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Clearing Data in Non-Volatile Memory in the Keithley Model 2600 and 2600A products

The Keithley Model 2600 and 2600A family of products (referred to as “26xx” in this paper) 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 following sections describe how the data stored in the memory devices may be cleared or destroyed.

Warning: Some of the procedures in this document may expose hazardous voltage and the risk of electric shock or death. Only trained, qualified, technical persons experienced with the risks and precautions of servicing electrical instruments should perform these procedures.

Description of memory devices and their use:

Microprocessors - contains some RAM for internal use and all information is lost when the unit is powered down.

Flash - A 32-megabyte flash device responsible for storing critical nonvolatile information, including:

- the firmware image,
- the digital- and analog-side FPGA images,
- the HTML image,
- factory scripts, and
- dedicated reading buffers.
- Additionally, this device hosts 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 - A 128-kilobit device is used to store calibration constants for the SMU as well as manufacturing strings (e.g. analog board serial number).

Procedure for clearing memory content:

Note: If the Model 26xx starts and operates properly when powered on, it is very unlikely that the Flash memory was compromised.

Microprocessors

Power down the instrument for ten minutes.

Flash

To clear or set the USER set ups to Factory Setups from the front panel.

- a) Press MENU.
- b) Select SAVE-SETUP. Press ENTER.
- c) Select RECALL, press ENTER.
- d) Select FACTORY, press ENTER.
- e) Press EXIT.
- f) Press MENU.
- g) Select SAVE-SETUP, press ENTER.
- h) Select SAVE, press ENTER.
- i) Select USER-1, press ENTER.

Repeat steps f through i for the remaining USER set ups.

To clear USER setups from remote control use the following example

To delete a user script named “test8” from non-volatile memory...
script.delete (“test8”)

To clear the buffer simply overwrite with open inputs.

Press STORE. Select OVERWRITE. Press ENTER.

To clear the operating software and factory scripts:

To allow field upgrade to the operating software, this memory device may be reprogrammed using a program, called the Flash Wizard, provided by Keithley Instruments Inc. If data (other than the 26xx operating system) was loaded into this memory device, the 26xx would be non-functional. To overwrite any suspect content in these memory devices, follow the instructions with the Keithley Flash Wizard and reload the operating firmware, using the original revision that came with the product when new, or a compatible upgrade version. The Flash Wizard first clears all content in these memory devices then overwrites them with the new the firmware. Note: the firmware that is used for the upload must be known to be valid and kept secure to prevent tampering.

We do not currently offer a program to just erase this code. Complete destruction of firmware requires physical removal of the integrated circuits and destruction of the integrated circuits. Note: this action renders the unit unusable.

SDRAM

26xx”A” – turn off instrument for 10 minutes

Non “A” version of the 26xx is battery backed-up: **WARNING** – This procedure may expose hazardous voltage. Follow all safety precautions in the service manual! **UNPLUG THE INSTRUMENT.** Follow instruction in the service manual to remove the outer chassis and unplug the battery for 10 minutes.

EEPROM

Delete all calibration contents by sending the following commands:

```
smua.cal.unlock("ki26xxadmin")
smua.cal.nominals()
smua.cal.save(0)
smua.cal.save(1)
smua.cal.save(2)
smua.cal.save(3)
smua.cal.lock()
```

Re-calibrate the instrument.

Note: this procedure does not clear the unit serial number or the manufacturing data such as hardware revisions.

Note: the only way to completely sanitize this instrument is to disassemble completely and physically destroy all memory devices.

If you have any further questions or comments, please feel free to contact my office at anytime.

Regards,



William Pelster
Director of Quality