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Declassification and Security Instructions

Introduction

If you have data security concerns, this document tells you how to clear or sanitize instrument memory devices in the Model 2601B-PULSE System SourceMeter® Instrument. It also explains how to declassify an instrument that is not functioning.

The procedures in this document are written to meet the requirements specified in:

- NISPOM, DoD 5220.22-M, chapter 8
- ISFO Process Manual for Certification and Accreditation of Classified Systems under NISPOM

Contact information

If you have any questions after you review the information in this documentation, please contact your local Keithley Instruments office, sales partner, or distributor. You can also call the Tektronix corporate headquarters (toll-free inside the U.S. and Canada only) at 1-800-833-9200. For worldwide contact numbers, visit tek.com/contact-us.

Terminology

The following terms may be used in this document:

- **Clear:** Removes data on media or in memory before reusing it in a secured area. Clears all reusable memory to deny access to previously unsecured information.
- **Demo setups:** Demonstration applications that come loaded on the instrument; you cannot modify them.
- **Direct method of modification:** You can modify data directly.
- **Erase:** Equivalent to clear (see above).
- **Indirect method of modification:** The instrument system resources modify the data; you cannot modify it.
- **Instrument declassification:** Procedures that must be completed before an instrument can be removed from a secure environment. Declassification procedures include memory sanitization and memory removal.
- **Media storage and data export device:** Devices that can be used to store or export data from the instrument, such as a USB port.
- **Nonvolatile memory:** Data is retained when the instrument power is turned off.
- **Protected user data area:** Contains data that is protected by a password.
- **Remove:** Clears instrument data by physically removing the memory device from the instrument.



- **Sanitize:** Eradicates instrument data from media and memory so it cannot be recovered by other means or technology. This is typically used when the device will be moved (temporarily or permanently) from a secured area to a nonsecured area.
- **Scrub:** Directly retrieve and clear the contents of the memory device.
- **User accessible:** You can directly retrieve the contents of the memory device.
- **User data:** Measurement data that represents signals that you connect to the instrument.
- **User modifiable:** You can write to the memory device during normal instrument operation using the front-panel interface or remote control.
- **User settings:** Instrument settings that you can change.
- **Volatile memory:** Temporary memory; data is lost when the instrument is turned off.

Description of memory

The 2601B-PULSE contains memory devices to hold firmware code that is executed by internal microprocessors to operate the product and memory to save setup information and data. The 2601B-PULSE stores data in volatile and nonvolatile memory in the following devices:

- **Microprocessors:** Contain some RAM for internal use. All information is lost when the instrument is powered down.
- **Flash:** A 32-megabyte flash device responsible for storing critical nonvolatile information, including:
 - The firmware image
 - The digital-side and analog-side FPGA images
 - Factory scripts
 - Dedicated reading buffers
 - An internal file system, which stores system settings, user setups, user strings, and user scripts

SDRAM: A total of 64 megabytes that holds data and instructions for firmware execution.

EEPROM: Two 128-kilobit devices that store calibration constants for the SMU and pulser and manufacturing strings (for example, the analog board serial number).

Memory devices

The following tables list the volatile and nonvolatile memory devices in the standard instrument and listed options.

Volatile memory devices

The following table lists the volatile memory devices in the 2601B-PULSE instrument and relevant memory-related information.

| Type and minimum size | Function | User modifiable | Data input method | Location | To clear | To sanitize |
|------------------------------------|--|-----------------|-------------------|-----------------------------------|---------------------------|---------------------------|
| SRAM 32 kB | Temporary memory used by the microprocessor controller for internal processor operations | Yes | Indirect | U1 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| SRAM 32 kB | Instruction cache for the microprocessor controller | No | None | U1 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| SRAM 32 kB | Data cache for the microprocessor controller | Yes | Indirect | U1 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| DDR SDRAM 32 MB | Temporary memory used by the microprocessor controller for internal processor operations | Yes | Indirect | U6 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| DDR SDRAM 32 MB | Temporary memory used by the microprocessor controller for internal processor operations | Yes | Indirect | U7 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| SRAM 4 kB | Temporary memory used by the display controller for internal processor operations | Yes | Indirect | U2 on the 2602-112 display board | Turn instrument power off | Turn instrument power off |
| FPGA SRAM 432 kB CLB 1920 (120 kB) | Digital control and communication with other TSP-Link enabled instruments | Yes | Indirect | U29 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |
| FPGA SRAM 288 kB CLB 896 (56 kB) | Digital control | No | None | U9 on the 2602a-102 analog board | Turn instrument power off | Turn instrument power off |
| FPGA SRAM 288 kB CLB 896 (56 kB) | Digital control | No | None | U9 on the 389552700 analog board | Turn instrument power off | Turn instrument power off |
| SRAM 32 B | Temporary memory used to transfer data over the GPIB interface | Yes | Indirect | U35 on the 2636-142 digital board | Turn instrument power off | Turn instrument power off |

Nonvolatile memory devices

The following table lists nonvolatile memory devices and relevant memory-related information. If the table indicates that a device can be cleared by the user, see the detailed instructions in [Clearing data](#) (on page 5).

| Type and minimum size | Function | User modifiable | Data input method | Location | To clear | To sanitize |
|-----------------------|--|-----------------|---------------------|-----------------------------------|-------------------------------------|-------------|
| FLASH 32 MB | Instrument firmware, user script storage, user string storage, user settings storage, reading buffer storage | Yes | Direct and indirect | U14 on the 2636-142 digital board | Follow the Clearing Data procedures | Remove chip |
| FLASH 64 kB | Display control firmware | No | None | U2 on the 2602-112 display board | N/A | N/A |
| EEPROM 1 kB | Not used | No | None | U2 on the 2602-112 display board | N/A | N/A |
| EEPROM 16 kB | Calibration constants and manufacturing information | Yes | Indirect | U12 on the 2602a-102 analog board | N/A | Remove chip |
| EEPROM 16 kB | Calibration constants and manufacturing information | Yes | Indirect | U12 on the 389552700 analog board | N/A | Remove chip |

Data export devices

The following table lists 2601B-PULSE data export devices. Procedures to disable these devices, if any, are included.

| Type and minimum size | Function | Method of modification | Data input method | Location | To disable |
|-----------------------|---|------------------------|---------------------------|--|--|
| USB host port | User storage of results and instrument setup | Direct | User writeable | USB host port on the front of the instrument | The USB host port cannot be disabled |
| USB device port | Supports remote control and data transfer to a computer | Direct | Remote control via USBTMC | Rear panel of the instrument | The USB device port cannot be disabled |
| LAN ethernet port | Supports remote control and data transfer to a computer | Direct | Remote control | Rear panel of the instrument | The LAN ethernet controller cannot be disabled |
| GPIB port | Supports remote control and data transfer to a computer | Direct | Remote control | Rear panel of the instrument | The GPIB port cannot be disabled |

Clearing data

The clearing procedures do not remove all traces of data from the instrument. The clearing procedures do make it impossible to retrieve the information using published commands. However, a person with intimate knowledge of the internal operation of the 2601B-PULSE and knowledge of unpublished commands could retrieve fragments of previously stored information using the standard command interface.

All volatile memories

After clearing nonvolatile memories, power down the instrument for ten minutes.

Flash memory

To clear USER setups from the instrument using the virtual front panel:

1. Press **MENU**.
2. Select **SAVE-SETUP**. Press **ENTER**.
3. Select **RECALL**, press **ENTER**.
4. Select **FACTORY**, press **ENTER**.
5. Press **EXIT**.
6. Press **MENU**.
7. Select **SAVE-SETUP**. Press **ENTER**.
8. Select **SAVE**. Press **ENTER**.
9. Select **USER-1**. Press **ENTER**.

Repeat steps 6 to 9 for the each of the five USER setups.

To clear USER setups using a remote interface, send the following command:

```
script.delete("scriptName")
```

Where *scriptName* is the name of the script to be deleted. You need to do this for each saved setup.

To clear the buffers:

1. Make sure all inputs are open.
2. On the front panel, select **CONFIG**, then **STORE**.
3. Select **CHANA-BUFF**.
4. Select **BUFFER1**.
5. Select **CLEAR**.
6. Select **YES**.
7. Select **BUFFER2**.
8. Select **CLEAR**.
9. Select **YES**.

To clear buffers using a remote interface:

```
smua.nvbuffer1.clear()  
smua.nvbuffer2.clear()
```

To clear userstrings:

1. Remove userstrings by sending:

```
for name in userstring.catalog() do userstring.delete(name) end
```

2. Delete each userstring by sending `userstring.delete(name)`.

EEPROM

Two EEPROMs store calibration and manufacturing data. This data is only indirectly changed by calibrating the instrument. The EEPROMs do not need to be cleared unless the instrument was calibrated in an unusual way.

To delete all calibration constants:

1. Send the following commands:

```
smua.cal.unlock("KI0026XX")  
smua.cal.nominals()  
smua.cal.save(0)  
smua.cal.save(1)  
smua.cal.save(2)  
smua.cal.save(3)  
smua.cal.lock()
```

2. Recalibrate the instrument.

Reset the LAN

Resetting the local area network (LAN) resets the LAN settings and the instrument password to the system default values.

To reset the LAN, send the command:

```
lan.reset()
```

Sanitize instrument data

The only way to sanitize data from an instrument is to physically remove the nonvolatile memory devices listed in the tables above.

Sanitize a nonfunctional instrument

To sanitize a nonfunctional instrument, remove the digital boards and return the instrument to Keithley Instruments for installation of replacement boards.