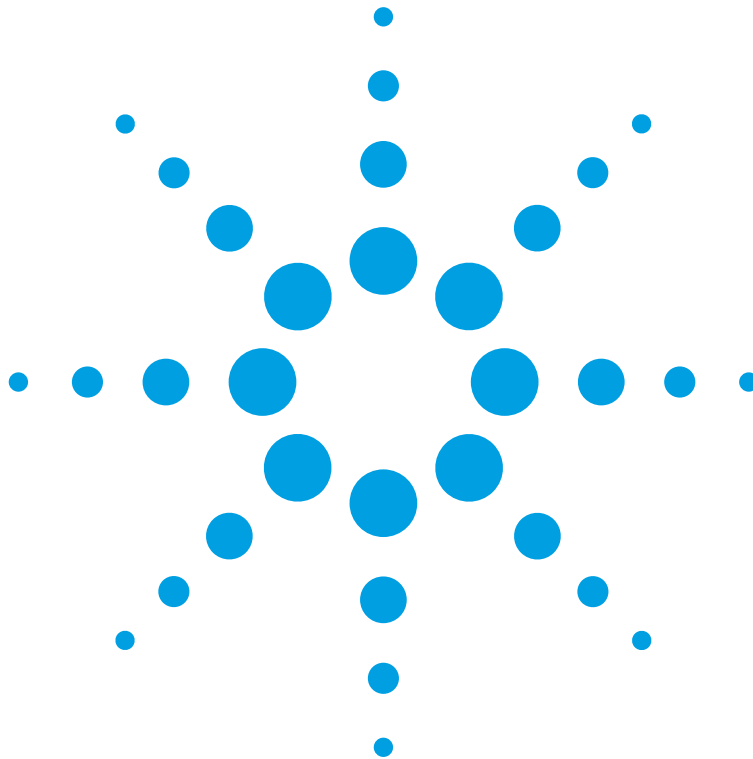

Agilent 86140A/B Series Optical Spectrum Analyzers Service Guide



Agilent Technologies

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CAUTION

The *caution* sign denotes a hazard. It calls attention to a procedure
which, if not correctly performed or adhered to, could result in dam-
age to or destruction of the product. Do not proceed beyond a caution
sign until the indicated conditions are fully understood and met.

WARNING

The *warning* sign denotes a hazard. It calls attention to a procedure
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cated conditions are fully understood and met.



The instruction manual symbol. The product is marked with
this warning symbol when it is necessary for the user to refer
to the instructions in the manual.



The laser radiation symbol. This warning symbol is marked on
products which have a laser output.



The AC symbol is used to indicate the required nature of the
line module input power.



The ON symbols are used to mark the positions of the
instrument power line switch.



The OFF symbols are used to mark the positions of the
instrument power line switch.



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munity.



The CSA mark is a registered trademark of the Canadian Stan-
dards Association.



The C-Tick mark is a registered trademark of the Australian
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ISM1-A

This text denotes the instrument is an Industrial Scientific and
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The following conventions are used in this book:

Key type for keys or text located on the keyboard or instrument.

Softkey type for key names that are displayed on the instrument's
screen.

Display type for words or characters displayed on the computer's
screen or instrument's display.

User type for words or characters that you type or enter.

Emphasis type for words or characters that emphasize some point or
that are used as place holders for text that you type.



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Warranty Service. Warranty service may be obtained from the nearest Agilent Technologies sales office or other location indicated in the owner's manual or service booklet.

The Agilent 86140A/B Series—At a Glance

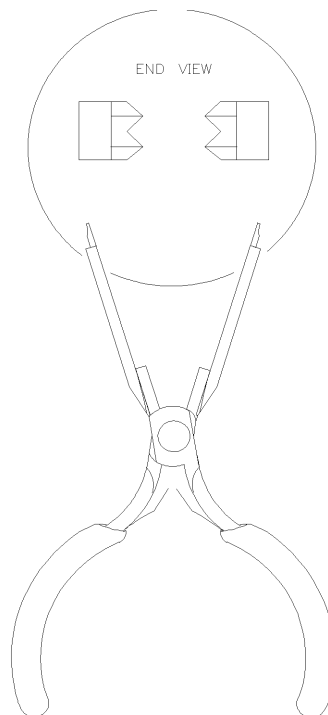
This manual documents the service and repair of Agilent 86140A/B series optical spectrum analyzers (OSAs) to the assembly level. Before servicing the optical spectrum analyzer, you should be aware that amplitude calibration data can only be provided by the factory.

Servicing requires special tools

A general service kit is available which includes the tools required to repair all version of the 86140. When replacing instrument assemblies, you will need the following tools:

- T-6 screwdriver, pn 8710-1618
- T-8 screwdriver, pn 8710-1614
- T-10 screwdriver, pn 8710-1623
- T-25 screwdriver, pn 8710-1617
- A7W1 removal tool, pn 8710-2043
- Flexure lock, pn 5022-0115
- 4-mm allen driver
- 5/64 allen driver

The A7W1 removal tool is a custom tool available from Agilent Technologies.



skb2a

Figure 1. A7W1 removal tool

General Safety Considerations

This product has been designed and tested in accordance with IEC Publication 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and has been supplied in a safe condition. The instruction documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

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

To prevent electrical shock, disconnect the Agilent 86140A/B Series from mains before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

WARNING

This is a Safety Class 1 product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

WARNING

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

WARNING

For continued protection against fire hazard, replace line fuse only with same type and ratings, (type T 0.315A/250V for 100/120V operation and 0.16A/250V for 220/240V operation). The use of other fuses or materials is prohibited. Verify that the value of the line-voltage fuse is correct.

- For 100/120V operation, use an IEC 127 5×20 mm, 0.315 A, 250 V, Agilent part number 2110-0449.
- For 220/240V operation, use an IEC 127 5×20 mm, 0.16 A, 250 V, Agilent Technologies part number 2110-0448.

General Safety Considerations

CAUTION

Before switching on this instrument, make sure that the line voltage selector switch is set to the line voltage of the power supply and the correct fuse is installed. Assure the supply voltage is in the specified range.

CAUTION

This product is designed for use in INSTALLATION CATEGORY II and POLLUTION DEGREE 2, per IEC 1010 and 664 respectively.

CAUTION

VENTILATION REQUIREMENTS: When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4°C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

CAUTION

Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause instrument damage.

CAUTION

Do not connect ac power until you have verified the line voltage is correct. Damage to the equipment could result.

CAUTION

This instrument has autoranging line voltage input. Be sure the supply voltage is within the specified range.

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General Information

General Information

In this chapter, you will find general information on caring for your optical devices.

Safety first!

Before servicing the Agilent 86140A/B Series Optical Spectrum Analyzer, familiarize yourself with the safety markings on the instrument and the safety instructions in this manual. This instrument has been manufactured and tested according to international safety standards. To ensure safe operation of the instrument and the personal safety of the user and service personnel, the cautions and warnings in this manual must be heeded. Refer to the summary of safety considerations at the front of this manual.

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 opened.
WARNING	The power cord is connected to internal capacitors that may remain live for five seconds after disconnecting the plug from its power supply.
WARNING	This is a Safety Class 1 Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.
NOTE	The warranty is null and void on instruments that have had the seals broken by the customer. The instrument should only be disassembled by Agilent Technologies Customer Engineers.
WARNING	Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

General Reference

Whenever you contact Agilent Technologies about your Agilent 86140A/B Series Optical Spectrum Analyzer, have the complete serial number and option designation available. This will ensure you obtain accurate service information.

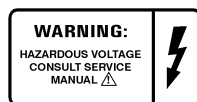
- Refer to [Table 1-1](#) for a list of internal labels.

Clean the cabinet using a damp cloth only.

Protect against ESD damage

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. [Refer to “Electrostatic Discharge Information” on page 1-10](#) for more information on preventing ESD.

Table 1-1. Internal Labels



This label warns you about hazardous voltages present on the power supply. Use extreme caution.

Cleaning Optical Connectors

Accurate and repeatable measurements require clean connections. Use the following guidelines to achieve the best possible performance when making measurements on a fiber-optic system:

- Keep connectors covered when not in use.
- Use dry connections whenever possible.
- Use the cleaning methods described in this section.
- Use care in handling all fiber-optic connectors.
- When inserting a fiber-optic connector into a front-panel adapter, make sure that the fiber end does not touch the outside of the mating connector or adapter.

Because of the small size of cores used in optical fibers, care must be used to ensure good connections. Poor connections result from core misalignment, air gaps, damaged fiber ends, contamination, and improper use and removal of index-matching compounds.

Use dry connections. Dry connectors are easier to clean and to keep clean. Dry connections can be used with physically contacting connectors (for example, Diamond HMS-10/HP, FC/PC, DIN, and ST). If a dry connection has 40 dB return loss or better, making a wet connection will probably not improve, and can actually degrade, performance.

CAUTION

Agilent Technologies strongly recommends that index matching compounds *not* be applied to their instruments and accessories. Some compounds, such as gels, may be difficult to remove and can contain damaging particulates. If you think the use of such compounds is necessary, refer to the compound manufacturer for information on application and cleaning procedures.

Table 1-2. Cleaning Accessories

Item	Part Number
Isopropyl alcohol	8500-5344
Cotton swabs	8520-0023
Small foam swabs	9300-1223
Compressed dust remover (non-residue)	8500-5262

Table 1-3. Dust Caps Provided with Lightwave Instruments

Item	Part Number
Laser shutter cap	08145-64521
FC/PC dust cap	08154-44102
Biconic dust cap	08154-44105
DIN dust cap	5040-9364
HMS10/HP dust cap	5040-9361
ST dust cap	5040-9366

Inspecting Fiber-Optic Cables

Consistent measurements with your lightwave equipment are a good indication that you have good connections. However, you may wish to know the insertion loss and/or return loss of your lightwave cables or accessories. If you test your cables and accessories for insertion loss and return loss upon receipt, and retain the measured data for comparison, you will be able to tell in the future if any degradation has occurred.

Connector (or insertion) loss is one important performance characteristic of a lightwave connector. Typical values are less than 0.5 dB of loss, and sometimes as little as 0.1 dB of loss with high performance connectors. Return loss is another important factor. It is a measure of reflection; the less reflection the better (the larger the return loss, the smaller the reflection). The best physically contacting connectors have return losses better than 50 dB, although 30 to 40 dB is more common.

Visual inspection of fiber ends

Although it is not necessary, visual inspection of fiber ends can be helpful. Contamination or imperfections on the cable end face can be detected as well as cracks or chips in the fiber itself. Use a microscope (100X to 200X magnification) to inspect the entire end face for contamination, raised metal, or dents in the metal as well as any other imperfections. Inspect the fiber for cracks and chips. An Opticspec ME5000 inspection scope can also be used for fiber and IC inspection. Visible imperfections not touching the fiber core may not affect performance (unless the imperfections keep the fibers from contacting).

To clean a non-lensed connector

CAUTION

Do not use any type of foam swab to clean optical fiber ends. Foam swabs can leave filmy deposits on fiber ends that can degrade performance.

- 1 Apply isopropyl alcohol to a clean, lint-free cotton swab or lens paper.
Cotton swabs can be used as long as no cotton fibers remain on the fiber end after cleaning.
- 2 Before cleaning the fiber end, clean the ferrules and other parts of the connector.
- 3 Apply isopropyl alcohol to a new, clean, lint-free cotton swab or lens paper.
- 4 Clean the fiber end with the swab or lens paper. Move the swab or lens paper back and forth across the fiber end several times.
Wiping or mild scrubbing of the fiber end can help remove particles when application of alcohol alone will not remove them. This technique can remove or displace particles smaller than one micron.
- 5 Immediately dry the fiber end with a clean, dry, lint-free cotton swab or lens paper.
- 6 Blow across the connector end face from a distance of 6 to 8 inches using filtered, dry, compressed air. Aim the compressed air at a shallow angle to the fiber end face.

Nitrogen gas or compressed dust remover can also be used.

CAUTION

Do not shake, tip, or invert compressed air canisters, because this releases particles in the can into the air. Refer to instructions provided on the compressed air canister.

- 7 As soon as the connector is dry, connect or cover it for later use.

To clean an adapter

- 1 Apply isopropyl alcohol to a clean foam swab.

Cotton swabs can be used as long as no cotton fibers remain after cleaning. The foam swabs listed in this section's introduction are small enough to fit into adapters.

Although foam swabs can leave filmy deposits, these deposits are very thin, and the risk of other contamination buildup on the inside of adapters greatly outweighs the risk of contamination by foam swabs.

- 2 Clean the adapter with the foam swab.
- 3 Dry the inside of the adapter with a clean, dry, foam swab.
- 4 Blow through the adapter using filtered, dry, compressed air.

Nitrogen gas or compressed dust remover can also be used. Do not shake, tip, or invert compressed air canisters, because this releases particles in the can into the air. Refer to instructions provided on the compressed air canister.

To test insertion loss and return loss

To test insertion loss, use an appropriate lightwave source and a compatible lightwave receiver. Examples of test equipment configurations include the following equipment:

- 86140A/B optical spectrum analyzers with Option 002 built-in white light source.
- 8702 or 8703 lightwave component analyzer system
- 83420 lightwave test set with an 8510 network analyzer
- 8153 lightwave multi-meter with a source and power sensor module

To test return loss, use an appropriate lightwave source, a lightwave receiver, and lightwave coupler. Examples of test equipment configurations include the following equipment:

- 8703 lightwave component analyzer
- 8702 analyzer with the appropriate source, receiver, and lightwave coupler
- 8504 precision reflectometer
- 8153 lightwave multimedia with a source and power sensor module in conjunction with a lightwave coupler
- 81554SM dual source and 81534A return loss module

Cleaning Electrical Connections

The following list includes the basic principles of microwave connector care. For more information on microwave connectors and connector care, consult the *Agilent Technologies Microwave Connector Care Manual*, part number 08510-90064.

Handling and Storage

- Keep connectors clean
- Extend sleeve or connector nut
- Use plastic end caps during storage
- Do *not* touch mating plane surfaces
- Do *not* set connectors contact-end down

Visual Inspection

- Inspect all connectors carefully before every connection
- Look for metal particles, scratches, and dents
- Do *not* use damaged connectors

Cleaning

- Try cleaning with compressed air first
- Clean the connector threads
- Do *not* use abrasives
- Do *not* get liquid onto the plastic support beads

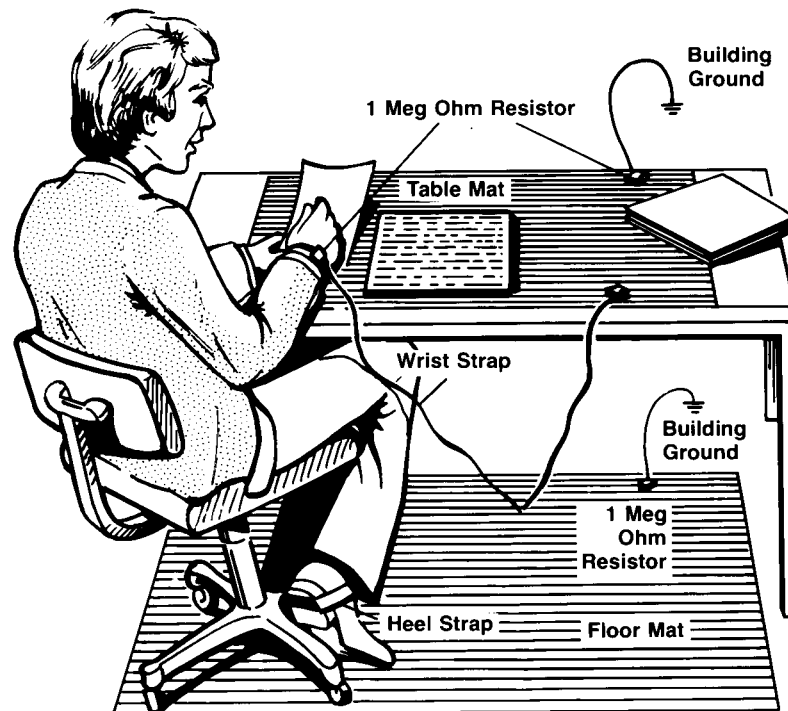
Making Connections

- Align connectors carefully
- Make preliminary connection lightly
- To tighten, turn connector nut *only*
- Do *not* apply bending force to connection
- Do *not* overtighten preliminary connection
- Do *not* twist or screw in connectors
- Do *not* tighten past the “break” point of the torque wrench

Electrostatic Discharge Information

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. The following figure shows an example of a static-safe work station using two types of ESD protection:

- Conductive table-mat and wrist-strap combination.
- Conductive floor-mat and heel-strap combination.



Both types, when used together, provide a significant level of ESD protection. Of the two, only the table-mat and wrist-strap combination provides adequate ESD protection when used alone.

To ensure user safety, the static-safe accessories must provide at least 1 M Ω of isolation from ground. Refer to [Table 1-4](#) for information on ordering static-safe accessories.

WARNING

These techniques for a static-safe work station should not be used when working on circuitry with a voltage potential greater than 500 volts.

Table 1-4. Static-Safe Accessories

Part Number	Description
9300-0797	3M static control mat 0.6 m × 1.2 m (2 ft × 4 ft) and 4.6 cm (15 ft) ground wire. (The wrist-strap and wrist-strap cord are not included. They must be ordered separately.)
9300-0980	Wrist-strap cord 1.5 m (5 ft).
9300-1383	Wrist-strap, color black, stainless steel, without cord, has four adjustable links and a 7 mm post-type connection.
9300-1169	ESD heel-strap (reusable 6 to 12 months).

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Troubleshooting

Troubleshooting

This chapter shows you how to troubleshoot the optical spectrum analyzer. It includes a troubleshooting flowchart to help you isolate problems.

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 opened.

WARNING

The power cord is connected to internal capacitors that may remain live for five seconds after disconnecting the plug from its power supply.

Troubleshooting Flowchart

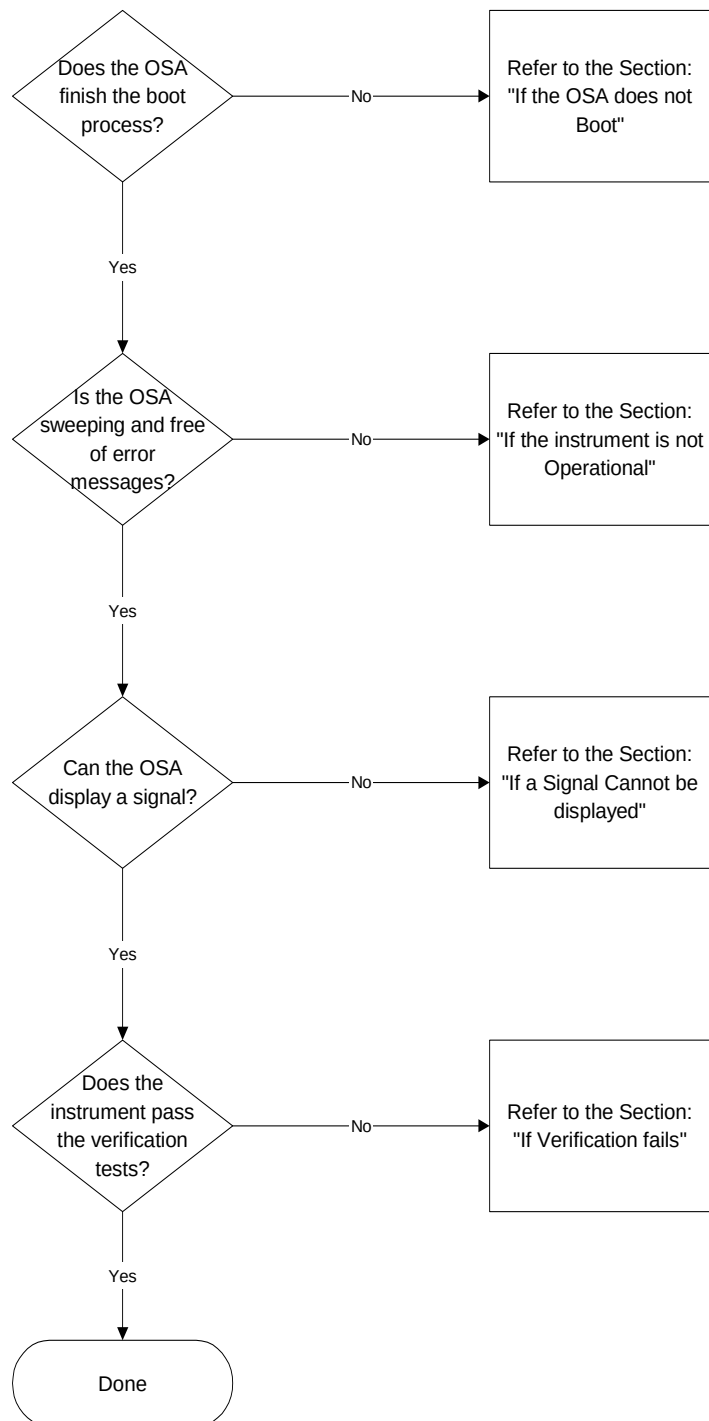


Figure 2-1. Troubleshooting flowchart

If the Measured Power is Low

Check for the following common problems:

- Clean the OPTICAL INPUT connector as described in ["Cleaning Optical Connectors" on page 1-4](#).
- Perform the Auto Align procedure:

To ensure maximum amplitude accuracy, connect an input signal to the instrument, position a marker on the input signal, and then press Auto Align. This starts an automatic alignment procedure that should be performed whenever the instrument has been moved, subjected to large temperature changes, or warmed up at the start of each day.

If the Line-Power Fuse is Faulty

The line fuse is part of the instrument power supply. If you suspect a blown power supply fuse, the complete power supply assembly must be replaced.

To replace the power supply [refer to "To Remove the Power Supply" on page 3-40](#).

If the OSA does not Boot

The power-on sequence in the Instrument Boot Failure flowchart shows the bootup time for firmware revision A.01.00. As functionality has been added to the firmware, the boot time has lengthened. The time sequence for firmware revision B.06.02 was also measured, and is as follows:

Power-on Sequence

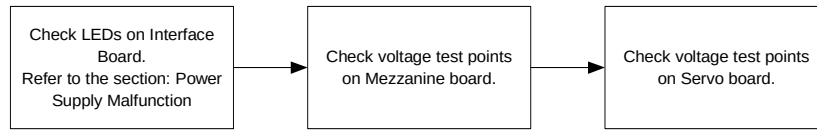
Table 2-5.

	Minutes:Seconds
Display shows events of boot process	0:35
Yellow softkeys are displayed at bottom of the screen.	0:50
Splash screen appears	1:35
“Performing Self Test 2” message appears	3:10
“Preliminary Tests Passed” message appears	3:40
OSA screen appears	4:10
OSA begins sweeping	4:15

These numbers are provide as a reference, and most firmware revisions will fall between the times for A.01.00 and B.06.02. (B.04.02 and B.05.xx releases may be longer than B.06.02.)

Troubleshooting
If the OSA does not Boot

Check Power Supplies



Power-on Sequence
Firmware A.01.00

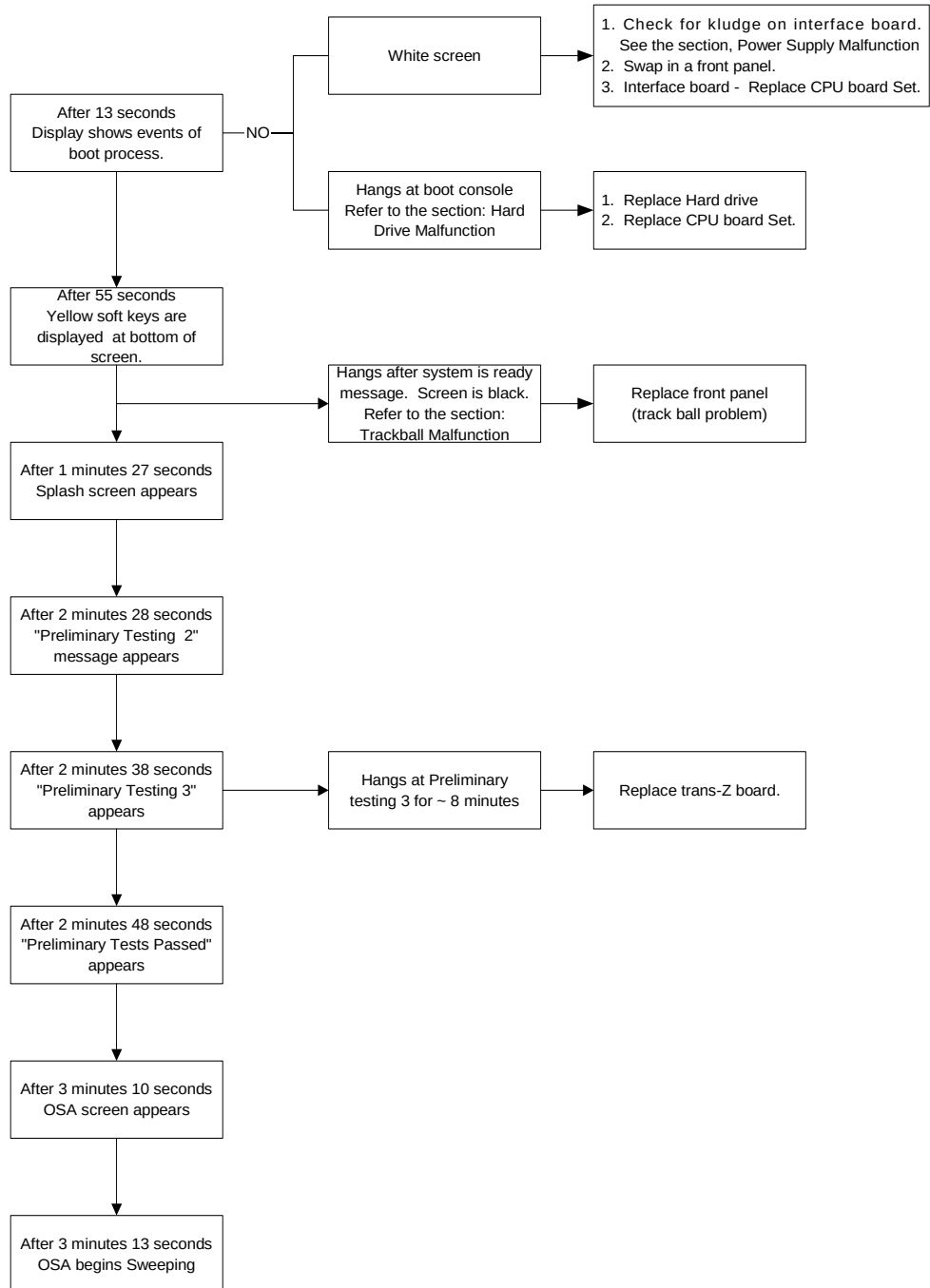


Figure 2-2. Instrument Boot Failure Flowchart

Power-on Sequence

The following time table shows the sequence of events that will take place while the instrument is booting up. The following time table applies only to firmware revision A.0.0 through revision A.0.01. With the current version, it is valid to ± 2 seconds.

After power is applied

Immediately after power is applied, all front panel LEDs will illuminate. The display will be blank during this time, although it may flash as power is applied.

After 13 seconds

All LED's will turn off with the exception of the "LINE" LED. This will occur twice. After the second cycling of the LEDs, the "Sweep" LED will remain on but dimmed for approximately 3 seconds. The display will flash white for less than a second during the first cycling of the LEDs and the operating system will begin booting. The screen will display the events in the boot process. The last message displayed will be "System is ready."

After 55 seconds

The display will flash white for less than a second again, and eight yellow softkeys will appear at the bottom of the display. Three softkeys have labels:

- F4 Remote Mode
- F7 Display Functions
- F8 Auto LF

After 1 minute and 27 seconds

The display will be blank for approximately two seconds, and then the splash screen shown in [Figure 2-3](#) will appear. If the instrument locks up after clearing the screen and does not display the splash screen, there may be a problem with the trackball. Please refer to the section, "[Trackball Malfunction \(86140A series only\)](#)" on page 2-22.

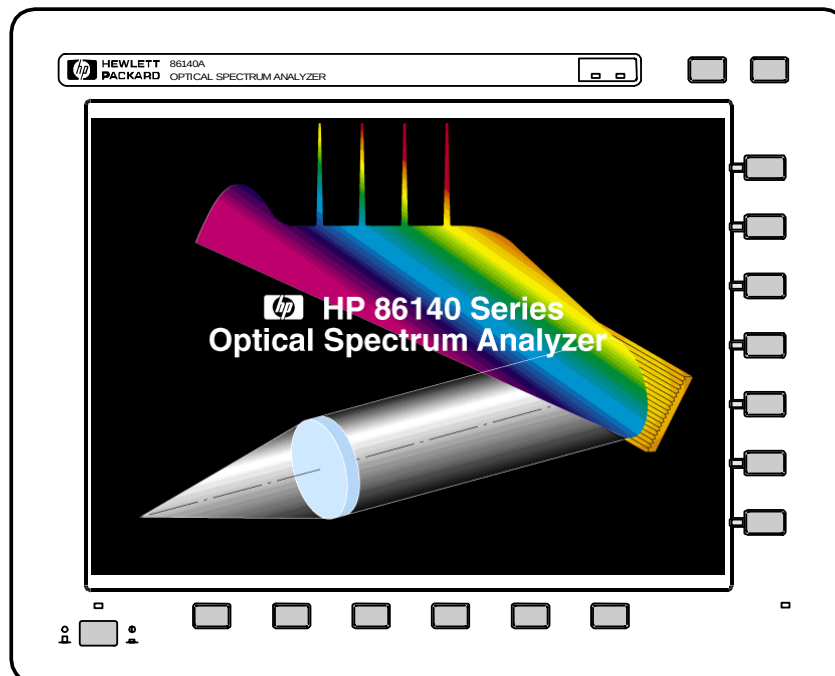


Figure 2-3. 86140 Splash Screen

If the OSA does not Boot

After 2 minutes and 28 seconds

The message, "Preliminary Testing 2" will be displayed in the bottom right hand corner of the display. Note that the message "Preliminary Testing 1" flashes on the screen very quickly just prior to "Preliminary Testing 2" message. Often, this message cannot be seen.

After 2 minutes and 38 seconds

The message, "Preliminary Testing 3" will appear in the bottom right hand corner of the display.

After 2 minutes and 48 seconds

The message, "Preliminary Tests Passed" will appear in the bottom right hand corner of the display.

After 3 minutes and 10 seconds

The graphic splash screen will clear, and the OSA screen will appear. Unlabeled softkeys will appear on the bottom and right sides of the display.

After 3 minutes and 13 seconds

The instrument will start and continuously sweep, and will accept front panel and remote commands. The display will be similar to [Figure 2-5 on page 2-10](#).

If the Instrument is not Operational

Use this section to troubleshoot instruments that do not display a screen similar to that shown in [Figure 2-5 on page 2-10](#) after the 3 to 6 minute power-on initialization period.

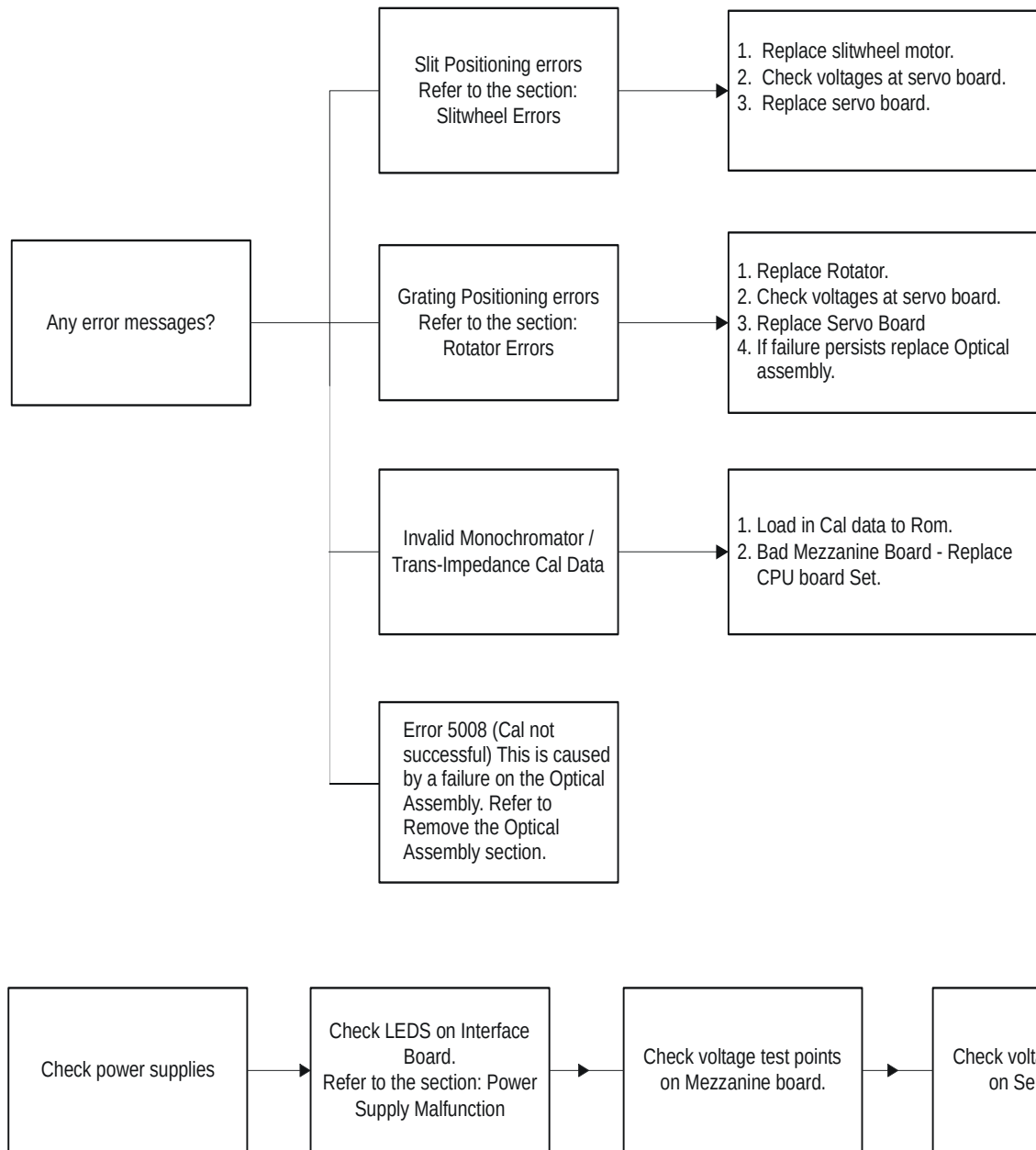


Figure 2-4. Instrument operation failure flowchart

If the Instrument is not Operational

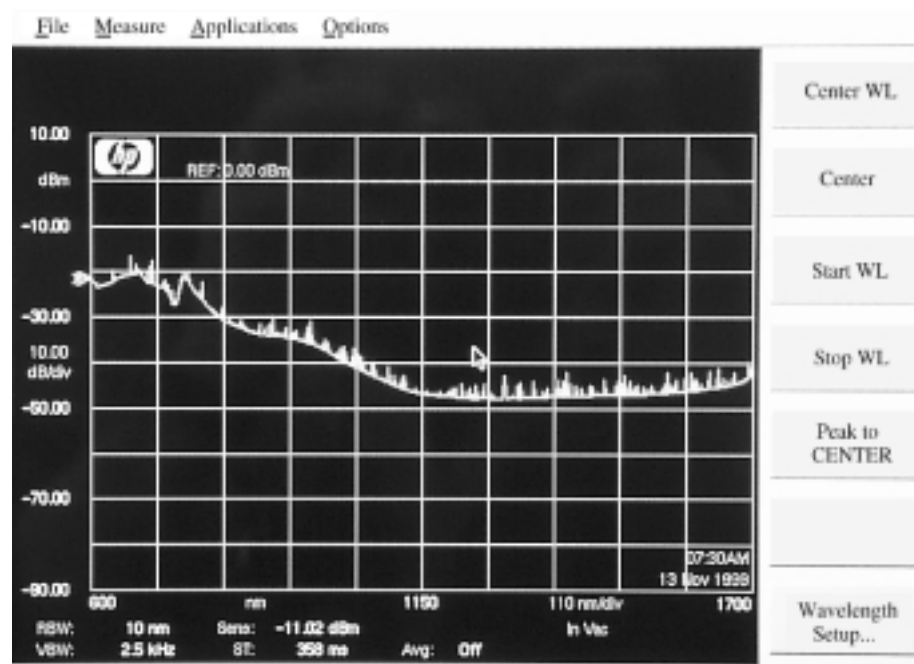


Figure 2-5. Typical Display

If a Signal Cannot be Displayed

Use this section to troubleshoot instruments that do not display a signal or display a signal incorrectly.

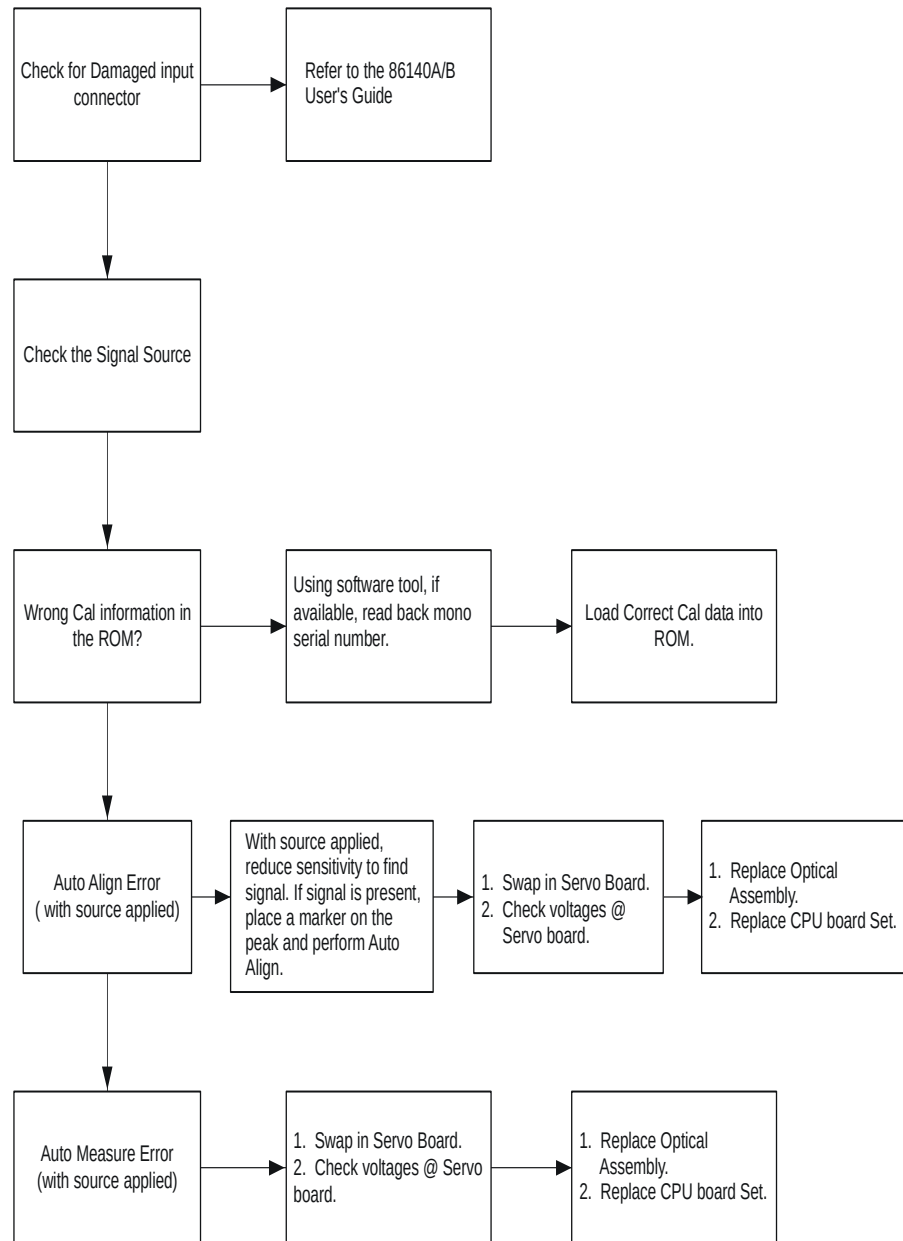


Figure 2-6. No signal flowchart

If the Instrument Verification Fails

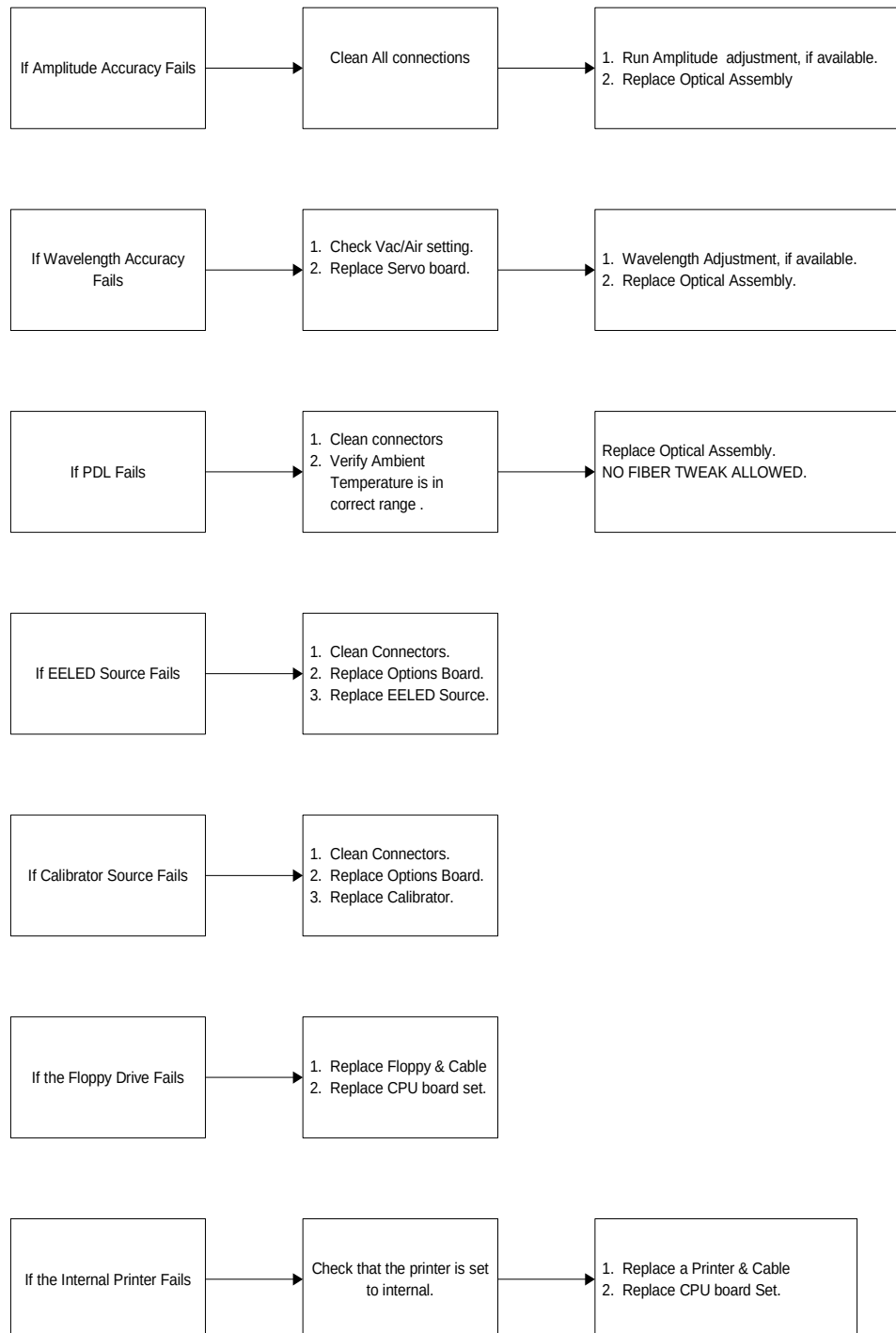


Figure 2-7. Instrument verification flowchart

- Confirm that the light source is functional.
- After the 25 second initialization sequence, the instrument should resemble [Figure 2-5 on page 2-10](#).
- If error messages are displayed, note the error numbers and refer to [Chapter 5, “Error Messages”](#) for more information.
- If no errors are displayed and the display is active and sweeping, perform the following steps:
 - 1** Connect the output of a DFB laser with a greater than –10 dBm power level, to the optical spectrum analyzer input.
 - 2** Set the optical spectrum analyzer to the following settings:

Center Wavelength	DFB laser wavelength
Span	10 nm
Resolution Bandwidth	10 nm
Marker	ON
 - 3** Press AUTO ALIGN. (This alignment takes approximately 25 seconds to mechanically adjust the modules internal optical components.)
 - If an error is displayed, refer to [Chapter 5, “Error Messages”](#) for more information. If the signal is displayed showing the correct amplitude and wavelength, the instrument is working correctly.
 - 4** If the signal still cannot be displayed, and the instrument has just been serviced, confirm that the X and Y cables are properly connected on the Servo board. A signal cannot be displayed if these cables are reversed.
 - 5** If the amplitude and wavelength of the displayed response is incorrect, perform operation verification to help isolate the problem.

If Tests Fail

This section is for solving operation verification test failures that result in measurements that do not meet specifications.

Check the following items:

- Connectors
 - physical contact types (such as the Diamond/HMS 10 connector)
 - cleanliness (refer to [Chapter 1, “General Information”](#))
- fibers
 - 9/125 μm input fiber
- proper instrument warmup time
- autoalign performed recently
- source stability
 - If more than one test fails, use operation verification testing to identify the defective assembly.

Wavelength Accuracy Test Failures

Examine the test data for wavelength errors. If the wavelength error for second order HeNe is approximately one half of the error for first order HeNe, there is a high probability that the monochromator needs to have the wavelength accuracy re-calibrated.

Amplitude Accuracy/Flatness Test Failures

For 86141B, 86144B, 86146B only.

The photodiode input can be used to verify the calibration accuracy in the 86141B, 86144B, and 86146B optical spectrum analyzer. If the power meter mode is within specification for amplitude accuracy and flatness, then the optical assembly needs to be replaced.

For a flatness error, the most likely cause of the failure is the optical assembly.

To replace the optical assembly [refer to “To Remove the Optical Assembly” on page 3-44](#).

Monochromator Output/Photodiode Input Test Failures

For the 86141B only.

When switching from optical spectrum analyzer mode to power meter mode, a click from the optical switch should be heard. If not, then either the switch or the Servo board driving the switch, is defective. The switch can be tested by removing the connector from the Servo board and applying 5V to the leads. Reverse the polarity of the voltage to switch the optical switch into the other position.

The Servo board contains the drive circuitry for the switch. It can be checked by probing the switch connector and measuring the drive voltage. Because this is an H-bridge circuit, probe both sides of the output to guarantee you see the pulse. It should be a 5V pulse of approximately 40 ms duration. Switch from optical spectrum analyzer mode to power meter mode to see the pulse. The pulse should change polarity when the instrument is changing from power meter mode to optical spectrum analyzer mode.

Resolution Bandwidth Accuracy Test Failures

If there are any failures during the Resolution Bandwidth Accuracy test, the most likely cause is the optical assembly. The optical assembly is a replaceable item, but it cannot be repaired in the field.

To replace the optical assembly [refer to “To Remove the Optical Assembly” on page 3-44](#).

PDL Test Failures

If there are any failures during the PDL test, the most likely cause is the optical assembly. The optical assembly is a replaceable item, but it cannot be repaired in the field.

To replace the optical assembly [refer to “To Remove the Optical Assembly” on page 3-44](#).

Power Supply Malfunction

Visually check for illuminated LEDs on the instrument interface board. There are five LEDs that will be lit on the interface board when the instrument is turned on, but only three can be seen through the instrument vents. Please see ① through ⑤ in [Figure 2-8](#).

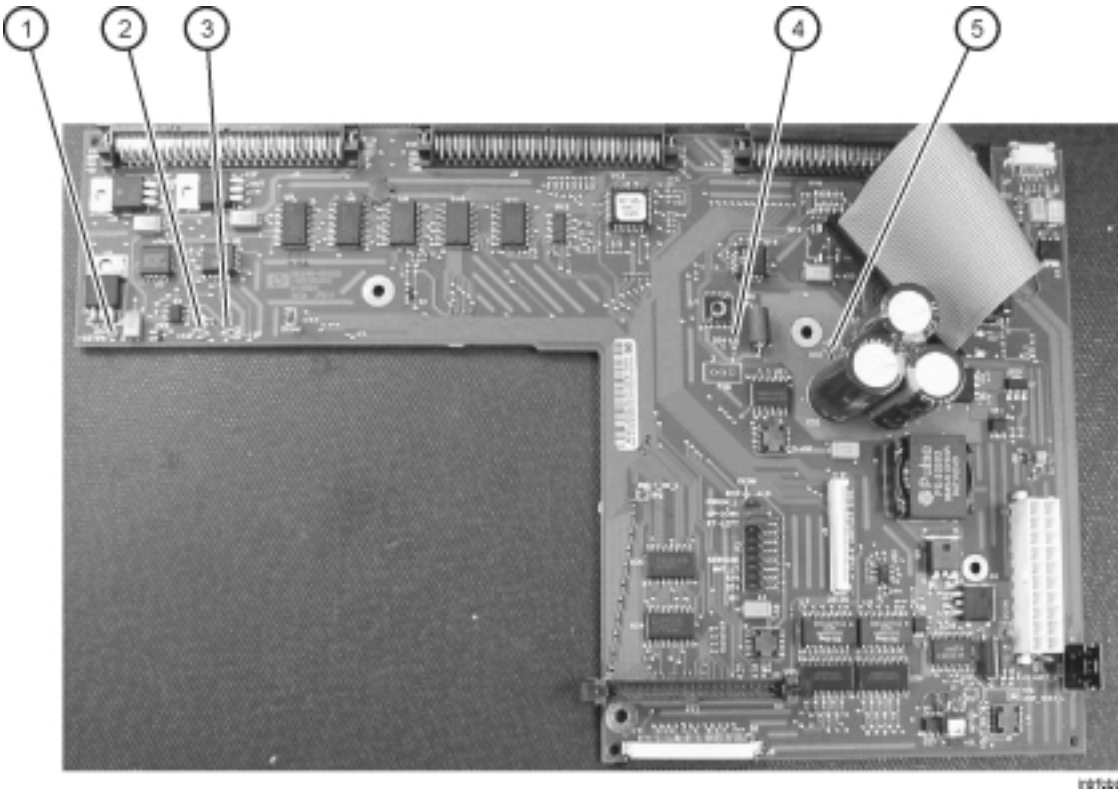


Figure 2-8. Instrument interface board

Table 2-6. Interface board LED Voltages (see [Figure 2-8](#))

LED	Voltage
1, DS1	+5v Standby
2, DS2	+12v
3, DS3	-12v
4, DS4	+5.2v
5, DS5	+3.4v

Make sure the kludge is on the interface board. Please see [Figure 2-9](#).

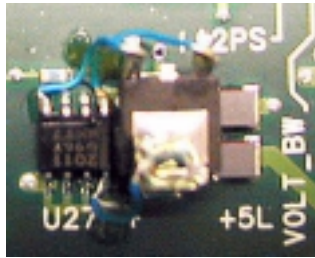


Figure 2-9. Interface board kludge

Check the voltages from the test points located on one corner of the mezzanine board. Please see [Figure 2-10](#).

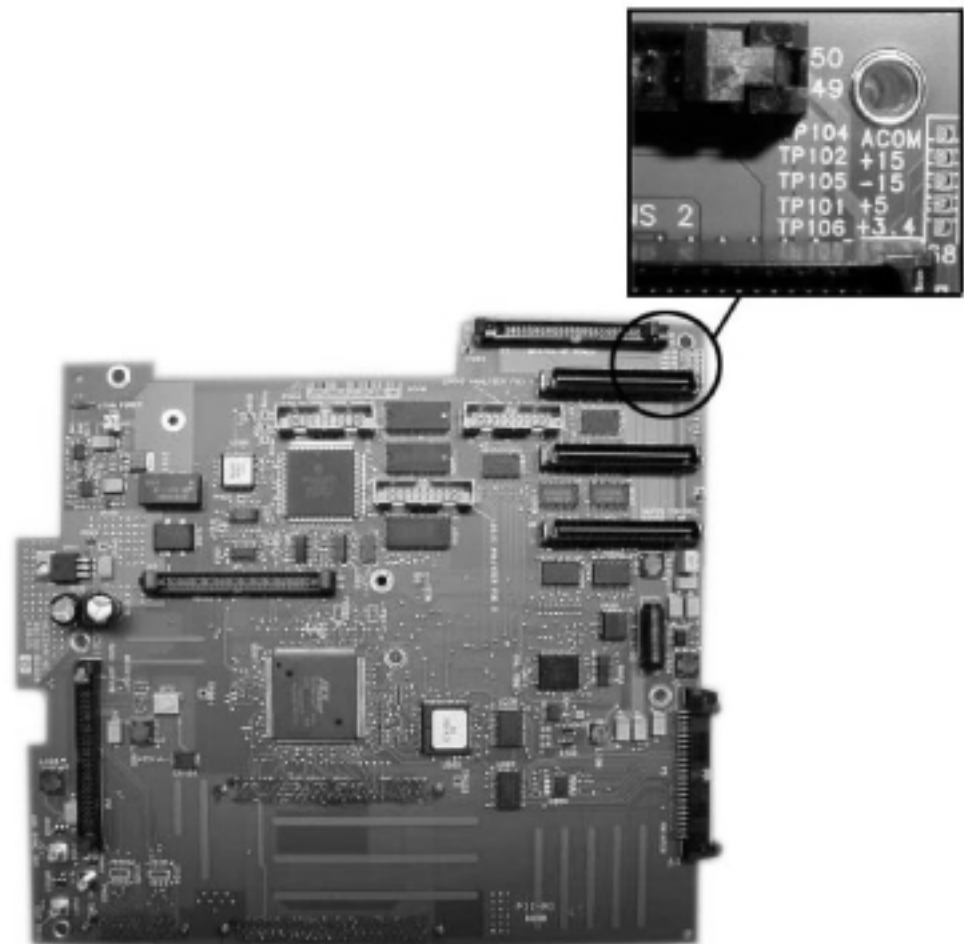


Figure 2-10. Mezzanine board voltage points

Checking the Servo board

Measure the voltages at the test points shown in [Figure 2-11](#).

Troubleshooting
Power Supply Malfunction

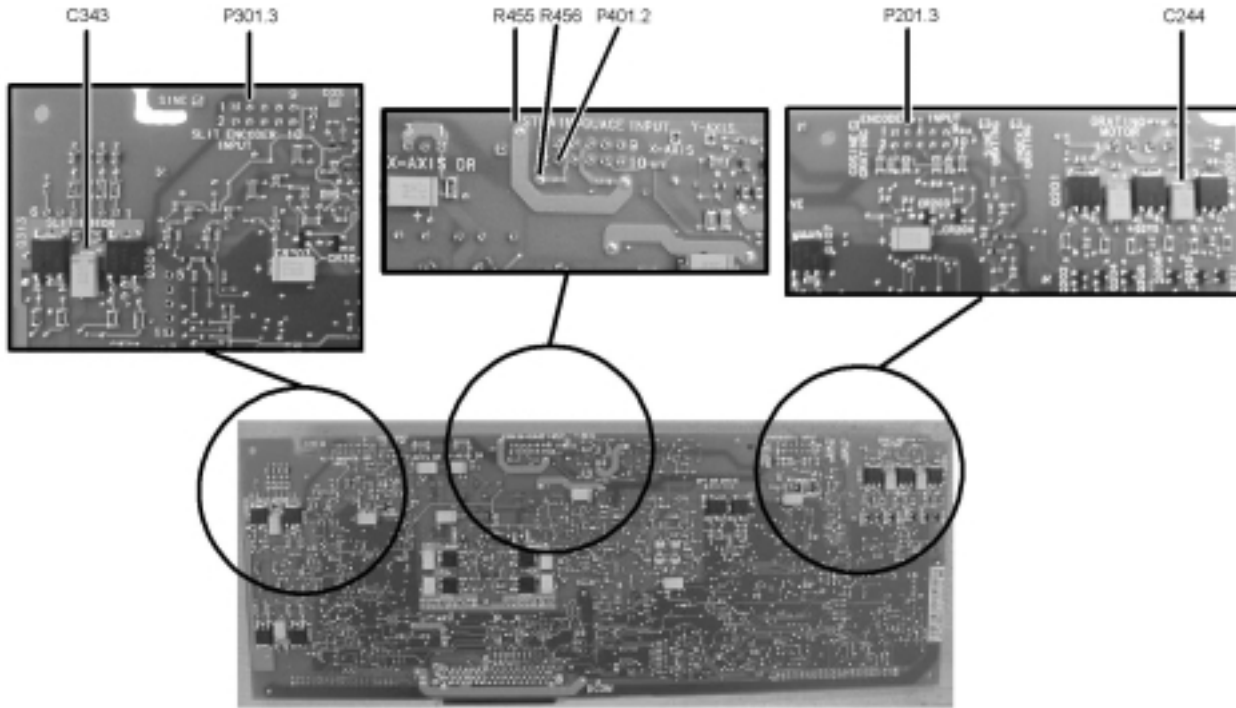


Figure 2-11. 86140A/B, 41B, 42A/B, 43A/B, and 45 A/B Servo board test points

Table 2-7. 86140A/B, 41B, 42A/B, 43A/B, and 45 A/B Servo board test points

Component	Description	Component	Description
C343	+5 Slit Wheel Motor	P301.3	+5 Digital Supply
P401.2	+5 Analog	R455	-15 Analog
R456	+15 Analog	P201.3	+5 Digital Supply
C244	+5G Grating Motor		

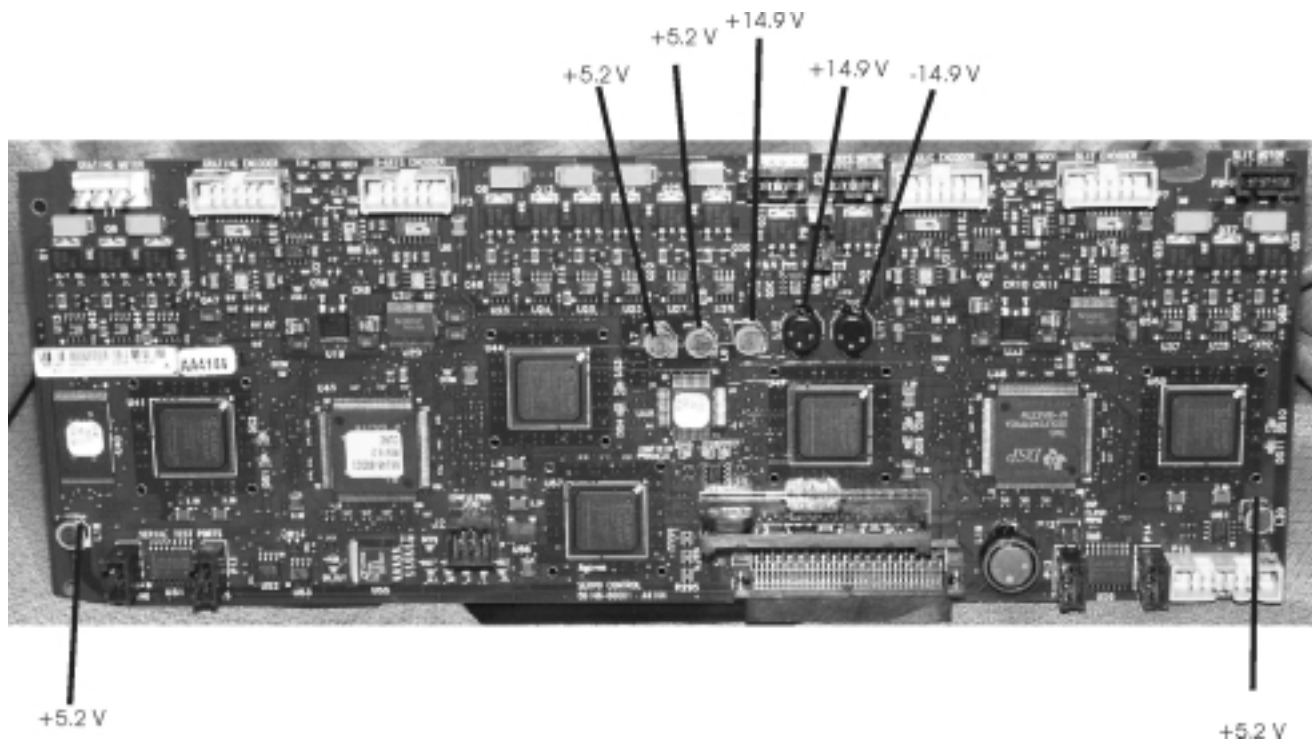


Figure 2-12. 86144B and 86146B Servo board top test points

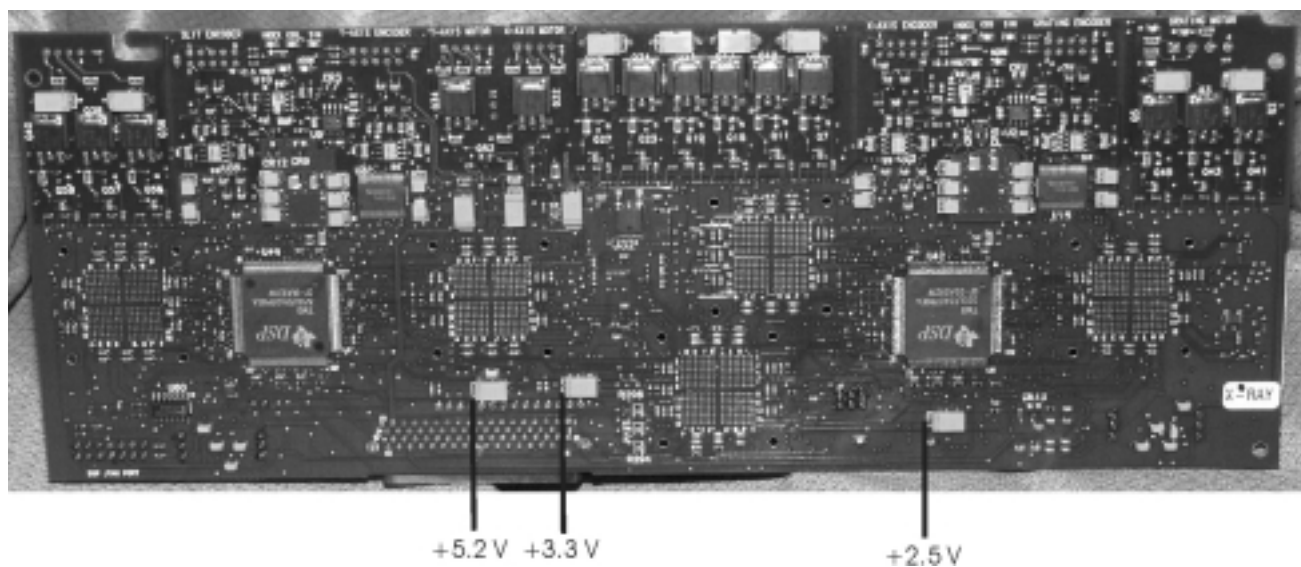


Figure 2-13. 86144B and 86146B Servo board bottom test points

Display Troubleshooting

Troubleshooting the instrument display consists of using an external monitor to determine that the instrument is otherwise working correctly. To replace the instrument display, the complete front panel assembly must be replaced.

If the instrument display is operating, but there is a gray gradient problem or the instrument is dim, a likely cause is the two inverters (top and bottom). The inverters control the two display backlights.

Potential Problems ***Top and Bottom Inverters***

The display seems to be working normally until about 55 seconds into the boot process when the yellow function keys at the bottom of the instrument display appear. The instrument then shuts down until the graphics splash screen shown in [Figure 2-3 on page 2-7](#) is displayed. Normally, the screen will flash white, then dim, and finally display the boot sequence messages.

Once the splash screen is displayed, the instrument will appear normal.



The back of the 86140A/B, 86141B, and 86142A/B front panel assembly

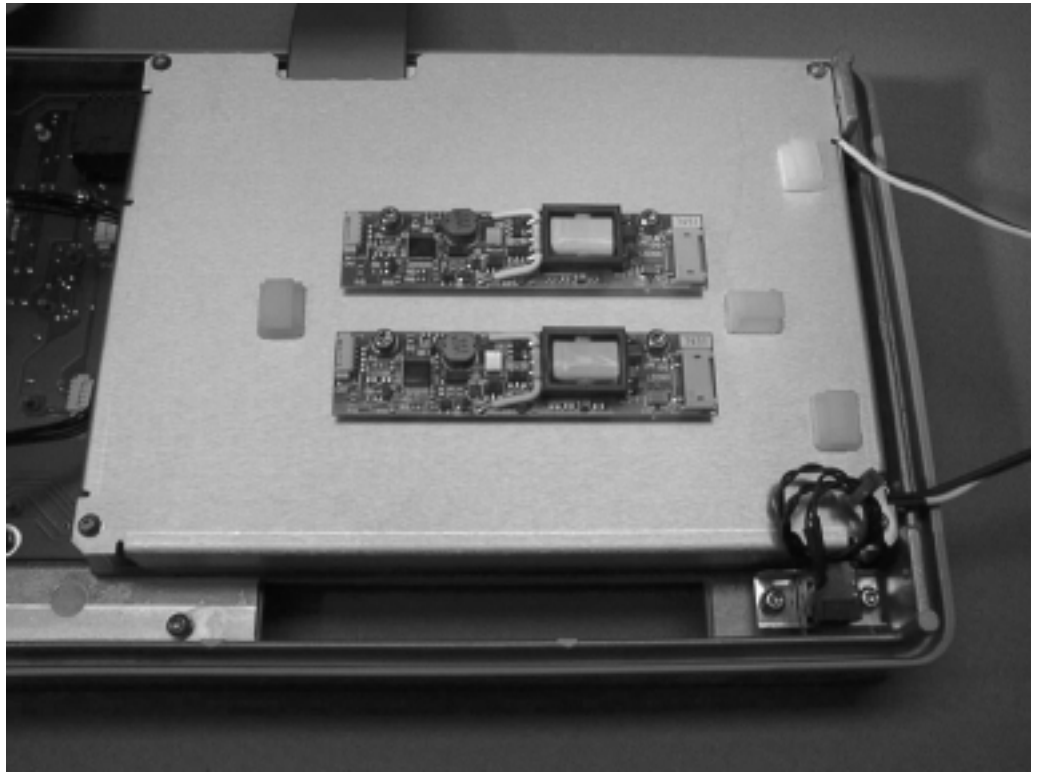


Figure 2-14. The back of the 86143A/B and 86145A/B system front panel assembly

Trackball Malfunction (86140A series only)

The instrument will clear the screen after displaying the message “The system is ready” shown in [Figure 2-15](#). If the trackball fails, the instrument display will clear as normal, but the system will halt before displaying the graphic splash screen shown in [Figure 2-3 on page 2-7](#). The hard drive may continue cycling occasionally, but the instrument will not complete the initialization process. No other indications of a malfunction will be available.

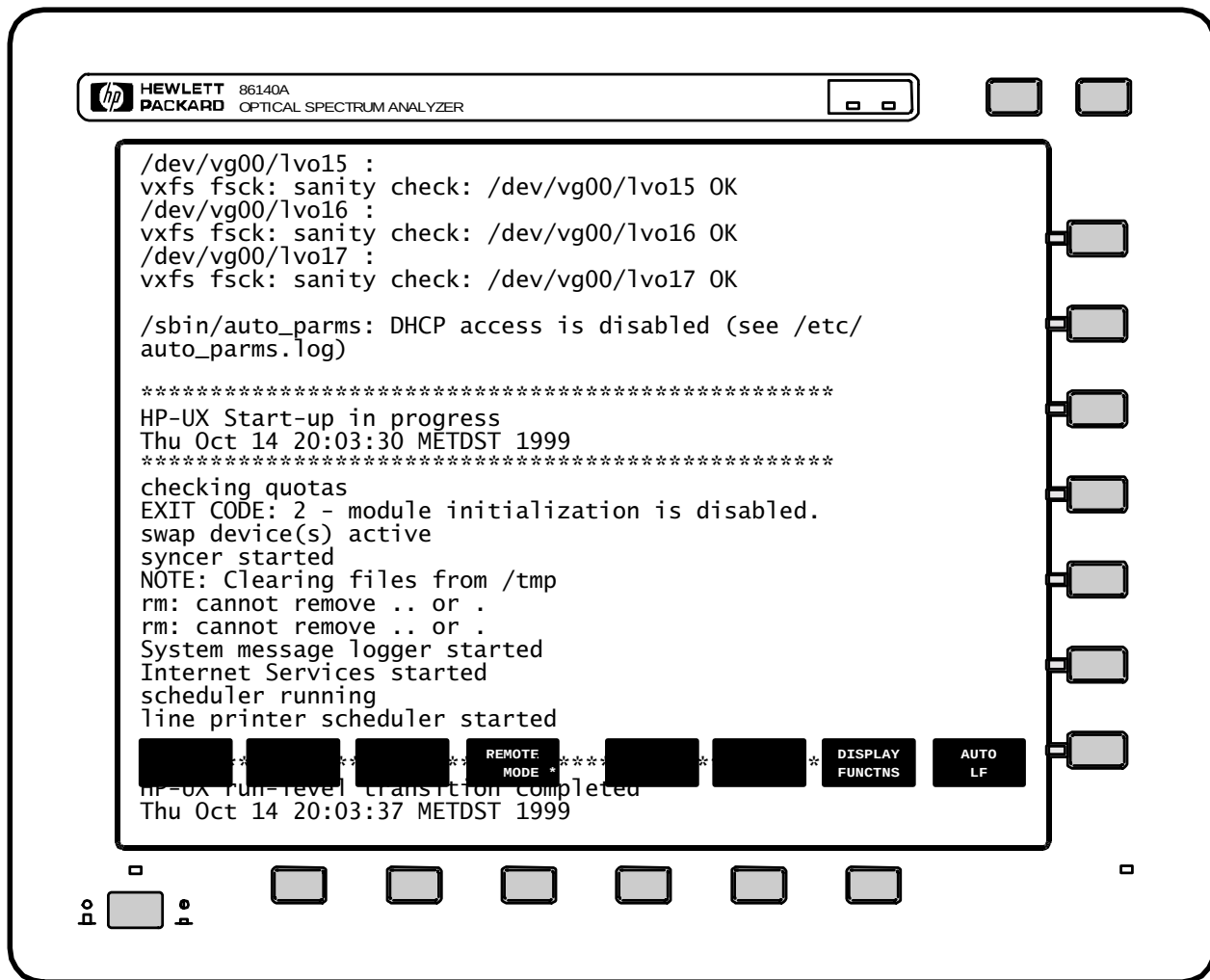


Figure 2-15. Trackball Failure

To replace the trackball, the complete front panel assembly must be replaced. [Refer to “To Remove the Front Panel Assembly” on page 3-13.](#)

Hard Drive Malfunction

If the hard drive fails during system startup, the instrument will display the screen shown in [Figure 2-16](#). Refer to [“To Remove the Hard Drive”](#) on page 3-26.

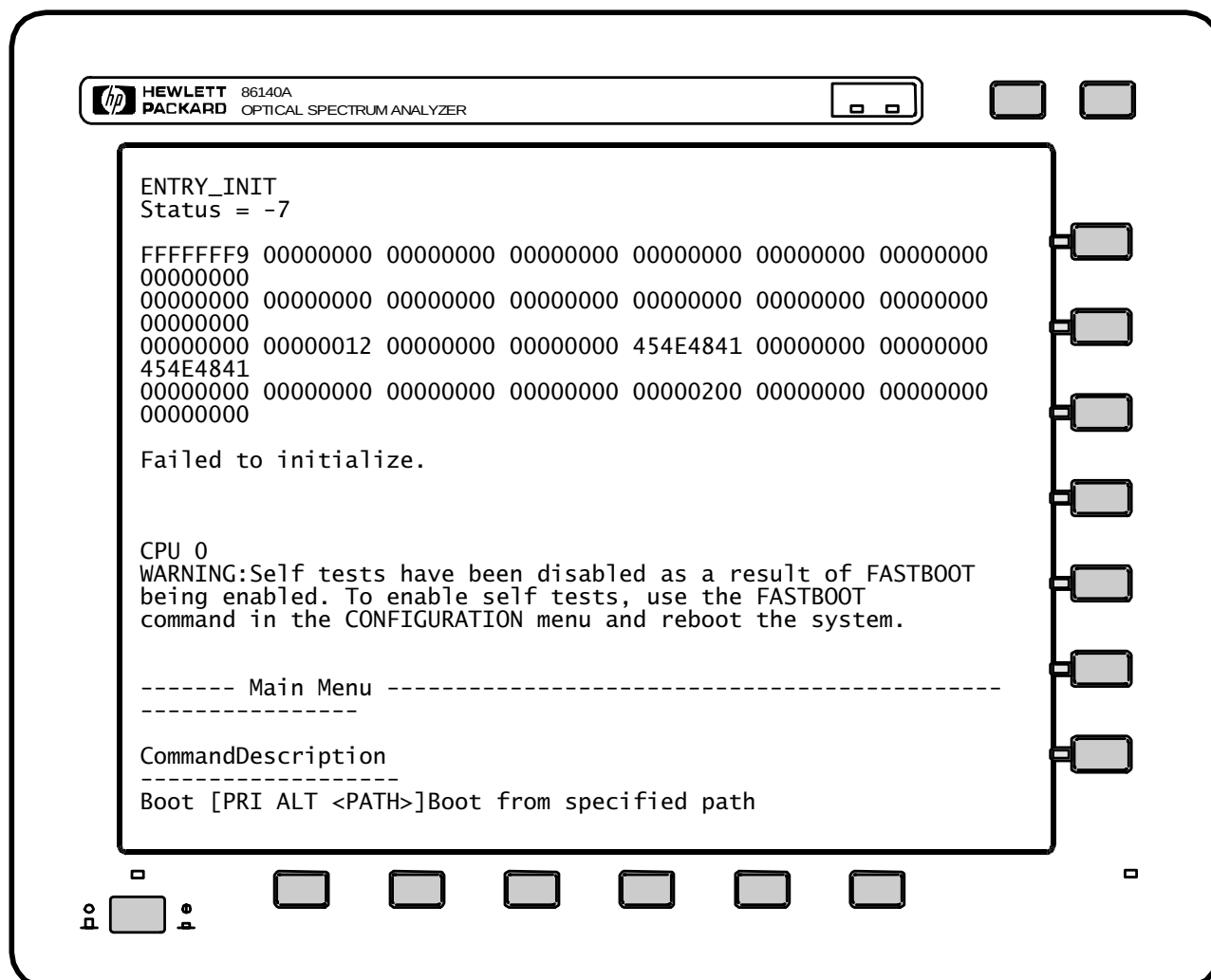


Figure 2-16. Hard Drive Failure

Sweep Errors

Checking the Servo board

If the sweep is not completed in the stated sweep time, the instrument will generate an error. Check the Servo board by measuring the voltages at the test points shown in [Figure 2-11 on page 2-18](#). [Table 2-7 on page 2-18](#) contains the correct voltage measurements for the test points.

Checking the Options board

To check if the Options board is the failed component, remove the Options board, and restart the instrument. If the instrument completes initialization, replace the Options board:

To replace the Options board refer to ["To Remove the Options Board" on page 3-12](#).

Rotator Errors

The following error can occur during a Rotator malfunction:

Rotator encoder cable or rotator power cable disconnected

The following error codes and descriptions will appear on the instrument display:

20003: Error detected in grating positioning
system 0434

20003: Error detected in grating positioning
system 0404

20003: Error detected in grating positioning
system 0432

20003: An error has been detected in the motor
which controls the diffraction grating. Please
record the hexadecimal number listed with the
error and cycle power. If the error persists,
contact Agilent Technologies for assistance.

A flat line will also appear at the bottom of the instrument display.

Trans-Z board Errors

There are several signs that there is a problem with the Trans-Z board:

- The instrument may take a long time to initialize (approximately 8 minutes).
- The instrument will appear to be locked up after the message, “Preliminary Testing 2” is displayed.
- The display will show a flat line at the bottom of the screen.
- In some cases, an ADC error is displayed.
- No error messages will be displayed.

Slitwheel Errors

The following error can occur during a slitwheel malfunction.

Slitwheel encoder cable or slitwheel power cable disconnected

The following error codes and descriptions will appear on the instrument display.

```

20002: Error detected in slit positioning system
0333
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
20002: Error detected in slit positioning system
0332
21999: Error listed has overflowed

20002: An error has been detected in the motor
which controls the resolution bandwidth slit
wheel. Please record the hexadecimal number listed
with the error and cycle power. If the error
persists, contact Agilent Technologies for
service.
21999: Error listed has overflowed. The last
entries received have been deleted.
```


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To Remove the Inner Instrument Cover	3-8
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Assembly Replacement Procedures

Replacing Instrument Assemblies

This chapter provides step-by-step procedures to remove the replaceable components of the optical spectrum analyzers. In many cases the procedures are the same for all model numbers. In some instances the procedures vary depending on the model. In this case, refer to the replacement procedure called out for your specific model. Unless specified, the replacement procedures are the reverse of the removal procedures.

To Replace a Cable Clamp

Cable clamps are used throughout the instrument to attach cables to sheet-metal housings. They attach with self-adhesive bonds.

- 1** Remove the old clamp.
- 2** Remove any remaining glue.
- 3** Clean the surface using isopropyl alcohol.
- 4** Remove the paper backing from the bottom of the new clamp.
- 5** Press the clamp firmly onto the surface.



Figure 3-1. Removing the cable clamp

To Remove the Instrument Cover

For the 86140A/B, 86141B, 86142A/B, and 86146B only

- 1 Disconnect the power cord from the instrument.

WARNING

The power cord is connected to internal capacitors that may remain live for five seconds after disconnecting the plug from its power supply.

- 2 Use a T-20 TORX driver to remove the two screws that attach the handles to the sides of the instrument. See ① and ② in [Figure 3-2](#) below.



Figure 3-2. Removing the side handles

- 3 Use a T-10 TORX driver to remove the two screws that fasten the instrument cover to the rear panel assembly. See ① and ② in [Figure 3-3](#) below.

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 opened.

- 4 Use a T-15 TORX driver (or a T-20 TORX driver in newer models) to remove the screws that secure the four bumper feet to the rear panel. See ③ through ⑥ in [Figure 3-3](#) below.
- 5 Remove the anti-tamper tape from the rear of the instrument.

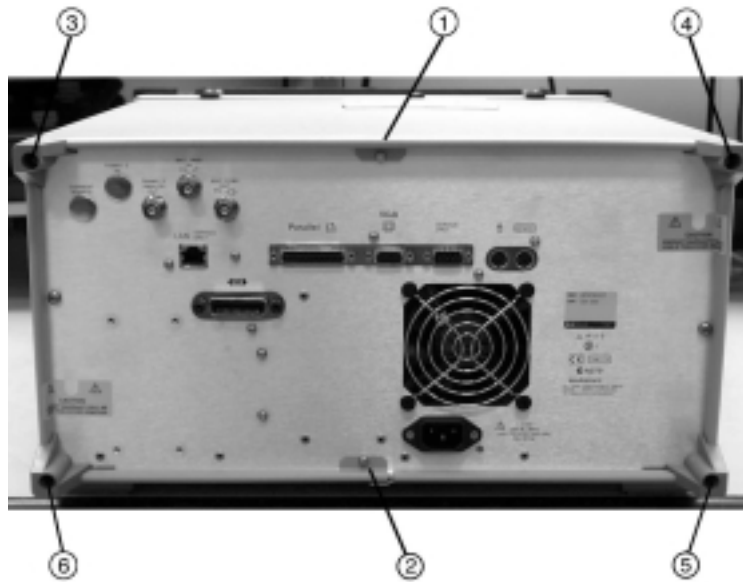


Figure 3-3. Removing the rear feet

- 6 As required, remove the two plastic feet from the bottom rear of the instrument. See [Figure 3-4](#) below. This step is not necessary on newer instruments because the sheet metal has been revised to allow for enough clearance.



Figure 3-4. Removing the bottom feet

- 7 Open the printer door, and pull the paper out of the paper slot.

NOTE

The printer door should remain fully open while the cover is removed so that it does not hang up on the instrument chassis.

- 8 Slide the cover off. See [Figure 3-5](#) below.



Figure 3-5. Removing the cover from the instrument

For the 86143A/B, 86144B, and 86145A/B only

- 1 Disconnect the power cord from the instrument.

WARNING

The power cord is connected to internal capacitors that may remain live for five seconds after disconnecting the plug from its power supply.

- 2 Use the 4-mm hex driver to loosen but not remove the four screws that fasten the rubber feet through the instrument cover to the rear panel assembly. See ① through ④ in [Figure 3-3](#) below.
- 3 Use the T-10 TORX driver to remove the four screws that fasten the cover to the instrument chassis. See ⑤ through ⑧ in [Figure 3-3](#) below.

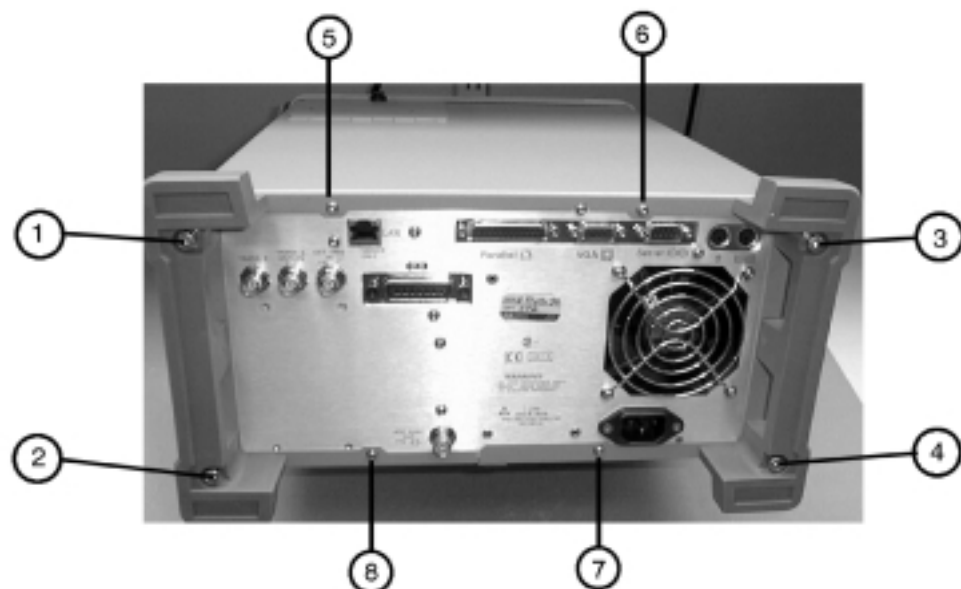


Figure 3-6. Removing the rear feet

- 4 Remove the anti-tamper tape from the rear of the instrument.

To Remove the Instrument Cover

- 5 Open the printer door, and pull the paper out of the paper slot.

NOTE

The printer door should remain open while the cover is removed so that it does not hang up on the instrument chassis.

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 opened.

- 6 Slide the case off of the instrument chassis.

To Remove the Inner Instrument Cover

CAUTION

Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe work station. See ["Electrostatic Discharge Information" on page 1-10](#) for more information on preventing ESD.

- 1 Using the T-10 TORX driver, remove the three screws (five screws for the 86144/46B) fastening the inside cover to the instrument chassis. See ① through ③ in [Figure 3-8](#) below.
- 2 Lift the cover out of the slots in the chassis, and lift off of the instrument.

Figure 3-7. Removing the inside cover on the 86140/41/42/43/45)

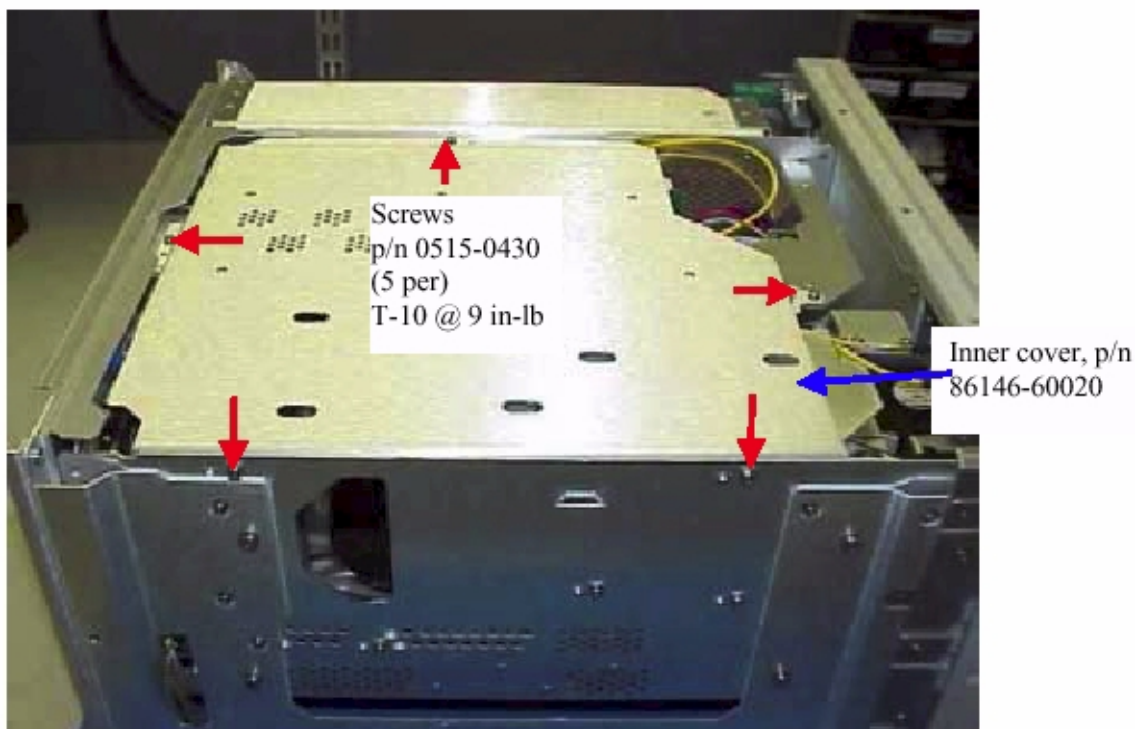


Figure 3-8. Removing the inside cover on the 86144B and 86146B

NOTE

Remove the *do not tamper* label (not shown) connecting the inner cover to the instrument chassis.

To Remove the Servo Board

For the 86140A/B, 86141A/B, 86142A/B, 86143A/B, and 86145A/B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8](#).
- 3 Disconnect and mark all connectors that are attached to the Servo board. See [Figure 3-9](#) below.

NOTE	Lift the servo board approximately 1-inch to remove the connectors and optical cables.
-------------	--



Figure 3-9. Disconnecting the connections on the Servo board

- 4 Lift the Servo board straight up, separating it from the mezzanine board.

For the 86144B and 86146B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8](#).
- 3 Remove the clips (pn 1252-2216) from the four ribbon cables. Save the clips as they will be needed when you install the new Servo board. Refer to [Figure 3-10](#).

To Remove the Servo Board

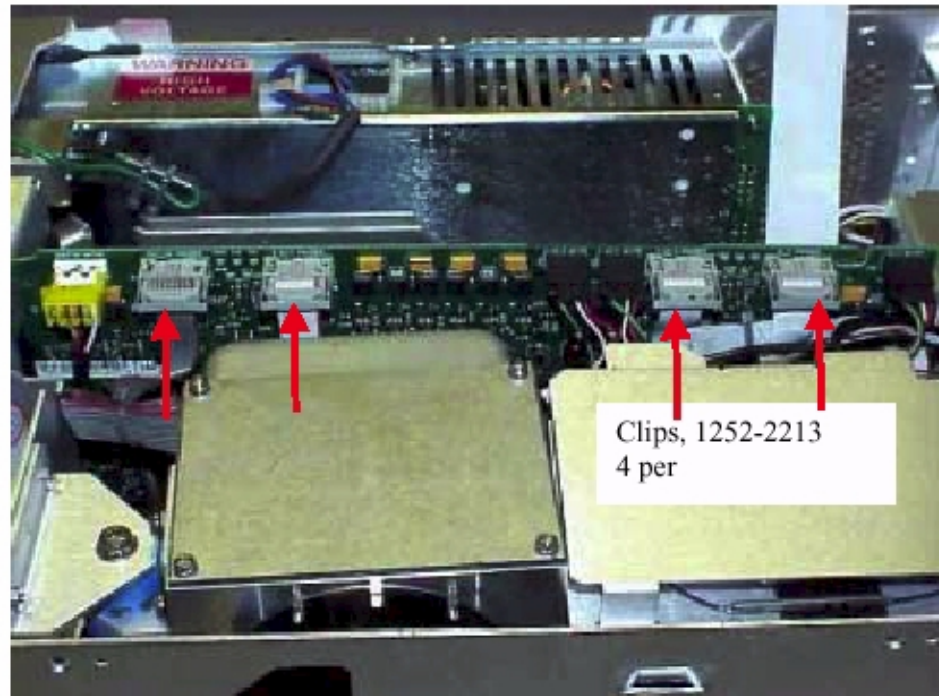


Figure 3-10. Removing the clips from the four ribbon cables on the Servo board

- 4 Remove the X and Y ribbon cables from the X- and Y-axis motor connectors. See [Figure 3-11](#).
- 5 Remove the Y ribbon cable from the Y-axis encoder connector. See [Figure 3-11](#).
- 6 Remove the slitwheel cable from the slip motor connector. See [Figure 3-11](#).
- 7 Remove the slitwheel ribbon cable from the slit encoder connector. See [Figure 3-11](#).

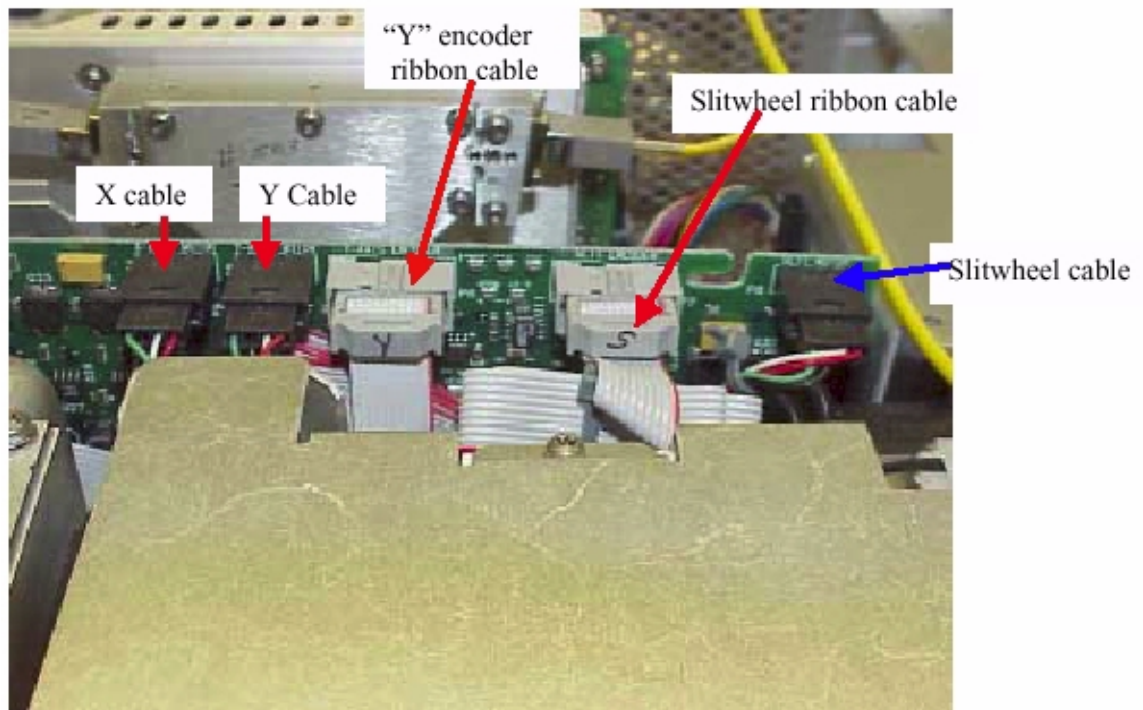


Figure 3-11. Disconnecting the connections on the Servo board

- 8** Remove the X encoder ribbon cable from the X-axis encoder connector. See [Figure 3-12](#).
- 9** Remove the encoder ribbon cable from the grating encoder connector. See [Figure 3-12](#).
- 10** Remove the rotator motor winding cable from the grating motor connector. See [Figure 3-12](#).
- 11** Remove the Servo board from the Mezzanine board.

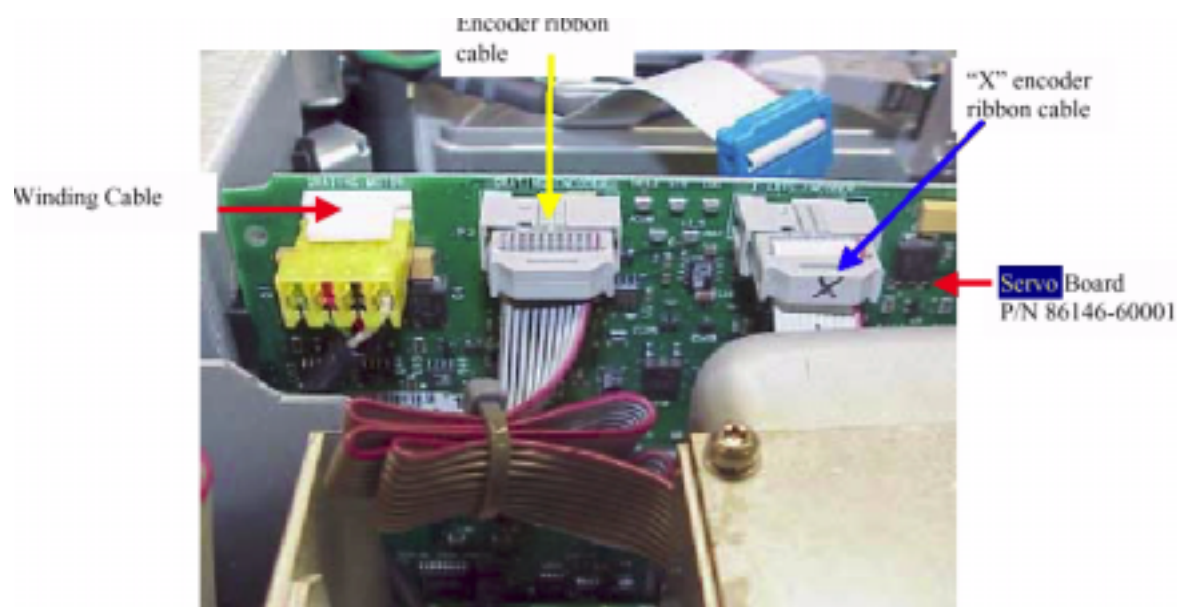


Figure 3-12. Removing the Servo board from the Mezzanine board

To Remove the Options Board

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8](#).
- 3 Disconnect and mark all connectors that are attached to the Options board. Depending on the instrument's configuration, there may be fewer connections than shown in [Figure 3-13](#) below.



Figure 3-13. Disconnecting the connections on the Options board

- 4 Lift the Options board straight up, separating it from the motherboard.

To Remove the Front Panel Assembly

Replacement Front Panels

OSA front panels have had changes due to obsolescence of trackballs and floppy drives, and redesign of the power switch. Replacement front panels may include a new floppy drive (the new version is narrower than the old, necessitating a different front panel overlay), and/or a new power switch and left bracket (the new power switch is larger, requiring a cut out in the left bracket). The following tables will help you identify what replacement front panel (and other parts if necessary) that you should order.

86140A/B, 86141B, 86142A/B Benchtop OSAs

Replacement front panels include a new power switch, new left bracket, and a new floppy drive.

Table 3-8. 86140A/B, 86141B, 86142A/B Benchtop OSAs

Front Panel Description	86140A/B and 86142A/B	86141B
Standard (no options)	86140-60102	86141-60001
Option 002 or 004 or 005	86140-60103	86141-60002
Option 006	86140-60104	86140-60060
Option 002/006 or 004/006 or 005/006	86143-60105	86141-60004

86143A/B, 86145A/B Portable OSAs

Replacement front panels do not include a new floppy drive. If the OSA has an old floppy drive, a new floppy drive and drive bracket must be ordered with the replacement front panel.

Table 3-9. 86143A/B, 86145A/B Portable OSAs

Front Panel Description	86143A or 86143B (with serial # ≤US40150502)	86143B (with serial # >US40150502)	86145A or 86145B (with serial # ≤US40150538)	86145B (with serial # >US40150538)
Standard (no options)	86143-60060 Also order 0950-2782 86144-00005	86143-60060	86143-60060 Also order 0950-2782 86144-00005	86143-60060
Option 006	86143-60063 Also order 0950-2782 86144-00005	86143-60063	86143-60063 Also order 0950-2782 86144-00005	86143-60043

For the 86140A/B, 86141B, 86142A/B, and 86146B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Unscrew and remove the adapters from the fiber connectors on the front panel. See [Figure 3-14](#) below. Place a protective cover over the fiber end.



Figure 3-14. Removing the fiber-optic connector adapters

- 3 Remove the trim strip from the top edge of the instrument front panel. See ① in [Figure 3-15](#) below.



Figure 3-15. Removing the trim strips from the front panel assembly

- 4 Use the T-10 TORX driver to remove the two screws fastening the Z-bracket to the front panel assembly. See ① and ② in [Figure 3-16](#) below.

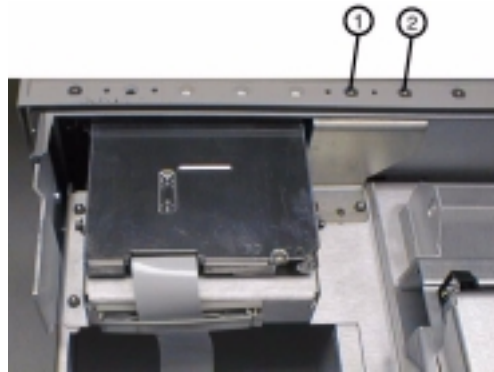


Figure 3-16. Detaching the Z-bracket from the front panel assembly

- 5 Turn the instrument over, and follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)

NOTE

Removing the inner instrument cover is only necessary if there are any options in the system.

- 6 Using a T-15 TORX driver (on newer models, use a T-20 TORX driver), remove four screws from each side of the front panel. See ① through ⑧ in [Figure 3-17](#) below.

NOTE

On newer instruments, the front panel is only attached to the chassis with two screws on each side (①, ④, ⑤, and ⑧)

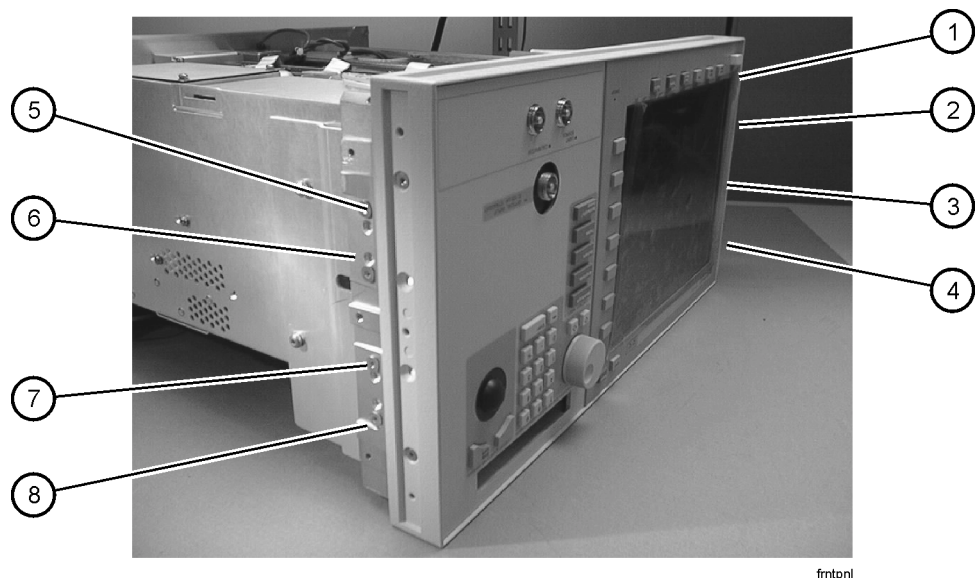


Figure 3-17. Attaching the front panel to the chassis

- 7 Slide the front panel a few inches away from the instrument chassis.

CAUTION

Use care when pulling the front panel away to keep from damaging the disk drive and to prevent stretching the cable that is still attached between the front panel assembly and the chassis.

Mark the two fiber-optic cables so that they are not accidentally swapped during reassembly.

To Remove the Front Panel Assembly

- 8 Using a T-10 TORX driver, remove the two screws and lock washers fastening each of the fiber-optic wire connectors to the inside of the front panel. See [Figure 3-18](#) below.

CAUTION

Using the wrong size screws to reinstall the fiber-optic cable connectors can damage the front panel assembly.

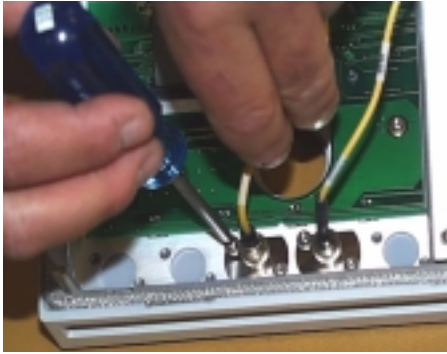


Figure 3-18. Removing the connectors (Left - Early model, Right - with new bracket assembly)

Move the front panel approximately 1-inch away from the instrument in order to remove two ribbon cables.

- 9 Remove the display board harness from connector P12 on the interface board. See [Figure 3-19](#) below.
- 10 Disconnect the flex cable from connector J6 on the interface board. See [Figure 3-19](#) below.

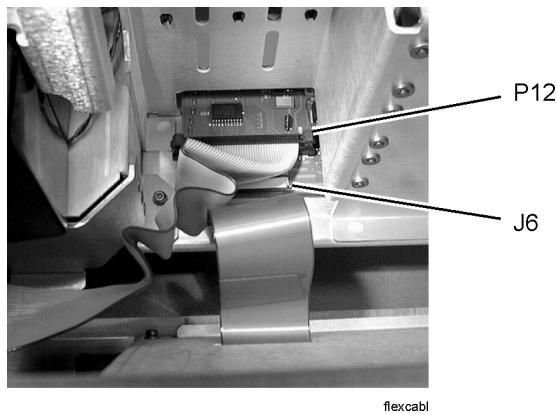


Figure 3-19. Removing the front panel flex cable from the interface board

For the 86143A/B, 86144B, and 86145A/B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover"](#) on page 3-4.
- 2 Unscrew and remove the adapters from the fiber connectors on the front panel. See [Figure 3-20](#) below. Place a protective cover over the exposed fiber end.



Figure 3-20. Removing the fiber-optic connector adapters

- 3** Remove the Z-bracket screws. See ① and ② in [Figure 3-4](#) below.



Figure 3-21. Removing the bracket screws

- 4** Turn the instrument over, and follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover"](#) on page 3-8.
- 5** Using a T-15 TORX driver (on newer models, use a T2-20 TORX driver), remove two screws from each side of the front panel. See ① through ④ in [Figure 3-17](#) below.



Figure 3-22. Attaching the front panel to the chassis

- 6 Slide the front panel a few inches away from the instrument chassis.

CAUTION

Use care when pulling the front panel away to keep from damaging the floppy disk drive.

- 7 Using a T-10 TORX driver, remove the two screws and lock washers fastening each of the fiber-optic wire connectors to the inside of the front panel. See [Figure 3-18](#) below.

CAUTION

Using the wrong size screws to reinstall the fiber-optic wire connectors can damage the front panel assembly.

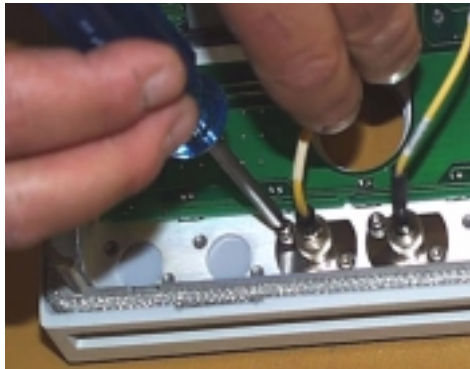


Figure 3-23. Removing the fiber-optic wire connectors

- 8 Remove the display board harness from connector P12 on the interface board. See [Figure 3-19](#) below.
- 9 Disconnect the flex cable from connector J6 on the interface board. See [Figure 3-19](#) below.

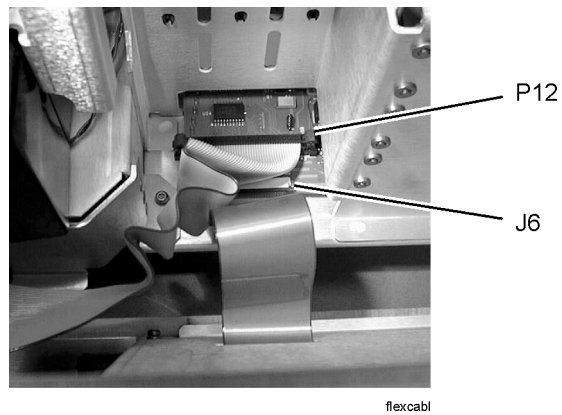


Figure 3-24. Removing the front panel flex cable from the interface board

- 10** Remove the front panel assembly from the instrument chassis.

To Remove the Rear Panel Assembly

For the 86140A/B, 86141B, 86142A/B, and 86146B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8](#).
- 3 Turn the instrument over, and release the cable clamp shown in [Figure 3-25](#).



Figure 3-25. Removing the cables from the cable clamp

- 4 Turn the instrument back over, and disconnect the line module cable from the power supply. See [Figure 3-26](#) below.



Figure 3-26. Disconnecting the line module power connector from the power supply

- 5 Remove the 10 screws fastening the rear panel to the instrument. See [Figure 3-27](#) below.
 - a Use the T-15 TORX driver to remove the two screws fastening the rear panel to the instrument chassis. See ① and ② in [Figure 3-27](#) below.
 - b Use the T-10 TORX driver to remove 8 screws fastening the rear panel to the instrument chassis. See ③ through ⑩ in [Figure 3-27](#) below. The 86146B has an additional GPIB port on the rear panel labelled auxiliary.

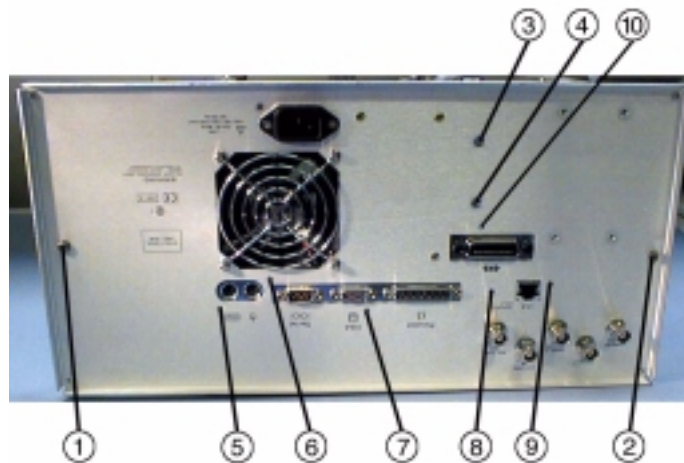


Figure 3-27. Removing the screws from the rear panel

- 6** Disconnect the hard drive ribbon connector from the mezzanine board. See [Figure 3-28](#) below.



Figure 3-28. Disconnecting the hard drive ribbon cable from the mezzanine board

- 7** Disconnect the fan connector from the mezzanine board. See [Figure 3-29](#) below.



Figure 3-29. Disconnecting the fan connector from the mezzanine board

- 8** Follow the instructions for removing the servo board assembly in the section, "[To Remove the Servo Board](#)" on [page 3-9](#).

To Remove the Rear Panel Assembly

- 9 Follow the instructions for removing the options board assembly in the section, "[To Remove the Options Board](#)" on page 3-12.
- 10 Use long-nosed pliers to disconnect the Trans-Z cable from the Trans-Z Analog Out connector on the Trans-Z board. See ① in [Figure 3-27](#) below.

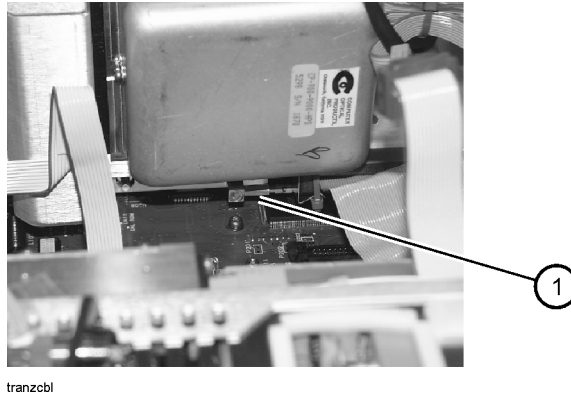


Figure 3-30. Disconnecting the Trans-Z Analog Out Cable from the Trans-Z board

- 11 Mark and disconnect the two monochromator SMB connectors from the left rear corner of the mezzanine board. See ① and ② in [Figure 3-31](#) below. SMB middle connector (③) is not used.

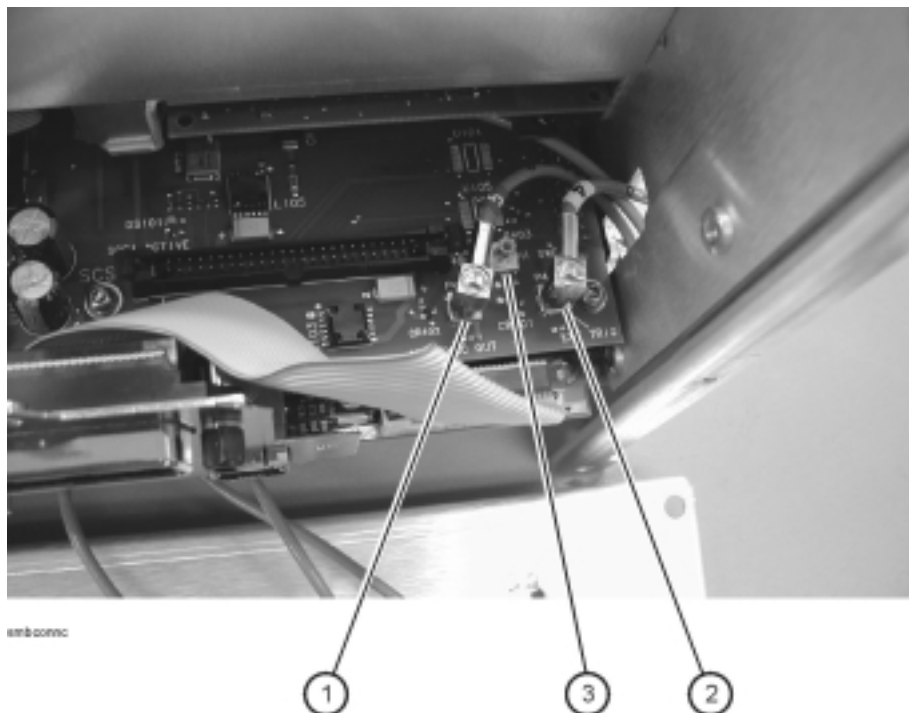


Figure 3-31. Removing the SMB connectors from the motherboard

- 12 Remove the rear panel assembly from the instrument chassis.

For the 86143A/B, 86144B, and 86145A/B only

- 1 Follow the instructions for removing the instrument cover in the section, "[To Remove the](#)

[Instrument Cover” on page 3-4.](#)

- 2 Follow the instructions for removing the instrument inside cover in the section, [”To Remove the Inner Instrument Cover” on page 3-8.](#)
- 3 Use the T-15 to remove 6 screws fastening the rear panel assembly to the chassis. See ① through ⑥ in [Figure 3-27](#) below.
- 4 Use the T-10 to remove 2 screws fastening the rear panel assembly to the optical assembly. See ⑦ and ⑧ in [Figure 3-27](#) below.
- 5 Use the T-10 to remove 6 screws fastening the CPU board to the rear panel assembly. See ⑨ through ⑭ in [Figure 3-27](#) below.

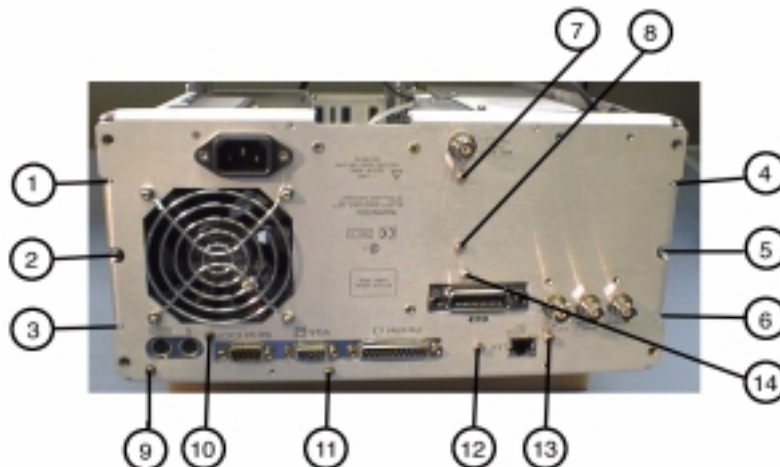


Figure 3-32. Removing the screws from the rear panel

- 6 Unplug the line cord from the power supply. See [Figure 3-33](#) below. Remove the cable from the cable clamp on the power supply

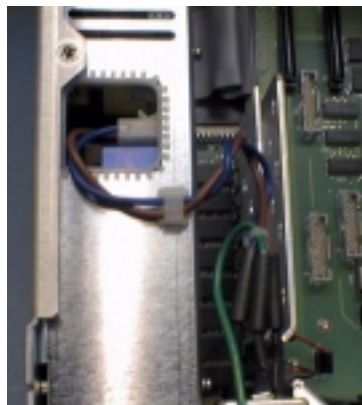


Figure 3-33. Unplugging the line cord from the power supply

- 7 Slide the rear panel away from the instrument a few inches making sure not to put tension on the cables that are still attached.
- 8 Follow the instructions for removing the Servo board in the section, [”To Remove the Servo Board” on page 3-9.](#)
- 9 Follow the instructions for removing the Options board in the section, [”To Remove the Options Board” on page 3-12.](#)

To Remove the Rear Panel Assembly

- 10 Follow the instructions for removing the floppy disk drive in the section, ["To Remove the Floppy Disk Drive" on page 3-30.](#)
- 11 Disconnect the hard drive ribbon connector from the mezzanine board. See [Figure 3-34](#) below.

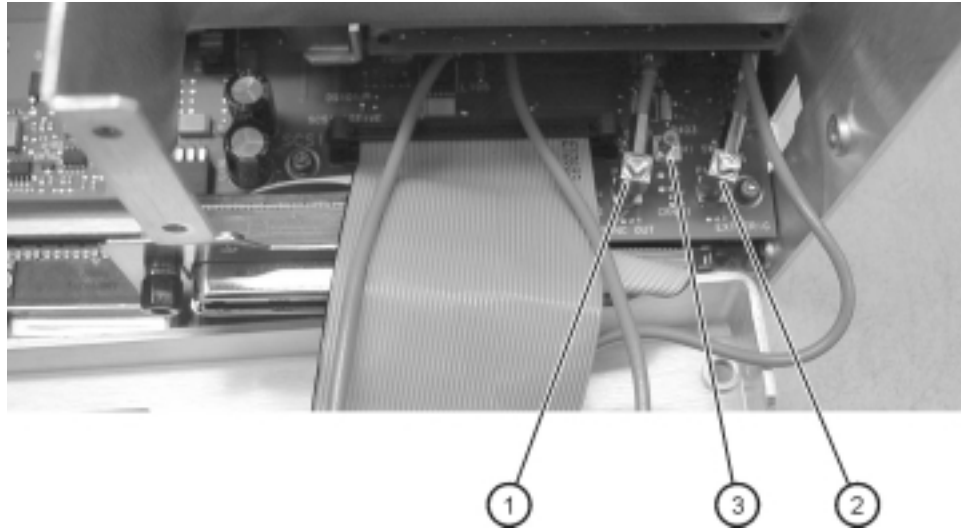


Figure 3-34. Disconnecting the hard drive ribbon cable from the mezzanine board

- 12 Disconnect the fan connector from the mezzanine board. See [Figure 3-29](#) below.

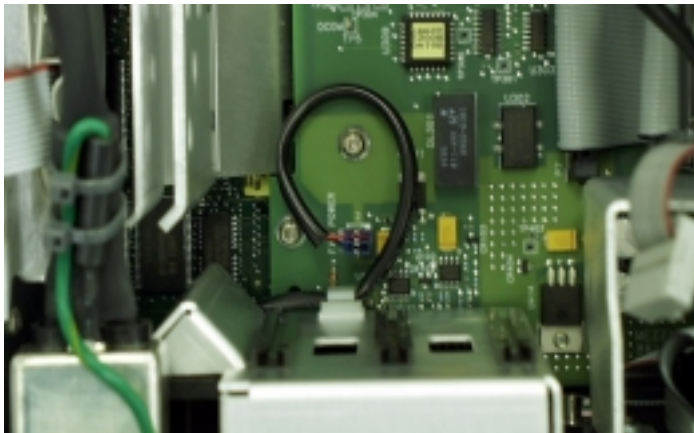


Figure 3-35. Disconnecting the fan connector from the mezzanine board

- 13 Use long-nosed pliers to disconnect the Trans-Z cable from the Trans-Z Analog Out connector on the Trans-Z board.

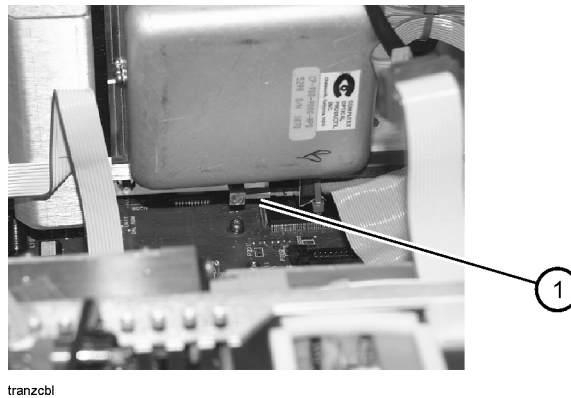


Figure 3-36. Disconnecting the Trans-Z Analog Out Cable from the Trans-Z board

- 14** Mark and disconnect the two monochromator SMB connectors from the left rear corner of the mezzanine board. See ① and ② in [Figure 3-31](#) below. The middle SMB connector (③) is not used.

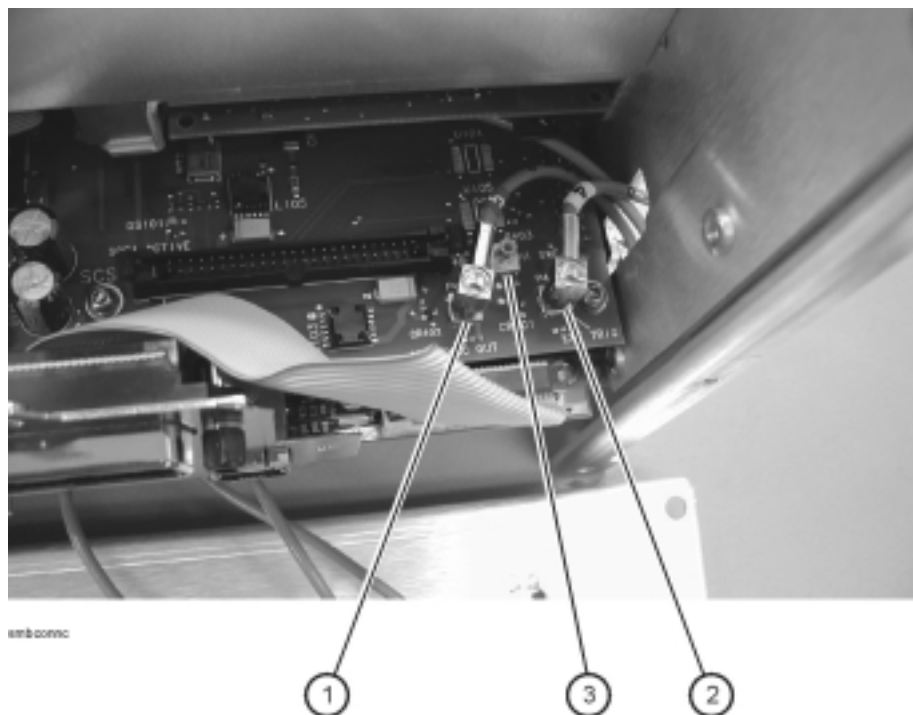


Figure 3-37. Removing the SMB connectors from the motherboard

- 15** Remove the rear panel assembly from the instrument chassis.

To Remove the Hard Drive

The hard drive is mounted to the rear panel, directly behind the optical assembly.

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8](#).
- 3 Follow the instructions for separating the rear panel assembly from the instrument chassis in the section, ["To Remove the Rear Panel Assembly" on page 3-20](#). It is not necessary to remove the SMB cables for this procedure.
- 4 Use the T-10 TORX driver to remove the four screws, grommets, and washers fastening the hard drive to the rear panel assembly. See ① through ④ in [Figure 3-38](#) below.

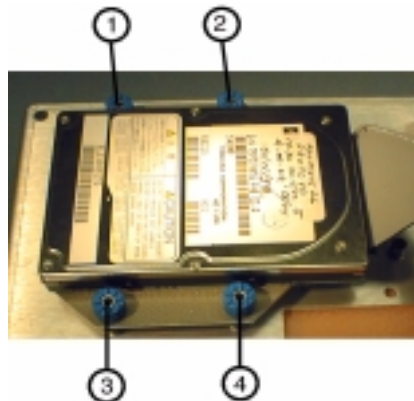


Figure 3-38. Removing the hard drive and mounting bracket from the rear panel

CAUTION

The hard drive can be very easily damaged unless handled correctly. Hold the hard drive/mounting bracket assembly by the mounting bracket, and only lay it down on a flat, clean surface.

To Remove the Printer

For the 86140A/B, 86141B, 86142A/B, and 86146B only

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Release the printer ribbon cable from the cable clamps.
- 3 Use the T-10 TORX driver to loosen the screw near the front of the printer two full turns. Do not remove the screw. See ① in [Figure 3-39](#) below.
- 4 From the front of the instrument, slide the printer to the left away from the disk drive to separate the tab on the printer from the slot on the chassis. See [Figure 3-39](#) below.

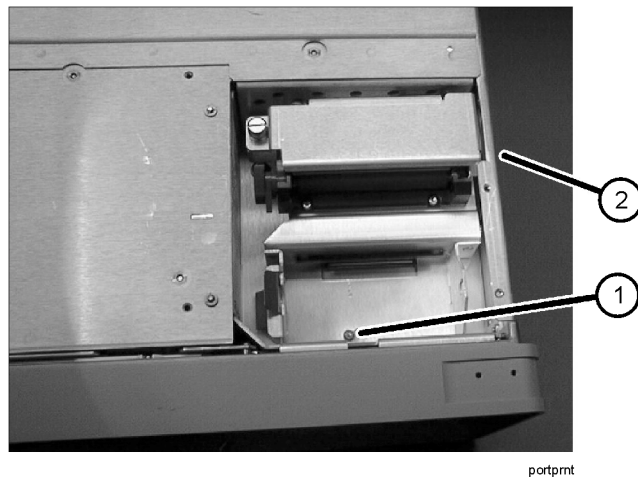


Figure 3-39. Separating the printer from the instrument chassis

- 5 Remove the 44-pin ribbon cable from the mezzanine board. See ① in [Figure 3-40](#) below.

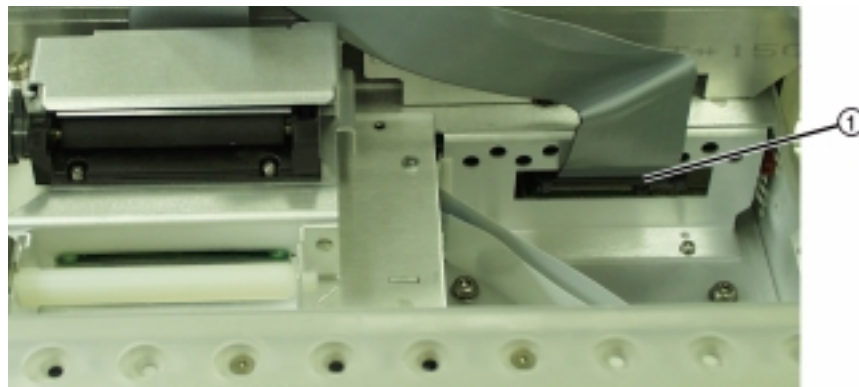


Figure 3-40. Disconnecting the printer ribbon cable from the mezzanine board

- 6 Lift the printer from the instrument chassis.

To Remove the Printer

For the 86143A/B and 86145A/B only

- 1 Follow the instructions for removing the instrument cover in the section, "[To Remove the Instrument Cover](#)" on page 3-4.
- 2 Use the T-10 TORX driver to loosen the screw near the front of the printer two full turns. Do not remove the screw. See ① in [Figure 3-39](#) below.
- 3 Use the T-10 TORX driver to remove the screw from the right side of the instrument. See ② in [Figure 3-39](#) below.
- 4 From the front of the instrument, slide the printer to the left to separate the tab on the printer from the slot on the chassis. See [Figure 3-39](#) below.

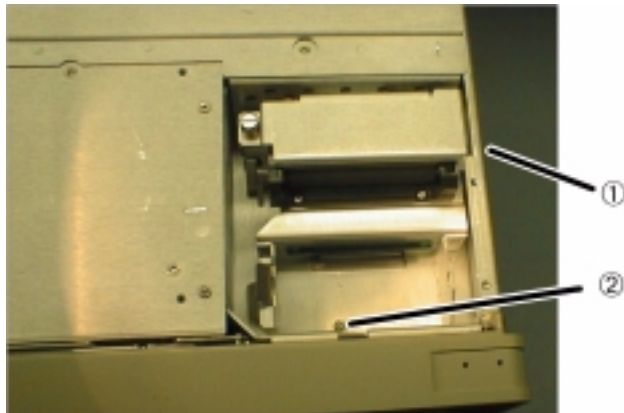


Figure 3-41. Separating the printer from the instrument chassis

- 5 Separate the printer assembly from the instrument chassis making sure not to put tension on the attached ribbon cable.
- 6 Remove the 44-pin ribbon cable from the mezzanine board. See ① in [Figure 3-42](#) below.

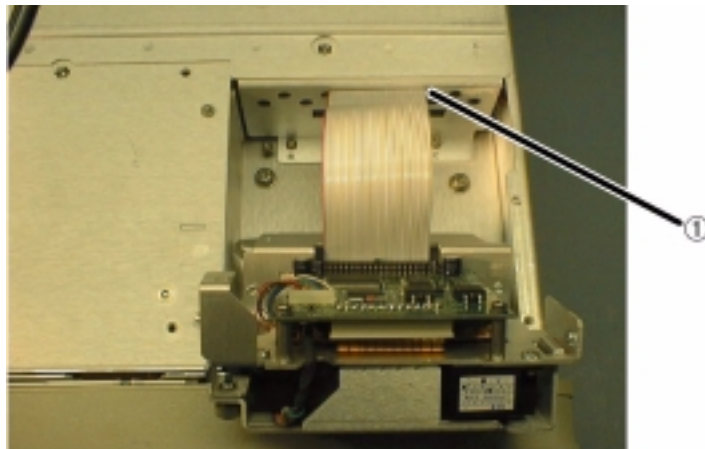


Figure 3-42. Disconnecting the printer ribbon cable from the mezzanine board

- 7 Remove the printer from the instrument chassis.

For the 86144B only

- 1 Follow the instructions for removing the instrument cover in the section, "[To Remove the Instrument Cover](#)" on page 3-4.
- 2 Disconnect the printer cable from the Mezzanine board.

- 3 Remove the two screws that attach the printer to the monochromator bracket.

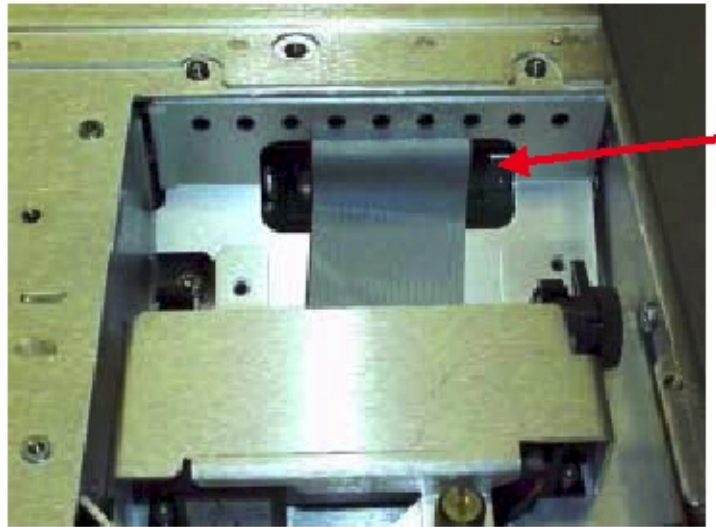


Figure 3-43. 86144B disconnecting the printer cable from the Mezzanine board

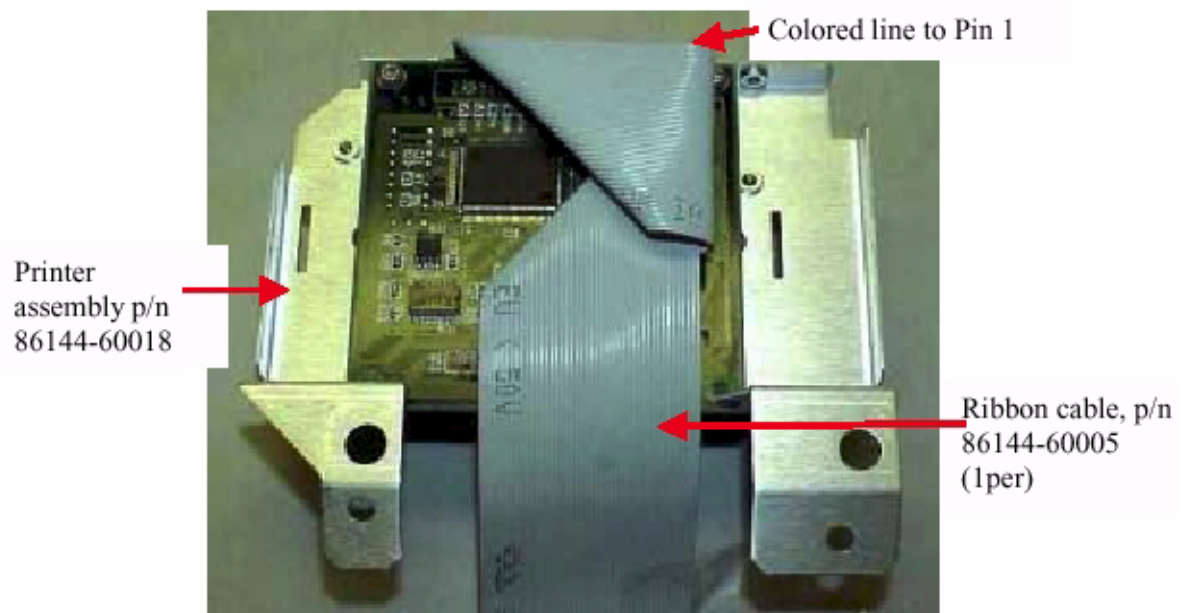


Figure 3-44. 86144B printer assembly and ribbon cable.

To Remove the Floppy Disk Drive

Replacement Floppy Drives

The original floppy drive shipped with bench top and portable OSAs has become obsolete. The new floppy drives are narrower, and therefore are not a drop-in replacement. Old floppy drives have been set aside for service. A serial number break was performed for the transition in the 86143B and 86145B portable units. The 86140B, 86141B, and 86142B OSAs did not have a serial break, so the floppy drives will have to be measured in order to determine the appropriate replacement part. Use the table below to determine the appropriate part number to order.

Table 3-10. Replacement Floppy Drives

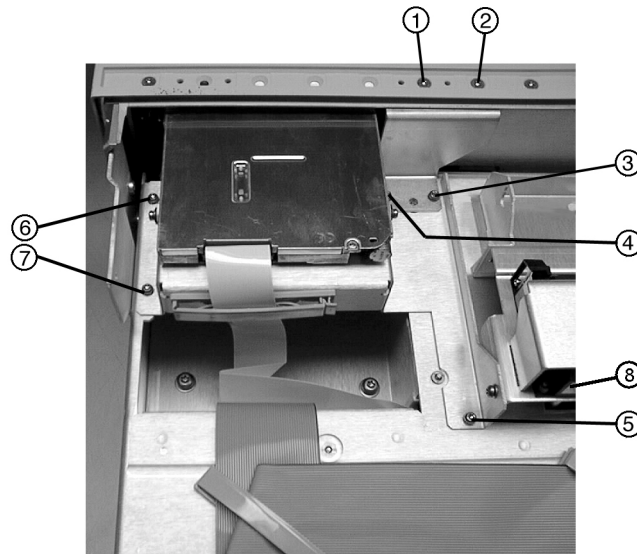
Instrument Model Number	Drive Description	Drive Part Number
86140A/42A	102 mm wide, light gray	0950-3109
86143A/45A	102 mm wide, dark gray	0950-3108
86140B/42B/42B	102 mm wide, light gray or,	0950-3109
	97 mm wide, light gray	0950-2782
86143B		
Serial Number ≤US40150502	102 mm wide, dark gray	0950-3108
Serial Number >US40150502	97 mm wide, light gray	0950-2782
86145B		
Serial Number ≤US40150538	102 mm wide, dark gray	0950-3108
Serial Number >US40150538	97 mm wide, light gray	0950-2782
86144B/46B	97 mm wide, light gray	0950-2782

For the 86140A/B, 86141B, 86142A/B, and 86146B only

The disk drive is mounted between the instrument chassis and the instrument cover.

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4](#).
- 2 Use the T-15 TORX driver to remove the two screws fastening the Z-bracket to the instrument front panel. See ① and ② in [Figure 3-45](#) below.
- 3 Use the T-10 TORX driver to remove the two screws fastening the Z-bracket to the disk drive mounting bracket and remove the Z-bracket from the instrument. See ③ and ④ in [Figure 3-45](#) below.
- 4 Use the T-10 TORX driver to remove the four remaining screws fastening the disk drive mounting bracket to the instrument chassis (86146B only has three screws). See ⑤

through ⑧ in [Figure 3-45](#) below.



diskmnt

Figure 3-45. Removing the disk drive

- 5 Disconnect the floppy drive ribbon cable from the back of the disk drive.

NOTE

To reinstall the ribbon cable, ensure that the metal contacts of the ribbon cable face toward the front of the disk drive.

- 6 Remove the disk drive and bracket assembly from the chassis.

CAUTION

The disk drive can be easily damaged unless handled correctly. Hold the disk drive by the edges, and only lay it down on a flat, clean surface.

- 7 Place the disk drive top side down on a flat, clean surface, and use the T-8 TORX driver to remove the four screws (0515-1934) fastening the disk drive mounting bracket to the disk drive.

For the 86143A/B, 86144B, and 86145A/B only

The disk drive is mounted between the instrument chassis and the instrument cover.

- 1 Follow the instructions for removing the instrument cover in the section, "[To Remove the Instrument Cover](#)" on page 3-4.
- 2 Follow the instructions for removing the inner instrument cover in the section, "[To Remove the Inner Instrument Cover](#)" on page 3-8.
- 3 Use the T-10 TORX driver to remove the two screws fastening the disk drive mounting bracket to the instrument chassis. See ① and ② in [Figure 3-45](#) below.

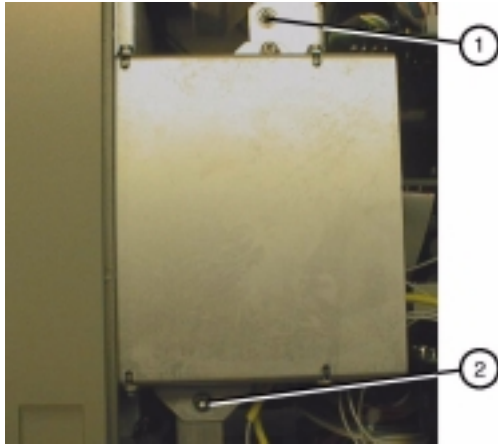


Figure 3-46. Removing the disk drive

- 4 Slide the floppy disk drive away from the front panel, and rotate 180°.
- 5 Disconnect the floppy ribbon cable from the back of the disk drive.

NOTE

To reinstall the ribbon cable, ensure that the metal contacts of the ribbon cable face toward the front of the disk drive.

- 6 Remove the disk drive and bracket assembly from the chassis.

CAUTION

The disk drive can be easily damaged unless handled correctly. Hold the disk drive by the edges, and only lay it down on a flat, clean surface.

- 7 Place the disk drive top side down on a flat, clean surface, and use the T-8 TORX driver to remove the four screws and washers fastening the disk drive mounting bracket to the disk drive. See ① through ④ in [Figure 3-47](#) below.

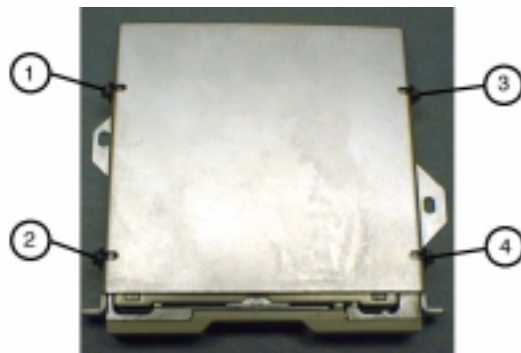


Figure 3-47. Removing the disk drive mounting bracket

To Replace the Power Switch

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2 Follow the instructions for removing the front panel in the section, ["To Remove the Front Panel Assembly" on page 3-13.](#)

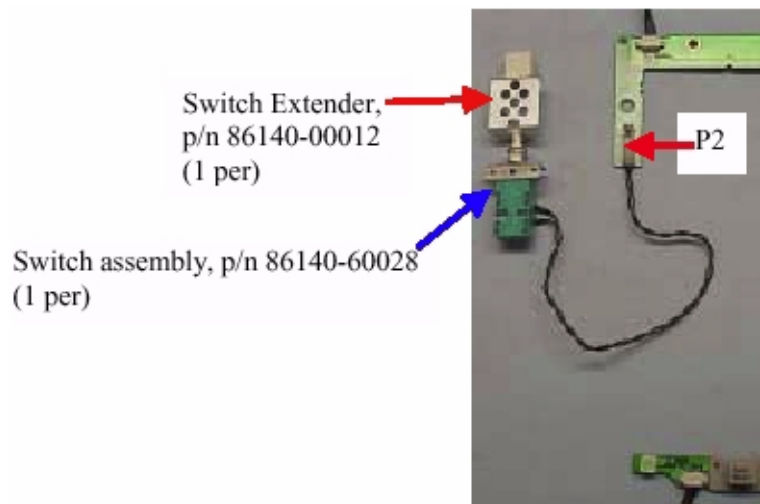


Figure 3-48. Switch Assembly

- 3 Remove the inverter cover and install the inverter assemblies on the new inverter cover (pn supplied in the kit (86140-60116)). See [Figure 3-49.](#)

To Replace the Power Switch

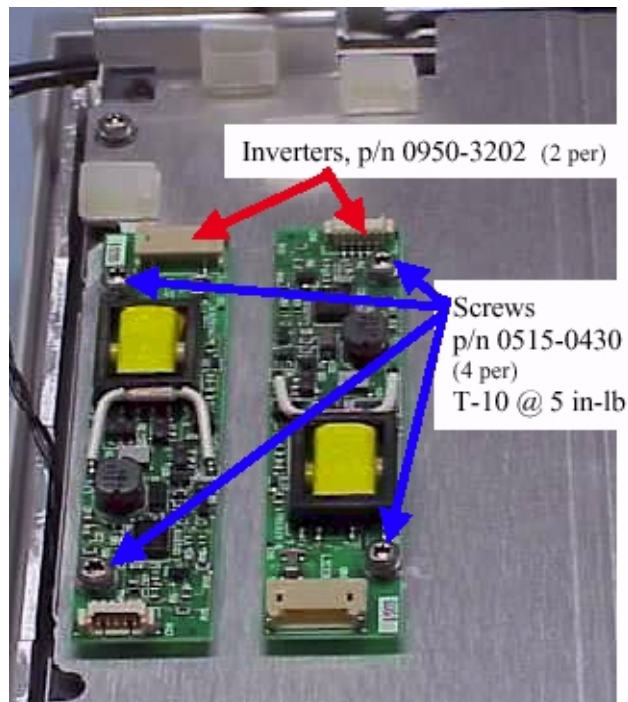


Figure 3-49. Attaching the inverters to the new assembly

- 4 Be careful to install a new piece of insulating tape (pn 0460-0965) over the high voltage components. See [Figure 3-50](#). Lay the cover aside for reassembly later.

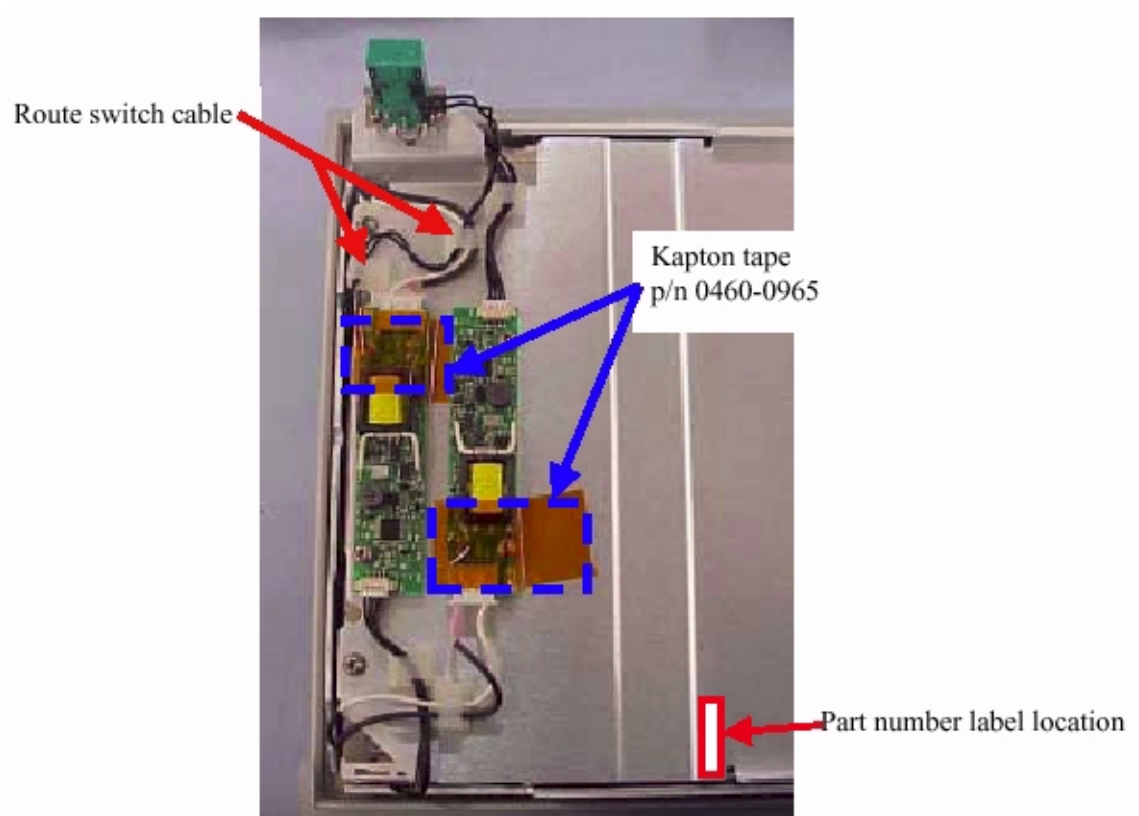


Figure 3-50. Location of insulation tape

- 5 Remove the two screws attaching the switch bracket to the original inverter cover. Carefully remove the display and gasket. See [Figure 3-51](#).

To Replace the Power Switch

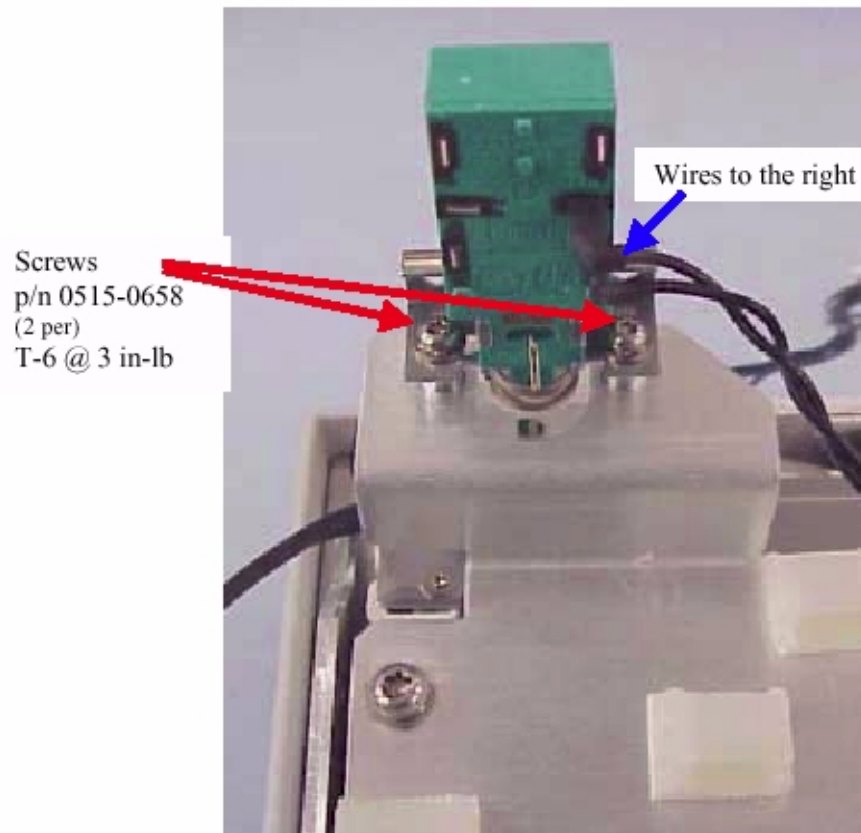


Figure 3-51. Removing the screws attaching the switch to the bracket

- 6** Remove the three screws fastening the front panel circuit board to the chassis at the locations nearest the switch.

This allows the circuit board to be raised slightly to access the switch wiring to disconnect the switch wiring connector.

- 7** Remove the old switch and wiring and install the new switch connector. Place the side showing the contacts toward the circuit board.
- 8** Use great care to avoid contamination to the inside of the display and front panel protective cover. Carefully blow any dust from the cavity. Examine the display from the front side to see if there are any dust motes or spots on the display.
- 9** Reinstall the gasket and position the display. Place the switch in the appropriate location. Fasten the new inverter cover bracket to the front panel to hold the display in place. Push and hold the cover up (direction toward the switch) while fastening.
- 10** Use the two supplied screws (n 0515-0658) and a T-6 bit with 3 in-lb of torque to fasten the switch to the inverter bracket.
- 11** Once the front panel is assembled, lay it aside and replace the left bracket (pn 86140-00010). The left bracket has the corner cut away to provide clearance for the larger switch.

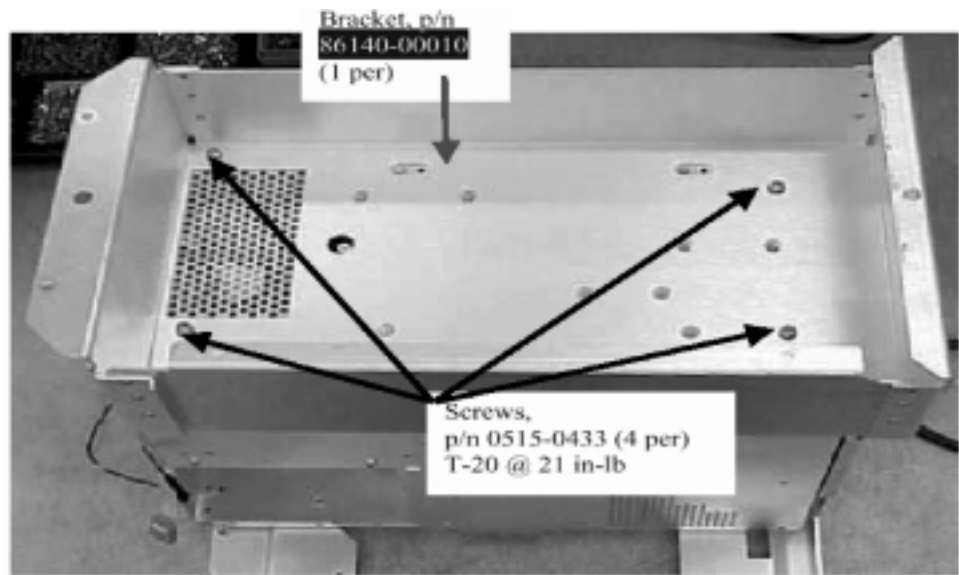


Figure 3-52. Left bracket screw locations

- 12** Reinstall the front panel and verify proper operation of the switch.

To Remove the Calibrator/Bracket Assembly

NOTE

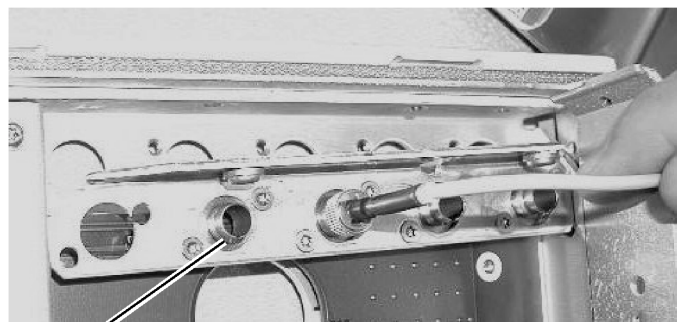
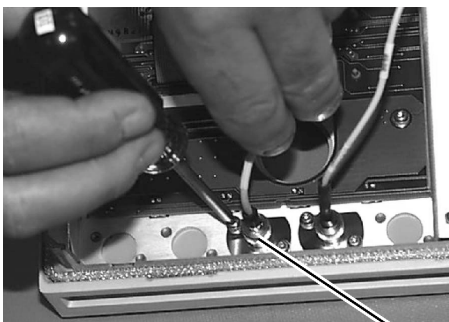
Since there are many different types of fiber connector adapters, make sure that you remove and keep the fiber connector adapter from the old calibrator assembly.

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)
- 3 Disconnect the line module cable from the power supply. See [Figure 3-53](#) below.



Figure 3-53. Disconnecting the line module power connector from the power supply

- 4 Use the T-10 TORX driver to remove the two screws fastening the calibrator connector to the front panel. See ① [Figure 3-54](#) below. The figure on the left shows an earlier model, and the figure on the right shows the new bracket assembly.



①

Figure 3-54. Removing the Calibrator fiber connector from the front panel

- 5 Disconnect the EELED 10-pin ribbon cable from the rear connector on the Options board. See ① [Figure 3-55](#) below.

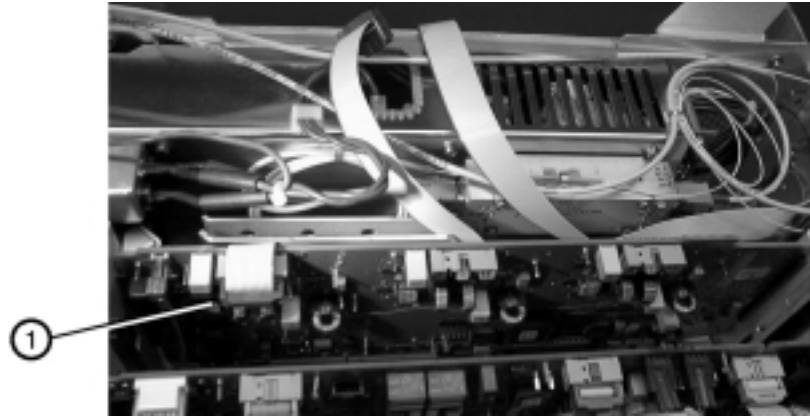


Figure 3-55. Disconnecting the 16-pin connector from the Options board

- 6** The calibrator/bracket assembly is fastened to the power supply with two screws on top, and two tabs on the bottom.
 - a** Using a T-10 TORX driver, remove the two screws fastening the calibrator bracket assembly to the power supply. See ① and ② in [Figure 3-56](#) below.
 - b** Tilt the top edge of the calibrator/bracket assembly away from the power supply, and lift the assembly out of the tabs located on the bottom of the power supply.

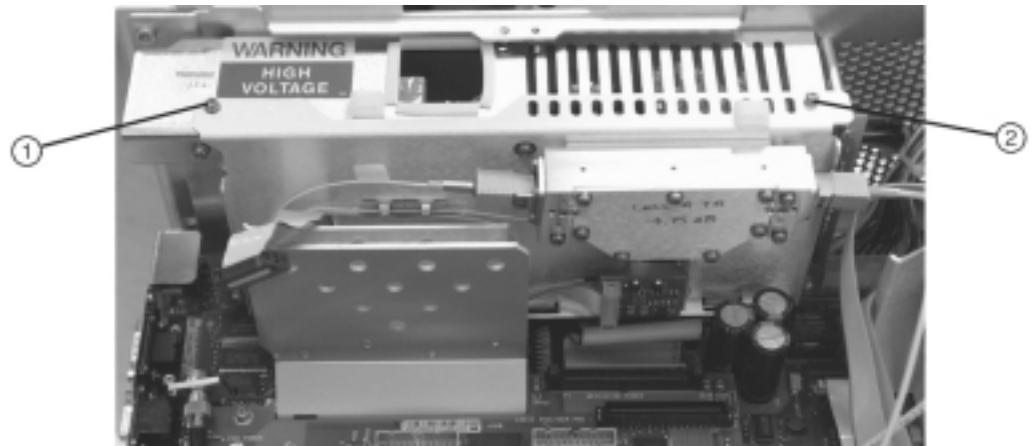


Figure 3-56. Detaching the calibrator bracket from the power supply

To Remove the Power Supply

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)
- 3 Disconnect the line module connector from the power supply. See [Figure 3-57](#) below.
- 4 Follow the instructions for removing the calibrator assembly in the section, ["To Remove the Calibrator/Bracket Assembly" on page 3-38.](#)



Figure 3-57. Disconnecting the line module power connector from the power supply

- 5 Disconnect all ten of the T-10 TORX screws from the right side of the power supply. The larger T-15 TORX screws (on newer models, use a T2-20 TORX screws) are used to attach the extension bracket to the side of the system chassis. This bracket can remain attached during the removal of the power supply. See ① through ⑩ in [Figure 3-58](#) below.

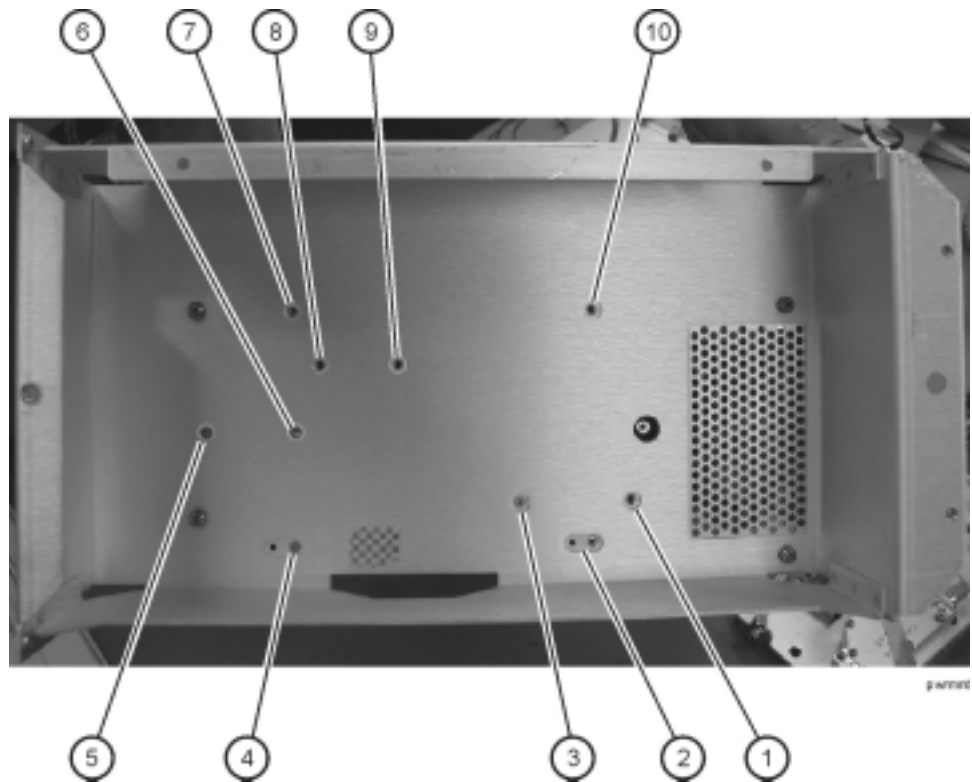


Figure 3-58. The power supply mounting screws

NOTE

The power supply used in this instrument is used in other products, so not all screw holes in the power supply will be used.

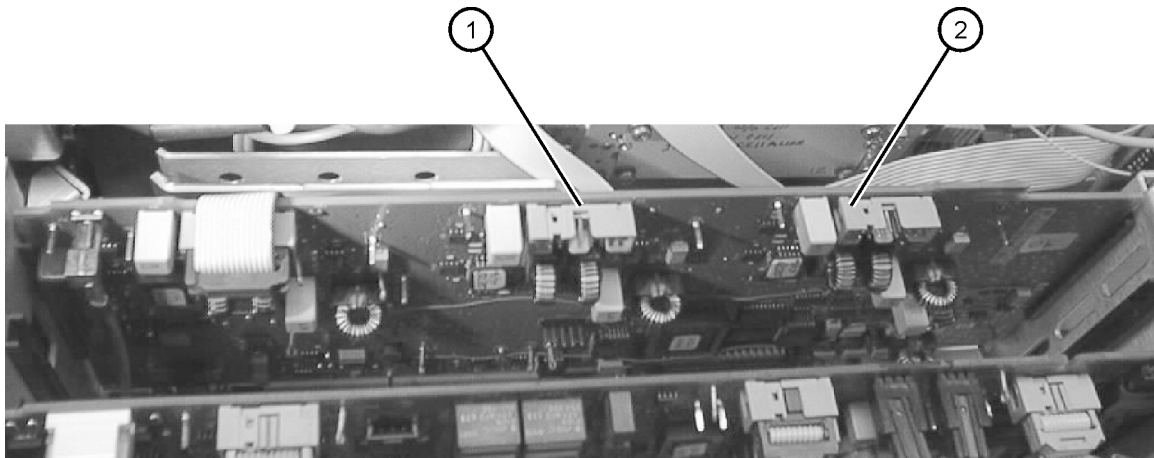
- 6 The power supply contains tabs on the bottom to align it with the chassis during installation. Lift the power supply assembly out of these tabs in the instrument chassis and slide the assembly toward the front of the instrument so that it will clear the rear panel.
- 7 Disconnect the 20-pin power supply connector from the interface board. See ① in [Figure 3-59](#) below.



Figure 3-59. The power supply connection on the interface board

To Remove the EELED Assembly

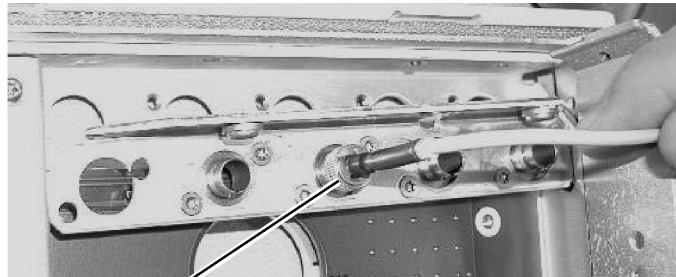
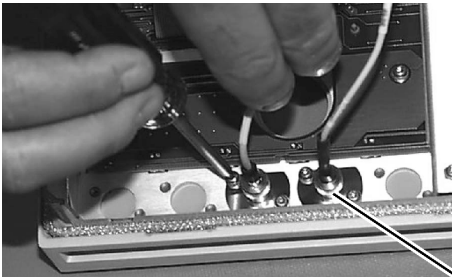
- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)
- 3 Disconnect two of the 10-pin ribbon cables from front of the options board. See ① and ② in [Figure 3-60](#) below.



eledopth

Figure 3-60. Disconnecting the connections on the Options board

- 4 Use the T-10 TORX driver to remove the two screws fastening the calibrator connector to the front panel. See ① [Figure 3-54](#) below. The figure on the left shows an earlier model, and the figure on the right shows the new bracket assembly.



fiberoon2

Figure 3-61. Removing the Calibrator fiber connector from the front panel

- 5 Remove the two T-10 TORX screws fastening the EELED assembly to the front of the instrument chassis. See ① and ② in [Figure 3-62](#) below.

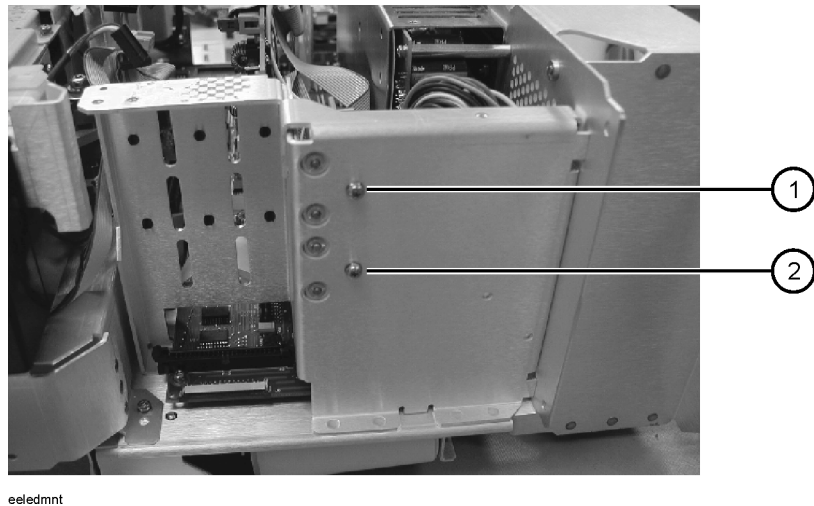


Figure 3-62. Removing the screws fastening the EELED assembly to the system chassis

- 6** Tilt the top of the EELED assembly in and slide the unit out.

To Remove the Optical Assembly

For the 86140A/B, 86141B, 86142A/B

- 1 Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2 Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)
- 3 Remove the two T-10 TORX screws fastening the optical assembly to the top of the instrument chassis. The screws are located to the rear of the floppy disk drive as shown in [Figure 3-63.](#)

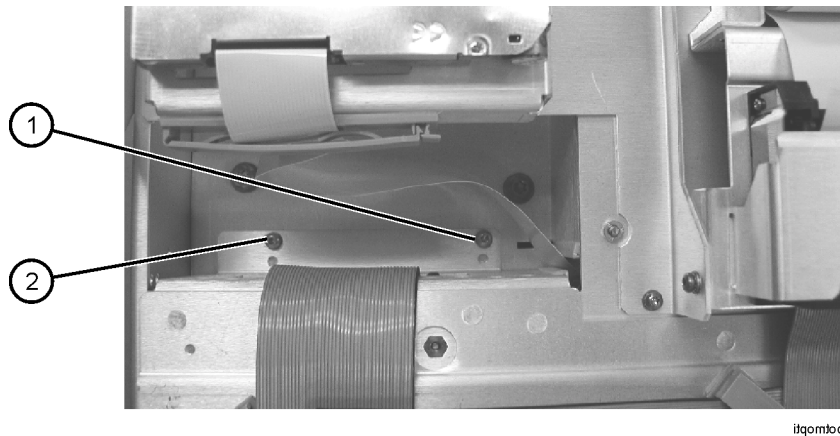


Figure 3-63. Removing the screws fastening the optical assembly to the top of the instrument

- 4 Follow the instructions for removing the instrument front panel in the section, ["To Remove the Front Panel Assembly" on page 3-13.](#)
- 5 Remove the TEN T-10 TORX screws fastening the optical assembly to the side of the instrument chassis. See ① and ⑨ in [Figure 3-65](#) below.

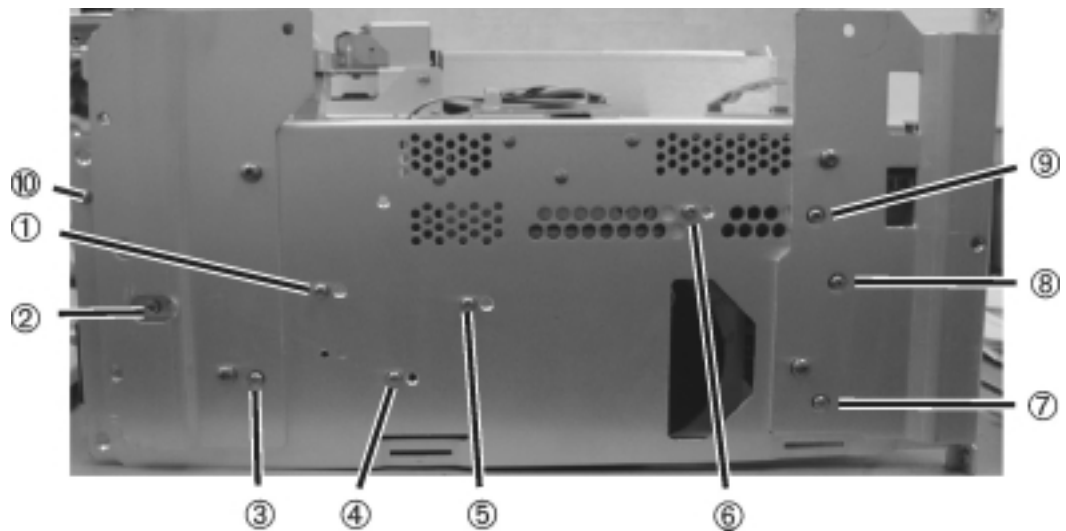


Figure 3-64. Removing the screws fastening the optical assembly to the side of the instrument

- 6 Follow the instructions for disconnecting the connectors on the servo board in the section, ["To Remove the Servo Board" on page 3-9](#).
- 7 Use the T-10 TORX driver to remove the two screws fastening the optical assembly to the front of the instrument chassis. See ① and ② in [Figure 3-65](#) below. Note that the rear holes are used.



Figure 3-65. Removing the screws fastening the optical assembly to the rear panel

- 8 Use the T-10 TORX driver to remove the two screws fastening the optical assembly to the rear panel. See ① and ② in [Figure 3-66](#) below.

Assembly Replacement Procedures
To Remove the Optical Assembly

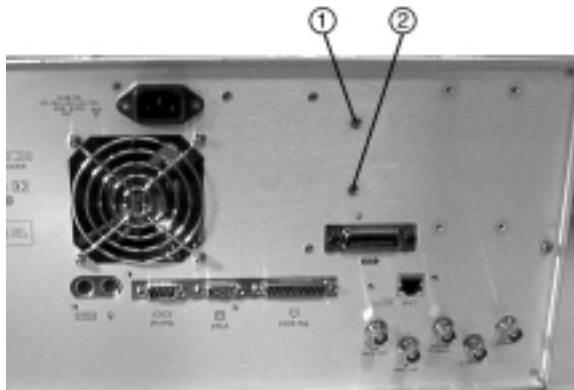


Figure 3-66. Removing the screws fastening the optical assembly to the rear panel

- 9** Disconnect the 50-pin Trans-Z ribbon cable located below and to the rear of the assembly. See ② in [Figure 3-67](#) below.

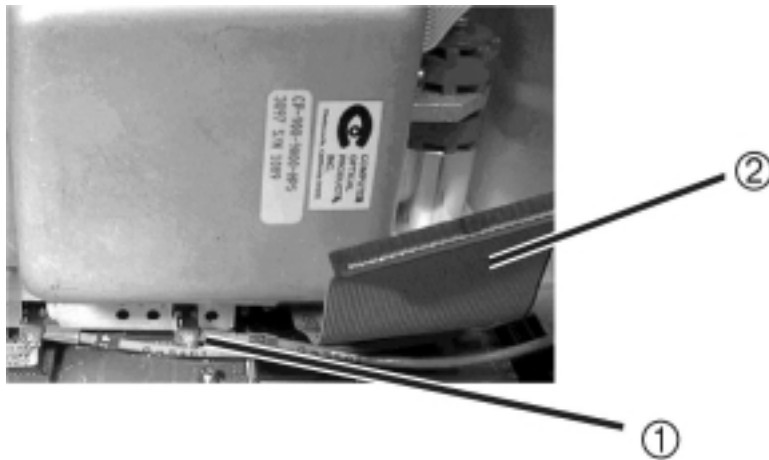


Figure 3-67. Disconnecting the Trans-Z ribbon cable

- 10** Lift up the outside edge of the optical assembly a few degrees making sure not to put tension on the Trans-Z Analog Out connector that is still connected. See [Figure 3-68](#) below.
- 11** While supporting the optical assembly, disconnect the Trans-Z Analog Out connector. See ① in [Figure 3-67](#) above.

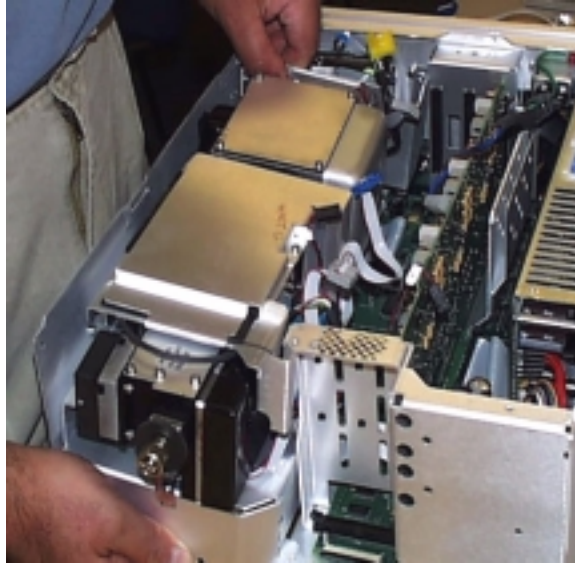


Figure 3-68. Removing the optical assembly

- 12** Remove the optical assembly from the instrument.

For the 86146B only

- 1** Follow the instructions for removing the instrument cover in the section, ["To Remove the Instrument Cover" on page 3-4.](#)
- 2** Follow the instructions for removing the inner instrument cover in the section, ["To Remove the Inner Instrument Cover" on page 3-8.](#)
- 3** Remove the two T-10 TORX screws fastening the optical assembly to the top of the instrument chassis. The screws are located to the rear of the floppy disk drive as shown in [Figure 3-63.](#)

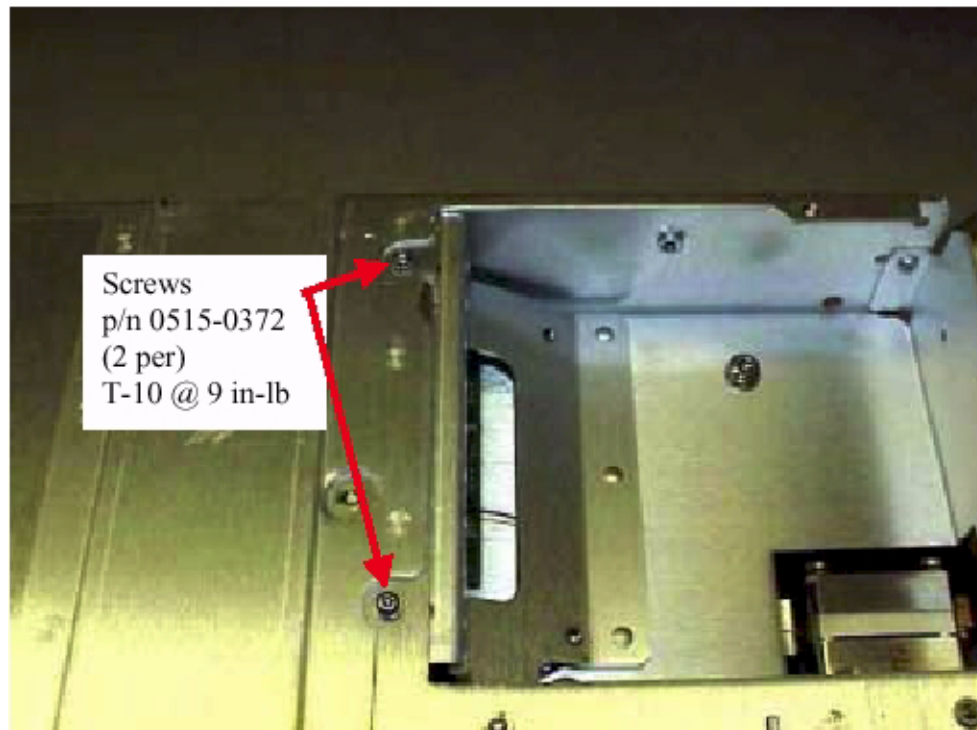


Figure 3-69. Removing the screws fastening the optical assembly to the top of the instrument

- 4 Follow the instructions for removing the instrument front panel in the section, ["To Remove the Front Panel Assembly" on page 3-13.](#)
- 5 Remove the TEN T-10 TORX screws fastening the optical assembly to the side of the instrument chassis. See ① and ⑨ in [Figure 3-65](#) below.

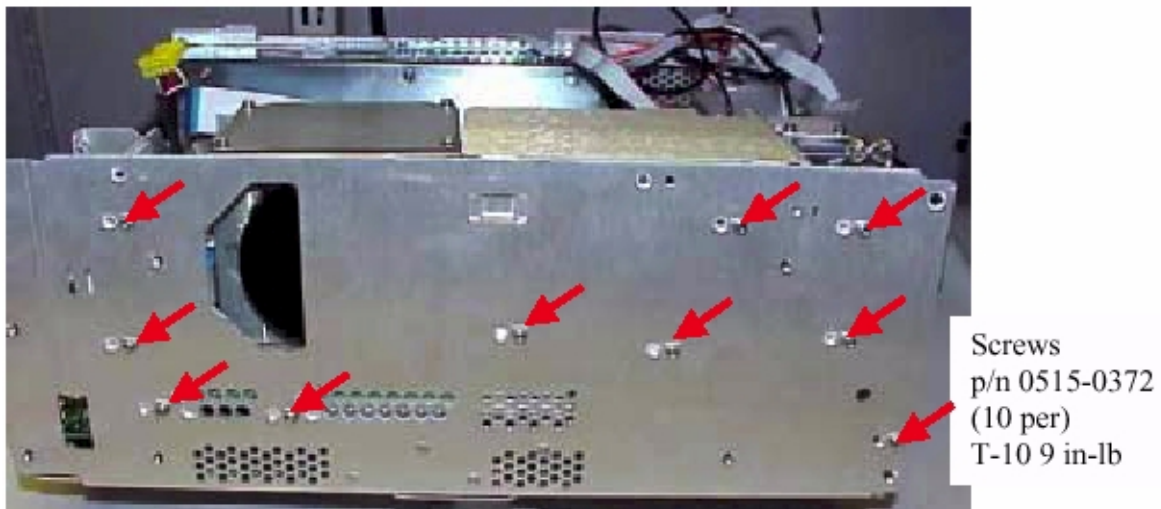


Figure 3-70. Removing the screws fastening the optical assembly to the side of the instrument

- 6 Follow the instructions for disconnecting the connectors on the servo board in the section, ["To Remove the Servo Board" on page 3-9.](#)
- 7 Use the T-10 TORX driver to remove the two screws fastening the optical assembly to the

front of the instrument chassis. See ① and ② in [Figure 3-65](#) below. Note that the rear holes are used.



Figure 3-71. Removing the screws fastening the optical assembly to the rear panel

- 8 Use the T-10 TORX driver to remove the two screws fastening the optical assembly to the rear panel. See ① and ② in [Figure 3-66](#) below.

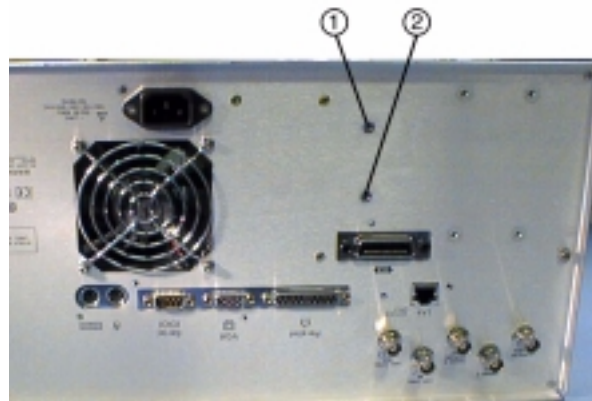


Figure 3-72. Removing the screws fastening the optical assembly to the rear panel

- 9 Disconnect the 50-pin Trans-Z ribbon cable located below and to the rear of the assembly. See ② in [Figure 3-67](#) below.

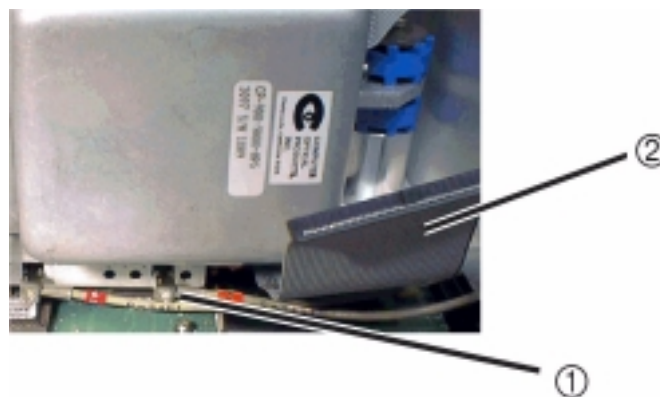


Figure 3-73. Disconnecting the Trans-Z ribbon cable

- 10 Lift up the outside edge of the optical assembly a few degrees making sure not to put tension on the Trans-Z Analog Out connector that is still connected. See [Figure 3-68](#) below.

- 11 While supporting the optical assembly, disconnect the Trans-Z Analog Out connector. See ① in [Figure 3-67](#) above.

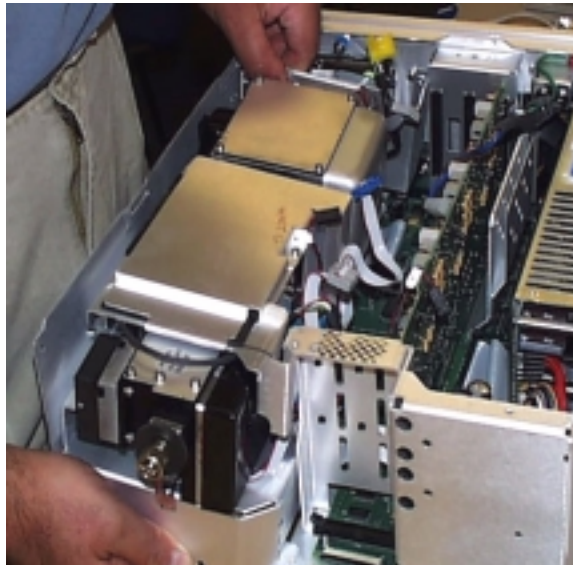


Figure 3-74. Removing the optical assembly

- 12 Remove the optical assembly from the instrument.

NOTE

Be careful to slide the optical assembly a little forward so the monochromator bracket does not knock components off of the board set.

For the 86143A/B, 86144B, and 86145A/B only

- 1 Follow the instructions for removing the instrument cover in the section, "[To Remove the Instrument Cover](#)" on page 3-4.
- 2 Follow the instructions for removing the inner instrument cover in the section, "[To Remove the Inner Instrument Cover](#)" on page 3-8.
- 3 Follow the instructions for removing the instrument front panel in the section, "[To Remove the Front Panel Assembly](#)" on page 3-13.
- 4 Follow the instructions for removing the printer assembly in the section, "[To Remove the Printer](#)" on page 3-27.
- 5 Follow the instructions for disconnecting the connectors on the servo board in the section, "[To Remove the Servo Board](#)" on page 3-9.
- 6 Remove the two screws beneath where the printer was mounted that fasten the optical assembly to the instrument chassis. See ① and ② in [Figure 3-75](#) below.

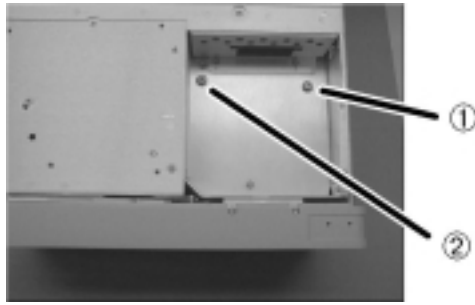


Figure 3-75. Removing the screws fastening the optical assembly to the top of the instrument

- 7 Remove the two screws fastening the optical assembly to the front of the instrument chassis. See ① and ② in [Figure 3-65](#) below. Note that the forward holes are used.

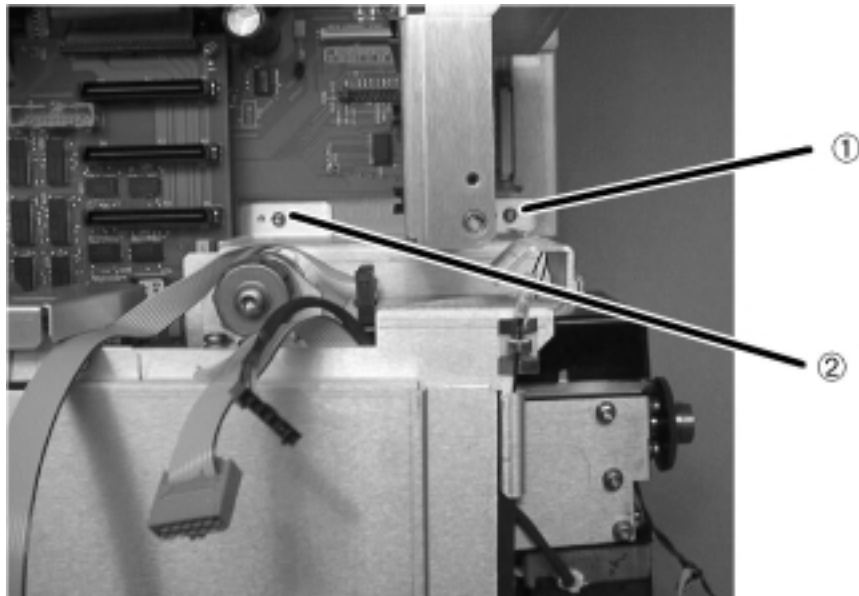


Figure 3-76. Removing the screws fastening the optical assembly to the bottom of the instrument

- 8 Remove the two screws fastening the optical assembly to the rear panel. See ① and ② in [Figure 3-77](#) below.

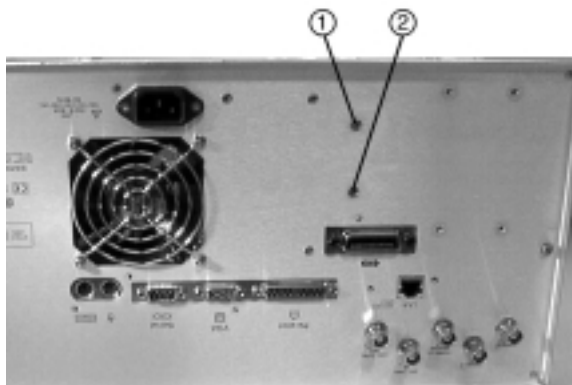


Figure 3-77. Removing the screws fastening the optical assembly to the rear panel

Assembly Replacement Procedures
To Remove the Optical Assembly

- 9 Using the T-10 TORX driver, remove ten screws fastening the optical assembly to the side of the instrument chassis. See ① through ⑩ in [Figure 3-78](#) below.

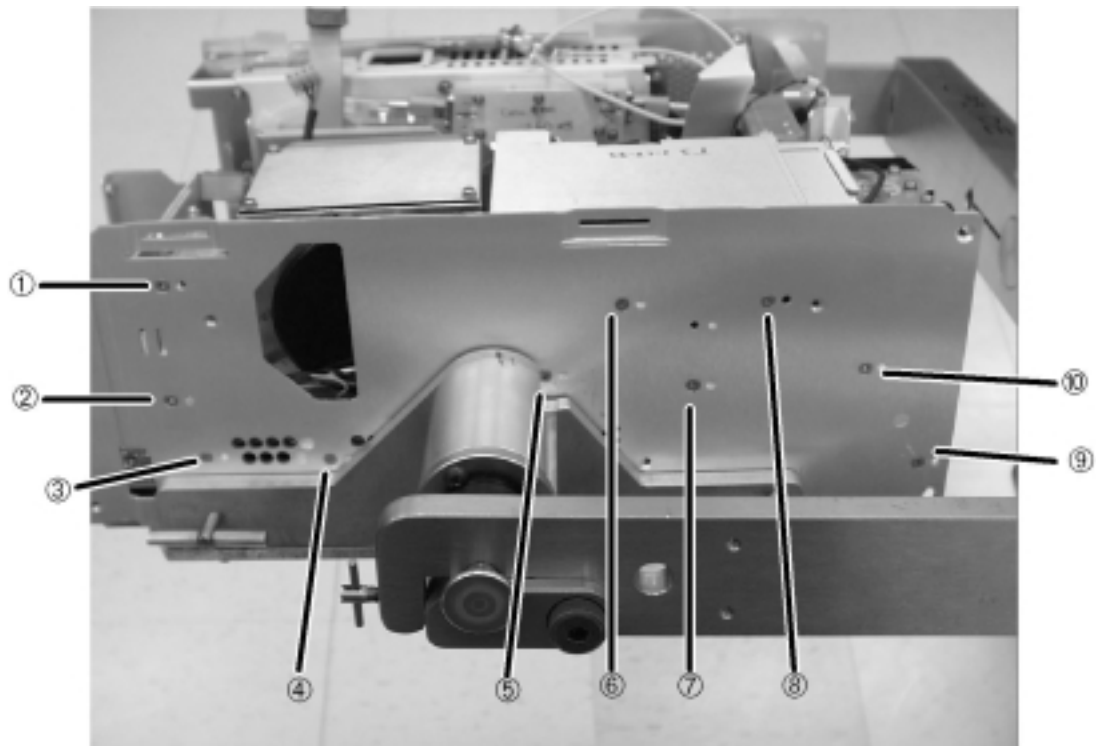


Figure 3-78. Removing the screws fastening the optical assembly to the side of the instrument

- 10 Disconnect the 50-pin Trans-Z ribbon cable located below and to the rear of the assembly. See ② in [Figure 3-67](#) below.

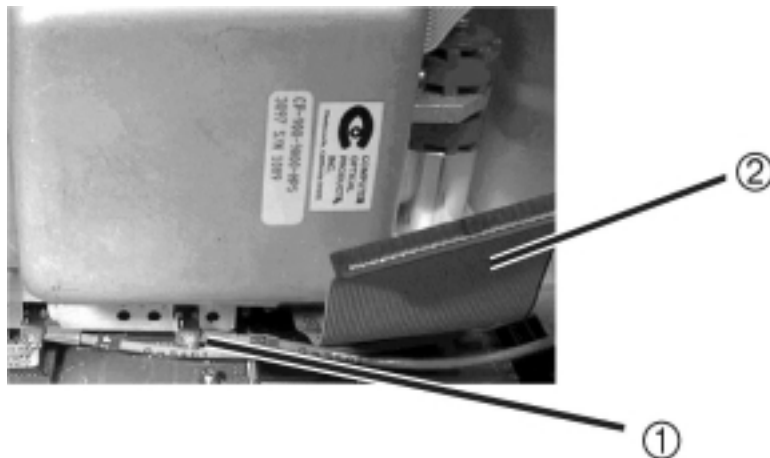


Figure 3-79. Disconnecting the Trans-Z ribbon cable

- 11 Lift up the outside edge of the optical assembly a few degrees making sure not to put tension on the Trans-Z Analog Out connector that is still connected. See [Figure 3-68](#) below.
- 12 While supporting the optical assembly, disconnect the Trans-Z Analog Out connector. See ① in [Figure 3-67](#) above.

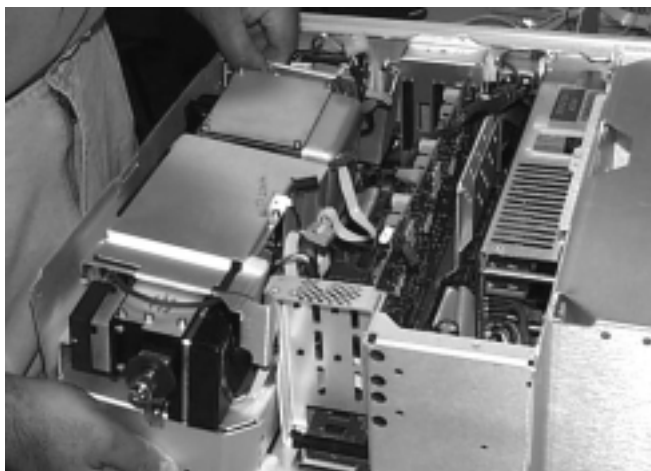


Figure 3-80. Removing the optical assembly

- 13** Remove the optical assembly from the instrument.

Assembly Replacement Procedures
To Remove the Optical Assembly

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Replaceable Parts

Instrument Options

Table 4-1. Instrument Options

Option	Description	86140A/B	86141B	86142A/B	86143A/B	86144B	86145A/B	86146B
001	Built-in current source	■	■	■				■
002 ^a	Built-in white light source	■	■	■				■
004	Built-in 1310 nm/1550 nm EELED	■	■	■				■
005	Built-in 1550 nm EELED	■	■	■				■
006	Calibration source	■	■	■	■	■	■	■
011	HMS-10 input connector	■	■	■	■	■	■	■
012	FC input connector	■	■	■	■	■	■	■
013	DIN input connector	■	■	■	■	■	■	■
014	ST input connector	■	■	■	■	■	■	■
017	SC input connector	■	■	■	■	■	■	■
025	Multimode input fiber	■			■			
030	Add single-mode 10 dB attenuator (flat connector)	■	■	■	■	■	■	■
040	Protective front cover				■	■	■	
042	Soft carrying case				■	■	■	
AX4	Rack mount kit without handles	■	■	■				■
AXE	Rack mount kit with handles	■	■	■				■
AB2	Chinese <i>User's Guide</i>	■	■	■	■	■	■	■
ABA	English <i>User's Guide</i>	■	■	■	■	■	■	■
ABJ	Japanese <i>User's Guide</i>	■	■	■	■	■	■	■
UK6	Calibration certificate with test data	■	■	■	■	■	■	■
W30	3 -years customer return repair service	■	■	■	■	■	■	■
W32	3 -years customer return calibration service	■	■	■	■	■	■	■
W34	3 -years customer return standards compliant calibration service	■	■	■	■	■	■	■
W50	5 -years customer return repair service	■	■	■	■	■	■	■
W52	5 -years customer return calibration service	■	■	■	■	■	■	■
W54	5 -years customer return standard compliant calibration service	■	■	■	■	■	■	■

a. Option 002 is available on "B" OSAs only.

86140 Series Adapters

Table 4-2. Fiber-Optic Adapters

Description	Part Number
HMS-10 (<i>Option 011</i>)	81000AI
FC/PC (<i>standard</i>)	81000FI
DIN 47256 (<i>Option 013</i>)	81000SI
ST (<i>Option 014</i>)	81000VI
SC (<i>Option 017</i>)	81000KI

86140 Series Major Assemblies

Table 4-3. 86140 Series Major Assemblies

Description	Part Number	Exchange Assemblies
Front Panel Assemblies		
86140A/B and 86142A/B Front Panel Exchange Assemblies		
Standard (No Options)	86140-60102	86140-69102
Options 002 or 004 or 005 (Left-hand opening)	86140-60103	86140-69103
Option 006 (Right-hand opening)	86140-60104	86140-69104
Options 002/006 or 004/006 or 005/006 (Both-sides opening)	86140-60105	86140-69105
86141B Front Panel Exchange Assemblies		
Standard (No Options)	86141-60001	86141-69001
Options 002 or 004 or 005 (Left-hand opening)	86141-60002	86141-69002
Option 006 (Right-hand opening)	86141-60003	86141-69003
Options 002/006 or 004/006 or 005/006 (Both-sides opening)	86141-60004	86141-69004
86143A/B and 86145A/B Front Panel Exchange Assemblies		
Standard (No Options)	86143-60060 ^a	86143-69060 ^a
Option 006 (Right-hand opening)	86143-60063 ^a	86143-69063 ^a
86144B Front Panel Exchange Assemblies		
Standard (No Options)	86144-60001	86144-69001
Option 006	86144-60002	86144-69002
86146B Front Panel Exchange Assemblies		
Standard (No Options)	86146-60101	86146-69101
Option 002 or 004 or 005 (left-hand opening)	86146-60106	86146-69106
Option 006 (right-hand opening)	86146-60107	86146-69107
Options 002/006 or 004/006 or 005/006 (both sides openings)	86146-60110	86146-69110
Optical Assemblies		
86140A/B and 86143A/B Optical Exchange Assemblies		
Standard single mode optical assembly	86140-60084	86140-69084
Multi-mode fiber input (Option 025)	86140-60080	86140-69080
86141B Optical Exchange Assembly		
Optically switched output optical assembly	86140-60081	86140-69081
86142A/B and 86145A/B Optical Exchange Assemblies		
Low PDL single mode optical assembly	86140-60082	86140-69082
H 42 Special option improved PDL single-mode optical assembly ^b	86140-60087	not available
86144B Optical Exchange Assembly		
Standard single mode dual fiber optical assembly	86146-60025	86146-69025
86146B Optical Exchange Assembly		
Low PDL single mode dual fiber optical assembly	86146-60026	86146-69026
Options Assemblies		
1310/1550 nm EELED Assembly (Option 004)	86140-60071	86140-69071
1550 nm EELED Assembly (Option 005)	86140-60070	86140-69070

Table 4-3. 86140 Series Major Assemblies

Description	Part Number	Exchange Assemblies
Calibrator Assembly (Option 006)	86140-60069	 86140-69069
Processor and Chassis Assemblies (includes chassis, processor, interface board, and mezzanine board)		
86140A/B, 86141B, 86142A/B, 86143A/B, and 86145A/B Processor and Chassis Assembly	86140-60063	86140-69063
86144B and 86146B Processor and Chassis Assembly	86146-60112	86146-69112
Rear Panel Assemblies		
86140A/B, 86141B, and 86142A/B Rear Panel Assembly	86140-60016	not available
86143A/B, 86144B, and 86145A/B Rear Panel Assembly	86140-60019	not available
86146B Rear Panel Assembly	86082-60010	not available
Servo Board		
86140A/B, 86141B, 86142A/B, 86143A/B, and 86145A/B Servo Board	86140-60060	not available
86144B and 86146B Servo Board	86146-60001	not available
Options Board	86140-60108	not available
Printer Assemblies		
86140A/B, 86141B, 86142A/B, 86143A/B, 86145A/B, and 86146B Printer Assembly	86143-60023	 not available
86144B Printer Assemblies	86144-60018	 not available
Floppy Drive Assemblies – Please refer to "To Remove the Floppy Disk Drive" on page 3-30 to make the appropriate selection.		
102 mm light gray drive	0950-3109	not available
102 mm dark gray drive	0950-3108	not available
97 mm light gray drive	0950-2782	not available
Hard Drive Assembly	86140-10001	not available
Power Supply Assembly	86143-60030	not available

- a. For 86143A and 86143B units with serial numbers US40150502 and earlier, and 86145A and 86145B units with serial numbers US40150538 and earlier, also order: 0950-2782 and 86144-00005.
b. H42 option is available on the 86142B only.

86140A Series Part Numbers

Table 4-4. Front Panel Assemblies

Description	86140A/86142A Part Number	86143A/86145A Part Number
Standard front panel (no options)	86140-60065	86143-60054
Options 002/004/005 front panel	86140-60066	na
Option 006 front panel	86140-60067	86143-60056
Option 002 and 006, option 004 and 006, or option 005 and 006 front panel	86140-60068	na
Nameplate	86140-80002 (86140A) 86142-80002 (86142A)	86143-80002 (86143A) 86145-80001 (86145A)

Table 4-5. Options

Description	86140A/86142A Part Number	86143A/86145A Part Number
Options board	86140-60008	86140-60008
White light source (option 002)	5086-6913	na
1310/1500 nm internal EELED source (option 004)	86140-60071	na
1550 nm internal EELED source (option 005)	86140-60070	na
Calibrator assembly (option 006)	86140-60069	86140-60069

Table 4-6. Chassis Assembly

Description	86140A/86142A Part Number	86143A/86145A Part Number
Replacement processor and chassis (without power supply)	86140-60063	86140-60063
Chassis assembly	86143-60022	86143-60022
Mezzanine board assembly	86140-60004	86140-60004
GPIB II interface board assembly	86140-60005	86140-60005
CPU board (Rocky board)	86140-60052	86140-60052
Servo control board assembly	86140-60060	86140-60060
Chassis	86143-00004	86143-00004
Rear connector plate	86143-00005	86143-00005
Heat sink	86143-00006	86143-00006
Heat sink retainer	86143-20025	86143-20025
GPIB harness assembly	86143-60028	86143-60028
Power supply assembly	86143-60030	86143-60030

Table 4-7. Instrument Frame/Other

Description	86140A/86142A Part Number	86143A/86145A Part Number
Right rear bracket	86140-00015	na
Z bracket	86140-00025	na
Adapter bracket	86140-00032	na
Disc drive bracket	86140-00004	86143-00012
Hard drive bracket	86143-00016	86143-00016
Left bracket	86140-00010	na
Right bracket	86140-00011	na
Support frame	na	86143-00023
Printer cable assembly	86140-60023	na
Hard drive cable assembly	86143-60024	86143-60024
Front panel cover assembly	na	86143-60031
3.5" floppy disc drive	0950-3109	0950-3108
Hard disk drive with software	86140-10001	86140-10001
Inner cover	86143-00002	86143-00002

Replaceable Parts
86140A Series Part Numbers

Table 4-8. Instrument Cover and Accessories

Description	86140A/86142A Part Number	86143A/86145A Part Number
Instrument cover	86140-00016	86143-60017
Handle assembly	86140-60020	na
Bottom foot	5041-9167	na
Rear foot	5041-9611	na
Modified rear foot	na	5042-1005
Rear panel assembly	86140-60016	86143-60019

Table 4-9. Optical Assemblies

Description	86140A Part Number	86142A Part Number	86143A Part number	86145A Part number
Standard single mode fiber input optical assembly	86140-60034	na	86140-60034	na
Multi-mode fiber input optical assembly (option 025)	86140-60030	na	86140-60030	na
Low polarization single mode optical assembly	na	86140-60032	na	86140-60032

Table 4-10. Printer Assembly

Description	86140A/86142A Part Number	86143A/86145A Part Number
Printer assembly	86143-60023	86143-60023
Thermal paper 	9270-1605	9270-1605

86140B Series Part Numbers

Table 4-11. Front Panel Assemblies



Description	86140B/86142B	86141B	86143B/86145B	86144B	86146B
Standard front panel	86140-60102	86141-60001	86143-60060	86144-60001	86146-60101
Option 002/004/005 front panel	86140-60103	86141-60002	na	na	86146-60106
Option 006 front panel	86140-60104	86141-60003	86143-60063	86144-60002	86146-60107
Option 002 and 006, option 004 and 006, or option 005 and 006 front panel	86140-60105	86141-60004	na	na	86146-60110
Nameplate	86140B 86140-80046 86142B 86142-80003	86141-80008	86143B 86143-80004 86145B 86145-80002	86144-80001	86146-80001

Table 4-12. Options

Description	86140B/41B/42B/46B Part Number	86143B/44B/45B Part Number
Options Board	86140-60108	86140-60108
White light source (option 002)	5086-6913	na
1310/1500 nm internal EELED source (option 004)	86140-60071	na
1550 nm internal EELED source (option 005)	86140-60070	na
Calibrator assembly (option 006)	86140-60069	86140-60069

Replaceable Parts
86140B Series Part Numbers

Table 4-13. Chassis Assembly

Description	86140B/41B/42B/43B/45B Part Number	86144B/46B Part Number
Chassis assembly	86143-60022	86146-60102
Mezzanine board assembly	86140-60004	86082-60004
GPIB II interface board assembly	86140-60005	86140-60106
CPU board (Rocky board)	86140-60052	86140-60052
Servo control board assembly	86140-60060	86146-60001
Chassis	86143-00004	86146-60045
Rear connector plate	86143-00005	86143-00005
Heat sink	86143-00006	86143-00006
Heat sink retainer	86143-20025	86143-20025
GPIB harness assembly	86143-60028	86144B 86143-60028
		86146B 86082-60020
Power supply assembly	86143-60030	86143-60030



Table 4-14. Instrument Frame/Other

Description	86140B/41B/42B Part Number	86143B/44B/45B Part Number	86146B Part Number
Right rear bracket	86140-00015	na	na
Z bracket	86140-00025	na	86140-00025
Adapter bracket	86140-00032	na	na
Disc drive bracket	86140-00037	86144-00005	86146-00005
Hard drive bracket	86143-00016	86143-00016	86143-00016
Printer roll bracket	na	86144-00002 (86144B only)	na
Left bracket	86140-00010	na	86140-00010
Right bracket	86140-00011	na	86146-00019
Support frame	na	86143-00023	na
Printer cable assembly	86140-60023	86143-60010 (86143B/45B) 86144-60005 (86144B)	86140-60023
Hard drive cable assembly	86143-60024	86143-60024	86143-60024
Front cover assembly	na	86143-60031	na
3.5" floppy disc drive	0950-2782	0950-2782	0950-2782
Floppy drive ribbon cable	8120-8711	8120-6423	8120-8711
Hard disk drive with software	86140-10001	86140-10001	86140-10001 
Inner cover	86143-00002	86143B/45B 86143-00002 86144B 86146-00020	86146-00020

Table 4-15. Instrument Cover and Accessories

Description	86140B/41B/42B/46B Part Number	86143B/44B/45B Part Number
Instrument cover	86140-00016 	86143B/45B 86143-60017 86144B 86144-00004
Handle assembly	86140-60020	na
Bottom foot	5041-9167	na
Rear foot	5041-9611	na
Modified rear foot	na	5042-1005
Rear panel assembly	86140B/41B/42B 86140-60016 86146B 86082-60010	86143-60019

Replaceable Parts
86140B Series Part Numbers

Table 4-16. Optical Assemblies

Description	86140B/86143B	86141B	86142B/45B	86144B	86146B
Standard single mode fiber input optical assembly	86140-60084	na	na	na	na
Multi-mode fiber input optical assembly (option 025)	86140-60080	na	na	na	na
Low polarization single mode optical assembly	na	na	86140-60082	na	na
Optically switched output optical assembly	na	86140-60081	na	na	na
Low polarization single mode dual fiber optical assembly	na	na	na	na	86146-60026
Standard single mode dual fiber optical assembly	na	na	na	86146-60025	na
Special optical assembly (H42) (improved PDL specification)	na	na	86142-60087 (86142B only)	na	na

Table 4-17. Printer Assembly

Description	86140B/41B/42B/43B/45B/46B Part Number	86144B Part Number
Thermal paper	9270-1605	9270-1605
Printer assembly	86143-60023	86144-60018

Portable Instrument Cover and Handle Parts

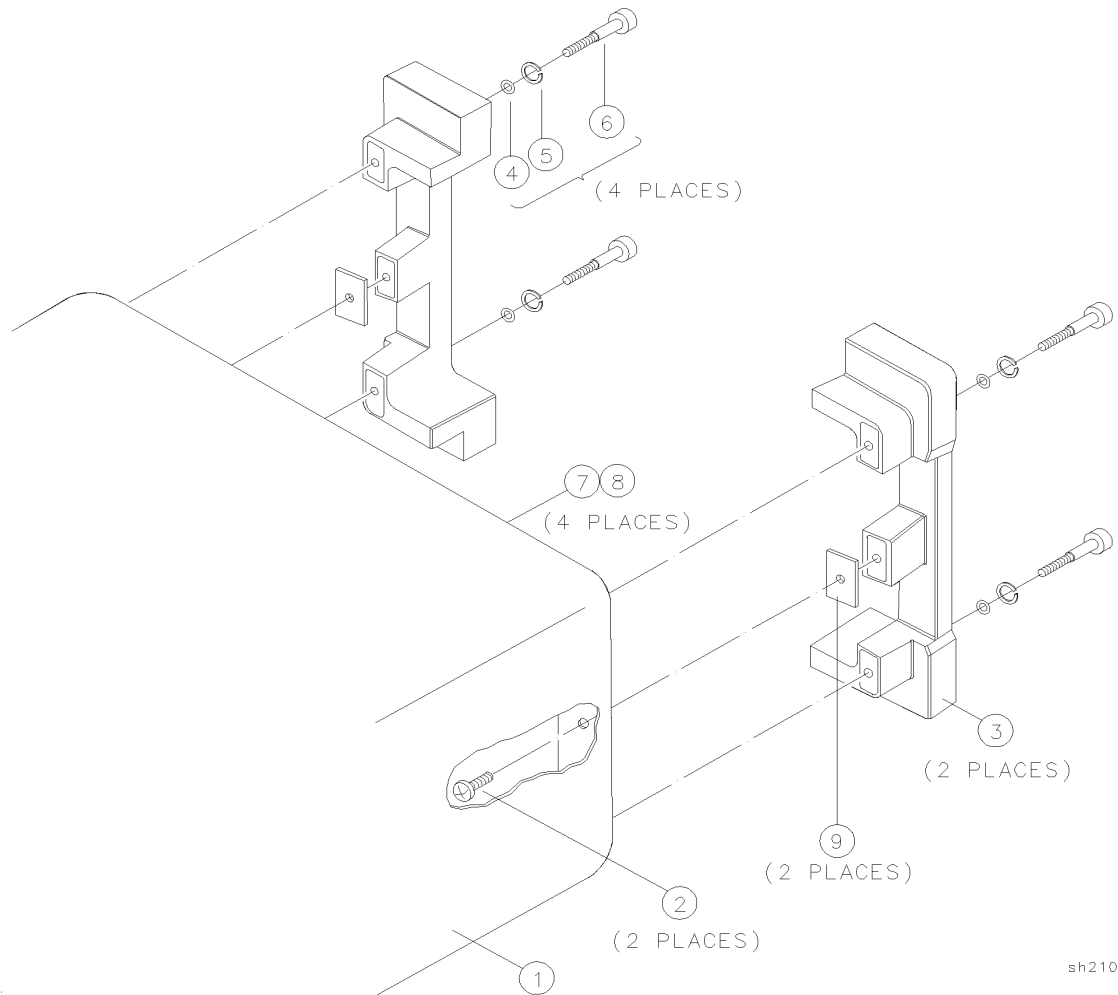


Table 4-18. Instrument Cover Parts

Item	Description	86143A/B and 86145A/B Part Number	86144B Part Number	Quantity
	Instrument cover. Includes all parts listed in this table.	86143-60017	86144-60004	1
1	Cover	86143-00001	86144-00004	1
2	Screw, TORX T15 Pan Head, M4 x 0.7, 10 mm long	0515-1819	0515-1819	6
3	Rear foot	5041-8907	5042-1005	2
4	O-ring, 0.145 inch diameter	0900-0024	0900-0024	4
5	Lock washer, M5	2190-0587	2190-0587	4
6	Screw, socket head cap (hex recess), M5 x 0.8, 40 mm long	0515-1218	0515-1218	4
7	Washer flat	3050-0893	3050-0893	4
8	Screw, Pan Head, M4, 10 mm long	0515-1069	0515-1069	4
9	Spacer for rear foot	08590-40005	08590-40005	2
10	Bumper, top right/bottom left	5041-8904	5041-8904	2
11	Bumper, top left/bottom right	5041-8905	5041-8905	2

Replaceable Parts
86140B Series Part Numbers

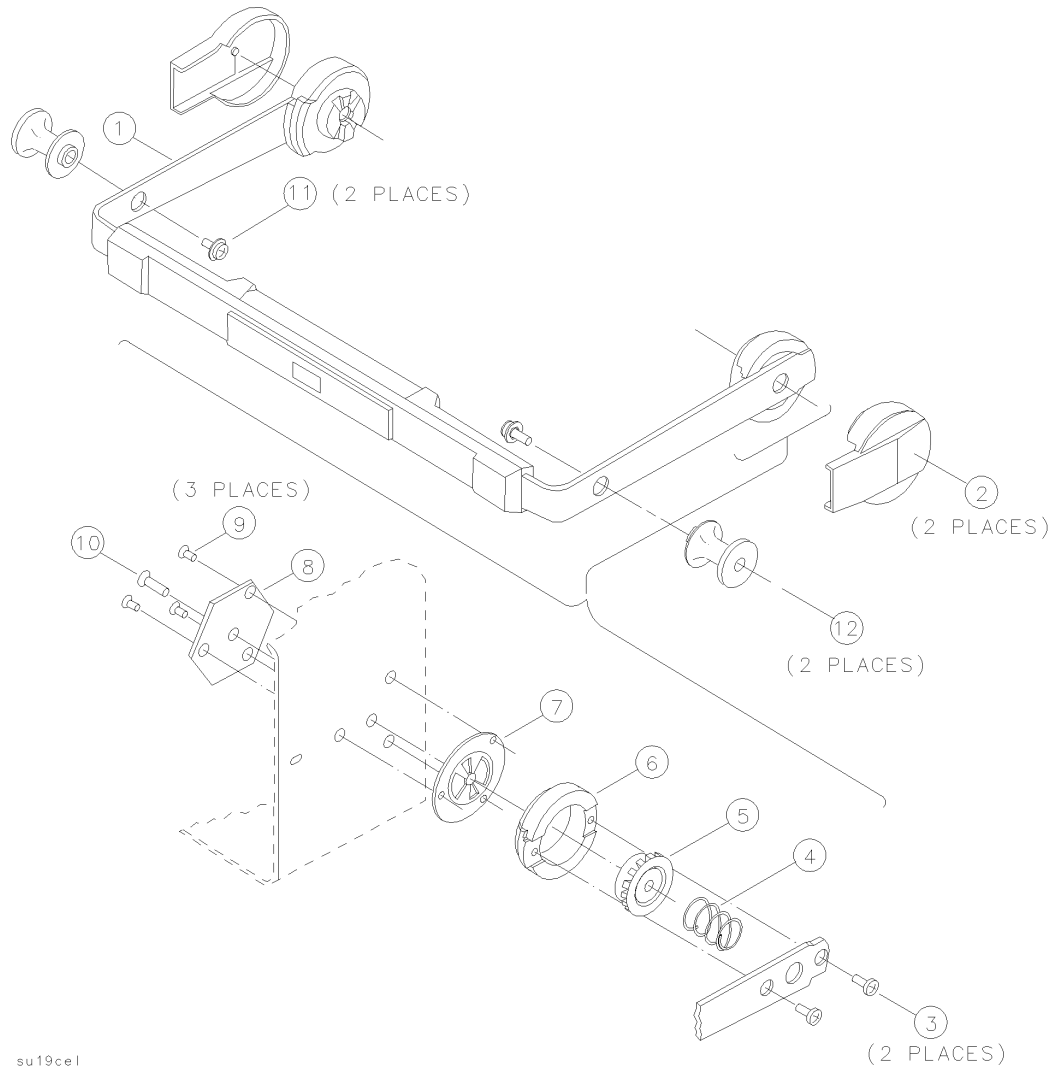
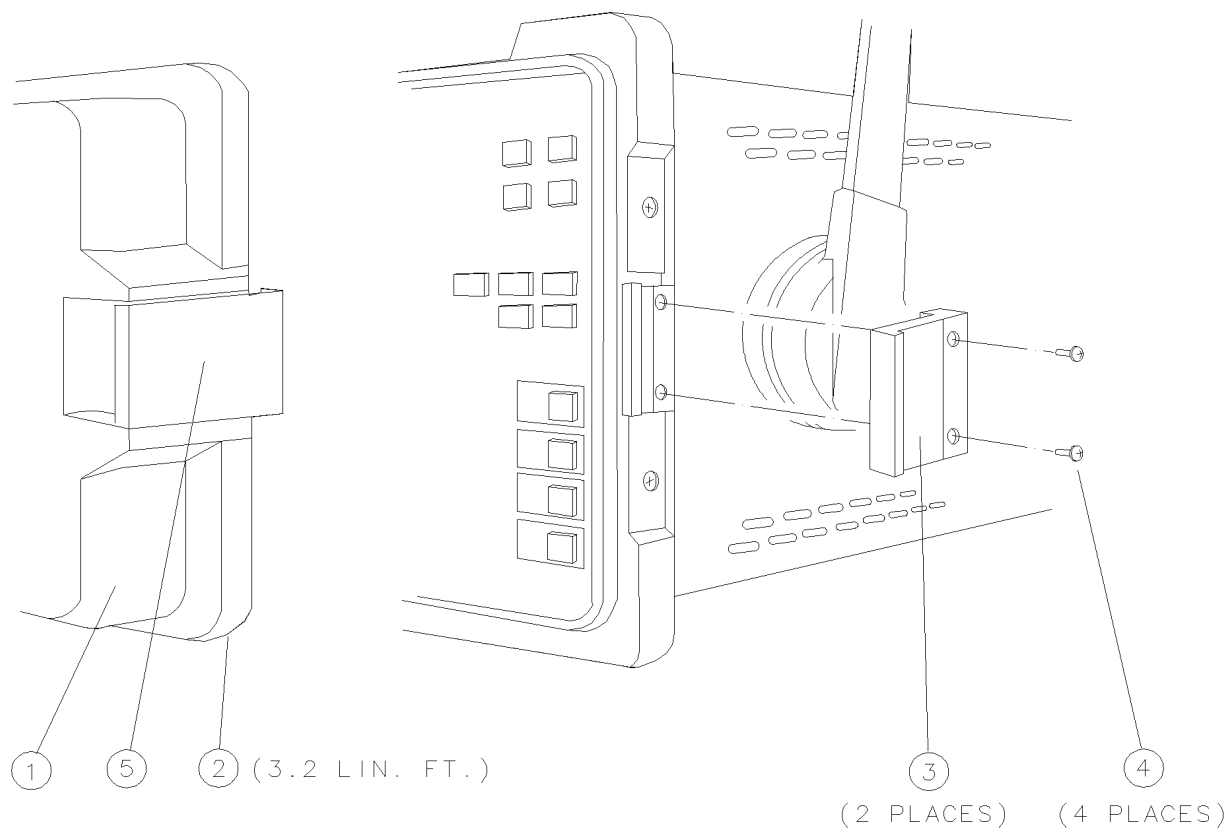


Table 4-19. Handle Assembly Parts

Item	Description	Part Number	Quantity
1	Handle	5041-8992	1
2	Trim cap for handle	5041-8912	2
3	Screw, TORX T15 Pan Head, M4 x 0.7, 10 mm long	0515-1819	6
4	Spring clip, 0.845 outer diameter	1460-2164	2
5	Ring gear	5021-6343	2
6	Socket gear	5021-6344	2
7	Plate for handle	5021-8667	2
8	Backup plate	5001-8728	2
9	Screw, TORX T15 Flat Head, M4 x 0.7, 8 mm long	0515-2043	6
10	Screw, TORX T20 Flat Head, M5 x 0.8, 16 mm long	0515-2049	2



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Table 4-20. Impact Cover Parts

Item	Description	Part Number	Quantity
1	Impact cover	5062-4805	1
2	Gasket, 3.2 ft.	5041-7235	1
3	Catch latch	5021-5483	2
4	Screw, TORX T10 Pan Head, M2.5, 6 mm long	0515-0894	4
5	Draw catch	5062-0730	2

Replaceable Parts

86140B Series Part Numbers

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Status Listings

Overview

This document describes the status listings of the Agilent 86140B series optical spectrum analyzers. Status conditions for the optical spectrum analyzer are grouped into categories.

Error	Indicates the instrument is malfunctioning. Measurement accuracy is probably affected. Errors can be caused by either a hardware or a firmware problem. The instrument requires repair at a Agilent Technologies service center.
Status error	Indicates an internal hardware function is unavailable or not operating within specifications. This is usually a temporary problem, such as a temperature control loop being unsettled. Status errors cannot be cleared by the user. When the condition causing the error is corrected the error will go away.
Warning	A warning is displayed when the optical spectrum analyzer cannot satisfy a request from the user. Parameter entries that are out of range, illegal or unrecognized remote commands or missing hardware options can cause a warning to be displayed. A warning can be displayed if a requested measurement, for example Auto Measure, cannot be performed due to a missing input signal.
UNCAL	This message alerts the user the requested instrument setup can cause an invalid measurement. For example, manually setting the sweep time to a value that is too fast for other instrument settings.
Notice	A user alert indicating something in the state of the instrument has changed. For example, if the user specifies a particular value for the current duty cycle, a notice will be displayed when the optical spectrum analyzer modifies the pulse width.

The following table lists the error numbers and their definitions.

Number Range	Definition
–1 to –999	Standard SCPI errors
1000 to 2999	OSA notices
3000 to 4999	Application specific notices
5000 to 7999	OSA warnings
8000 to 9999	Application specific warnings
10000 to 11999	OSA status errors
12000 to 13999	Application specific status errors
20000 to 21999	OSA errors
22000 to 23999	Application specific errors
30000 to 32767	Firmware errors

Error Reporting Behavior

Errors are displayed in an on-screen dialog box. To continue operation, the user must acknowledge the error by pressing a button.

Status errors are displayed with a descriptive line in the lower-left corner of the graticule. Immediately press the **System** key below the display, and then press the *Help* softkey to the right of the display to display more information. A softkey menu is displayed that includes, *Show Critical Errors*, *Show HW Errors*, *Show Warnings*, and *Show Notices*. If there are any errors, warnings or notices, one or more of these keys are enabled. Press the key to display a more complete description of the condition causing the message.

Warnings and notices are displayed in a status line at the bottom of the screen. They are cleared when any front-panel key, other than the **System** key, is pressed, or they will clear automatically after a few seconds. To view warnings and notices, press the front-panel **System** key, the *Help* softkey and then the *Show Warnings* or *Show Notices* softkey. **UNCAL** is displayed as red text in the lower-right corner of the graticule. It is only displayed when a condition exists that can lead to an inaccurate measurement. There are cases when valid measurements can be made while an **UNCAL** condition exists, but the operator should use caution.

SCPI-Defined Errors

These error messages and descriptions were copied from the *SCPI 1997 Volume 2: Command reference*. The sentences enclosed in brackets “[]” are copied from the error descriptions in the SCPI reference. References are also made to IEEE 488.2 sections for further clarification of events.

Not all the available SCPI error messages were utilized in the optical spectrum analyzer. Only those pertinent to the instrument were implemented.

Note that some of the error messages do not contain descriptions or help messages. These error numbers are reserved for future expansion. This document is subject to further change and development.

Standards related information

Further information on the Standard Commands for Programmable Instruments (SCPI) standard is available from the SCPI consortium.

Contact:

Fred Bode, Executive Director
SCPI Consortium
8380 Hercules Drive, Suite P3
La Mesa, CA 91942
Phone: (619) 697-8790
FAX: (619) 697-5955
CompuServe Number: 76516,254
Fbode@vxinl.com

For more detailed information on the IEEE 488.2 Standard, order a reference copy.

Contact:

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street
New York, New York 10017-2394
Phone: (800) 678-IEEE (US) 8 a.m. – 4:30 p.m. (EST)
(908) 981-1393 (International)
Fax: (908) 981-9667

Standard SCPI errors (–1 to –999)

All positive numbers are instrument-dependent. All negative numbers are reserved by the SCPI standard with certain standard error/event codes described in this document. The value, zero, is also reserved to indicate that no error or event has occurred.

Error/event numbers

The system-defined error/event numbers are chosen on an enumerated (“1 of N”) basis. The SCPI-defined error/event numbers and the <error/event description> portions of the full queue item are listed here. The first error/event described in each class (for example, –100, –200, –300, –400) is a “generic” error. In selecting the proper Error/event number to report, more specific error/event codes are preferred, and the generic error/event is used only if the others are inappropriate.

Command errors

An <error/event number> in the range [–199, –100] indicates that an IEEE 488.2 syntax error has been detected by the instrument’s parser. The occurrence of any error in this class shall cause the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1) to be set.

One of the following events has occurred:

- An IEEE 488.2 syntax error has been detected by the parser. That is, a controller-to-device message was received which is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates the device listening formats or whose type is unacceptable to the device.
- An unrecognized header was received. Unrecognized headers include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.
- A Group Execute Trigger (GET) was entered into the input buffer inside of an IEEE 488.2 <PROGRAM MESSAGE>.

Events that generate command errors shall not generate execution errors, device-specific errors, or query errors; see the other error definitions in this chapter.

Table 5-1. Command Errors (1 of 4)

Error Number	Error Description [description/explanation/examples]
–101	desc = “Invalid character” help = “” [A syntactic element contains a character which is invalid for that type; for example, a header containing an ampersand, SETUP&. This error might be used in place of errors –114, –121, –141, and perhaps some others.]
–102	desc = “Syntax error” help = “” [An unrecognized command or data type was encountered for example, a sting was received when the instrument does not accept strings.]
–103	desc = “Invalid separator” help = “” [The parser was expecting a separator and encountered an illegal character; for example, the semicolon was omitted after a program message unit, *EMC 1:CH1:VOLTS 5.]

Table 5-1. Command Errors (2 of 4)

Error Number	Error Description [description/explanation/examples]
–104	desc = “Wrong Parameter Type” help = “” [The parser recognized a data element different than one allowed; for example, numeric or string data was expected but block data was encountered.]
–105	desc = “GET not allowed” help = “” [A Group Execute Trigger was received within a program message (see IEEE 488.2, 7.7).]
–108	desc = “Parameter not allowed” help = “” [More parameters were received than expected for the header; for example, the *EMC common command only accepts one parameter, so receiving *EMC 0,1 is not allowed.]
–109	desc = “Missing parameter” help = “” [Fewer parameters were received than required for the header; for example, the *EMC common command requires one parameter, so receiving *EMC is not allowed.]
–112	desc = “Program mnemonic too long” help = “” [The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).]
–113	desc = “Undefined header” help = “” [The header is syntactically correct, but it is undefined for this specific device; for example, *XYZ is not defined for any device.]
–120	desc = “Numeric Data Error” help = “” [This error, as well as errors –121 through –129, are generated when parsing a data element which appears to be numeric, including the non-decimal numeric types. This particular error message should be used if the device cannot detect a more specific error.]
–121	desc = “Invalid character in number” help = “” [An invalid character for the data type being parsed was encountered; for example, an alpha in a decimal numeric or a “9” in octal data.]
–123	desc = “Exponent too large” help = “” [The magnitude of the exponent was larger than 32000 (see IEEE 488.2, 7.7.2.4.1).]
–124	desc = “Too many digits” help = “” [The mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).]
–128	desc = “Numeric data not allowed” help = “” [A legal numeric data element was received, but the device does not accept one in this position for the header.]

SCPI-Defined Errors**Table 5-1. Command Errors (3 of 4)**

Error Number	Error Description [description/explanation/examples]
–131	desc = “Invalid suffix” help = “” [The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.]
–134	desc = “Suffix too long” help = “” [The suffix contained more than 12 characters (see IEEE 488.2, 7.7.3.4).]
–138	desc = “Suffix not allowed” help = “” [A suffix was encountered after a numeric element which does not allow suffixes.]
–148	desc = “Character data not allowed” help = “” [A legal character data element was encountered where prohibited by the device.]
–150	desc = “String data error” help = “” [This error, as well as errors –151 through –159, are generated when parsing a string data element. This particular error message should be used if the device cannot detect a more specific error.]
–151	desc = “Invalid string data” help = “” [A string data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.5.2); for example, an END message was received before the terminal quote character.]
–158	desc = “String data not allowed” help = “” [A string data element was encountered but was not allowed by the device at this point in parsing.]
–161	desc = “Invalid block data” help = “” [A block data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.6.2); for example, an END message was received before the length was satisfied.]
–168	desc = “Block data not allowed” help = “” [A legal block data element was encountered but was not allowed by the device at this point in parsing.]
–170	desc = “Expression error” help = “” [This error, as well as errors –171 through –179, are generated when parsing an expression data element. This particular error message should be used if the device cannot detect a more specific error.]
–171	desc = “Invalid expression” help = “” [The expression data element was invalid (see IEEE 488.2, 7.7.7.2); for example, unmatched parentheses or an illegal character.]

Table 5-1. Command Errors (4 of 4)

Error Number	Error Description [description/explanation/examples]
-178	desc = "Expression data not allowed" help = "" [A legal expression data was encountered but was not allowed by the device at this point in parsing.]
-181	desc = "Invalid outside macro definition" help = "" [Indicates that a macro parameter placeholder (\$<number>) was encountered outside of a macro definition.]
-183	desc = "Invalid inside macro definition" help = "" Indicates that the program message unit sequence, sent with a *DDT or *DMC command, is syntactically invalid (see IEEE 488.2, 10.7.6.3).]

Execution errors

An <error/event number> in the range [–299, –200] indicates that an error has been detected by the instrument’s execution control block. The occurrence of any error in this class shall cause the execution error bit (bit 4) in the event status register (IEEE 488.2, section 11.5.1) to be set.

One of the following events has occurred:

- A <PROGRAM DATA> element following a header was evaluated by the device as outside of its legal input range or is otherwise inconsistent with the device’s capabilities.
- A valid program message could not be properly executed due to some device condition.

Execution errors shall be reported by the device after rounding and expression evaluation operations have taken place. Rounding a numeric data element, for example, shall not be reported as an execution error. Events that generate execution errors shall not generate Command Errors, device-specific errors, or Query Errors; see the other error definitions in this section.

Table 5-2. Execution Errors (1 of 2)

Error Number	Error Description [description/explanation/examples]
–200	desc = “Execution error” help = “” [This is the generic syntax error for devices that cannot detect more specific errors. This code indicates only that an Execution Error as defined in IEEE 488.2, 11.5.1.1.5 has occurred.]
–213	desc = “INIT:IMM command ignored” help = “An initiate immediate remote command was received. The instrument was in continuous sweep mode when the command was received. The remote command is ignored unless the instrument is in single sweep mode. To select single sweep mode use the INIT:CONT OFF command.”
–221	desc = “Settings Conflict Error” help = “A request was made but the instrument settings resulting from the request are in conflict with each other.” [Indicates that a legal program data element was parsed but could not be executed due to the current device state (see IEEE 488.2, 6.4.5.3 and 11.5.1.1.5.)]
–222	desc = “Data out of range” help = “A numeric value was entered which is outside the legal range of values for the parameter. The name of the parameter is listed at the end of the error message.” [Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device (see IEEE 488.2, 11.5.1.1.5.)]
–222	desc = “Span out of range” help = “A numeric value was entered which is outside the legal range of values for the span setting. This occurs if the value is too large less than zero or between zero and 0.2nm. Zero span may not be entered by using the DOWN arrow key from 0.2nm; a numeric value of zero must be entered instead.” [Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device (see IEEE 488.2, 11.5.1.1.5.)]

Table 5-2. Execution Errors (2 of 2)

Error Number	Error Description [description/explanation/examples]
-223	desc = "Too much data" help = "" [Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.]
-224	desc = "Illegal parameter value" help = "" [Used where exact value, from a list of possibles, was expected.]
-257	desc = "File name error" help = "" [Indicates that a legal program command or query could not be executed because the file name on the device media was in error; for example, an attempt was made to copy to a duplicate file name. The definition of what constitutes a file name error is device-specific.]
-272	desc = "Macro Exec Error" help = "" [Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition (see IEEE 488.2, 10.7.6.3).]
-273	desc = "Illegal macro label" help = "" [Indicates that the macro label defined in the *DMC command was a legal string syntax, but could not be accepted by the device (see IEEE 488.2, 10.7.3 and 10.7.6.2); for example, the label was too long, the same as a common command header, or contained invalid header
-276	desc = "Macro recursion error" help = "" [Indicates that a syntactically legal macro program data sequence could not be executed because the device found it to be recursive (see IEEE 488.2, 10.7.6.6).]
-277	desc = "Macro redefinition not allowed" help = "" [Indicates that a syntactically legal macro label in the *DMC command could not be executed because the macro label was already defined (see IEEE 488.2, 10.7.6.4).]
-278	desc = "Macro header not found" help = "" [Indicates that a syntactically legal macro label in the *GMC? query could not be executed because the header was not previously defined.]

Device-specific errors

An <error/event number> in the range [–399, –300] or [1, 32767] indicates the instrument has detected an error which is not a command error, a query error, or an execution error; some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. The meaning of positive error codes is device-dependent and may be enumerated or bit mapped; the <error message> string for positive error codes is not defined by SCPI and available to the device designer. Note that the string is not optional; if the designer does not wish to implement a string for a particular error, the null string should be sent (for example, 42,""). The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. Events that generate device-specific errors shall not generate command errors, execution errors, or query errors; see the other error definitions in this section.

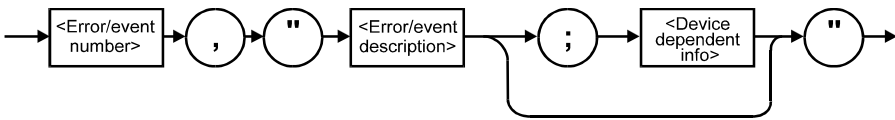


Table 5-3. Device-Specific Errors

Error Number	Error Description [description/explanation/examples]
–310	desc = "System error" help = "" [Indicates that some error, termed "system error" by the device, has occurred. This code is device-dependent.]
–321	desc = "Out of memory" help = "" [An internal operation needed more memory than was available.]

Query errors

An <error/event number> in the range [–499, –400] indicates that the output queue control of the instrument has detected a problem with the message exchange protocol described in IEEE 488.2, chapter 6. The occurrence of any error in this class shall cause the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1) to be set. These errors correspond to message exchange protocol errors described in IEEE 488.2, section 6.5.

One of the following is true:

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

Events that generate query errors will not generate command errors, execution errors, or device-specific errors; see the other error definitions in this section.

Table 5-4. Query Errors (1 of 2)

Error Number	Error Description [description/explanation/examples]
–400	Query error [This is the generic query error for devices that cannot detect more specific errors. This code indicates only that a Query Error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.]
–410	Query INTERRUPTED [Indicates that a condition causing an INTERRUPTED Query error occurred (see IEEE 488.2, 6.3.2.3); for example, a query followed by DAB or GET before a response was completely sent.]
–420	Query UNTERMINATED [Indicates that a condition causing an UNTERMINATED Query error occurred (see IEEE 488.2, 6.3.2.2); for example, the device was addressed to talk and an incomplete program message was received.]
–430	Query DEADLOCKED [Indicates that a condition causing an DEADLOCKED Query error occurred (see IEEE 488.2, 6.3.1.7); for example, both input buffer and output buffer are full and the device cannot continue.]

SCPI-Defined Errors**Table 5-4. Query Errors (2 of 2)**

Error Number	Error Description [description/explanation/examples]
–440	Query UNTERMINATED after indefinite response [Indicates that a query was received in the same program message after an query requesting an indefinite response was executed (see IEEE 488.2, 6.5.7.5).]

OSA Notices

System control-related error messages or warnings

The OSA system changed a setting and generated a warning that the operation was performed.

Table 5-5. System Control Errors or Warnings

Error Number	Error Description [description/explanation/examples]
1000	desc = "Sensitivity forced to Auto" help = "Sensitivity has been forced to the Auto setting because another instrument setting was made which does not permit sensitivity to be in the Manual setting."
1001	desc = "Old Mezzanine board in system" help = "This OSA has an old mezzanine board installed. It is not necessary to upgrade the mezzanine board but the software will not be able to correctly determine which light source options are available."
1002	desc = "No Delta Marker Amplitude for" help = "The delta marker amplitude display has been turned off due to a units mismatch. The amplitude units of the reference marker are different than those of the delta marker. Values in differing units cannot be compared."
1003	desc = "Trace length increased" help = "Trace length has been increased because the wavelength limit function was turned off. The minimum trace length is larger when the wavelength limit function is off and trace length was below the new minimum value."
2999	desc = "The Notices list has overflowed" help = "The Notices list has overflowed. The last entries received have been deleted."

OSA Warnings

Table 5-6. OSA Warnings (1 of 9)

Error Number	Error Description [description/explanation/examples]
5000	desc = "AutoMeasure cannot find an input signal" help = "The auto-measure procedure cannot find a usable input signal. Make sure you have a signal connected to the optical input. Auto-measure will not work with very small input signals. They must be measured manually."
5001	desc = "AutoAlign cannot find an input signal" help = "The auto-align procedure cannot find a usable input signal. Make sure you have a signal connected to the optical input."
5002	desc = "Cal aborted: there is no active marker" help = "A wavelength calibration using the wavelength of the active marker was requested. The calibration cannot be made because all markers are turned off. Place a marker on the calibration signal and try again."
5003	desc = "Cal aborted: trace resolution is inadequate" help = "A wavelength calibration using the wavelength of the active marker was requested. The calibration cannot be done because the resolution of the marker's trace is inadequate. Trace resolution is defined as wavelength span divided by (trace points – 1) and must be less than 10pm. This problem can be corrected by one or more of the following steps: 1. Reduce wavelength span 2. Increase number of trace points"
5004	desc = "Cal aborted: wavelength correction too large" help = "A wavelength calibration was requested. The calibration was aborted since the correction needed is larger than 2nm. Make sure you have the correct index of refraction set. If the wavelength error is still this large the OSA may need to be serviced. The wavelength calibration function is not intended to apply large arbitrary offsets. Use the wavelength offset function for this purpose."
5005	desc = "Cal aborted: amplitude correction too large" help = "An amplitude calibration was requested. The calibration was aborted since the correction needed is more than +3dB or less than –10dB. Make sure you have done an Auto-Align prior to calibration. If the amplitude error is still this large the OSA may need to be serviced. The amplitude calibration function is not intended to apply large arbitrary offsets. Use the amplitude offset function for this purpose."
5006	desc = "Cal aborted: cannot find an input signal" help = "The calibration procedure cannot find an input signal close enough to the wavelength and/or amplitude specified. Make sure the wavelength and/or amplitude specified for calibration are correct and verify that an input signal of the correct wavelength and/or amplitude is connected to the optical input."

Table 5-6. OSA Warnings (2 of 9)

Error Number	Error Description [description/explanation/examples]
5007	desc = "Calibration aborted: signal disappeared" help = "The calibration procedure found a signal which subsequently disappeared. Make sure the calibration signal is connected to the optical input and try again."
5008	desc = "Calibration was not successful" help = "The requested calibration procedure did not complete successfully. Verify the instrument setup and the presence of a valid calibration signal. This problem can sometimes be caused by removing or changing the amplitude of the calibration signal during the calibration procedure. In rare cases this error can occur after the OSA has received a severe mechanical shock. Try running AutoAlign"
5009	desc = "I/O error" help = "An error occurred while processing an input/output request"
5010	desc = "The floppy disk is full" help = "There is not enough free space left on the floppy disk to contain the new file(s). Either make room on the existing floppy by deleting unwanted files or try a different floppy disk."
5011	desc = "There is no disk in the floppy disk drive" help = "An operation was requested which uses the floppy disk. There is no disk detected in the floppy disk drive. If there is a disk in the drive it may be of a format which cannot be read. This problem can be fixed by inserting a disk in the floppy disk drive or replacing the current disk with one which is properly formatted."
5012	desc = "The floppy disk is not formatted" help = "An operation was requested which uses the floppy disk. The disk currently in the drive does not appear to be formatted. Use the format utility to format the disk or replace it with a formatted disk."
5013	desc = "The floppy disk is write protected" help = "An operation was requested which writes to the floppy disk. The disk currently in the drive is write-protected. Turn off write protection on the current floppy disk or replace it with another disk."
5014	desc = "The internal memory is full" help = "An operation was requested which uses internal memory. There is not enough free space left in internal memory for this operation. You must make room by deleting one or more files."
5015	desc = "Up/down keys will not alter the span when it is zero" help = "The up/down step keys may not be used to alter the span setting when it is zero. A non-zero numeric value must be entered for span in order to leave zero span mode."
5016	desc = "Incompatible measurement file" help = "An attempt was made to recall a measurement file which is incompatible with the current version of software."
5017	desc = "The requested file does not exist" help = "An attempt was made to access a file which does not exist. Check the spelling of the file name against the listing of available files."

Table 5-6. OSA Warnings (3 of 9)

Error Number	Error Description [description/explanation/examples]
5020–5030	desc = “I/O Error” help “An unexpected error occurred during the I/O operation. Please try the operation again. If the operation involves the floppy disk drive, try a different floppy disk. If the error persists, please make a note of the error number and contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices.
5031	desc = “Could not initialize floppy” help => “A request was made to initialize a floppy disk. The operation did not succeed. Check to see that there is a floppy disk inserted in the drive and that the disk is not write protected. This can also be caused by a defective floppy disk.”
5032–5043	desc = “I/O Error” help “An unexpected error occurred during the I/O operation. Please try the operation again. If the operation involves the floppy disk drive, try a different floppy disk. If the error persists, please make a note of the error number and contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices.
5044	desc = “Please cycle power to synchronize system time” help = “The system time clock has been set backwards. Due to internal system requirements it is necessary to cycle power before continuing. Please turn power off and back on again. This must be done to ensure proper system operation.”
5045	desc = “Sweep limit markers too close together” help = “The sweep limit function is on and the line markers are too close together. The OSA cannot limit the sweep range to such a small value. The current sweep may be using a wider range than requested. Move the line markers farther apart or turn off sweep limit to resolve this problem.”
5046	desc = “AutoAlign cannot find input signal at marker” help = “The auto-align procedure could not find a usable input signal. If there is an active marker auto-align will attempt to align at the marker wavelength without searching for a signal peak. This error can also occur if the input signal amplitude is very low or if the OSA has received a large mechanical shock or if the input signal is removed after the auto-align procedure has begun. Be sure a signal is connected to the optical input. If there is an active marker make sure it is placed on the input signal or turn off all markers.”
5047	desc = “Signal disappeared during AutoAlign” help = “The auto-align procedure did not complete. The input signal disappeared during the auto-align procedure. Make sure the input signal is connected to the optical input and try again.”
5048	desc = “Wrong trace X axis units for peak to center” help = “The peak-to-center function was requested. This function will only execute if the active trace X axis has units of meters (um nm pm). Change the active trace to one with an X axis in meters or re-measure the active trace in a non-zero span.”

Table 5-6. OSA Warnings (4 of 9)

Error Number	Error Description [description/explanation/examples]
5049	desc = "Wrong marker X axis units for active trace" help = "The active marker cannot be placed on the active trace because the desired X axis units do not match the X axis units of the active trace. This is normally caused by recalling a wavelength trace in zero span or a zero span trace in a wavelength span. It can also be caused by loading a trace with conflicting units by remote control."
5050	desc = "Trace not displayed: wrong X axis units" help = "View has been turned on for this trace but it cannot be displayed. The X axis units in the trace do not match the X axis units being displayed. This is normally caused by trying to view a wavelength trace in zero span or a zero span trace in a wavelength span. It can also be caused by loading a trace with conflicting units by remote control."
5051	desc = "AutoMeasure cannot find input signal at marker" help = "The auto-measure function was requested. The auto-measure at marker option was enabled but the active marker was not placed on a valid signal. A valid signal was found but the active marker is too far from that signal. To correct this problem place the marker on the desired signal turn off all markers or disable the auto-measure at marker function."
5052	desc = "Sweep time auto is not allowed in zero span" help = "The sweep time function was requested to switch from manual to auto while in zero span. Automatic sweep time coupling cannot be done in zero span. The desired sweep time must be set explicitly."
5053	desc = "Noise marker not allowed." help = "A request was made to enable the noise marker readout. The readout cannot be enabled for one of the following reasons. Noise markers cannot be used on traces which have X axis units other than meters. This typically occurs in zero span where the X axis units are seconds. Noise markers cannot be used on traces which have Y axis units other than power. This typically happens when trace math is on and the trace Y axis represents a ratio."
5054	desc = "Bandwidth markers are not allowed in zero span" help = "A request was made to enable the bandwidth marker readout while the OSA was in zero span. Bandwidth markers are not permitted when span is set to zero. If a bandwidth marker readout is required set span to a value greater than zero."
5055	desc = "Firmware Upgrade was not successful" help => "A firmware upgrade operation was requested. The firmware upgrade operation cannot be done at this time due to an internal software problem. " + <- .serviceCenterHelp
5056	desc = "Trajectory align cannot find input signal" help = "The trajectory align procedure cannot find a usable input signal. Make sure you have a signal connected to the optical input."
5057	desc = "Invalid settings for trajectory align" help = "The external trajectory align function was requested. It cannot be executed because the start and/or stop wavelength settings are invalid. Start and stop wavelengths must be between 600nm and 1700nm. In addition the difference between start and stop wavelengths (span) must be greater than 25nm. To correct this problem adjust the start and/or stop wavelength settings to be valid."

Table 5-6. OSA Warnings (5 of 9)

Error Number	Error Description [description/explanation/examples]
5058	desc = "Out of memory" help = "The OSA has run out of execution memory. An internal function was aborted due to lack of execution memory. The correction for this problem is to cycle power."
5059	desc = "Trajectory align: marginal input signal" help = "The trajectory align procedure was aborted due to an input signal with marginal amplitude. The input signal was large enough when the function began it's operation but later became too small. This usually happens when the signal is on the edge of being too small. To correct this problem increase the input signal level. If this is not possible then a slight increase in signal level can sometimes be achieved by cleaning optical fiber connectors."
5060	desc = "Trajectory align failed" help = "The trajectory align procedure failed. The trajectory adjustments computed were invalid. This is usually occurs after the OSA has received a large mechanical shock. To correct this problem try the trajectory align procedure again. If the error persists, contact the Agilent support center nearest your location."
5061	desc = "Invalid marker trace" help = "The marker could not be positioned. The marker is on a trace which does not contain any valid data. This is sometimes caused by a trace math result which is invalid."
5062	desc = "ADC Triggered Sweep Too Fast" help = "A sweep was taken with one of the ADC trigger modes enabled. The sweep rate was too fast to allow trace data to be acquired for every wavelength. To resolve this problem increase sweep time or increase the frequency the external trigger input signal."
5063	desc = "Key disabled during applications" help = "The key you pressed is not active while an application is running. Exiting the application should re-enable the key."
5064	desc = "Invalid measurement file" help = "An attempt was made to recall a measurement file which is contains invalid or corrupt data."
5065	desc = "Error detected in DSP sub-system" help = "The Digital Signal Processor has reported an unexpected error. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the Agilent support center nearest your location."
5066	desc = "Error in Enhanced Wavelength Calibration" help = "Enhanced Wavelength Calibration failed. Check OSA system. If the error persists, contact the Agilent Service Center."
5067	desc = "OSNR marker not allowed." help = "A request was made to enable the OSNR marker readout. The readout cannot be enabled for one of the following reasons: OSNR markers cannot be used on traces which have X axis units other than meters. This typically occurs in zero span where the X axis units are seconds. OSNR marks cannot be used on traces which have Y axis units other than power. this typically happens when trace math is on and the trace Y axis represents a ratio."

Table 5-6. OSA Warnings (6 of 9)

Error Number	Error Description [description/explanation/examples]
5068	desc = "The configured SHARE does not exist." help = "A request was made to a remote file or printer share that does not exist or cannot be found."
5069	desc = "The configured SHARE cannot be accessed." help = "A request was made to a remote file or printer share that cannot be accessed using the configured USER, PASSWORD, or DOMAIN/WORKGROUP."
5070	desc = "Trajectory add failed." help = "The trajectory add procedure failed. This usually occurs when the trajectory table is full or the computed trajectory table is invalid. The correct this problem, try AUTO ALIGN PRESET and the AUTO ALIGN & ADD TO TRAJECTORY procedure again. If the error persists, contact the Agilent Service Center."
6700	desc = "Math expression input parameter undefined." help = "A math expression could not be evaluated because one or more input arguments are undefined. Please check the spelling of all input arguments."
6701	desc = "Math expression input parameter has error." help = "A math expression could not be evaluated because an error is present on one or more of the input arguments. The error must be cleared before the expression can be evaluated."
6702	desc = "Math expression parameter has zero length." help = "A math expression could not be evaluated because one or more input arguments has a zero length. This is often caused when the subset of a trace contains no points such as when advanced line marker functions are turned on and the line markers are too close together. It can also be caused when peak/pit searches find no peaks or pits."
6720	desc = "Math expression input parameter has error." help = "A math expression could not be evaluated because of improper input arguments. This could be due to one or more input arguments having the wrong type or size or because one or more inputs are not defined."
6721	desc = "Internal error in marker search" help => "A marker search function has failed due to an internal software problem. Please try the operation again. If the error persists, contact the Agilent support center nearest your location."
6722	desc = "Math expression input cannot be boolean." help = "A math expression could not be evaluated because one or more of the input arguments is boolean. This function does not allow boolean input arguments."
6723	desc = "Trace X axis values do not match." help = "A math expression could not be evaluated because the input arguments have differing X axis values. This function requires that all input arguments have identical X axis values. All trace inputs must be taken with identical start/stop settings."
6724	desc = "Error in source trace" help => "The source trace has an error. The error may possibly be that the source trace contains no points. Please try the operation again. If the error persists, contact the Agilent support center nearest your location."

Table 5-6. OSA Warnings (7 of 9)

Error Number	Error Description [description/explanation/examples]
6725	desc = "Trace lengths do not match." help = "A math expression could not be evaluated because the inputs have differing sizes (trace lengths). All inputs to this function must be of the same size."
6726	desc = "Trace lengths do not match." help = "A math expression could not be evaluated because the inputs have differing sizes (trace lengths). All inputs to this function must be of the same size."
6727	desc = "Y axis counts do not match." help = "A math expression could not be evaluated because the inputs have differing numbers of Y axis data. All input arguments to this function must have the same number of Y axis data points."
6728	desc = "Incorrect number of inputs for math expression" help = "A math expression could not be evaluated because the number of input arguments to the function is incorrect."
6729	desc = "Math expression expects units of dBm." help = "A math expression could not be evaluated because the input argument does not have the required Y axis units of dBm."
6730	desc = "Math expression expects units of watts." help = "A math expression could not be evaluated because the input argument does not have the required Y axis units of watts."
6731	desc = "Illegal combination of trace Y axis units" help = "A math expression could not be evaluated because the combination of Y axis units in the input arguments do not make sense. For example it is valid to divide watts by watts or to divide watts by a unitless value but it is invalid to divide a unitless value by watts."
6732	desc = "Illegal combination of trace X axis units" help = "A math expression could not be evaluated because the input arguments have differing X axis units. All input arguments must have identical X axis units. This commonly happens when trace math is attempted between a zero span trace (time units) and a non-zero span trace (wavelength units)."
6733	desc = "Invalid combination of Y axis units" help = "A math expression could not be evaluated because of an invalid combination of Y axis units. The math operation being performed only allows one of the arguments to have units. All other arguments must be unitless. The math operator is shown in parenthesis in the short message above. For example multiplying a trace in watts (dBm) by another trace in watts (dBm) is not permitted."
6734	desc = "Too many inputs have Y axis units" help = "A math expression could not be evaluated because of an invalid combination of inputs. Only one input argument is allowed to have non-blank Y axis units."
6735	desc = "Trace has too many Y axes" help = "A math expression could not be evaluated because of an invalid input. One of the arguments contains multiple sets of Y data. Only one set of Y data is allowed for this math function."

Table 5-6. OSA Warnings (8 of 9)

Error Number	Error Description [description/explanation/examples]
6736	desc = "Math expression expects boolean inputs." help = "A math expression could not be evaluated because of an invalid input. The math function requires all of it's arguments to be boolean. At least one of the arguments is not boolean."
6737	desc = "Invalid math constant" help = "During evaluation of a math expression an invalid constant was encountered. The constant has undefined or default settings for it's X and/or Y values."
6738	desc = "Out of memory" help = "A trace or math operation was requested. There is insufficient memory available to perform the operation. Try reducing trace length or cycle power."
6739	desc = "Too many peaks or pits" help = "A marker search operation was requested. There are too many valid pits or peaks in the current trace. Reduce the number of valid pits or peaks by increasing the peak or pit excursion setting."
6741	desc = "Constant with multiple Y values" help = "During evaluation of a math expression a constant was encountered which contains more than one Y value. Constants are only permitted to have one Y value."
6742	desc = "Requested amplitude not found" help = "A math expression to search for a specific amplitude in a trace did not succeed. There are no trace points with the desired amplitude."
6744	desc = "Excursion should be in dB" help = "The units for the excursion are not in dB."
6745	desc = "Log of a negative number is not allowed." help = "During evaluation of a math expression the logarithm of a negative number was encountered."
6746	desc = "Math expression contains a circular reference." help = "A new math expression was entered. The expression was rejected because it would create a circular reference. For example if trace math for trace C is set to (A-B) then setting trace math for trace B to (C+D) would create a circular reference."
6747	desc = "Next peak not found" help = "A next-peak search was requested. There are no more peaks on the current marker's trace in the requested direction. To find additional peaks reduce the marker peak excursion setting or adjust sensitivity."
6748	desc = "Next pit not found" help = "A next-pit search was requested. There are no more pits on the current marker's trace in the requested direction. To find additional pits reduce the marker pit excursion setting or adjust sensitivity."
6749	desc = "Peak not found" help = "A peak search was requested. There are no valid peaks on the current marker's trace. Try decreasing the marker peak excursion setting or adjust the sensitivity setting."

Table 5-6. OSA Warnings (9 of 9)

Error Number	Error Description [description/explanation/examples]
6750	desc = "Pit not found" help = "A pit search was requested. There are no valid pits on the current marker's trace. Try decreasing the marker pit excursion setting or adjust the sensitivity setting."
6751	desc = "Trace has no centroid" help = "The trace has no centroid. This may occur because the sum of trace points' amplitudes is zero or there a no trace points."
6752	desc = "The reference point is outside trace bounds" help = "The reference point's wavelength is either too small or too large. The reference point will be clipped to a trace endpoint."
6753	desc = "The window specified is invalid." help = "The window specified is invalid. The window should be a constant."
6754	desc = "Search failed: no data" help = "A marker search operation was requested. After clipping the trace data to screen limits and line marker limits (if enabled) there was no data to search. This can be caused when all trace data points are beyond current X axis screen limits or when there are no trace data points between the line markers. Trace data values which exceed the current Y axis screen limits will not cause this problem. Adjust the current X axis screen limits and/or move the line markers to include at least one trace data point."
6755	desc = "Attempt to divide by 0" help = "At least one point was attempted to be divided by 0. The result for these divisions has been set to not-a-number. Please realize that further calculations with not-a-number values are undefined."
6756	desc = "Syntax error; bad token: " help = "The grammar expression entered cannot be parsed. Please check the string entered. The bad token attempts to indicate where the error occurred. The end of line indicates that the OSA expected more information. Please consult the manual for additional help."
7998	desc = "Unknown error detected" help = "An unlisted error was reported by the instrument software. If this error persists contact Agilent Technologies for assistance."
7999	desc = "The warning list has overflowed" help = "The Warning list has overflowed. The last entries received have been deleted."

Application-Specific Warnings

Table 5-7. Application-Specific Warnings (1 of 4)

Error Number	Error Description [description/explanation/examples]
8001	desc = "Incorrect application type is listed in spec file." help = "The application expects the first non-comment line of the specification file to contain the APPLICATION keyword followed by the application type. Either the APPLICATION keyword was missing or the wrong application type was specified for this particular application."
8002	desc = "A keyword cannot be used as a variable name." help = "The application has a list of keywords reserved for specification file use. These reserved words cannot be used as a name for one of the measurement parameters."
8003	desc = "The variable name has already been used." help = "The application allows new names to be assigned to measurement parameters. Once assigned these names can only be used as inputs to other measurements. Only the first ten characters are significant. The line number indicates where the problem was found. The word in the parentheses is the variable name causing the problem."
8004	desc = "Wrong number of input parameters." help = "The wrong number of inputs were found for a specification file command. The line number listed is where the problem was found in the specification file. The first number in parentheses is the number of inputs found and the second number is the number of inputs required."
8005	desc = "An input parameter has the wrong units." help = "One of the input parameters to the specification file has the wrong units specified. The line number listed is where the problem was found in the specification file. The first units listed in the parentheses was the units used by the parameter and the second units is the units required by the parameter. An empty pair of quotes " " indicates unitless."
8006	desc = "The specification file cannot be imported." help = "An error occurred while trying to import the specification file. Refer to the previous warnings for more information on specific errors in the specification file."
8007	desc = "The specification file has a syntax error." help = "One of the specification file lines has a syntax problem. The problem occurred on the line number listed. The string in the parentheses caused the problem."
8008	desc = "A variable was used where a constant is expected." help = "A variable name was used as a parameter where only a constant value or the DEFAULT keyword is allowed. The line number indicates where the problem was found. The variable name in the parentheses caused the problem."

Application-Specific Warnings**Table 5-7. Application-Specific Warnings (2 of 4)**

Error Number	Error Description [description/explanation/examples]
8009	desc = "The variable name has not been defined." help = "An undefined variable name was used as a parameter for a specification. All variables used as parameters must be defined in a specification statement preceding the variable's use. The line number indicates where the problem was found. The variable name in the parentheses is the undefined variable."
8010	desc = "A variable can be used only once per statement." help = "A variable name was used as multiple parameters for the same specification statement. The input parameter was ignored because using multiple references is not allowed. The line number indicates where the problem was found. The variable name in the parentheses is the variable causing the problem."
8011	desc = "A keyword was used where a variable is expected." help = "The application specification file has a list of reserved words which are used to specify the measurements to be made. These keywords cannot be used as input parameters for specification statements. The input parameter was ignored for this case. The line number indicates where the problem was found. The word in the parentheses is the reserved word causing the problem."
8012	desc = "A label is required to identify the spec file." help = "The label string is used to identify the specification file. It is required after specifying the application type. An empty string (pair of double quotes) is acceptable input."
8013	desc = "The specification file cannot be exported." help = "An error occurred while trying to export the specification file."
8014	desc = "Print statement ignored: no path is specified" help = "The PRINT statement needs to be after a PATH statement to indicate which PATH data is to be printed. The PRINT statement at the line number specified came before any PATH statement. This PRINT statement will not trigger any printouts."
8015	desc = "DEFAULT cannot be used for a parameter." help = "A parameter cannot be specified as DEFAULT. The parameter needs to be either a previously defined variable name or an actual value. The bad parameter was found on the line number specified. The number in the parentheses is the number of the parameter causing the problem."
8016	desc = "A duplicate command is in the spec file." help = "Certain commands should be used only once in the specification file. The duplicate command was found on the line number specified. The command in the parentheses is the duplicate."
8017	desc = "A required command is missing from the spec file." help = "Certain commands must be used in the specification file. The missing command is listed in the parentheses. This command should be used only once in the file."
8018	desc = "The normalization interval limited to maximum." help = "The normalization interval has a maximum value of 24 and a minimum value of 0.1 hours. The interval specified in the specification file is outside this range. The specification file can still be used but the calibration interval will be 24 hours."

Table 5-7. Application-Specific Warnings (3 of 4)

Error Number	Error Description [description/explanation/examples]
8019	desc = "The spec file could not be loaded." help = "The application found a problem with the specification file. Possible causes can include the following: the file is incompatible with the application the file is from a previous version of the application the file was corrupted. The file with the problem is specified within the parentheses. Try re-importing the specification file."
8020	desc = "The default spec file was loaded." help = "The default specification file for the application was loaded. This is done when the application is first started or if a problem occurred when trying to load another specification file. Refer to the previous warnings for information on any problems loading another file."
8021	desc = "The spec file could not be found." help = "The application tried to load a specification file which could not be found in the internal memory. This may have occurred if the last file used by the application was deleted. The filename is specified within the parentheses."
8022	desc = "A closing quote is missing." help = "The specification file contained a line with an opening quote but no closing quote could be found."
8023	desc = "A default path name was used." help = "The imported specification file was given a default path name. All specification files must have at least one PATH statement before any of the measurement statements. A default path name was used either because some measurement statements were used before a PATH statement or there was no PATH statement at all in the file."
8024	desc = "A variable is expected." help = "The statement expected a variable as an input parameter. The line number indicates which statement did not have the proper input parameter type."
8025	desc = "The path name has already been used." help = "The application allows new names to be assigned to measurement paths. Once assigned these names can no longer be used by other measurement paths. Only the first thirty-two characters are significant. The line number indicates where the problem was found. The word in the parentheses is the path name causing the problem."
8026	desc = "A path name was used where a variable is expected." help = "The input parameters for measurement statements can take variables as inputs. These variables are the results of other measurement statements. A path name is the name of a measurement path not the result of a measurement and cannot be used as an input parameter. The input parameter was ignored for this case. The line number indicates where the problem was found. The word in the parentheses is the path name causing the problem."
8027	desc = "A parameter value was outside the legal range." help = "A parameter value was used which was outside the allowable range. The first number in the parentheses is the number of the parameter causing the problem. The other two numbers are the minimum and maximum values allowed. These values are in base units (e.g meters watts)."

Application-Specific Warnings**Table 5-7. Application-Specific Warnings (4 of 4)**

Error Number	Error Description [description/explanation/examples]
8028	desc = "A minimum non-zero span is required." help = "The application cannot run in a zero span setting. The start and stop wavelength must be separated by a minimum span. The line number indicates the line in the specification file which had a start and stop wavelength pair that did not meet the minimum span requirement."
8029	desc = "The requested function is not yet implemented." help = "The statement within the specification file is not implemented in this version of the application. The word in parentheses has been reserved for future use. The statement at the specified line number needs to be removed before the specification file can be imported."
8030	desc = "A SETUP statement is needed before SWEEP." help = "The wavelength limits of the SWEEP statement are checked against the wavelength limits in the SETUP statement. This check requires that the SETUP statement occur before the SWEEP statement. The line number indicates which SWEEP statement is not preceded by the SETUP statement."
8031	desc = "The SWEEP limits are outside the SETUP range." help = "The start and stop values for the SWEEP statement must be within the start and stop values of the SETUP statement. The line number indicates which SWEEP statement has values out of range. The number in the parentheses indicates which parameter is out of range."
8032	desc = "The units of the inputs are not compatible." help = "The units of the inputs to a math operation need to be compatible with the operation desired. Addition and subtraction need to have matching units. Multiplication needs to have a unitless parameter. Division needs a unitless denominator or the units for the numerator and denominator need to match. The line number indicates which statement had the mismatched input units."
8033	desc = "The reference point is outside the SETUP range." help = "The reference point value must be within the start and stop values of the SETUP statement. The line number indicates which statement had the value out of range."
8034	desc = "The values are associated with different axes." help = "The variables used in a basic math operation like ADD or DIV must be associated with the same data axis (e.g. wavelength or amplitude). Mixing the axes values within a single math operation is not allowed. The line number indicates which statement had the incompatible variables."
8035	desc = "The search limits are outside the SETUP range." help = "The search limits for statements like PEAK or CENTER_OF_MASS must be within the start and stop values of the SETUP statement. The line number indicates which statement has values out of range. The number in the parentheses indicates which parameter is out of range."
8036	desc = "The specification units do not match." help = "The units for the minimum and maximum specification values need to match. The line number indicates which statement has the mismatching units."
8037	desc = "The specification units do not match the input units." help = "The units for the minimum and maximum specification values need to match the units for the input parameters. The line number indicates which statement has the mismatching units."

OSA Status Errors

Table 5-8. OSA Status Errors

Error Number	Error Description [description/explanation/examples]
10000	desc = "Sweep Uncalibrated" help = "The current setting of sweep time may be too fast. This could result in an invalid measurement. In certain cases it is possible to sweep faster than the coupled sweep time without compromising measurement accuracy. Please refer to the users manual and relevant application notes for more information."
11998	desc = "Too Many Hardware Status Errors" help = "The Hardware Status Error list has overflowed. Additional more recent items have been deleted."

OSA Errors

Table 5-9. OSA Errors (1 of 2)

Error Number	Error Description [description/explanation/examples]
20001	desc = "Error detected in ADC sub-system" help = "An error has been detected in the Analog-to-Digital converter subsystem. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
20002	desc = "Error detected in slit positioning system" help = "An error has been detected in the motor which controls the resolution bandwidth slit wheel. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
20003	desc = "Error detected in grating positioning system" help = "An error has been detected in the motor which controls the diffraction grating. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
20004	desc = "Monochromator calibration data is invalid" help = "Factory calibration data for the monochromator is invalid. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
20005	desc = "Trans-Impedance calibration data is invalid" help = "Factory calibration data for the trans-impedance amplifier is invalid. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
20006	desc = "Monochromator flatness calibration data is invalid" help = "Factory flatness data for the monochromator is invalid. Please record the hexadecimal number listed with the error and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."

Table 5-9. OSA Errors (2 of 2)

Error Number	Error Description [description/explanation/examples]
20007	desc = "Sweep Timeout" help = "A sweep was started but did not finish in the expected amount of time. The trace data acquired during this sweep may not be valid. Try taking another sweep. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B Series Users Guide</i> for a listing of the Agilent sales and service offices."
21999	desc = "The Error list has overflowed" help = "The Error list has overflowed. The last entries received have been deleted."

Firmware Errors

Table 5-10. Firmware Errors

Error Number	Error Description [description/explanation/examples]
30000	desc = "Internal Communications Error" help = "An internal software error has occurred involving communications between different software processes. Please record this error including the extra text and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B series Users Guide</i> for a listing of the Agilent sales and service offices."
30001	desc = "Auto-Measure Software Error" help = "An error has been detected in the auto-measure software. There is an internal problem with the software. Please make a note of the text in parentheses at the end of the error message and cycle power. If the error persists, contact the nearest Agilent Technologies Instrument support center for assistance. In the U.S., call (800) 403-0801. See the <i>Agilent 86140B series Users Guide</i> for a listing of the Agilent sales and service offices."

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