

# **Agilent Technologies E444xAU Option H26**

Installation Guide



# **Agilent Technologies E444xAU Option H26**

## **Installation Guide**

**This manual applies to the following instruments:**

**E4440A, E4443A, and E4445A**



**Agilent Technologies**

**Manufacturing Part Number: E4440-90582**

**Printed in USA  
October 2004**

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## Safety Notes

The following safety notes are used throughout this document. Familiarize yourself with each of these notes and its meaning before performing any of the procedures in this document.

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<b>WARNING</b>	<b>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.</b>
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<b>CAUTION</b>	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.
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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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# Contents

<b>1 Overview</b>	
Introduction .....	1-2
Description .....	1-3
Checking the Shipment/Parts .....	1-4
Contacting Agilent .....	1-5
<b>2 Installation</b>	
Removal of Assemblies .....	2-2
Installation .....	2-3
<b>3 Amplitude Correction</b>	
Option H26 Corrections Application .....	3-2
Requirements for using the Software Application .....	3-2
PC Requirements .....	3-2
Equipment Required .....	3-2
Connections .....	3-2
Installing and Starting the Application .....	3-3
Configuring I/O Interfaces .....	3-4
Connecting the Spectrum Analyzer and Signal Generator .....	3-5
Setting the Start and Stop Frequencies .....	3-7
Saving the Data to Disk .....	3-9





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# 1 Overview

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## **Introduction**

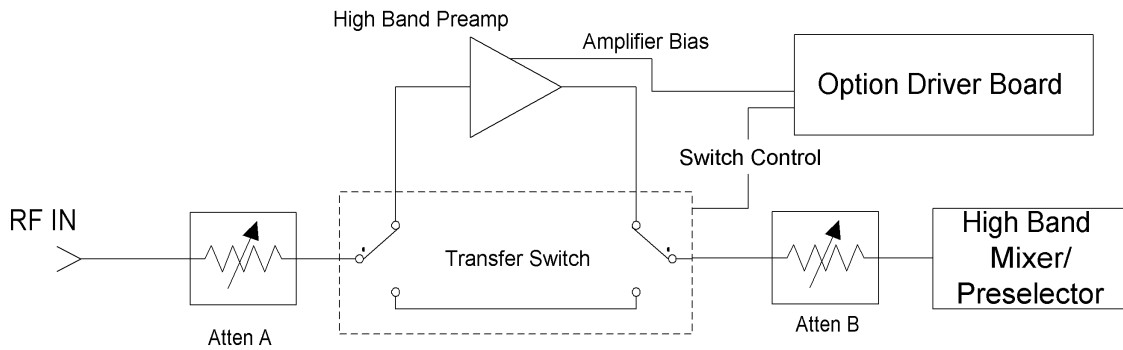
This chapter guides you through the steps necessary to insure you have received your full order. The steps are:

- “Description” on page 1-3.
- “Checking the Shipment/Parts” on page 1-4.
- “Contacting Agilent” on page 1-5.

## Description

The E444xAU H26 is a retrofit kit providing parts to install the high band preamp. The E444xAU H26 consists of the parts listed in [“Checking the Shipment/Parts”](#) on page 1-4.

**Figure 1-1 Block Diagram for E4440A, E4443A and E4445A H26**



## Checking the Shipment/Parts

## Checking the Shipment/Parts

Verify the items received in [Table 1-1](#) to make sure that you have received a complete 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. Refer to [“Contacting Agilent” on page 1-5](#).

**Table 1-1 E4440AU Option H26 Accessories Supplied**

Description	Agilent Part Number	Quantity
Screw, M3 x 0.5, 8 mm long	0515-0372	4
Screw, M3 x 0.5, 20 mm long	0515-1410	2
Screw, 2-56 x .312 in long, Pozi	0520-0129	4
Amplifier 3 GHz to 26.5 GHz	0955-1663	1
Washer	2190-0112	4
Entitlement Certificate	5964-5141	1
RF switch	N1811TL-CFG002 <sup>1</sup>	1
H26 amplitude correction disk	E4407-60016	1
Shield, Front Panel Assy	E4440-00050	1
Bracket	E4440-00051	1
E444xAU H26 Install CD-ROM	E4440-10026	1
Cable Assembly, Switch In	E4440-20302	1
Cable assembly, Amp Out	E4440-20303	1
Cable Assembly, Amp In	E4440-20304	1
Cable assembly, Switch Out	E4440-20305	1
Board assy, PSA H26	E4440-60358	1
Cable assembly, ribbon	E4440-60427	1
E444xA H26 User Guide	E4440-90560	1
E444xAU H26 Installation Note	E4440-90582	1
Cable assembly, harness	E4446-60067	1

1. CFG002 corresponds to Options 124, 026, 201, 302 and 403.

## Contacting Agilent

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

<b>Online assistance:</b> <a href="http://www.agilent.com/find/assist">www.agilent.com/find/assist</a>			
<b>Americas</b>			
<b>Brazil</b> (tel) (+55) 11 4197 3600 (fax) (+55) 11 4197 3800	<b>Canada</b> (tel) 877 894 4414 (fax) (+1) 905 282-6495	<b>Mexico</b> (tel) (+52) 55 5081 9469 (alt) 01800 5064 800 (fax) (+52) 55 5081 9467	<b>United States</b> (tel) 800 829 4444 (alt) (+1) 303 662 3998 (fax) 800 829 4433
<b>Asia Pacific and Japan</b>			
<b>Australia</b> (tel) 1800 629 485 (alt) 1800 143 243 (fax) 1800 142 134	<b>China</b> (tel) 800 810 0189 (alt) (+86) 10800 650 0021 (fax) 800 820 2816	<b>Hong Kong</b> (tel) 800 930 871 (alt) (+852) 3197 7889 (fax) (+852) 2 506 9233	<b>India</b> (tel) 1600 112 929 (fax) 000800 650 1101
<b>Japan</b> (tel) 0120 421 345 (alt) (+81) 426 56 7832 (fax) 0120 421 678	<b>Malaysia</b> (tel) 1800 888 848 (alt) 1800 828 848 (fax) 1800 801 664	<b>Singapore</b> (tel) 1800 375 8100 (alt) (+65) 6 375 8100 (fax) (+65) 6836 0252	<b>South Korea</b> (tel) 080 769 0800 (alt) (+82) 2 2004 5004 (fax) (+82) 2 2004 5115
<b>Taiwan</b> (tel) 0800 047 866 (alt) 00801 651 317 (fax) 0800 286 331	<b>Thailand</b> (tel) 1800 226 008 (alt) (+66) 2 268 1345 (fax) (+66) 2 661 3714		
<b>Europe</b>			
<b>Austria</b> (tel) 0820 87 44 11* (fax) 0820 87 44 22	<b>Belgium</b> (tel) (+32) (0)2 404 9340 (alt) (+32) (0)2 404 9000 (fax) (+32) (0)2 404 9395	<b>Denmark</b> (tel) (+45) 7013 1515 (alt) (+45) 7013 7313 (fax) (+45) 7013 1555	<b>Finland</b> (tel) (+358) 10 855 2100 (fax) (+358) 10 855 2923
<b>France</b> (tel) 0825 010 700* (alt) (+33) (0)1 6453 5623 (fax) 0825 010 701*	<b>Germany</b> (tel) 01805 24 6333* (alt) 01805 24 6330* (fax) 01805 24 6336*	<b>Ireland</b> (tel) (+353) (0)1 890 924 204 (alt) (+353) (0)1 890 924 206 (fax) (+353) (0)1 890 924 024	<b>Israel</b> (tel) (+972) 3 9288 500 (fax) (+972) 3 9288 501
<b>Italy</b> (tel) (+39) (0)2 9260 8484 (fax) (+39) (0)2 9544 1175	<b>Luxemburg</b> (tel) (+32) (0)2 404 9340 (alt) (+32) (0)2 404 9000 (fax) (+32) (0)2 404 9395	<b>Netherlands</b> (tel) (+31) (0)20 547 2111 (alt) (+31) (0)20 547 2000 (fax) (+31) (0)20 547 2190	<b>Russia</b> (tel) (+7) 095 797 3963 (alt) (+7) 095 797 3900 (fax) (+7) 095 797 3901
<b>Spain</b> (tel) (+34) 91 631 3300 (alt) (+34) 91 631 3000 (fax) (+34) 91 631 3301	<b>Sweden</b> (tel) 0200 88 22 55* (alt) (+46) (0)8 5064 8686 (fax) 020 120 2266*	<b>Switzerland (French)</b> (tel) 0800 80 5353 opt. 2* (alt) (+33) (0)1 6453 5623 (fax) (+41) (0)22 567 5313	<b>Switzerland (German)</b> (tel) 0800 80 5353 opt. 1* (alt) (+49) (0)7031 464 6333 (fax) (+41) (0)1 272 7373
<b>Switzerland (Italian)</b> (tel) 0800 80 5353 opt. 3* (alt) (+39) (0)2 9260 8484 (fax) (+41) (0)22 567 5314	<b>United Kingdom</b> (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			



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## **2 Installation**

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## Removal of Assemblies

Follow the steps as outlined in the Agilent PSA Spectrum Analyzer Service Guide:

1. Instrument Outer Case
2. Chassis Cover
3. Front Frame Assembly. Replace the front frame shield on the instrument with the new shield (E4440-00050) supplied in the kit, if necessary. The new shield will have four standoffs for attaching the bracket plate (E4440-00051).

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**CAUTION** Use ESD precautions when performing these installation procedures

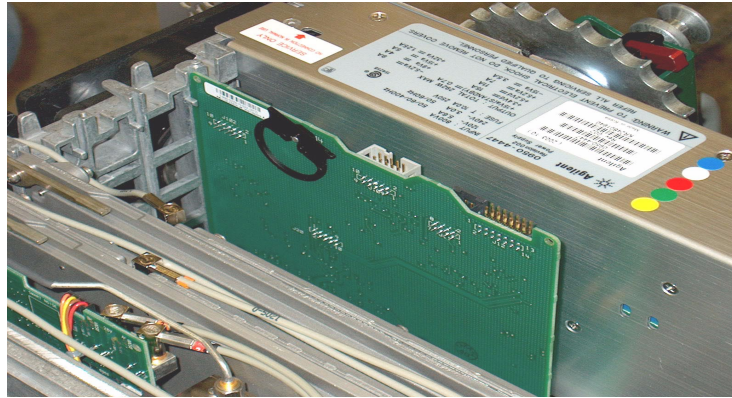
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## Installation

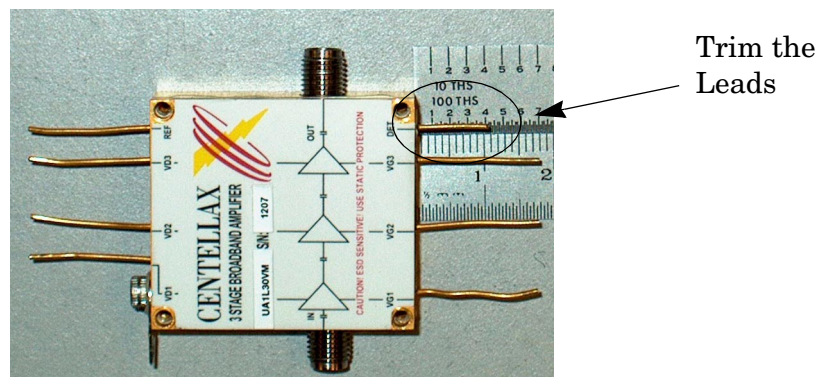
1. Install the Option Driver board (E4440-60358). The Option Driver board uses the half slot (slot 0) next to the power supply. Refer to [Figure 2-1](#).

**Figure 2-1** Installing the Option Driver board



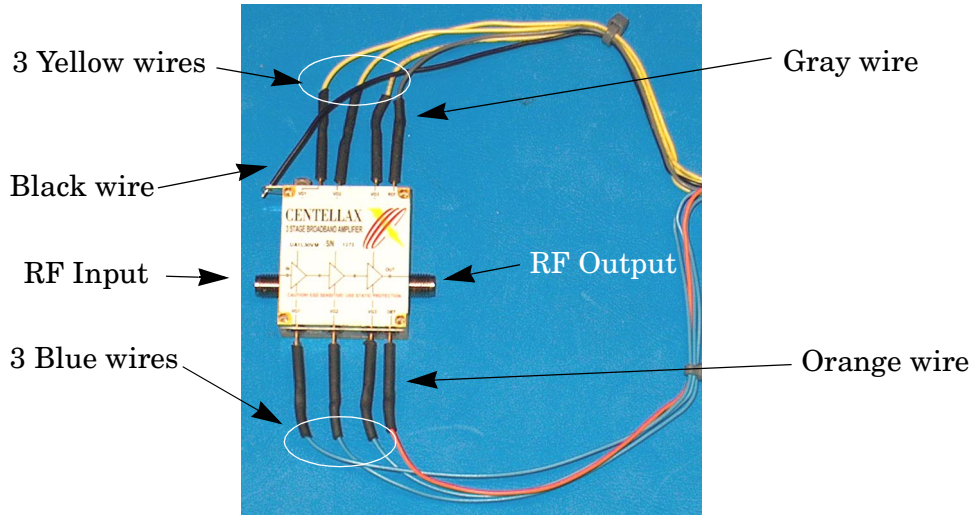
2. Trim all 8 leads on the amplifier (0955-1663) to 1 cm (0.4 in). [Figure 2-2](#) shows the first lead trimmed to length.

**Figure 2-2** Trimming the Leads on the Amplifier



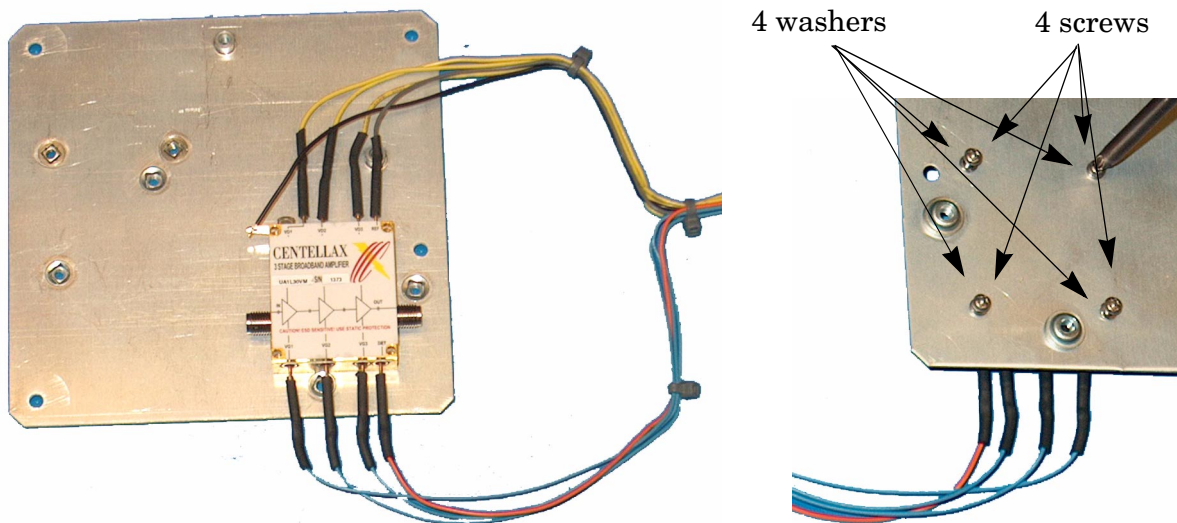
3. Install the amplifier cable assembly (E4446-60067) onto the amplifier (0955-1663). Use caution when pressing the wire connectors onto the pins of the amplifier. They are fragile and can be easily bent or broken. Refer to [Figure 2-3](#).
4. Solder the black wire to the ground pin on the amplifier. Refer to [Figure 2-3](#).

**Figure 2-3. Attaching the Cable Assembly to the Amplifier**



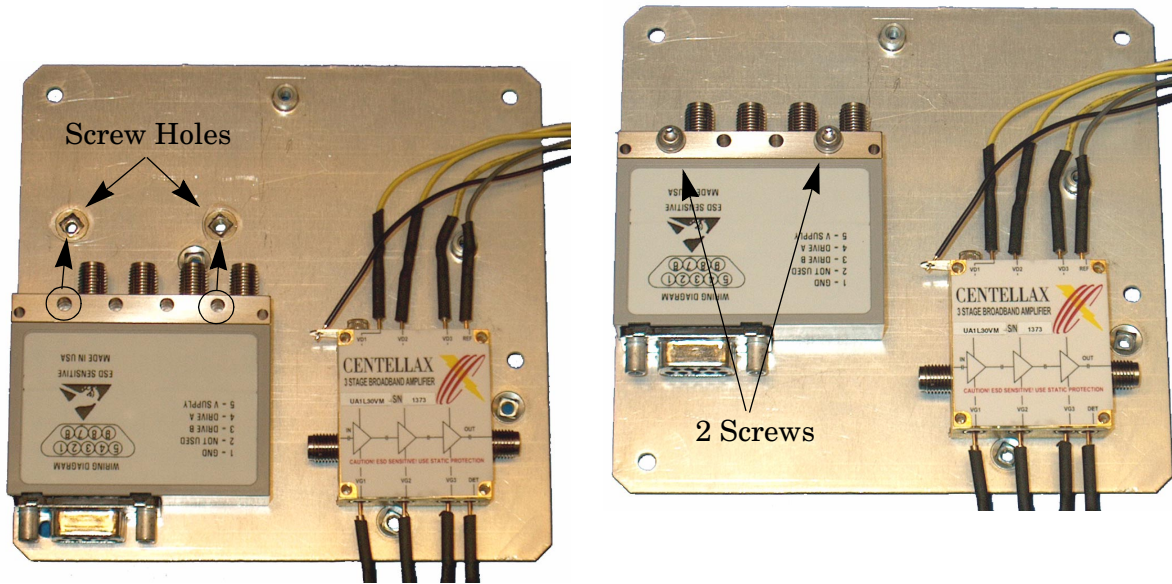
5. Attach the amplifier (0955-1663) to the bracket plate (E4440-00051) using 4 washers (2190-0112) and 4 screws (0520-0129). The amplifier is positioned such that the output connector is toward the edge of the bracket. Torque to 3 in-lb. Refer to [Figure 2-4](#).

**Figure 2-4 Installing the Amplifier**



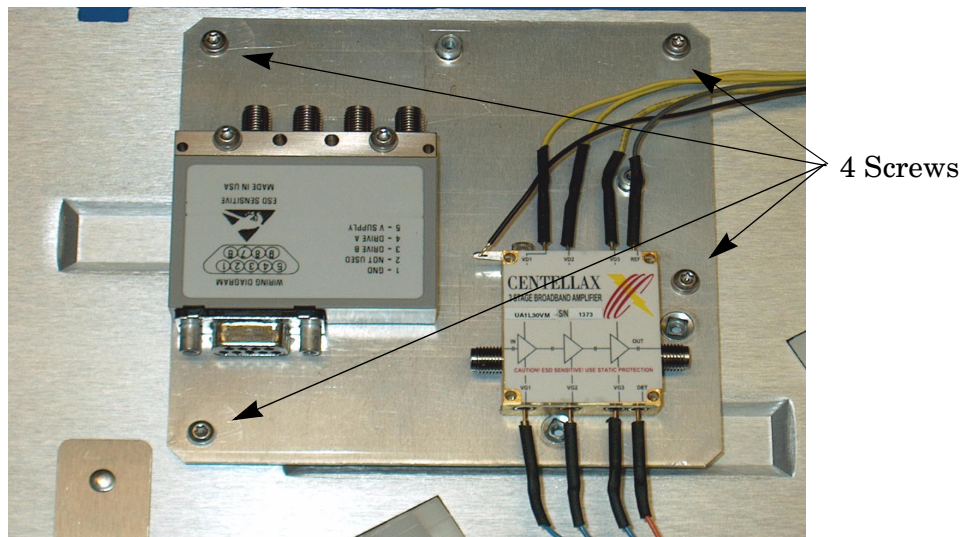
- 6. Attach the RF switch (N1811TL-CFG002) to the bracket plate (E4440-00051) using 2 screws (0515-1410). Torque to 9 in-lb. Refer to [Figure 2-5](#).

**Figure 2-5 Attaching RF Switch to Bracket**



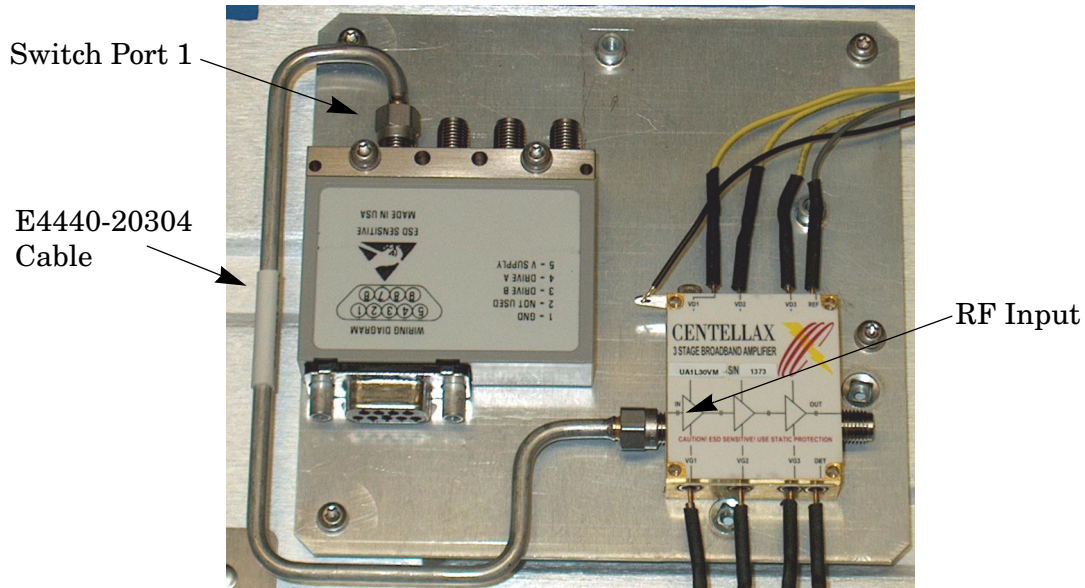
- 7. Install the assembled bracket on the front frame using 4 screws (0515-0372). Torque to 9 in-lbs. Refer to [Figure 2-6](#).

**Figure 2-6 Installing the Bracket to the Front Frame**



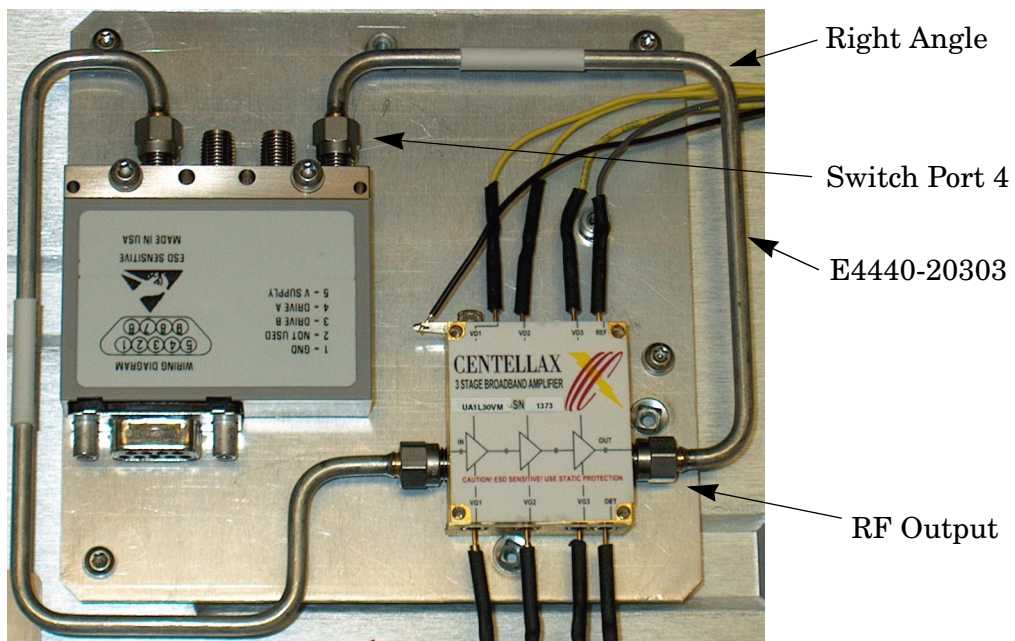
- Attach the cable (E4440-20304) from the amplifier “Amp In” connector to the switch “Port 1.” Torque to 10 in-lbs. Refer to [Figure 2-7](#).

**Figure 2-7 Attaching E4440-20304 cable**



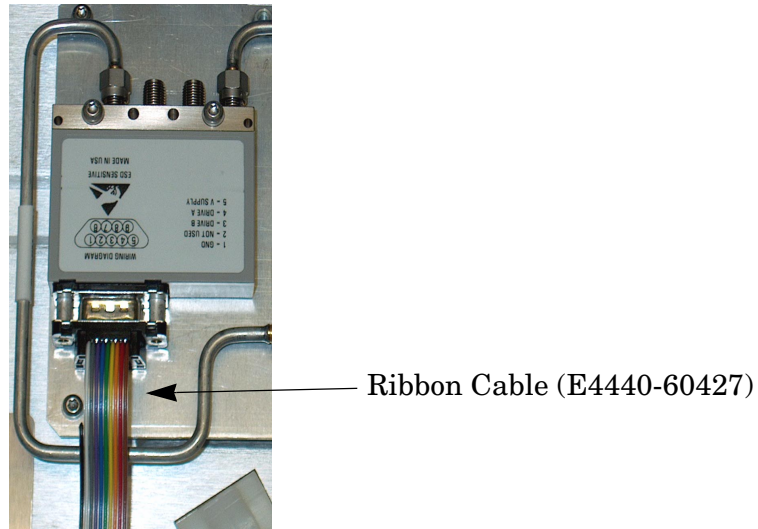
- Attach the cable (E4440-20303) from the amplifier “Amp Out” connector to the switch “Port 4.” Torque to 10 in-lbs. Refer to [Figure 2-8](#). Insure that the cable maintains a right-angle when installed. If the cable is installed backwards, the right angle bend in the cable will not be maintained.

**Figure 2-8 Attaching the E4440-20303 Cable**



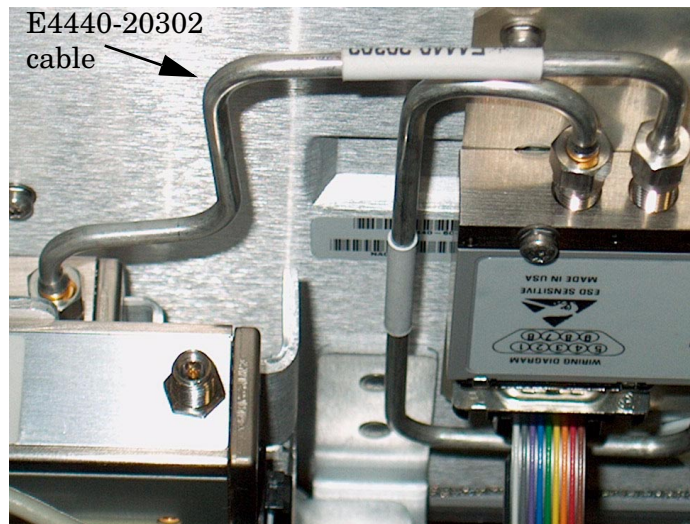
10. Install one end of the ribbon cable (E4440-60427) to the RF switch.  
Torque each Load to 10 in-lb. Refer to [Figure 2-9](#).

**Figure 2-9**      **Installing the ribbon cable**



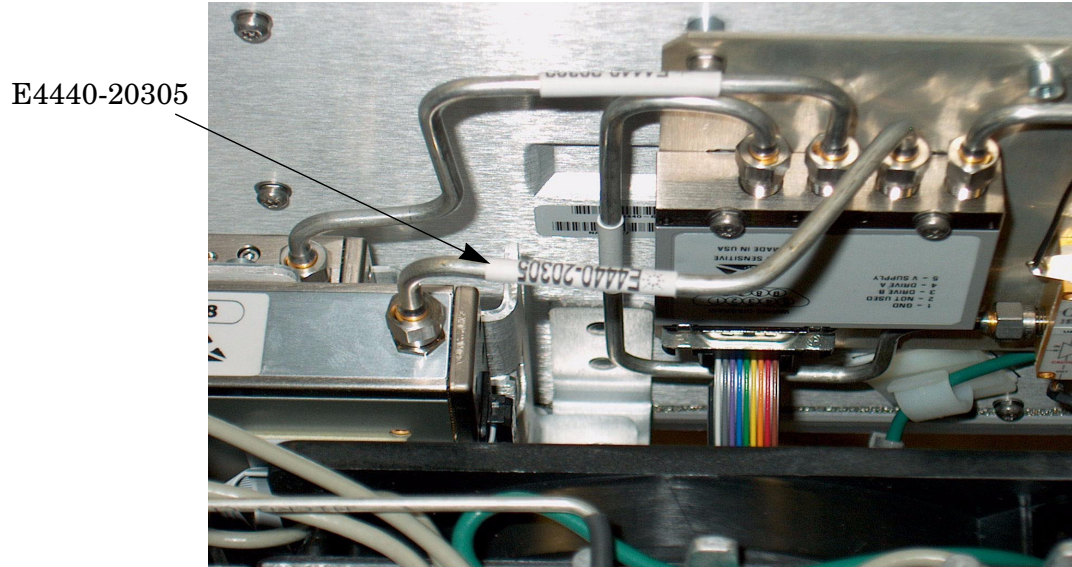
11. Re-install the front frame following the standard procedure.
12. Attach the cable (E4440-20302) from Attenuator A “Out” to the switch “Port 2.”  
Torque to 10 in-lb. Refer to [Figure 2-10](#).

**Figure 2-10**      **Attaching the E4440-20302 Cable**



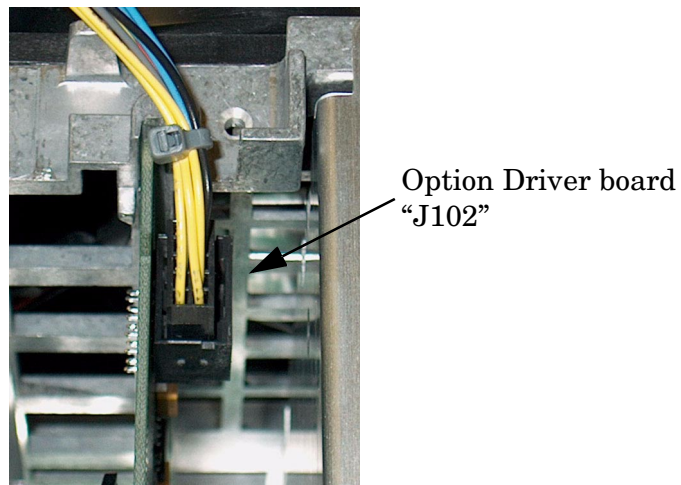
13. Attach the cable (E4440-20305) from Attenuator B “In” to the switch “Port 3.”  
Torque to 10 in-lb. Refer to [Figure 2-11](#).

**Figure 2-11** Attaching the E4440-20305 Cable



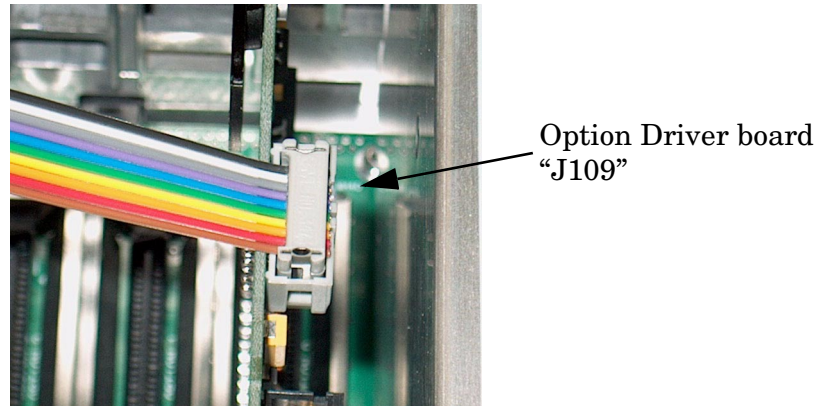
14. Plug the cable assembly (E4446-60067) into J102 of the Option Driver board.  
Refer to [Figure 2-12](#).

**Figure 2-12** Cable Assembly Connected to J102



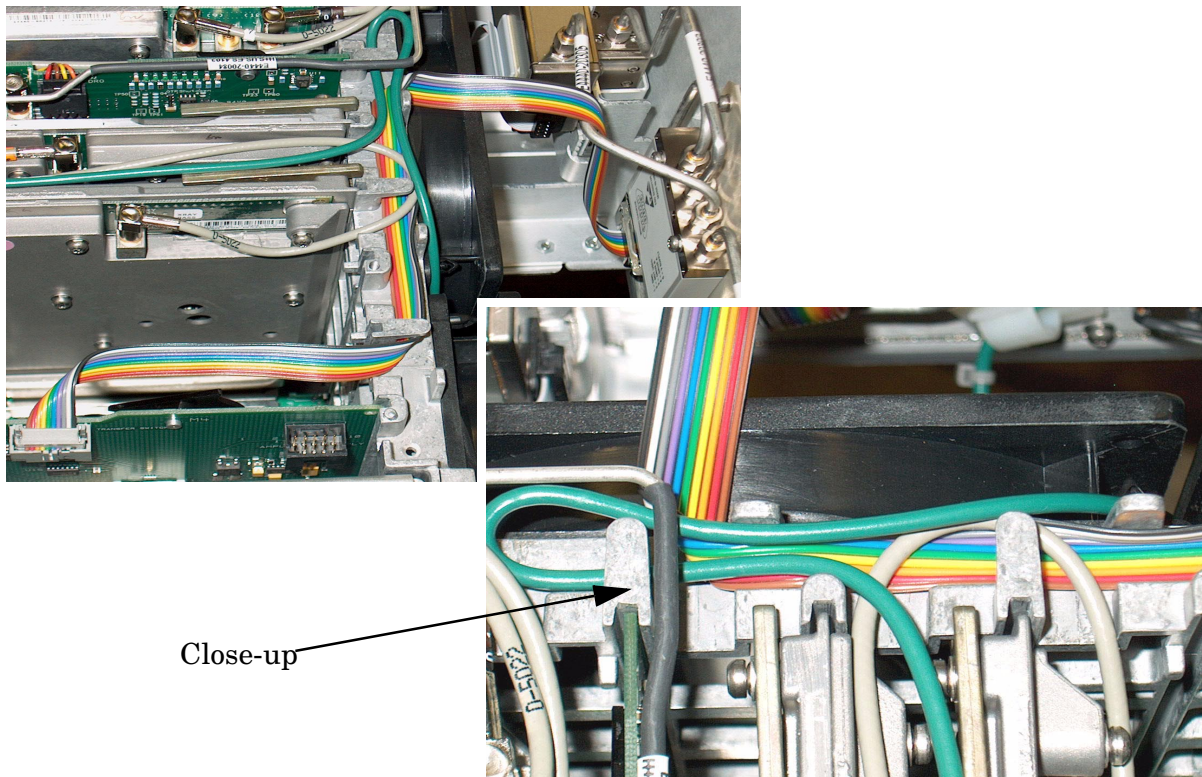
15. Plug the loose end of the ribbon cable (E4440-60427) into J109 of the Option Driver board. Refer to [Figure 2-13](#).

**Figure 2-13** Ribbon Cable Connected to J109



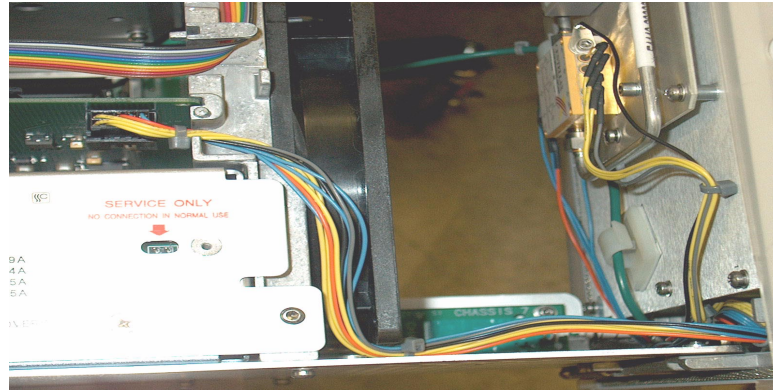
16. Dress the ribbon cable (E4440-60427) as shown in [Figure 2-14](#).

**Figure 2-14** Dressing the Ribbon Cable



17. Dress the cable assembly (E4446-60067) as shown in [Figure 2-15](#).

**Figure 2-15** Dressing the Cable Assembly



This concludes the “Installation.” Proceed to [Chapter 3, “Amplitude Correction,”](#) to generate the amplitude correction table for Option H26.



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## **3 Amplitude Correction**

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## Option H26 Corrections Application

The primary purpose of the Amplitude Correction application is to improve amplitude accuracy when using the Option H26 preamp.

The PSA can improve its amplitude accuracy in certain cases by using its internal Amplitude Correction registers. The PSA offers four user-definable Amplitude Correction registers labeled Antenna, Cable, Other and User. The Option H26 application stores its correction data in the register labeled “**OTHER**”.

The application also allows the user to correct the preamp over a subset of its full frequency range. This enables the correction values to be concentrated over a narrower frequency range, which will accurately measure the preamp amplitude flatness. For example; if the frequencies of interest were between 12 and 13 GHz, the correction would be performed only in this range and the correction values applied only in this region.

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**NOTE** The instrument does not automatically enable the above mentioned Amplitude Corrections, they must be enabled by the user where appropriate. Unlike the option 1DS lowband preamp where the lowband preamp flatness is corrected automatically, the Amplitude Correction “**OTHER**” must be turned “ON” when the Preamp is turned “ON” and turned “OFF” when the Preamp is turned “OFF.” Measurement errors will result if this is not done. Refer to the E444xA H26 User’s Guide (E4440-90560) contained on the CD.

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## Requirements for using the Software Application

### PC Requirements

- Computer running Windows 2000 Professional or WindowsXP operating systems
- Microsoft .NET Framework 1.1 (free download from Microsoft’s website or available on the CD)
- Agilent I/O Libraries Version M or later
- GPIB or LAN connection
- CD or DVD drive

### Equipment Required

- PSA with Option H26
- Signal Generator (The following models are supported: 83623A/B, 83630A/B, 83640A/B, 83650A/B, E4438C or E8267C/D).
- Cable to connect Generator RF Output to Analyzer RF Input

### Connections

- Connect the Signal Generator RF output to the Spectrum Analyzer RF Input
- Connect Generator and Analyzer to PC via GPIB or LAN

## Installing and Starting the Application

1. Insert the CD-ROM into your computer.
2. If Autostart does not install the application after a few moments, manually perform the following: **Start > Run > Browse**. Select the drive where the CD is located. Select the file “**H26app.msi**” and click **OK**. The program should now install on your computer.

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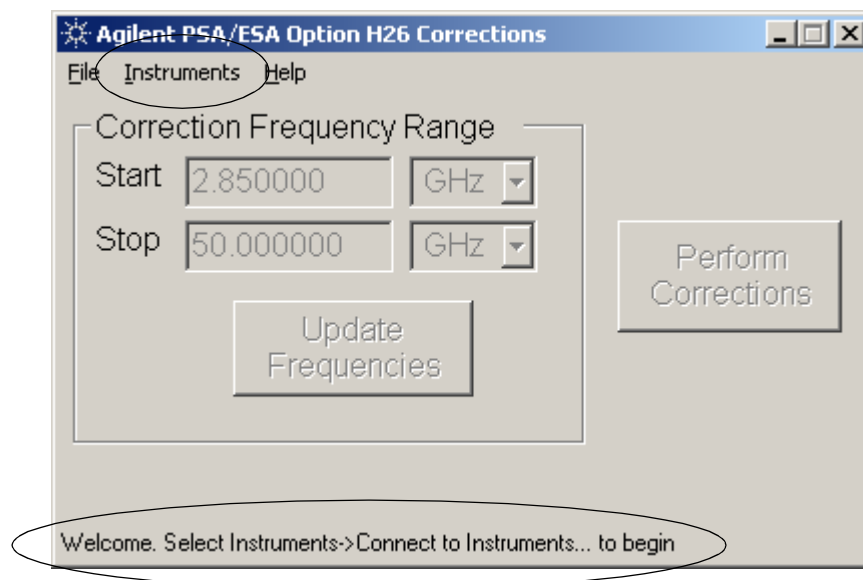
**NOTE** The Microsoft .NET Framework must be installed prior to installing the Option H26 application. The Framework is available at Microsoft’s website (also through Windows Update) and is also provided on the CD (locate dotnetfx.exe in the Framework folder).

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3. Locate the program “*H26 Amplitude Corrections*” by navigating to the **Start > Programs** window or using the icon located on the desktop.

The start of the program will appear as in [Figure 3-1](#).

**Figure 3-1** Starting the H26 Amplitude Corrections Application



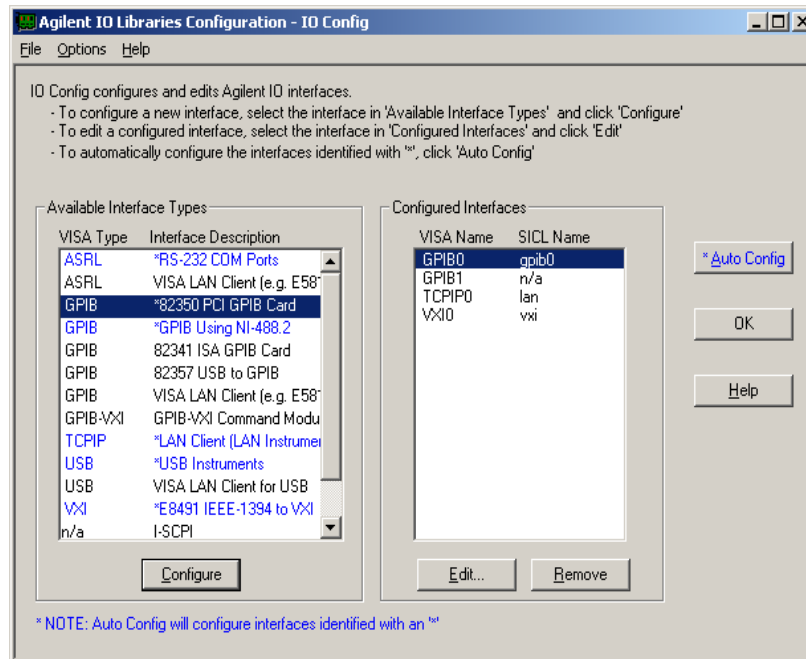
The program startup window contains entry fields for setting the start and stop frequencies, an Update Frequencies button, a Perform Corrections button, menu bar, and a status bar at the bottom of the window. Detailed information will be provided in the following sections.

## Configuring I/O Interfaces

Before an instrument can be controlled by software applications on the PC, Agilent I/O Libraries must be configured properly.

1. Run Agilent I/O Config, either from the **Start > Programs** menu or by clicking on the blue “IO” icon in the Windows Taskbar.
2. Select your hardware interface from the Available Interface Type list and enable it for use by clicking the Configure button. See the I/O Libraries documentation for information about configuring specific hardware interfaces.

**Figure 3-2** Agilent I/O Config Utility



## Connecting the Spectrum Analyzer and Signal Generator

The application must connect to the spectrum analyzer and the signal generator in order to function.

1. Select **Instruments > Connect to Instruments** from the drop-down menu. A new window will be displayed as in [Figure 3-3](#). Enter the GPIB or LAN address of your instrument. The actual Interface and Address numbers will depend on what interfaces you configured in I/O Config in [Step 2 on page 3-4](#). For example, if the VISA Name of your GPIB card is “GPIB0”, and your Analyzer is located at address 18, then you would enter “0” for the Interface number and “18” for the Address number.
2. Click **Connect**.

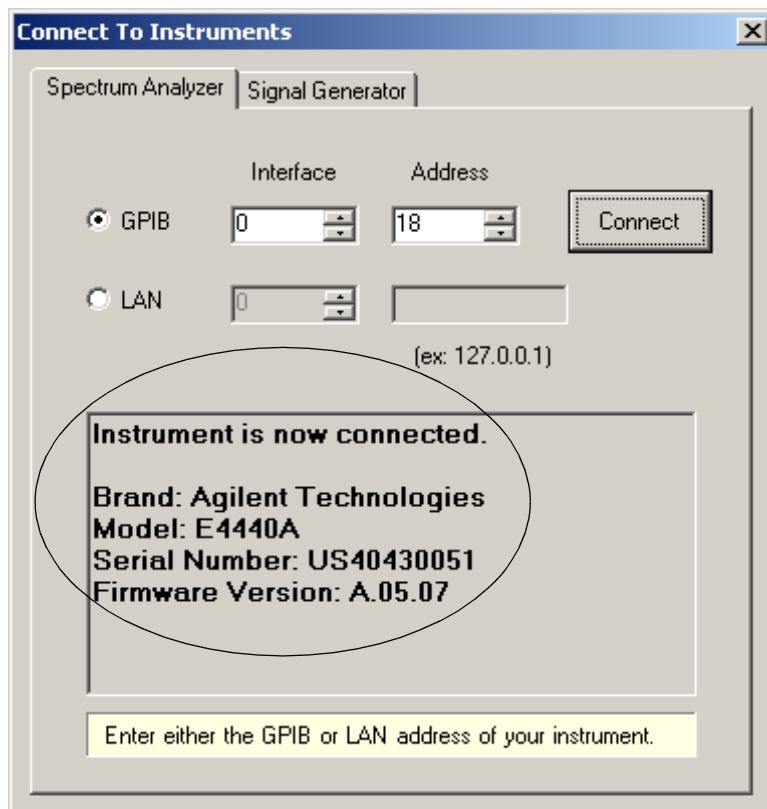
**Figure 3-3**      **Connect to Instruments**



Once the instrument is connected, [Figure 3-4](#) displays information such as the model number, serial number and firmware revision.

3. Select the Signal Generator tab.
4. Configure your signal generator by entering its Interface and Address information and clicking the Connect button.
5. After instruments are connected, close the Configure Instruments window. You may repeat this process later to connect to other signal analyzers or generators.

**Figure 3-4**      **Connecting to the Spectrum Analyzer**

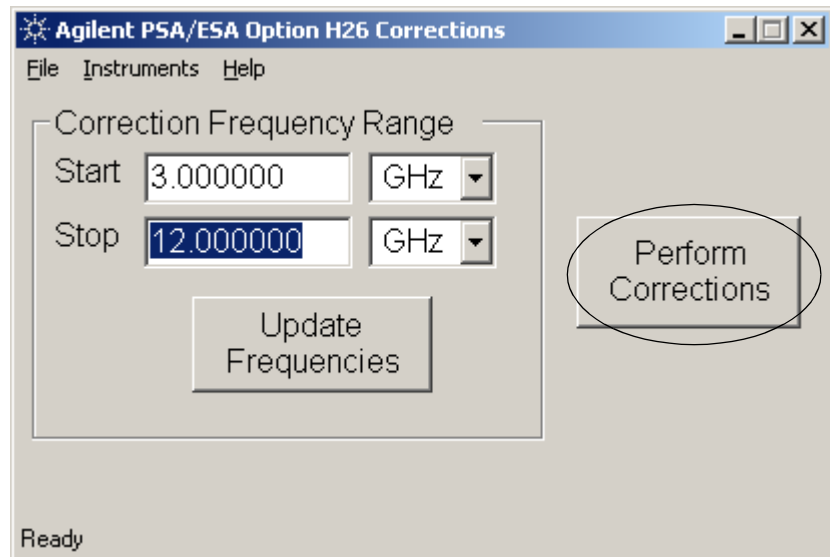
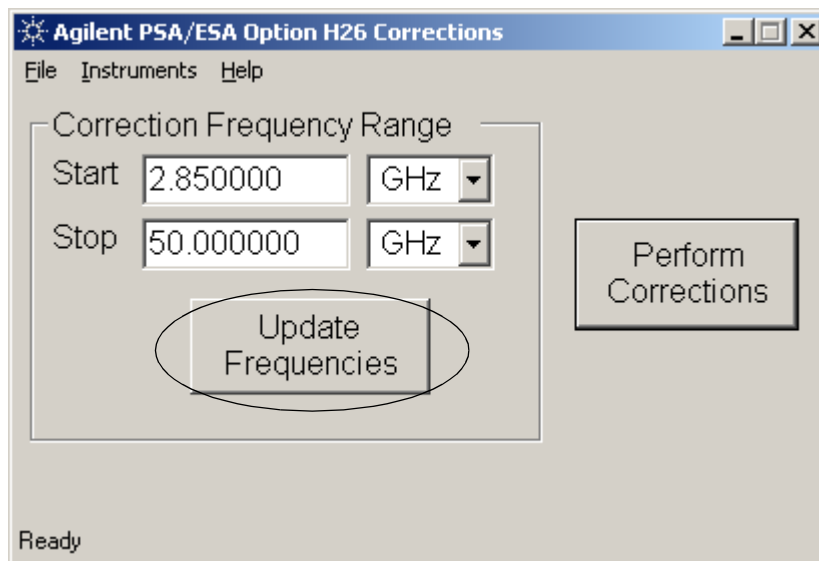


## Setting the Start and Stop Frequencies

After connecting the instruments, the Start and Stop frequencies are enabled for updating as shown in [Figure 3-5](#). Although the application begins with default Start and Stop frequencies, the Stop frequency will be updated after connecting the hardware. Its new value will reflect the limits imposed by the currently connected instruments. The Start frequency has a lower limit of 2.85 GHz imposed by the start frequency of the high band preamp.

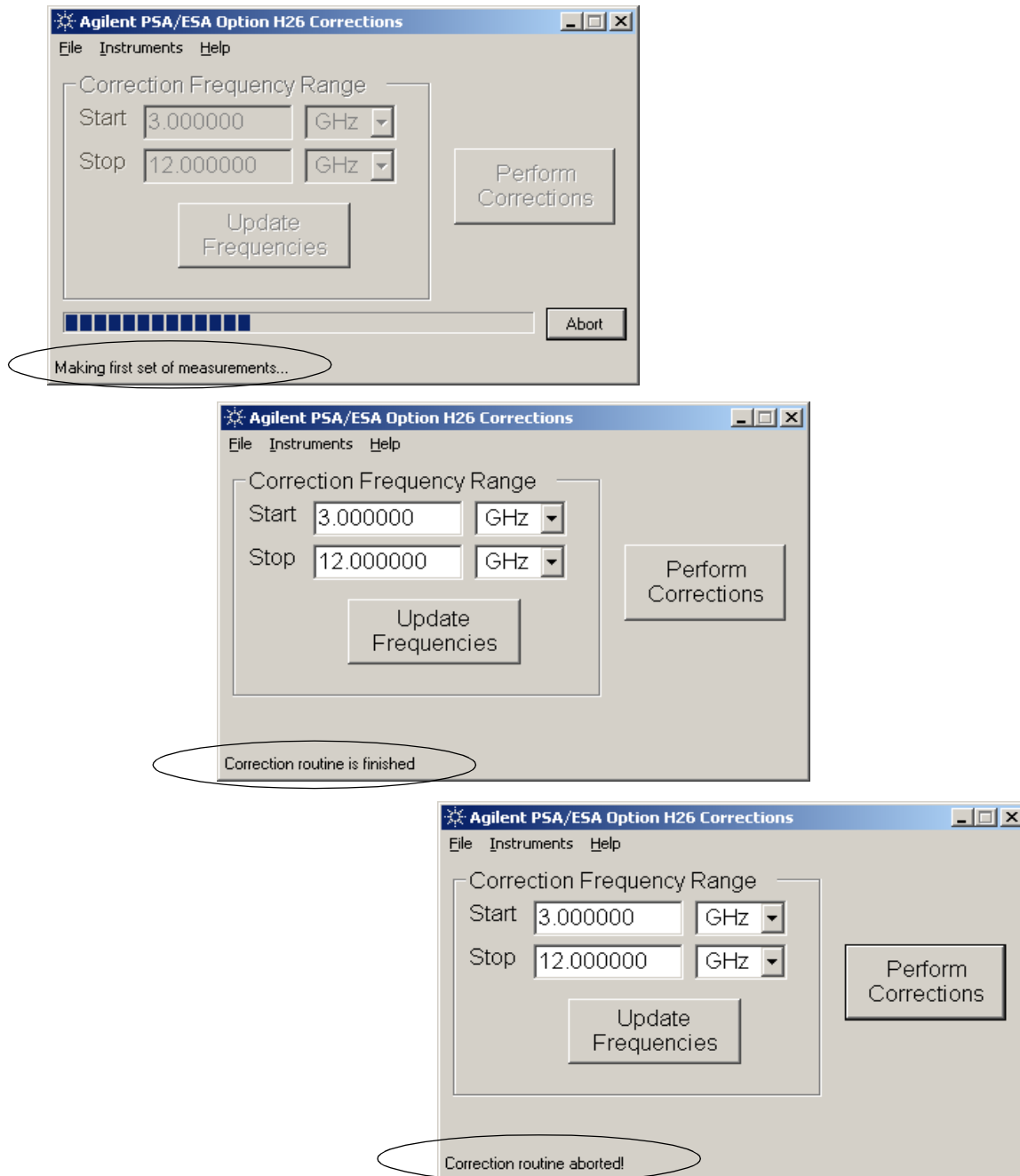
1. To override the default Start and Stop frequencies, enter the desired values and click **Update Frequencies**.
2. Click **Perform Corrections** to begin the correction routine.

**Figure 3-5** Setting the Start and Stop Frequencies



Once running, the application displays the progress of the correction routine as shown in Figure 3-6. This may take several minutes. When the routine has finished, the application displays the “*Correction Routine is Finished*” message in its status bar. The correction data will be automatically stored in the “**OTHER**” register at the end of the correction routine. If for some reason the process needs to be stopped and restarted, click the **Abort** button.

**Figure 3-6** Performing the Corrections





## Saving the Data to Disk

The data can be saved to a floppy disk in the PSA as a backup file. This option becomes available after a correction routine is successfully completed.

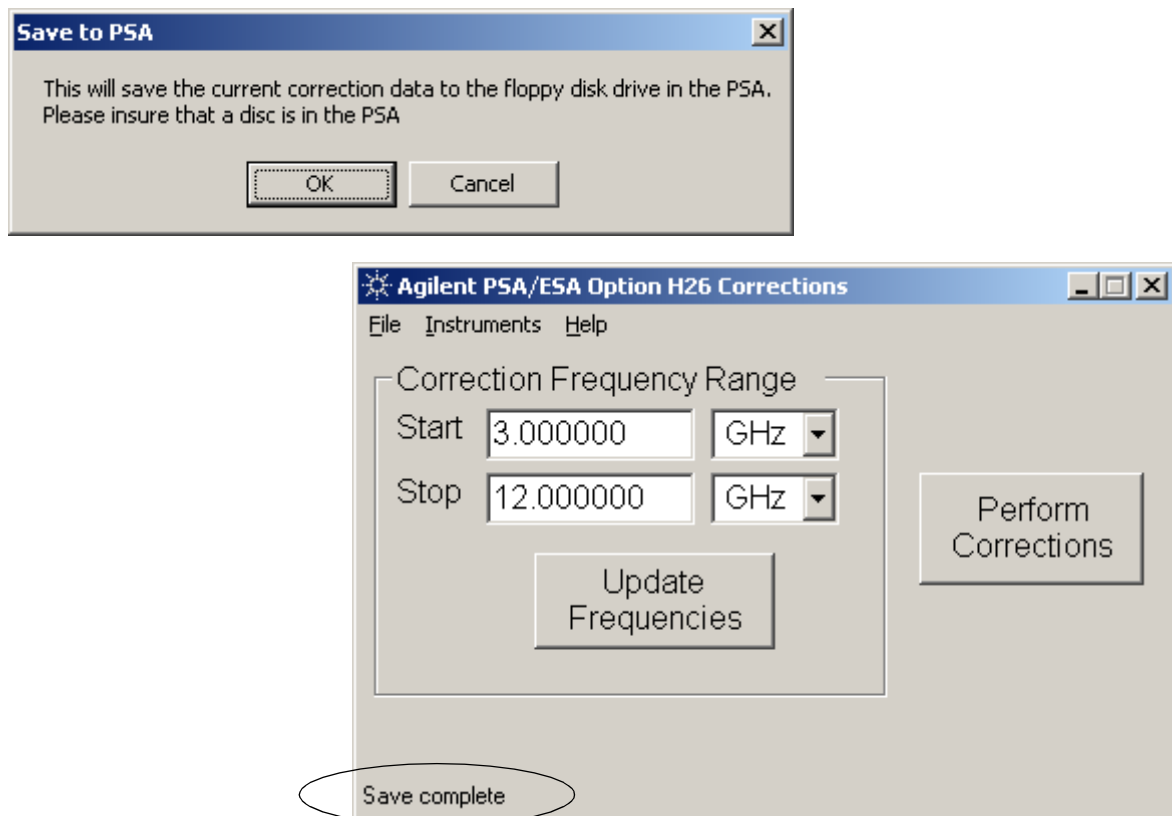
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**NOTE** Starting a new correction routine prevents the application from saving any previous correction data to disk. Also, if a correction routine is Aborted it is impossible to save data from the last successful routine. It is recommended that correction data be saved to disk before running the routine again.

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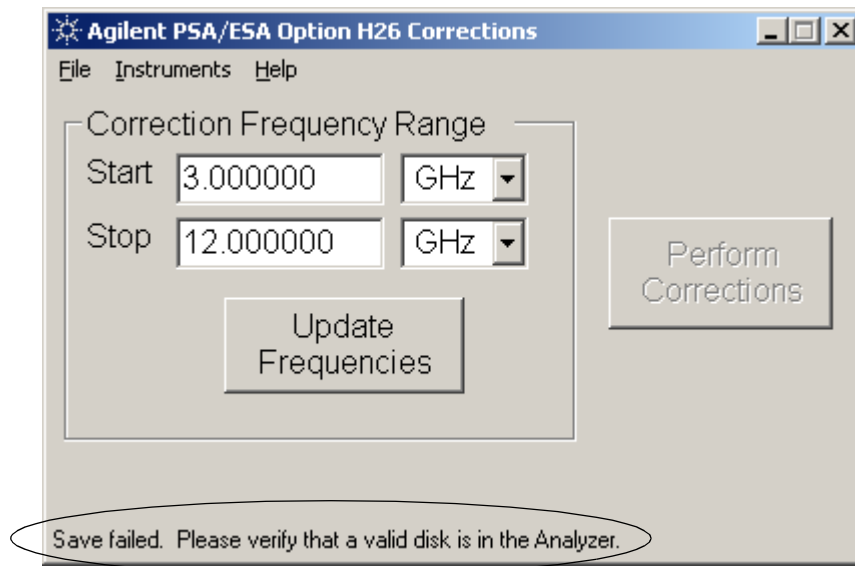
1. Click **File > Save to Disk**. Insure a floppy disk has been inserted in the PSA.
2. Click **OK**. Once finalized, the message “*Save Complete*” is displayed. A backup copy is stored on the c: drive of the PSA as a safety precaution.

**Figure 3-7** Saving the Data to Disk



If a failure occurs when saving to disk, the “*Save Failed...*” message is displayed. This may occur for such things as a full disk, or a disk not inserted in the PSA.

**Figure 3-8** “Save Failed” Error Message



*This concludes the “Amplitude Correction.”*