Impedance Analyzer

This manual provides the security information for the following instruments:

E4990A
E4991B

Revision

Edition 5, May 2023

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Contacting Keysight Sales and Service Offices

Assistance with test and measurement needs, and information on finding a local Keysight office, is available on the Internet at:

http://www.keysight.com/find/assist

If you do not have access to the Internet, please contact your field engineer.

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.

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Products Covered by this Document

Product Family Name	Product Names	Model Numbers
Impedance Analyzer	Impedance Analyzer	E4990A, E4991B

This document describes instrument security features and the steps to declassify an instrument through memory clearing, sanitization or removal.

For additional information, go to:

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

NOTE	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.

This document contains sample information to indicate the content and style of typical sections in a Security Document. The details may or may not apply to specific instruments, so check and edit all information as appropriate.

Security Terms and Definitions

Term	Definition
Clearing	Clearing is the process of eradicating the data on media before reusing the media so that the data can no longer be retrieved using the standard interfaces on the instrument. Clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection.
Instrument Declassification	A term that refers to procedures that must be undertaken before an instrument can be removed from a secure environment such as is the case when the instrument is returned for calibration. Declassification procedures will include memory sanitization and/or memory removal. Keysight declassification procedures are designed to meet the requirements specified by the DSS NISPOM security document (DoD 5220.22M Chapter 8)
Sanitization	Sanitization is the process of removing or eradicating stored data so that the data cannot be recovered using any known technology. 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. Keysight memory sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS). These requirements are outlined in the "Clearing and Sanitization Matrix" issued by the Cognizant Security Agency (CSA) and referenced in National Industrial Security Program Operating Manual (NISPOM) DoD 5220.22M ISL 01L-1 section 8-301.
Secure Erase	Secure Erase is a term that is used to refer to either the clearing or sanitization features of Keysight instruments.

Instrument Memory

This section contains information on the types of memory available in your instrument. It explains the size of memory, how it is used, its location, volatility, and the sanitization procedure.

Table 1: Summary of instrument memory

Memory Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/ Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
Main Memory	Yes	No	Windows Operating system memory	Operating system (not user defined)	CPU Module	Cycle Power
E4990A						
4GB[SN:SG/MY541xxxxx]						
4GB[SN:SG/MY542xxxxx]						
4GB[SN:SG/MY543xxxxx]						
8GB[SN:SG/MY543xxxxx]						
8GB[SN:SG/MY544xxxxx]						
E4991B						
4GB[SN:SG/MY541xxxxx]						
4GB[SN:SG/MY542xxxxx]						
4GB[SN:SG/MY543xxxxx]						
4GB[SN:SG/MY544xxxxx]						

Memory Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/ Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
Media Storage **E4990A** (Solid State Drive) 80 GB – [Revision Prefix: RY102-RY221] 150 GB – [Revision Prefix: RY221-RY223, RF302] 256 GB – [Revision Prefix: RF302] 256 GB – [Revision Prefix: RG401] **E4991B** (Solid State Drive) 80 GB – [Revision Prefix: KB103, KB115] 150 GB – [Revision Prefix: KB115-KB117, BF202] 256 GB – [Revision Prefix: BF202, BG306]	Yes	Yes	Windows Operating system boot device, factory correction data, and users file including saved traces data, settings, or images.	User-Saved Data Operating system (not user defined)	HDD/SSD assembly	Remove
Memory for DSP module (RAM)	Yes	Yes	Data Processing for measurement	Measurement (not user defined)	A51/A71/A81 DSP Module	Cycle Power

Memory Type and Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/ Contents	Data Input Method	Location in Instrument and Remarks	Sanitization Procedure
Non-volatile Memory (Flash)	No	Yes	Product Serial Number, Options System Calibration Data (not user defined calibration data)	Adjustment Program performed by Keysight factory personnel or by calibration labs	A51/A71/A81 DSP Module	N/A (The data is not stored by user under normal operation)
Non-volatile Memory (EEPROM)	No	Yes	Module serial number, Revision number	Calibration at factory	E4990A: A21 Source Module, A5 TRD Module, A7 LF Source Module, A8 VRD Module and A10 Analog Motherboard Module E4991B: A21 Source Module, A6 Receiver Module, A9 DC Bias Module, and A10 Analog Motherboard Module	N/A (The data is not stored by user under normal operation)

Notes

Summary of Memory Declassification Procedures

This section explains how to clear, sanitize, and remove memory from your instrument, for all classes of memory that are writeable during normal operation.

IMPORTANT   Before beginning clearing or sanitization, be sure to write down and save the instrument's Option and License Key information.

NOTE   Read this entire document before using any sanitization procedure. Failure to do so may necessitate returning the instrument to an Authorized Keysight Service Center for firmware downloads and recalibration.

Table 2: Main Memory

Description and purpose	Main Memory for Windows Operating system memory
Size	Windows 7: 4 GB, Windows 10: 4GB / 8GB
Memory clearing	Power rebooting. This is a volatile memory.
Memory sanitization	Power rebooting. This is a volatile memory.
Memory removal	This memory cannot be removed without damaging the instrument.
Write protecting	N/A
Memory validation	N/A
Remarks	

Table 3: Media Storage

Description and purpose	Media Storage (Hard Disk Drive/Solid State Drive)
Size	Windows 7/SSD: 80 GB/ 150 GB, Windows 10/SSD: 150GB/ 256GB. **E4990A** (Solid State Drive) 80 GB – [Revision Prefix: RY102-RY221] 150 GB – [Revision Prefix: RY221-RY223, RF302] 256 GB – [Revision Prefix: RF302] 256 GB – [Revision Prefix: RG401] **E4991B** (Solid State Drive) 80 GB – [Revision Prefix: KB103, KB115] 150 GB – [Revision Prefix: KB115-KB117, BF202] 256 GB – [Revision Prefix: BF202, BG306]
Memory clearing	N/A
Memory sanitization	N/A
Memory removal	The storage drive needs to be removed and replaced with a new or unused storage drive part per Replacement Procedure/Parts List. See E4990A/E4991B Replacement Procedure/Parts List for more detail information on the procedure as well as the replacement parts.
Write protecting	N/A
Memory validation	N/A
Remarks	

Table 4: Memory for DSP (RAM)

Description and purpose	Memory for DSP (RAM) for A51/A71/A81 DSP Module
Size	1.8 M bit
Memory clearing	Power rebooting. This is a volatile memory.
Memory sanitization	Power rebooting. This is a volatile memory.
Memory removal	This memory cannot be removed without damaging the instrument.
Write protecting	N/A
Memory validation	N/A
Remarks	

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Table 5: Non-volatile Memory (Flash)

Description and purpose	Non-volatile Memory (Flash) for A51/A71/A81 DSP Module. This memory is for product serial number and options. The system calibration data are also stored in the E4990A/E4991B. (Any user data is not stored in these memory)
Size	64 MB
Memory clearing	N/A
Memory sanitization	N/A
Memory removal	The A51/A71/A81 DSP module needs to be removed and replaced with a new or unused module as per the service manual.
Write protecting	N/A
Memory validation	N/A
Remarks	

Table 6: Non-volatile Memory (EEPROM)

Description and purpose	Non-volatile Memory (EEPROM) for A11/A21, A5, A6, A7, A8, A9 and A10 Modules. These memories are for board serial number, board revision number. (Any user data is not stored in these memories)
Size	256 M Bit
Memory clearing	N/A
Memory sanitization	N/A
Memory removal	E4990A (A11/A21, A5, A7, A8 and A10) and E4991B (A11/A21, A6, A9 and A10) modules need to be removed and replaced with a new or unused module as per the service manual.
Write protecting	N/A
Memory validation	N/A
Remarks	

Storage Removal (E4990A/E4991B)

Because it is virtually impossible to completely and selectively erase all user data on a hard drive without also destroying the operating system, the best method for maintaining security when the E4990A/E4991B must be removed from a secure area is to replace the storage with a "non-secure" hard drive, i.e. a drive that has never had any sensitive data placed on it. This allows the E4990A/E4991B to still function properly in non-secured areas or for use when servicing.
The E4990A and E4991B have a removable storage on the rear panel. Keysight has a pre-configured storage available for the E4990A/E4991B that must be purchased for this security method to work. A spare disk is available as below.

Product Model	Windows License (Look at the Windows label on the rear panel)	Keysight Part Number
E4990A	Windows Embedded Standard 7 (For MY541/SG541, MY542/SG542)	E4990-65001
	Windows 10 IoT Ver.1607 (For MY543/SG543)	E4990-65002
	Windows 10 IoT Ver.1809 (For MY544/SG544)	E4990-65003
E4991B	Windows Embedded Standard 7 (For MY541/SG541, MY542/SG542)	E4991-65002
	Windows 10 IoT Ver.1607 (For MY543/SG543)	E4991-65004
	Windows 10 IoT Ver.1809 (For MY544/SG544)	E4991-65005

Hard disk removal procedure:

Two main variants of removable storage with distinct differences according to the listed serial prefix. The serial prefix identification is no longer applicable to the instrument(s) with digital hardware/ OS upgrades applied. Refer to the physical appearance in identifying the storage removal procedure.
These steps should be followed to maintain security:

Storage Removal Procedure A

E4990A – Serial Prefix MY542 or SG542 and below
E4991B – Serial Prefix MY542 or SG542 and below

Storage Removal Procedure B

E4990A – Serial Prefix MY543 or SG543 and above
E4991B – Serial Prefix MY543 or SG543 and above

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Storage Removal Procedure A

1. Clearly mark the spare hard drive as "Unsecured!"
2. If there is the file named *.lic under E:\License directory, copy it into your USB memory. This file contains software option information.
3. Remove the two screws on the rear panel. Remove the case with the hard drive and put it on the top panel. (It is recommended to place a cushion on the top panel to put the hard drive.
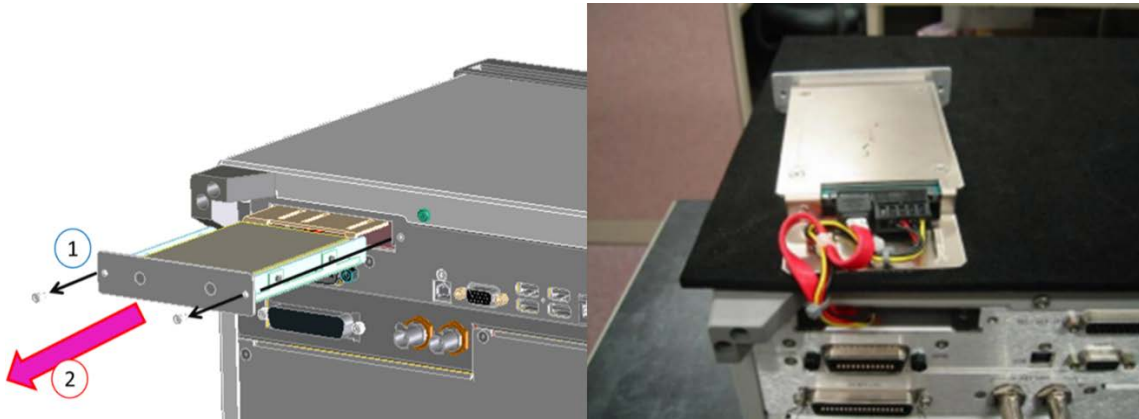
4. Disconnect both connectors from the HDD/SSD by pushing the latches, and then remove the four screws holding the hard drive to the case.

5. Replace the original "Secured" hard drive with the spare "Unsecured" hard drive.
6. Connect an external keyboard and mouse to the connectors on the E4990A/E4991B. Turn on

the E4990A/E4991B.

7. Press [Macro Setup] and a dialog box will appear.

8. Select **Edit...** on the right panel of the dialog box. After that, key-in the Macro Title: **RestoreSysCorFile**. (Title can be changed to other)

9. Select **Browse...** and open the following directory E4990A (**D:\Agilent\Service**) and E4991B (**D:\Instrument\Service**) folder to load the following file **RestoreSysCorFile.vbs**. Press **Open** once the file is selected. (Note: Make sure the file type is changed to .vbs or All Files)

10. Press [Macro Menu]. Click on the **RestoreSysCorFile**. (or the new title that has been changed).

11. The **RestoreSysCorFile** dialog box will appear. Click **OK**.

12. Place the **gen.lic** files into the **E:\License** directory. Manually create the License directory if the directory does not exist.

The E4990A/E4991B can now be used elsewhere or sent for servicing without fear of leaking any sensitive information.

Storage Removal Procedure B

1. Loosen the 4 screws and remove the cover.
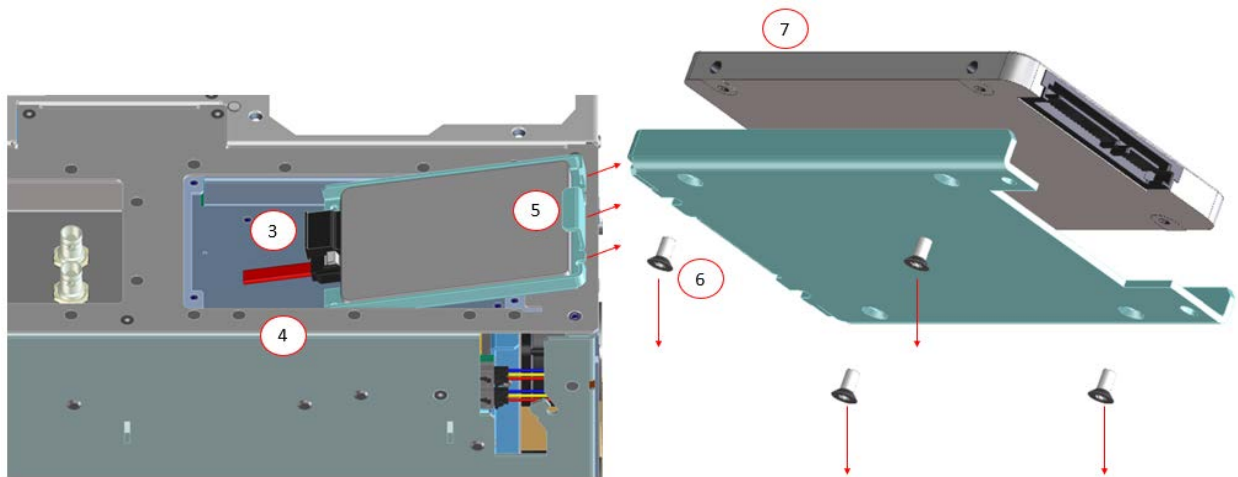2. Loosen the 4 screws that hold bracket of the HDD/SSD. (Keep the screws for reassembly)
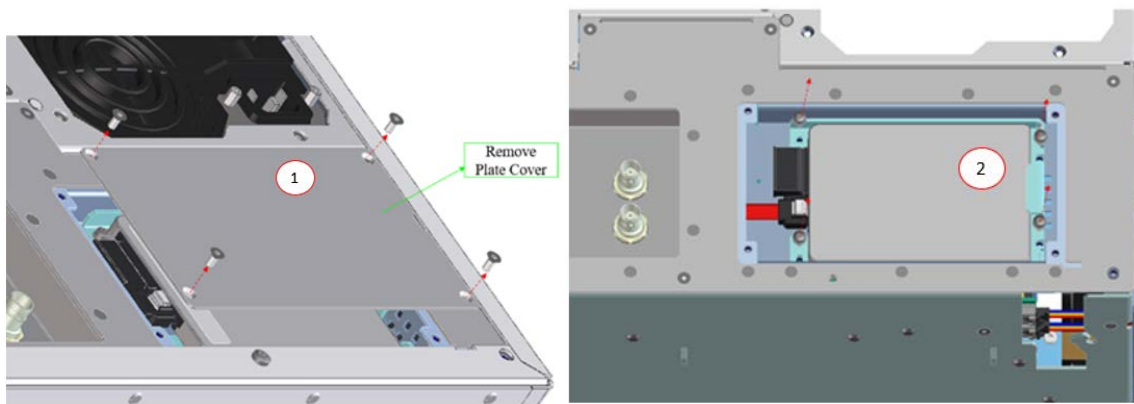
3. Disconnect the cable
4. Push the latch and disconnect the red cable
5. Remove the HDD/SSD from the instrument
6. Loosen the 4 screws (Keep the screws for re-assembly)
7. Replace the original "Secured" hard drive with the spare "Unsecured" hard drive.

8. Connect an external keyboard and mouse to the connectors on the E4990A/E4991B. Turn on the E4990A/E4991B.

9. Press [Macro Setup] and a dialog box will appear.

10. Select **Edit...** on the right panel of the dialog box. After that, key-in the Macro Title: **RestoreSysCorFile**. (Title can be changed to other)

11. Select **Browse...** and open the following directory E4990A (**D:\Agilent\Service**) and E4991B (**D:\Instrument\Service**) folder to load the following file **RestoreSysCorFile.vbs**. Press **Open** once the file is selected. (Note: Make sure the file type is changed to .vbs or All Files)

12. Press [Macro Menu]. Click on the **RestoreSysCorFile**. (or the new title that has been changed).

13. The **RestoreSysCorFile** dialog box will appear. Click **OK**.

14. Place the **gen.lic** files into the **E:\License** directory. Manually create the License directory if the directory does not exist.

The E4990A/E4991B can now be used elsewhere or sent for servicing without fear of leaking any sensitive information.

Storage disk re-installation procedure:

Once the E4990A/E4991B is returned to the secured area, follow the steps listed below. Any servicing of the E4990A/E4991B may include the regeneration of correction constants.

1. Remove the spare "Unsecured" hard drive and replace with the original "Secured" hard drive.
2. Connect the external keyboard and mouse to the connectors on the E4990A/E4991B. Turn on the E4990A/E4991B.
3. Press [Macro Setup] and a dialog box will appear.
4. Select **Edit...** on the right panel of the dialog box. After that, key-in the Macro Title: **RestoreSysCorFile**. (Title can be changed to other)
5. Select **Browse...** and open the following directory for E4990A (**D:\Agilent\Service**) and E4991B (**D:\Instrument\Service**) folder to load the following file **RestoreSysCorFile.vbs.** Press **Open** once the file is selected. (Note: Make sure the file type is changed to .vbs or All Files)
6. Press [Macro Menu]. Click on the **RestoreSysCorFile**. (or the new title that has been changed).
7. The **RestoreSysCorFile** dialog box will appear. Click **OK**.
8. Place the **gen.lic** files into the **E:\License** directory. Manually create the License directory if the directory does not exist.

Note: If your secured hard disk does not contain the "RestoreSysCorFile.vbs" program, copy the program from the unsecured hard disk.

User and Remote Interface Security Measures

Screen and Annotation Blanking

The frequency-blanking feature is available. This function provides three security levels:
"OF" during normal operation;
"Low" deletes frequency information from the display but can be turned "OFF" by front panel operation;
and
"High" deletes frequency information from the display and cannot be turned "OFF" except rebooting.
The operator can perform the following keystrokes to control this frequency-blanking feature, [System] > Service Menu > Security Level > None | Low | High,

or set the levels by the following SCPI command:

:SYSTem:SECurity:LEVel {NONE|LOW|HIGH}

Note:
Any SCPI/COM commands that read the frequency data are not influenced by this function. All commands can read frequency data regardless of the security level.

USB Mass Storage Device Security

Refer to the following site:
E4990A:
http://ena.support.keysight.com/e4990a/manuals/webhelp/eng/index.htm#using_windows/enablingdisabling_usb_storage.htm

E4991B:
http://ena.support.keysight.com/e4991b/manuals/webhelp/eng/using_windows/enablingdisabling_usb_storage.htm

Remote Access Interfaces

The user is 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 all user settings, user states and the display image.

The I/O ports include USB, GPIB and LAN.

The LAN port provides the following services, which can be selectively disabled:

a) http

b) ftp

c) sockets

d) telnet

There is also a 'ping' service, which presently cannot be selectively disabled. The concern might be that it is possible to discover IP addresses of connected instruments to query their setups over the net or break into the code.

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