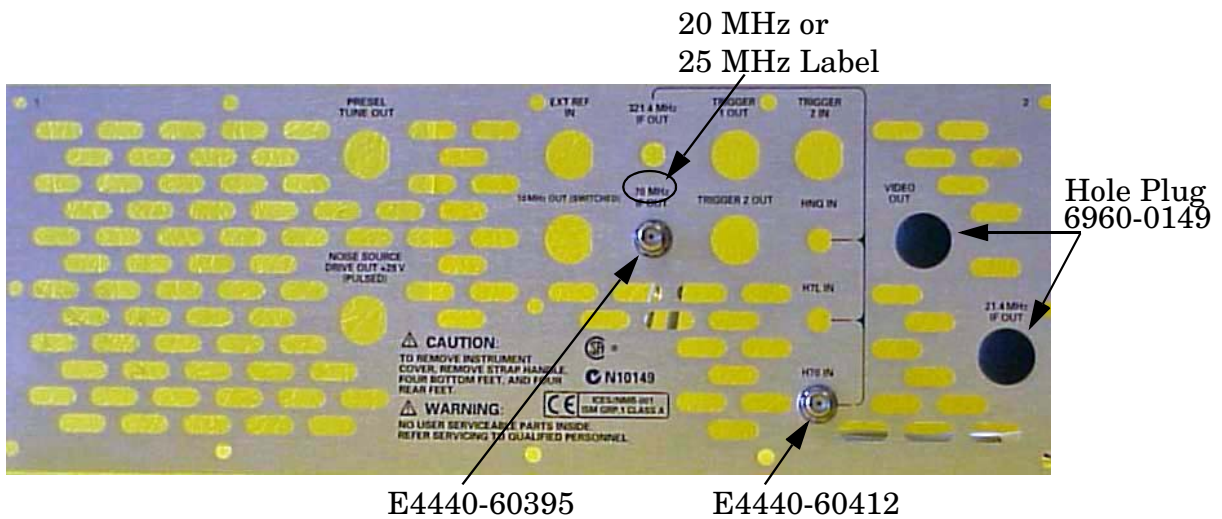


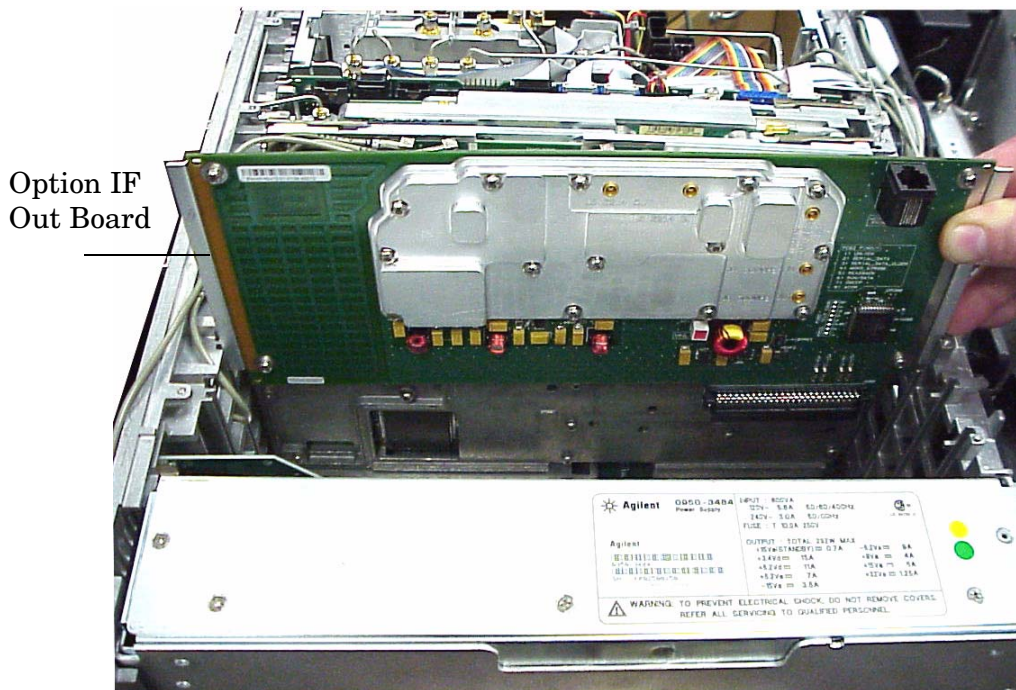
Figure 8 Rear Panel Plate with Option H7L and HNQ



Installing the Rear Panel with H7L or HNQ

1. Connect the BNC and SMA connectors as labeled in step 7 on [Page 9](#) using the previously removed hardware. Carefully route the new cables (W41 and W52) through the rear frame, near Slot 2. (To be connected to the Option IF board later in this procedure). Refer to [Figure 12 on page 14](#).
2. Connect the new rear panel plate to the rear panel using the previously removed screws. Torque to 9 in-lb.
3. Partially insert the Option IF board into Option Slot 2. See [Figure 9](#).

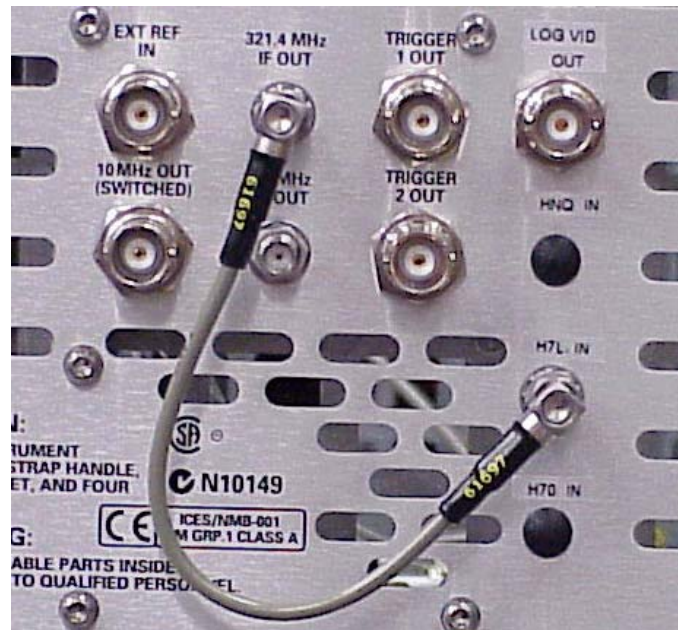
Figure 9 Option IF Board Insertion



4. Carefully route the cables along the top of the rear frame and between the board extractors to insure that they will not be damaged when installing the chassis cover. Refer to [Figure 12 on page 14](#). Connect the cables as follows:
 - Connect the 321.4 MHz IF Input cable (E4440-60412) (W52) on the rear panel to the 321.4 MHz IF Input connector (J1) on the Option IF board. Refer to [Figure 11 on page 14](#).
 - Connect the Option IF Output cable (E4440-60395) (W41) on the rear panel to the Option IF Output connector (J2) on the Option IF board.
 - Connect the jumper cable (8120-5066). See [Figure 10](#).

NOTE Jumper cable (8120-5066) is included on instruments with Option H7L or HNQ. Move the cable from the Option H7L IN or HNQ IN to the Option IF IN connector (H20 IN, H25 IN or H70 IN) for the option to function properly.

Figure 10 Jumper Cable (Option H7L)



5. Completely insert the Option IF Output board into Slot 2.
6. Attach the “H70” label (7121-8080) to the rear panel next to the existing list of options on the serial number label.
7. Install the chassis cover, instrument cover, side handles, bottom and rear feet in reverse order of the removal process described in the beginning of the procedure.
8. Install licence key to enable Option H20, H25 or H70. Refer to Option Upgrade Entitlement Certificate for option license procedure.

Figure 11 Option IF Board Connector Layout

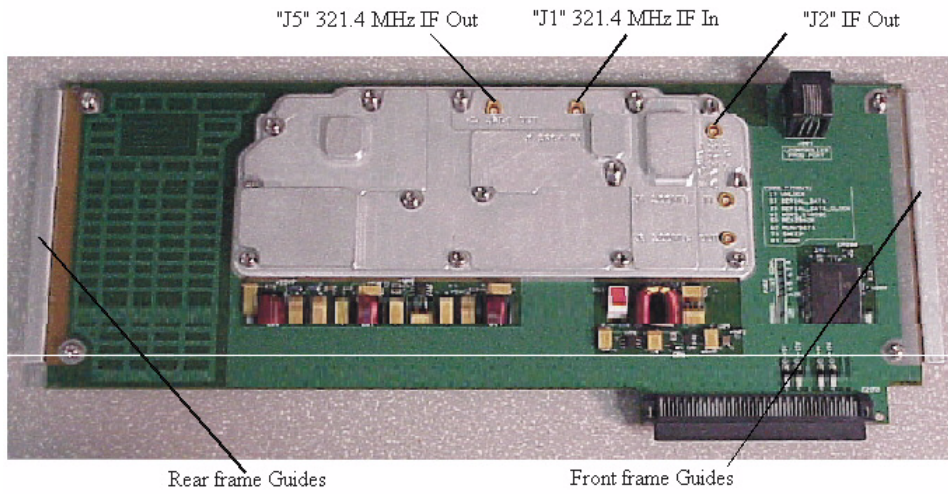


Figure 12 Top View of the PSA Instrument

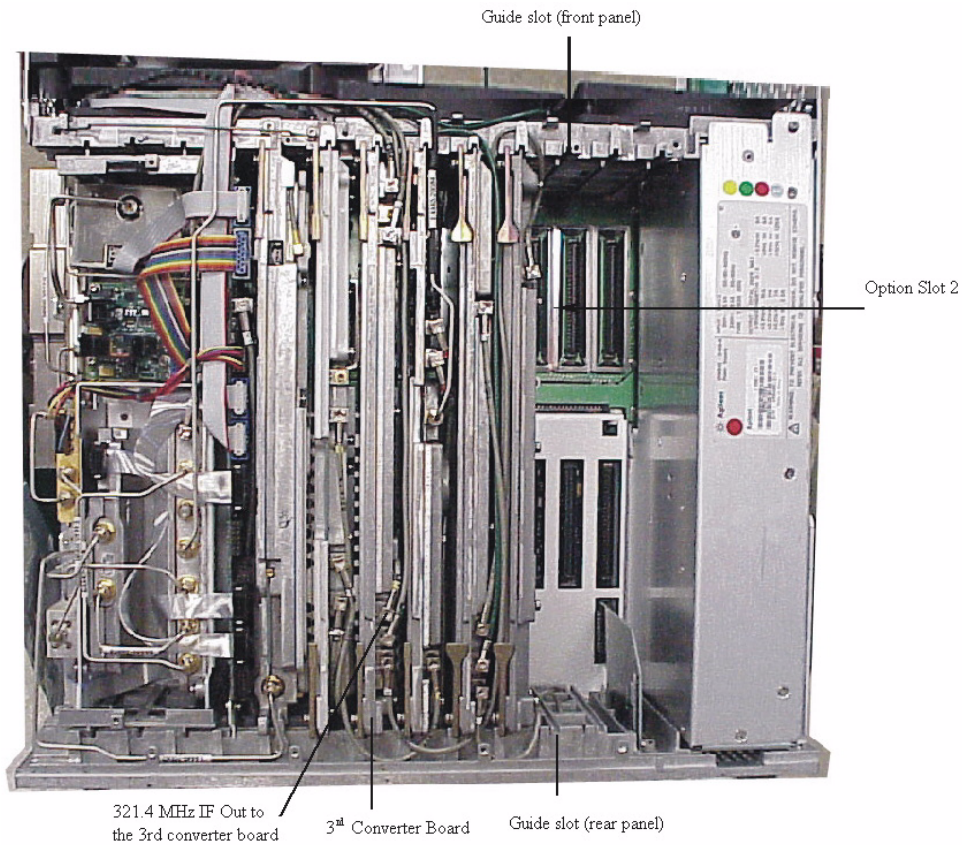
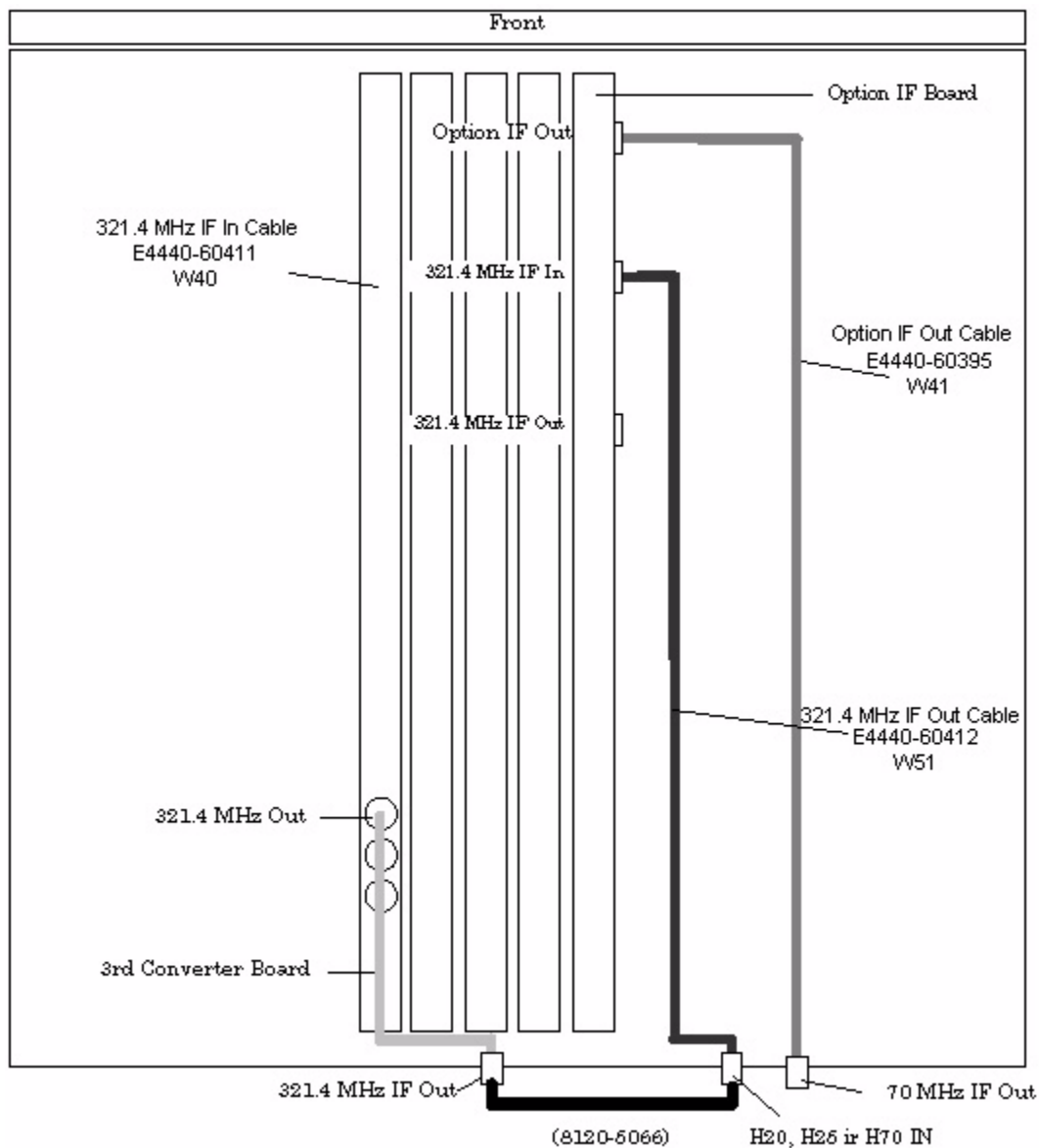


Figure 13 Top View Cable Orientation with Option H7L or HNQ

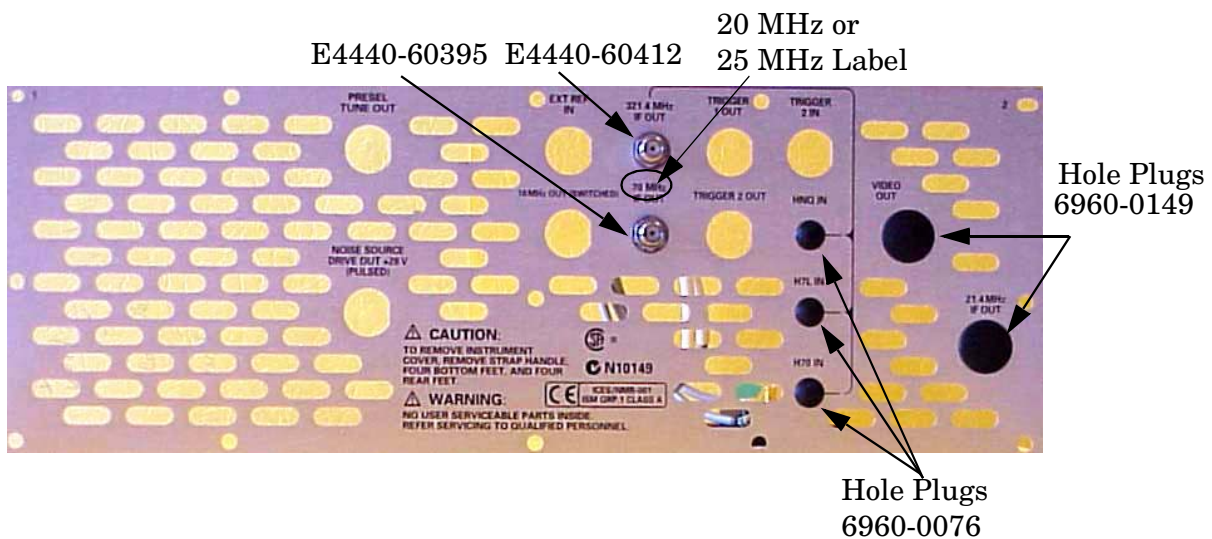


This concludes the installation of the E444xAU Option into the PSA instrument.

Instruments without H7L or HNQ

1. Add a yellow (4) and brown (1) marker clip to each end of the (E4440-60395) cable. The wire marker will now read 41 (reference designator W41).
2. Assemble the rear panel plate (E4440-00059), cables (E4440-60412 and E4440-60395) and hole plug(s) as per the specific option configuration. See [Figure 14](#).
3. Apply the option specific label to cover the 70 MHz silk screen with the frequency for the specific option being installed (20 MHz or 25 MHz). The Option H70 does not require a label.

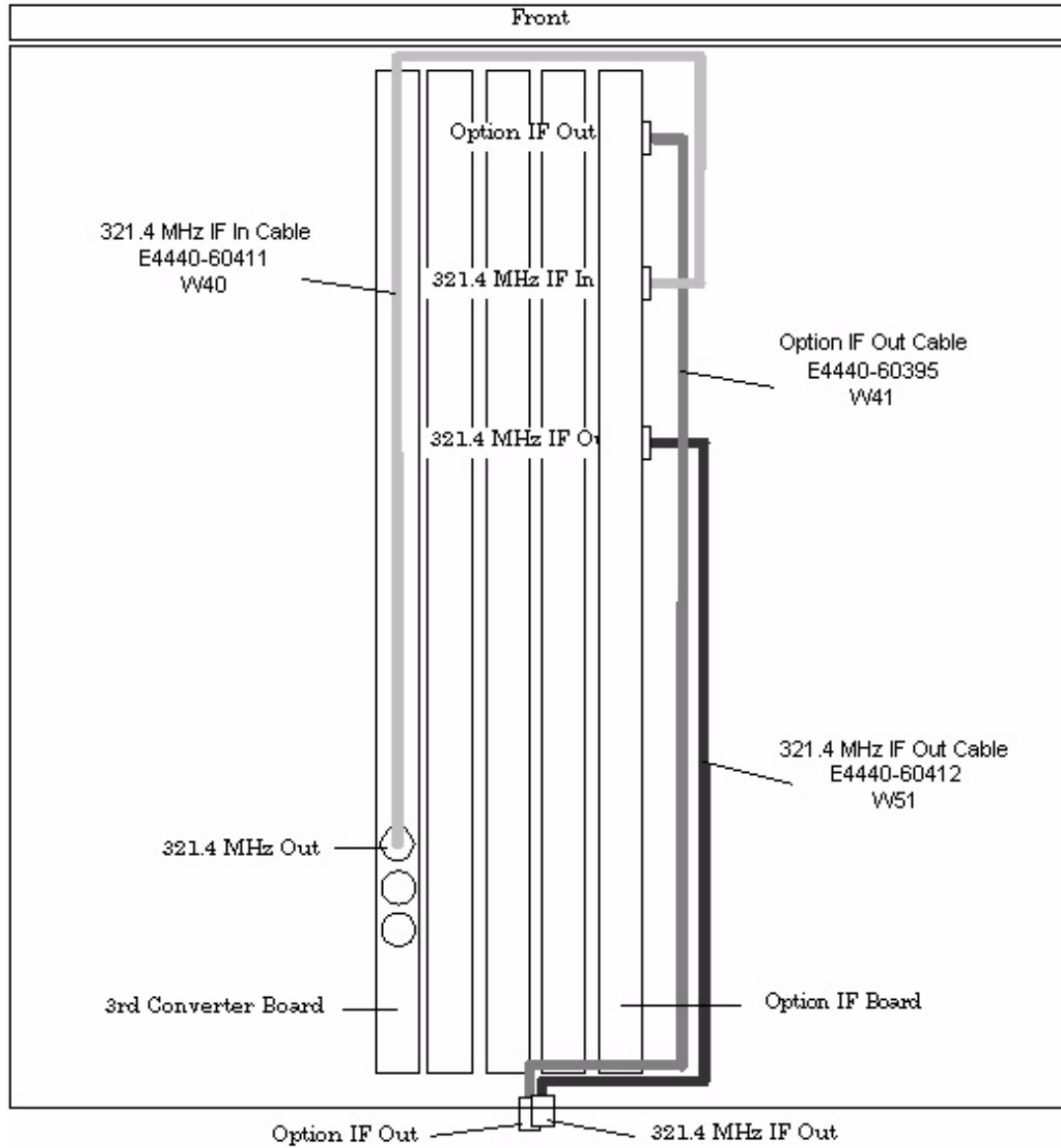
Figure 14 Rear Panel Plate (without Option H7L or HNQ)



4. Connect the BNC and SMA connectors as labeled in step 7 on [Page 9](#) using the previously removed hardware. Carefully route the new cables (W41 and W51) through the rear frame. (To be connected to the Option IF board later in this procedure). Refer to [Figure 12 on page 14](#).
5. Connect the new rear panel plate to the rear panel using the previously removed screws. Torque to 9 in-lb.
6. Carefully disconnect and remove the 321.4 MHz IF Out cable from the 3rd Converter board by gently pulling up using needle nose pliers. Refer to [Figure 12 on page 14](#) and [Figure 15 on page 18](#).
7. Partially insert the Option IF board (E4440-60414) into Option Slot 2. See [Figure 9 on page 12](#) and [Figure 12 on page 14](#). Ensure the Option IF board is installed with the edges in the grooves of the chassis.

8. Carefully route the cables along the top of the rear frame and between the board extractors to insure that they will not be damaged when installing the chassis cover. Refer to [Figure 12 on page 14](#). Connect the cables as follows:
 - Connect the new 321.4 MHz IF Output cable (E4440-60411) (W40) in the instrument from the 321.4 MHz Output connector on the 3rd Converter board to the 321.4 MHz IF Input (J5) on the Option IF board. Refer to [Figure 11 on page 14](#) and [Figure 15 on page 18](#).
 - Connect the 321.4 MHz IF Input cable (E4440-60412) (W51) on the rear panel to the 321.4 MHz IF Input connector (J1) on the Option IF board.
 - Connect the Option IF Output cable (E4440-60395) (W41) on the rear panel to the Option IF Output connector (J2) on the Option IF board.
9. Attach the “H70” label (7121-8080) to the rear panel next to the existing list of options on the serial number label.
10. Install the chassis cover, instrument cover, side handles, bottom and rear feet in reverse order of the removal process described in the beginning of this procedure.
11. Install licence key to enable Option H20, H25 or H70. Refer to Option Upgrade Entitlement Certificate for option license procedure.

Figure 15 Top View Cable Orientation without Option H7L or HNQ



This concludes the installation of the E444xAU Option into the PSA instrument.

Nominal Characteristics

Review the following table for the nominal characteristics of the 321.4 MHz and Option IF Output of the E444xAU with the new Option IF Output installed.

Table 4 Nominal Characteristics for the 321.4 and Option IF Output

Parameter	321.4 MHz IF Output	Option IF Output
Frequency	321.4 MHz	20, 25, or 70 MHz
Conversion Loss ¹	-2 dB (\pm 2 dB)	-6 dB (\pm 2 dB)
IF Bandwidth		
Low Band < 3 GHz	40 MHz	40 MHz
High Band \geq 3 GHz ²	30 to 60 MHz	30 to 60 MHz

1. Attenuator setting: 0 dB. In high band, the Preselector Center routine must be performed to achieve the conversion loss listed in [Table 4](#). If applicable, when Option 1DS (100 kHz to 3 GHz Preamp) is on there will be a 28 to 30 dB of gain in the Option IF Output at the rear panel of the PSA. With the Preamp ON the conversion loss outlined in [Table 4](#) will be +22 dB.
2. Dependent on internal RF path. Typically, 40 MHz bandwidth increases as a function of center frequency up to approximately 60 MHz with a center frequency of 26 GHz.

While performing the “Align All” routine on the PSA, the Option IF Output will be corrupted due to the systems variable gain circuit stepping through the alignment routine.

The ripple correction in the flatness routine will be non-existent in the Option IF Output since the Option IF Output is ported to the rear panel before the IF signal is digitized and used for the flatness correction routine.

NOTE The 321.4 MHz IF Output is only effected if the Option IF Out is installed without Option H7L or HNQ.

Performance Tests and Adjustments

The tests outlined in this section are to verify the operation of the IF Output options and should be used in conjunction with the standard PSA manuals. This section also includes the equipment required.

Tests:

- “Equipment Required” on page 21.
- “Option IF Output Amplitude Test Procedure” on page 23.
- “321.4 MHz IF Out Amplitude Test Procedure” on page 25.
- “Measuring the Bandwidth of the IF Outputs” on page 26.
- “Repeat Steps 3 through 6 to measure the bandwidth of the Option IF Output.” on page 27.

Equipment Required

Gather the equipment listed in the Tables below to verify the performance of the PSA amplitude at the Option IF Output on the rear panel.

Table 5 Signal Source Equipment

Description	Characteristics	Model
Synthesized Sweeper	Frequency: Must sweep 100 MHz around 1 GHz Amplitude: >0 dBm	83620B

Table 6 Analyzer Equipment (test spectrum analyzer)

Description	Characteristics	Model
Spectrum Analyzer	Upper Frequency Range: 2 GHz	8562E 8563E

Table 7 Power Meter Equipment

Description	Characteristics	Model
Power Meter	Absolute Accuracy: $\pm 0.5\%$ Resolution: 0.01 dB Reference Accuracy: 1.2% Power Reference Accuracy: $\pm 0.9\%$ Compatible with Agilent 8480 series power sensors dB relative mode	E4419B E4418A
Power Sensor	Frequency Range: 1 MHz to 4.0 GHz SWR at 50 MHz: ≤ 1.05 1 MHz to 4 GHz SWR: $\leq 1.22:1$ Type-N (m) 50 Ω	8482A 8481A

Table 8 Cables

Description	Characteristics	Agilent Part Numbers
APC 3.5 (m)(m) 2 required	DC to 26.5 GHz Length: ≤ 92 cm (36 in) Insertion Loss: ~ 2 dB	8120-4921
SMA	Low-loss, 1 m	5064-5458

Table 9 50 Ω Adapters

Description	Characteristics	Model Number/ Part Number
Adapter 3.5 (f) to 3.5 (f) (two required)	VSWR: ≤ 1.05:1	83059B
BNC to dual banana		1251-0781
BNC Tee (f,m,f)		1250-0781
BNC (m) to SMA (f)	VSWR: ≤ 1.13:1	1250-1700
BNC (f) to SMA (m)		1250-1200
Type-N (m) to 3.5 mm (m)	VSWR: ≤ 1.08:1	1250-1743
Type-N (m) to APC 3.5 (f) two required	VSWR: ≤ 1.08:1	1250-1744
Type-N (f) to APC 3.5 (f)	For the 83620B VSWR: 1.08:1	1250-1745
APC 3.5 (m) to APC 3.5 (m) two required	VSWR: ≤ 1.12:1	1250-1748
APC 3.5 (f) to APC 3.5 (f)	Connector saver for 83630B VSWR: 1.15:1	1250-1749
Type-N (f) to APC 3.5 (m) two required	VSWR: 1.08:1	1250-1750
Type-N (f) to N (f)	VSWR: 1.03:1 ≤ 1.3 GHz ~1.15 ≤ 18 GHz	1250-1472
Type-N (m) to BNC (m)		1250-1473
Type-N (m) to N (m)	VSWR: 1.03:1 ≤ 1.3 GHz ~1.15 ≤ 18 GHz	1250-1475
Type-N (m) to BNC (f)	VSWR: ≤ 1.03:1 ≤ 1.3 GHz ~1.15 ≤ 18 GHz	1250-1476
Type-N (f) to BNC (m)	VSWR: 1.03:1 ≤ 1.3 GHz ~1.15 ≤ 18 GHz	1250-1477

Option IF Output Amplitude Test Procedure

This test verifies that the Option IF Output meets its amplitude accuracy specification. In this test, the source is connected to the RF Input and a spectrum analyzer is connected to the Option H70 Output.

Follow the steps below to prepare for the amplitude verification of the Option IF Output on the rear of the PSA.

1. Preset the PSA DUT and all the test equipment.
2. Run **Align All Now** on the PSA. Press: **[System] > Alignments < Align All Now**.
3. Initialize the test equipment parameters as follows:

Table 10 E444xA PSA Spectrum Analyzer Setup

Parameter	Setting
Frequency: Center Span	1 GHz 0 Hz
Resolution Bandwidth	1 MHz
Attenuation	Need to choose 0 dB since this setting will determine what the IF out level is with respect to the input signal
Frequency Reference	Internal

Table 11 Synthesized Sweeper Setup

Parameter	Settings
Frequency	1 GHz
Function	CW or Sine
Level	-10 dBm

4. Zero and calibrate the power sensor.
5. Connect the power sensor/power meter to the end of the Type-N cable that is connected to the source. Use an N (f) to N (f) adapter between the power sensor and the cable.
6. Adjust the source amplitude for a power meter reading of -10 dBm.
7. Disconnect the power sensor from the cable and connect the cable to the PSA RF Input.

NOTE If the PSA has Option BAB (APC 3.5 mm input connector) an APC 3.5 mm (f) to N (f) adapter is required between the PSA and the Type-N cable.

8. Connect the PSA rear panel Option IF Output to the RF Input of the test spectrum analyzer. Use an SMA or APC 3.5 mm cable and appropriate adapters.
9. Initialize the test spectrum analyzer parameters as follows. Refer to [Table 12](#).

Table 12 Option IF Output Measurement Settings

Parameter	Option H20	Option H25	Option H70
Center Frequency	20 MHz	25 MHz	70 MHz
Span	5 MHz	5 MHz	5 MHz
Res BW	1 MHz	1 MHz	1 MHz
Reference Level	0 dBm	0 dBm	0 dBm
Log Scale	5 dB/div.	5 dB/div.	5 dB/div.

10. Record the amplitude of the Option IF Output in the table below. The signal level should be -16 dBm (± 2 dB). This equates to a 6 dB loss between the RF input and the Option IF Output port.

Table 13 Data Sheet Record

Frequency	Expected Amplitude	Measured Amplitude
20/25/70 MHz	-15 dBm (± 2 dB)	
321.4 MHz (with H7L & HNQ)	-2 dBm (± 2 dB)	
321.4 MHz (without H7L & HNQ)	-12 dBm (± 2 dB)	

321.4 MHz IF Out Amplitude Test Procedure

1. Refer to the previous steps for the Option IF Output measurements, connect the PSA rear panel 321.4 MHz IF Out to the RF Input of the test spectrum analyzer. Use an SMA or APC 3.5 mm cable and appropriate adapters. Initialize the test spectrum analyzer parameters as follows to measure the 321.4 MHz IF Out on the rear panel of the PSA.

Table 14 321.4 MHz Measurement Spectrum Analyzer Settings

Parameter	Settings
Center Frequency	321.4 MHz
Span	5 MHz
Res BW	1 MHz
Reference Level	0 dBm
Log Scale	5 dB/div.

2. Record the amplitude of the 321.4 MHz Output. The signal level should be -12 dBm (± 2 dB). This equates to a 2 dB loss between the RF Input and the 321.4 MHz Output port.

NOTE For units with Option H7L or HNQ the signal level should be -2 dBm.

Measuring the Bandwidth of the IF Outputs

This test measures the PSA's IF Outputs (standard 321.4 MHz and IF Output options) amplitude response as a function of frequency (bandwidth). A signal is applied to the PSA at 950 MHz to 1050 MHz. The 321.4 MHz If Output and 21.4 MHz If Output bandwidth are measured using a test spectrum analyzer.

1. While the spectrum analyzer is still connected to the 321.4 MHz IF Output connector on the rear panel of the PSA, configure the PSA and test equipment as follows:

Table 15 E444xA PSA Spectrum Analyzer Setup

Parameter	Setting
Frequency: Center Span	1 GHz 0 Hz
Resolution Bandwidth	1 MHz
Attenuation	Need to choose 0 dB since this setting will determine what the IF out level is with respect to the input signal
Frequency Reference	Internal

Table 16 Bandwidth Measurement Spectrum Analyzer Setup

Parameter	Settings
Center Frequency	321.4 MHz
Span	100 MHz
Res BW	3 MHz
Reference Level	0 dBm
Log Scale	5 dB/div.
Trace	MAX Hold

Table 17 Synthesized Sweeper Setup

Parameter	Settings
Frequency: Start Freq Stop Freq	950 MHz 1050 MHz
Function	CW or Sine
Level	-10 dBm

2. Press **Trace Max Hold** and wait until the response of the 321.4 MHz Output is displayed on the test spectrum analyzer.
3. Press **Peak Search** on the spectrum analyzer to place a marker on the peak of the response.
4. Press **Marker Delta** on the test spectrum analyzer and adjust the delta marker down the skirt of the response to the 3 dB point.
5. Press **Marker Delta** again and adjust the marker to the other side of the peak response and down the other skirt until the marker amplitude reads 0 dB. (The marker delta frequency is the 3 dB bandwidth of the 321.4 MHz Output).
6. Refer to the [“Nominal Characteristics” on page 19](#) to verify the results of your tests.
7. Connect the test spectrum analyzer to the Option IF Output port on the rear panel of the PSA.
8. Repeat Steps 3 through 6 to measure the bandwidth of the Option IF Output.

NOTE If the flatness slopes on the IF Output, connect a 50 Ohm load to the 321.4 MHz IF Output port.

This concludes the Performance Verification of the E444xAU Option in the PSA instrument.

Safety and Regulatory Information

Introduction

Review this product and related documentation to familiarize yourself with safety markings and instructions before you operate the instrument. This product has been designed and tested in accordance with international standards.

Before Applying Power

Verify that the product is configured to match the available main power source. If this product is to be powered by autotransformer, make sure the common terminal is connected to the neutral (grounded) side of the ac power supply.

Shipping Instructions

You must always call the Agilent Technologies Instrument Support Center to initiate service before retuning your instrument to a service office. See [“Contacting Agilent” on page 32](#). Always transport or ship the instrument using the original packaging if possible. If not, comparable packaging must be used. Attach a complete description of the failure symptoms.

Warnings

WARNING The **WARNING** notice denotes a hazard. It calls attention to a procedure, practice, or the like, which if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Warnings applicable to this instrument are:

WARNING If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition (in which all means for protection are intact) only.

WARNING For continued protection against fire hazard replace line fuse only with same type and rating:

- United States—F 3A/250V, Part Number 2110-0780
- Europe—F 3.15A/250V, Part Number 2110-0655

The use of other fuses or material is prohibited.

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

WARNING The power cord is connected to internal capacitors that may retain dangerous electrical charges for 5 seconds after disconnecting the plug from its power supply.

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

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

WARNING This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.

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

WARNING	If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.
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Cautions

CAUTION	The CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like, which if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.
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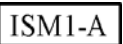



Cautions applicable to this instrument are:

CAUTION	Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding (by not using this cord) can cause instrument damage.
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CAUTION	This instrument has autoranging line voltage input; be sure the supply voltage is within the specified range.
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CAUTION	Ventilation Requirements: When installing the instrument in a cabinet, the convection into and out of the instrument must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the instrument by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, forced convection must be used.
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Instrument Markings

	When you see this symbol on your instrument, you should refer to the instrument's instruction manual for important information.
	This symbol indicates hazardous voltages.
	The laser radiation symbol is marked on products that have a laser output.
	This symbol indicates that the instrument requires alternating current (ac) input.
	The CE mark is a registered trademark of the European Community. If it is accompanied by a year, it indicates the year the design was proven.
	The CSA mark is a registered trademark of the Canadian Standards Association.
	This symbol indicates the product meets the Australian Standards.
	This symbol indicates separate collection for electrical and electronic equipment, mandated under EU law as of August 13, 2005. All electric and electronic equipment are required to be separated from normal waste for disposal (Reference WEEE Directive, 2002/96/EC).
	This text indicates that the instrument is an Industrial Scientific and Medical Group 1 Class A product (CISPR 11, Clause 4).
	This symbol indicates that the power line switch is ON.
	This symbol indicates that the power line switch is OFF or in STANDBY position.
	Safety Earth Ground. This is a Safety Class I product (provided with a protective earthing terminal). An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, the product must be made inoperative and secured against any unintended operation.

Contacting Agilent

By internet, phone, or fax, get assistance with all your test and measurement needs.

This information supersedes all prior HP contact information.			
Online assistance: www.agilent.com/find/assist			
Americas			
Brazil (tel) (+55) 11 3351 7012 (fax) (+55) 11 3351 7024	Canada (tel) +1 877 894 4414 (fax) +1 303 662 3369	Mexico (tel) 1 800 254 2440 (fax) 1 800 254 4222	United States (tel) 800 829 4444 (alt) (+1) 303 662 3998 (fax) 800 829 4433
Asia Pacific and Japan			
Australia (tel) 1 800 225 574 (fax) 1 800 681 776 (fax) 1 800 225 539	China (tel) 800 810 0508 (alt) 800 810 0510 (fax) 800 810 0507 (fax) 800 810 0362	Hong Kong (tel) 800 933 229 (fax) 800 900 701	India (tel) 1600 112 626 (fax) 1600 112 727 (fax) 1600 113 040
Japan (Bench) (tel) 0120 32 0119 (alt) (+81) 426 56 7799 (fax) 0120 01 2144	Japan (On-Site) (tel) 0120 802 363 (alt) (+81) 426 56 7498 (fax) (+81) 426 60 8953	Singapore (tel) 1 800 275 0880 (fax) (+65) 6755 1235 (fax) (+65) 6755 1214	South Korea (tel) 080 778 0011 (fax) 080 778 0013
Taiwan (tel) 0800 047 669 (fax) 0800 047 667 (fax) 886 3492 0779	Thailand (tel) 1 800 2758 5822 (alt) (+66) 2267 5913 (fax) 1 800 656 336	Malaysia (tel) 1800 880 399 (fax) 1800 801 054	
Europe			
Austria (tel) 0820 87 44 11* (fax) 0820 87 44 22	Belgium (tel) (+32) (0)2 404 9340 (alt) (+32) (0)2 404 9000 (fax) (+32) (0)2 404 9395	Denmark (tel) (+45) 7013 1515 (alt) (+45) 7013 7313 (fax) (+45) 7013 1555	Finland (tel) (+358) 10 855 2100 (fax) (+358) (0) 10 855 2923
France (tel) 0825 010 700* (alt) (+33) (0)1 6453 5623 (fax) 0825 010 701*	Germany (tel) 01805 24 6333* (alt) 01805 24 6330* (fax) 01805 24 6336*	Ireland (tel) (+353) (0)1 890 924 204 (alt) (+353) (0)1 890 924 206 (fax) (+353) (0)1 890 924 024	Israel (tel) (+972) 3 9288 500 (fax) (+972) 3 9288 501
Italy (tel) (+39) (0)2 9260 8484 (fax) (+39) (0)2 9544 1175	Luxemburg (tel) (+32) (0)2 404 9340 (alt) (+32) (0)2 404 9000 (fax) (+32) (0)2 404 9395	Netherlands (tel) (+31) (0)20 547 2111 (alt) (+31) (0)20 547 2000 (fax) (+31) (0)20 547 2190	Russia (tel) (+7) 095 797 3963 (alt) (+7) 095 797 3900 (fax) (+7) 095 797 3901
Spain (tel) (+34) 91 631 3300 (alt) (+34) 91 631 3000 (fax) (+34) 91 631 3301	Sweden (tel) 0200 88 22 55* (alt) (+46) (0)8 5064 8686 (fax) 020 120 2266*	Switzerland (French) (tel) 0800 80 5353 opt. 2* (alt) (+33) (0)1 6453 5623 (fax) (+41) (0)22 567 5313	Switzerland (German) (tel) 0800 80 5353 opt. 1* (alt) (+49) (0)7031 464 6333 (fax) (+41) (0)1 272 7373
Switzerland (Italian) (tel) 0800 80 5353 opt. 3* (alt) (+39) (0)2 9260 8484 (fax) (+41) (0)22 567 5314	United Kingdom (tel) (+44) (0)7004 666666 (alt) (+44) (0)7004 123123 (fax) (+44) (0)7004 444555		
(tel) = primary telephone number; (alt) = alternate telephone number; (fax) = FAX number; * = in country number 11/16/04			