

R&S® RTO1000

Digital Oscilloscope

Instrument Security Procedures



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1 Overview

In many cases, it is imperative that the R&S RTO Digital Oscilloscopes are used in a secured environment. Generally these highly secured environments do not allow any test equipment to leave the area unless it can be proven that no user information leaves with the test equipment. Security concerns can arise when devices need to leave a secured area e.g. to be calibrated or serviced.

This document describes the types of memory and their usage in the R&S RTO. It provides a statement regarding the volatility of all memory types and specifies the steps required to declassify an instrument through memory clearing or sanitization procedures. These sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS).

2 Instrument Models Covered

Table 2-1: Digital Oscilloscope models

Product name	Order number
R&S RTO1002	1316.1000.02
R&S RTO1004	1316.1000.04
R&S RTO1012	1316.1000.12
R&S RTO1014	1316.1000.14
R&S RTO1022	1316.1000.22
R&S RTO1024	1316.1000.24
R&S RTO1044	1316.1000.44

3 Security Terms and Definitions

Clearing

The term "clearing" is defined in Section 8-301a of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)". Clearing is the process of eradicating the data on media so that the data can no longer be retrieved using the standard interfaces on the instrument. Therefore, clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection.

Sanitization

The term "sanitization" is defined in Section 8-301b of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)". 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 for service of calibration.

The memory sanitization procedures described in this document are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS). These requirements are specified in the "Clearing and Sanitization Matrix" in Section 14.1.16 of the ISFO "Manual for the Certification and Accreditation of Classified Systems under the NISPOM".

Instrument declassification

The term "instrument declassification" refers to procedures that must be undertaken before an instrument can be removed from a secure environment, for example when the instrument is returned for calibration. Declassification procedures include memory sanitization or memory removal, or both. The declassification procedures described in this document are designed to meet the requirements specified in DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", Chapter 8.

4 Types of Memory and Information Storage in the R&S RTO

The Digital Oscilloscope contains various memory components.

The following table provides an overview of the memory components that are part of your instrument. For a detailed description regarding type, size, usage and location, refer to the subsequent sections.

Memory type	Size	Content	Volatility	User Data	Sanitization procedure
SDRAM/DDR3 (CPU board)	2 Gbyte or 8 Gbyte	Temporary information storage for operating system and instrument firmware	Volatile	Yes	Turn off instrument power
SDRAM/DDR2 (main board)	Two-channel models R&S RTO10x2: 1024 Mbyte	<ul style="list-style-type: none"> Waveform data Measurement data 	Volatile	Yes	Turn off instrument power
	Four-channel models R&S RTO10x4: 1920 Mbyte				
EEPROM (board assembly)	32 kbyte up to 1 Mbyte	Hardware information: <ul style="list-style-type: none"> Serial number Product options Calibration correction data 	Non-volatile	No	None required (no user data)
Flash (CPU board)	8 Mbyte	BIOS	Non-volatile	No	None required (no user data)
Hard Disk Drive (HDD) (removable) or Solid-State Drive (SSD) (removable)	80 Gbyte / 160 Gbyte / 500 Gbyte 256 Gbyte	<ul style="list-style-type: none"> Operating system Instrument firmware Instrument states and setups Limit lines, limit masks Waveform data Measurement results and screen images 	Non-volatile	Yes	Remove HDD from instrument or Remove SSD from instrument
EEPROM (R&S RTO-B1)	Option R&S RTO-B1: 128 Mbit	<ul style="list-style-type: none"> Component information FPGA configuration 	Non-volatile	No	None required (no user data)
RAM/DDR3 (R&S RTO-B1)	2 Gbit	<ul style="list-style-type: none"> Waveform data 	Volatile	Yes	Turn off instrument power

4.1 Volatile Memory

The volatile memory in the instrument loses its contents as soon as power is removed from the instrument. The volatile memory is not a security concern.

Removing power from this memory meets the memory sanitization requirements specified in the "Clearing and Sanitization Matrix" in Section 5.2.5.5.5 of the ISFO Process Manual for the Certification and Accreditation of Classified Systems under the NIS-POM.

SDRAM/DDR3

The SDRAM/DDR3 on the CPU board has a size of 2 Gbyte or 8 Gbyte and contains temporary information storage for operating system and instrument firmware. The SDRAM/DDR3 loses its memory as soon as power is removed.

Sanitization procedure: Turn off instrument power

SDRAM/DDR2

The size of the SDRAM/DDR2 on the main board depends on the R&S RTO model:

- **Two-channel models R&S RTO10x2:**
1024 Mbyte
- **Four-channel models R&S RTO10x4:**
1920 Mbyte

The SDRAM/DDR2 contains waveform and measurement data. It loses its memory as soon as power is removed.

Sanitization procedure: Turn off instrument power

RAM/DDR3 (option R&S RTO-B1)

The MSO option R&S RTO-B1 has one 2 Gbit DDR3 RAM. The DDR3 RAM contains waveform data. It loses its memory as soon as power is removed.

Sanitization procedure: Turn off instrument power

4.2 Non-Volatile Memory

The R&S RTO contains various non-volatile memories. Out of these, only the removable Hard Disk Drive/Solid-State Drive (HDD/SSD) contains user data. The HDD/SSD can be physically removed from the R&S RTO and left in the secure area.

All non-volatile memories of the R&S RTO are not a security concern.

EEPROM

Each board assembly in the R&S RTO Digital Oscilloscope has one EEPROM device with a size of 32 kbyte up to 1 Mbyte. The EEPROM contains information related to the installed hardware, such as board serial number, product options and calibration correction data. The EEPROM does not hold user data nor can the user access the EEPROM storage.

Sanitization procedure: None required (no user data)

Flash

The CPU board of the R&S RTO Digital Oscilloscope has one 8 Mbyte flash memory device. It contains the BIOS. The flash memory does not hold user data nor can the user access the flash memory.

Sanitization procedure: None required (no user data)

Hard Disk Drive (HDD)/Solid-State Drive (SSD)

The removable HDD/SSD is located on the rear of the R&S RTO.

The size of the memory depends on the memory type:

- **HDD:**
80 Gbyte / 160 Gbyte / 500 Gbyte
- **SSD:**
256 Gbyte

The HDD/SSD is used to store:

- Operating system
- Instrument firmware and firmware options (measurement personalities) with option license keys
- Instrument states and setups
- Limit lines, limit masks
- Waveform data
- Measurement results and screen images

The HDD/SSD holds user data and is non-volatile. Hence, user data is not erased when power is removed from the instrument.

The removable HDD/SSD can be removed from the Digital Oscilloscope to make sure that no user data is stored within the Digital Oscilloscope. This can be done without opening the instrument.

The R&S RTO, equipped with the removable HDD/SSD, addresses the needs of customers working in highly sensitive areas.

Sanitization procedure: Remove HDD or SSD from instrument

EEPROM (option R&S RTO-B1)

The MSO option R&S RTO-B1 has one 128 Mbit EEPROM. The EEPROM contains information related to the installed hardware, such as component information and FPGA configuration. The EEPROM does not hold user data nor can the user access the EEPROM storage.

Sanitization procedure: None required (no user data)

5 Instrument Declassification

Before you can remove the Digital Oscilloscope from a secured area (for example to perform service or calibration), all classified user data needs to be removed. You can declassify the Digital Oscilloscope as follows:

1. Turn off the Digital Oscilloscope and disconnect the power plug. This will sanitize the volatile memory.
2. To remove the HDD/SSD (containing user data), perform the following steps:

- a) Locate the HDD/SSD.



Figure 5-1: Location of the R&S RTO HDD/SSD

- b) Unscrew the two knurled screws.
c) Remove the HDD/SSD at the rear of the instrument.

Following these steps removes all user data from the Digital Oscilloscope. The Digital Oscilloscope can now leave the secured area.

These declassification procedures meet the needs of customers working in secured areas.

Once the R&S RTO is outside the secured area, installing a second non-classified removable HDD/SSD (without any user data) allows the Digital Oscilloscope to function properly for service or other needs.

Prior to re-entering the secured area, the non-classified removable HDD/SSD (without the user data) is removed. When the R&S RTO is back within the secured area, the original classified removable HDD/SSD can be reinstalled.

- To hold classified user data in secure areas, use the removable HDD/SSD comes with the instrument.
- To hold non-classified user data in non-secure areas, use a second HDD/SSD (R&S RTO-B18/B19).

Validity of instrument calibration after declassification

The calibration makes sure that measurements comply to government standards. Rohde & Schwarz recommends that you follow the calibration cycle suggested for your instrument.

The EEPROM is the only memory type used to hold permanent adjustment values required to maintain the validity of the R&S RTO's calibration. Therefore, replacing one removable HDD/SSD with another, does not affect the validity of the instrument's calibration.

After exchanging the removable HDD/SSD, perform a self-alignment once:



Note that the instrument has sufficient warm-up time before you perform the self-alignment.

1. From the "File" menu, select "Self Alignment".
2. Tap "Start Alignment".

Using the permanent and temporary values, the necessary adjustment information is then stored in the R&S RTO. Rohde & Schwarz recommends that you perform the self-alignment function once a week.

6 Special Considerations for USB Ports

USB ports can pose a security risk in high-security locations. Generally, this risk comes from small USB pen drives, also known as memory sticks or key drives. They can be easily concealed and can quickly read/write several Gbyte of data.

Disabling USB ports for writing user data

You can disable the write capability on the USB ports of the R&S RTO R&S RTO via a utility software. This utility software is available on the R&S RTO website <http://www.rohde-schwarz.com/product/rto1000.html>.

To disable the write capability, copy the utility software to the R&S RTO and run it once. After a reboot of the instrument, the write capability on any USB memory device is disabled.

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