

# **Agilent Technologies 85395B Upgrade Kit Installation Manual**

**Adds Agilent 8530A Operation to the  
Agilent 8510A/B Network Analyzers**



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# Hewlett-Packard to Agilent Technologies Transition

This documentation supports a product that previously shipped under the Hewlett-Packard company brand name. The brand name has now been changed to Agilent Technologies. The two products are functionally identical, only our name has changed. The document still includes references to Hewlett-Packard products, some of which have been transitioned to Agilent Technologies.

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## Installation

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### Introduction

This introduction contains information about this and other upgrade kits, who should install the upgrade, supplied parts, and equipment/tools required. HP 8360-family source information is also provided.

This manual explains how to install and check the HP 85395B upgrade.

### Product Description

The following versions of the HP 85395B are available:

- |            |   |
|------------|---|
| Standard   | converts an HP 8510A (serial number suffix greater than 03000) <i>or</i> any HP 8510B to an HP 8530A. The upgrade provides HP 8510C capability as well. |
| Option 010 | adds time domain operation.   |
| Option 111 | deletes HP 8510C operation.   |

### Intended Audience

This installation manual is intended for use by Hewlett-Packard customer engineers.

### Other Kits

- |           |  |
|-----------|--|
| HP 85395A | converts an HP 8510A (serial number suffix lower than 03000) to an HP 8530A with HP 8510C capability. Option 111 deletes HP 8510C operation. |
| HP 85395C | converts an HP 8510C to an HP 8530A (retains HP 8510C capability). Option 111 deletes HP 8510C operation.                                    |
| HP 85396A | adds HP 8510C operation to an HP 8530A.  |
| HP 85012D | adds time domain operation to HP 8530A.  |

### Warranty Information

If the upgrade is installed by an HP customer engineer, an upgraded instrument has an on-site warranty of 90 days following the installation date. This upgrade does not affect any existing HP 8510/8530 warranty. The warranty of other system instruments does not change.

## 8360 Source Compatibility

Some 8360-family sources must be upgraded before “quick step” or “test port power flatness” features will function. Table 1-1 explains how to upgrade various 8360 models, and which models do not require an upgrade.

**Table 1-1.**

HP Model	Serial Prefix	Required for Test Port Flatness Correction	Required for Quick Step
83630A 83650A 83651A	All	No modification required. <sup>1</sup>	
83621A 83631A	<3103A	HP 83601A upgrade kit <sup>2</sup>	
	3103A	08360-60167 firmware kit	
	3104A to 3111A	08360-60201 firmware kit	
	≥3112A	No modification required. <sup>1</sup>	
83620A 83622A 83623A 83624A 83640A 83642A	≤3103A	08360-60167 firmware kit	X <sup>3</sup>
	3104A to 3111A	08360-60201 firmware kit	X <sup>3</sup>
	≥3112A	No modification required. <sup>1</sup>	X <sup>3</sup>

1 Fully compatible at time of shipment.

2 Includes installation.

3 Cannot be retrofitted to these models.

### *How to use the table*

Example 1: Assume you have an HP 83621A with a prefix less than 3103A. You would need to upgrade the unit with the HP 83601A upgrade kit.

Example 2: Assume you have an HP 83621A with a prefix of 3103A. You need to order the 08360-60167 firmware upgrade kit.

Example 3: Assume you have an HP 83621A with a prefix of 3112 or above. This unit requires no modification. It can perform quick step and test port power leveling already.

Notice that the HP 83631A is listed in the same box (under HP Model) as the HP 83621A. This means that the prefix numbers shown for the HP 83621A would also apply to the HP 83631A.



**Supplied Parts** The upgrade package supplies the following parts:

**Table 1-2. HP 85395B Upgrade Package Contents**

Item	Qty	HP Part Number	Item	Qty	HP Part Number
<b>Assemblies/Components</b>			HP 85102 adjustments disk <sup>1</sup>	1	08510-10024
HP 85101C Display Processor	1	HP 85101C	Calibration data disk <sup>1</sup>	1	08510-10034
Keyboard	1	85102-60243	CMP program kit <sup>3</sup>	1	85101-60040
A16 remote applications	1	85102-60235	<b>Documentation</b>		
A20 sweep ADC	1	85102-60234	HP 8530A manual set	1	08530-90001
A24 trigger board	1	85102-60241	HP 8510C manual set <sup>1</sup>	1	08510-90275
A10/12 IF amplifier	2	85102-60244	HP 85395B installation manual	1	85395-90003
Standard front dress panel	1	08530-80002	<b>Tools</b>		
Opt. 111 front dress panel	1	85102-80116	0.655 inch countersink drill bit	1	8920-0388
470 pF capacitor	1	0160-3447	Rear panel hole alignment guide	1	85103-00001
<b>Cables</b>			9/16 inch nut driver	1	8720-0008
SMB(f) to BNC(m)	1	5062-7230	SMB connector remover	1	85103-00002
Cable, A24J3 to R.P. J10	1	85102-60246	7/16 inch wrench	1	8720-0009
Cable, A24J2 to R.P. J11	1	85102-60250	<b>Labels</b>		
Cable, A10J6 to A24J7	1	85102-60251	Front panel I.D. label	1	08530-80001
Cable, A12J6 to A24J6	1	85102-60252	Rear panel upgrade label	2	none
Cable, A12J7 to A24J4	1	85102-60253	Rear panel 85102R label	1	85102-80125
Cable, A20J2 to A24J5	1	85102-60254	Rear panel FTZ label	1	08530-80006
Cable, A10J7 to A24J8	1	85102-60256	Rear panel Source Trigger label	1	none
Cable, A10J8 to A24J9	1	85102-60257	Rear panel Event Trigger label	1	none
Cable, A10J8 to A12J8	1	85102-60258	Merchandise return label	1	7121-5162
Cable, Serial	2	HP 24542G	Blank serial label	1	5180-8444
Cable, external video display	1	HP D1191A	English hardware warning	1	7121-2527
<b>Connector Parts</b>			System Bus label	1	9320-5875
BNC Body	1	1250-1091	<b>Screws and Extra Hardware</b>		
15/32 inch hex nut	1	0590-1251	Front panel PC board screw <sup>4</sup>	2	2360-0115
Internal star washer	1	2190-0102	Front dress panel clip <sup>4</sup>	2	0510-1148
Shouldered insulating washer	2	00310-48801	<b>Miscellaneous</b>		
Flat washer	2	3050-1094	Rack mount kit (for top box)	1	5062-4072
SMB adapter tee	1	1250-1391	HP 85102 service adapter	1	85102-60210
<b>Software</b>			Safety glasses	1	9300-1159
HP 8530 operating system disk	1	08530-80009	Masking tape	1	0460-0030
Antenna/RCS calibration disk	1	08530-10001	Self-adhesive foam tape (2 ft)		0460-0114
HP 8510 operating system disk <sup>1</sup>	1	85101-80113	Clear plastic sheet	1	85103-20001
HP 8510 specs and perf. ver. disk <sup>2</sup>	1	08510-10033	Blank disks	5	92192X
Software tool kit disk <sup>1</sup>	1	85103-10002	Cable ties	5	1400-0249

1 Not supplied with option 111

2 Runs on HP 9000 Series 200/300 workstations (calculates and verifies specifications). Not supplied with option 111.

3 The CMP (circuit modeling program) is only useful if your instrument is equipped with option 010, time domain. This disk is not supplied with option 111.

4 Supplied in case an existing item is lost.

## Required Tools and Equipment

In addition to the tools supplied, you will need the following to perform the upgrade procedure.

**Table 1-3. Equipment Required But Not Supplied**

Item	HP Part or Model Number
Computer	Any HP 9000 Series 200/300
Disk drive	HP 9122C
Source <sup>1</sup>	8350B with plug-in, 8340A/B, 8341A/B, or 8360-series
Frequency converter or test set <sup>1</sup>	8511A/B, 85310A 8512A, 8513A 8514A/B, 8515, 8516A, or 8517A
Function generator <sup>2</sup>	Any with TTL square wave output
Flexible RF cable <sup>1</sup>	8120-4396
HP-IB cables <sup>3</sup>	10833A
Static control table mat	9300-0797
Wrist strap	9300-1367
Wrist-strap-to-mat cord (5 ft)	9300-1980
Flat blade screwdriver	8730-0019
#1 Pozidriv	8710-0899
#2 Pozidriv	8710-0900
Long nose pliers	8710-0595
Center punch	8890-0001
Wire cutters	8710-0012
Variable speed drill	
Knife or scissors	
Solder removal tool	
Soldering iron and solder	
<b>For HP 85310A or 8511A Only</b>	
Power splitter	5086-7408 or HP 11667B
RF cable	08513-60009
Semi-rigid cable <sup>4</sup>	08510-20005
Semi-rigid cable <sup>4</sup>	08510-20006
2 RF cables <sup>5</sup>	08513-60009

1 Usually available as part of the customer's current test setup.

2 Only required if an HP 8360-series source is not available.

3 Quantity and length depend on your test setup

4 From HP 8511A test set

5 Only required for the HP 85310A.

---

## Upgrade Procedure

This procedure is given in the following major steps.

- Converting tape files to disk.
- Check system operation.
- Return the old top box.
- Install the new front panel and face plate.
- Install the new BNC connector.
- Solder a small capacitor on the motherboard.
- Install the new PC board assemblies and reroute cables.
- Apply labels.
- Load the HP 8530A operating system.
- Check HP 8530A operation.

---

## Converting Tape Files to Disk

### About the Conversion Program

A tape-to-disk conversion program is included with each performance upgrade package. The program moves all DATA, MEMORY, MEMORY ALL, and DELAY TABLE files from tape to disk. Files are saved in CITIfile (ASCII) format on low capacity (gray HP), or a high-capacity (black HP) disks. The new disk files are fully compatible with the HP 8510C.

### When You Should Skip this Procedure

If you are installing an option 111 upgrade kit you can skip the tape-to-disk conversion procedure. Option 111 eliminates HP 8510 capability, so none of the old HP 8510 tape files are usable.

### Cal Kit Files

All factory cal kit definition files are supplied with the upgrade kit. However some customers may have created their own cal kit files, and need them stored to disk. If you must transfer custom cal kits to disk, refer to "Moving Cal Kit Files to Disk", at the end of this procedure.

### Files You Cannot Transfer

Instrument and hardware state files cannot be converted. Also, the HP 8510C and HP 8530A are incompatible with the learn strings of earlier analyzer versions.

### **Normal (Automatic) Mode Versus Attended Mode.**

HP 8510A/B instruments cannot save parameter or frequency range to disk with the measurement data. Many users write this missing information on the tape itself, along with the file name. “Attended Mode” lets you add this information before saving the file to disk. Here’s how Attended Mode works:

- The program loads a file.
- You choose the appropriate parameter ( $S_{11}$ ,  $S_{21}$ , and so on) and the frequency range. Make these selections using the HP 8510 front panel keys.
- The program stores the file to disk, with parameter and frequency information.

In contrast, “Normal Mode” converts all files with no interruption. All the new files will have the USER 1 parameter selected, along with the preset frequency range. Normal mode is much easier to use than Attended mode, and allows you to perform the tape-to-disk transfers much faster.

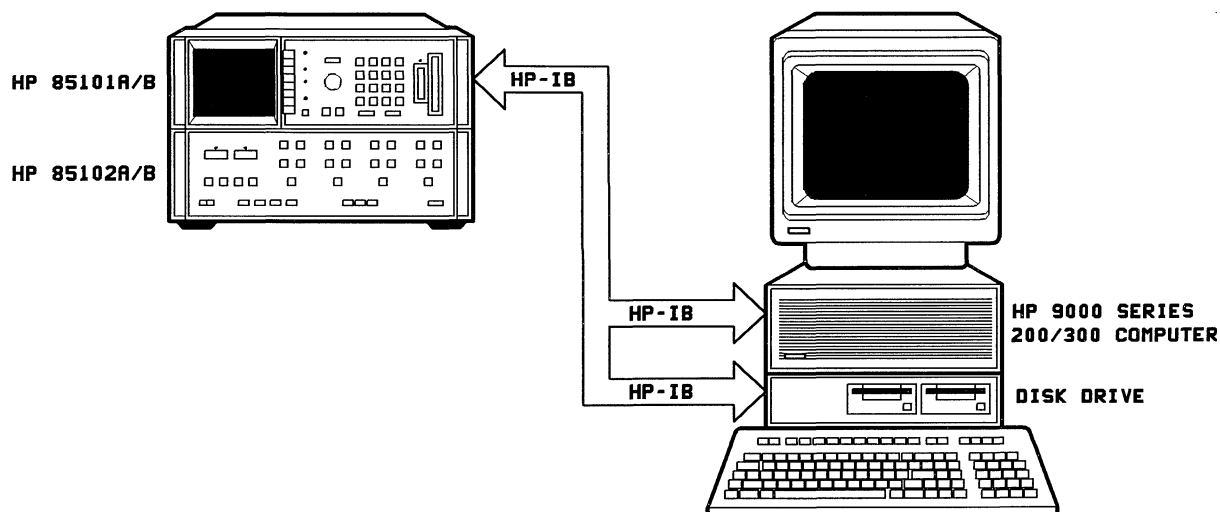
*Recommended practice is to use Normal mode. Later, the customer can load each disk file into the HP 8510C, set parameter and frequency range, and save the file again.*

### **Duplicate File Names**

If your customer uses the same file names on different tapes, store each tape to a different disk. A full tape will take up about 200 Kbytes, so low-capacity disks practical in this case. If you don’t use separate disks, you must rename each duplicate file name before saving it to disk. *When you save a file it will overwrite any existing disk file with the same name. This occurs without a warning message.*

### **Procedure**

1. Connect the equipment as shown in Figure 1-1
2. Turn the equipment on.
3. Load HP Basic into the computer.



**Figure 1-1. Equipment Setup for Data Transfer**

4. Initialize one or more blank disks. One high-capacity (black HP) disk can hold data from six full tapes. A low-capacity (gray HP) disk can hold data from three full tapes.

**Note**



High-capacity and low-capacity disks are initialized using the same HP BASIC INITIALIZE command. The computer system automatically initializes disks at the proper capacity. You do *not* have to enter any special command options when initializing either type of disk.

5. Insert the Software Tool Kit disk (included in the upgrade kit) into drive 0 of the HP 9122 disk drive.
6. Load the computer program as follows:
  - a. Type:
 

```
GET "TAPE_DISC"
```

 Press **ENTER** (or **RETURN**).
  - b. Wait about 2 minutes.

**Note**



You can store a version of this program so that it loads faster during future use. See "Storing a Binary Version" at the end of this procedure.

- c. Press **Run**. After about 10 seconds the computer displays the following message:
 

```
HP 8510A/B TO HP 8510C TAPE FILE CONVERSION UTILITY
```
7. Read and follow the main menu instructions displayed on the computer.
8. Replace the tool kit disk with an initialized disk.

9. Place the first tape into the HP 8510A/B tape drive.

*To Use Normal (Automatic) Conversion*

10. If you wish the conversion process to proceed automatically, select **Convert**. The computer shows the transfer activity, and displays a conversion summary when the transfer is complete. A complete tape to disk conversion takes between 1 to 20 minutes. When finished, proceed with step 12.

*To Use Attended Conversion*

11. If you want to add parameter and frequency information to each file, press **ConvertMode Attended**. The computer prompts you to recall or setup the correct parameter and frequency settings (for example S<sub>11</sub>, at 2 to 20 GHz) before the data is loaded from tape and transferred to disk. When finished, proceed with step 12.

**Caution**



---

When transfer is complete, you can use the **Rename** softkey to rename disk files. This is *required* if you transfer files with the same name to a single disk, because duplicate files overwrite existing disk files.

---

12. Remove the data disk from the drive and label it.
13. Perform a catalog on the disk and make sure all the files have been transferred.

## Storing a Binary Version

To store a binary version of the utility program (for faster loading in the future):

1. Type STORE "TAPEDISC".
2. To load this program in the future, type LOAD "TAPEDISC".

## Moving Cal Kit Files to Disk

Cal kits created by HP 8510A firmware cannot be used by the 8510C. The customer must re-create the custom cal kits.

Cal kits created with HP 8510B firmware are compatible with the HP 8510C. Move these files to disk as explained below.

1. Connect the disk drive to the HP 8510 System Bus.
2. Press **SYSTEM HP-IB ADDRESSES MORE DISC**. Make sure the address shown on the screen matches the HP-IB address setting on the disk drive.
3. Insert an initialized disk in drive 0. You can use a disk that already contains data. Existing data will not be damaged.

*If the custom cal kit is already in instrument memory, skip steps 4 through 6.*

4. Insert the tape that contains the cal kit file, or files.

5. Press **TAPE/DISC** **STORAGE IS TAPE** **LOAD** **CAL KIT 1-2**  
**CAL KIT 1**.
  6. Pick the desired tape file to load by pressing **FILE 1** through **FILE 8** as necessary. Files that actually exist have \* next to the softkey title.
  7. Press **STORAGE IS DISC** **STORE** **CAL KIT 1-2** **CAL KIT 1**.
  8. Use the “label-maker” menu to choose a file name for the disk file. The file name you enter can be up to seven characters long.
  9. Press **STORE FILE**.
- Repeat steps 5 through 9 for each file.

## Check System Operation

The HP 8510 needs to be operating as part of an existing system. This is necessary so you can test the upgrade when you install it. If the HP 8510 is not set up as part of a system, set it up as shown in Figure 1-2, Figure 1-3, or Figure 1-4, as applicable.

### Note



If you are using an HP 85310A frequency converter, you must set the HP 8510 up as explained in the HP 85310A manual. This includes placing the HP 8510 in the multiple source mode.

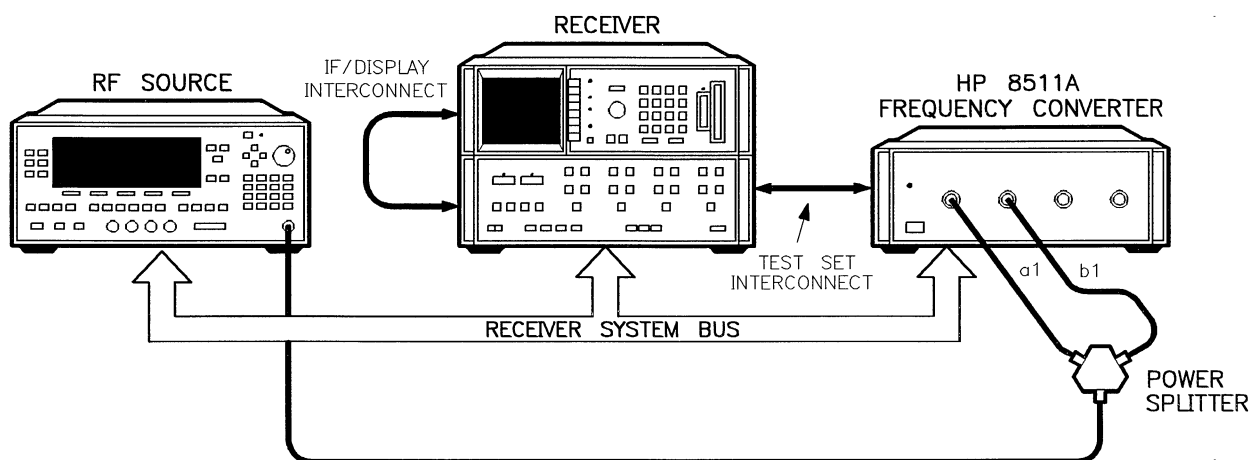
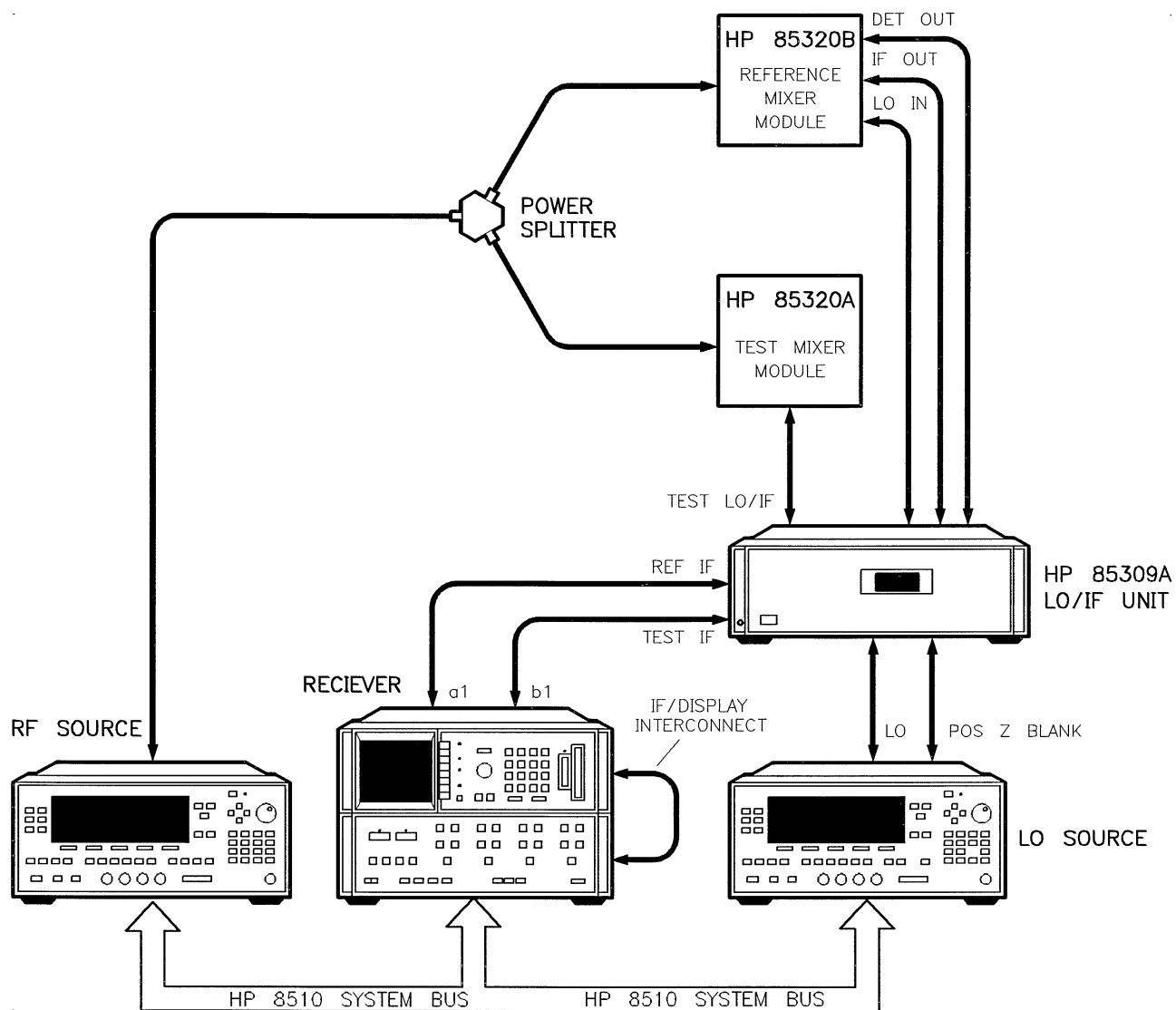


Figure 1-2. Temporary Equipment Setup Using an HP 8511A Frequency Converter





**Figure 1-3. Temporary Equipment Setup Using an HP 85310A Frequency Converter**



6. All error messages should now be gone. If an error message still appears on the display, solve the problem before continuing. Do not perform the upgrade until the problem is corrected.
7. Press INSTRUMENT STATE **SAVE** **USER PRESET 8**.

---

## Determining Firmware Revision

Later in this upgrade you must decide whether or not to replace the A20 assembly. One of the deciding factors is the firmware revision of the instrument. The most reliable way to determine the firmware revision is to display it on the instrument screen. You will not be able to do this later, because the instrument will be disassembled. For this reason, it is important that you determine and write down the firmware revision now.

1. Press **SYSTEM** **MORE** **SERVICE FUNCTIONS** **SOFTWARE REVISION**.  
The firmware revision will appear near the top of the instrument display.
2. Write the firmware revision in Table 1-4, below.

**Table 1-4. Instrument Firmware Revision**

<b>Firmware Revision</b> _____
--------------------------------

---

## Return the Old Top Box

Remove the HP 85101 display processor (top box) from the system and return it to Hewlett-Packard:

1. Turn OFF all instruments.
2. Disconnect the AC power cord from the HP 8510 top and bottom boxes.
3. Disconnect all cables from the back of the top and bottom boxes.
4. Separate the top box from the bottom box as follows:
  - a. Look at the bumper feet on the rear panel of the HP 8510. Chrome screws hold the top and bottom box together. Loosen the screws using a flat head screwdriver. When the screws pop up they are disengaged.
  - b. Now pull the top box forward to disengage it from the bottom box.
5. Remove the display processor (top box) from the system.
6. Remove the new display processor from its shipping box.
7. Package the old display processor in the box. Add two inches of packing material and secure the box.
8. Fill out the merchandise return label (included in the upgrade kit) and attach it to the shipping box.

---

### Note



The prepaid return label is valid in the U.S. only

---

9. Send the packaged display processor back to Hewlett-Packard.

## Install the New Front Panel

Refer to Figure 1-5 when performing this procedure. You will replace the front panel of the HP 85102 IF Detector (bottom box) in this procedure.

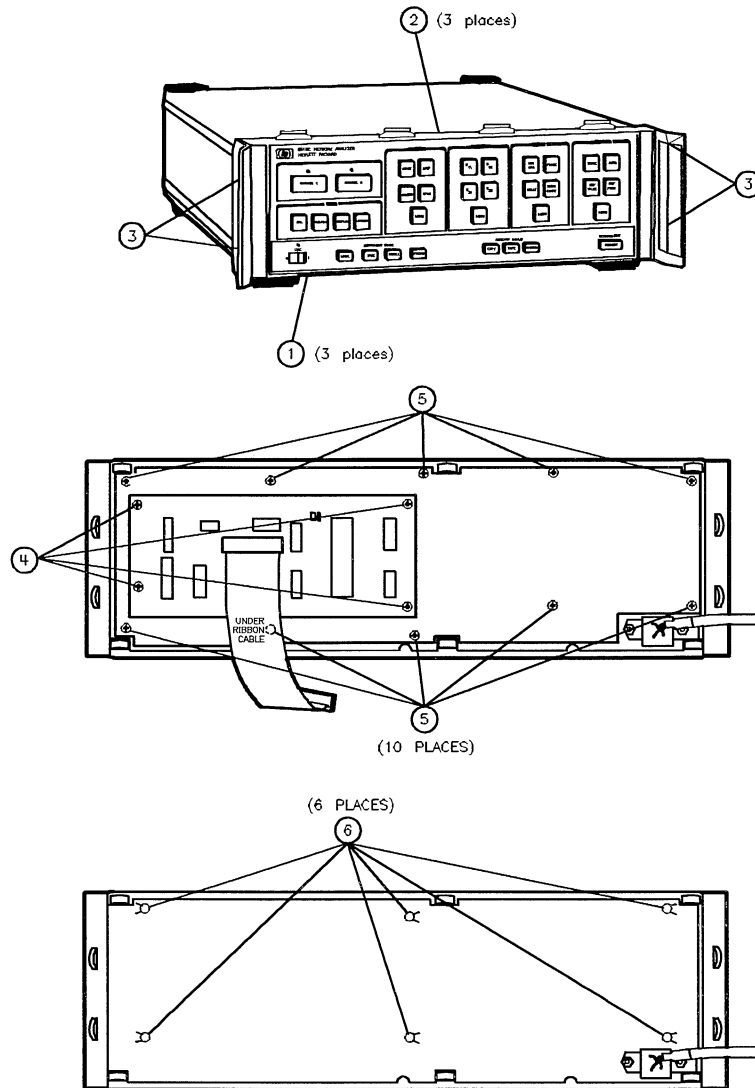


Figure 1-5. Front Panel Disassembly

**Caution**

---

Perform the following procedure only at a static-safe workstation. Wear an anti-static wrist strap.

---

**Detaching the Front Panel from the Bottom Box**

On the bottom box:

1. Remove the two instrument feet nearest the front panel.

**Note**

---

Skip step 2 if your instrument has rack mount flanges.

---

2. Pry the plastic screw covers off of the handles (use a flat blade screwdriver).
3. Remove the three screws that hold each handle in place (use large pozidriv).
4. Remove three screws from the bottom edge of the frame (item 1).
5. Remove the three screws from the top edge of the frame (item 2).
6. Remove two screws from each side of the frame (item 3).
7. Pull the front panel assembly outward to remove it from the instrument. Disconnect the ribbon cable from the motherboard and lay the front panel face-down on the instrument.

**Replacing the Front Panel Board**

8. Remove the four screws that hold the small A1A1 display interface board in place (item 4).
9. Pull straight up on the A1A1 assembly to detach it from the keyboard.
10. Remove the 10 screws (or clips) that hold the keyboard in place (item 5). (Some instruments use screws to hold the keyboard in place, others use clips.)
11. Remove the keyboard from the front panel frame.

**Note**

---

Some instruments have a plastic sheet that lays on top of the keyboard. This sheet is an “air dam” - it stops air from blowing out the front panel key holes. If your instrument has this plastic air dam, be careful not to damage it when handling the front panel assembly.

---

12. Remove the six retainer clips (item 6) with long nose pliers. The front dress panel can now be removed.

## Reassembly

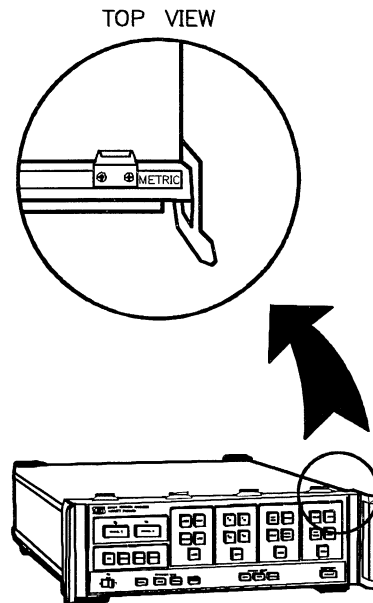
13. Press the replacement front dress panel tightly onto the frame. Replace the six clips (item 6).

Push the clips down as far as possible. **DO NOT** apply the clips with the frame resting on a flat surface. (A flat surface will not press the dress panel in all the way.) Instead, press the dress panel firmly with your fingers. Then place the six clips on the posts.

14. Install the new keyboard PC board assembly. **Make sure the three LEDs on the board are aligned properly with the holes in the front panel frame.**
15. Replace the plastic air dam (if your instrument has one). Install the 10 screws (or clips, item 5).
16. Place the A1A1 assembly onto the new keyboard. Be careful not to bend the interconnect pins, and make sure the pins go into the correct receptacle holes.
17. Reinstall the four screws that hold the A1A1 assembly in place (item 4).
18. Hold the front panel in front of the instrument cavity. Make sure the power switch is on your left.
19. Push the AC power cable behind the motherboard ribbon connector. This makes it easier to reinstall the front panel assembly.
20. Reconnect the ribbon cable and push the front panel back into place.
21. Install the frame screws (items 1, 2 and 3).
22. Replace the rack-mount flanges (if used) and handles.



23. Reinstall the plastic screw covers on each handle, if necessary.



**Figure 1-6.**  
**Determining if the Instrument Frame Uses English or Metric Screws**

24. Refer to Figure 1-6. Determine whether the word “METRIC” is stamped on the front panel frame.

If the word “METRIC” *is* there, the instrument uses metric hardware in the frame.

If no text is stamped there, the bottom box uses all-English hardware.

If the unit has all-English hardware, install the supplied warning label (7121-2527) on the top cover. Place the label near the rear panel frame.

25. Reinstall the bottom feet.

## Installing a BNC Connector

Use the following procedure to install a BNC connector on the rear panel of the HP 85102 (bottom box).

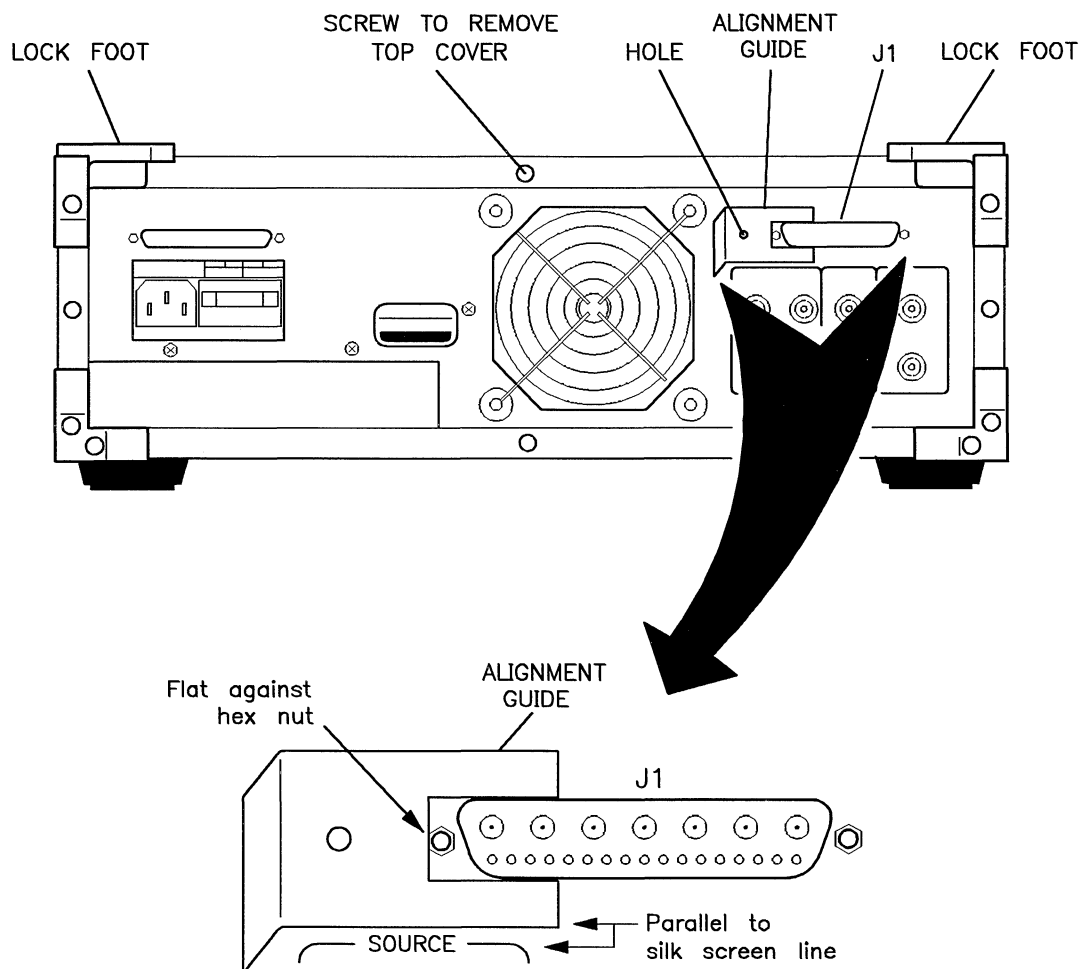
### Warning



**The following procedure presents a danger to your eyes; the use of safety glasses during such procedures is required by law.**

### Procedure

1. Put on safety glasses.
2. Turn the bottom box around so the rear panel faces you.
3. Remove the lock feet (shown in Figure 1-7), and the top cover.
4. Position the rear alignment guide (85103-00001, shown in Figure 1-7) to locate the center of the hole for the BNC connector. Mark the location with a pencil.



**Figure 1-7. HP 85102 Rear Panel BNC Hole Location**

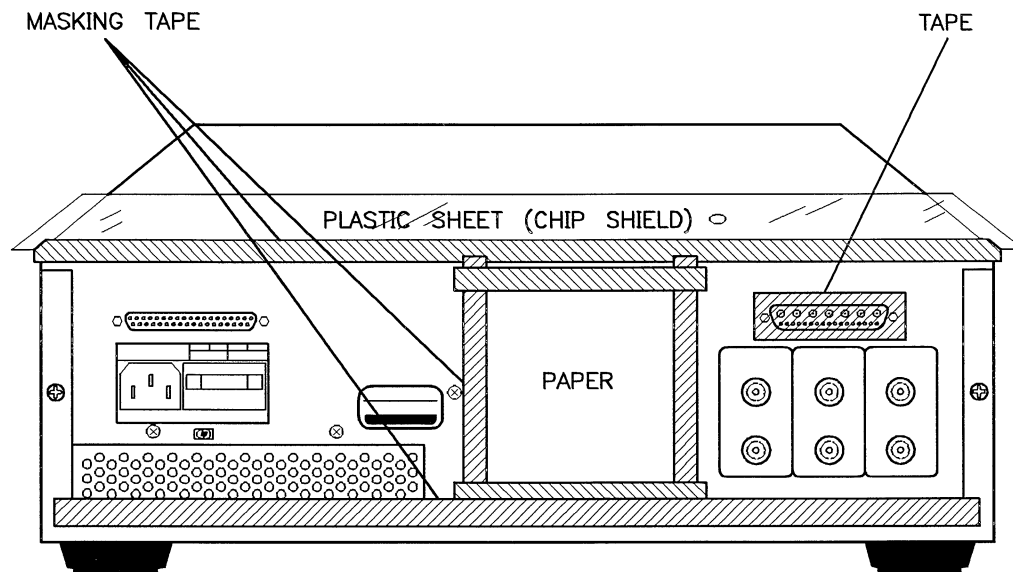
5. Remove the alignment guide, and center punch the marked spot (if an automatic center punch is not available, use the drill bit and a small hammer).
6. Cut the supplied foam tape (0460-0114) into four pieces (each three-inches long).
7. Remove the backing from the foam tape and stack them on top of one another.
8. Stick the tape to the inside of the rear panel, directly behind the punched indentation.

**Note**



The foam keeps metal chips out of the instrument.

9. Refer to Figure 1-8. To keep out metal chips, mask the fan opening and the lower edge of the rear panel with paper and masking tape.



**Figure 1-8. Masking Tape Applications**

10. Refer to Figure 1-8. Tape a piece of plastic (85103-20001) across the top of the instrument at the rear panel. Place tape over the hole in the plastic sheet. Lay the plastic sheet down away from you (the plastic sheet keeps metal fragments from flying up into the instrument).
11. Place the top cover over the portion of the instrument that is still exposed.

## Caution



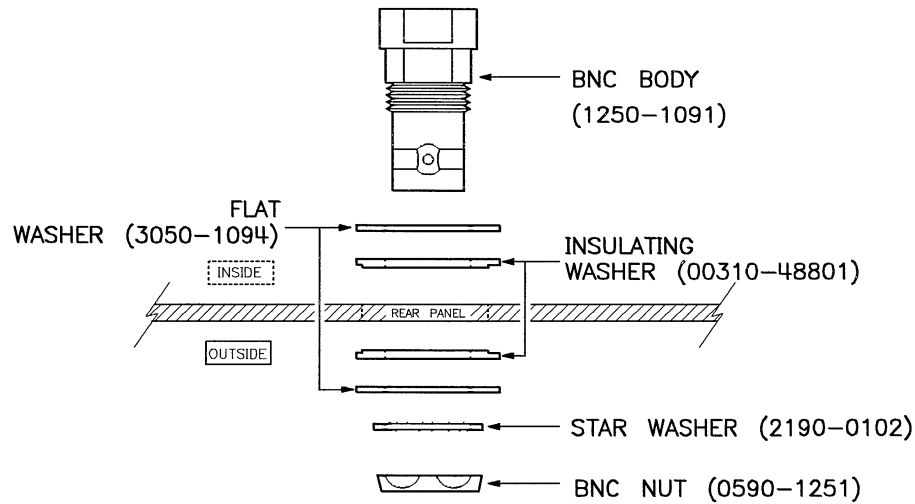
---

Do not get metal fragments inside the instrument.

---

12. At the spot punched on the rear panel, use the supplied drill bit to drill the BNC hole. Keep the following in mind:
  - Use a constant but slow clockwise RPM.
  - Press *very hard*. Try to cut an “apple peel” strip rather than many small chips.
  - Use less pressure on the drill as the bit is about to go all the way through. Unlike other types of drill bits, this bit does not pull itself through the hole.
13. From the outside, clean any fragments out of the hole you just drilled.
14. Remove the clear plastic sheet and the top cover.
15. Press the foam tape one last time to trap as many metal fragments as possible. Do not remove the tape yet.
16. Brush all metal fragments from the work bench.
17. Place the instrument on its side. (The rear panel BNC connectors should be next to the table surface.)
18. Carefully remove the foam tape stack so that any metal chips stuck to it do not fall into the instrument.
19. Search for any stray metal chips and pick them up with masking tape.

20. Place the instrument on its feet and remove all masking material.

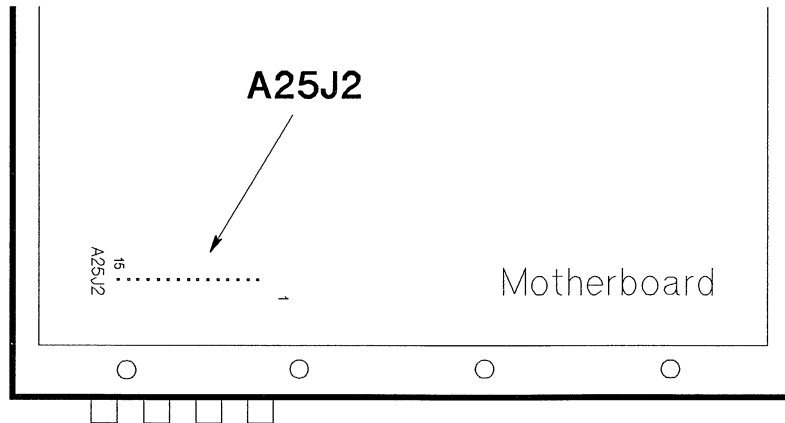


**Figure 1-9. BNC Parts Identification**

21. Refer to Figure 1-9. Find new cable 85102-60250. Attach this cable to the supplied BNC body (1250-1091). Tighten with the supplied 7/16 inch open-end wrench.
22. Install the BNC connector body and hardware in the hole as shown. Tighten the BNC nut with the supplied 9/16 inch nut driver until snug. Do not over tighten.
23. Leave the top cover off, continue with "Installing the STOP SWEEP Capacitor"

## Installing the STOP SWEEP Capacitor

1. Turn the instrument upside-down, with the rear panel facing you.
2. Remove the remaining rear panel bumper feet.
3. Remove the bottom cover.



### Bottom View

Figure 1-10. A25J2 Location

4. Refer to Figure 1-10, find A25J2 on the bottom of the motherboard.
5. Bend the leads on the supplied capacitor (0160-3447) as shown in Figure 1-11.

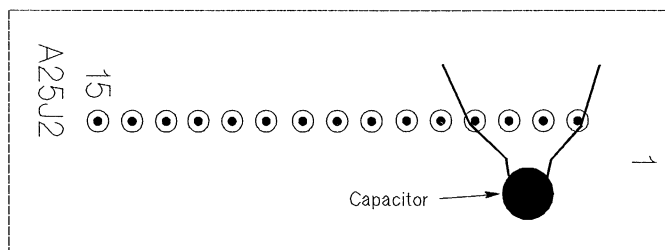
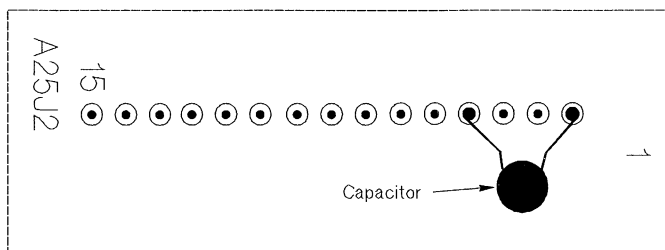


Figure 1-11. Mounting the Capacitor

6. Remove the solder from A25J2 pins 1 and 4.
7. Wrap the capacitor leads around pins 1 and 4. The capacitor is *not* polarized, so orientation is not important.
8. Solder the capacitor leads in place as shown in Figure 1-12 and cut off the excess lead length.



**Figure 1-12. Mounting the Capacitor**

9. Replace the bottom cover and rear bumper feet.
10. Turn the instrument so the top faces up.
11. Continue with “Installing Assemblies”.

## Installing Assemblies

Use the following procedure to replace assemblies in the HP 85102 (bottom box).

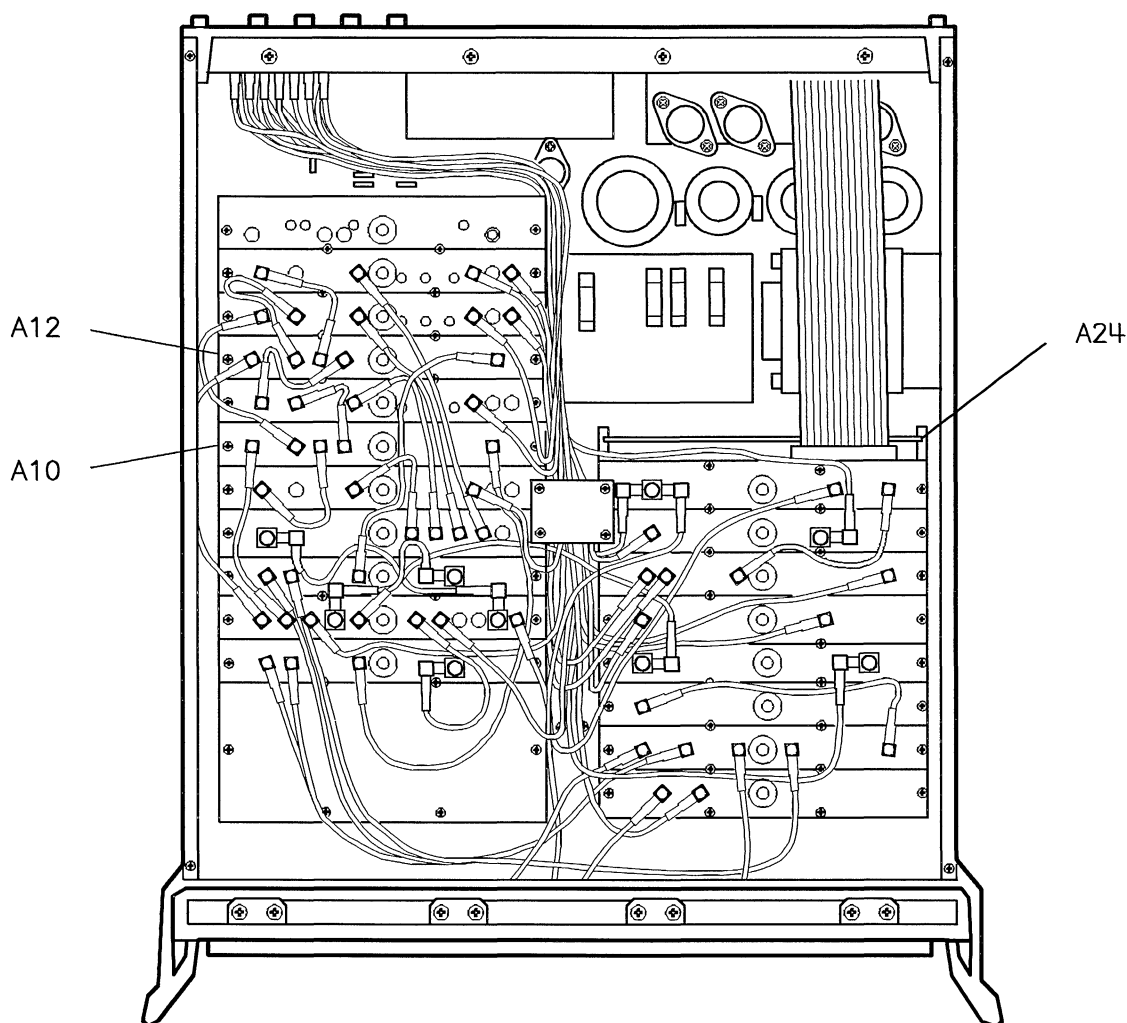
### Caution



You handle assemblies in this procedure that are very sensitive to static electricity. Wear an anti-static wrist strap that is connected to earth ground. If you must place assemblies down, place them on a grounded anti-static surface.

### Replacing A10 and A12

There are two boards marked “A10/A12 Test Ref IF Amplifier.” Actually, the one closest to the rear panel is A12 (the reference channel amp), the other is A10 (the test channel amp). These boards are interchangeable.



**Figure 1-13. HP 85102 Assembly Locations**

1. Turn the bottom box around so the front panel faces you.



2. Refer to Figure 1-13. Using the supplied SMB cable remover, disconnect all cables from the A10 and A12 assemblies.
3. The following cables must be disconnected (only on one end) so you can remove the A10 and A12 assemblies. Disconnect these cables at the following places:

**Table 1-5.**  
**Cables that Interfere with Board Replacement**

Cable	Disconnect at
W2	A9J3
W1	A11J3
W30	A11J4
W4	A13J3
W32	A13J4
W3	A14J3

4. Remove the screws that hold the metal covers on both A10 and A12 assemblies.

**Caution**



In the following step, be careful not to damage the metal gaskets (located under the metal covers) when you remove the assemblies.

**Note**



The boards you remove in this procedure may be valuable spare parts if your customer owns other HP 8510A, 8510B or 8510C instruments (or plans on buying more in the future). Because of this, be careful to observe static precautions when removing the boards, and place them on an anti-static mat.

After you install the new boards, place the old ones in the anti-static bags and seal them.

The old boards will work in HP 8510A's with serial prefixes of 03000 or higher, or in any HP 8510B or 8510C.

5. Grab the white knob on top of the A10 assembly and pull upward to remove the board (the metal cover and PC board are all one piece). Move the assembly gently from side-to-side if necessary.
6. Remove the A12 assembly.
7. Install the new A10 and A12 assemblies (85102-60244). Push the boards in firmly and make sure they are fully seated. The new A10 and A12 boards are interchangeable.
8. Reinstall A10 and A12 cover screws.

---

## Replacing A24

1. Remove the ribbon cable going to A24.
2. Remove the A24 assembly (85102-60241, refer to Figure 1-13), and replace it with the new A24 board.
3. Reconnect the ribbon cable that goes to A24.

---

## Connecting Cables

Connect existing and new cables as explained below.

### Reconnect Existing Cables

1. Reconnect all internal cables as follows:
2. Sort through the loose cables and plug in the ones that go to the A9 board.
3. Repeat this step for A10, A11, A12, A13, and A14 (one at a time).

### Problem Solver



If you don't remember which board is A10 and which is A12, refer to Figure 1-14.

### Note



The following jacks should be empty at this time: A10J6, A10J7, A10J8, A12J6, A12J7, A12J8, and all the jacks on the new A24 board.

4. After connecting all cables, *inspect each jack on boards A9 through A14. This is very important! It is very easy to miss a connection. Try to move each connector. Sometimes a cable may look like it is connected, but may simply be laying on top of the PC board jack.*

### Adding and Rerouting Cables

1. Remove the metal plate shown in Figure 1-14.
2. Cut the cable ties that hold all yellow (rear panel) cables together.
3. Using the supplied 7/16 inch wrench, remove the cable that goes to the rear panel TRIGGER IN connector:
  - a. Carefully insert the wrench between existing rear panel cables.
  - b. Loosen the nut until the cable comes off.
  - c. Remove the other end of the cable from A20J2. Throw the cable away.
4. Install the supplied SMB adapter tee (1250-1391) on A10J8.
5. Connect the new cables as shown in Table 1-6 and Figure 1-14.

### Note



The new cables must be positioned (dressed) carefully. There are many new cables near A23 and A24. The new cables can be positioned well if you use care and a little skill. Notice the cables (W34 and W42) attached to the SMB tee on A23J1. Run some of the new cables under W34 and W42 to save space. Turn the SMB tee (on A23J1) clockwise. This allows you to plug cables into A24J4 and A24J5.

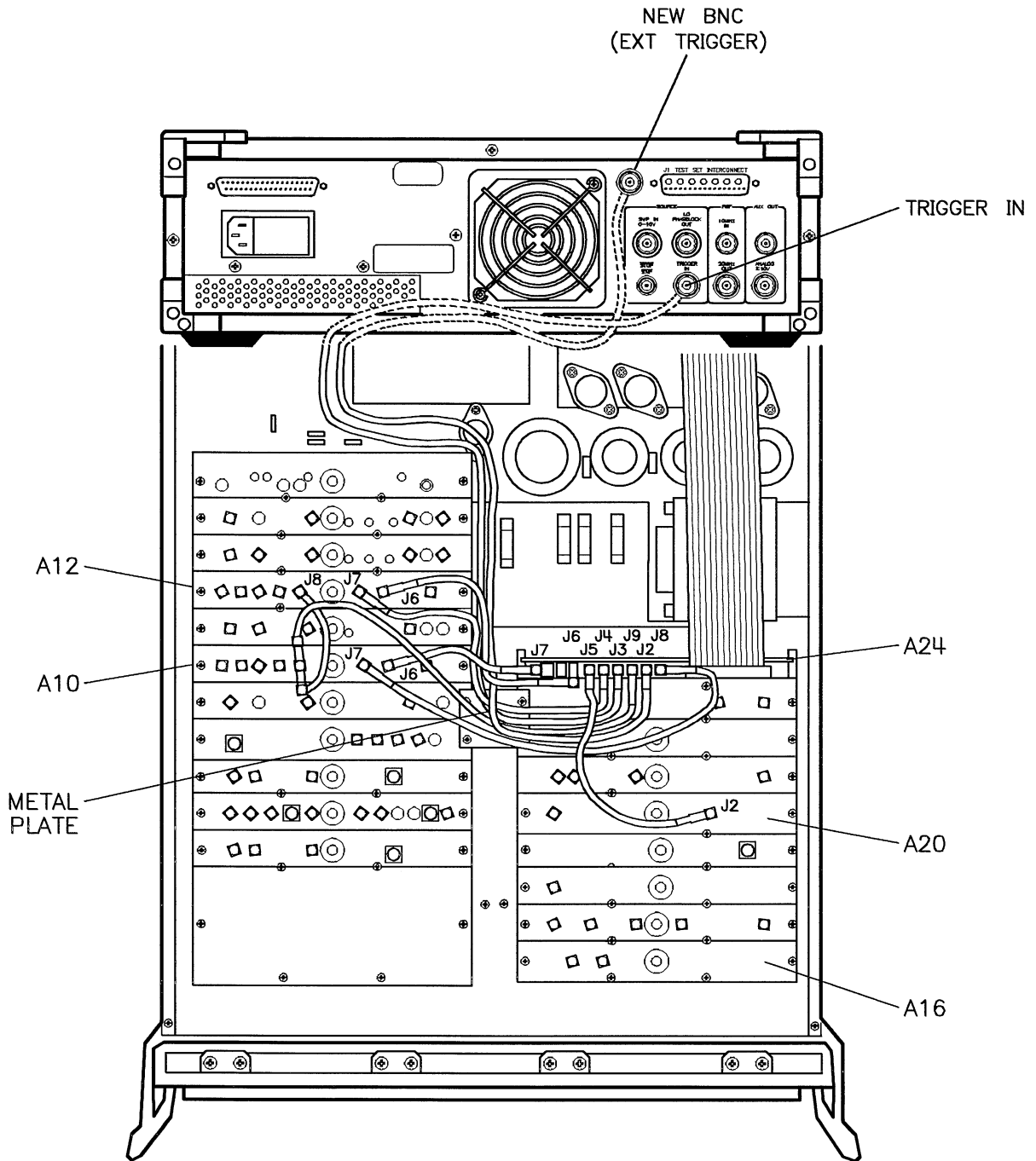
**Table 1-6. Cable Connections**

W #	From	To	Part Number
W74	A10J8	A12J8	85102-60258
W73	A10J8	A24J9	85102-60257
W72	A10J7	A24J8	85102-60256
W71	A24J2	New BNC <sup>1</sup>	85102-60250
W70	A24J3	TRIGGER IN BNC	85102-60246
W69	A24J4	A12J7	85102-60253
W68	A24J5	A20J2	85102-60254
W67	A24J6	A12J6	85102-60252
W66	A24J7	A10J6	85102-60251

<sup>1</sup> This connector will be labeled "EVENT TRIGGER" when labels are applied.

6. Use three cable ties (1400-0249) to dress and secure the cables going to rear panel BNCs. Dress the cables so they go under the metal plate shown in Figure 1-14.
7. Reinstall the metal plate with the four remaining screws.

# REAR PANEL



# TOP VIEW

**Figure 1-14. HP 85102 New Cable Connections**

---

## Replacing A16

The location of the A16 assembly is shown in Figure 1-14.

*How to tell if you must change the A16 assembly:*

Two versions of A16 assemblies have been shipped in HP 8510 instruments. The newer version does not need to be changed. Look at A16's VTO TUNE IN jack. If it is marked "J1" you have an old board. If VTO TUNE IN is marked "J5" you have a new board.

If you have the new board, go directly to "Apply Labels". If you have the old board, replace it as explained in the procedure below:

1. Disconnect any A17 cables that *cross over* the A16 assembly.
2. Remove W40 and W42 from the A16 assembly.
3. Remove the machine screws that hold the metal cover of the A16 assembly.

### Caution



---

In the following step, be careful not to damage the metal gasket (located under the metal cover) when you remove the assembly.

---

4. Remove A16 by pulling up on the white knob. (Move the assembly gently from side-to-side if necessary.)
5. Insert the new A16 board and replace the six screws that hold it in place.

The old board may be a valuable spare if the customer owns other HP 8510s. Place the old board in an anti-static bag and seal it.

6. Reconnect all cables that go to A17.
7. Connect W42 (gray cable) to A16J5. Connect W40 (yellow cable) to A16J6.
8. Carefully inspect each A16 and A17 cable, make sure they are plugged in all the way.

---

## Replacing A20

Find out the firmware revision of your instrument. To do this, refer to Table 1-4.

If the firmware is revision 5.0 or above, you do not need to change the A20 assembly. Skip the rest of this procedure and continue with “Apply Labels”.

If the firmware is *below* revision 5.0, perform the following procedure:

The location of the A20 assembly is shown in Figure 1-14.

1. Disconnect the following cables (only disconnect the specified end):

**Table 1-7.**  
**Cables that Interfere with Board Replacement**

Cable	Disconnect from
W28	A20J1
W41	A20J2
W37	A21J2
W29	A21J4
W39	A19J1

2. Remove the machine screws that hold the metal cover of the A20 assembly.

### Caution



---

In the following step, be careful not to damage the metal gasket (located under the metal cover) when you remove the assembly.

---

3. Remove A20 by pulling up on the white knob. (Move the assembly gently from side-to-side if necessary.)
4. Check the part number of the A20 assembly.
  - a. If the A20 assembly is part number 85102-60234, you do not need to replace it. Reinstall A20 and replace the six screws that hold it in place.
  - b. If the existing A20 assembly is any other part number, remove it and set it aside. Install the new A20 assembly.

Replace the six screws that hold A20 in place.

The old board may be a valuable spare if the customer owns other HP 8510s. Place the old board in an anti-static bag and seal it.

5. Reconnect all cables:

**Table 1-8. Cables that Must Be Reconnected**

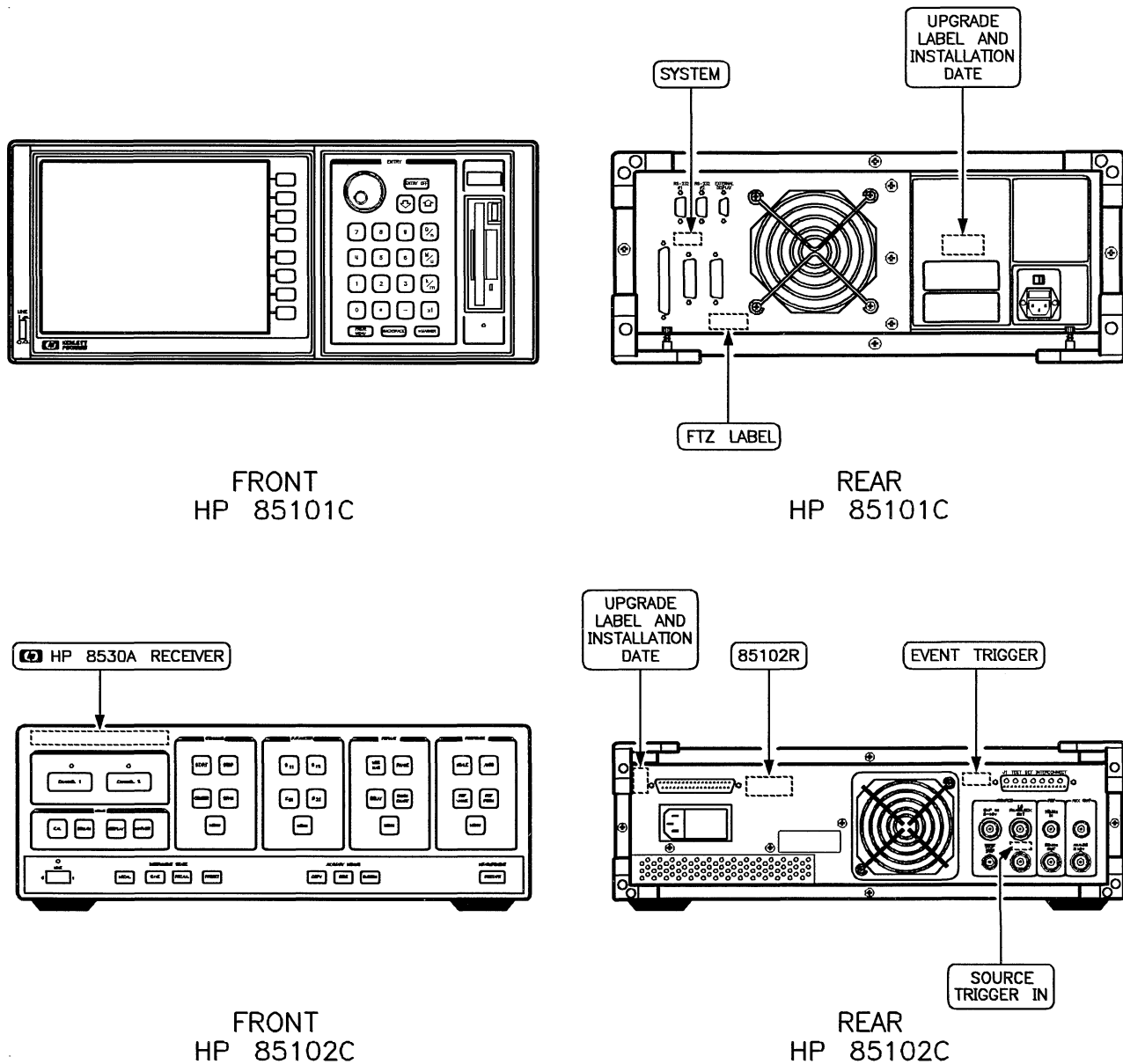
Cable	Connect to
W28	A20J1
W41	A20J2
W37	A21J2
W29	A21J4
W39	A19J1

6. Carefully inspect each of these cables, make sure they are plugged in all the way.
7. Set the top cover on the instrument temporarily.



## Apply Labels

Place the supplied labels as shown in Figure 1-15. Do not reassemble the bottom box, do not reattach the top box.



**Figure 1-15. Location of New Labels**

One label requires you to write today's date. This date information is important, because the date determines when the upgrade warranty period begins.

Write the date on the label as follows: MONTH/DAY/YEAR. The order you write the date is important! This is how the date will be interpreted for warranty coverage.

### *Why is a Blank Serial Label Supplied?*

When the instrument is upgraded, HP assigns it a new serial number. This allows HP to keep track of the upgraded instrument. Many of our customers, however, want to retain the *old* serial number. Why? Because many of their departments *already* use the *old* number to keep track the instrument. To avoid customer inconvenience we have supplied a blank serial tag for the new top box. The customer can type in their old serial number and place the tag on the new top box.

---

## Check Basic Instrument Operation

Now that major modifications have been made to the instrument, check basic instrument operation.

1. Place the top box *next to* the bottom box. Make sure the front panel is facing you.
2. Connect AC power to the top and bottom box.

### Note



You must make a decision at this time. The next stages of the procedure ask you to electrically reconnect the system and check its operation. If the other system components are in a rack, it may be easier to fully reassemble the top and bottom boxes and place them back into the rack. Before you do this, however, keep the following points in mind:

Point 1: You must re-open the bottom box again in a later procedure (to test the new trigger input BNC circuitry).

Point 2: If the following test shows a problem, the most likely cause is a cabling error, which will require you to open the bottom box again.

This procedure assumes you can bring the system instruments to the HP 8510/8530, so the bottom box remains accessible.

- 
3. Reconnect system components in their original electrical configuration. Make sure the IF/Display Interconnect is connected between the top and bottom box.
  4. Turn on the instruments in the following order:
    - a. The source (make sure the switch is turned to power on, not standby). Also turn on the LO source (if your system has one).
    - b. The test set or frequency converter.
    - c. The HP 85102 IF detector (bottom box).
    - d. The HP 85101 display processor (top box) now has its own power switch, located in the extreme lower-left corner of the top box. Turn the top box ON.

5. Make sure the instrument passes all self-tests (if it displays a normal measurement screen it has passed self-tests).
  - a. If the instrument fails self-test, make sure the IF/DISPLAY INTERCONNECT cable is connected between the top and bottom box. If it is, recheck the previous PC board and cable installation. If necessary, use the troubleshooting information found in the HP 8530A service manual. Do not continue until the problem is corrected.
  - b. If a measurement screen appears, then the instrument has passed self tests. Continue with the procedure.

There should be no error messages on the screen. If an error message still appears, solve the problem before continuing.

---

## Load the HP 8530 Operating System

1. Press **SYSTEM** **MORE** **SERVICE FUNCTIONS** **TEST MENU**.
2. Insert the HP 8530 operating system disk (the disk label should face the CRT).
3. Press **1** **9** **=MARKER** to load the operating system.
4. Press **LOAD FILE**. The default-selected file PG\_8530A will now load. The message LOADING PROGRAM FROM DISC ... will appear, followed by the instrument self-test sequence.

If the error message ERROR: SYSTEM KEY NOT INSTALLED appears, suspect a problem with the HP 8530A security IC (located in the top box). Refer to Appendix A, located at the end of this document.

The instrument is operating as an HP 8530 if P1:b1/a1 log MAG appears at the top of the display.

*Ignore error messages until you perform the next three steps.*

5. If using an HP 85310 distributed frequency converter, make sure the HP 8530 is in multiple source mode. This is explained in the HP 85310 manual.
6. Place the HP 8530 in step sweep mode by pressing **STIMULUS** **MENU** **STEP**.
7. Reduce source 1 power by pressing **POWER MENU** **POWER SOURCE 1** **-** **5** **x1**. All error messages should go away at this time. If error messages remain, check the setup.
8. Press **INSTRUMENT STATE** **SAVE** **USER PRESET 8**.

---

## In Depth Instrument Tests

This procedure checks HP 8530A operation and the new **EVENT TRIGGER** connector/circuitry.

### HP 85102R Functional Check

1. Turn the top and bottom boxes OFF.
2. Remove the top cover of the bottom box.
3. On the HP 85102 (bottom box):
  - a. Remove the Test Set-IF Interconnect cable.
  - b. Connect the rear panel ANALOG  $\pm 10\text{V}$  BNC to the SWEEP IN 0-10V BNC (failure to do this causes a false error).
  - c. Attach a BNC cable to the rear-panel 20 MHz output.
  - d. Connect the other end of the BNC cable to the supplied service adapter (85102-60210).
  - e. Plug the service adapter into J1 (multi-pin rear-panel connector).
4. Turn on the HP 8530. Ignore the SYSTEM BUS ADDRESS ERROR or FAILED PRETUNE error messages.
5. Press **SYSTEM** **MORE** **SERVICE FUNCTIONS** **TEST MENU**.
6. Press **2** **2** **=MARKER**.
7. Press **2** **=MARKER**.
8. Press **=MARKER**.
9. Run all of the tests by pressing **M/u** (hexadecimal B) **=MARKER**. When finished, the instrument should display the following message at the top of the screen:  
  
>>> PASSED ALL HP 85102 TESTS <<<
10. Turn the HP 8530 OFF.
11. Disconnect the service adapter and its BNC cable. Disconnect the BNC cable that goes between the ANALOG  $\pm 10\text{V}$  BNC and the SWEEP IN 0-10V BNC.
12. Reconnect the Test Set-IF Interconnect.

### LO Phase Lock Out Functional Check

#### Note



---

Only perform this test if you replaced the A16 assembly. If you did *not* change A16, go directly to “New Trigger Input Tests”.

---

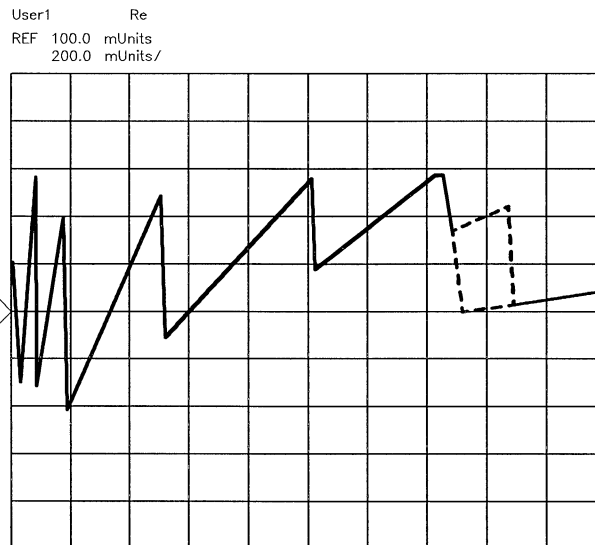
The A16 assembly inverts the main phase lock signal to fine tune a sweep oscillator. In this check, you use the HP 8530A as an oscilloscope to check this function.

1. Check that all connections are as shown in Figure 1-2, Figure 1-3, or Figure 1-4.
2. Make sure the HP 8510 is OFF.
3. On the HP 85102 (bottom box):
  - a. Disconnect W24 from the A17J4 REF X connector.
  - b. Connect the (supplied) BNC-to-SMB cable (5062-7230) between the rear panel LO PHASE LOCK OUT jack and the A17J4 REF X connector.
4. Turn the HP 8530A ON.
5. Press PARAMETER **MENU** **SERVICE PARAMETERS** **SERVICE 1 a1**.
6. Press FORMAT **MENU** and select **REAL**.
7. Press RESPONSE **AUTO**.
8. The signal displayed should ramp up as shown in Figure 1-16.

## Note



The top of the sawtooth waveform may be flat on some instruments, this is normal. Do not be concerned if the instrument displays: IF FAILED CAL. Press **ENTRY OFF** to clear the error.



**Figure 1-16. LO Phase Lock Out and Main Phase Lock Signals**

Look for a waveform that looks *similar* to the one shown above, it does not have to be identical. The presence of just about any sawtooth wave (even a clipped one) means that this test passed.

9. Turn OFF the HP 8530A.

10. On the HP 85102:
  - a. Remove the BNC-to-SMB cable.
  - b. Reconnect W24 to A17J4.
  - c. Leave the top cover off.
11. Continue with “New Trigger Input Tests”.

## New Trigger Input Tests

Use the appropriate procedure, below, depending on the type of RF source you have.

### If Using an HP 836xx Family RF Source

This procedure tests the EVENT TRIGGER and SOURCE TRIGGER IN connectors and circuitry.

#### *SOURCE TRIGGER IN Test:*

1. Turn the HP 8530 top and bottom boxes are OFF.
2. Connect STOP SWEEP IN/OUT on the RF source to STOP SWEEP on the HP 8530A.
3. Connect TRIGGER OUTPUT on the 836xx RF source to SOURCE TRIGGER IN on the HP 8530A.
4. Connect an HP-IB cable from the RF source to the SYSTEM INTERCONNECT (System Bus) connector on the HP 8530A.
5. Turn the RF source ON, then turn the HP 8530A ON.
6. Press: **RECALL** **MORE** **FACTORY PRESET**
7. Press: **SYSTEM** **MORE** **SYSTEM PHASELOCK** **LOCK TYPE: NONE**
8. Press: **STIMULUS** **MENU** **MORE** **TRIGGER MODE**  
**TRIG SRC FREE RUN**

If the receiver sweeps it is proof that the SOURCE TRIGGER IN connector and circuitry work.

#### *EVENT TRIGGER Test:*

9. Press **EXTERNAL**, the receiver will stop sweeping.
10. Get a function generator and:
  - a. Set its frequency to 20 Hertz.
  - b. Set it to produce a TTL (0 to +5V) pulse or square wave.
11. Connect the function generator output to the receiver’s EVENT TRIGGER input.

The receiver should now begin sweeping.

12. The Trigger and Phase Lock settings do not change when you perform a user or factory preset. Thus, you should go back and change these settings so they are appropriate for the customer:

Set trigger mode to **FREE RUN**, unless the customer specifically wants the receiver in HP-IB or EXTERNAL trigger mode.

Select phase lock mode as shown in Table 1-9.

**Table 1-9.**

If the System Uses:	Select:
An HP 8511A:	PHASE LOCK: INTERNAL
An HP 85310A and Synthesized LO Source:	PHASE LOCK: NONE
An HP 85310A and HP 8350 LO Source:	PHASE LOCK: EXTERNAL

13. Reassemble the HP 8530A top and bottom boxes.
14. If needed, attach the new rack mount flanges to the top box.
15. You have now completed the upgrade procedure.

#### **If Using an HP 8340/41 RF Source**

This procedure tests the EVENT TRIGGER IN connector and circuitry.

NOTE: during this procedure, you *do not* need to connect the RF source to the receiver in any way.

1. On the receiver:

Press: **RECALL** **MORE** **FACTORY PRESET**

Press: **SYSTEM** **MORE** **SYSTEM PHASELOCK** **LOCK TYPE: NONE**

Press: **STIMULUS** **MENU** **MORE** **TRIGGER MODE** **EXTERNAL**. The receiver will stop sweeping.

2. Get a function generator and:
  - a. Set its frequency to 20 Hertz.
  - b. Set it to produce a TTL (0 to +5V) pulse or square wave.
3. Connect the function generator output to the receiver's EVENT TRIGGER input.

The receiver should now begin sweeping.

4. The Trigger and Phase Lock settings do not change when you perform a user or factory preset. Thus, you should go back and change these settings so they are appropriate for the customer:

Set trigger mode to **FREE RUN**, unless the customer specifically wants the receiver in HP-IB or EXTERNAL trigger mode.

Select phase lock mode as shown in Table 1-9.

5. Reassemble the HP 8530A top and bottom boxes.
6. If needed, attach the new rack mount flanges to the top box.





## Troubleshooting Security ICs

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IC is an acronym for “integrated circuit.” The error message:

ERROR: SYSTEM KEY NOT INSTALLED

... means that there is a problem with one of the security ICs. These ICs, located on a small board in the top box, determine which features are active in the instrument. Table A-1 shows all security ICs and the functions they enable:

**Table A-1. Security ICs**

This IC ...	Activates this Feature
08530-60001	HP 8530A Operation
85101-60269	HP 8510C Operation
85101-60268	Time Domain Operation

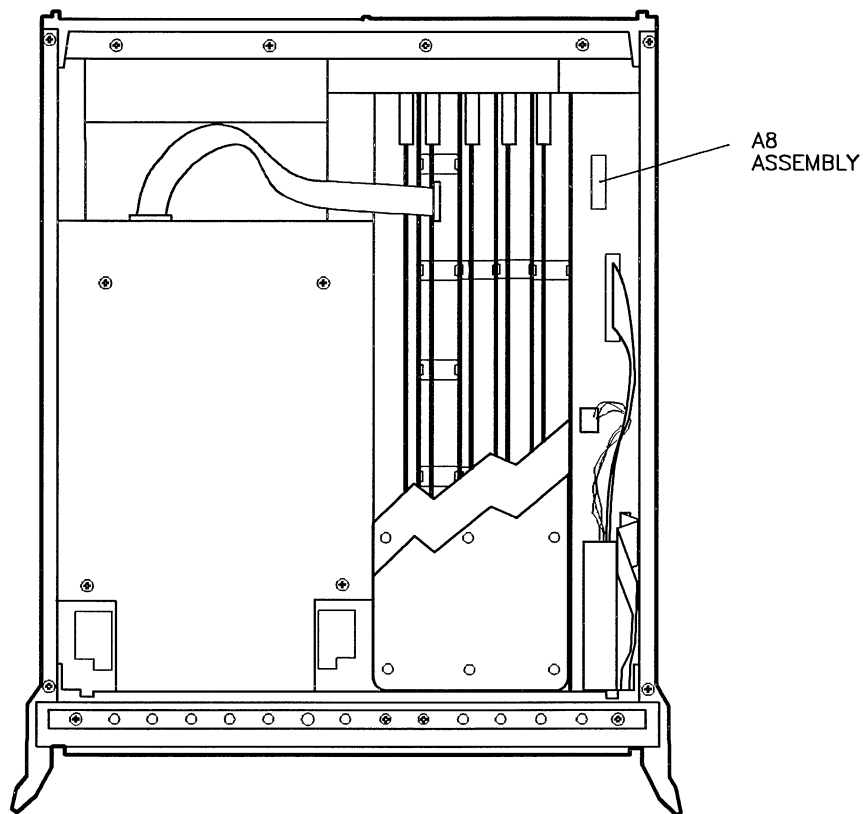
### Note



If you determine that one of these ICs is bad, DO NOT order one of the numbers listed above. Instead, order the rebuild-exchange part numbers listed in Table A-2. You must return the defective IC to Santa Rosa Systems Division.

To determine which IC is the likely cause of the problem, simply note which “feature” you are trying to use when the error occurs. For example, if you just loaded the HP 8530A operating system, suspect a problem with the HP 8530A security IC. If the error occurred when you tried to activate time domain, suspect the time domain security IC.

*Refer to Figure A-1 and perform the steps that follow:*



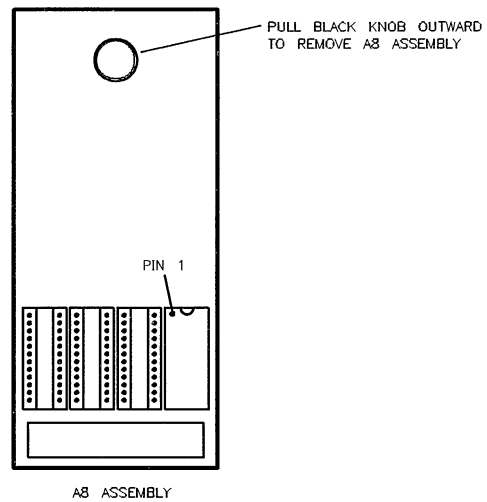
**Figure A-1. A8 Assembly Location**

**Caution**



Use an anti-static ground strap and a grounded mat when performing this procedure.

1. Remove the power cord from the top box.
2. Pull the black knob on the A8 assembly directly outward. Remove the A8 assembly.
3. Make sure the appropriate IC is installed (refer to Table A-1).
4. Refer to Figure A-2. Make sure the ICs are all oriented as shown (pin 1 is must be in the right place). ICs can be installed in any socket.
5. Look carefully at the IC pins, make sure none of them are bent.



**Figure A-2. Proper IC Orientation**

6. As a last resort, remove the IC with a small screwdriver. Pry one end up a small amount, then pry up the other end. Repeat until both ends are free of the socket.
7. Inspect the pins, then put the IC back in.
8. Reinstall A8 and push the black knob back in.
9. Apply power to the instrument and try the feature again. If it still doesn't work replace the IC. The order numbers shown in Table A-2 are only available through the rebuilt-exchange program. *The original IC must be returned to the factory.*

**Table A-2. Exchange Part Numbers for ICs**

Part Number On IC	Order Number
08530-60001	08530-69001
85101-60269	85101-69269
85101-60268	85101-69268