Agilent 8990B
Peak Power Analyzer

Service Guide

Agilent Technologies

Notices

Manual Part Number

08990-90010

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Agilent recommends a one-year calibration cycle for the 8990B peak power analyzer.

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The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent assumes no liability for the customer's failure to comply with these requirements.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions that must be taken to maintain safe operation of the instrument.

	Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Alternating current (AC)
	Frame or chassis terminal

General Safety Information

This is a Safety Class I instrument (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 instrument is likely to damage the instrument. Intentional interruption is prohibited.

WARNING

- **Do not operate the instrument in an explosive atmosphere or in the presence of flammable gasses or fumes.**
- **Do not use repaired fuses or short-circuited fuseholders. For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.**
- **Do not perform procedures involving cover or shield removal unless you are qualified to do so. Operating personnel must not remove the meter covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only.**
- **Do not service or adjust alone. Under certain conditions, dangerous voltages may exist even with the instrument switched off. To avoid electrical shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.**
- **Do not operate damaged instrument. Whenever it is possible that the safety protection features built into this instrument have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the instrument until safe operation can be verified by service-trained personnel. If necessary, return the instrument to Agilent for service and repair to ensure that the safety features are maintained.**
- **Do not substitute parts or modify the instrument. Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to Agilent for service and repair to ensure the safety features are maintained.**

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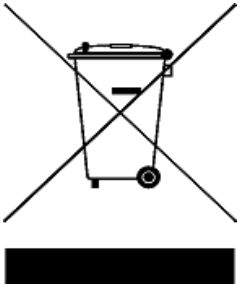
Product Category:

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a "Monitoring and Control Instrument" product.

The affixed product label is as shown below.



Do not dispose in domestic household waste.

To return this unwanted instrument, contact your nearest Agilent Service Center, or visit

www.agilent.com/environment/product

for more information.

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1 Performance Verification and Adjustments

The performance verification procedures described in this chapter verify that the 8990B is operating within its published specifications.

Introduction

The performance verification procedures described in this chapter verify the peak power analyzer's electrical performance against the published specifications. For the 8990B characteristics and specifications details, refer to the *8990B User's Guide*.

Performance verification is used for incoming inspection, the calibration cycle (also called periodic maintenance), or after repairs have been made.

NOTE Performance verification is limited to the measurement and verification of warranted specifications.

The following performance verifications are described in this chapter:

- Zero set verification
- Linearity verification
- Rise and fall time verification
- Timebase frequency accuracy verification
- Impedance verification
- Offset accuracy verification
- DC gain verification
- Maximum frequency verification (analog bandwidth)

Equipment List

Table 1-1 Equipment list

Equipment	Critical specification	Recommended model number/ part number
Signal generator	• Power range: –50 dBm to +22 dBm at 1 GHz • Output resistance: 50 Ω	E8257D Option 520
Oscilloscope	Analog bandwidth 1 GHz and above	Infiniium MSO 9104A
Diode detector (negative)	SMB connector	33334EZ
Frequency counter	• Frequency: 10 MHz • Gate time: 10 seconds	53132A
10 MHz frequency reference source	• Output frequency: 10 MHz • Output amplitude: 0 dBm • Absolute frequency error: <0.01 ppm	Symmetricom 58503B
Digital multimeter	• Measure resistance (4-wire) at better than ±0.1% accuracy • DC voltage measurement accuracy better than ±0.1% of reading	34410A/3458A
DC power supply	• Output voltage: 100 V maximum • Output current: 0.5 A maximum	6614C
Power splitter	• Two-resistor type power splitter, N-type (f) • Maximum frequency: 18 GHz	11667A
Power meter	• Compatible with E-Series power sensor • Absolute accuracy: ±0.5%	E4418B/E4419B/N1913A/N1914A
Power sensor	• Frequency: 50 MHz or above • Power range: –30 dBm to +20 dBm • SWR: ≤1.15 at 50 MHz	E4412/3A
Wideband power sensor	• Power range: –30 dBm to +20 dBm • SWR: ≤1.20 at 1 GHz	N1923/4A
N-type to BNC adapter	• N-type (m) to BNC (f) • 50 Ω characteristic impedance	1250-1476
N-type to SMA adapter	• N-type (f) to 3.5 mm (m) SMA • 50 Ω characteristic impedance	1250-1750

Table 1-1 Equipment list

Equipment	Critical specification	Recommended model number/ part number
N-type to SMA adapter	• N-type (m) to 2.4 mm (f) SMA • 50 Ω characteristic impedance	11903D
BNC cable	50 Ω characteristic impedance	10503A
Trigger cable	• 50 Ω characteristic impedance • BNC (m) to SMB (f)	U2032A
BNC tee adapter	• BNC Tee (m)(f)(f) • 50 Ω characteristic impedance	1250-0781
BNC to dual banana adapters	BNC (f) to dual banana (m)	1251-2277

Performance Verification

Zero set verification

Zero set is defined as the amount of residual offset error that is present following a zero operation. This offset error is caused by contamination from several sources, including circuit noise. This test is a system-level verification which requires the N1923/4A wideband power sensor.

Required test equipment:

- 1 unit of N1923/4A wideband power sensor

System specification:

- <200 ns

Test procedure

1 Turn on the 8990B.

2 Connect the N1923/4A wideband power sensor to the 8990B as shown in Figure 1-1.

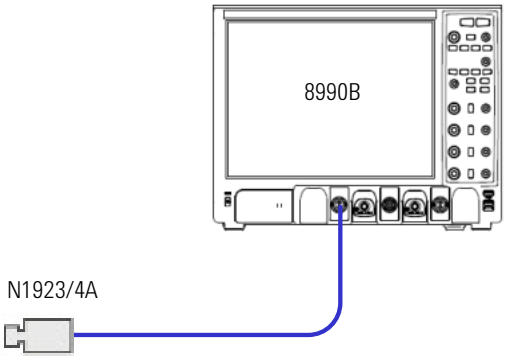


Figure 1-1 Zero set verification setup

3 Allow the system to warm up for approximately an hour.

4 Set the 8990B RF input channel 1 frequency to 50 MHz.

5 Perform zeroing and calibration for the N1923/4A.

6 Set the horizontal scale to the Linear scale.

7 Measure the average power.

8 Collect each mean value of the average power reading for one minute.

9 Calculate the standard deviation (σ) of the collected data.

10 The zero set is computed using the following equation:

Zero set = *mean* + $k \times s$, where k = 2 due to the 95% confidence level

11 Repeat step 2 to step 10 for RF input channel 4.

12 If the calculated zero set value is out of specification (>200 ns), refer to "Adjustments" on page 28.

Linearity verification

Linearity over the full input voltage range of the measurement path is warranted to provide assurance of the instrument accuracy. Linearity verification is a system-level verification which requires the N1923/4A wideband power sensor.

Required test equipment:

- 1 unit of E8257D Option 520 signal generator
- 1 unit of N1923/4A wideband power sensor

System specifications:

- ±0.2 dB
- Instrument linearity: 0.8%
- Sensor calibration uncertainty: ~4%

Test procedure

1 Turn on the 8990B.

2 Connect the N1923/4A to the E8257D and 8990B as shown in Figure 1-2.

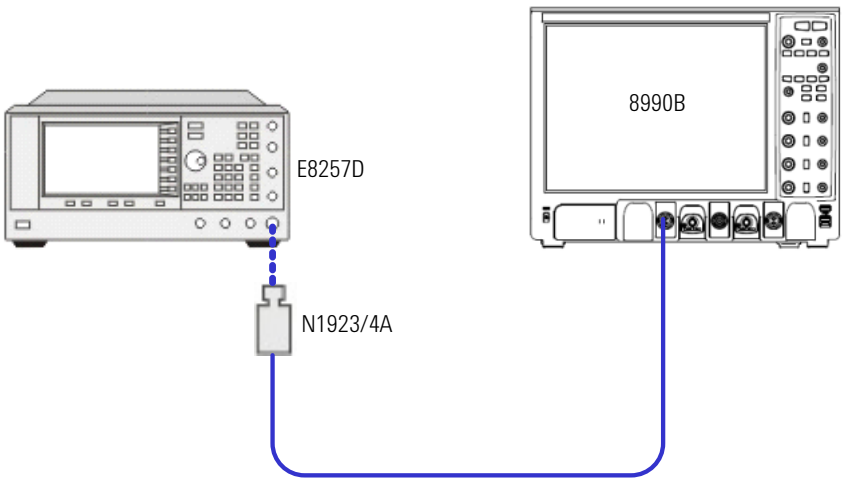


Figure 1-2 Linearity verification setup

3 Allow the system to warm up for approximately an hour.

4 Set the 8990B RF input channel 1 frequency to 1 GHz.

5 Perform zeroing and calibration for the N1923/4A.

6 Set the E8257D frequency to 50 MHz and the power level to 0 dBm.

7 Measure the average power, and ensure that the measured power is within ±0.2 dB of the uncertainty error. If the test fails, refer to "Adjustments" on page 28.

8 Repeat step 6 to step 7 for RF power level from –15 dBm to 20 dBm.

Rise and fall time verification

The rise and fall time performance of the instrument path must be quantified accurately. This test however, is more of a system-level verification, validating the rise and fall time with the N1923/4A using an actual RF pulse.

Required test equipment:

- 1 unit of E8257D signal generator
- 1 unit of 33334EZ diode detector
- 1 unit of oscilloscope with bandwidth >500 MHz
- 1 unit of U2032A trigger cable
- 1 unit of N1923/4A wideband power sensor (DUT)

System specifications:

- Rise/fall time: <5 ns ±% error (Refer to Figure 1-3)
- Overshoot: 0.5%

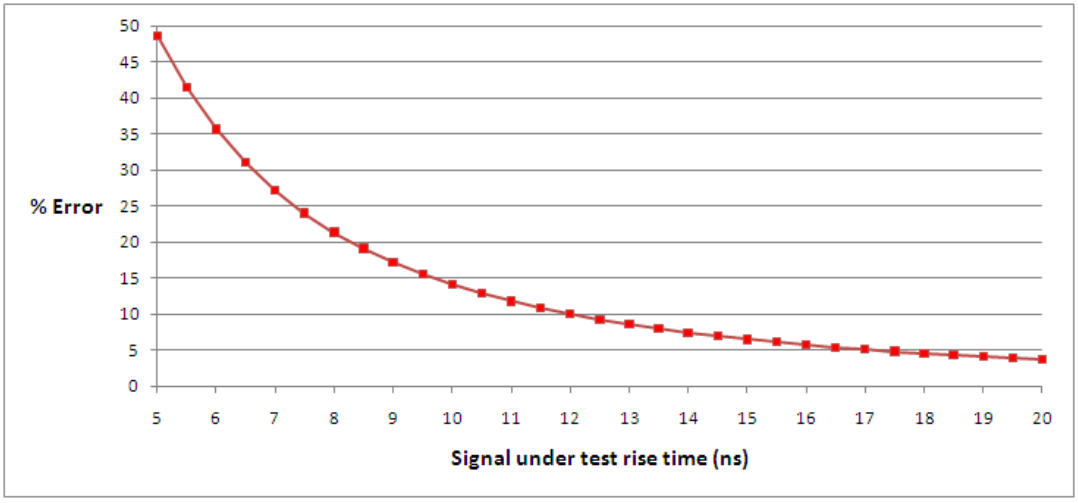


Figure 1-3 Measured rise time percentage error versus signal-under-test rise time

Test procedure

1 Turn on the E8257D, oscilloscope, and 8990B.

2 Allow the system to warm up for approximately an hour before starting the measurement.

3 Generate an RF pulse signal from the E8257D with the following recommended signal profile:

- Frequency: 1 GHz
- Power level: 10 dBm
- Pulse period: 10 µs
- Duty cycle: 50%

The pulse signal is characterized using a diode detector which feeds to the oscilloscope. This is to verify that the rise/fall time of the RF pulse measured by the oscilloscope is <5 ns and the overshoot is <0.5%.

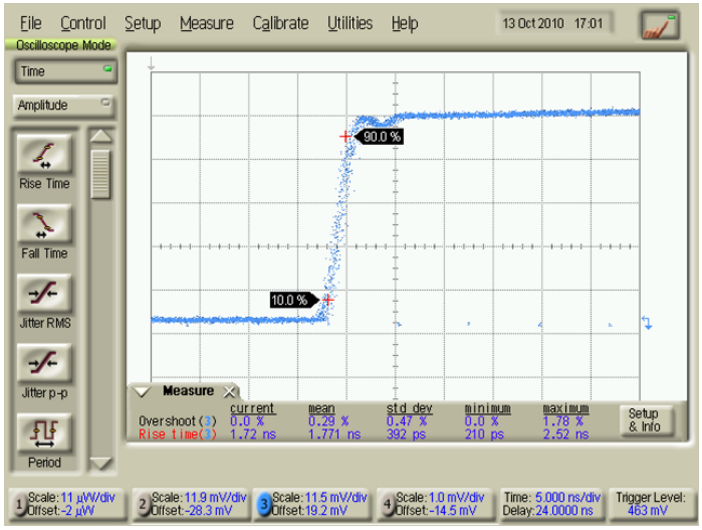


Figure 1-4 Screenshot of the measurement reading from the oscilloscope

4 Connect the N1923/4A to the E8257D and 8990B as shown in Figure 1-5.

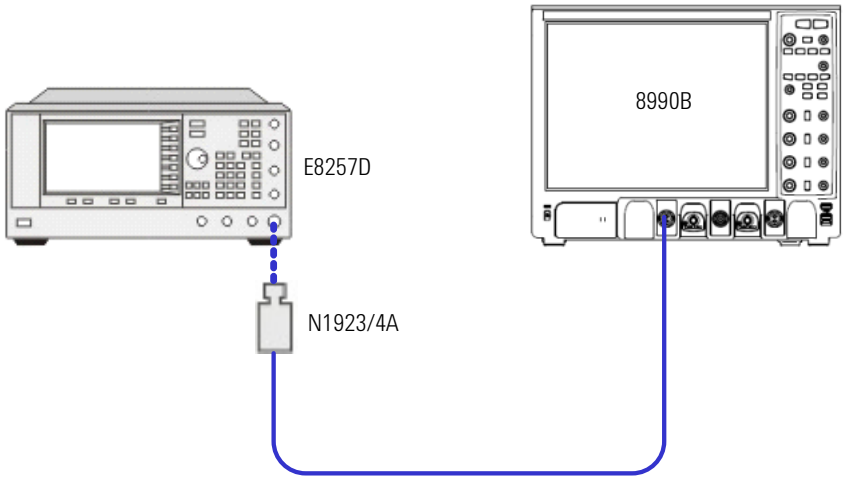


Figure 1-5 Rise and fall time verification setup

5 Generate the same pulse signal as shown in step 3.

6 Press **Auto Scale** on the 8990B to scale the pulse signal to the optimum display.

7 Turn off the video bandwidth on the 8990B.

8 Measure and record the rise/fall time of the pulse signal from the 8990B into Table 1-2.

9 Repeat step 3 to step 8 for the pulse signal with different pulse periods and different video bandwidth settings. Record all the readings into Table 1-2.

10 Compare the recorded readings to the specifications as listed in Table 1-2. If the test fails, refer to "Adjustments" on page 28.

Table 1-2 Test record for rise/fall time verification

Measured points	Specification	Measured rise time (s)	Pass/Fail
Bandwidth: OFF, Power level: 10 dBm, Pulse period: 0.2 µs, Duty cycle: 50%	5n		
Bandwidth: OFF, Power level: 10 dBm, Pulse period: 1 µs, Duty cycle: 50%	5n		
Bandwidth: OFF, Power level: 10 dBm, Pulse period: 10 µs, Duty cycle: 50%	5n		
Bandwidth: OFF, Power level: 10 dBm, Pulse period: 100 µs, Duty cycle: 50%	5n		
Bandwidth: LOW, Power level: 10 dBm, Pulse period: 0.2 µs, Duty cycle: 50%	60n		
Bandwidth: LOW, Power level: 10 dBm, Pulse period: 1 µs, Duty cycle: 50%	60n		
Bandwidth: LOW, Power level: 10 dBm, Pulse period: 10 µs, Duty cycle: 50%	60n		
Bandwidth: LOW, Power level: 10 dBm, Pulse period: 100 µs, Duty cycle: 50%	60n		
Bandwidth: MED, Power level: 10 dBm, Pulse period: 0.2 µs, Duty cycle: 50%	25n		
Bandwidth: MED, Power level: 10 dBm, Pulse period: 1 µs, Duty cycle: 50%	25n		
Bandwidth: MED, Power level: 10 dBm, Pulse period: 10 µs, Duty cycle: 50%	25n		
Bandwidth: MED, Power level: 10 dBm, Pulse period: 100 µs, Duty cycle: 50%	25n		
Bandwidth: HIGH, Power level: 10 dBm, Pulse period: 0.2 µs, Duty cycle: 50%	13n		
Bandwidth: HIGH, Power level: 10 dBm, Pulse period: 1 µs, Duty cycle: 50%	13n		

Table 1-2 Test record for rise/fall time verification (continued)

Measured points	Specification	Measured rise time (s)	Pass/Fail
Bandwidth: HIGH, Power level: 10 dBm, Pulse period: 10 µs, Duty cycle: 50%	13n		
Bandwidth: HIGH, Power level: 10 dBm, Pulse period: 100 µs, Duty cycle: 50%	13n		

Timebase frequency accuracy verification

The accuracy of the 100 MHz sample clock determines the accuracy of all measurements that are based on samples taken over time. This test measures the timebase by dividing the sample clock by 10 (within the meter) and feeding it out of the trigger output connector, where it can be directly measured by a frequency counter.

Required test equipment:

- 1 unit of 53132A frequency counter
- 1 unit of Symmetricom 58503B 10 MHz frequency reference source
- 2 units of 1053A BNC cable

System specification:

- ±1.4 ppm

Test procedure

1. Turn on the 8990B and 53132A.
2. Allow the system to warm up for approximately an hour.
3. Connect the 8990B to the PC via USB interface.
4. The test equipment setup is as shown in Figure 1-6.

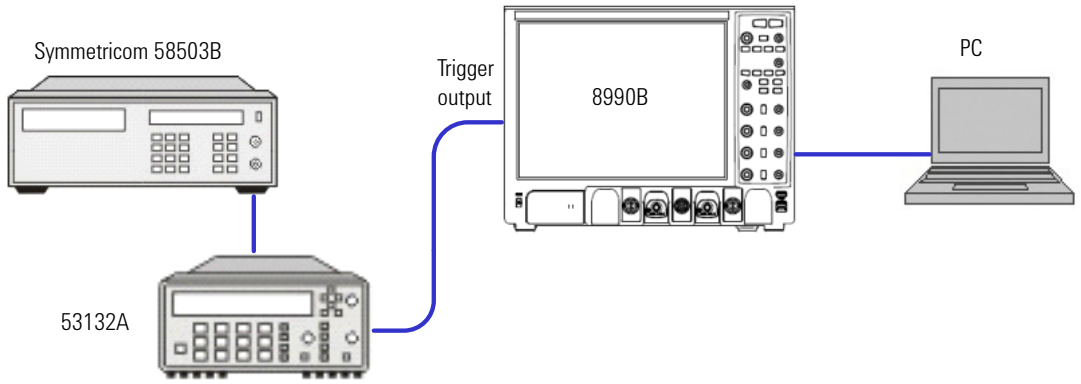


Figure 1-6 Timebase frequency accuracy verification setup

5 Enable the path that routes the time base signal to the trigger output connector with the following command.

```
SERV:BIST:TBAS:STAT ON
```

6 Measure the frequency of the signal at the trigger output connector using the 53132A.

NOTE No adjustment is available for this test if it fails. Refer to Chapter 3, "Troubleshooting Guide".

Impedance verification

The impedance verification checks the input impedance of the vertical inputs. A four-wire measurement is used to accurately measure the 50 Ω and 1 MΩ inputs.

Required test equipment:

- 1 unit of 34410A digital multimeter
- 2 units of 10503A BNC cable
- 1 unit of BNC tee adapter (1250-0781)
- 2 units of BNC to dual banana adapter (1251-2277)

System specifications:

- 50 Ω ±2.5%
- 1 MΩ ±1%

Test procedure

1. Turn on the 8990B and 34410A.
2. Allow the system to warm up for approximately an hour.
3. Set up the digital multimeter to make a four-wire resistance measurement.
4. Assemble the two units of BNC to dual banana adapter and two units of BNC cable as follows.
   - Connect one end of each of the BNC cables to the BNC to dual banana adapters.
   - Connect both the BNC to dual banana adapters to the four-wire resistance connections on the multimeter.
   - Connect the other end of each of the BNC cables to the BNC tee adapter.
5. Connect the male end of the BNC tee adapter to the video input channel 2 of the 8990B.
6. The test equipment setup is shown in Figure 1-7.

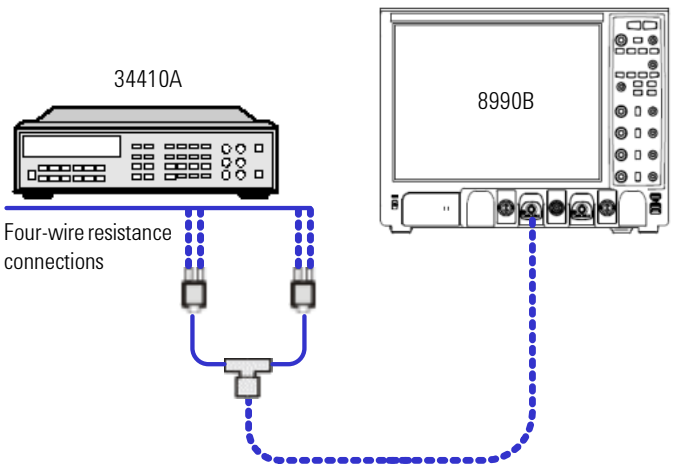


Figure 1-7 Impedance verification setup

7 Press **Default Setup** on the 8990B to set the 8990B to its default settings.

8 Set the vertical scale for the video input channel 2 to 10 mV/div.

9 Set the input impedance for the video input channel 2 to 50 Ω. and verify the resistance reading with 50 Ω ±1.25 Ω.

10 Measure and record the resistance reading from the multimeter in Table 1-3.

11 Repeat step 4 to step 10 for the rest of the vertical scale setting in Table 1-3.

12 Repeat step 4 to step 11 with the input impedance set to 1 MΩ. and verify the resistance reading with 1 MΩ ±10 kΩ.

13 Repeat step 4 to step 12 for the video input channel 3 of the 8990B.

14 Compare the recorded values with the specification values as listed in Table 1-3. If the test fails, refer to "Adjustments" on page 28.

Table 1-3 Test record for impedance verification

Input impedance	Vertical scale	Video input channel 2	Video input channel 3	Limits
50 Ω	0.01 V/div			48.75 Ω to 51.25 Ω
50 Ω	0.02 V/div			48.75 Ω to 51.25 Ω
50 Ω	0.05 V/div			48.75 Ω to 51.25 Ω
50 Ω	0.1 V/div			48.75 Ω to 51.25 Ω
50 Ω	0.2 V/div			48.75 Ω to 51.25 Ω
50 Ω	0.5 V/div			48.75 Ω to 51.25 Ω
50 Ω	1 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.01 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.02 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.05 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.1 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.2 V/div			990 kΩ to 1.010 MΩ
1 MΩ	0.5 V/div			990 kΩ to 1.010 MΩ

Table 1-3 Test record for impedance verification (continued)

Input impedance	Vertical scale	Video input channel 2	Video input channel 3	Limits
1 MΩ	1 V/div			990 kΩ to 1.010 MΩ
1 MΩ	2 V/div			990 kΩ to 1.010 MΩ
1 MΩ	5 V/div			990 kΩ to 1.010 MΩ

Offset accuracy verification

The offset accuracy specification consists of the offset gain and zero error. The offset gain characteristic is ±1.25% of the channel offset and the zero error characteristic is ±1% of the full scale. The offset accuracy verification procedure tests the zero error and offset accuracy.

Required test equipment:

- 1 unit 34410A/3458A digital multimeter
- 2 units of 10503A BNC cable
- 1 unit of 6614C DC power supply
- 1 unit of BNC tee adapter (1250-0781)
- 2 units of BNC to dual banana adapter (1251-2277)

System specification:

- Offset accuracy: ±(1.25% of channel offset + 1% of full scale + 1 mV)

Test procedure (zero set)

1. Turn on the 8990B and multimeter.
2. Allow the system to warm up for approximately an hour.
3. Press **Default Setup** on the 8990B to set the 8990B to its default settings, and turn on video input channel 2.
4. Enable averaging and set the average count to 256.
5. Set the input impedance for the video input channel 2 to 50 Ω.
6. Set the vertical scale for the video input channel 2 to 10 mV/div.
7. Press **Clear Display**, and wait for the average count to reach 256.

8 Record the mean value of the average reading in $V_{zero\text{-}error}$ in Table 1-4.

9 Repeat step 6 to step 8 for the rest of the vertical scale setting in Table 1-4.

10 Repeat step 6 to step 9 with the input impedance set to 1 MΩ.

11 Ensure that the $V_{zero\text{-}error}$ is less than the $V_{zero\text{-}error}$ limit as shown in Table 1-4.

Test procedure

1 Assemble the test equipment as shown in Figure 1-8.

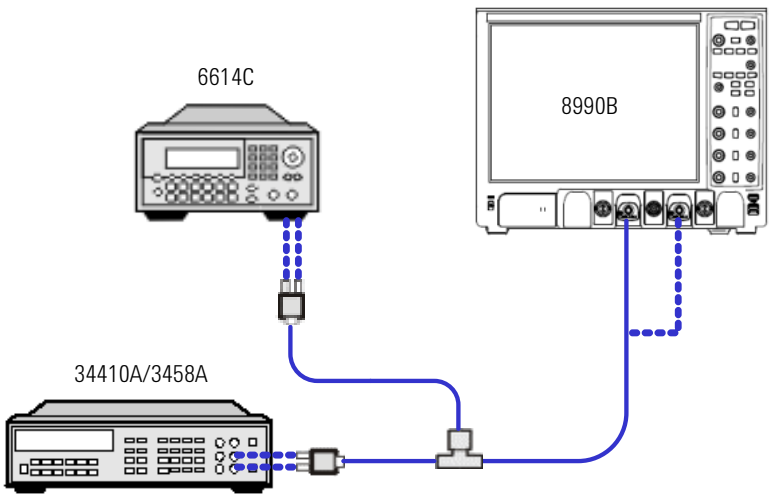


Figure 1-8 Offset accuracy verification setup

2 Set the digital multimeter to measure DC voltage.

3 Press **Default Setup** on the 8990B to set the 8990B to its default settings, and turn on video input channel 2.

4 Enable averaging and set the average count to 256.

5 Set the input impedance for the video input channel 2 to 50 Ω.

6 Set the vertical scale for the video input channel 2 to 10 mV/div.

7 Set the video input channel 2 offset to 120 mV.

8 Set the DC power supply to output ±120 mV as shown in Table 1-4.

9 Press **Clear Display**, and wait for the average count to reach 256.

10 Record the voltage reading at the digital multimeter in V_{DMM+} and V_{DMM-} respectively in Table 1-4.

11 Record the mean value of the average reading at the 8990B in V_{scope+} and V_{scope-} respectively in Table 1-4.

12 Calculate the V_{error+} and V_{error-} respectively using the following equation and record the value in Table 1-4.

$$V_{error} = V_{DMM} - V_{scope}$$

13 Repeat step 5 to step 12 for the rest of the vertical scale setting in Table 1-4.

14 Repeat step 5 to step 13 with the input impedance set to 1 MΩ.

15 Repeat step 3 to step 14 for video input channel 3.

16 Compare the recorded V_{error} values with the Offset accuracy limit values as listed in Table 1-4. If the test fails, refer to "Adjustments" on page 28.

Table 1-4 Test record for offset accuracy verification

Vertical scale (V/div)	Output voltage	V_{DMM+}	V_{scope+}	V_{error+}	V_{DMM-}	V_{scope-}	V_{error-}	Offset accuracy limit (±)	$V_{zero-error}$	$V_{zero-error}$ limit (±)
Video input channel 2 (50 Ω)										
0.01	±120 mV							3.30 mV		1.8 mV
0.02	±240 mV							5.60 mV		2.6 mV
0.05	±600 mV							12.50 mV		5.0 mV
0.1	±1.2 V							24.00 mV		9.0 mV
0.2	±2.4 V							47.00 mV		17.0 mV
0.5	±4.0 V							91.00 mV		41.0 mV
1	±4.0 V							131.00 mV		81.0 mV
Video input channel 2 (1 MΩ)										
0.01	±5 V							64.3 mV		1.8 mV

Table 1-4 Test record for offset accuracy verification (continued)

Vertical scale (V/div)	Output voltage	V_{DMM+}	V_{scope+}	V_{error+}	V_{DMM-}	V_{scope-}	V_{error-}	Offset accuracy limit (±)	$V_{zero\text{-}error}$	$V_{zero\text{-}error}$ limit (±)
0.02	±10 V							127.6 mV		2.6 mV
0.05	±10 V							130.0 mV		5.0 mV
0.1	±20 V							259.0 mV		9.0 mV
0.2	±20 V							267.0 mV		17.0 mV
0.5	±20 V							291.0 mV		41.0 mV
1	±100 V							1.33 V		81.0 mV
2	±100 V							1.41 V		161.0 mV
5	±100 V							1.65 V		401.0 mV
Video input channel 3 (50 Ω)										
0.01	±120 mV							3.30 mV		1.8 mV
0.02	±240 mV							5.60 mV		2.6 mV
0.05	±600 mV							12.50 mV		5.0 mV
0.1	±1.2 V							24.00 mV		9.0 mV
0.2	±2.4 V							47.00 mV		17.0 mV
0.5	±4.0 V							91.00 mV		41.0 mV
1	±4.0 V							131.00 mV		81.0 mV
Video input channel 3 (1 MΩ)										
0.01	±5 V							64.3 mV		1.8 mV
0.02	±10 V							127.6 mV		2.6 mV
0.05	±10 V							130.0 mV		5.0 mV
0.1	±20 V							259.0 mV		9.0 mV
0.2	±20 V							267.0 mV		17.0 mV
0.5	±20 V							291.0 mV		41.0 mV
1	±100 V							1.33 V		81.0 mV

Table 1-4 Test record for offset accuracy verification (continued)

Vertical scale (V/div)	Output voltage	V_{DMM+}	V_{scope+}	V_{error+}	V_{DMM-}	V_{scope-}	V_{error-}	Offset accuracy limit (±)	$V_{zero\text{-}error}$	$V_{zero\text{-}error}$ limit (±)
2	±100 V							1.41 V		161.0 mV
5	±100 V							1.65 V		401.0 mV

DC gain verification

The DC gain verification ensures the peak power analyzer gain accuracy when measuring DC voltages. The gain accuracy measurement is made by measuring the difference between two DC voltages and comparing the difference to the same voltages measured by a digital multimeter. The comparison between the two voltages is performed regardless of the 8990B offset error and ground reference.

Required test equipment:

- 1 unit of 34401A/3458A digital multimeter
- 2 units of 10503A BNC cable
- 1 unit of 6614C DC power supply
- 1 unit of BNC tee adapter (1250-0781)
- 2 units of BNC to dual banana adapter (1251-2277)

System specification:

- DC gain accuracy: ±2% of the full scale at full resolution channel scale (±5 °C from calibration temperature)

Test procedure

1 Assemble the test equipment as shown in Figure 1-9.

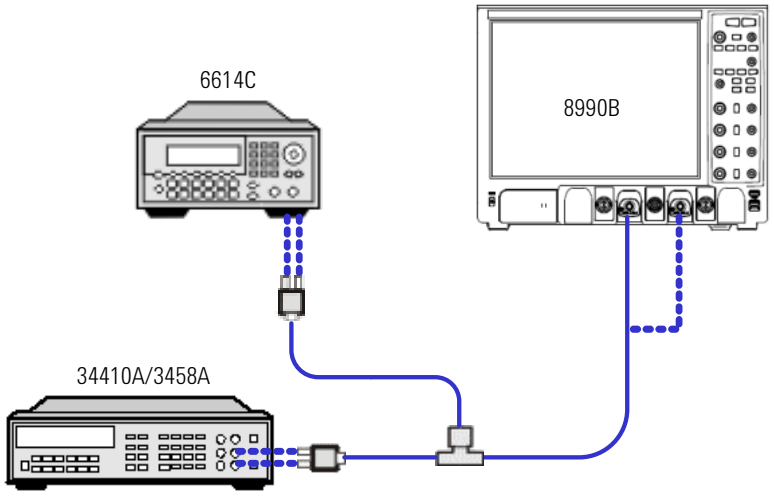


Figure 1-9 DC gain verification setup

2 Allow the system to warm up for approximately an hour.

3 Press **Default Setup** on the 8990B to set the 8990B to its default settings, and turn on video input channel 2.

4 Enable averaging and set the average count to 256.

5 Set the DC power supply to output ±15 mV as shown in Table 1-5.

6 Set the input impedance for the video input channel 2 to 50 Ω.

7 Set the vertical scale for the video input channel 2 to 10 mV/div.

8 Press **Clear Display**, and wait for the average count to reach 256.

9 Record the voltage reading at the digital multimeter in V_{DMM+} and V_{DMM-} respectively in Table 1-5.

10 Record the mean value of the average reading at the 8990B in V_{scope+} and V_{scope-} respectively in Table 1-5.

11 Repeat step 5 to step 10 for the rest of the vertical scale setting in Table 1-5.

12 Repeat step 5 to step 11 with the input impedance set to 1 MΩ.

13 Calculate the DC gain error using the following equation and record the value in Table 1-5.

$$DC\ Gain\ Error = \frac{DV_{out}}{DV_{in}} = \left(\frac{V_{scope+} - V_{scope-}}{V_{DMM+} - V_{DMM-}} - 1\right) 0.75$$

14 Repeat step 3 to step 13 for video input channel 3.

15 Compare the recorded DC gain error values with the DC gain error limit values as listed in Table 1-5. If the test fails, refer to "Adjustments" on page 28.

Table 1-5 Test record for DC gain verification

Vertical scale	Output voltage	V_{DMM+}	V_{DMM-}	V_{scope+}	V_{scope-}	DC gain error	DC gain error limit
Video input channel 2 (50 Ω)							
10 mV/div	±30 mV						±2%
20 mV/div	±60 mV						±2%
50 mV/div	±150 mV						±2%
100 mV/div	±300 mV						±2%
200 mV/div	±600 mV						±2%
500 mV/div	±1.5 V						±2%
1 V/div	±3.0 V						±2%
Video input channel 2 (1 MΩ)							
10 mV/div	±30 mV						±2%
20 mV/div	±60 mV						±2%
50 mV/div	±150 mV						±2%
100 mV/div	±300 mV						±2%
200 mV/div	±600 mV						±2%
500 mV/div	±1.5 V						±2%
1 V/div	±3.0 V						±2%
2 V/div	±6.0 V						±2%

Table 1-5 Test record for DC gain verification (continued)

Vertical scale	Output voltage	V_{DMM+}	V_{DMM-}	V_{scope+}	V_{scope-}	DC gain error	DC gain error limit
5 V/div	±15.0 V						±2%
Video input channel 3 (50 Ω)							
10 mV/div	±30 mV						±2%
20 mV/div	±60 mV						±2%
50 mV/div	±150 mV						±2%
100 mV/div	±300 mV						±2%
200 mV/div	±600 mV						±2%
500 mV/div	±1.5 V						±2%
1 V/div	±3.0 V						±2%
Video input channel 3 (1 MΩ)							
10 mV/div	±30 mV						±2%
20 mV/div	±60 mV						±2%
50 mV/div	±150 mV						±2%
100 mV/div	±300 mV						±2%
200 mV/div	±600 mV						±2%
500 mV/div	±1.5 V						±2%
1 V/div	±3.0 V						±2%
2 V/div	±6.0 V						±2%
5 V/div	±15.0 V						±2%

Maximum frequency verification (analog bandwidth)

The AC gain of the peak power analyzer decreases at frequencies nearing the upper end of the usable frequency range. The maximum frequency verification ensures that at a specified frequency, the drop in the AC gain is 3 dB or less.

Required test equipment:

- 1 unit of E8257D Option 520 signal generator
- 1 unit of 11667A power splitter
- 1 unit of E4418B/E4419B/N1913A/N1914A power meter
- 1 unit of E4412/3A power sensor
- 1 unit of 10503A BNC cable
- 1 unit of N-type to BNC adapter (1250-1476)

System specification:

- Analog bandwidth: >–3 dB

Test procedure

1 Assemble the test equipment as shown in Figure 1-10.

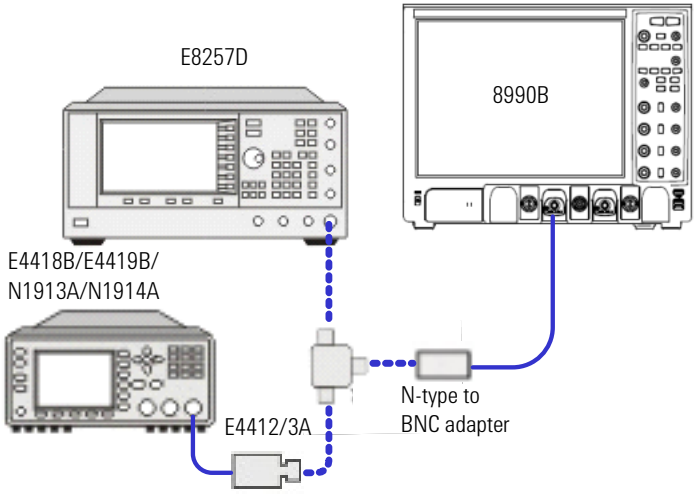


Figure 1-10 Maximum frequency verification setup

2 Allow the system to warm up for approximately an hour.

3 Preset the power meter.

4 Perform zeroing and calibration for the power sensor.

5 Set the power meter to display the measurement in Watts.

6 Press **Default Setup** on the 8990B to set the 8990B to its default settings, and turn on video input channel 2.

7 Set the input impedance for the video input channel 2 to 50 Ω.

8 Set the vertical scale for the video input channel 2 to 10 mV/div.

9 Set the horizontal scale to 16 ns/div.

10 Set the signal generator to output a 50 MHz sine wave (CW signal) with a peak-to-peak amplitude of 4 divisions. Refer to Table 1-6 to determine the required signal amplitude.

Table 1-6 Signal generator settings

Vertical scale	RF signal amplitude (signal source)	RF signal amplitude (signal source)	RF signal amplitude (power meter and 8990B)
5 mV/div	0.02 Vpp	–24 dBm	–30 dBm
10 mV/div	0.04 Vpp	–18 dBm	–24 dBm
20 mV/div	0.08 Vpp	–12 dBm	–18 dBm
50 mV/div	0.20 Vpp	–4 dBm	–10 dBm
100 mV/div	0.40 Vpp	+2 dBm	–4 dBm
200 mV/div	0.80 Vpp	+8 dBm	+2 dBm
500 mV/div	2.0 Vpp	+16 dBm	+10 dBm
1 V/div	4.0 Vpp	+22 dBm	+16 dBm

NOTE The power splitter has a 6 dB loss.

11 Turn on the RF Out of the signal generator.

12 Measure the input power at video input channel 2 of the 8990B, and convert the value to rms voltage using the following equation:

$$V_{in@50\ MHz} = \sqrt{P_{meas} \times 50\ \Omega}$$

13 Record the calculated RMS voltage in Table 1-7.

14 Press **Clear Display**, and measure the peak voltage.

15 Calculate the rms voltage from the peak voltage using the following equation, and record the value in Table 1-7.

$$V_{out@50\ MHz} = V_{peak} / (\sqrt{3})$$

16 Calculate the reference gain using the following equation, and record the value in Table 1-7.

$$Gain_{50\ MHz} = 20log[(V_{out@50\ MHz} / V_{in@50\ MHz})]$$

17 Set the signal generator to output a 1 GHz signal, which is the maximum bandwidth of the 8990B.

18 Set the horizontal scale to 2 ns/div.

19 Set the channel frequency of the power meter to 1 GHz.

20 Measure the input power at video input channel 2 of the 8990B, and convert the value to rms voltage using the following equation:

$$V_{in@max\ freq} = \sqrt{P_{meas} \times 50\ \Omega}$$

21 Record the calculated RMS voltage in Table 1-7.

22 Press **Clear Display**, and measure the peak voltage.

23 Calculate the rms voltage from the peak voltage using the following equation, and record the value in Table 1-7.

$$V_{out@max\ freq} = V_{peak} / (\sqrt{3})$$

24 Calculate the gain of the maximum analog bandwidth using the following equation, and record the value in Table 1-7.

$$Gain_{Max\ freq} = 20log\left[\frac{V_{out@max\ freq} / V_{in@max\ freq}}{Gain_{50\ MHz}}\right]$$

25 Repeat step 8 to step 24 for the rest of the vertical scale setting in Table 1-7.

26 Repeat step 8 to step 25 for video input channel 3.

27 If the maximum analog bandwidth gain is less than –3.0 dB, refer to "Adjustments" on page 28.

Table 1-7 Test record for maximum frequency verification

Vertical scale	Vin@50 MHz	Vout@50 MHz	Gain50 MHz	Vin@max freq	Vout@max freq	GainMax freq
Video input channel 2						
5 mV/div						
10 mV/div						
20 mV/div						
50 mV/div						
100 mV/div						
200 mV/div						
500 mV/div						
1 V/div						
Video input channel 3						
5 mV/div						
10 mV/div						
20 mV/div						
50 mV/div						
100 mV/div						
200 mV/div						
500 mV/div						

Adjustments

Adjustments are usually performed on yearly basis or after a performance verification has indicated that some parameters are out of specification. Performance verifications must be performed after any repairs that may have altered the characteristics of the 8990B.

Contact your local Agilent service center to perform adjustment on the 8990B.

For more information, you can contact your local Agilent representative at the telephone numbers listed in "Contacting Agilent" on page 127 or at the Web address below.

www.agilent.com/find/assist

2
Theory of Operation

This chapter describes how each of the peak power analyzer's individual assemblies operate.

Overview

The 8990B is a peak power analyzer designed to provide accurate radar pulse analysis measurement. A combination of the 8990B and the N1923/4A wideband power sensor enables the RF pulse rise/fall time measurement of up to 5 ns.

The 8990B has a high sampling rate of 100 MSa/s for RF channels. This enables the peak power analyzer to offer faster measurement speed and greater measurement accuracy in key applications such as radar pulse analysis and wireless pulse measurement.

The peak power analyzer is also able to perform auto-zeroing and calibration function to eliminate the need to connect and disconnect from the calibration source and reduces the test time and measurement uncertainty.

Processor PCI Mezzanine Card (PPMC) Assembly

Purpose

- Provides the main processor and memory for the peak power analyzer
- Stores the peak power analyzer firmware in flash
- Stores the serial number of the peak power analyzer

Inputs

- Power supplies (from PSU, via main board)
- Control and data lines (from main board and DAP)

Outputs

- Control, address, and data lines (to main board and DAP)

Backplane Main Board Assembly

Purpose

- Provides the peak measurement path to the DAP
- Provides the external trigger input or output
- Provides the signal routing between the PPMC and DAP

Inputs

- Power supplies (from PSU)
- Control, address, and data lines (from PPMC)

Outputs

- Control and data lines (to PPMC)

DAP Assembly

Purpose

- Provides data acquisition and processing for the peak measurement path

Inputs

- Power supplies (from PSU, via main board)
- Control, address, and data lines (from PPMC)

Outputs

- Processed peak path measurement data (to PPMC, via main board)
- Control and data lines (to PPMC, via main board)
- Trigger output (to external equipment)

Check Source Assembly

The check source assembly verifies that the wideband power sensor is operational by outputting an RF signal.

Filter and Clock Distribution Board

The filter and clock distribution board provides a 10 MHz clock conditioning source to sync the main board assembly with the test acquisition board. It performs filtering function when the 8990B is used with a sensor at a low frequency RF signal.

Test Acquisition Board

The test acquisition board contains the TUT modules, onboard ADC, clock distribution, data management ASICs, external acquisition memory, ADC, communication and programming FPGA, and supporting power supply circuitry.

The main function of this board is as follows.

- Provide scope measurement function
- Stable internal crystal ~1.4 ppm
- Power conditioning circuitry
- Trigger/sync to the peak power analyzer
- Control the front panel
- Integrate with the PC motherboard through PCIE

PC Motherboard

The PC motherboard provides all the system control and interface functions for the 8990B Windows® 7 based operating system. It contains the CPU, ROM, RAM, keyboard and mouse interfaces, serial and parallel interfaces, hard disk drive interface, and PCIE buses.

Power Supply Assembly

AC input to the power supply: 100 VAC to 240 VAC ±10%

Maximum input power: 375 W

AC input frequency: 50 Hz to 60 Hz

Monitor Assembly

The Flat Panel Display (FPD) monitor is a thin film liquid-crystal touch screen display (TFT-LCD). This FPD is a 15-inch diagonal, 1024 by 768 pixel, XGA color monitor.

Front Panel

The front panel keyboard has a breakaway section that interfaces to the keyboard. This breakaway section receives the power supply nets from the acquisition board.

The keyboard links to the PC motherboard through a high-speed USB 2.0 interface. The on-board USB hub serves the PIC microcontroller, touch screen controller board, and up to three front panel USB connectors as user's peripherals.

A conductive element on the inside of each key shorts a gap on the underlying keyboard circuit board. The keyboard controller detects this short and sends the proper keypress information to the system controller on the motherboard.

There are 12 knobs located on the front panel.

NOTE Option U02 is not integrated with the three front panel USB connectors.

Hard Disk Drive

The hard disk drive is a high-capacity and shock-resistant unit. It is used to store the peak power analyzer operating system and certain system configuration data.

The hard disk drive can also be used to store and recall the peak power analyzer setups and waveforms.

Display Board

The display board controls the flat-panel display monitor. It translates the video signals from the motherboard's on-board video system to the Low Voltage Differential Signal (LVDS) signals that drive the monitor.

System Fans

The system fans consists of six fans. There are two large fans that draw air out of the rear of the instrument, two medium fans that are positioned over each ADC to give additional cooling, one small fan positioned over the trigger IC, and another small fan installed on the backplane main board to give additional cooling. The fans are all controlled by the main FPGA.

3 Troubleshooting Guide

This chapter provides the troubleshooting information for the peak power analyzer.

Introduction

This chapter contains a general troubleshooting guide to detect failures for the 8990B peak power analyzer. The service strategy for this peak power analyzer is by replacement of the defective assembly boards.

Power-Up Failure

Table 3-1 Power-up failure troubleshooting

Basic check	Debug tips	Possible faults
Basic external check	• Ensure that the Power On/Off switch lights up • Ensure that the main power source is live • Check the main cable for any obvious damage • Replace the main power cable	• Power supply module (high probability) • Mainboard (low probability)
Basic internal check	• Ensure that the green LED DS 14 on the DAP board light up when the power button is pressed • Ensure that the green LED DS4 on the main board light up when the power button is pressed • Ensure that the green LED DS2/DS3 on the main board flashes on and off during normal operation	• Power supply module (high probability) • Main board (low probability) • DAP board (low probability)

Instrument Self-Test

Table 3-2 Instrument self-test troubleshooting

Self-test	Purpose	Debug tip	Possible faults
Test point voltages	Ensures that all the supply voltages are present	Replace the PSU	• Main board (high probability) • PSU (low probability)
Fan	Verifies that the fan is working	Unplug and plug back the fan assembly and the main board	• Fan assembly (high probability) • Main board (low probability)
Battery	Ensures that the lithium manganese battery on the main board is working	Replace the battery	• Lithium manganese battery (high probability) • Main board (low probability)
PLL	Ensures the connectivity between the scope acquisition board, DAP, filter board, and DAP board	Unplug and plug back the cable connection between the acquisition board and DAP filter board	• DAP filter board (high probability) • Test acquisition board 1 GHz or DAP board (low probability)
Channel 1 measurement path test	Ensures that the measurement path of channel 1 is working	Replace the DAP board	• DAP assembly (high probability) • Main board or channel 1 sensor adapter board (low probability)
Channel 1 memory interface test	Ensures that the memory interface of channel 1 is working	Replace the DAP board	• DAP assembly (high probability) • Main board (low probability)
Channel 4 measurement path test	Ensures that the measurement path of channel 4 is working	Replace the DAP board	• DAP assembly (high probability) • Main board or channel 4 sensor adapter board (low probability)

Table 3-2 Instrument self-test troubleshooting (continued)

Self-test	Purpose	Debug tip	Possible faults
Channel 4 memory interface test	Ensures that the memory interface of channel 4 is working	Replace the DAP board	• DAP assembly (high probability) • Main board (low probability)
Video channels	Ensures the functionality of the video channels	–	Scope acquisition board

Performance Verification

Table 3-3 Performance verification troubleshooting

Type of failure	Debug tip	Possible faults
Zero set failure	–	Main board
Linearity failure	Replace the DAP board	• DAP assembly (high probability) • Main board (low probability)
Rise/fall time failure	Unplug and plug back the sensor flex RF connections	• Main board (high probability) • Sensor flex (low probability) • DAP assembly (low probability)
Time base frequency accuracy failure	• Check that the BNC cable used is not damaged • Check that the BNC cable is connected to the **Trig Out** and not to **Trig In**	Main board
Impedance failure	–	Scope acquisition board
Offset accuracy failure	–	Scope acquisition board
DC gain failure	–	Scope acquisition board
Analog bandwidth check failure	–	Scope acquisition board
Time scale accuracy failure	–	Scope acquisition board

Display Trouble Isolation

Check the backlight inverter voltages

Access the backlight inverter board by opening the front chassis as shown in Figure 3-1.

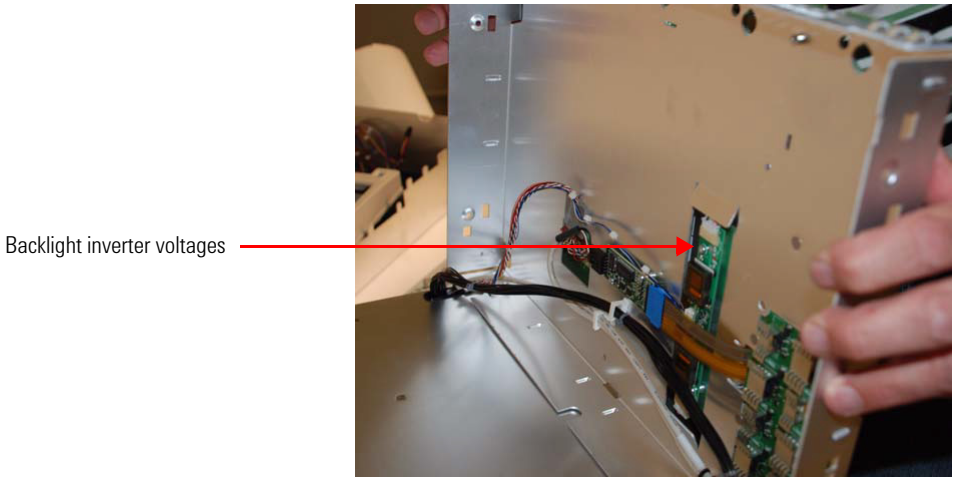


Figure 3-1 Check the backlight inverter voltages

There is an input connector at one side of the board and two output connectors on the other end of the board, that power the two backlights which are inserted into the flat panel display.

The output voltage is approximately 300 to 450 Vrms, 40 kHz (measured differentially between the two wires) when the backlight is illuminated. The voltage is approximately 1 kV before the backlight tube is illuminated. A red LED on the backlight inverter board illuminates when the output voltage is present.

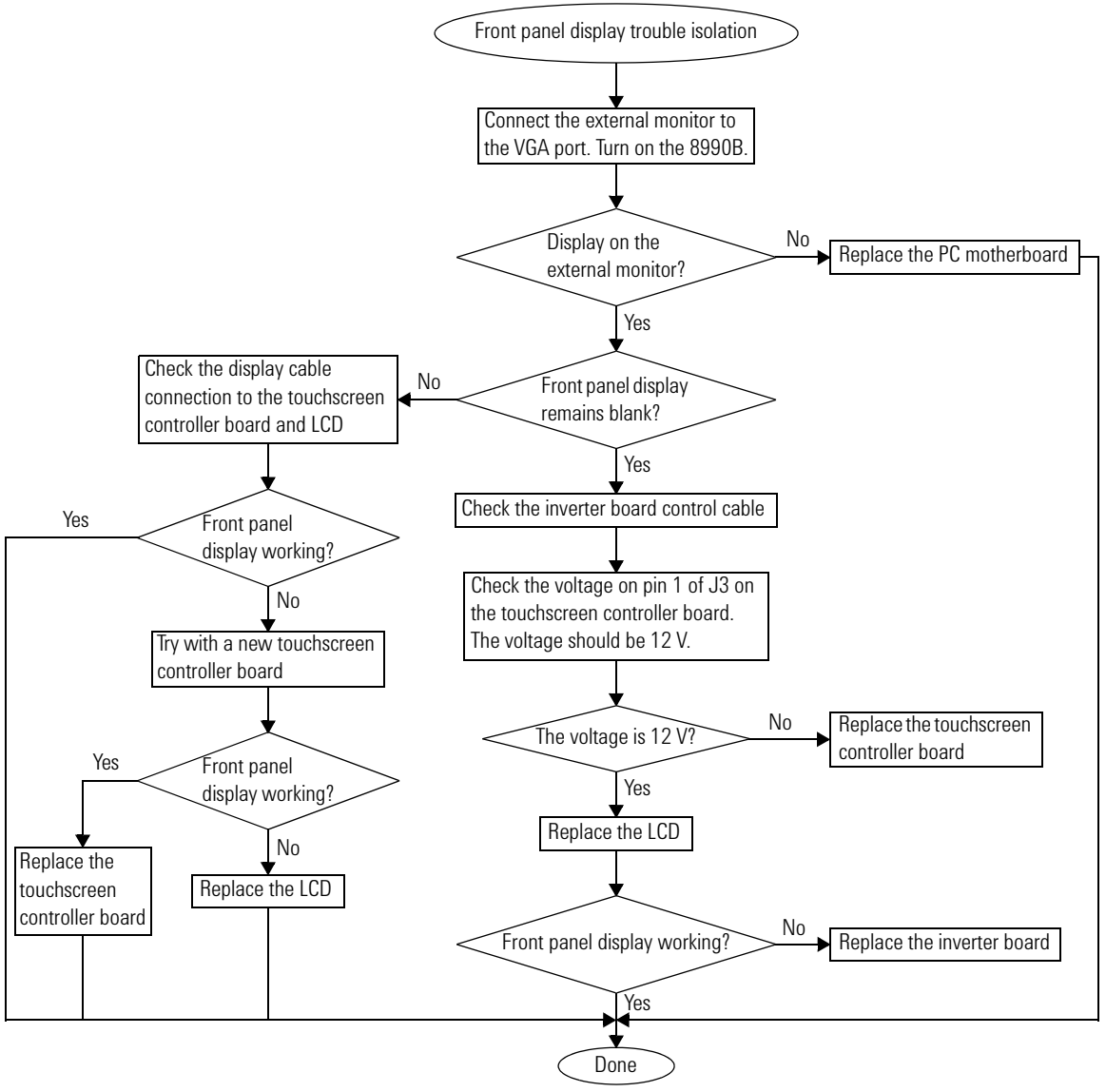
When the backlight goes off (when the peak power analyzer's operating system switches to screen saver mode) the voltage on pins 1 and 2 (with respect to ground) slowly decays to 0 V.

The outputs are controlled by the input. The input pin 5 goes low to enable the output voltage. These pins can be reached at J1 on the display board MP12.

Table 3-4 Backlight inverter board input voltages

Backlight inverter board input voltages							
Input pin	7	6	5	4	3	2	1
Backlight OFF	0 V	0 V	0 V	0 V	0 V	0 V	0 V
Backlight ON	5 V	0 V	2.5 V	0 V	0 V	12 V	12 V

Front panel display isolation



Communication Interface Failure

Table 3-5 Communication interface failure troubleshooting

Type of communication	Debug tip	Possible fault
LAN	Ensure that the connector is not damaged	PPMC assembly
USB 2.0	Ensure that the connector is not damaged	PPMC assembly

Check Source Failure

The possible faults if the sensor check source of the peak power analyzer is not functioning are as follows.

- Check source board (high probability)
- Main board (low probability)

Setup the BIOS

If the BIOS setting is corrupted, the peak power analyzer's PC motherboard will not recognize the hard disk drive and the unit may not be able to boot.

Use the following procedure to display the motherboard BIOS setup.

1. Connect the power cable to the 8990B.
2. Power on the 8990B.
3. Connect an external keyboard to the USB port at the side panel.
4. Press **Delete** when you see the following message at the bottom of the screen.

   "**Press TAB to show POST screen, DEL to enter SETUP, F12 to select boot drive.**"

NOTE If you do not see the message on the screen or the 8990B does not appear to be functioning, check the ribbon cable connectors to the motherboard.

Use the following procedure to configure the motherboard BIOS parameters.

1. Select **Exit** and press **Enter**.
2. Select either **Optimal Defaults** or **Fail safe default** and press **Enter**.
3. Press **OK** to perform the selection.
4. Select **Save and Exit Setup** to save the settings and exit the BIOS setup.
5. Press **OK** to exit.

Display the Software and Firmware Revision

Use the following procedure to display the current software and firmware revision in the 8990B.

1. Select **Support > About** on the toolbar.
2. The About dialog is displayed with the current software revision information.

4
Repair Guide

This chapter contains information on repair and replaceable parts of the 8990B. This chapter also explains how to disassemble the 8990B.

Introduction

This chapter contains the information for some of the higher level components and assemblies which can be ordered from Agilent. It also describes how to assemble and disassemble the peak power analyzer for repair.

To order the replaceable parts, contact your local Agilent Sales and Service Office.

To return your peak power analyzer for servicing at a qualified service center, refer to Chapter 5, “Contacting Agilent”.

Main Replacement Parts for 8990B

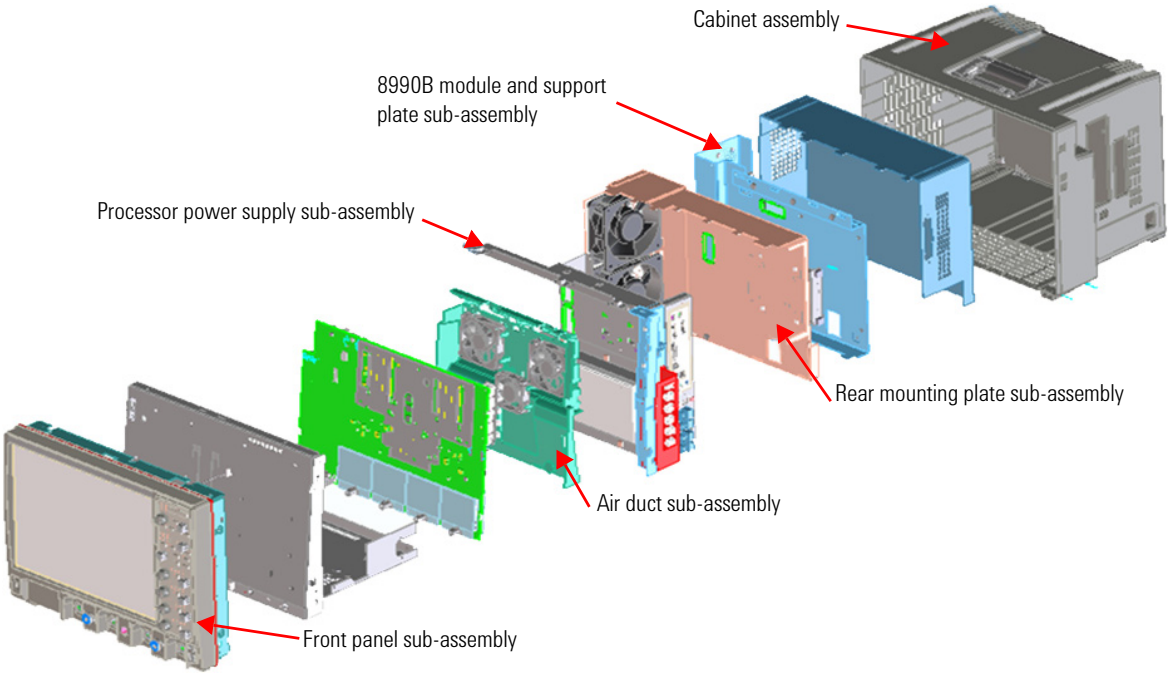


Figure 4-1 Overview assembly of the 8990B

Front panel assembly

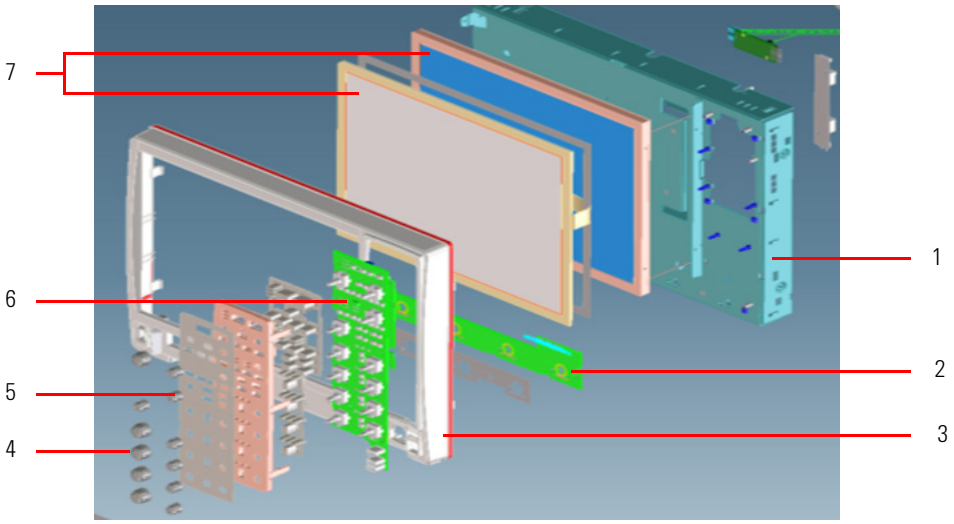


Figure 4-2 Front panel assembly

Table 4-1 Front panel assembly

No	Part number	Quantity	Description
1	08990-00100	1	8990B front deck
2	54904-66403 08990-60069	1	PCA – Autoprobe PCA – Front panel without USB
3	08990-40200 08990-40201	1	Bezel (Option U01) Bezel without USB host (Option U02)
4	54913-47402	5	18 mm knob Flint gray
5	54913-47401	7	12 mm knob Flint gray
6	54904-66405	1	PCA front panel
7	54904-68708	1	Display/touchscreen – support assembly

Air duct sub-assembly

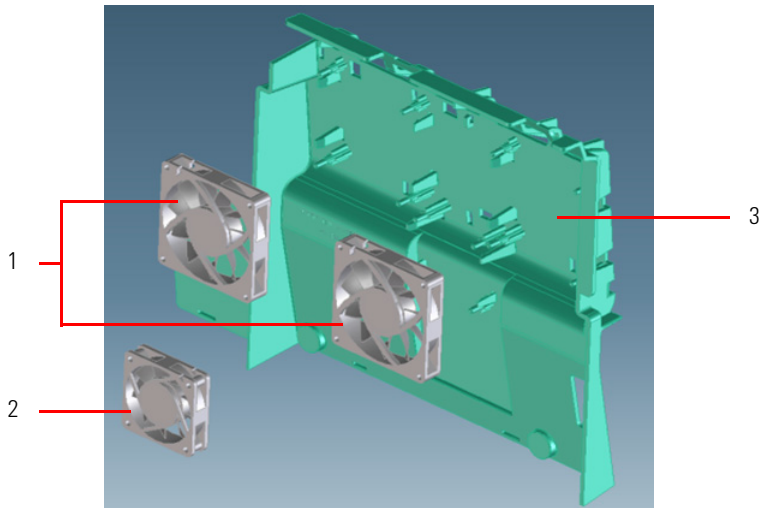


Figure 4-3 Air duct sub-assembly

Table 4-2 Air duct sub-assembly

No	Part number	Quantity	Description
1	54904-68502	2	80 mm fan assembly
2	54904-68503	1	60 mm fan assembly
3	54904-44102	1	Air duct

PC motherboard sub-assembly

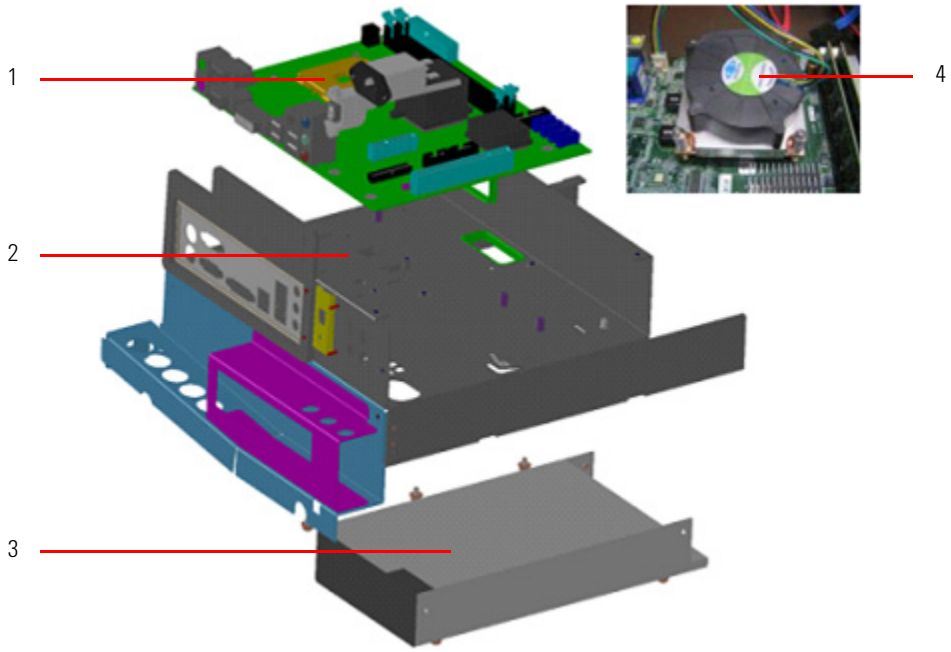


Figure 4-4 PC motherboard sub-assembly

Table 4-3 PC motherboard sub-assembly

No	Part number	Quantity	Description
1	0960-2939	1	Motherboard Flex-ATX Core 2 Duo 4 GB with inverted backlight-enable
2	08990-60205	1	8990B power supply deck assembly
3	0950-5060	1	Power supply module 700-Watt 12 V with one output
4	3160-4331	1	CPU fan assembly with socket 12 VDC 5000 RPM

Rear mounting plate sub-assembly

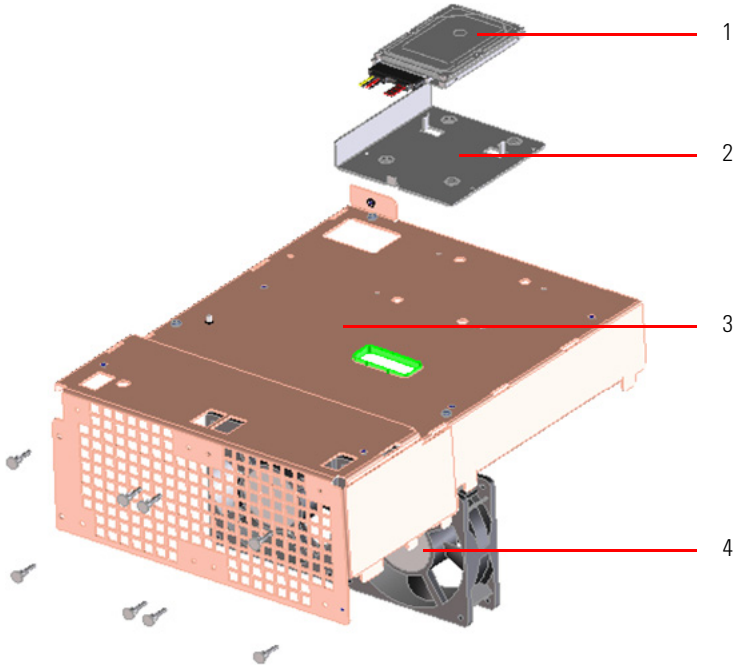


Figure 4-5 Rear mounting plate sub-assembly

Table 4-4 Rear mounting plate sub-assembly

No	Part number	Quantity	Description
1	08990-68707	1	8990B hard drive replacement kit
2	54904-00107	1	Standard hard disk plate
3	08990-00105	1	8990B rear mounting deck
4	54904-68501	2	Fan assembly

Cabinet sub-assembly

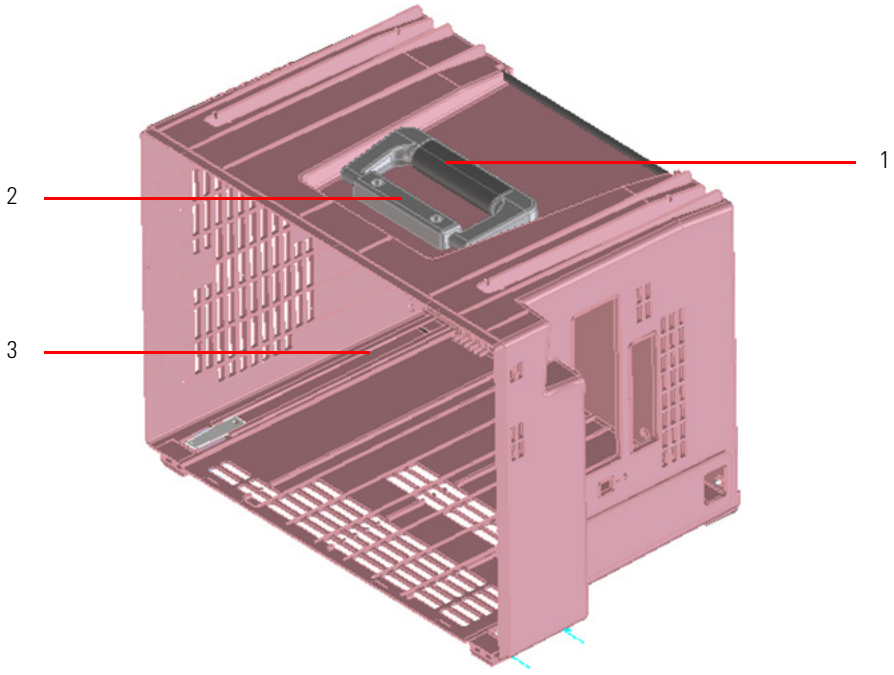


Figure 4-6 Cabinet sub-assembly

Table 4-5 Cabinet sub-assembly

No	Part number	Quantity	Description
1	54904-44901	1	Handle
2	54904-44902	1	Handle keeper
3	08990-44402	1	Bucket

8990B module and support plate sub-assembly

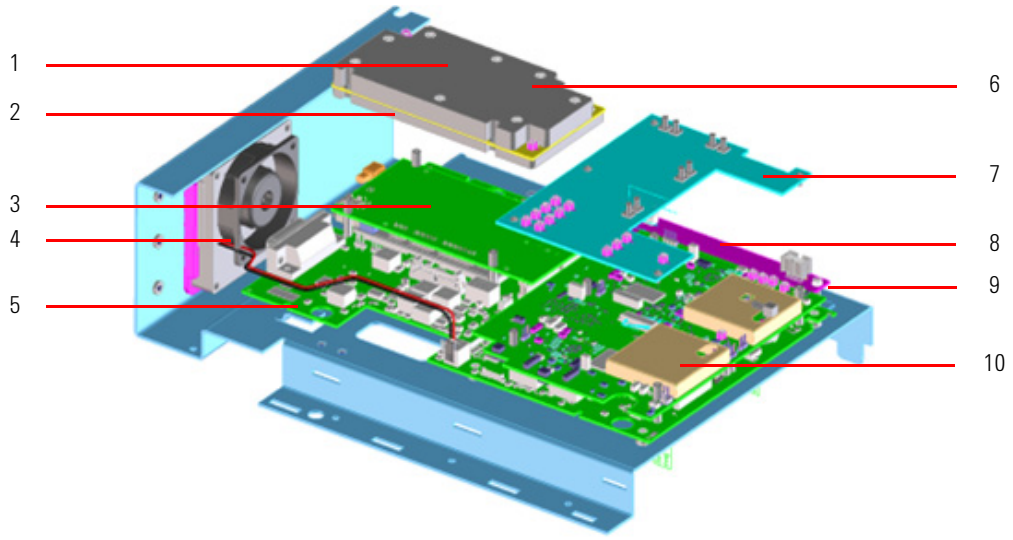


Figure 4-7 8990B module and support plate sub-assembly

Table 4-6 8990B module and support plate sub-assembly

No	Part number	Quantity	Description
1	08990-66004	1	Tested checking source board for SPO
2[1]	08990-00601	1	Shield can bottom
3	08990-66005	1	Tested PPMC with 8990B firmware for SPO
4	08990-68501	1	Sanyo Denki fan
5	08990-66002	1	Tested backplane motherboard for SPO
6[1]	08990-00600	1	Shield can top
7	08990-66003	1	Tested filter and clock distribution board for SPO
8	08990-60067	1	Channel A adapter board
9	08990-60068	1	Channel B adapter board
10	08990-66001	1	Tested data acquisition board for SPO

[1] This part number is not orderable.

Replacement Parts

Table 4-7 Replacement parts

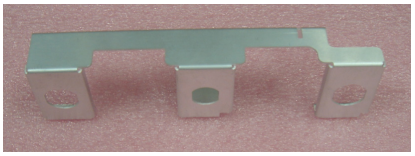
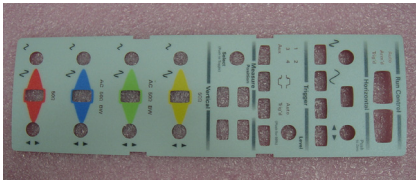
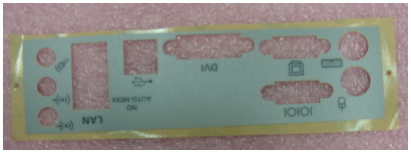
Part number	Description	Item
08990-00109	8990B N-type CON cover	
08990-84300	Label ID - 8990B	
08990-94301	Label - Control panel	
08990-94303	Label - PC IO (option U01)	
08990-94302	Label - PC IO without USB host (Option U02)	

Table 4-7 Replacement parts (continued)

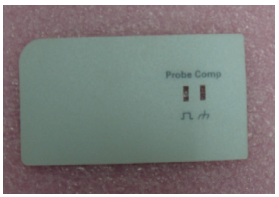
Part number	Description	Item
08990-84302	Label - Probe comp	
08990-84303	Label - Check source	
08990-84304	Label - Port 1	
08990-84305	Label - Port 2	
08990-84306	Label - Port 3	

Table 4-7 Replacement parts (continued)

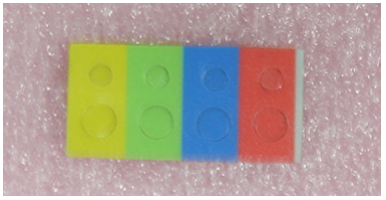
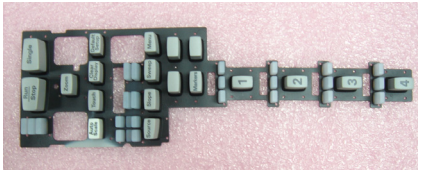
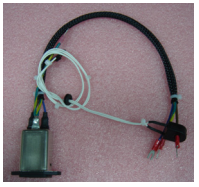
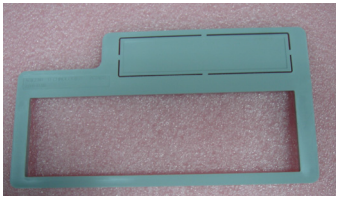
Part number	Description	Item
08990-84307	Label - Port 4	
54913-94300	Label - Colored knob set	
08990-41900	Switch - Control Panel	
08990-61615	PSU to AC inlet	
08990-44700	Filler plate	

Table 4-7 Replacement parts (continued)

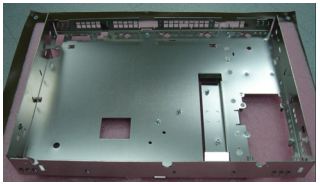
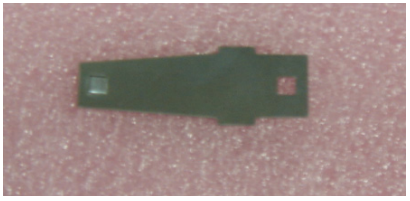
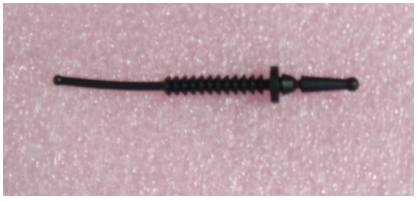
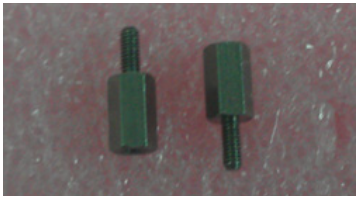
Part number	Description	Item
08990-62300	Storage pouch	
08990-00101	8990B acquisition deck	
54574-09101	Spring - Tilt leg	
1520-0702	Fan-mount break away 83.5 mm - LG 0.8-1.6 mm-THK silicone rubber	
08990-25000	Stand off HEX male-female	

Table 4-7 Replacement parts (continued)

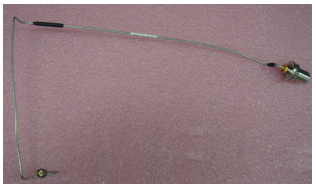
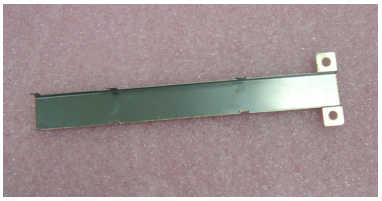
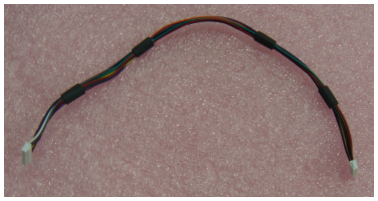
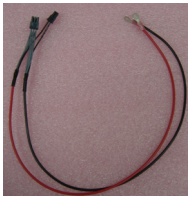
Part number	Description	Item
08990-61606	N-type connector semi rigid cable	
08990-61603	Sensor cable ODU	
08990-00108	8990B cable cover	
N1911-61003	Calibrator cable assembly	
08990-61600	Cable from PSU to motherboard	

Table 4-7 Replacement parts (continued)

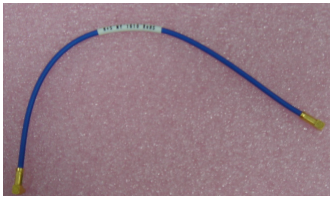
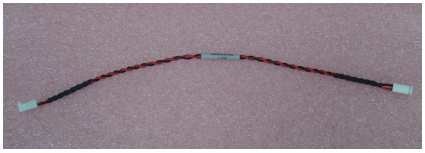
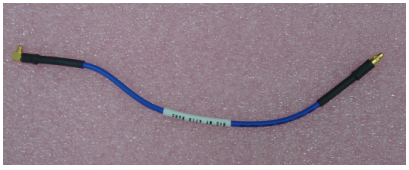
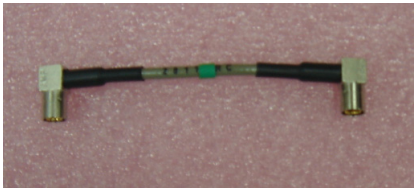
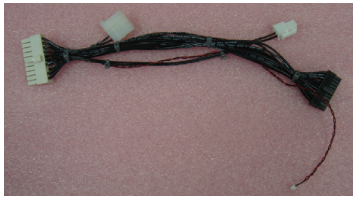
Part number	Description	Item
08990-61608	MMCX male right-angle cable	
08990-61613	Cable 2-pin	
08990-61616	MMCX male straight/right-angle cable	
5190-3462	RF cable assembly, SMB/F-SMB/F, length is 80, without marker	
08990-61601	Power ATX cable	

Table 4-7 Replacement parts (continued)

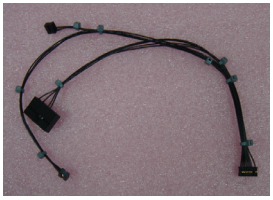
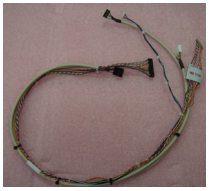
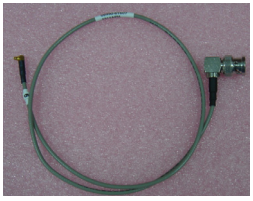
Part number	Description	Item
08990-61614	Cable standby/ON-OFF	
08990-61625	Cable display/inverter USB	
08990-44101	Cover - Front	
08990-61604	USB cable (mini USB to 10 pin receptacles)	
08990-61607	BNC cable (10 MHz Out scope to filter board)	

Table 4-7 Replacement parts (continued)

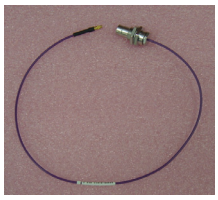
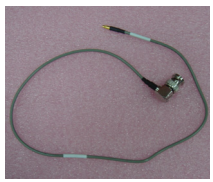
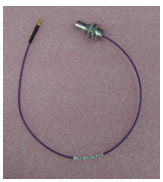
Part number	Description	Item
08990-61609	BNC cable (from filter board to 8990B 10 MHz Out)	
08990-61611	BNC cable (Trig In PM to DAP board)	
08990-61618	BNC cable (Trig In scope to filter board)	
08990-61619	BNC cable (Trig Out scope to filter board)	
08990-61620	BNC cable (Trig Out PM to DAP board)	

Table 4-7 Replacement parts (continued)

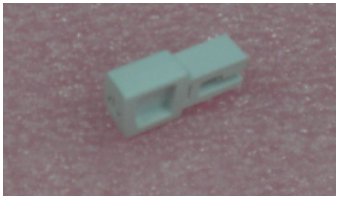
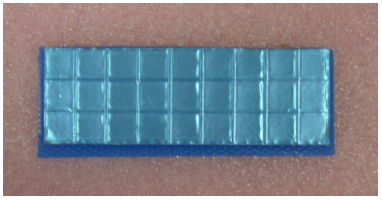
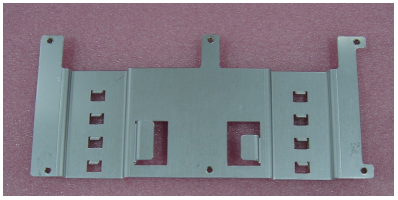
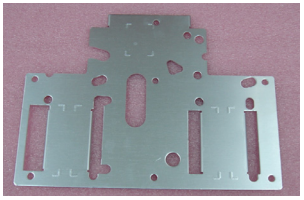
Part number	Description	Item
54901-66501	Test acquisition board 1 GHz	
54904-43901	Shaft - Power switch	
54904-43201	Thermal pad	
54904-01202	Heat spreader	
54904-01203	Heat spreader - Bottom	

Table 4-7 Replacement parts (continued)

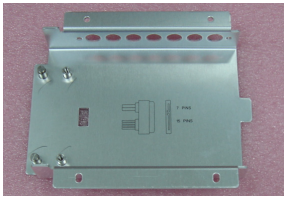
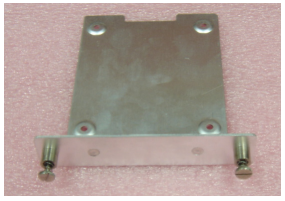
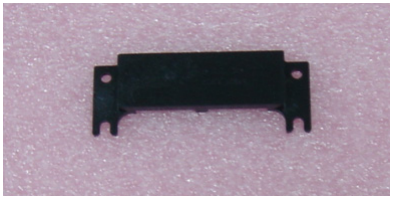
Part number	Description	Item
54904-01201	Bracket - Removable hard disk	
54904-04101	Plate - Removable hard disk	
54904-41202	Clamp SATA	
54904-94317	Label - Removable hard disk tray	
54904-00108	Bracket - Power supply	

Table 4-7 Replacement parts (continued)

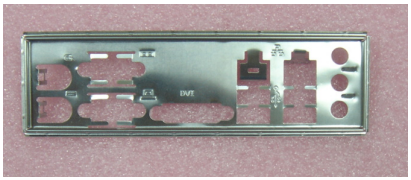
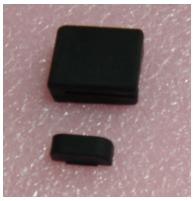
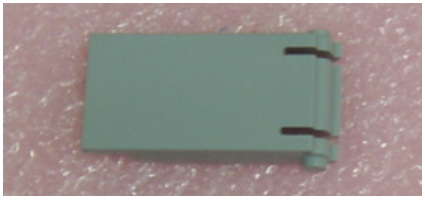
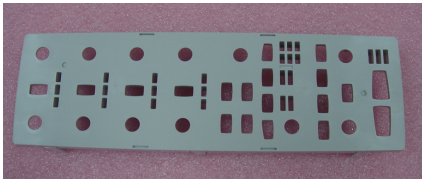
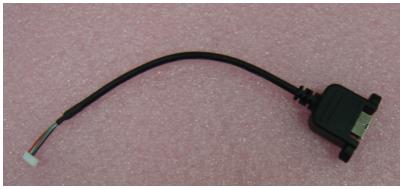
Part number	Description	Item
7144-0709	Rear panel I/O shield	
54904-44001	Rubber foot set	
54904-41001	Tilt leg	
54904-42202	Keybox	
54904-61606	Cable - USB device	

Table 4-7 Replacement parts (continued)

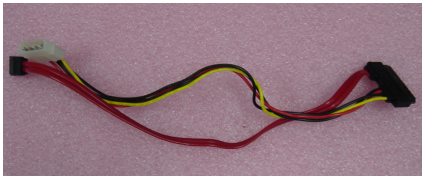
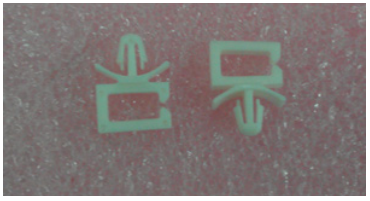
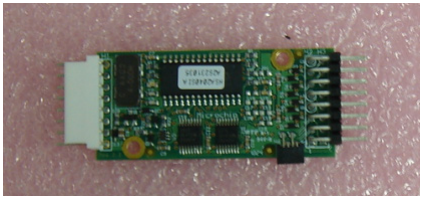
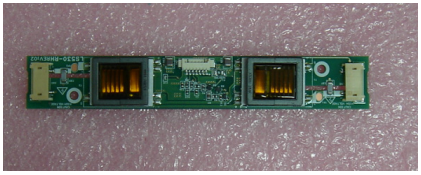
Part number	Description	Item
54904-61612	Cable - Bulk power	
54904-61609	Cable - Front panel power	
54904-61614	Cable - Hard disk power	
1400-3411	Saddle-wire side entry 0.22-IN	
0960-2796	Touchscreen controller board 5V-DC	

Table 4-7 Replacement parts (continued)

Part number	Description	Item
0950-2888	Inverter DC to AC 4-Watt 2-output	
1420-0394	Battery 3 V 1 A-HR Lithium Manganese Dioxide	

NOTE The replacement parts are not trade parts and orderable only through the Agilent Service Center for repair purposes.

Tools Required

Table 4-8 Tools required

Tool	Function	Item
5/16" open-end wrench, 5 in-lbs	Attach the attenuator pad on the check source assembly	
Glue gun	Attach the jumper of the 08990-61614 on the power supply module (0950-5060)	
9/32 socket, 5 in-lbs (for earth wire)	Attach the earth wires (nut)	
Manual T10 Torx screwdriver	Fix the screw on the top cover and attach the PCA	
Philips 12 in-lbs power driver	Fit the screws on the power supply module (red and black wires)	
Philips 5 in-lbs power driver	Fit the screws on the CPU fan	
Customized socket for power reference connector	Fit the nut at the front panel N-type connector	
Special tooling kit (N1912-61807)	Fit the sensor connector	
16 mm socket, 21 in-lbs (for BNC nut)	Fit the nut at the BNC connector	

Table 4-8 Tools required

Tool	Function	Item
5 mm socket, 5 in-lbs (for standoff)	Fit the standoff at the DAP assembly	
T10, 5 in-lbs power driver	Fix the screw on the top cover and attach the PCA	
T20, 18 in-lbs power driver	Attach the belt cover to hold the check source assembly	
T6, 3 in-lbs manual torx screwdriver	Fit the screw to the front panel PCA (beside the channel 2 and channel 3)	
T8, 5 in-lbs power driver	Attach the filter board on top of the DAP assembly or attach the PPMC/DAP assembly to the main board	

Remove and Replace the Handle and Rear Cover

Use this procedure to remove and replace the 8990B handle and rear cover.

1 Disconnect the power cable.

2 Disconnect any connected cables to the 8990B.

3 Remove the two T20 screws at the handle on top of the 8990B as shown in Figure 4-8.

WARNING **Keep track of which screws go with the handle as when during reassembling, different screws may result in a safety hazard.**

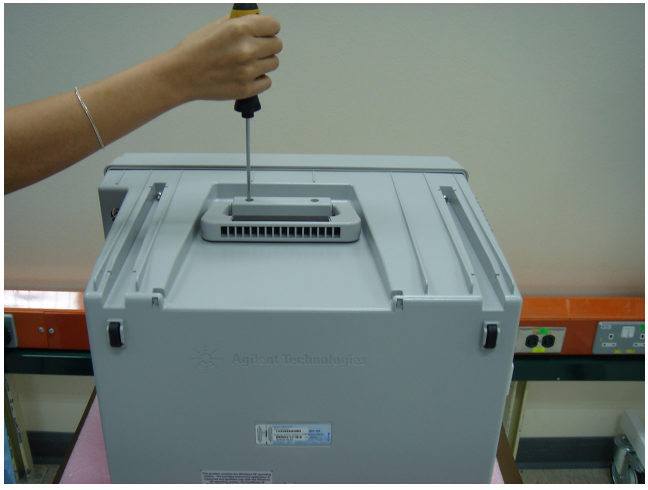


Figure 4-8 Remove the T20 screws at the handle

4 Remove the two T20 screws from the upper rear cover of the 8990B as shown in Figure 4-9.

Figure 4-9 Remove the T20 screws from the upper rear cover

5 Remove the two T20 screws on the bottom rear cover of the 8990B as shown in Figure 4-10.

Figure 4-10 Remove the T20 screws on the bottom rear cover

6 Place the 8990B face down and lift up the rear cover to remove it from the chassis as shown in Figure 4-11.

Figure 4-11 Lift up the rear cover

CAUTION

- Properly tighten the handle and screws.
- Tighten the handle screws to 21 in-lbs and the four rear cover screws to 18 in-lbs.

Front Panel Disassembly

Use this procedure to disassemble the 8990B front panel.

1 Disconnect the power cable, and remove the handle and rear cover as shown in “Remove and Replace the Handle and Rear Cover” on page 73.

2 Remove the nuts at the sensor connector and the N-type connector as shown in Figure 4-12.

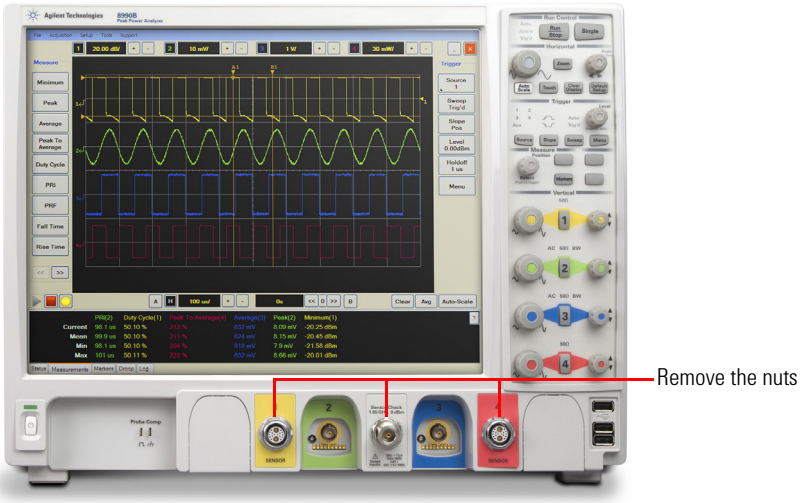


Figure 4-12 Remove the nuts at the sensor connector and the N-type connector

3 Remove the four screws on both of the cable shields at the bottom of 8990B with the 18 in-lbs, T20 Torx screwdriver as shown in Figure 4-13.

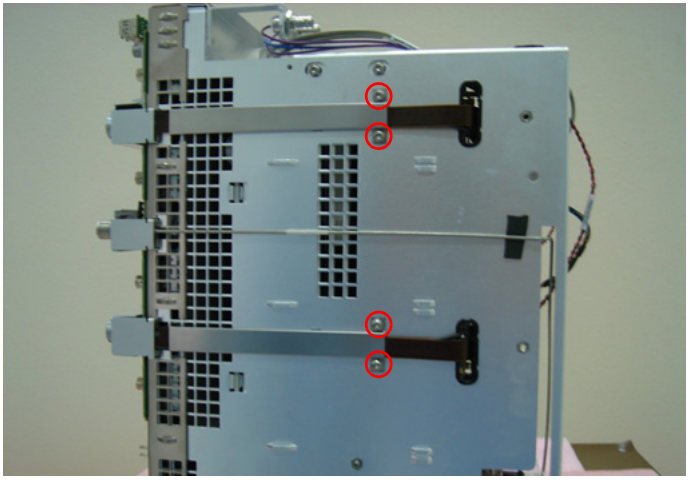


Figure 4-13 Remove the 4 units of screws on both of the cable shields

4 Position the 8990B upright and disengage the series of tabs around the outside of the front bezel as in Figure 4-14.

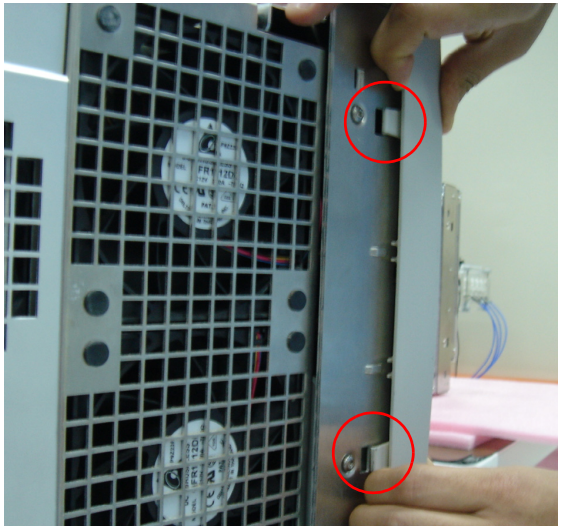


Figure 4-14 Disengage the series of tabs

5 With the tabs disengaged, pull the front panel bezel off as shown in Figure 4-15.

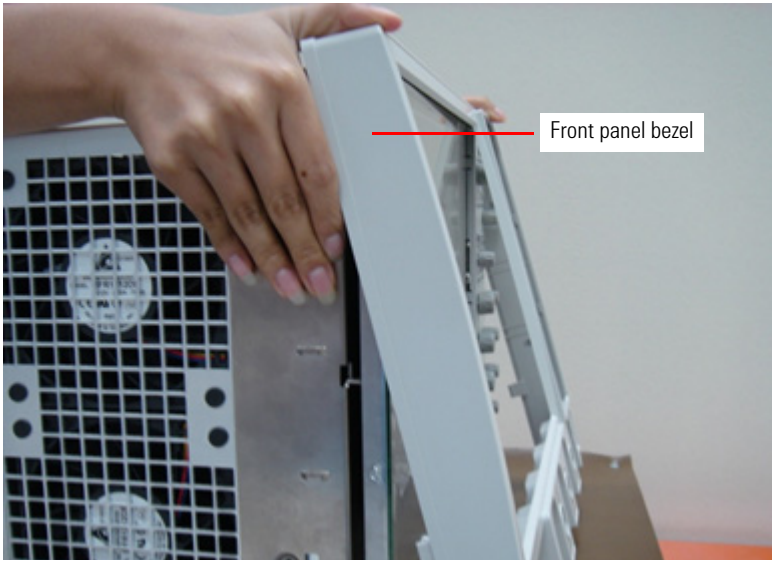


Figure 4-15 Pull the front panel bezel off

6 Detach the N-type connector cover (08990-00109) from the front panel PCA by unslotting it from the holes on the acquisition deck and release the two screws (0515-1246) with the 5 in-lbs, T10 Torx screwdriver as shown in Figure 4-16.

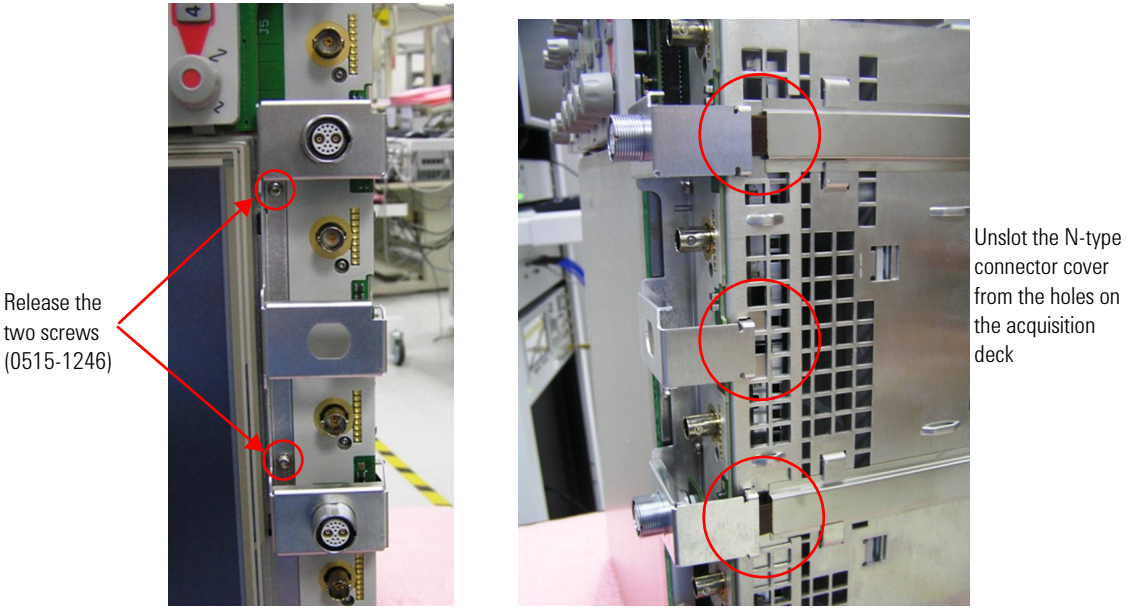


Figure 4-16 Unslot the N-type connector and release the two screws

7 Remove the N-type connector cover (08990-00109) from the front panel.

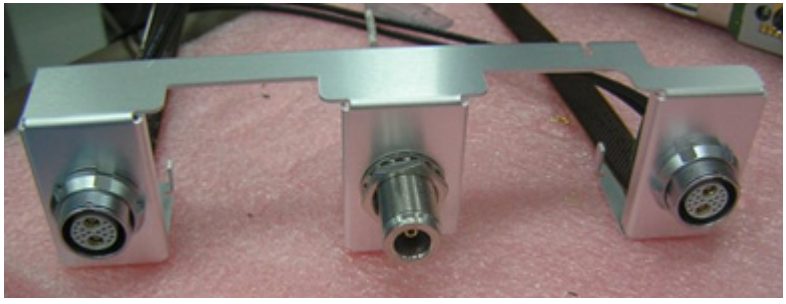


Figure 4-17 N-type connector cover

8 Pull up all the knobs to remove them from the front panel keypad as shown in Figure 4-18.

Figure 4-18 Pull up all the knobs

9 Remove the screw near the front panel USB ports with the T10, 5 in-lbs torx screwdriver as shown in Figure 4-19.

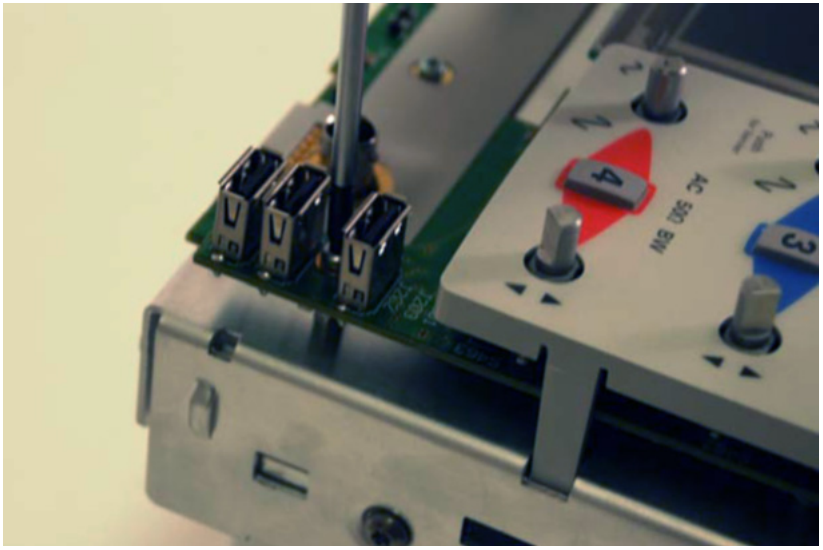


Figure 4-19 Remove the screw near the front panel USB ports

10 Disengage the three tabs located on the outside edge of the plastic plate that covers the front panel keyboard as shown in Figure 4-20.

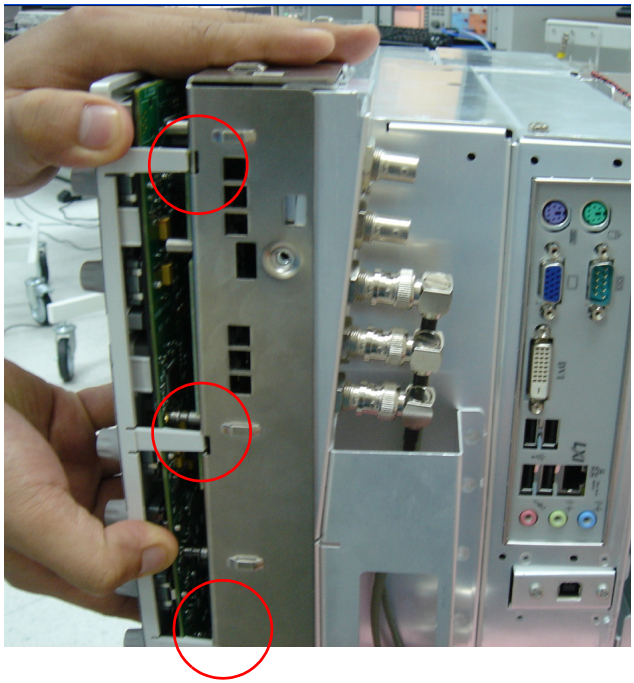


Figure 4-20 Disengage the three tabs

11 There are two tabs on the edge closest to the touchscreen that need to be disengaged. To disengage the tab near the top of the oscilloscope, look down the edge from the top and press in on the tab (press straight towards the bottom of the 8990B) with a flathead screwdriver while pulling up on the plastic keyboard cover as shown in Figure 4-21.

12 The plastic piece and keyboard will not come all the way off because you need to repeat step 11 for the bottom tab. Look along the inner edge from the bottom, push in on the bottom tab (push towards the top of the 8990B), and then pull up on the plastic keyboard cover.

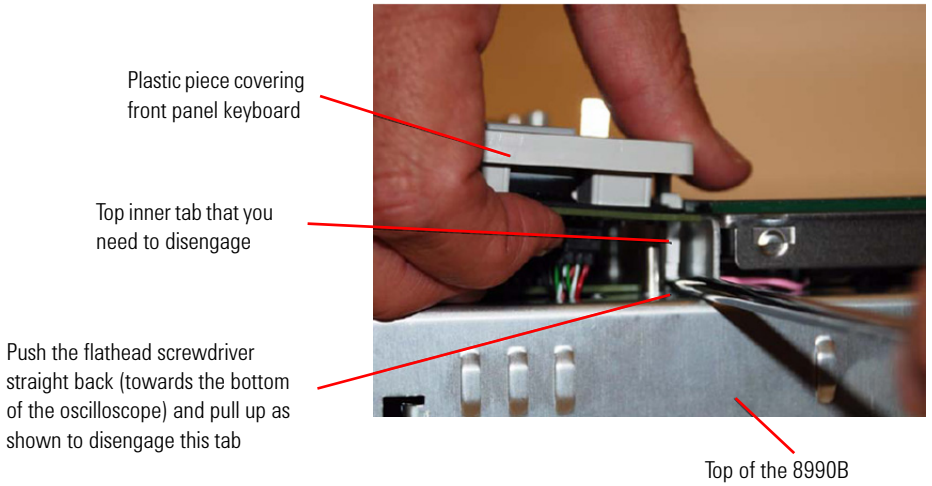


Figure 4-21 Plastic keyboard cover

13 Once the two inner tabs and three outer tabs have been disengaged, pull the plastic keyboard cover up from the bottom and tilt it towards the top as there is a cable connected to the top of the front panel keyboard as shown in Figure 4-22.

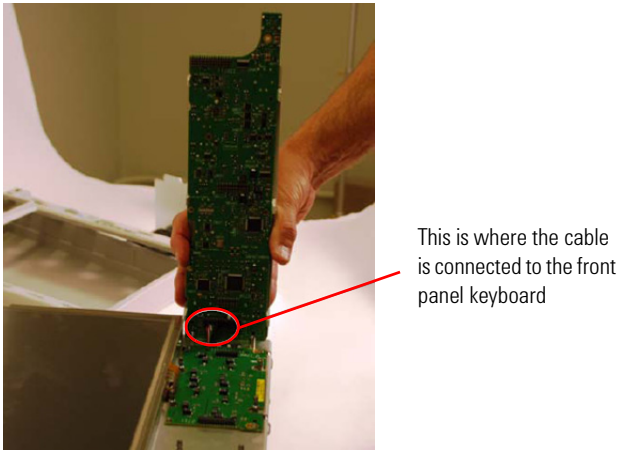


Figure 4-22 Pull the plastic keyboard cover up

14 Disconnect the cable connected to the front panel keyboard. There are two similar connections right next to each other. When you reconnect this cable, it goes in the connection closest to the touchscreen as shown in Figure 4-23.

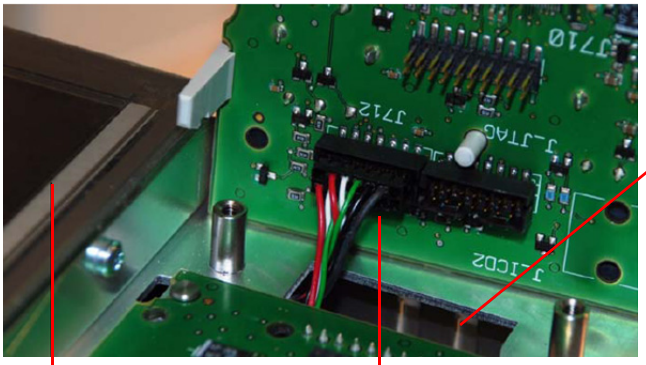


Figure 4-23 Disconnect the cable connected to the front panel keyboard

15 Remove the front panel keyboard from the plastic keyboard cover. There are a series of six tabs around the outside edge, holding the plastic covering the keyboard. Disengage all of these and then separate the two pieces as shown in Figure 4-24.

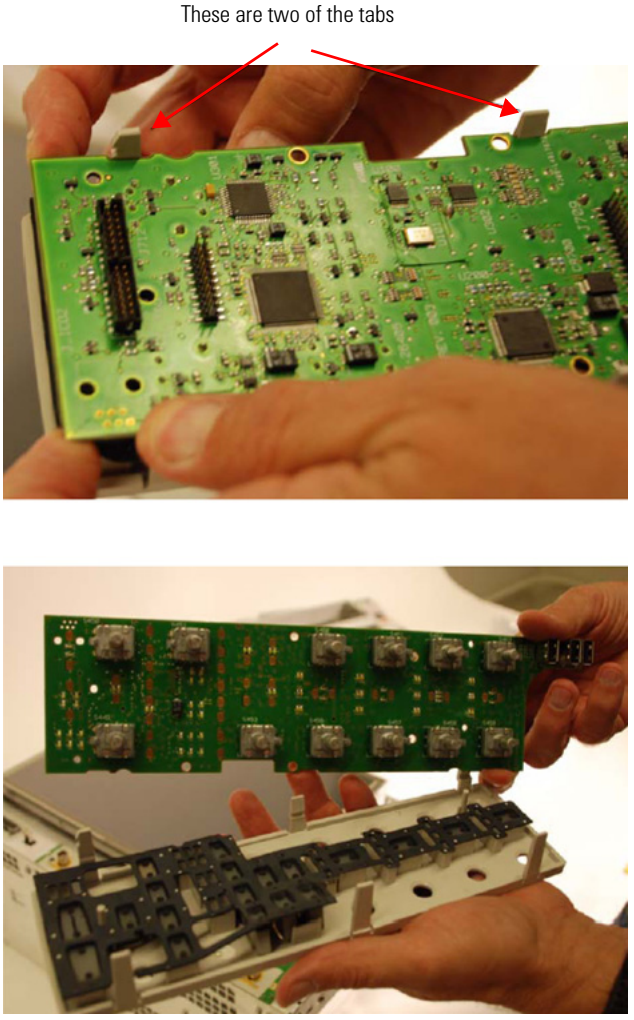


Figure 4-24 Remove the front panel keyboard from the plastic keyboard cover

16 If you are replacing the front panel keyboard, ensure that the front panel keyboard and the breakaway board are attached together. You have to break them apart and then use the two pieces. The break occurs beneath the USB ports on the front panel keyboard.

17 There are four latches that connect the breakaway board to the sheet metal. To remove the breakaway board that is located underneath the front panel keyboard, pull it directly away from the touchscreen to disengage the latches and then pull up to the board as shown in Figure 4-25.

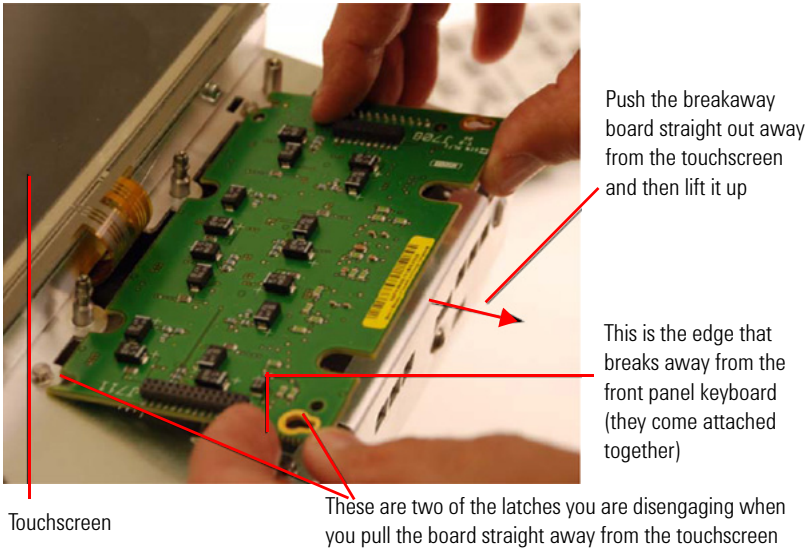


Figure 4-25 Remove the breakaway board

18 Disconnect the cable from the back of the breakaway board as shown in Figure 4-26.

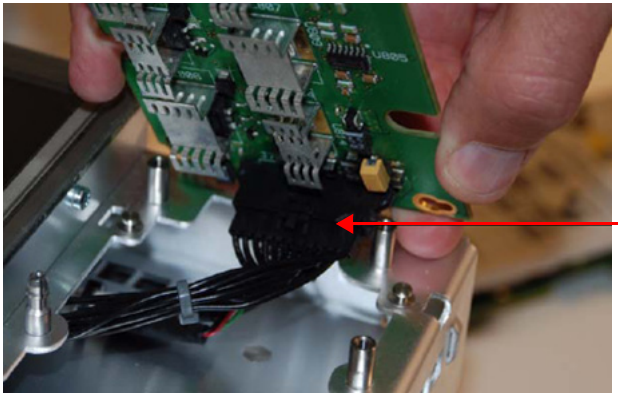


Figure 4-26 Disconnect the cable from the back of the breakaway board

19 To remove the Autoprobe board, remove the two screws with the T10 torx screwdriver and then slide the board to the right to disengage the two latches on either side of the board as shown in Figure 4-27.

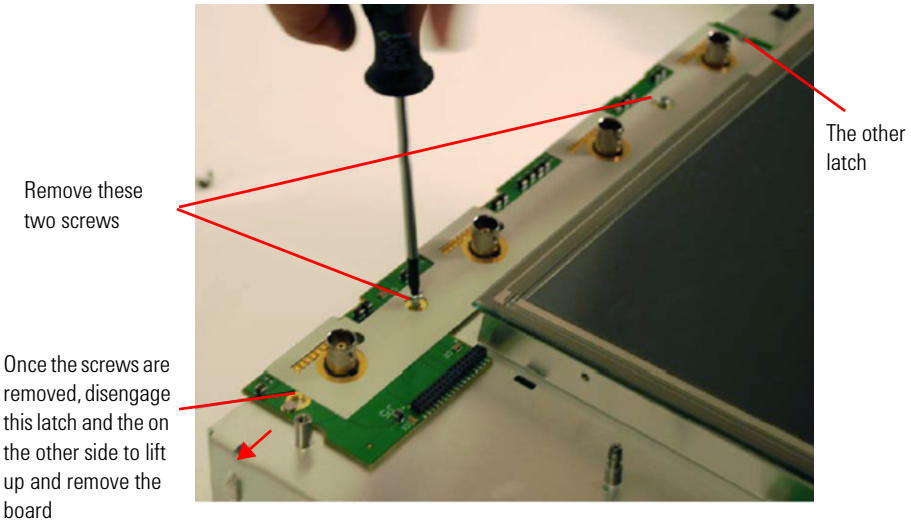


Figure 4-27 Remove the Autoprobe board

20 When reattaching the Autoprobe board, do not fully tighten the two T10 screws until you have reattached the front panel keyboard to the 8990B and attached it to the Autoprobe board. Once the front panel keyboard is attached, tighten the Autoprobe screws with the 5 in-lbs, T10 torx screwdriver.

21 To remove the touchscreen, you will need to access the back side of the sheet metal in order to disconnect cables. There are two T15 screws on either side of the 8990B that need to be removed as shown in Figure 4-28.

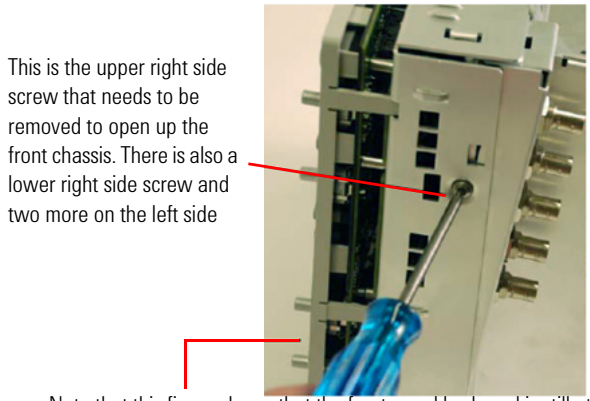
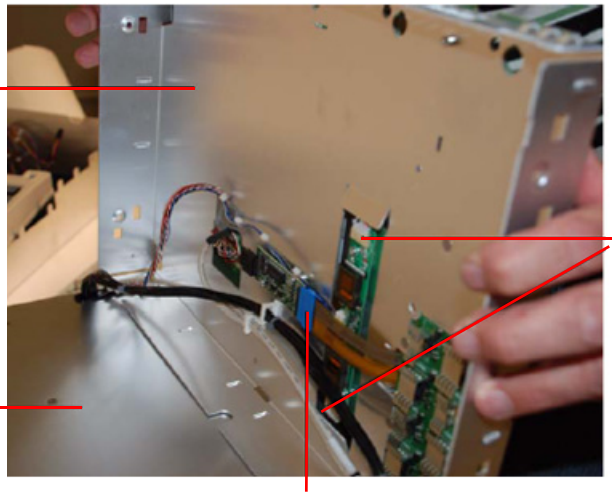


Figure 4-28 Remove the two t15 screws

22 Open up the front chassis after the screws are removed, and the touchscreen cable (blue connector) and the three display cables (white connectors) are disconnected as shown in Figure 4-29.



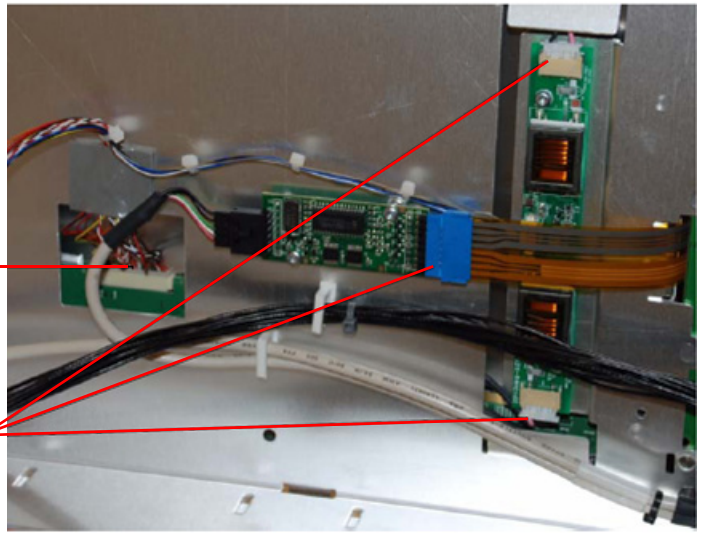


Figure 4-29 Remove the screws and the cables

23 Remove the four T10 screws that attaches the touchscreen to the sheet metal. There are two on each side of the touchscreen as shown in Figure 4-30. When reattaching these screws, tighten to 5 in-lbs with the T10 torx screwdriver.

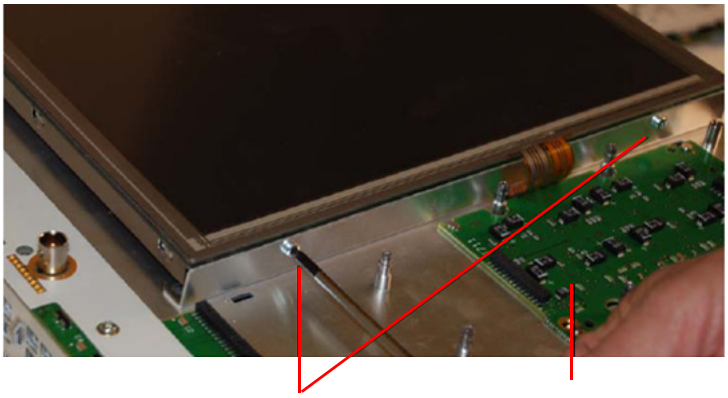


Figure 4-30 Remove the four T10 screws

24 To replace the backlight inverter board, disconnect the cables from the backlight inverter board and remove the two T10 screws as shown in Figure 4-31. You may need to temporarily remove the touch screen cable (blue connector) in order to remove and replace the inverter board.

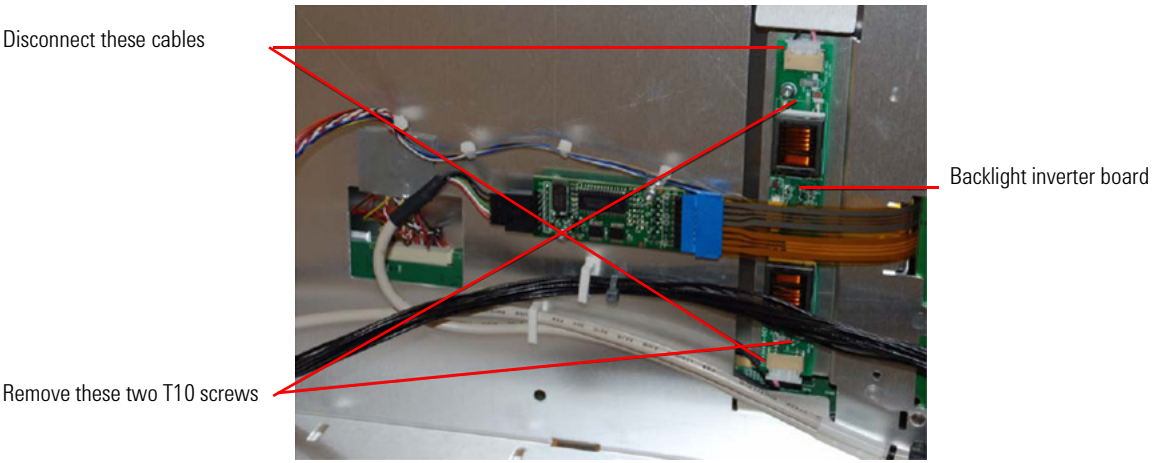


Figure 4-31 Replace the backlight inverter board

25 When replacing the inverter board, use the 5 in-lbs, T10 torx screwdriver to tighten the screws.

26 To replace the touchscreen controller board (0960-2796), disconnect the cables from the touchscreen controller board and remove the two T10 screws as shown in Figure 4-32.

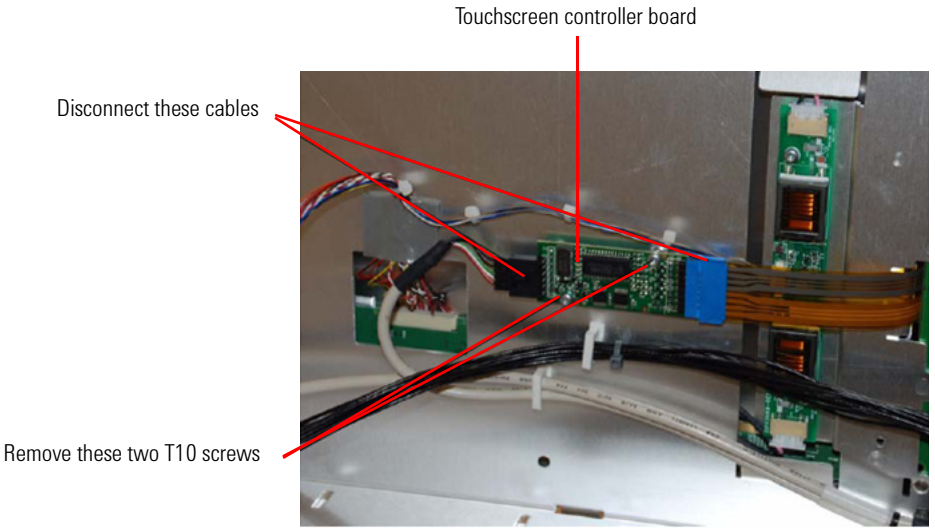


Figure 4-32 Replace the touchscreen controller board

NOTE

- When performing this procedure in reverse to reassemble the 8990B, ensure that all the edges (inner and outer edges) are fully pressed in when you place the front bezel back on the 8990B.
- Before reassembling the front chassis, ensure that all the cables are pulled through their appropriate openings and reattached to the boards located on the back of the front chassis. Once you have closed the chassis, it is difficult to reach into the small holes to pull the cables through.

Disassembly

Use this procedure to disassemble the 8990B.

1 Place the 8990B face down and remove the top cover with the following steps.

   i Unscrew the 4 screws (0515-0390) on the cover with the 18 in-lbs, T20 Torx screwdriver.

   ii Unscrew the 2 screws (0515-2032) near the AC inlet with the 5 in-lbs, T10 Torx screwdriver.

   iii Unscrew the 2 screws (0515-0430) opposite the AC inlet with the 5 in-lbs, T10 Torx screwdriver.

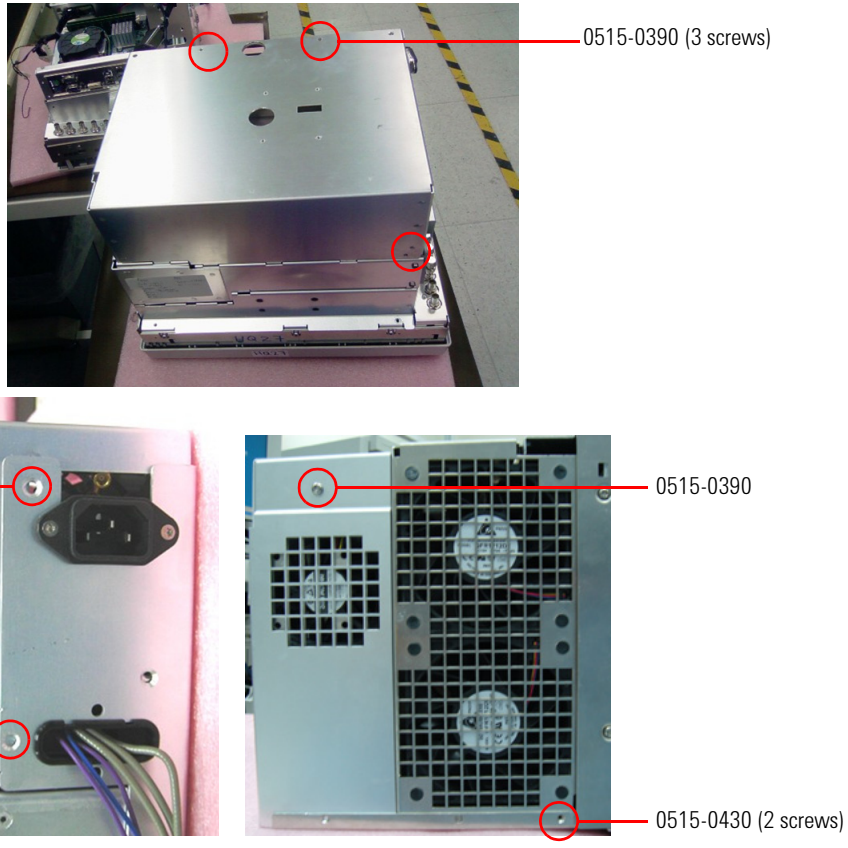


Figure 4-33 Remove the top cover

2 Disconnect all the cables from the BNC connector base as shown in Figure 4-34.

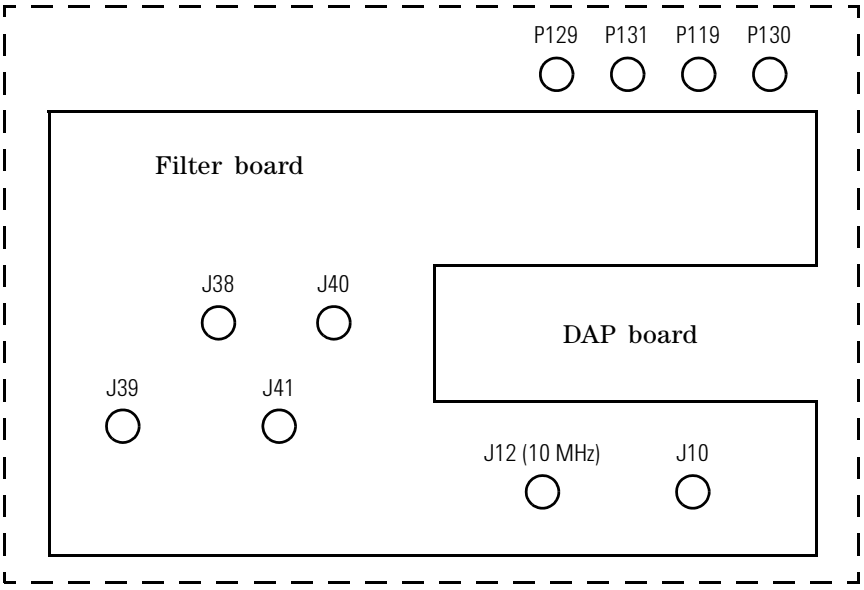


Figure 4-34 Cable connections at the BNC connector base

Table 4-9 Cable connections at the BNC connector base

Part number	Description	To
08990-61607	BNC cable (10 MHz Out scope to filter board)	J10
08990-61619	BNC cable (Trig Out scope to filter board)	P131
08990-61618	BNC cable (Trig In scope to filter board)	J41
08990-61609	BNC cable (filter board to 8990B 10 MHz Out)	J12
08990-61611	BNC cable (Trig In PM to DAP board)	J39
08990-61620	BNC cable (Trig Out PM to DAP board)	P129

NOTE Table 4-9 can be used as a reference for reassembly.

3 Remove the 2 MMCX cables (08990-61616) as shown in Figure 4-35.

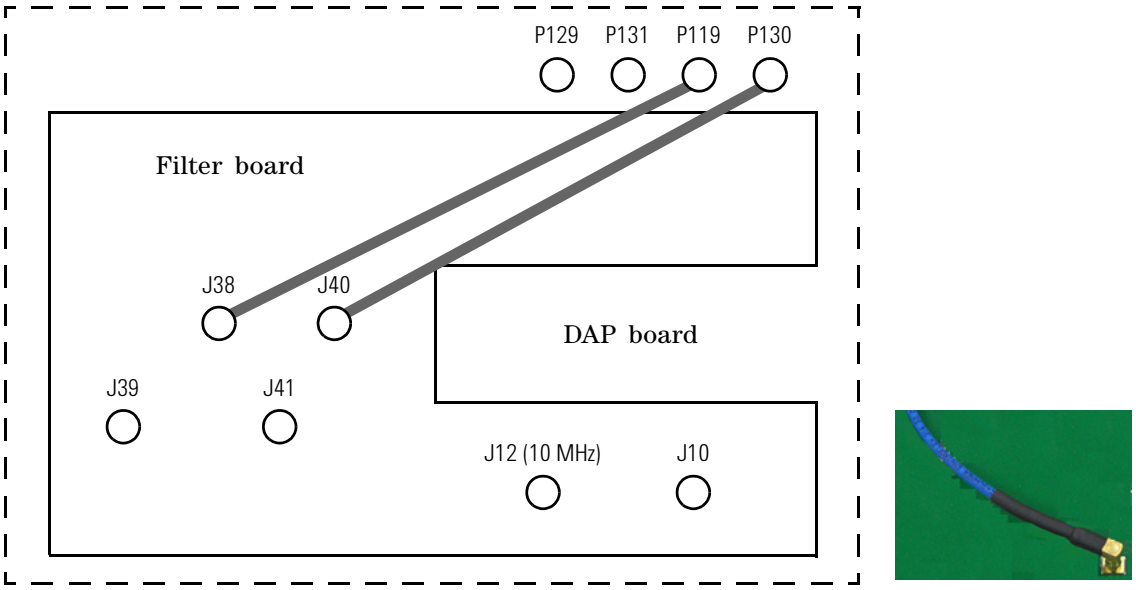


Figure 4-35 Remove the MMCX cables

4 Remove the 2 pin cables (08990-61613) as shown in Figure 4-36.

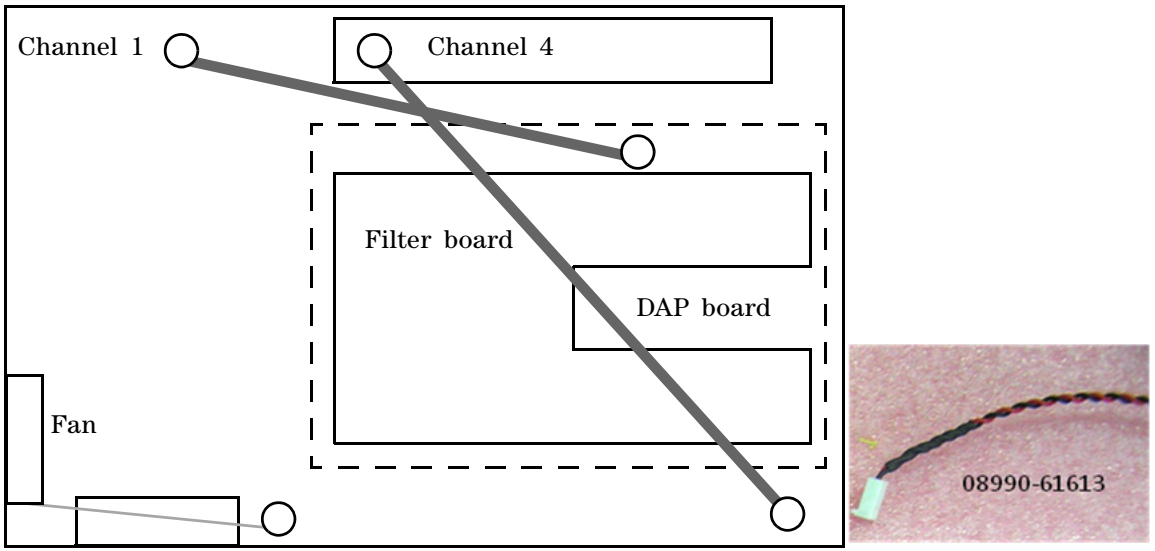


Figure 4-36 Remove the pin cables

5 Disconnect the semi rigid cable from the attenuator with the 5 in-lbs, 5/16" open end wrench and remove the calibration cable assembly (N1911-61003) in between the check source board and backplane motherboard (08990-66002) as shown in Figure 4-37.

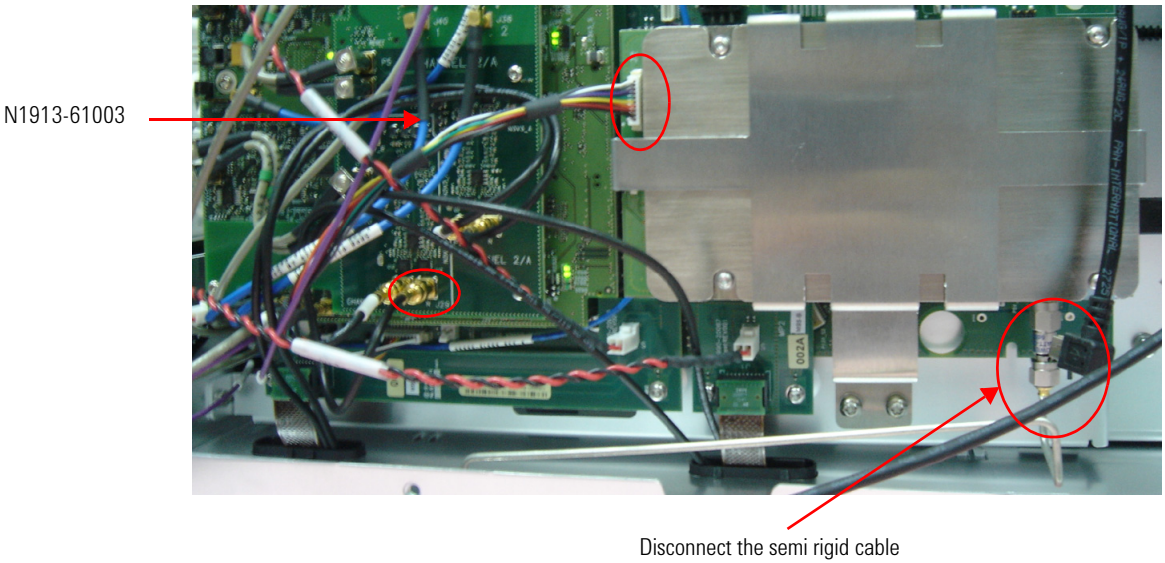


Figure 4-37 Disconnect the semi rigid cable and remove the calibration cable assembly

6 Remove the sensor flex and coaxial cables (08990-61603) through the grommet and detach them from the filter board as shown in Figure 4-38.

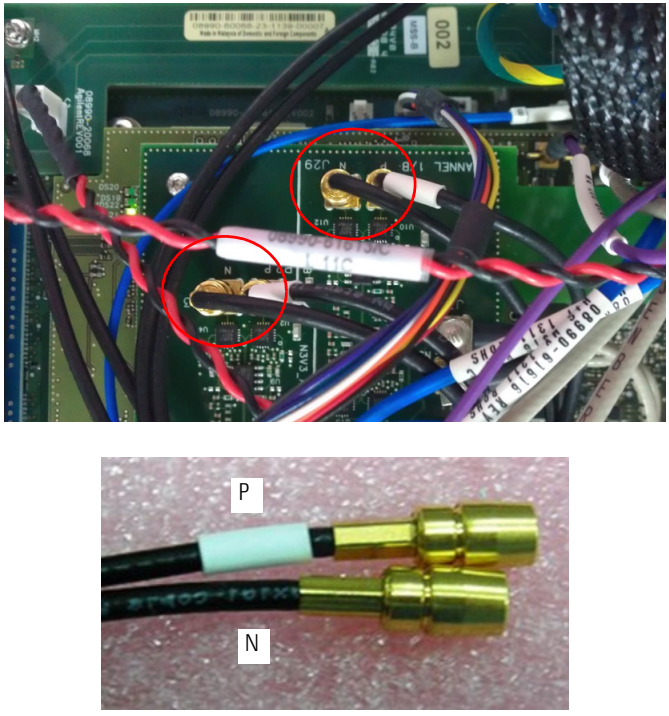


Figure 4-38 Remove the sensor flex and coaxial cables

Table 4-10 Coaxial cables connections

Description	To
Channel 1 (Negative)	J28 (N)
Channel 1 (Positive)	J29 (P)
Channel 4 (Negative)	P2 (N)
Channel 4 (Positive)	P3 (P)

NOTE Table 4-10 can be used as a reference for reassembly.

7 Remove the four SMB cables (5190-3462) and the MMCX cable (08990-61608) from the filter board and DAP board as shown in Figure 4-39.

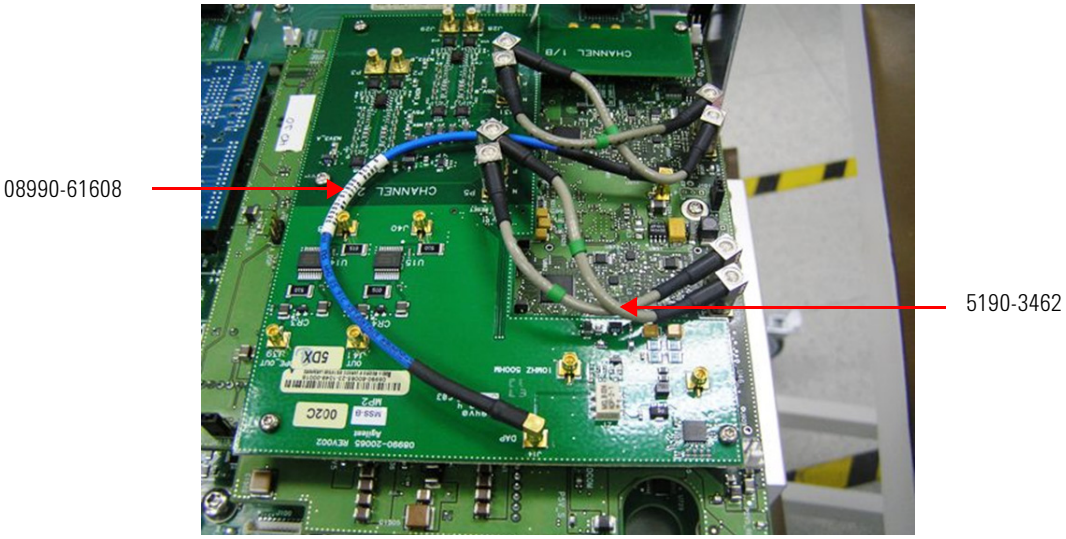


Figure 4-39 Remove the SMB cables

Table 4-11 SMB cables connections

Part number	Description	From	To
08990-61608	MMCX male right angle cable	J106	J14 (DAP)
5190-3462	SMB cables	P109 (+)	P4 (P)
5190-3462	SMB cables	P108 (–)	P5 (N)
5190-3462	SMB cables	P111 (+)	J31 (N)
5190-3462	SMB cables	P110 (–)	J30 (P)

NOTE Table 4-11 can be used as a reference for reassembly.

8 Remove the cables from the grommet of the sheet metal, and remove the BNC connectors as shown in Figure 4-40.

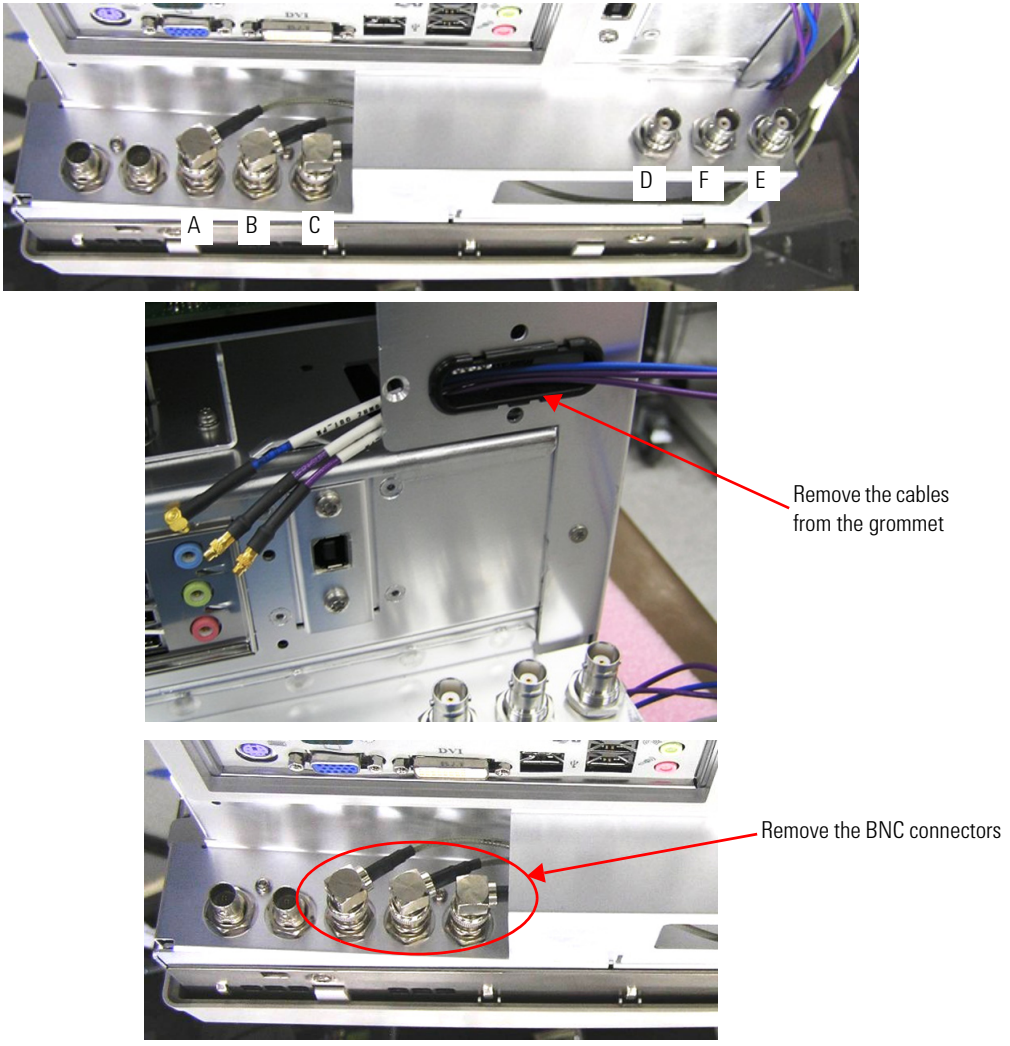


Figure 4-40 Remove the cables from the grommet of the sheet metal

Table 4-12 Cable connection from the grommet of the sheet metal

Label	Part number	Description	To
A	08990-61607	BNC cable (10 MHz Out scope to filter board)	J10
B	08990-61618	BNC cable (Trig Out scope to filter board)	J41
C	08990-61619	BNC cable (Trig In scope to filter board)	P131
D	08990-61609	10 MHz Out PM	J12
E	08990-61611	BNC cable Trig In PM	J39
F	08990-61620	BNC cable Trig Out PM	P129

NOTE Table 4-12 can be used as a reference for reassembly.

9 To remove the check source assembly, refer to "Check Source Board Module Disassembly" on page 108.

10 Unscrew the five screws (0515-1940) on the filter board (08990-66003) with the 5 in-lbs, T8 Torx screwdriver to remove it from the top of DAP board as shown in Figure 4-41.

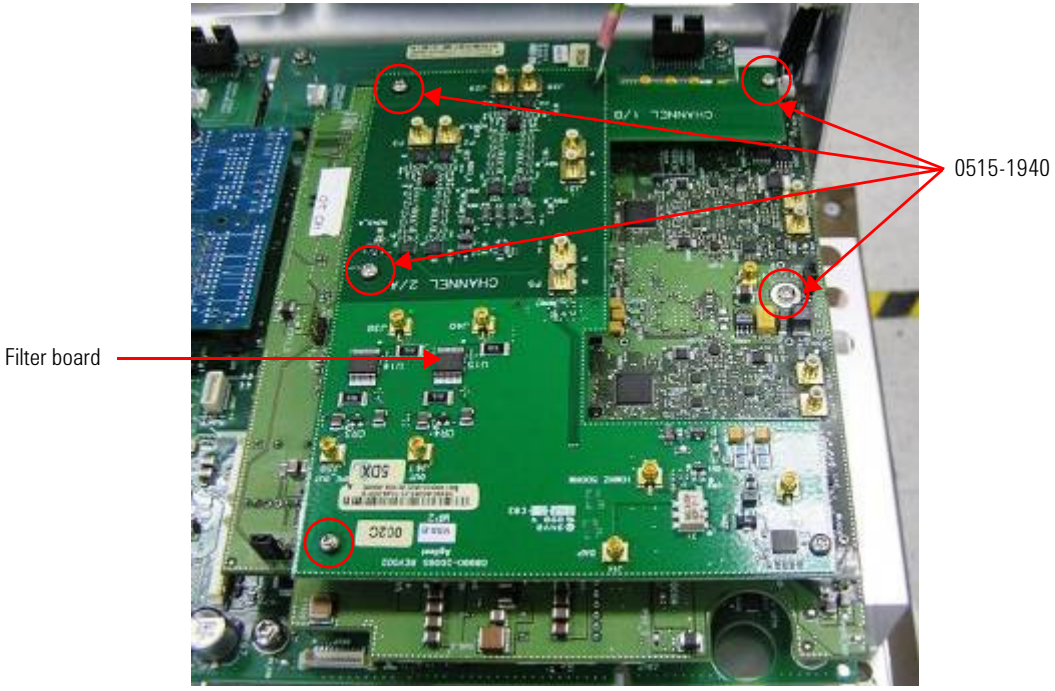


Figure 4-41 Unscrew the screws on the filter board

11 To remove and replace the sensor adapter board, unscrew the four screws (0515-0372) with the 5 in-lbs, T10 Torx screwdriver as shown in Figure 4-42.

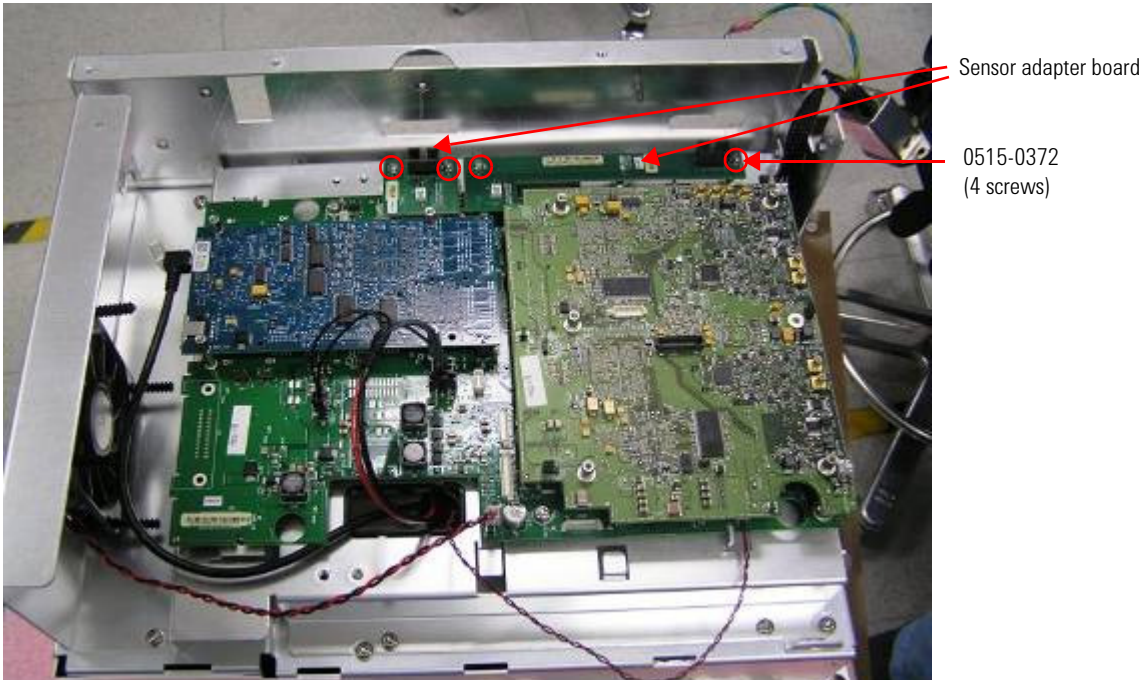


Figure 4-42 Remove the sensor adapter board

12 The locations of the PCA boards in the 8990B are shown in Figure 4-43.

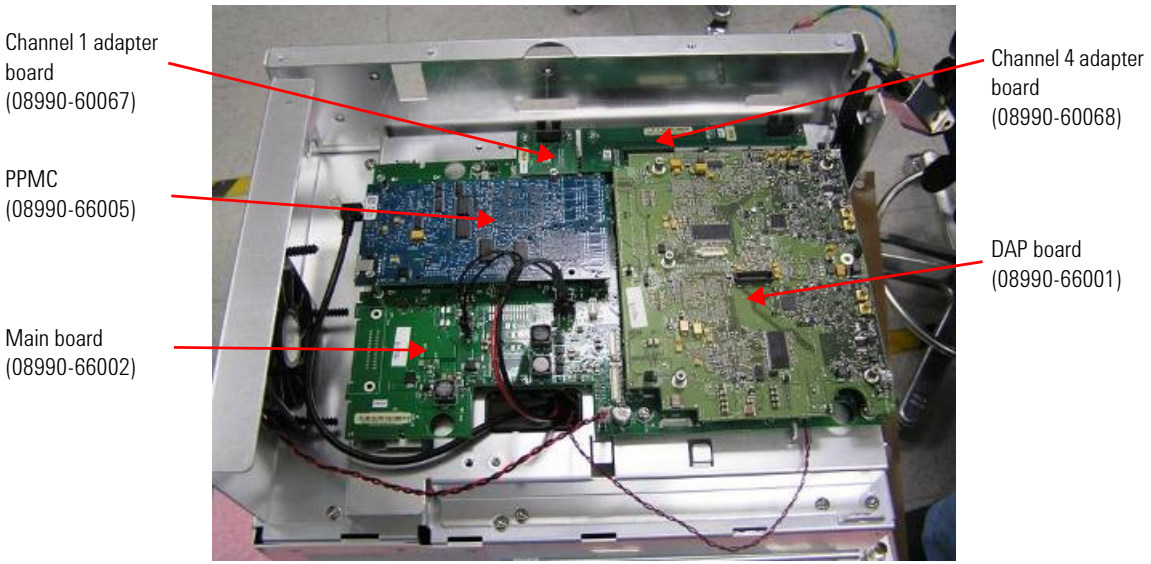


Figure 4-43 PCA boards location

13 Disconnect all the cables as shown in Figure 4-44 before removing and replacing the PCA boards.

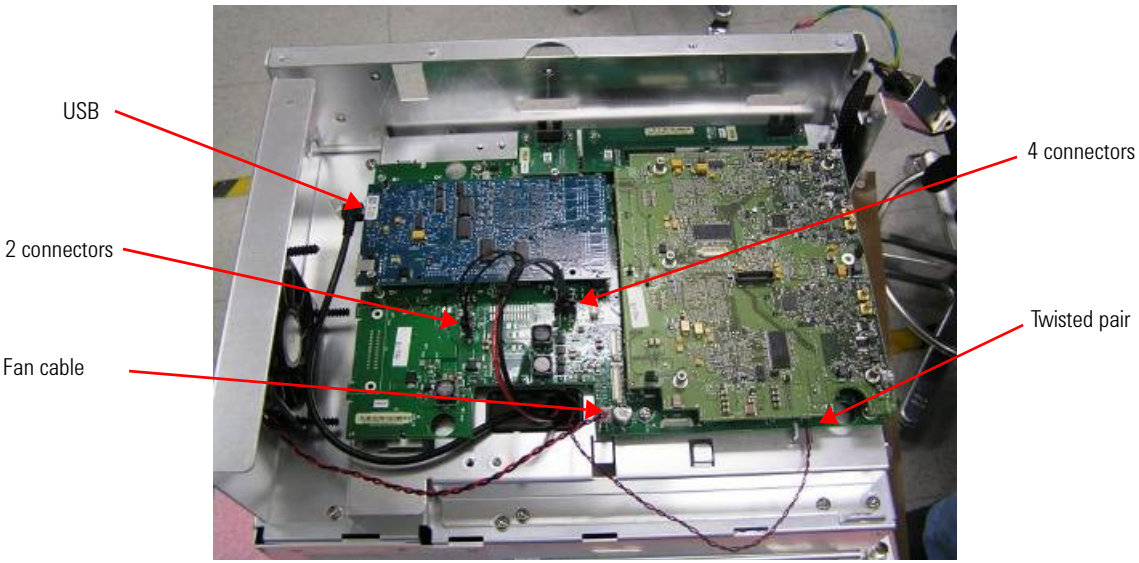


Figure 4-44 Disconnect all the cables

14 To remove and replace the DAP board and PPMC, detach the eight standoffs (08990-25000) with the 5 mm socket, 5 in-lbs as shown in Figure 4-45.

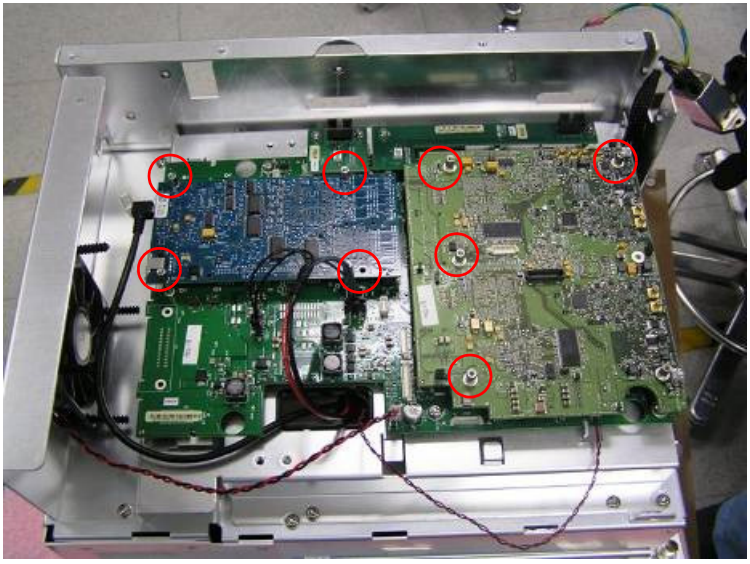


Figure 4-45 Detach the 8 screws

15 To remove and replace the mainboard (08990-60064) from the deck, detach the five screws (0515-0435) with the 18 in-lbs, T20 Torx screwdriver and the screw (0515-0372) with the 5 in-lbs, T10 Torx screwdriver as shown in Figure 4-46.

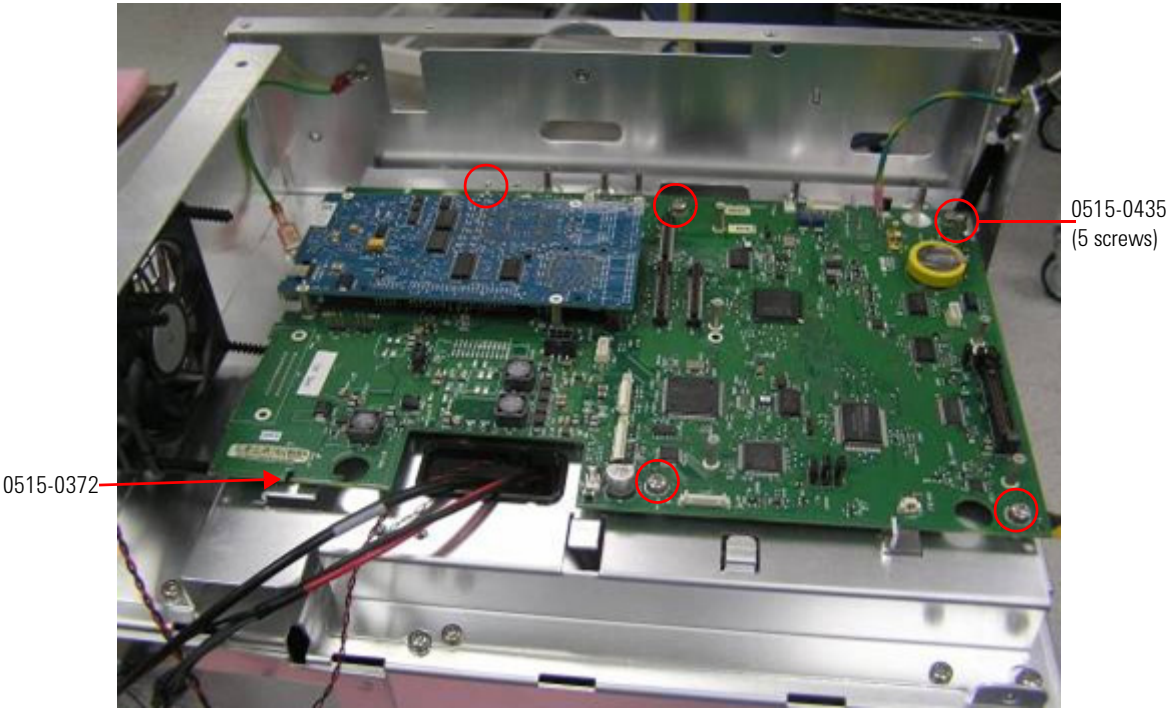


Figure 4-46 Remove the mainboard

16 To remove and replace the power supply module, PC motherboard, and scope acquisition board, you must uninstall the support deck by removing the screw (0515-2032) with 5 in-lbs, T10 Torx screwdriver and the four screws (0515-0390) with 18 in-lbs, T20 Torx screwdriver as shown in Figure 4-47.

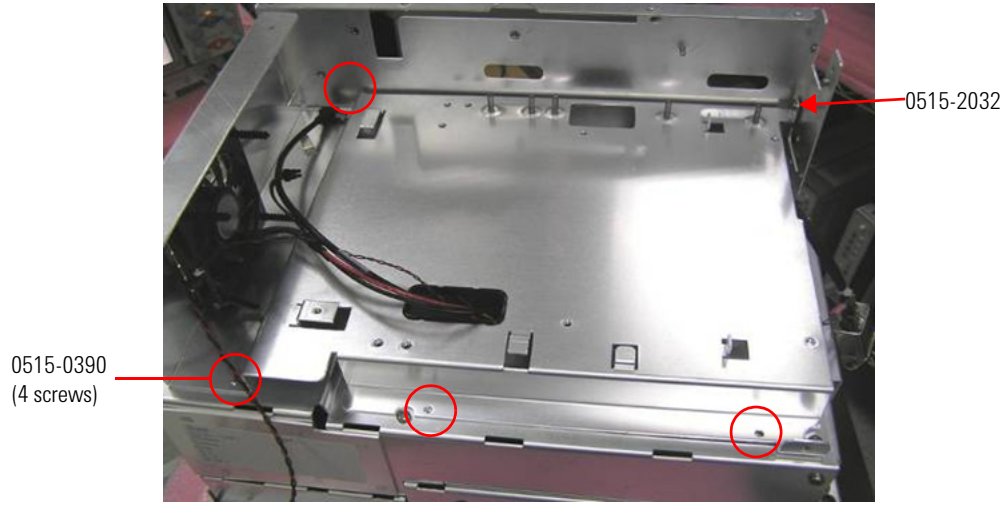


Figure 4-47 Remove and replace the power supply module, PC motherboard, and scope acquisition board

17 Remove the support deck after the screws are removed. To remove and replace the hard disk, unscrew the four screws (0515-0430) with the 5in-lbs, T10 Torx screwdriver and then remove the hard disk SATA cable and power cable as shown in Figure 4-48.

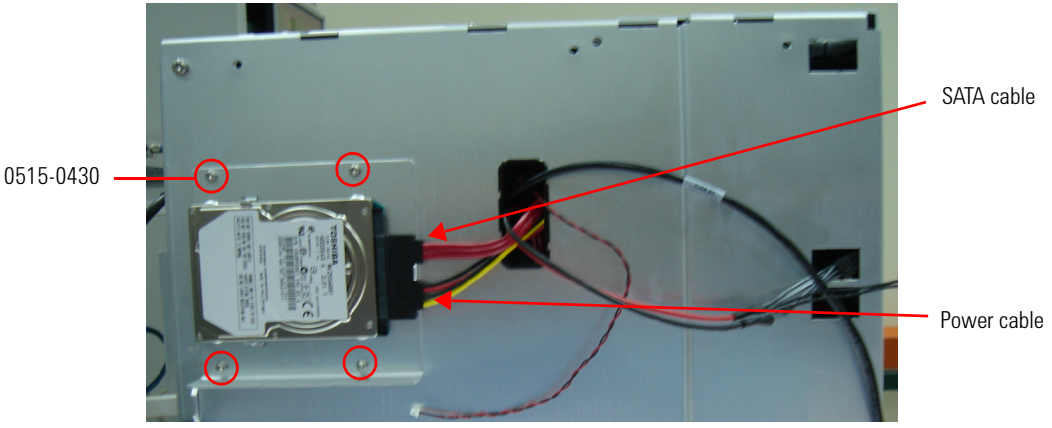


Figure 4-48 Remove and replace the hard disk

Check Source Board Module Disassembly

Use this procedure to disassemble the check source board module.

1 Detach the U-wave attenuator pad (0955-0462) on the check source board assembly using the manual torque wrench (5/16”) with torque of 5 in-lbs as shown in Figure 4-49.

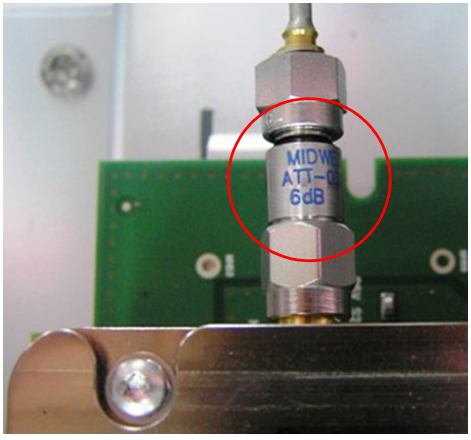


Figure 4-49 Detach the U-wave attenuator pad

2 Unscrew the four screws (0515-0390) with the 18 in-lbs, T20 Torx screwdriver. Detach the belt cover with the poron pad (08990-00110) as shown in Figure 4-50. Unscrew the four screws (0515-2007) with the 5 in-lbs, T8 Torx screwdriver and then remove the check source assembly (08990-66004) from the PPMC assembly.

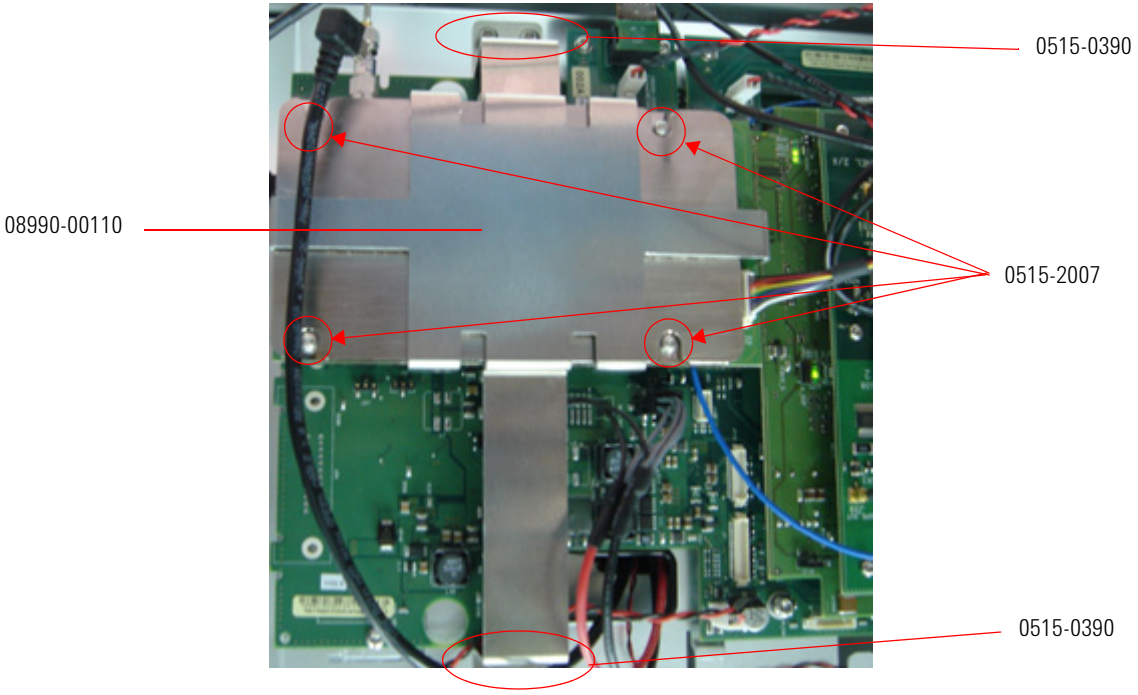


Figure 4-50 Detach the belt cover with the poron pad

3 Unscrew the five screws (0515-2007) on the shield can bottom (08990-00601) of the check source assembly with the 5 in-lbs, T8 Torx screwdriver as shown in Figure 4-51.

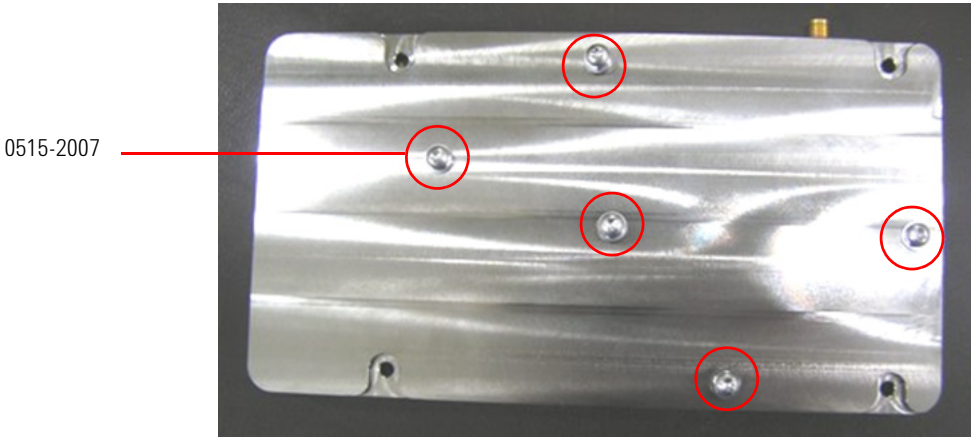


Figure 4-51 Shield can bottom of the check source assembly

4 Detach the shield can bottom and remove the check source board (08990-66004) for replacement.

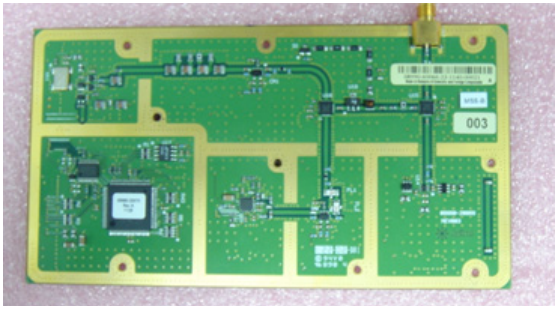


Figure 4-52 Check source board (08990-66004)

5 Take note on the connector orientation.

Remove and Replace the Power Supply and PC Motherboard

Use this procedure to remove and replace the power supply and PC motherboard.

1 The rear mounting deck (08990-00105) must be uninstalled to remove and replace the power supply module and PC motherboard.

2 Uninstall the rear mounting deck with the following steps.

i Uninstall the L-bracket from the rear mounting deck by removing the nut (0535-0082) with the 5 in-lbs, manual torque screwdriver and the screw (0515-0435) with the 18 in-lbs, T20 Torx screwdriver as shown in Figure 4-53.

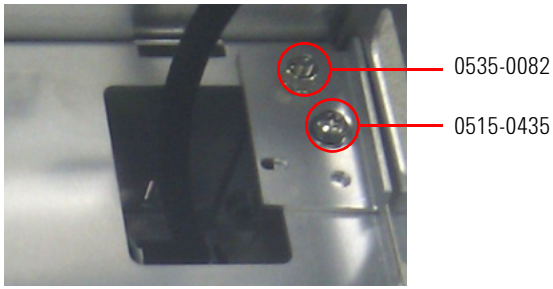


Figure 4-53 Uninstall the L-bracket from the rear mounting deck

ii Remove the seven screws (0515-0390) with the 18 in-lbs, T20 Torx screwdriver and the screw (0515-0435) with the 18 in-lbs, T20 Torx screwdriver as shown in Figure 4-54.

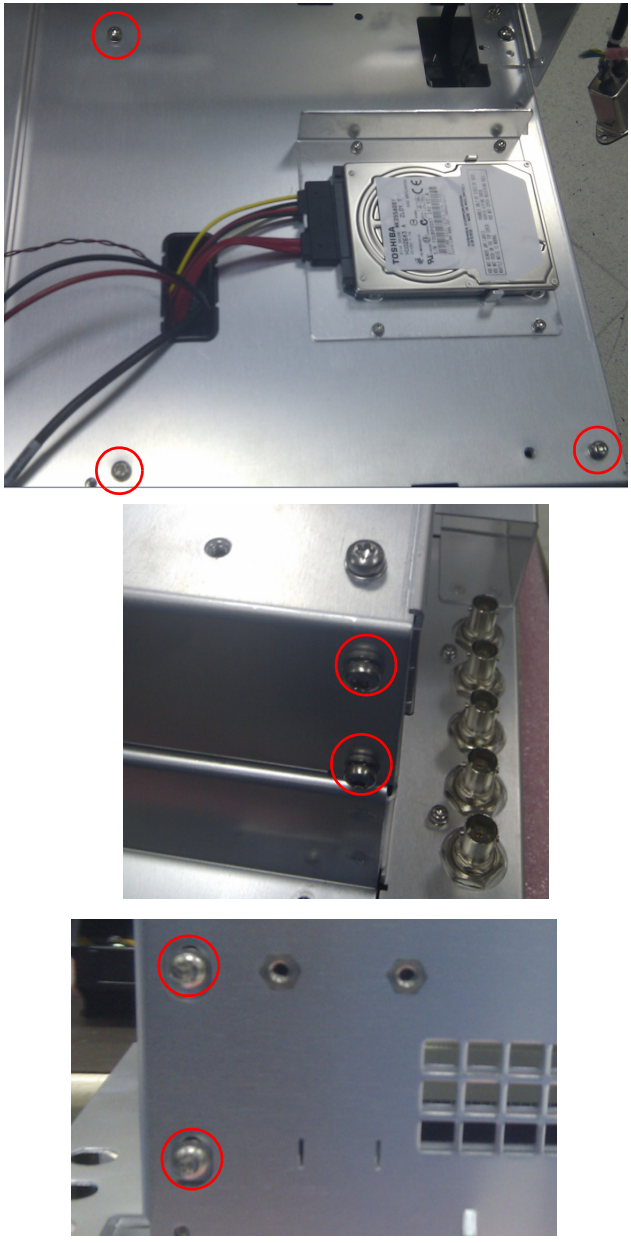


Figure 4-54 Remove the seven screws

3 Remove the three screws (0515-0430) with the 5 in-lbs T10 Torx screwdriver as shown in Figure 4-55.

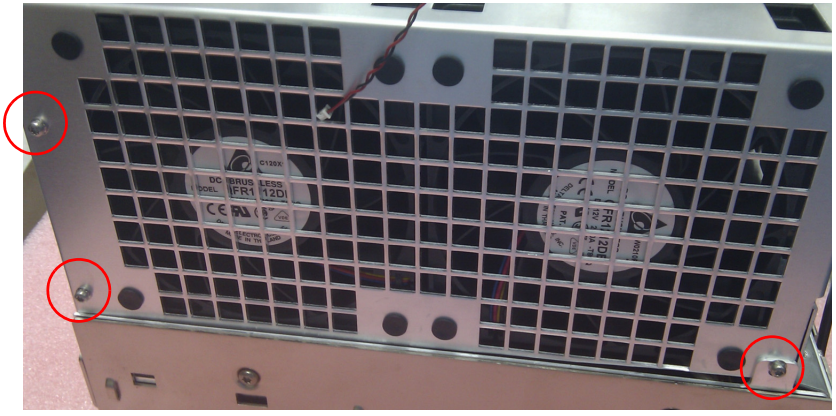


Figure 4-55 Remove the three screws

4 Remove the rear mounting deck after the screws are removed.

5 Remove and replace the remote USB port (54904-61606) with the following steps.

i Remove the jumper as shown in Figure 4-56.

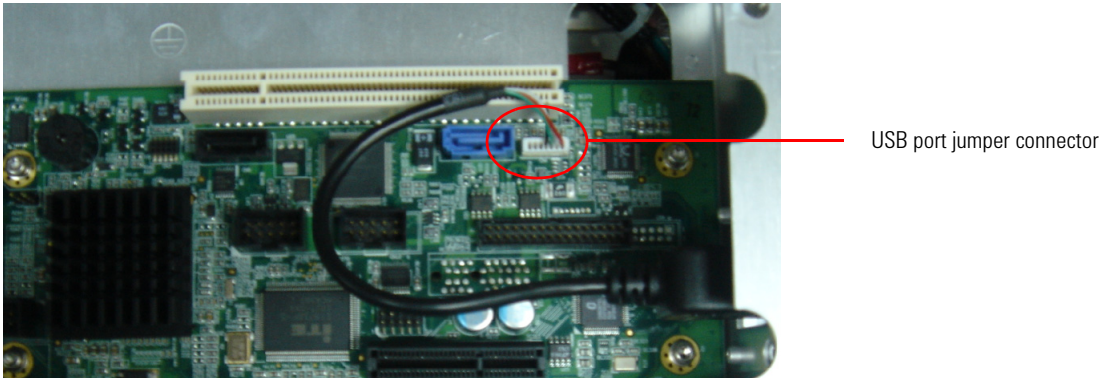


Figure 4-56 Remove the jumper

ii Detach the two screws (0624-0520) from the deck as shown in Figure 4-57.

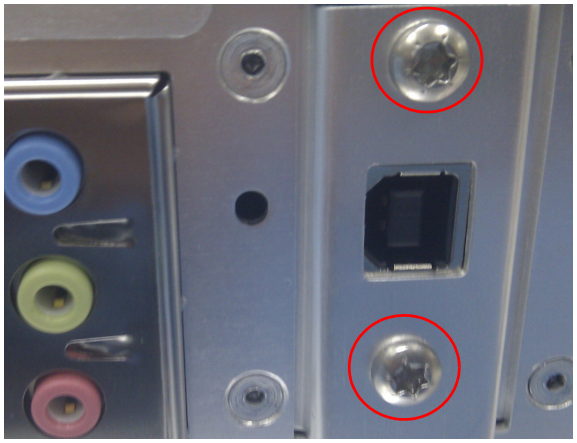


Figure 4-57 Detach the screws

6 To remove and replace the CPU fan assembly (3160-4331), unscrew the screws with the Philips 5 in-lbs screwdriver and disconnect the jumper cable as shown in Figure 4-58.

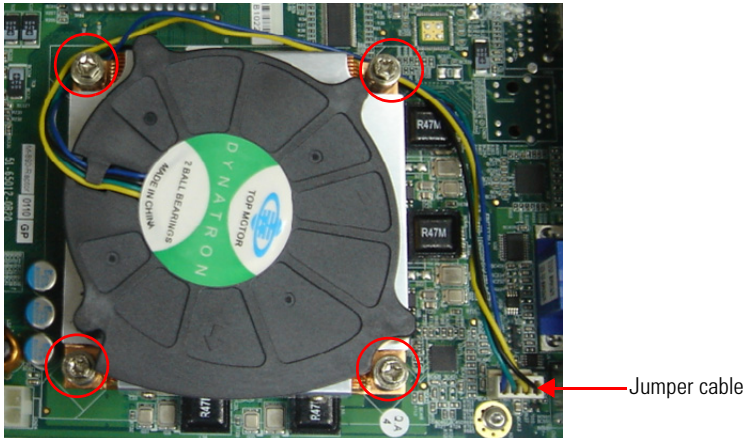


Figure 4-58 Remove the CPU fan assembly

7 To remove and replace the PC motherboard (0960-2939), disconnect the cables and six screws (0515-0374) with the 5 in-lbs T10, Torx screwdriver as shown in Figure 4-59.

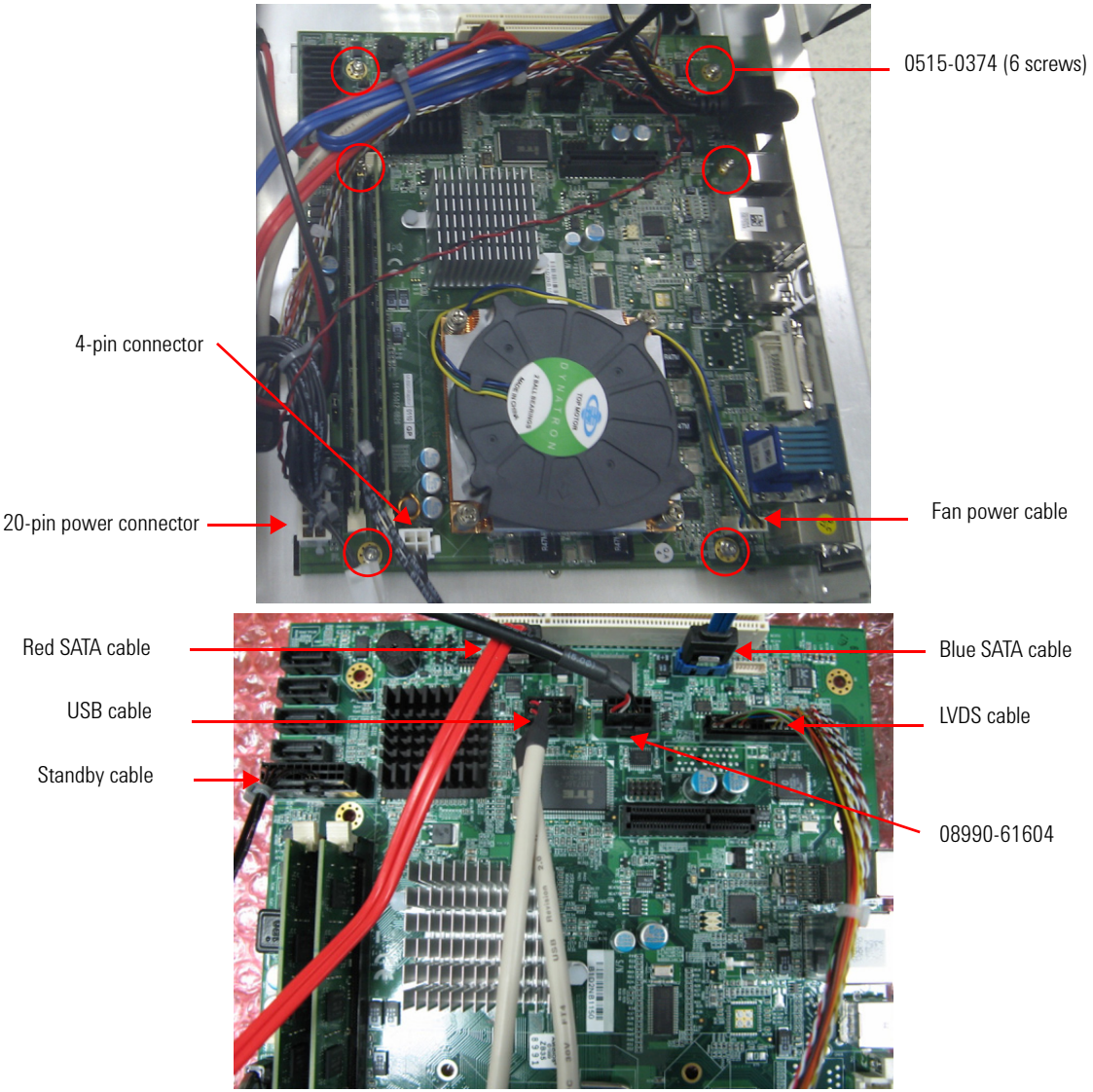


Figure 4-59 Remove the PC motherboard

8 To remove and replace the power supply module, the power supply deck assembly (08990-60205) needs to be uninstalled.

9 To uninstall the power supply deck assembly (08990-60205), disconnect all the cables connected to the scope acquisition board and remove all the attached screws as shown in Figure 4-60 and Figure 4-61.

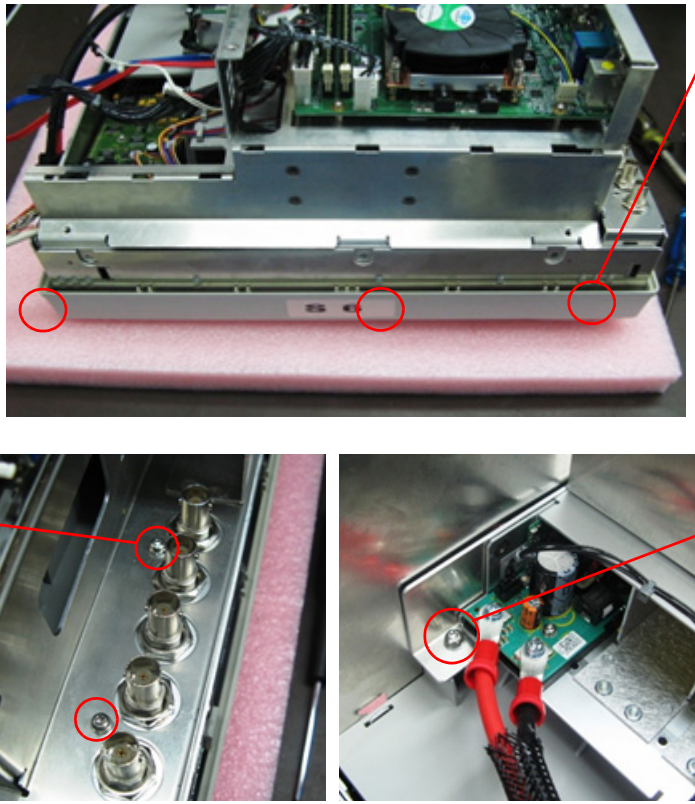


Figure 4-60 Uninstall the power supply deck assembly

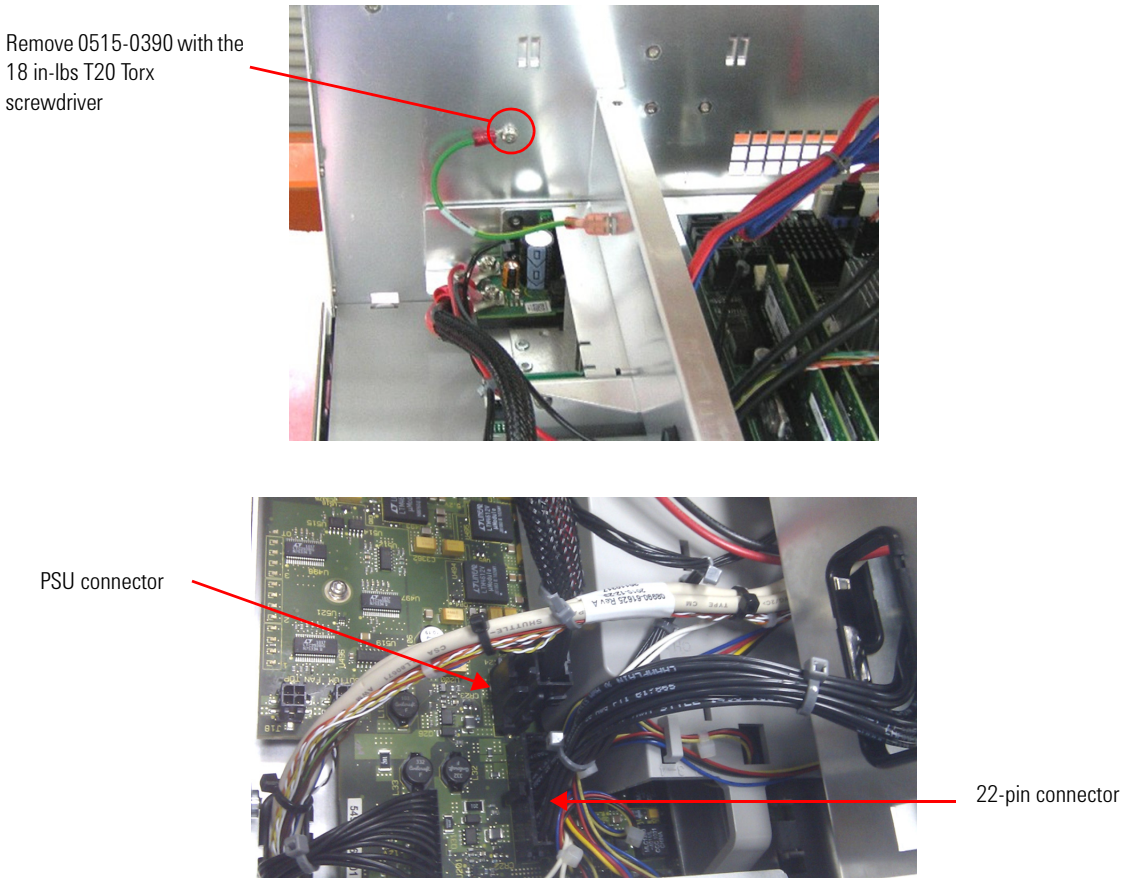


Figure 4-61 Uninstall the power supply deck assembly

10 Before uninstalling the power supply deck assembly, ensure that all the cables are removed through the grommet.

11 The power supply deck assembly with the power supply module and PC motherboard after they are removed from the 8990B are as shown in Figure 4-62.

Figure 4-62 Power supply deck assembly with the power supply module and PC motherboard

12 Place the power supply deck assembly with the power supply module (PSU) faced up.

13 Remove and replace the power supply module with the following steps.

i Unscrew the five screws (0515-0390) with the 18 in-lbs T20, Torx screwdriver and slot out the PSU as shown in Figure 4-63.

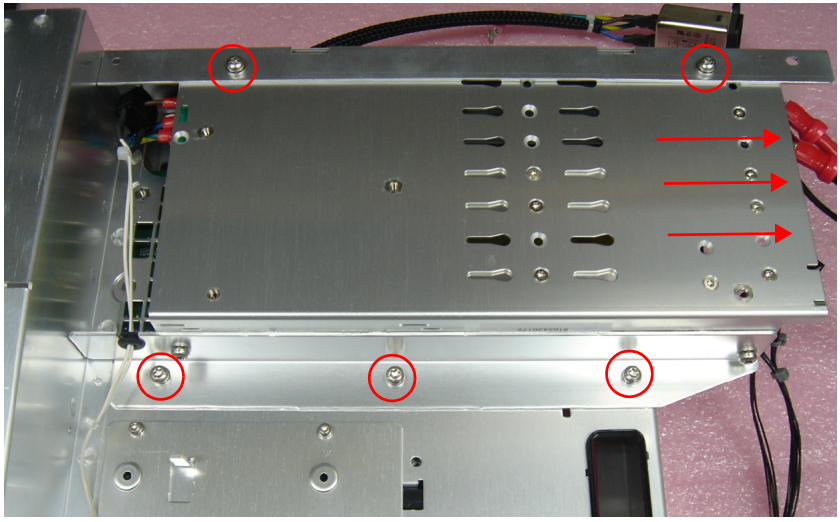


Figure 4-63 Unscrew the screws and slot out the PSU

ii Remove the three power cables connected to the power supply module from the PC motherboard as shown in Figure 4-64.

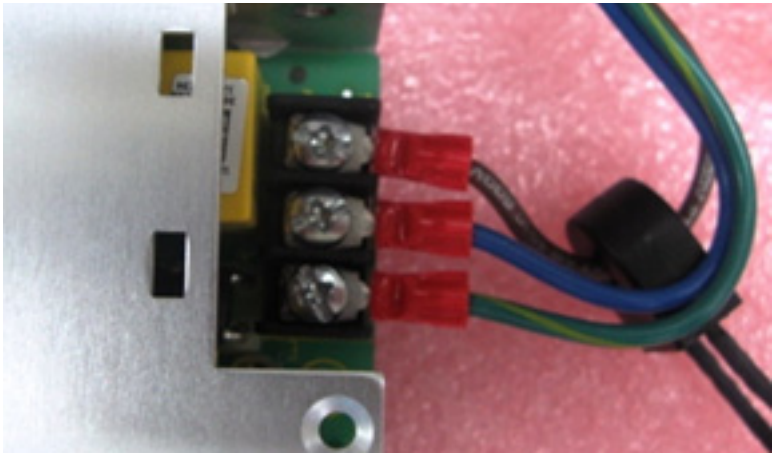


Figure 4-64 Remove the power cables connected to the power supply module

CAUTION Ensure that the connection is correct during reassembly to prevent any power trip.

iii Loosen the two screws to remove the two power cable with the 12 in-lbs Pozit screwdriver as shown in Figure 4-65.

iv For new PSU replacement, a new standby ON-OFF cable (08990-61614) is needed to install on the PSU as shown in Figure 4-65.

NOTE Apply glue to the connectors to attach the connectors to the PSU permanently.

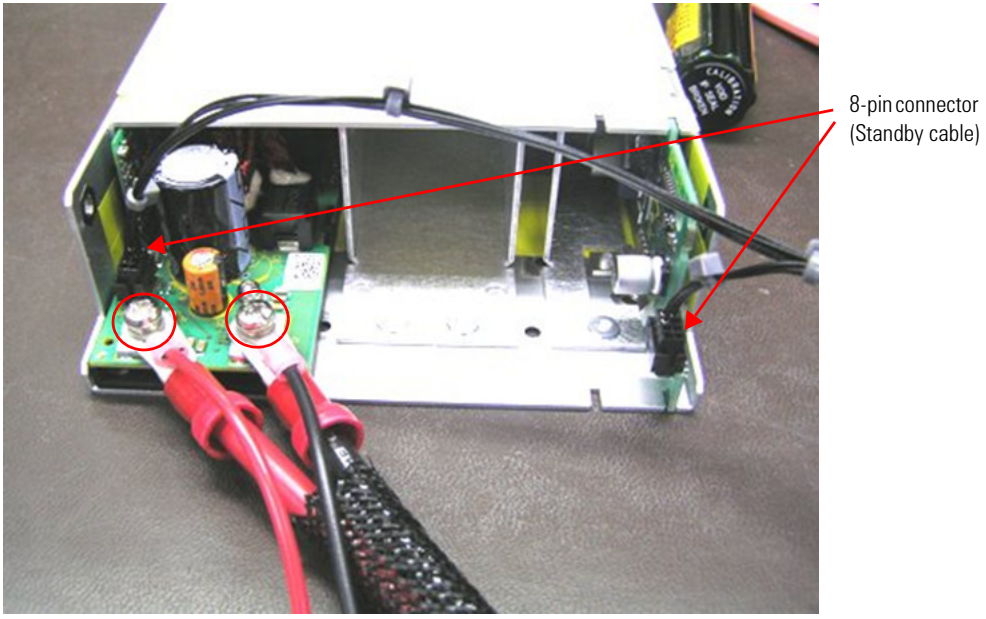


Figure 4-65 Loosen the screws to remove the power cables

- Remove the two screws (0515-0390) on the bracket attached to the PSU with the 18 in-lbs T20 torx screwdriver as shown in Figure 4-66.

Figure 4-66 Remove the screws on the bracket

Remove and Replace the Acquisition Board Assembly

Use this procedure to remove and replace the acquisition board assembly.

1 Remove and replace the air duct (54904-44102) with the following steps.

   i Uninstall the connectors and the cables attached to the air duct as shown in Figure 4-67.

   ii Uninstall the bottom slots from the tabs on the rear of the acquisition deck as shown in Figure 4-67.

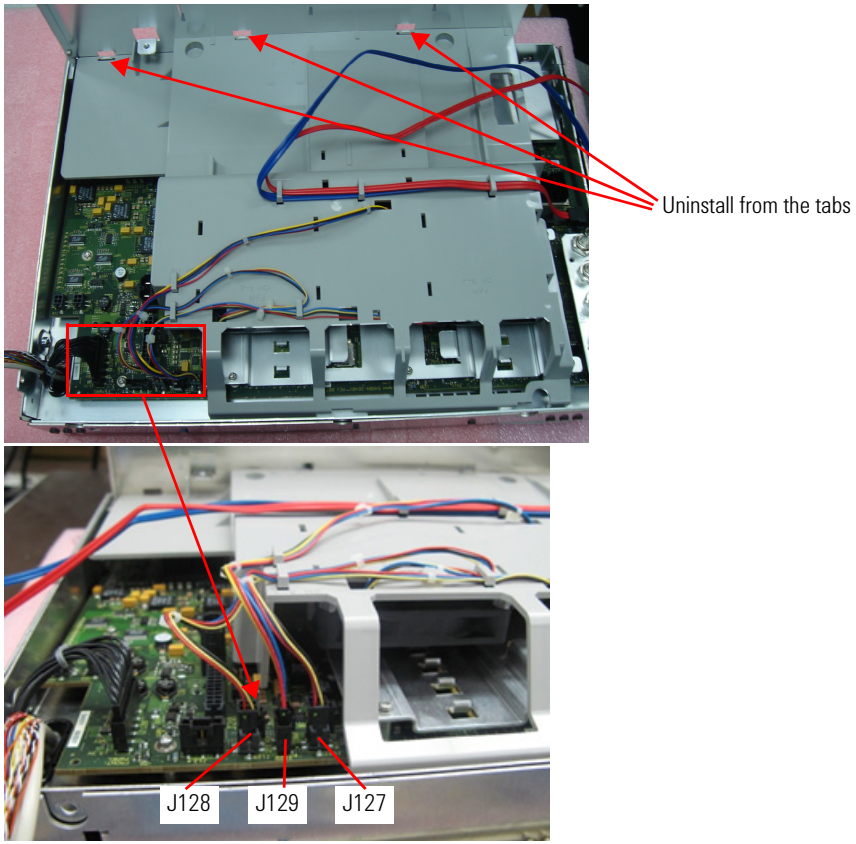


Figure 4-67 Uninstall the connectors and cables

NOTE Connect the respective fan cable connector for channel 3 and 4 to J127, fan cable connector for channel 1 and 2 to J128, and another fan cable to J129 for the reassembly process.

2 To remove and replace the heat spread (54904-01202), remove the six screws (0515-1410) from the acquisition board standoff with the 5 in-lbs T10, Torx screwdriver as shown in Figure 4-68.

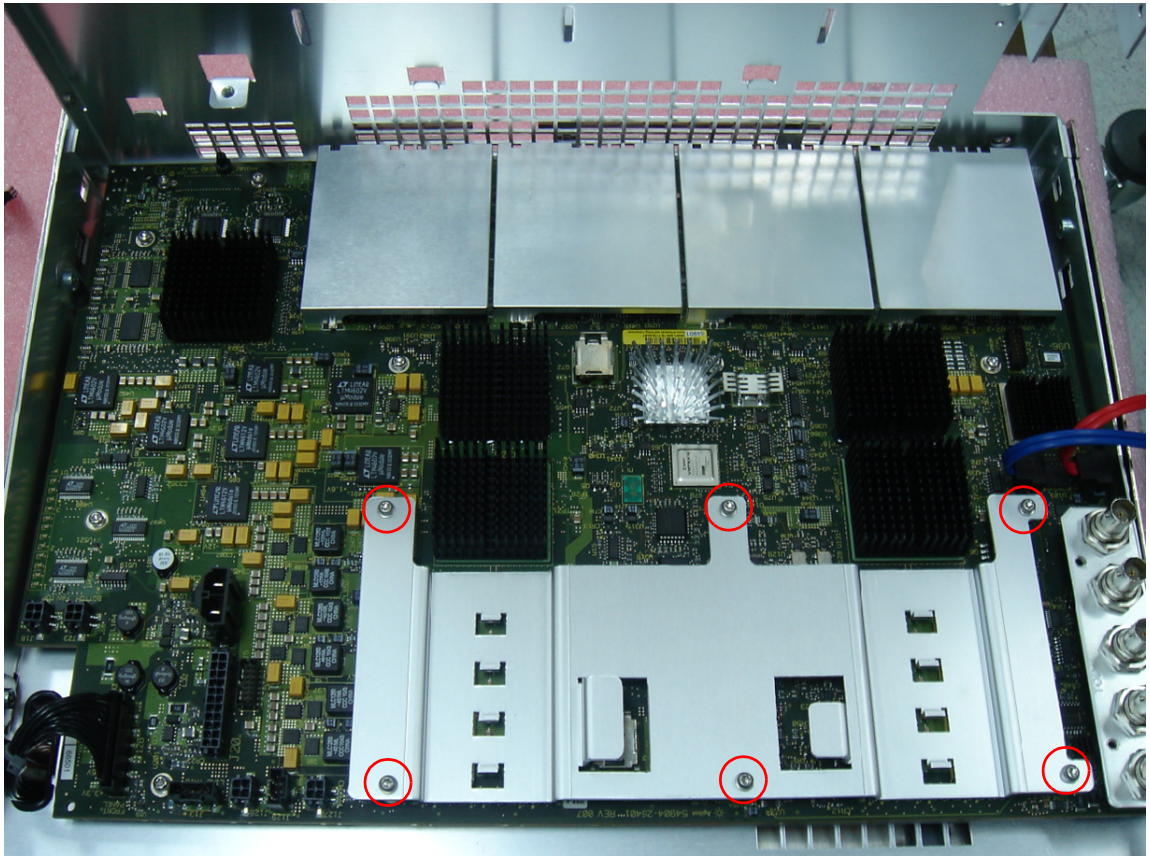


Figure 4-68 Remove the heat spread

3 New thermal pads (54904-43201) need to be installed during the new heat spread replacement as shown in Figure 4-69.

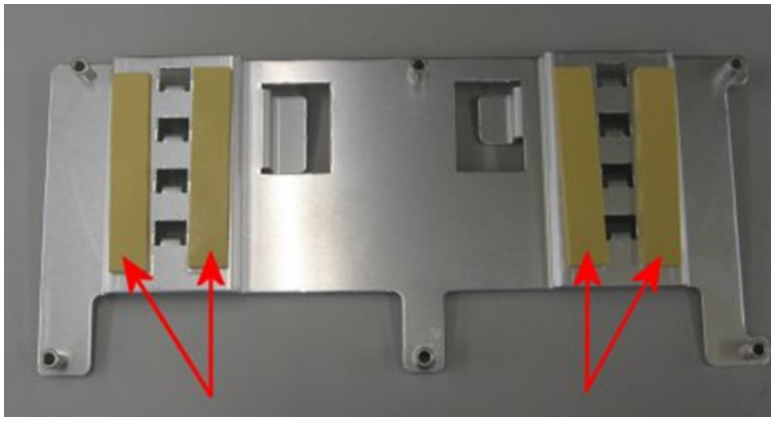


Figure 4-69 New thermal pads

4 To remove and replace the scope acquisition board (54901-66501), uninstall all the connectors (SATA connectors and front panel power cable connector) from the board and remove the six screws (0515-0372) with the 5 in-lbs T10, Torx screwdriver as shown in Figure 4-70.

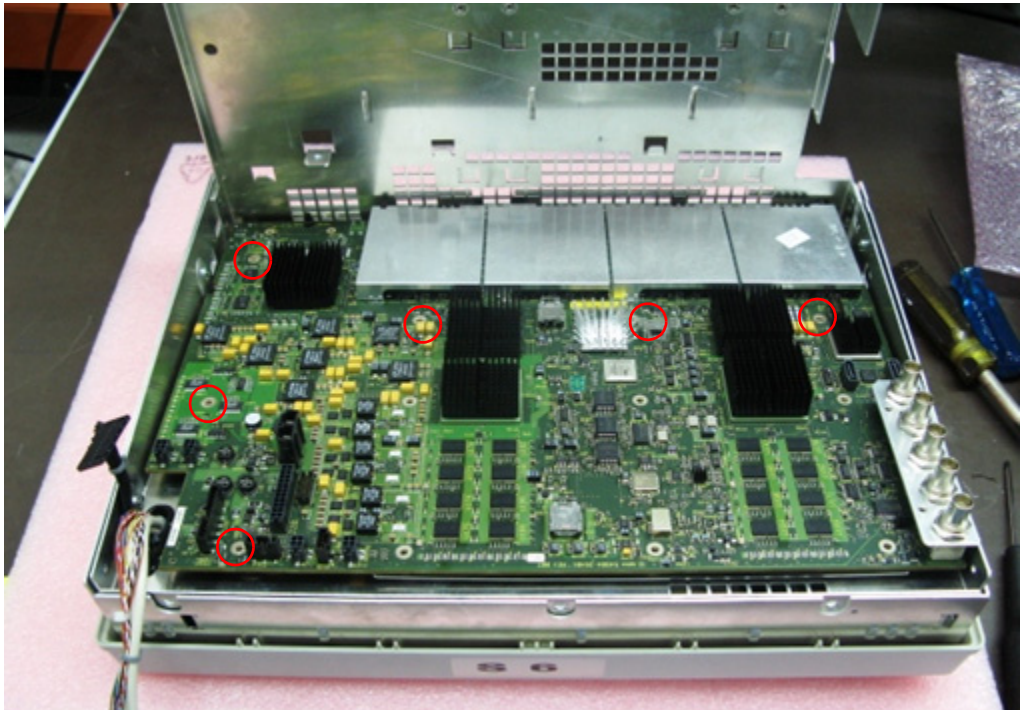
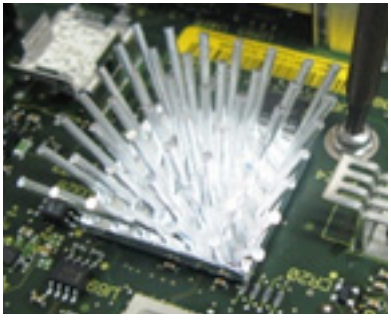


Figure 4-70 Uninstall all the connectors

CAUTION Do not damage the heatsink.



5 Contacting Agilent

This chapter provides the steps to take if you experience a problem with your peak power analyzer.

Introduction

Contacting Agilent

This section describes the steps to take if you experience a problem with your peak power analyzer. If you experience a problem with your peak power analyzer, refer to "Before Calling Agilent" on page 129. This section contains a checklist that helps you identify some of the common problems.

If you wish to contact Agilent about any aspect of the peak power analyzer, from service problems to ordering information, refer to "Contact us" on page 133.

If you wish to return the peak power analyzer to Agilent, refer to "Returning Your Peak Power Analyzer for Service" on page 132.

Before Calling Agilent

Before calling Agilent or returning the peak power analyzer for service, please make the checks listed in "Check the Basics" on page 130. If your peak power analyzer is covered by a separate maintenance agreement, please be familiar with the terms.

Agilent offers several maintenance plans to service your peak power analyzer after warranty expiration. Call your Agilent Sales and Service Center for full details.

If the peak power analyzer becomes faulty and you wish to return the faulty instrument, follow the description on how to return the faulty instrument in "Returning Your Peak Power Analyzer for Service" on page 132.

Check the Basics

Problems can be solved by repeating what was being performed when the problem occurred. A few minutes spent in performing these simple checks may eliminate the time required for instrument repair.

Before contacting Agilent or returning the peak power analyzer for service, please perform the following checks.

- Check that the line socket has power.
- Check that the peak power analyzer is plugged into the proper AC power source.
- Check that the peak power analyzer is switched on.
- Check that the other equipment, cables, and connectors are connected properly and operating correctly.
- Check the equipment settings in the procedure that was being used when the problem occurred.
- Check that the test being performed and the expected results are within the specifications and capabilities of the peak power analyzer.
- Check the peak power analyzer display for error message.
- Check operation by performing the self-tests.
- Check with a different power sensor.

Instrument Serial Numbers

Agilent makes frequent improvements to its products to enhance their performance, usability and reliability. Agilent service personnel have access to complete records of design changes for each instrument. The information is based on the serial number and option designation of each peak power analyzer.

Whenever you contact Agilent about your peak power analyzer, have a complete serial number available. This ensures that you obtain the most complete and accurate service information. The serial number can be obtained by:

- Querying the peak power analyzer over a remote interface (via the `*IDN?` command).
- From the serial number label.

The serial number label is attached to the rear of each peak power analyzer. This label has two instrument identification entries. The first provides the instruments serial number and the second provides the identification number for each option built into the instrument.

The serial number is divided into two parts: the prefix (two letters and the first four numbers), and the suffix (the last four numbers).

The prefix letters indicate the country of manufacture. This code is based on the ISO international country code standard, and is used to designate the specific country of manufacture for the individual product. The same product number could be manufactured in two different countries. In this case the individual product serial numbers would reflect different country of manufacture codes. The prefix also consists of four numbers. This is a code identifying the date of the last major design change.

The suffix indicates an alpha numeric code which is used to ensure unique identification of each product throughout Agilent.

Returning Your Peak Power Analyzer for Service

Use the information in this section if you need to return your peak power analyzer to Agilent.

Packaging the power meter for shipment to Agilent for service

- Fill in a blue service tag (available at the end of this manual) and attach it to the peak power analyzer. Please be as specific as possible about the nature of the problem. Send a copy of any or all of the following information:
  - Any error messages that appeared on the peak power analyzer display.
  - Any information on the performance of the peak power analyzer.

CAUTION Peak power analyzer damage can result from using packaging materials other than those specified. Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the peak power analyzer or prevent it from shifting in the carton. Styrene pellets cause peak power analyzer damage by generating static electricity and by lodging in the rear panel.

- Use the original packaging materials or a strong shipping container that is made of double-walled, corrugated cardboard with 159 kg (350 lb.) bursting strength. The carton must be both large enough and strong enough to accommodate the peak power analyzer and allow at least 3 to 4 inches on all sides of the power meter for packing material.

www.agilent.com

Contact us
To obtain service, warranty, or technical assistance, contact us at the following phone or fax numbers:

United States:
(tel) 800 829 4444 (fax) 800 829 4433
Canada:
(tel) 877 894 4414 (fax) 800 746 4866
China:
(tel) 800 810 0189 (fax) 800 820 2816
Europe:
(tel) 31 20 547 2111
Japan:
(tel) 0120 (421) 345 (fax) 0120 (421) 678
Korea:
(tel) (080) 769 0800 (fax) (080) 769 0900
Latin America:
(tel) (305) 269 7500
Taiwan:
(tel) 0800 047 866 (fax) 0800 286 331
Other Asia Pacific Countries:
(tel) (65) 6375 8100 (fax) (65) 6755 0042

Or visit Agilent World Wide Web at:
www.agilent.com/find/assist

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