

# R&S®RSC

## Step Attenuator

# Instrument Security Procedures



1176.7949.02 – 02



**ROHDE & SCHWARZ**

Instrument Security Procedures

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## 1 Overview

In many cases, it is imperative that the R&S RSC Step Attenuators 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 RSC. 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: Step Attenuator models*

Product name	Order number
R&S RSC model 02	1313.8004.02
R&S RSC model 03	1313.9000.03
R&S RSC model 04	1313.9000.04
R&S RSC model 05	1313.9000.05
R&S RSC model 13	1313.9000.13
R&S RSC model 14	1313.9000.14
R&S RSC model 15	1313.9000.15

Product name	Order number
R&S RSC-Z405 (external Step Attenuator)	1313.9952.02
R&S RSC-Z675 (external Step Attenuator)	1314.0065.02

## 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 RSC

The Step Attenuator 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 (CPU board)	256 Mbyte	Temporary information storage for operating system and instrument firmware	Volatile	Yes	Turn off instrument power
EEPROM (RF module, processor module)	4 x 4 kbyte up to 1 Mbyte	<ul style="list-style-type: none"> <li>• Module-specific data: <ul style="list-style-type: none"> <li>– Serial number</li> <li>– Revision</li> <li>– Options</li> </ul> </li> <li>• Calibration correction data</li> <li>• Initial CPU configuration data</li> </ul>	Non-volatile	No	None required (no user data)
Flash (processor board)	256 Mbyte	<ul style="list-style-type: none"> <li>• Operating system</li> <li>• Instrument firmware</li> <li>• Boot code</li> <li>• Maintenance and recovery system</li> <li>• User data, instrument settings</li> </ul>	Non-volatile	Yes	"NISPOM Secure" procedure (see "Flash" on page 5)

The external Step Attenuator R&S RSC-Z405 and R&S RSC-Z675 have only EEPROM memory. Therefore, no user data is stored on these devices and no sanitization procedure is required.

## 4.1 Volatile Memory

The volatile memory in the instrument does not have battery backup. It 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 NISPOM.

### SDRAM

The SDRAM on the CPU board has a size of 256 Mbyte and contains temporary information storage for operating system and instrument firmware. The SDRAM loses its memory as soon as power is removed.

**Sanitization procedure:** Turn off instrument power

## 4.2 Non-Volatile Memory

The R&S RSC contains various non-volatile memories. Out of these, only the internal flash memory contains user data as well as instrument configuration in its Journaling Flash File System (JFFS) area. The Flash memory can be sanitized via "NISPOM Secure" procedure.

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

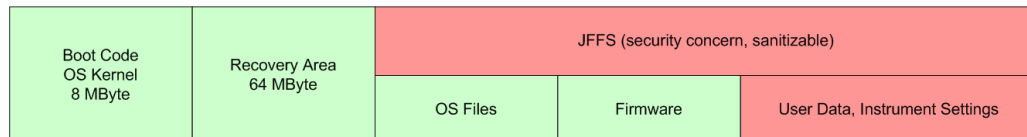
### EEPROM

The RF module as well as the processor module of the R&S RSC Step Attenuator are equipped with in total four serial EEPROM devices with a size of 4 kbyte up to 1 Mbyte. The EEPROMs contain module-specific data, calibration correction data and initial processor configuration data. In addition, the current setting of the "Standby" button is saved here in order to restart the instrument properly in case of power loss. The EEPROM does not hold user data nor can the user access the EEPROM storage.

**Sanitization procedure:** None required (no user data)

### Flash

The single-chip flash memory, located on the processor board, has a size of 256 Mbyte of storage. The flash contains boot code, maintenance and recovery system, the operating system and instrument firmware. Furthermore user data and instrument settings are stored here.



**Figure 4-1: Logical sections of the flash memory**

The flash memory is logically divided into three sections:

- Boot code/OS kernel:**  
 The 8 Mbyte memory section contains the boot code and the operating system kernel. This area is initialized during production and can be updated in case of firmware update. It cannot be accessed by the user and is not modified during instrument operation.
- Recovery area:**  
 The 64 Mbyte memory section contains recovery data which is used to restore the factory instrument configuration if required. This area is initialized during production. It cannot be accessed by the user and is not modified during instrument operation.
- Journaling Flash File System (JFFS):**  
 The remaining memory section is controlled by a Journaling Flash File System (JFFS). This area is shared between operating system files, instrument firmware and user data. Operating system files and instrument firmware are encapsulated in preconfigured, read-only squash FS file systems. Both cannot be modified during

instrument operation nor can they be modified in parts. During firmware update, they are replaced in total.

In the remaining JFFS area the following information is stored:

- User data and instrument settings (automatically or manually saved instrument setups)
- Internal adjustment data

The R&S RSC provides a sanitizing procedure that ensures that user data is irretrievably removed from the instrument.

**Sanitization procedure:** "NISPOM Secure" procedure

To sanitize the internal flash memory, select "NISPOM Secure" in the "System" menu.

After activating the sanitizing procedure, the following steps occur:

- The file `rootfs.squashfs` (read-only, encapsulating operating system files) and the file `optfs` (read-only, encapsulating instrument firmware) are temporarily saved in SDRAM.
- A full sector erase command as per manufacturer data sheet is applied to each sector of the JFFS area. This explicitly includes sectors which might be declared as defect.
- Every addressable location of the JFFS area is overwritten by a single character.
- Again, a full sector erase command as per manufacturer data sheet is applied to each sector of the JFFS area, including defect sectors.
- The JFFS is recreated and operating system files as well as instrument firmware are restored.

The "NISPOM Secure" procedure meets the memory sanitization requirements 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.

## 5 Instrument Declassification

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

1. To sanitize the internal flash memory, perform the "NISPOM Secure" procedure:
  - a) Select SETUP and then "System".
  - b) Select "NISPOM Secure".
  - c) Accept the following dialog by pressing ENTER.
2. Turn off the Step Attenuator. This will sanitize the volatile memory.

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

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

### **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 RSC's calibration. Therefore, performing the declassification procedure does not affect the validity of the instrument's calibration.

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