
X-Series Signal Analyzers

B-Series Instruments

N9000B N9010B N9020B N9021B N9030B N9032B N9038B
N9040B N9041B N9042B N9048B
N8973B N8974B N8975B N8976B



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Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, navigate to the URL above, then in the Support by Product Model Number box, enter the Product Number of your instrument (for example, N9040B) and click **Find**:

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1 Contacting Keysight Sales and Service Offices

Assistance with test and measurement needs, and information to help you find a local Keysight office, is available via the internet at, <http://www.keysight.com/find/assist>. If you do not have internet access, please contact your designated Keysight representative.

NOTE

In any correspondence or telephone conversation, refer to the instrument by its model number and full serial number. With this information, the Keysight representative can determine whether your unit is still within its warranty period.

2 Products Covered by this Document

For the full list of instrument models covered by this documentation, see the title page: "[B-Series Instruments Security Document & Statement of Volatility](#)" on page 1.

This document describes instrument memory types and security features. It provides a statement regarding the volatility of all memory types, and specifies the steps required to declassify an instrument through memory clearing, sanitization, or removal.

For additional information, go to:

<http://www.keysight.com/find/security>

IMPORTANT

Be sure that all information stored by the user in the instrument that needs to be saved is properly backed up before attempting to clear any of the instrument memory. Keysight Technologies cannot be held responsible for any lost files or data resulting from the clearing of memory.

Be sure to read this document entirely before proceeding with any file deletion or memory clearing.

2.1 Determining Installed Options & Processor Assembly Type

To determine your instrument's installed options and processor assembly type:

1. Press the **System** hardkey on the front panel, or tap the **Gear** icon in the user interface. The System Settings panel opens.



System Hardkey



Gear Icon

2. Select the System tab at left, then, in the **Show** group, tap **Show System**
3. A screen appears that displays all installed options, and indicates the instrument's processor assembly type
4. For B-Series instruments, possible processor assembly types are:
 - PC6
 - PC6S
 - PC7
 - PC7S
 - PC8
 - PC9
 - PCA
 - PCB
5. For more details, see the **User Interface** or **System Settings** sections of the instrument's embedded or online Help

2.2 Determining Instrument Software Revision

1. On the instrument front panel, press **System** > **Show** > **System**
2. The **Show System** display appears, as shown in **Figure 2-1** below. Look for the Software Revision number specified in the **Instrument S/W Revision** entry

Figure 2-1 Show System Display

System Information	
Keysight Technologies	
Keysight PXA	Keysight PXA Signal Analyzer
Product Number	N9032B
Serial Number	MY61010010
S/W Release Name	2024 Update 1.0
Instrument S/W Revision	A.37.07
Revision Date	2/27/2024 10:37:40 AM
Computer System	Windows 10
Computer Name	K-N9032B-10010
IP Address	141.121.151.174
IPv6 Address	
Link-Local IPv6 Address	fe80::830f:e5a5:c072:607e%6
Host ID	N9032B,MY61010010
mDNS Enabled	Yes
mDNS Host Name	K-N9032B-10010
mDNS Service Name	Keysight N9032B Signal Analyzer - MY61010010
Option	Name / Description
N9032B-MTU	Multi-touch user interface
N9032B-PC8	Intel(R) Core(TM) i7-9850HL CPU @ 1.90GHz, 32 GB
N9032B-SSD	MICRON_1300_MTFDDAK256TDL
N9032B-W10	Microsoft Windows 10 Enterprise LTSC 17763, 64 bit OS

Software
Revision
Entry

3. To dismiss the **Show System** display, press any other front-panel or menu key

3 Security Terms and Definitions

Term	Definition
Clearing	<p>Clearing is a sanitization method by which classified information in user-addressable storage space on the media is overwritten with non-sensitive data, using the standard read and write commands for the device</p> <p>Hence, clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection</p> <p>Keysight memory clearing procedures are designed for customers who need to meet the requirements specified by the US Defense Counterintelligence and Security Agency (DCSA). These requirements are specified in the “Media Sanitization Matrix” in Appendix S of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual</p>
Instrument Declassification	<p>A term that refers to procedures that must be undertaken before an instrument can be removed from a secure environment (<i>aka</i> controlled area), such as is the case when the instrument is returned for calibration. Declassification procedures include memory sanitization or memory removal, or both</p>
Sanitization	<p>Sanitization methods are defined and discussed in NIST SP 800-88, Revision 1, Guidelines for Media Sanitization. In that document, Purging is defined as a method by which classified information is completely removed from memory, or the memory is destroyed, so that even a laboratory attack using known techniques or analysis will not recover any information</p> <p>In this document, the term Sanitization is reserved for the Purge Sanitization method described in the NIST document</p> <p>Hence, instrument sanitization is typically required when an instrument is moved from a secure to a non-secure environment, such as when it is returned to the factory for calibration</p> <p>Keysight memory sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Counterintelligence and Security Agency (DCSA). These requirements are specified in the “Media Sanitization Matrix” in Appendix S of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual</p>
Secure Erase	<p>Secure Erase is a term that is used to refer to either the clearing or sanitization features of Keysight instruments</p>

4 Instrument Memory & Volatility

This chapter summarizes all memory types in the instrument.

The descriptions below are divided between:

1. **Non-Volatile Memory**
2. **Volatile Memory**

4.1 Non-Volatile Memory

This section contains information on the memory components available in your instrument.

The table provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

NOTE

The instrument contains no user-accessible non-volatile memory, except for the SD Memory Card described in Item 7 of [Table 4.1](#), and the Disk Drive described in Item 18 of the same table. For this reason, as indicated in the tables below, no sanitization procedure is required for any other memory component.

In the table below, some column titles have been abbreviated for compactness:

- W* = Writable During Normal Operation
- D* = Data Retained When Powered Off

Table 4.1 Summary of Non-Volatile instrument memory

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Front Panel EEPROM 64 kbit	No	Yes	Contains software for running front panel microcontroller Operates front panel LEDs, and transmits key presses to processor	Programmed before installation	A1A2 Front Panel Interface Board ^a .	None
2. EDID Memory 2 kbit EEPROM	No	Yes	Extended Display Identification Data Contains basic information about a monitor and its capabilities	Programmed before installation	A1A2 Front Panel Interface Board ^a .	None
3. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A2 Analog IF Assy ^a .	None
4. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A3 Digital IF Assy ^a .	None

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
5. Config Memory 8 Mbit Flash	No	Yes	Contains measurement and control software, which is preloaded into FPGA during instrument power-up	Programmed before installation	A3 Digital IF Assy ^a .	None
6. CPU BIOS (CMOS NVRAM) 256 Byte (battery backed)	No	Yes	Contains default BIOS settings to use when booting the Processor Assembly	Programmed by factory. Settings can be toggled by user	A4 Processor Assy ^a . Battery backed to maintain Windows calendar time	None
7. SD Memory Card 16 GByte	Yes	Yes	Calibration database file backup	Programmed by instrument software and by the user	A4 Processor Assy ^a .	See Table 5.3 on page 29
8. SD card controller configuration memory 2 Kbit EEPROM	No	Yes	Configuration for the SD card controller on boot up	Programmed before installation	A4 Processor Assy ^a .	None
9. PCIe retimer configuration 8 Kbit EEPROM	No	Yes	Configuration for the PCIe retimer for external PCIe communication	Programmed before installation	A4 Processor Assy ^a .	None
10. FPGA configuration 64 Mbit SPI Flash	No	Yes	Configuration of the FPGA	Programmed before installation	A4 Processor Assy ^a .	None
11. USB3 Device Side controller configuration 64 Kbit EEPROM	No	Yes	Configuration of the USB3.0 Device Side Controller	Programmed before installation	A4 Processor Assy ^a .	None
12. COMe EEPROM 64 Kbit EEPROM	No	Yes	Defines PCIe, SATA, USB, DisplayPort, VGA, LAN, audio link	Programmed before installation	A4 Processor Assy ^a .	None
13. Board	No	Yes	Record board	Programmed	A4 Processor	None

4 Instrument Memory & Volatility
4.1 Non-Volatile Memory

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
Controller 512 Bytes EEPROM			information (boot times, WDT, etc.)	before installation	Assy ^a .	
14. CPLD 64 Mbit SPI Flash	No	Yes	Power sequence control	Programmed before installation	A4 Processor Assy ^a .	None
15. I2C EEPROM 2 Kbit EEPROM	No	Yes	Stores EAPI-related settings for COMe module	Programmed by factory	A4 Processor Assy ^a .	None
16. COMe BIOS 64 Mbit SPI Flash	No	Yes	COMe BIOS SPI ROM	Programmed before installation	A4 Processor Assy ^a .	None
17. Calibration Backup memory 1 Gbit Flash	No ^b .	Yes	Calibration data backup	Programmed by instrument software	A4 Processor Assy ^a . Present only in instruments with PC6S, PC7S, PC8, PCA or PCB Processors ^c .	None
18. Disk Drive Capacity Varies: 80 GByte - 960 GByte This drive is partitioned, as detailed in "Disk Drive Partitioning" on page 18	Yes	Yes	Contains Operating System, Instrument Software, Factory Calibration Data, Diagnostic software, Crash recovery image, user instrument states, user data files, user trace data and any user installed third party software	Programmed before installation or by factory/service center calibration procedure software, or by upgrade installation software. Also programmed via operations and by the user	A5 Disk Drive Assy ^a .	See Table 5.1 on page 28
19. License Storage Memory 512 kbit EEPROM	No	Yes	Contains instrument serial number and license keys for measurement applications.	Programmed before installation and by installing new license keys	A7 Midplane Assy ^a .	None

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
			License keys are encrypted			
20. Config Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A11 RF Switch / High Band Preamp ^a .	None
21. Config Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A12 YTF Assy ^a .	None
22. Config Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A13 Front End Assy ^a .	None
23. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A14 Synthesizer Assy ^a .	None
24. Config Memory 8 Mbit Flash (1024 x 8)	No	Yes	Contains measurement and control software, which is preloaded into FPGA during instrument power-up	Programmed before installation	A14 Synthesizer Assy ^a .	None
25. Config and Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly and board specific Cal data	Programmed during board pretest	A14 Synthesizer Assy ^a .	None
26. Spartan6 configuration memory 8 Mbit Flash	No	Yes	Contains measurement and control software, which is preloaded into Spartan6 FPGA during instrument power-up	Programmed before installation	A14 Synthesizer Assy ^a .	None
27. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A15 Front End Control Assy ^a .	None
28. Config Memory 2 Mbit Flash	No	Yes	Contains measurement and control software,	Programmed before installation	A15 Front End Control Assy ^a .	None

4 Instrument Memory & Volatility
4.1 Non-Volatile Memory

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
			which is preloaded into FPGA during instrument power-up. Primarily YTF, attenuator, and front end switch control			
29. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A16 Reference Assy ^a	None
30. FPGA Config Memory 2 Mbit Flash	No	Yes	Contains measurement and control software	Programmed before installation	A16 Reference Assy ^a	None
31. Digital Potentiometer 112 bits EEPROM	No	Yes	Contains default data to preset digital potentiometers during power-up	Programmed before installation	A16 Reference Assy ^a	None
32. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A16A1 Reference Daughter Assy ^a	None
33. Config Memory 1 Mbit Flash	No	Yes	Contains measurement and control software, which is preloaded into FPGA during instrument power-up	Programmed before installation.	A16A1 Reference Daughter Assy ^a	None
34. Local Bus CPLD 64 macrocell CPLD	No	Yes	Contains configuration for CPLD	Programmed before installation	A21 WBIF Assy ^a	None
35. Config and Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed during board pretest	A21 WBIF Assy ^a	None
36. PSoCA configuration memory 64 kByte Flash	No	Yes	Contains configuration for PSoCA processor	Programmed before installation	A21 WBIF Assy ^a	None
37. PSoCMA	No	Yes	Contains	Programmed	A21 WBIF	None

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
configuration memory 64 kByte Flash			configuration for PSoCMA processor	before installation	Assy ^a .	
38. PSoCD configuration memory 64 kByte Flash	No	Yes	Contains configuration for PSoCD processor	Programmed before installation	A21 WBIF Assy ^a .	None
39. PSoCMD configuration memory 64 kByte Flash	No	Yes	Contains configuration for PSoCMD processor	Programmed before installation	A21 WBIF Assy ^a .	None
40. PSoCA EEPROM memory 2 kByte EEPROM	No	Yes	Contains parameters for PSoCA processor	Programmed during board pretest	A21 WBIF Assy ^a .	None
41. PSoCMA EEPROM memory 2 kByte EEPROM	No	Yes	Contains parameters for PSoCMA processor	Programmed during board pretest	A21 WBIF Assy ^a .	None
42. PSoCD EEPROM memory 2 kByte EEPROM	No	Yes	Contains parameters for PSoCD processor	Programmed during board pretest	A21 WBIF Assy ^a .	None
43. PSoCMD EEPROM memory 2 kByte EEPROM	No	Yes	Contains parameters for PSoCMD processor	Programmed during board pretest	A21 WBIF Assy ^a .	None
44. Spartan6 configuration memory 4 Mbit Flash	No	Yes	Contains configuration for Spartan6 FPGA	Programmed before installation	A21 WBIF Assy ^a .	None
45. Virtex6 configuration memory 0 32 Mbit Flash	No	Yes	Contains configuration for Virtex6 FPGA	Programmed before installation	A21 WBIF Assy ^a .	None
46. Virtex6	No	Yes	Contains	Programmed	A21 WBIF Assy ^a .	None

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
configuration memory 1 32 Mbit Flash			configuration for Virtex6 FPGA	before installation		

- a. Contains no measurement or state user data
- b. Accessible only via a Keysight-provided utility, which permits only storage and retrieval of calibration data
- c. To determine your instrument's installed processor type, see ["Determining Installed Options & Processor Assembly Type" on page 8](#)

4.1.1 Disk Drive Partitioning

The instrument's disk drive is divided at the factory into three visible partitions, labeled C:, D: and E:, plus a fourth hidden partition.

Details of the partition functions are provided in [Table 4.2](#) below.

Table 4.2 Disk Drive Partitions

Partition Label	Purpose
C:	Primary partition for applications and secondary data
D:	Default location for user data
E:	Calibration data
Hidden	Factory recovery image of the C: partition

4.2 Volatile Memory

The volatile memory in the instrument does not have battery backup. It does not retain any information when AC power is removed.

Removing power from this memory meets the memory sanitization requirements specified in the “Media Sanitization Matrix” in Appendix T of the [Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual](#).

In the table below, some column titles have been abbreviated for compactness:

- W* = Writable During Normal Operation
- D* = Data Retained When Powered Off

Table 4.3 Summary of Volatile Instrument Memory

Memory Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. SDRAM 256 MByte	Yes	No	Contains measurement data from data acquisition system	Programmed by firmware. Not accessible by user	A3 Digital IF Assy Contains raw measurement data	Turn off instrument power ^a .
2. Processor SDRAM 16 - 32 GByte	Yes	No	Main dynamic RAM memory for processor Contains working copies of Operating System, instrument measurement applications, calibration data, and measurement data	Programmed before installation, or by factory/service center calibration procedure software, or by firmware upgrade installation software Also programmed via firmware operations and by user	A4 Processor Assy Contains user data	Turn off instrument power ^a .
3. SDRAM 2 GByte	Yes	No	Contains measurement data from data	Programmed by firmware. Not accessible by	A3 Digital IF Assy	Turn off instrument power ^a .

4 Instrument Memory & Volatility

4.2 Volatile Memory

Memory Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
			acquisition system	user	Contains raw measurement data	
4. SDRAM 2 GByte	Yes	No	Contains measurement data from data acquisition system	Programmed by firmware. Not accessible by user	A22 Digital IF (Option B2X) Contains raw measurement data	Turn off instrument power ^a .
5. SDRAM 2 GByte	Yes	No	Contains measurement data from data acquisition system	Programmed by firmware. Not accessible by user	A23 Digital IF (Option B5X) Contains raw measurement data	Turn off instrument power ^a .

a. This memory is not battery backed-up or connected to standby power

4.3 Additional Components for N9032B

This section contains information on memory components that are present *only* in the N9032B instrument.

In the tables below, some column titles have been abbreviated for compactness:

- W* = Writable During Normal Operation
- D* = Data Retained When Powered Off

Non-Volatile Memory

Table 4.4 Summary of Additional Non-Volatile memory for N9032B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Config & Cal Memory 8 Kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly Stores assembly specific calibration data	Programmed before installation	A8 Wideband Calibrator ^a .	None required
2. FPGA Configuration 1 Gbit Flash	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^a .	None required
3. Board Header 8 kbit EEPROM	No	Yes	Board header	Programmed before installation	A21 Wideband digital IF board ^a .	None required
4. FPGA Configuration 256 Mbit EEPROM	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^a .	None required
5. Config Memory 128Mbit Flash	No	Yes	Configuration Memory for FPGA	Programmed before installation	A23 IF MUX and Converter ^a .	None required
6. Config & Cal Memory 8kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A23 IF MUX and Converter ^a .	None required

a. Contains no measurement or state user data

Volatile Memory

Table 4.5 Summary of Additional Volatile memory for N9032B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Wideband Capture 8 GByte SDRAM	Yes	No	Stores data collected during wideband data capture	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	Turn off instrument power
2. Extended Display Identification 4 Gbit SDRAM	Yes	No	Extended Display Identification Data	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	Turn off instrument power

4.4 Additional Components for N9042B

This section contains information on memory components that are present *only* in the N9042B instrument.

In the tables below, some column titles have been abbreviated for compactness:

- W* = Writable During Normal Operation
- D* = Data Retained When Powered Off

Non-Volatile Memory

Table 4.6 Summary of Additional Non-Volatile memory for N9042B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Config & Cal Memory 8 Kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly Stores assembly specific calibration data	Programmed before installation	A8 Wideband Calibrator ^a .	None required
2. FPGA configuration 64 Mbit Flash	No	Yes	Configuration of the FPGA	Programmed before installation	A17 LO Multiplier ^a .	None required
3. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A18 Millimeter Control ^a .	None required
4. FPGA configuration 4 Mbit Flash	No	Yes	Configuration of the FPGA	Programmed before installation	A18 Millimeter Control ^a .	None required
5. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A19 Wideband Downconverter ^a .	None required
6. FPGA Configuration 1 Gbit Flash	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^a .	None required
7. Board	No	Yes	Board header	Programmed	A21 Wideband	None

4 Instrument Memory & Volatility
4.4 Additional Components for N9042B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
Header 8 kbit EEPROM				before installation	digital IF board ^a .	required
8. FPGA Configuration 256 Mbit EEPROM	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^a .	None required
9. Config & Cal Memory 8 kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A22 UWB Assembly ^a .	None required
10. Artix-7 FPGA Config Memory 128 Mbit Flash	No	Yes	Measurement and control software	Programmed before installation	A22 UWB Assembly ^a .	None required
11. MAX10 FPGA internal Config Memory 1.54 Mbit	No	Yes	Measurement and control software	Programmed before installation	A22 UWB Assembly ^a .	None required
12. Config Memory 128Mbit Flash	No	Yes	Configuration Memory for FPGA	Programmed before installation	A23 IF MUX and Converter ^a .	None required
13. Config & Cal Memory 8kbit EEPROM	No	Yes	Header EEPROM used to identify the assembly	Programmed before installation	A23 IF MUX and Converter ^a .	None required

a. Contains no measurement or state user data

Volatile Memory

Table 4.7 Summary of Additional Volatile memory for N9042B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Wideband Capture 8 GByte SDRAM	Yes	No	Stores data collected during wideband data capture	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	Turn off instrument power

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
2. Extended Display Identification 4 Gbit SDRAM	Yes	No	Extended Display Identification Data	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	Turn off instrument power

4.5 Additional Components for N9048B

This section contains information on memory components that are present *only* in the N9048B instrument.

In the tables below, some column titles have been abbreviated for compactness:

- W* = Writable During Normal Operation
- D* = Data Retained When Powered Off

Non-Volatile Memory

Table 4.8 Summary of Additional Non-Volatile memory for N9048B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. FPGA Configuration 1 Gbit Flash	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^{a.}	None required
2. Board Header 8 kbit EEPROM	No	Yes	Board header	Programmed before installation	A21 Wideband digital IF board ^{a.}	None required
3. FPGA Configuration 256 Mbit EEPROM	No	Yes	FPGA configuration memory	Written only during firmware updates	A21 Wideband digital IF board ^{a.}	None required

a. Contains no measurement or state user data

Volatile Memory

Table 4.9 Summary of Additional Volatile memory for N9048B

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
1. Wideband Capture 8 GByte SDRAM	Yes	No	Stores data collected during wideband data capture	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	None required

Memory Component, Type and Size	W*	D*	Purpose/Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
2. Extended Display Identification 4 Gbit SDRAM	Yes	No	Extended Display Identification Data	Programmed by firmware Not accessible by user	A21 Wideband digital IF board	None required

5 Memory Clearing, Sanitization and Removal Procedures

This section explains how to clear, sanitize, and remove memory from your instrument, for all types of non-volatile memory that can be written to during normal instrument operation.

Table 5.1 Disk Drive

Description and purpose	<p>The Disk Drive is the main memory for the instrument. It has very large storage capacity, plus fast read and write times. There are no limitations on the number of read/write cycles</p> <p>It contains the Operating System, Instrument Software, Factory Calibration Data, Diagnostic software, Crash recovery image, user instrument states, user data files, user trace data and any user-installed third party software. The Disk Drive is written to frequently by the Operating System and other application software</p>
Size	Capacity varies from 80 GByte to 960 GByte
Memory clearing	Software utilities are available that comply with the clearing requirements specified for Magnetic Disks and Flash Drives in the "Media Sanitization Matrix" in Appendix T of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual
Memory sanitization	<p>We recommend always removing the Disk Drive to achieve sanitization</p> <p>For program classifications lower than Top Secret, this media type can be sanitized using method "d" as defined in the "Media Sanitization Matrix" in Appendix T of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual</p> <p>For Top Secret and higher program classifications, Disk Drive removal is the only acceptable sanitization procedure</p>
Memory removal	See the Chapter "Disk Drive Removal Procedure" on page 44
Write protecting	The Disk Drive cannot be write protected. The operating system and software must be able to read from and write to the drive during normal operation
Memory validation	The Disk Drive memory can be validated using third-party Windows utilities

Table 5.2 EEPROM Memories

Description and purpose	<p>These memories are used to identify the assemblies (header info) and store option configuration data. Some are also used to hold factory software for FPGAs. The software is loaded when the instrument powers up. This memory cannot be written to during instrument operation</p>
Size	2 kbit to 8 Mbit
Memory clearing	Not applicable. This memory does not contain user information and is not accessible by the user
Memory sanitization	Not applicable. This memory does not contain user information and is not accessible by the user
Memory removal	Not applicable

5 Memory Clearing, Sanitization and Removal Procedures

Write protecting	Not applicable
Memory validation	Not applicable
Remarks	<p>With one exception, as described below, these memories are only writable by factory/service center software, or upgrade installation software. These memories are internally connected to proprietary internal control data buses (as opposed to standard computer buses such as IDE, PCI, USB). They are not accessible by the Operating System or by third-party software, or by the user, to protect the measurement accuracy and consistency of the instrument. They are rarely modified, to ensure no degradation of instrument performance. These memories contain no user data. Many of these memories have long write times, and limited write endurance, so they are not intended to be written to dynamically by software</p> <p>The sole exception applies to the EEPROM on the A7 Midplane Assembly. Inserting a USB memory device containing a valid license key file into the instrument causes the key file to be copied to both the C: drive and the EEPROM on the A7 Midplane Assembly</p>

Table 5.3 SD Memory Card (if present)

Description and purpose	<p>Only present in instruments with PC6, PC6S, PC7, PC7S, PC8, or PC9 CPUs</p> <p>The intended purpose of the SD Memory Card is for backing up the instrument calibration database file. The backup and restore process used by the instrument will default to this location</p> <p>Users can also write to this memory, since it appears as another disk drive to the instrument</p>
Size	16 Gigabytes
Memory clearing	Software utilities are available that comply with the clearing requirements specified for Magnetic Disks and Flash Drives in the "Media Sanitization Matrix" in Appendix T of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual
Memory sanitization	<p>We recommend always removing the SD Memory Card to achieve sanitization</p> <p>For program classifications lower than Top Secret, this media type can be sanitized using method "d" as defined in the "Media Sanitization Matrix" in Appendix T of the Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual</p> <p>For Top Secret and higher program classifications, SD Card removal is the only acceptable sanitization procedure</p>
Memory removal	See the Chapter "SD Memory Card Removal Procedure" on page 47
Write protecting	The SD Memory Card can be write protected by the use of a switch located on the card itself. Write protecting the card does not interfere with the normal operation of the instrument operating system or the instrument application software
Memory validation	The SD Memory Card can be validated using third-party Windows utilities

5.1 Instrument Sanitization Procedures

This section includes flowcharts that describe how to sanitize an instrument by physical removal and replacement of the Disk Drive.

5.1.1 Application License Key Storage

Note that License keys for all Applications are stored in EEPROM on the A7 Midplane Assembly (as described in Item 19 of [Table 4.1 on page 12](#)). Therefore, when replacing the Disk Drive, you do *not* need to back up and restore the license keys.

5.1.2 Disk Drive Replacement (All except PC6S, PC7S, PC8, PCA, PCB)

Refer to the procedure below for details of how to perform this procedure.

For details of how to archive or restore the instrument's calibration files, see ["Archiving and Restoring Factory Calibration Data Files" on page 36](#).

IMPORTANT

Ensure that the instrument software revision on the secondary non-classified disk drive matches that of the classified drive in the controlled area.

If the non-classified drive receives a software upgrade, or if the non-classified drive is replaced with a drive that contains a newer revision of software than that of the classified drive, the classified drive will require a software upgrade (inside the controlled area) to match the non-classified drive.

5.1.2.1 Items Required

To perform these tasks in a controlled area, you will need:

- 1x Instrument
- 2x Disk Drives for the instrument

One drive (Disk Drive #1) stays permanently within the controlled area, and the other (Disk Drive #2) stays permanently outside it

- 1x One-time writable media, plus 1x compatible writing device for the non-controlled area *and* 1x reading device for the controlled area. See ["Selection of USB Memory Device" on page 36](#) for details

5.1.2.2 Procedure

Steps below that appear on a yellow background take place in the controlled area.
All other steps take place in a non-controlled area.

Step	Task
1	Receive new instrument from factory The instrument shipment may include a spare disk drive (additional drive) prepared by the factory, which contains the same calibration data and software revision as the disk drive in the instrument. If such a factory-prepared disk drive is present, you can skip steps 3, 4, 6, 7, 9, and 10 below
2	Power up the instrument and verify the Instrument Software Revision For instructions on how to verify the currently installed Instrument Software Revision, see "Determining Instrument Software Revision" on page 9 Write down the software revision
3	If the instrument's software is not the latest version, update the instrument software to the latest version available. For instructions, see "Is your product software up-to-date?" on page 3 Write down the software revision
4	Back up (archive) the instrument factory calibration data to the USB memory device For details of the procedure, see "Archiving and Restoring Factory Calibration Data Files" on page 36
5	Remove the Disk Drive and SD Memory Card (if present) from the instrument. See "SD Memory Card Removal Procedure" on page 47
6	Replace the original instrument disk drive (Disk Drive #1) with the spare disk drive (Disk Drive #2) that was obtained previously For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44
7	Turn on the instrument with the spare Disk Drive #2 installed
8	Verify that the instrument software on the spare Disk Drive #2 has the same revision as that on the original Disk Drive #1
9	If the Instrument Software Revision on the spare Disk Drive #2 is not the same as that on the original Disk Drive #1, update the instrument software on this drive to match the software revision that you documented in step 3 For instructions, see "Is your product software up-to-date?" on page 3
10	Restore the instrument calibration data that was previously backed up from the original Disk Drive #1 For details, see "Archiving and Restoring Factory Calibration Data Files" on page 36
11	Write the instrument model number, serial number, and software revision on the original Disk Drive #1, then reinstall it in the instrument
12	Write the instrument model number, serial number, and software revision on the spare Disk Drive #2, place it back in the static safe bag that it was shipped in, then store it in a safe place until it is needed again
13	The instrument is now ready for use in a secure environment
14	Physically deploy instrument into controlled area
15	Use instrument inside controlled area until cal or repair is needed
16	Make a note of the current software version, because the instrument's software may have been updated inside

Step	Task
	the secure area. To determine this, press System, Show System , and write down the Instrument Software Revision. Attach this note to the instrument
17	Remove Disk Drive #1 and retain in controlled area For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44
18	Physically remove instrument from controlled area. Without the Disk Drive, instrument is sanitized
19	Install secondary non-classified Disk Drive #2., which was previously prepared in Step 12 Power on instrument
20	When the instrument has booted up, press System, Show System , and confirm that the Instrument Software Revision is the same as noted in Step 16. If not, upgrade the instrument software to the same version as recorded in Step 16
21	Instrument is now operational with original calibration data. Deliver to service center for cal/repair
22	Service center may or may not generate new calibration files on Disk Drive, depending on whether an adjustment is performed This procedure assumes that new cal data was generated
23	Instrument returned to customer's non-controlled area
24	Verify Instrument Software Revision, to determine whether the service center upgraded the software. See Step 2 and Step 12
25	Back up (Archive) calibration file from Disk Drive to portable read-only media For details of the procedure, see "Archiving and Restoring Factory Calibration Data Files" on page 36
26	Remove the non-classified Disk Drive #2 and retain outside of controlled area. If necessary, update the documented software revision on the drive label For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44
27	Physically deploy instrument back into controlled area, without a Disk Drive Bring read-only media containing calibration file (created in Step 25) into controlled area
28	Re-insert classified Disk Drive #1 into instrument, and verify Instrument Software Revision, as in Step 2
29	If the Instrument Software Revision does not match the revision documented in step 24 (because the software was updated at service center), then a software update must be performed, to force the controlled-area drive to match the non-controlled-area drive that was used to calibrate the instrument
30	Restore calibration file (Step 25) from read-only media to instrument
31	Done. Go to Step 15

5.1.3 Disk Drive Replacement (For PC6S, PC7S, PC8, PCA, PCB)

Refer to the procedure below for details of how to perform this procedure.

For details of how to archive or restore the instrument's calibration files (Steps 3, 12 and 16 in the flowchart), see ["Archiving and Restoring Factory Calibration Data Files" on page 36](#).

IMPORTANT

Ensure that the instrument software revision on the secondary non-classified disk drive matches that of the classified drive in the controlled area.

If the non-classified drive receives a software upgrade, or if the non-classified drive is replaced with a drive that contains a newer revision of software than that of the classified drive, the classified drive will require a software upgrade (inside the controlled area) to match the non-classified drive.

5.1.3.1 Items Required

To perform these tasks in a controlled area, you will need:

- 1x Instrument
- 2x Disk Drives for the instrument

One drive (Disk Drive #1) stays permanently within the controlled area, and the other (Disk Drive #2) stays permanently outside it.

5.1.3.2 Procedure

Steps below that appear on a yellow background take place in the controlled area. All other steps take place in a non-controlled area.

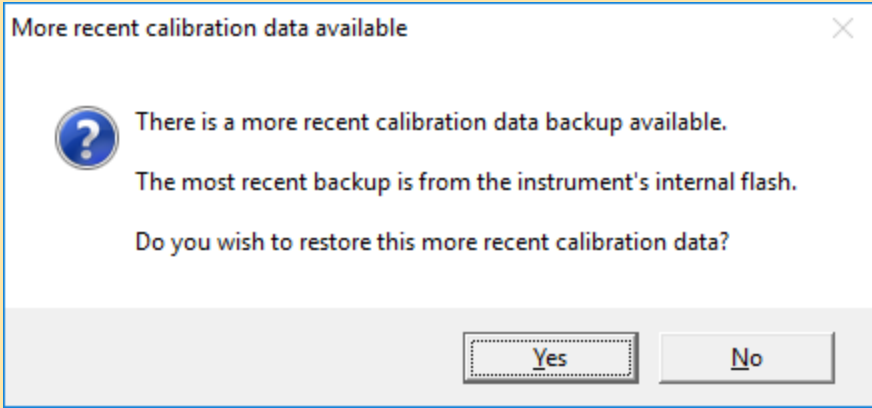
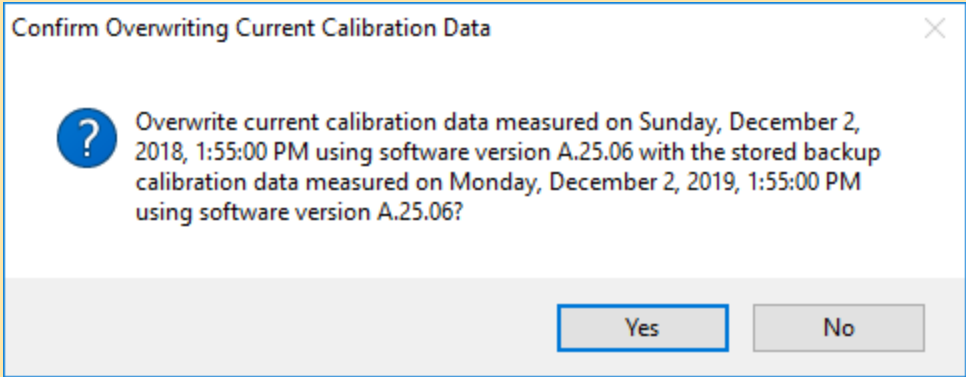
Step	Task
1	Receive new instrument from factory The instrument shipment may include a spare disk drive (additional drive) prepared by the factory, which contains the same calibration data and software revision as the disk drive in the instrument. If such a factory-prepared disk drive is present, you can skip steps 3, 4, 6, 7, 9, and 10 below
2	Power up the instrument and verify the Instrument Software Revision For instructions on how to verify the currently installed Instrument Software Revision, see "Determining Instrument Software Revision" on page 9 Write down the software revision
3	If the instrument's software is not the latest version, update the instrument software to the latest version available. For instructions, see "Is your product software up-to-date?" on page 3 Write down the software revision
4	Back up (archive) the instrument factory calibration data to internal Flash memory For details of the procedure, see "Data Backup or Restore using Alignment Data Wizard" on page 36
5	Remove the Disk Drive and SD Memory Card (if present) from the instrument. See "SD Memory Card Removal Procedure" on page 47
6	Replace the original instrument disk drive (Disk Drive #1) with the spare disk drive (Disk Drive #2) that was obtained previously For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44

5 Memory Clearing, Sanitization and Removal Procedures

5.1 Instrument Sanitization Procedures

Step	Task
7	Turn on the instrument with the spare Disk Drive #2 installed
8	Verify that the instrument software on the spare Disk Drive #2 has the same revision as that on the original Disk Drive #1
9	If the Instrument Software Revision on the spare Disk Drive #2 is not the same as that on the original Disk Drive #1, update the instrument software on this drive to match the software revision that you documented in step 3 For instructions, see "Is your product software up-to-date?" on page 3
10	Restore the instrument calibration data that was previously backed up from the original Disk Drive #1 For details, see "Data Backup or Restore using Alignment Data Wizard" on page 36
11	Write the instrument model number, serial number, and software revision on the original Disk Drive #1, then reinstall it in the instrument
12	Write the instrument model number, serial number, and software revision on the spare Disk Drive #2, place it back in the static safe bag that it was shipped in, then store it in a safe place until it is needed again
13	The instrument is now ready for use in a secure environment
14	Physically deploy instrument into controlled area
15	Use instrument inside controlled area until cal or repair is needed
16	Make a note of the current software version, because the instrument's software may have been updated inside the secure area. To determine this, press System, Show System , and write down the Instrument Software Revision. Attach this note to the instrument
17	Remove Disk Drive #1 and retain in controlled area For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44
18	Physically remove instrument from controlled area. Without the Disk Drive, instrument is sanitized
19	Install secondary non-classified Disk Drive #2., which was previously prepared in Step 12 Power on instrument
20	When the instrument has booted up, press System, Show System , and confirm that the Instrument Software Revision is the same as noted in Step 16. If not, upgrade the instrument software to the same version as recorded in Step 16
21	Instrument is now operational with original calibration data. Deliver to service center for cal/repair
22	Service center may or may not generate new calibration files on Disk Drive, depending on whether an adjustment is performed This procedure assumes that new cal data was generated
23	Instrument returned to customer's non-controlled area
24	Verify Instrument Software Revision, to determine whether the service center upgraded the software. See Step 2 and Step 12
25	Remove the non-classified Disk Drive #2 and retain outside of controlled area. If necessary, update the documented software revision on the drive label For details of how to remove the Disk Drive, see "Disk Drive Removal Procedure" on page 44
26	Physically deploy instrument back into controlled area, without a Disk Drive
27	Re-insert classified Disk Drive #1 into instrument

5 Memory Clearing, Sanitization and Removal Procedures
5.1 Instrument Sanitization Procedures

Step	Task
	<p>If cal files were updated during repair /calibration, a dialog will appear on the instrument screen, as shown in below, advising you that more recent calibration data is backed up to the instrument's internal Flash memory. You are asked whether you wish to restore the calibration data from the internal memory; select Yes</p> <p>Restore Calibration Data Dialog</p> 
28	<p>A further dialog appears, as shown in below, asking you to confirm that you want to overwrite the current calibration data (presently on the Disk Drive) with the backup data stored in the internal Flash memory. The measurement date, time and software revision are displayed for each set of calibration data</p> <p>Confirm Overwrite Calibration Data Dialog</p> 
29	<p>Verify that the software revisions shown in are the same</p> <p>If so, select Yes</p> <p>If the software revisions displayed in the dialog shown in do not match, this is probably because the software was updated at the service center. In this case, it is highly recommended that you should perform a software update on Disk Drive #1. This ensures that the software on controlled-area Disk Drive #1 matches the software used on non-controlled-area Disk Drive #2 that was installed when the instrument was adjusted and recalibrated</p>
30	<p>Done. Go to Step 15</p>

5.2 Archiving and Restoring Factory Calibration Data Files

This section describes how to archive ("back up") the instrument's factory calibration data to an external USB memory device, or restore the calibration data from an external memory device.

5.2.1 Selection of USB Memory Device

The appropriate choice of USB Memory Device depends on the circumstances. In cases where the calibration data will *not* need to be brought into a controlled area, a USB Flash drive is generally a good choice.

In cases where the calibration data must be moved into a controlled area, USB Flash devices are not permitted. In these cases, a good choice is to back up the calibration data to write-once optical media such as a CD-R, DVD±R or BD-R disc.

The optical disc can be written using an external writer device outside the controlled area, and then read using a further external reader device situated in the controlled area.

5.2.2 Tools Required

To perform backup or restore operations, you need:

- a mouse with a USB interface
- an alphanumeric keyboard with a USB interface
- a portable USB Memory Device. For details, see "[Selection of USB Memory Device](#)" on page 36

5.2.3 Data Backup or Restore using Alignment Data Wizard

The Alignment Data Wizard is launched directly from the instrument application software interface, so you do *not* need to exit the application software before proceeding.

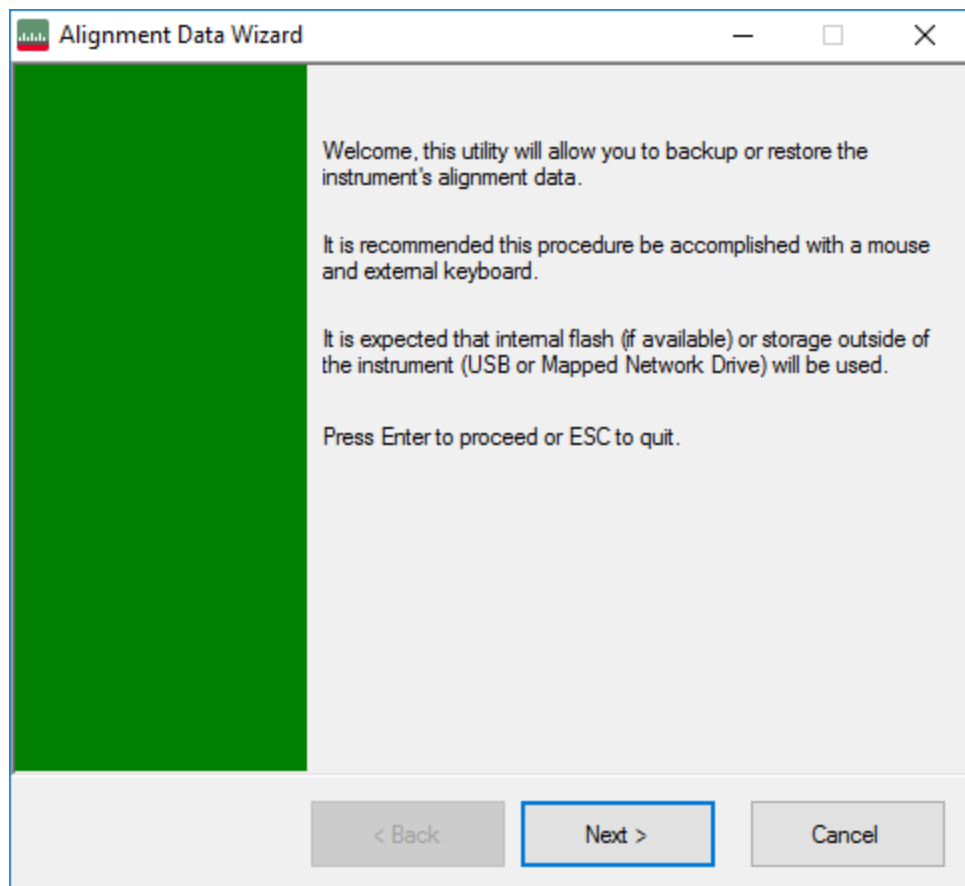
Follow the steps below to start the wizard:

1. Plug the mouse's USB cable into one of the instrument's USB ports
2. Plug the USB Memory Device into another of the instrument's USB ports. For details of appropriate devices, see "[Selection of USB Memory Device](#)" on page 36

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3. Plug the USB keyboard into another of the instrument's USB ports
4. Press **System** > **Alignments** > **Backup or Restore Align Data...**
5. If you are prompted to enter the Administrator password, enter either Keysight4u!, or agilent4u, depending on your instrument's software version
6. When prompted, press **OK** to close the analyzer program
7. The Alignment Data Wizard dialog appears, as shown in **Figure 5-1** below:

Figure 5-1 Alignment Data Wizard Dialog



Click **Next** to proceed

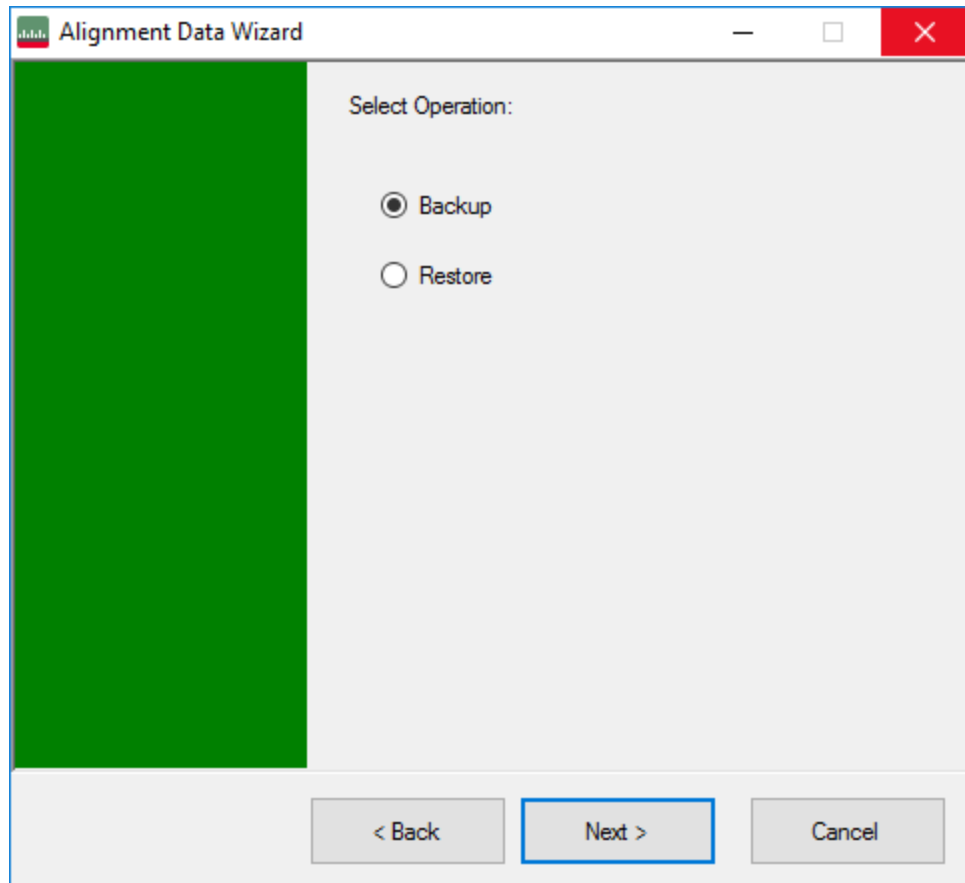
8. The next screen allows you to select either Backup or Restore
 - To complete a Backup operation, follow the instructions in "**Backup Operation**" on page 38

- To complete a Restore operation, follow the instructions in ["Restore Operation" on page 40](#)

5.2.3.1 Backup Operation

1. The next screen allows you to select either **Backup** or **Restore**, as shown in [Figure 5-2](#) below

Figure 5-2 Operation Selection

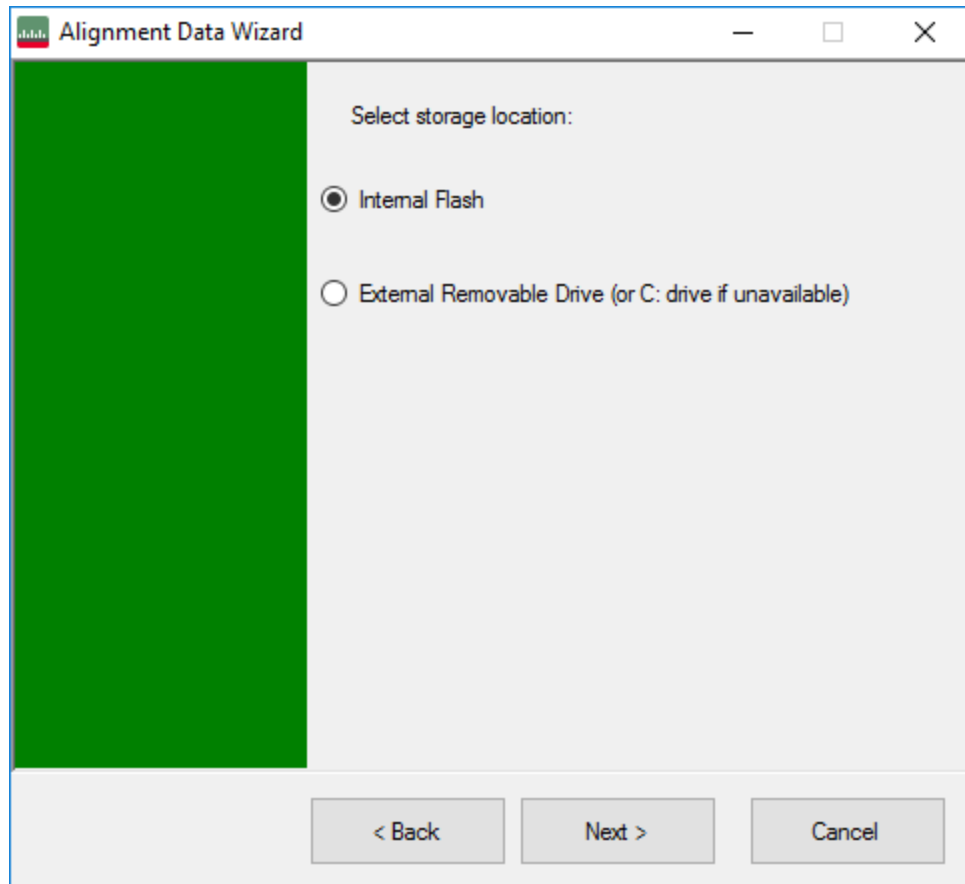


Select the desired operation, then click **Next** to proceed

2. The content of the next screen displayed depends on the Processor Assembly type. To determine your instrument's Processor Assembly type, see ["Determining Installed Options & Processor Assembly Type" on page 8](#)

If the instrument has a PC6S, PC7S, PC8, PCA, or PCB Processor Assembly, then the screen contains the selections shown in [Figure 5-3](#) below

Figure 5-3 Alignment Data Wizard Dialog for PC6S/PC7S/PC8

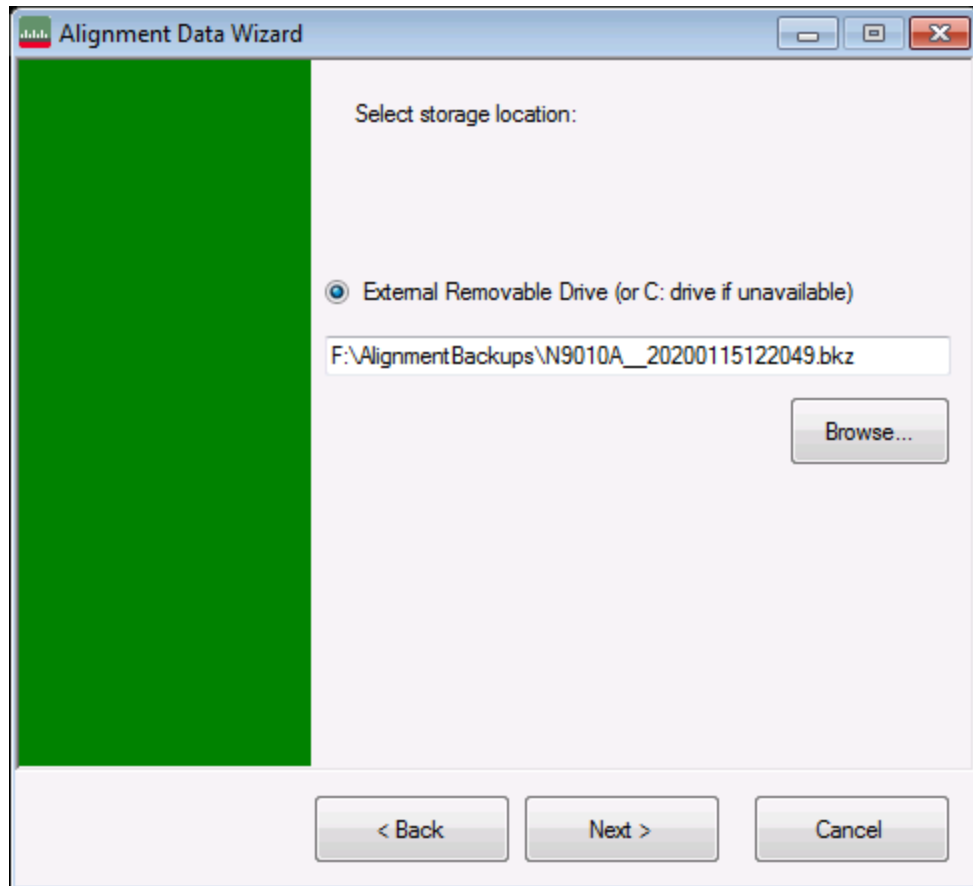


The available storage location options are as follows:

- **Internal Flash** is the Calibration Backup memory in the A4 Processor assembly. For PC6, PC7S, PC8, PCA, or PCB, this is the default location. See item 17 of [Table 4.1 on page 12](#)
- **External Removable Drive**. This is the SD memory card in the A4 Processor assembly. See item 7 of [Table 4.1 on page 12](#)

If the instrument has a PC6 or PC7 Processor Assembly, then the dialog contains only the External Removable Drive selection, as shown in [Figure 5-4](#) below. In this case, the default storage location is the SD memory card in the A4 Processor assembly

Figure 5-4 Alignment Data Wizard Dialog for PC6/PC7



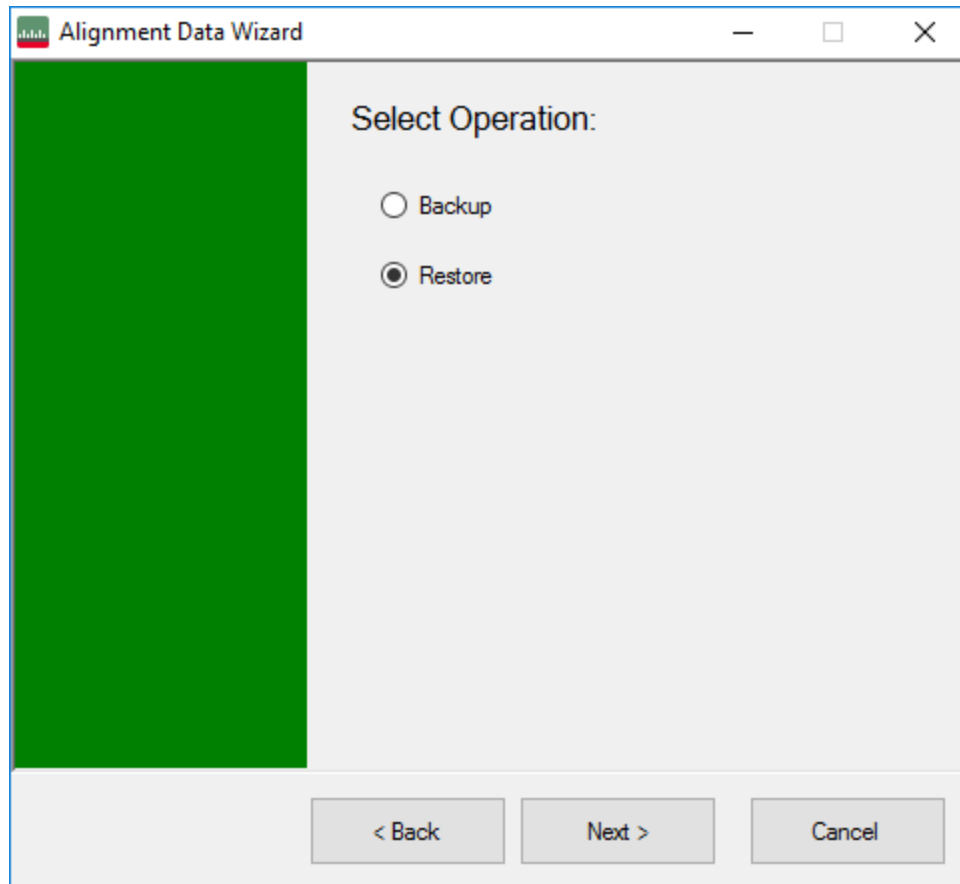
3. Select the desired storage location, then click **Next** and follow the wizard's on-screen instructions to back up the calibration data to the external USB Memory Device or Flash Memory

This completes the Backup operation

5.2.3.2 Restore Operation

1. From the Select Operation screen, select **Restore**, as shown in [Figure 5-5](#), then click **Next** to proceed

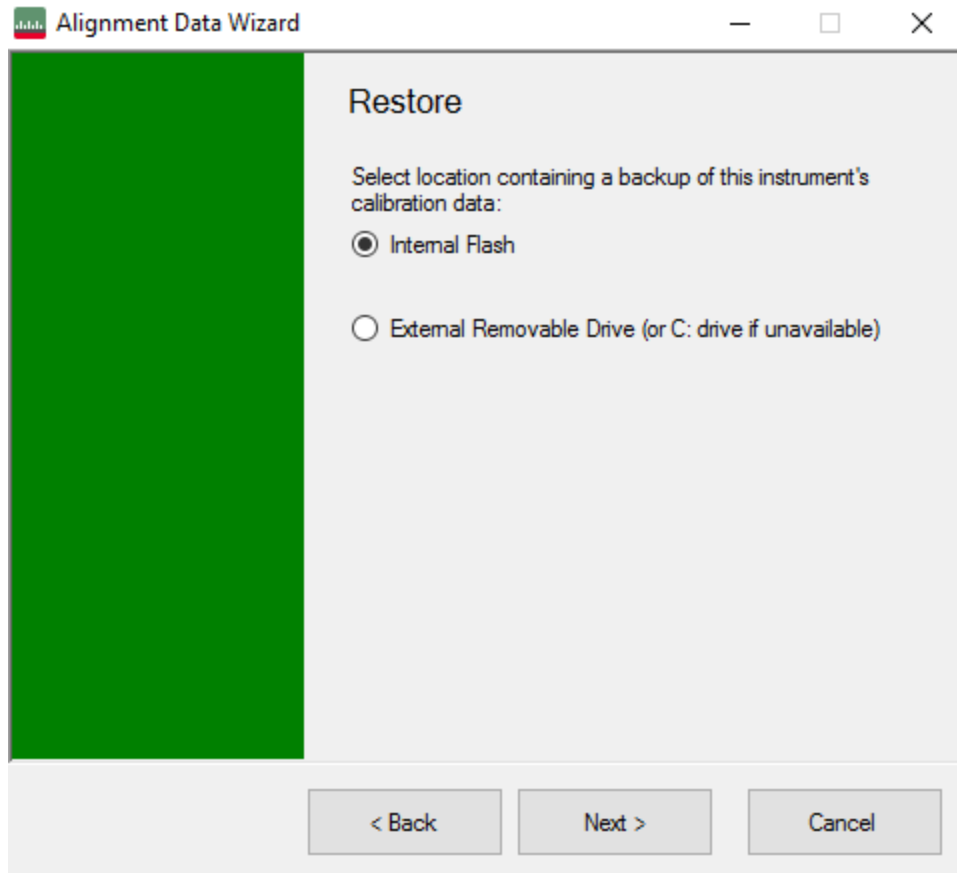
Figure 5-5 Selecting Restore Operation



2. The content of the next screen displayed depends on the Processor Assembly type. To determine your instrument's Processor Assembly type, see ["Determining Installed Options & Processor Assembly Type" on page 8](#)

If the instrument has a PC6S, PC7S, PC8, PCA, or PCB Processor Assembly, then the screen contains the selections shown in [Figure 5-6](#) below

Figure 5-6 Restore Operation from Internal Flash (PC6S/PC7S/PC8/PCA/PCB only)

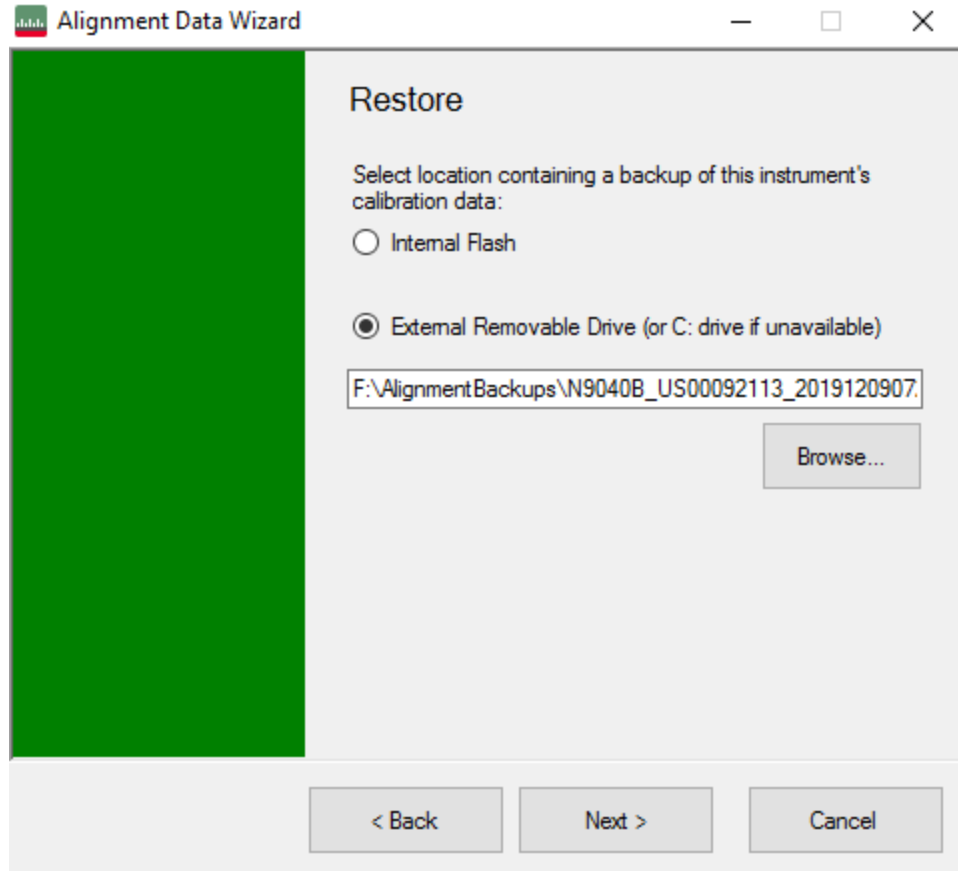


The available storage location options are as follows:

- **Internal Flash** is the Calibration Backup memory in the A4 Processor assembly. For PC6S, PC7S, PC8, PCA, or PCB, this is the default location. See item 17 of [Table 4.1 on page 12](#)
- **External Removable Drive**. This is the SD memory card in the A4 Processor assembly. See item 7 of [Table 4.1 on page 12](#)

If the instrument has a PC6 or PC7 Processor Assembly, then the dialog contains only the External Removable Drive selection, as shown in [Figure 5-7](#) below. In this case, the default storage location is the SD memory card in the A4 Processor assembly

Figure 5-7 Restore Operation from External Removable Drive (PC6/PC7, PC6S/PC7S/PC8/PCA/PCB)



3. Select the desired storage location, then click **Next** and follow the wizard's on-screen instructions to restore the calibration data from the external USB Memory Device or Flash Memory

This completes the Restore operation

6 Disk Drive Removal Procedure

This chapter describes the procedures for physical removal of the disk drive.

TIP

Application License keys are stored in EEPROM on the A7 Midplane Assembly (as described in Item 19 of [Table 4.1 on page 12](#)). Therefore, when replacing the Disk Drive, you do not need to back up and restore the license keys.

When installing a replacement Disk Drive, ensure that the instrument software revision on the replacement drive matches that of the original drive.

To remove the disk drive, follow the steps below. The numbered items in the figures correspond to the step numbers in the procedure.

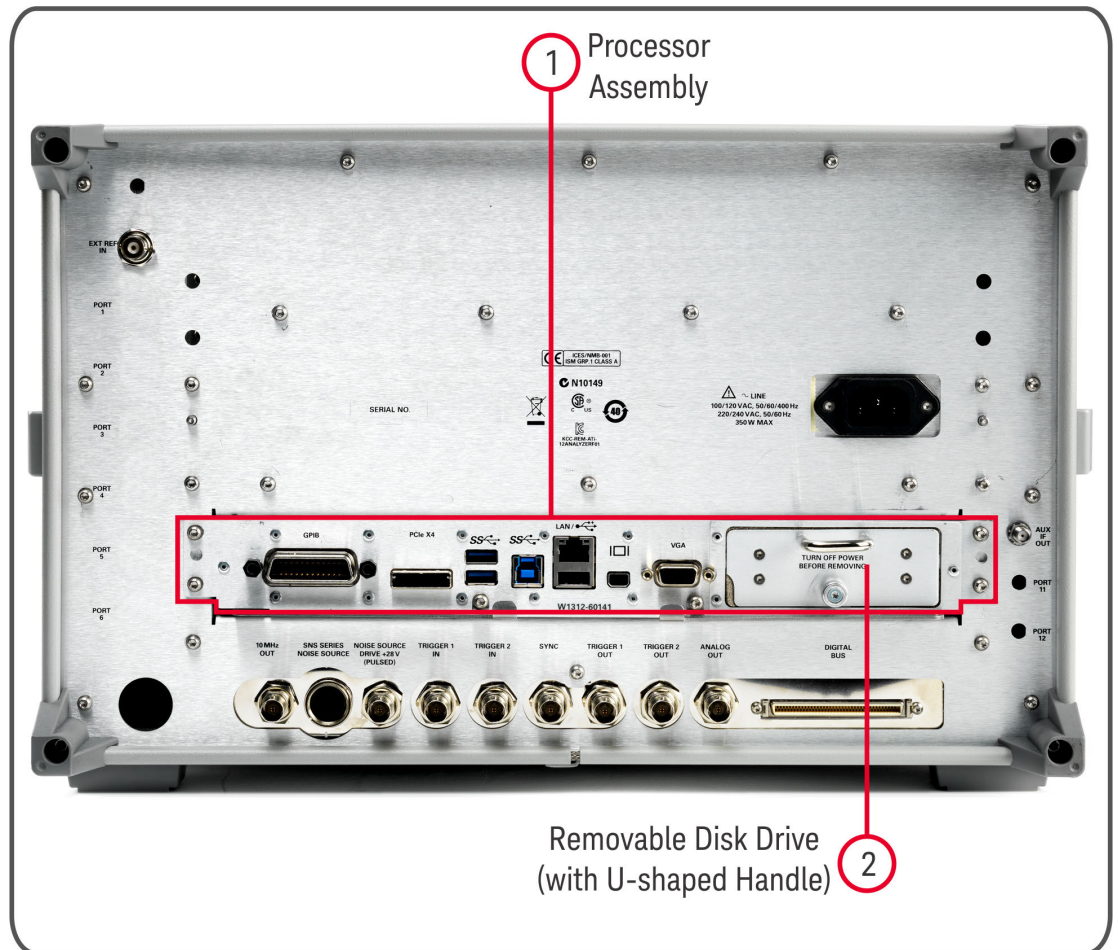
CAUTION

Before removing the disk drive, ensure that the instrument's power is turned off.

-
1. Locate the Processor and Disk Drive Assembly on the instrument's rear panel, as shown in [Figure 6-1](#)
 2. Locate the removable drive, and its retaining thumbscrew, as shown in [Figure 6-1](#)

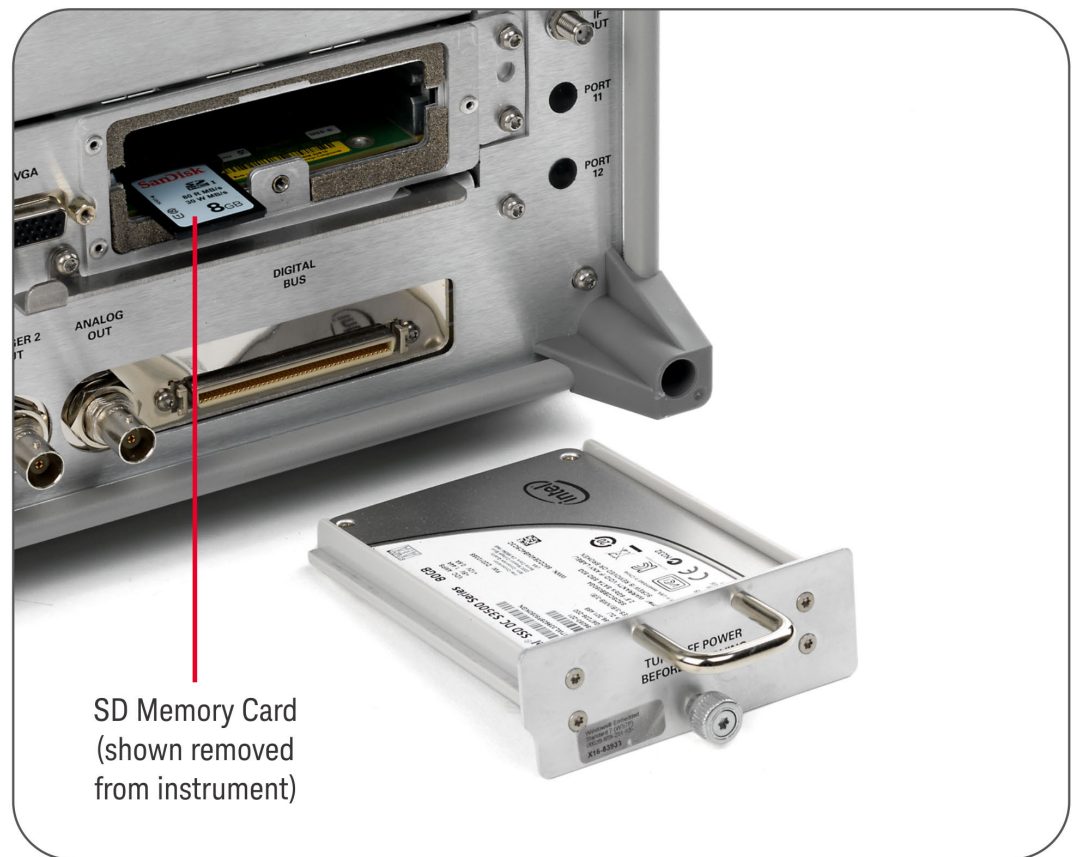
6 Disk Drive Removal Procedure

Figure 6-1 Instrument Rear Panel & Processor Assembly



3. Turn the thumbscrew to release the drive from the panel, as shown in [Figure 6-2](#). If the thumbscrew is too tight to turn by hand, use a TORX T10 screwdriver to loosen it

Figure 6-2 Instrument Rear Panel, showing Removable Disk Drive Assembly and SD Memory Card



4. Pull the U-shaped handle attached to the drive unit, to remove the drive from the Processor Assembly, as shown in [Figure 6-2](#)

7 SD Memory Card Removal Procedure

The SD Memory Card is present only in instruments with the PC6 and PC7 processor assemblies. See ["Determining Installed Options & Processor Assembly Type" on page 8](#) for details.

When present, the SD Memory Card is located on the A4 Processor assembly. However, it can only be accessed after the instrument's disk drive is removed.

To remove the SD Memory Card:

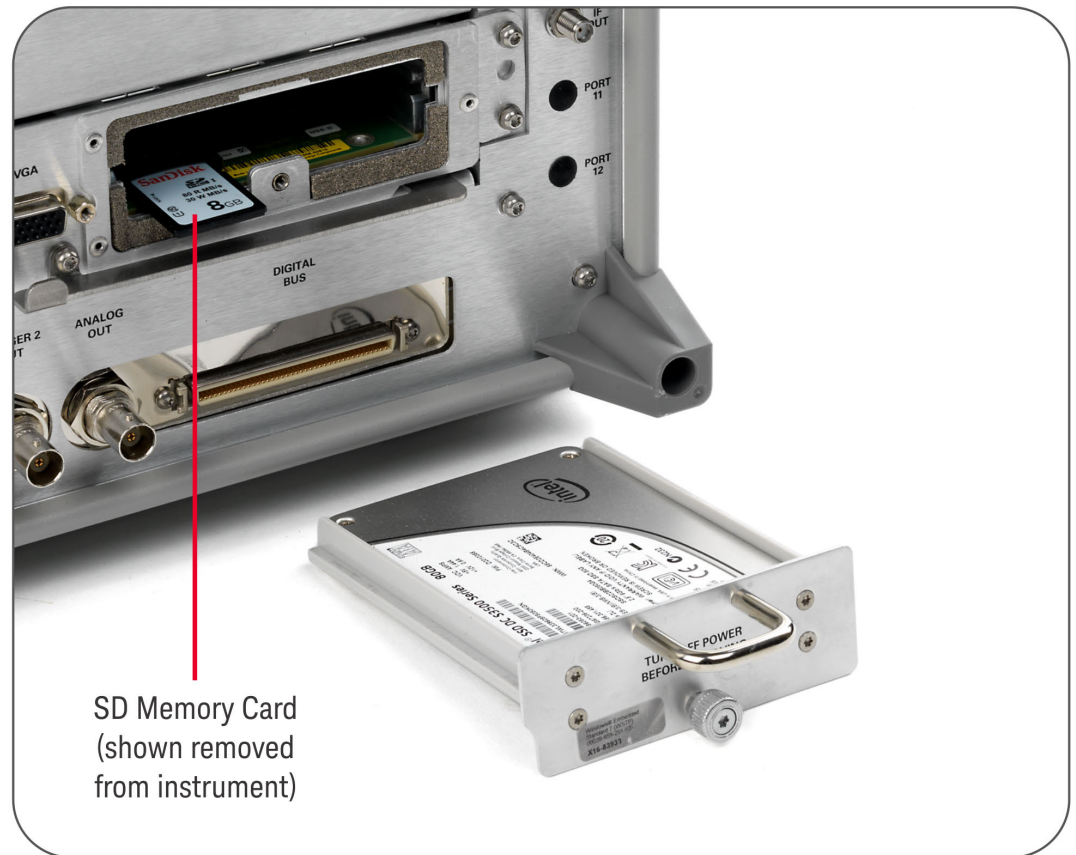
1. Remove the disk drive by following the ["Disk Drive Removal Procedure" on page 44](#)

Once the disk drive has been removed, the SD Memory Card is accessible

2. Push in on the SD Memory Card and release. The Card springs back out, and can then be removed. [Figure 7-1](#) below shows the instrument rear panel, with the Disk Drive Assembly and SD Memory Card extracted from the instrument

7 SD Memory Card Removal Procedure

Figure 7-1 Instrument Rear Panel, showing Removable Disk Drive Assembly and SD Memory Card



3. Reinstall the disk drive assembly

Removing the SD Memory Card does not interfere with normal operation of the instrument operating system or the instrument application software.

8 User and Remote Interface Security Measures

This chapter discusses options that are available to you to control and configure remote access to the instrument, including:

- ["SCPI/GPIB Control of Interfaces" on page 50](#)
- ["Operating System Security Features" on page 51](#)
- ["USB Interfaces" on page 52](#). This topic includes information about how to set the instrument's USB ports to read-only
- ["SD Memory Card" on page 54](#)

IMPORTANT

Users are responsible for providing security for the I/O ports for remote access, by controlling physical access to the I/O ports. The I/O ports must be controlled because they provide access to most user settings, user states, and the display memory.

8.1 SCPI/GPIB Control of Interfaces

The GPIB command LLO (local lockout) can be sent by the controller to disable operation of the instrument's front-panel keys and menus.

However, sending the LLO command does *not* disable access to the instrument via its USB ports. For details of how to restrict the operation of the USB ports, see ["Configuring USB for Read-only" on page 52](#) below.

8.2 Operating System Security Features

The instrument's Windows operating system includes a variety of features that you can invoke or modify to enhance system security. These include the following:

- The ability to create custom user accounts, and assign different security levels to each account by adding it to an existing group. The group types predefined by Windows are: Administrator, Power User, User, Backup Operator, and Guest, but you can also define new group types
- To provide additional protection for instruments that have a network (or internet) connection, the standard Windows Firewall is enabled by default
- You can install standard third-party antivirus and spyware detection software designed for use with Windows. If your instrument has a network (or internet) connection, this may be advisable

CAUTION

Running any third-party program while making measurements may adversely affect the instrument's performance.

8.3 USB Interfaces

The instrument's Microsoft Windows operating system can be configured to improve the security of the USB interfaces. This section includes the following topics:

- [Disabling or Enabling AutoRun/AutoPlay](#)
- [Configuring USB for Read-only](#)

8.3.1 Disabling or Enabling AutoRun/AutoPlay

AutoRun, and the associated **AutoPlay**, are Windows features that assist users in selecting appropriate actions when new media and devices are detected. The AutoRun feature is disabled in the instrument by default, for improved security, unless the Administrator account is running. (In Administrator mode, AutoRun is enabled, to aid with program installation.)

You can disable or enable AutoPlay via the Control Panel. Open the Control Panel and select **Hardware and Sound** > **AutoPlay**, then uncheck or check the Use AutoPlay for all media and devices checkbox.

8.3.2 Configuring USB for Read-only

You can set the instrument's USB interfaces to read-only, thus preventing transfer of files from the instrument onto USB devices.

You can change this setting only when you are logged on as the Administrator. To change the setting, do the following:

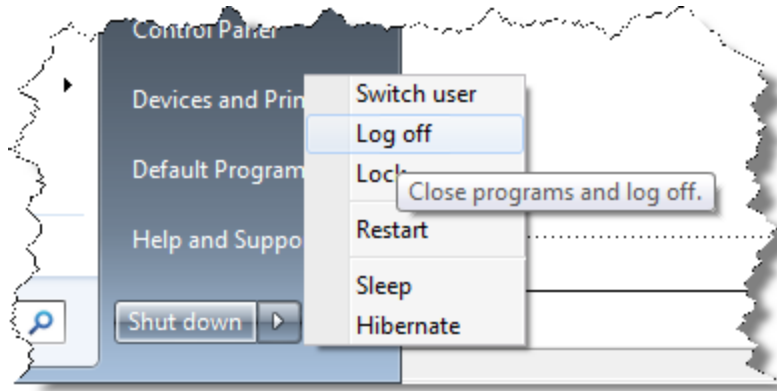
1. If you are *not* currently logged on to the instrument as the Administrator, you must log off

If you are currently logged on to the instrument as the Administrator, and the Keysight XSA application is already running, go to Step 4

The log-off procedure executes more quickly if you first exit the Keysight XSA application, but you can also log off without exiting the application

2. To log off, click the Windows **Start** button, then select **Shut down** > **Log off** from the Windows Start menu, as shown in [Figure 8-1](#) below

Figure 8-1 Windows Log off Control



3. After you have logged on to the instrument as the Administrator, restart the Keysight XSA application
4. When the XSA application has fully initialized (that is, when the main results view and menus are visible), press the **System** front-panel key
5. From the System softkey menu, select: **More > Security > USB**
6. Select the option **Read Only**
7. To activate the configuration change, either log out and then back in under your usual user name (which by default is instrument), or cycle the instrument power

8.4 SD Memory Card

The SD Memory Card can either be write protected, or removed from the instrument:

- To remove the SD Memory Card, follow the instructions in "[SD Memory Card Removal Procedure](#)" on page 47
- To write protect the SD Memory Card, first remove it from the instrument, as above. The SD Memory Card features a Lock switch that, when set, prevents the writing of data to the card

Write protecting or removing the SD Memory Card does not interfere with normal operation of the instrument operating system or the instrument application software.

9 Procedure for Declassifying a Faulty Instrument

Even if the instrument is not able to power on, it may be declassified by:

1. Removing the disk drive from the instrument, using the appropriate procedure as described in ["Disk Drive Removal Procedure" on page 44](#)
2. Removing the SD Memory card (if present), using the procedure described in ["SD Memory Card Removal Procedure" on page 47](#)

10 Special Options

There are certain special options for X-Series instruments that provide security-related functionality. The following available options are described in this chapter.

- "Option SF1" on page 57
- "Option SF2" on page 59
- "Option SF3" on page 67

To determine which of these options, if any, are installed in your instrument, use the procedure described in "Determining Installed Options & Processor Assembly Type" on page 8.

10.1 Option SF1

Option SF1 is a license key-enabled special option that addresses the requirements of security-conscious users. Installing Option SF1 in the instrument causes changes to available functionality in certain menus, and suppression of certain SCPI commands, to prevent the launching of Windows programs from the instrument application. This reduces the instrument's vulnerability to the effects of unauthorized or undesirable third-party programs or scripts.

This section summarizes the functional modifications to the instrument capabilities when Option SF1 is installed.

10.1.1 Menu & Command Changes

Installing Option SF1 causes the following menu and command changes in the instrument.

10.1.1.1 File Menu

In the **File** menu, the **File Explorer...** key is not available.

10.1.1.2 System Menu

- In the **System** menu, the keys **Control Panel...**, **Licensing...**, and **Internet Explorer...** are not available
- In the **System > Diagnostics** menu, the keys **Front Panel Test...**, **Advanced**, **FP State Logger**, and **Quick Test...**, and the functions of all submenus of these keys, are not available
- In the **System > Service > Diagnostics** menu, the **Advanced** key and all functions of its submenu are not available
- In the **System > Service > Align > Diagnostics** menu, the **Align Log...** key is not available

10.1.1.3 Disabled SCPI Commands

The SCPI command `:SERVICE[:PRODUCTION]:RUN` is not available.

10.1.1.4 Right-Click (Popup) Menu

When Option SF1 is installed, the **Virtual Front Panel** selection and functionality (under the **Utility** menu) are not available.

10.2 Option SF2

Option SF2 is a license key-enabled special option that addresses the requirements of security-conscious users who need to be able to prevent the saving of measurement results or user configurations when any Signal Analyzer application is running. The option also prevents the recall of results and configurations.

Installing Option SF2 makes the following changes to the instrument's operating environment:

- Modifies aspects of the Windows operating system, specifically to disable memory page file usage. For details, see ["Option SF2" on page 59](#)
- Disables certain menu keys and SCPI commands, eliminating the ability to save or recall user data. For details, see ["Menu & Command Changes" on page 60](#)

10.2.1 Operating System Changes

Installing Option SF2 disables Windows memory page files. The reason for this change is to ensure that memory page swapping does not inadvertently cause the instrument to create on-disk copies of RAM data.

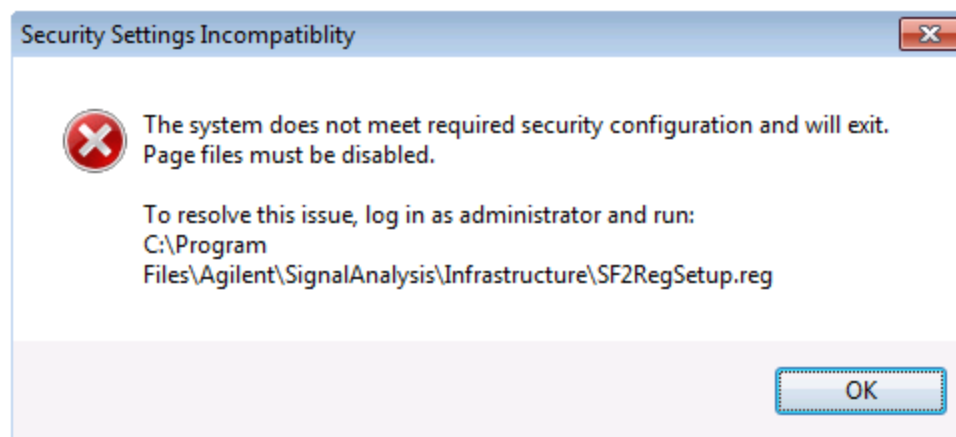
Note that one effect of disabling memory page files is to reduce the available memory space for preloading applications at power-on.

TIP

If a disk recovery and software update to revision A.14.00 and above is performed, memory paging files will automatically be re-enabled. If the X-Series application is then started (with Option SF2 installed), the message shown in [Figure 10-1](#) appears, describing how to disable the page files.

The X-Series application will not start until memory page files are disabled. For details of how to run SF2RegSetup.reg, refer to [Installation Note: Keysight X-Series Signal Analyzers Option SF2](#).

Figure 10-1 Option SF2 System Incompatibility Message



10.2.2 Menu & Command Changes

Installing Option SF2 causes several menu and command changes in the instrument, as follows.

10.2.2.1 Front-panel Keys

The functions of the following front-panel keys are disabled. Pressing one of these keys displays the informational message “Settings conflict; Feature not available for Option SF2”:

- Print
- Quick Save
- Recall
- Save

NOTE

Save and Recall are often used with the N9069A Noise Figure Measurement Application to allow multiple noise sources to be used without the need to re-enter ENR values or to perform the noise source calibration each time a different noise source is connected. When Option SF2 is installed, this functionality is not available.

10.2.2.2 File Menu

The **Page Setup...** and **Print...** keys are not available.

10.2.2.3 Preset Menu

The **User Preset**, **Save User Preset**, and **User Preset All Modes** icons are not available.

10.2.2.4 System Menu

In the **System > Power On** menu, the Power On Type selection keys (**Mode Preset**, **User Preset** and **Last State**) are not available.

10.2.2.5 Disabled SCPI Commands

The following SCPI commands are *not* available. Attempting to use these commands generates the Error message –113, Undefined header.

Note that some of the commands listed are specific to individual applications, thus the set of available commands depends on which applications are licensed for a given instrument.

IEEE 488.2 Common Commands (*)

- *RCL
- *SAV

MMEMory Subsystem

- :MMEMory:CLEar:ALL
- :MMEMory:CLEar:STATe
- :MMEMory:COMMeNt
- :MMEMory:COpy:DEvIce
- :MMEMory:INITialize
- :MMEMory:LOAD:ALIMit
- :MMEMory:LOAD:ALISt
- :MMEMory:LOAD:ATRace
- :MMEMory:LOAD:AUTO
- :MMEMory:LOAD:CAPTured

- :MMEMory:LOAD:CHTable
- :MMEMory:LOAD:CORRection
- :MMEMory:LOAD:ENR
- :MMEMory:LOAD:EVMSetup
- :MMEMory:LOAD:FREQuency
- :MMEMory:LOAD:LIMit
- :MMEMory:LOAD:LOSS
- :MMEMory:LOAD:MASK
- :MMEMory:LOAD:MPADapter:CORRection
- :MMEMory:LOAD:PSET
- :MMEMory:LOAD:REGister
- :MMEMory:LOAD:SCAN
- :MMEMory:LOAD:SETup
- :MMEMory:LOAD:SLISt
- :MMEMory:LOAD:SSSetup
- :MMEMory:LOAD:STATe
- :MMEMory:LOAD:STATe:VSA
- :MMEMory:LOAD:T2Config
- :MMEMory:LOAD:TMMConfig
- :MMEMory:LOAD:TRACe
- :MMEMory:LOAD:TRACe:DATA
- :MMEMory:LOAD:TRACe:REGister
- :MMEMory:LOAD:VSASetup
- :MMEMory:LOAD:ZMAP
- :MMEMory:MSIS

10 Special Options

10.2 Option SF2

- :MMEMory:NAME
- :MMEMory:NFIGure:LOAD:ENR
- :MMEMory:NFIGure:LOAD:FREQuency
- :MMEMory:NFIGure:LOAD:LOSS
- :MMEMory:NFIGure:STORe:ENR
- :MMEMory:NFIGure:STORe:FREQuency
- :MMEMory:NFIGure:STORe:LOSS
- :MMEMory:REGister:STATe:LABel
- :MMEMory:RESuIts:CORRection:MODE
- :MMEMory:RESuIts:LIMits:MODE
- :MMEMory:RESuIts:OUTPut
- :MMEMory:RESuIts:SCAN
- :MMEMory:RESuIts:SCReen:THEMe
- :MMEMory:RESuIts:SLIST
- :MMEMory:RESuIts:TRACe:DATA
- :MMEMory:RESuIts:TRACe:HEADer
- :MMEMory:RESuIts:TRACe:SETTing
- :MMEMory:SElect[:ITEM]:ALL
- :MMEMory:SElect[:ITEM]:DEFault
- :MMEMory:SElect[:ITEM]:HWSettings
- :MMEMory:SElect[:ITEM]:LINes:ALL
- :MMEMory:SElect[:ITEM]:NONE
- :MMEMory:SElect[:ITEM]:SCData
- :MMEMory:SElect[:ITEM]:TRACe[:ACTive]
- :MMEMory:SElect[:ITEM]:TRANsducer:ALL

- :MMEMory:STORe:ALIMit
- :MMEMory:STORe:ALISt
- :MMEMory:STORe:ATRace
- :MMEMory:STORe:CAPTured
- :MMEMory:STORe:CHTable
- :MMEMory:STORe:CORRection
- :MMEMory:STORe:ENR
- :MMEMory:STORe:FREQuency
- :MMEMory:STORe:LIMit
- :MMEMory:STORe:LOSS
- :MMEMory:STORe:MPADapter:CORRection
- :MMEMory:STORe:PSET
- :MMEMory:STORe:RESuIts
- :MMEMory:STORe:RESuIts:MTABLE
- :MMEMory:STORe:RESuIts:PTABLE
- :MMEMory:STORe:RESuIts:SNGLS
- :MMEMory:STORe:RESuIts:SPECTrogram
- :MMEMory:STORe:SCAN
- :MMEMory:STORe:SCReen
- :MMEMory:STORe:SCReen:THEMe
- :MMEMory:STORe:SLISt
- :MMEMory:STORe:STATe
- :MMEMory:STORe:T2Config
- :MMEMory:STORe:TMMConfig
- :MMEMory:STORe:TRACe

10 Special Options

10.2 Option SF2

- :MMEMory:STORe:TRACe:DATA
- :MMEMory:STORe:TRACe:REGister
- :MMEMory:STORe:ZMAP
- :MMEMory:TRACe:CLIent
- :MMEMory:TRACe:CLIent:STATe
- :MMEMory:TRACe:OPERator
- :MMEMory:TRACe:OPERator:STATe
- :MMEMory:TRACe:PDEscription
- :MMEMory:TRACe:PDEscription:STATe
- :MMEMory:TRACe:TITLe
- :MMEMory:TRACe:TITLe:STATe

SYSTem Subsystem

- :SYSTem:PON:TYPE
- :SYSTem:PRESet:SAVE
- :SYSTem:PRESet:TYPE
- :SYSTem:PRESet:USER
- :SYSTem:PRESet:USER:ALL
- :SYSTem:PRESet:USER:SAVE
- :SYSTem:PRINt:THEMe

10.2.2.6 Right-Click (Popup) Menu

When Option SF2 is installed, the following functionality is not available.

- In the main menu:
 - User Preset
- Under the **Utility** submenu:

- Quick Save
- Save
- Recall

10.3 Option SF3

Option SF3 is a license key-enabled special option that address the requirements of security-conscious users that require running X-Series Signal Analyzers in volatile memory. This option lets the instrument boot the Windows Operating System into volatile memory, which ensures that, after a power cycle, all information from the previous boot is lost.

Installing **Option SF3** makes the following changes to the instrument's operating environment:

- Modifies aspects of the Windows Operating System, specifically enabling the **"Windows Unified Write Filter" on page 68**
- Installs the **Keysight Secure RAM Boot Configuration** utility, to monitor and control the **Unified Write Filter**

For full details of Option SF3 and its operation, see: **Installation Note: Keysight X-Series Signal Analyzers Option SF3**.

10.3.1 Operating System Changes

Installing **Option SF3** enables the Windows **"Windows Unified Write Filter" on page 68**, which is a Windows feature that enables the Operating System to allocate System Memory (RAM) for a file system overlay.

This overlay is temporary, and any changes made to the system are discarded upon reboot, effectively "locking down" the system to a known state.

This feature can be enabled or disabled by rebooting, allowing the system to retain permanent changes such as firmware upgrades, Windows updates, and hardware alignments. When **Unified Write Filter** is enabled, memory is allocated for actions that interact with the system disk.

NOTE

Virtual Memory is also disabled, resulting in very limited memory resources for the Operating System and measurement software.

Appendix A: References

Some items below provide links to non-Keysight URLs. Please note that such links are subject to deletion or change without notice. In case of the failure of any such link, please contact the specified third party.

1. **Defense Counterintelligence and Security Agency Assessment and Authorization Process Manual**
Defense Counterintelligence and Security Agency. Version 2.2, 31 August 2020
May be downloaded in PDF format from:
<https://www.dcsa.mil/Portals/91/Documents/CTP/tools/DCSA%20Assessment%20and%20Authorization%20Process%20Manual%20Version%202.2.pdf>
2. **NIST SP 800-88, Revision 1, Guidelines for Media Sanitization**
National Institute of Standards and Technology. December 17, 2014
May be downloaded in PDF format from:
<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-88r1.pdf>
3. **Installation Note: Keysight X-Series Signal Analyzers Option SF2**
Keysight Technologies 2018. Part Number: N9020-90234
May be downloaded from:
<http://literature.cdn.keysight.com/litweb/pdf/N9020-90234.pdf>
4. **Installation Note: Keysight X-Series Signal Analyzers Option SF3**
Keysight Technologies 2024. Part Number: N9020-90309
May be downloaded from:
<http://www.keysight.com/us/en/assets/9924-01115/installation-guides/X-Series-Signal-Analyzers-Option-SF3-Security-Feature-Secure-RAM-Boot-Installation-Note.pdf>
5. **Windows Unified Write Filter**
Microsoft, 2023
See <https://learn.microsoft.com/en-us/windows/iot/iot-enterprise/customize/unified-write-filter>

