R&S®FPH
Spectrum Analyzer
Instrument Security Procedures

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Contents

1 Overview

In many cases, it is imperative that the R&S FPH Spectrum Analyzers 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 FPH. 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: Spectrum Analyzer models

Product name	Order number
R&S FPH	1321.1111.02
R&S FPH	1321.1111.06
R&S FPH	1321.1111.13
R&S FPH	1321.1111.26
R&S FPH	1321.1111.52, equivalent to 1321.111.02
R&S FPH	1321.1111.56, equivalent to 1321.111.06
R&S FPH	1321.1111.63, equivalent to 1321.111.13
R&S FPH	1321.1111.76, equivalent to 1321.111.26

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 FPH

The R&S FPH Spectrum Analyzer 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	512 Mbyte	Temporary information storage for operating system and instrument firmware	Volatile	Yes	Turn off instrument power
Flash (µC internal)	32 kbyte	Power-up / Power-down firmware	Non-volatile	No	None required
SRAM (µC internal)	4 kbyte	Temporary information storage for Power-up / Power-down firmware	Volatile	No	Turn off instrument power
Flash	128 Mbyte	• Operating System • Instrument firmware • Boot code • Calibration correction data, product options and serial number • User data and instrument settings	Non-volatile	Yes	"Sanitize internal memory" procedure (see "Flash" on page 5)

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 512 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.

SRAM (µC)

The SRAM of the µController has a size of 4 kbyte and contains temporary information storage for Power-up / Power-down firmware. The SRAM loses its memory as soon as power is removed.

Sanitization procedure: Turn off instrument power

4.2 Non-Volatile Memory

The R&S FPH contains various non-volatile memories. Out of these, only the internal Flash memory contains user data as well as instrument configuration. The Flash memory can be sanitized via "Sanitize internal memory" procedure.

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

Flash (µC)

The µController internal flash memory has a size of 32 kbyte and contains the µController firmware for the Power-up / Power-down sequence. The flash does not hold user data nor can the user access the flash storage.

Sanitization procedure: None required (no user data)

Flash

The flash memory has a size of 128 Mbyte of storage. It contains the boot code, operating system and instrument firmware, calibration correction data of product options and serial number. Furthermore user data and instrument settings are stored here.

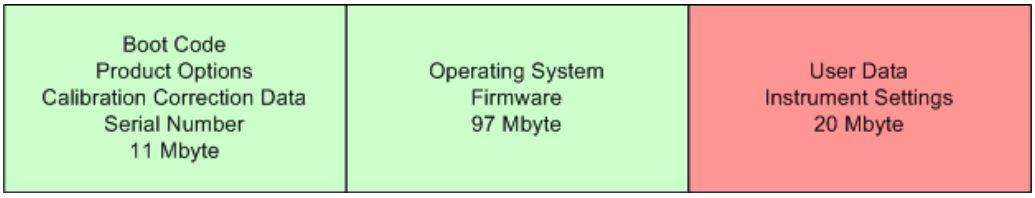

Figure 4-1: Logical sections of the Flash memory

The Flash memory is logically divided into three sections:

- **Boot Code / Product Options / Calibration Correction Data / Serial Number:**
  The 11 Mbyte memory section contains the boot code, the product options, the factory calibration correction data and the instrument serial number. This section is initialized during production and can be updated in case of firmware update and option installation. It cannot be accessed by the user and is not modified during instrument operation.
- **Operating System / Firmware:**
  The 97 Mbyte memory section contains the operating system and the instrument firmware. This section 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.
- **User Data / Instrument Settings:**
  The 20 Mbyte memory section contains the user data and automatically or manually saved instrument settings.

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

Sanitization procedure: "Sanitize internal memory" procedure

The sanitizing procedure is part of the instruments maintenance system which can be accessed by pressing the front panel buttons [PRESET] and softkey [5] during power-on.

After activating the sanitizing procedure, the following steps occur:

- A full sector erase command as per manufacturer data sheet is applied to each sector of the instrument settings and user data section. This explicitly includes sectors which might be declared as defect.
- Every addressable location of the instrument settings and user data section is overwritten by a single character.
- Again, a full sector erase command as per manufacturer data sheet is applied to each sector of the instrument settings and user data section, including defect sectors.

The "Sanitize internal memory" 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

Firmware greater or equal 1.60 is required for the instrument declassification.

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

1. Turn off the R&S FPH. This will sanitize the volatile memory.
2. To sanitize the internal Flash memory, perform the following steps:
   a) Make sure, that no USB mass memory device is connected.
   b) Press the front panel buttons [PRESET] and softkey [5] and hold them while switching on the instrument again.

   After a few seconds, the sanitizing procedure starts.

   Sanitizing is indicated by the message "Secure Formatting Flash, please wait!" on the instrument's screen. The sanitizing procedure takes approximately 8 minutes.

Afterwards, the instrument reboots. Since permanent adjustment values are not located in instrument settings and user data section of the flash, the validity of the R&S FPH Spectrum Analyzer’s calibration is maintained throughout the sanitization.

Following these steps removes all user data from the R&S FPH Spectrum Analyzer. The instrument 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 flash is the only memory type used to hold permanent adjustment values required to maintain the validity of the R&S FPH's calibration.

Since only the flash instrument settings and user data section is erased during sanitization, performing the declassification procedure does not affect the validity of the instrument's calibration.

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