KEITHLEY
A Tektronix Company

2470 High-Voltage SourceMeter Instrument

Version 1.7.14 Firmware Release Notes

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GENERAL INFORMATION

SUPPORTED MODELS

This firmware is used on the following Keithley Instruments product models:

Model 2470 High-Voltage SourceMeter® Instrument

INSTALLATION INSTRUCTIONS

Firmware upgrade and downgrade instructions

NOTE

If you are upgrading from a firmware version earlier than 1.7.10, use the **Downgrade to older** option from the front panel or use the downgrade remote commands. When you upgrade from a firmware version earlier than 1.7.10, system messages display the firmware version as 1.7.1. This is a cosmetic issue and does not affect instrument performance.

CAUTION

Do not turn off power or remove the USB flash drive until the upgrade process is complete.

From the front panel:

1. Turn the instrument power off, wait a few seconds, then turn the instrument power on.
2. Copy the firmware upgrade file (`.upg` file) to a USB flash drive.
3. Verify that the upgrade file is in the root subdirectory of the flash drive and that it is the only firmware file in that location.
4. Disconnect any terminals that are attached to the instrument.
5. Turn the instrument power off. Wait a few seconds.
6. Turn the instrument power on.
7. Insert the flash drive into the USB port on the front panel of the instrument.
8. From the instrument front panel, press the **MENU** key.
9. Under System, select **Info/Manage**.
10. Choose an upgrade option:
    - To upgrade to a newer version of firmware: Select **Upgrade to New**.
    - To return to a previous version of firmware: Select **Downgrade to Older**.
11. When the upgrade is complete, reboot the instrument.

A message is displayed while the upgrade is in progress.

For additional firmware installation instructions, refer to “Upgrading the firmware” in the “Installation” section of the *Model 2470 High Voltage SourceMeter™ Instrument Reference Manual* (document number 2470-901-01). This manual is available online at tek.com/keithley.

VERSION 1.7.14 RELEASE

OVERVIEW

Version 1.7.14 provides a fix and enhancements.

CRITICAL FIXES

Reference number	**SK-1754**
Symptom	When users were interacting with the SMU, under rare circumstances a 5072 error was generated that required a power cycle to fix.
Resolution	These issues have been resolved.

ENHANCEMENTS

Reference number	**SK-1718**
Enhancement	Added a command to read the revision number of the 2470 analog board: `localnode.analogrevision` (TSP). This information is not available when using the SCPI command set.
Reference number	**SK-1579**
Enhancement	Added commands to control how switched operation behaves: `smu.rangecompensation` (TSP) and `:SYSTem:RANGe:COMPensation` (SCPI) These commands change the settling behavior of the SMU. In most cases, these commands should be set to the default mode of AUTO. **CAUTION:** Setting this to ON or OFF is an advanced feature of the SMU. It can produce overshoots and will affect SMU settling and other specified performance. Before using this feature, discuss it with your local applications engineer.
Reference number	**SK-1301**
Enhancement	Changed the functionality of the breakdown connection commands to allow you to enable the breakdown protection in situations where the current may exceed the programmed current or the limit current value due to a breakdown condition. This affects the commands: `smu.breakdownprotection` (TSP) and `:SYSTem:BREakdown:PROTection` (SCPI) Refer to the *Model 2470 Reference Manual* for detail on using these commands.
Reference number	**NS-1702, NS-53**
Enhancement	Added instrument error code listings to the *Model 2470 Reference Manual*.

VERSION 1.7.12 RELEASE

OVERVIEW

Version 1.7.12 provides a fix.

CRITICAL FIX

Reference number	**NS-2105**
Symptom	Saving numerous configuration scripts or system setups may lead to an out of memory error message depending on the time since the instrument has been restarted.
Resolution	This issue has been resolved.

VERSION 1.7.10 RELEASE

NOTE

When you load the 1.7.10 firmware into your instrument, system messages will display the firmware version as 1.7.1. This is a cosmetic issue and does not impact the performance of the unit. Subsequent firmware upgrades will display a two-digit firmware version number.

To install firmware version 1.7.10 on your instrument, use the **Downgrade to older** option from the front panel or use the downgrade remote commands. See "Upgrading the firmware" in your instrument's Reference Manual for more information.

OVERVIEW

Version 1.7.10 provides fixes and enhancements.

CRITICAL FIXES

Reference number	**NS-2070**
Symptom	Heavy script processing can interfere with the timely generation of an SRQ as the result of setting the MAV bit in the Status Byte Register. This interference affects both the bus and the front panel display.
Resolution	This issue has been resolved.

Reference number	**NS-2072**
Symptom	After changing the group number of a node to be the group number previously used for another node, the instrument may generate errors when trying to start a test on that node using the execute() command, even after using `waitcomplete()` to make sure the previous tests have finished. Subsequently, performing a `waitcomplete()` on the previous group number may cause the instrument to wait for tests to complete on that node even though the node is in a new group.
Resolution	This issue has been resolved.

Reference number	**NS-2074**
Symptom	The MAV bit may be set in the status byte indicating that there is data to be read from the instrument, but the subsequent read operation to pull that data from the instrument fails and times out. This may occur when rapidly generating data and enabling the MAV bit to be set in the status model to indicate when data is available to read from the instrument.
Resolution	This issue has been resolved.

ENHANCEMENTS

Category	**System commands**
Reference number	**NS-1946**
Enhancements	New commands have been added to control the DST port (5030): TSP: `lan.dstprotection = lan.ON` or `lan.OFF` SCPI: `SYSTem:COMMunication:LAN:DST:PROTection <ON (1)` or `OFF(0)>` `OFF` is the default command state. When DST protection is turned `OFF`, a simple open-and-close on the DST port (5030) will close any and all open LAN connections. When DST protection is turned ON, the DST port will need to be opened and the system login and password entered followed by closing the DST port to close any open LAN connections, including the DST port. Turning DST protection `ON` prevents LAN connections from being inadvertently closed by your IT department performing a port scan across the corporate network.

VERSION 1.7.7 RELEASE

OVERVIEW

Version 1.7.7 provides fixes.

CRITICAL FIXES

Reference number	**NS-2025**
Symptom	While running a test loop in an application that sends the `reset()` command as part of the code, a blue screen appears after running the test for several days.
Resolution	The issue has been resolved.
Reference number	**NS-2043**
Symptom	While remotely communicating with the instrument, if a new error is displayed on the front panel shortly after a previous error is being cleared from the front panel, the instrument may become unresponsive or inoperative.
Resolution	The issue has been resolved.

VERSION 1.7.5 RELEASE

OVERVIEW

Version 1.7.5 provides fixes and enhancements.

CRITICAL FIXES

Reference number	**NS-1978**
Symptom	Unable to set voltage protection level with the SCPI command `SOUR:VOLT:PROT:LEV` and query the setting when the source function is set to current.
Resolution	This issue has been resolved.
Reference number	**NS-1981**
Symptom	When measuring in local mode with sense mode set to 4-wire or output off mode set to High Z, and turning output on, measurement readings do not automatically begin. Instead, you must turn continuous measurements on manually after turning the output on.
Resolution	The issue has been resolved to automatically start continuous measurements in these configurations.

ENHANCEMENTS

Category	**General settings**
Enhancement	The "Branch to Block" setting on branch blocks on the Trigger Flow screen on the front panel now allows a minimum value of 0.

VERSION 1.7.3 RELEASE

OVERVIEW

Version 1.7.3 provides fixes and enhancements.

CRITICAL FIXES

Reference number	**NS-1923**
Symptom	When measuring resistance in local mode, the SMU does not switch from `INACTive` to `CONTinuous` measurement when output is turned on.
Resolution	This issue has been corrected.
Reference number	**NS-1927**
Symptom	The LXI identification web page shows the incorrect LXI version and web page links.
Resolution	This issue has been corrected.
Reference number	**NS-1944**
Symptom	Source and Limit values do not update correctly when exiting the quick edit method (not live edit) with the navigation control.
Resolution	This issue has been corrected.

ENHANCEMENTS

Category	**Remote commands**
Reference number	**NS-1931**
Enhancement	Added a transport layer security (TLS) option when using the `tspnet.connect()` command. *connectionID* = tspnet.connect(*ipAddress*, *portNumber*, *initString*, *useTLS*) Where: *ipAddress*: A string that indicates the IP address or host name to connect to. *portNumber*: Default 5025. *initString*: Sends a string to ipAddress. *useTLS*: `0` or `1`; `0`: Do not use TLS with the connection (default) `1`: Use TLS with the connection. When *useTLS* is set to `1`, the instrument negotiates the security protocol when connecting to the host or IP address that is used. This security protocol is used when using `tspnet.write()` to send data or `tspnet.read()` to receive data. The following is an example of how to use a host name with the TLS option: `connectionID = tspnet.connect("hostname.domain.com", 443, "", 1)`
Category	**Remote commands**
Reference number	**NS-1960**
Enhancement	The `localnode.gettimewithfractional()` TSP command is available to retrieve the number of seconds elapsed since January 1, 1970, with fractional seconds appended to the returned response.

VERSION 1.7.2 RELEASE

OVERVIEW

Version 1.7.2 provides fixes and required support.

CRITICAL FIXES

Reference number	**NS-1902**
Symptom	After using a pulse or sweep command that specifies a user-created buffer instead of a default buffer, the configuration of the instrument is saved in a setup or configuration script. Recalling this setup or running this script causes an error that says a parameter was expecting a certain reading buffer type but instead found an unknown type.
Resolution	This issue has been corrected.

NONCRITICAL FIXES

Reference number	**NS-1915**
Symptom	When running a Test Script Processor® (TSP) script application with a custom user interface that has an End App button, the custom user interface may not close properly when **End App** is selected.
Resolution	This issue has been corrected. This fix also introduces a behavior change from previous firmware versions. If you are running a nested script (scripts running within a script), the user interface only displays the first running script. Previously, the user interface displayed name changes between nested scripts.

VERSION 1.7.1 RELEASE

OVERVIEW

Version 1.7.1 provides minor fixes and required support for the I-V Tracer TSP™ Application. You must install the new firmware to use the Application, available from:

https://www.tek.com/en/keithley-i-v_tracer

The support changes for the Application do not impact normal instrument operation.

CRITICAL FIXES

Reference number	**NS-1846**
Symptom	Pressing the Function key repeatedly while running a script or trigger model generates several messages stating that the key is disabled. This may cause the instrument to stop functioning, depending on the number of messages generated.
Resolution	This issue has been corrected.

ENHANCEMENTS

Category	**Applications**
Enhancement	Changes have been made to the Apps Manager view to state whether or not an Application is supported on an instrument and the required firmware version.

VERSION 1.7.0 RELEASE

OVERVIEW

Version 1.7.0 is a significant maintenance firmware release for the 2470 that brings numerous updates along with stability and reliability improvements. See *Model 2470 High Voltage SourceMeter Instrument Reference Manual* (document number 2470-901-01) for more information.

CRITICAL FIXES

Reference number	**AR41750, AR41769, AR42131, AR42243, AR42807, AR50058, AR50059, NS-422**
Symptom	The effective source limit of the SMU is the lesser of either the programmed source limit or 105% of the active measure range. If you use fixed measure ranges, the instrument prevents you from selecting different limit and measure ranges. However, if measure autorange is selected, it is possible for the autorange process to cause the ranges to differ because the instrument may go down to a range that is lower than the one on which the source limit is programmed. This causes the effective source limit to drop to 105% of the newly selected measure range. The source limit will remain at this value until either you make another measurement that causes a range change or you explicitly select another range. If you take no action to change the measure range before you change the source level, or perhaps test a new device, you may find that the output voltage or current level is less than expected due to the reduced source limit. This may prevent your device from properly turning on or otherwise operating as expected.
Resolution	These issues have been addressed. The front panel display now indicates if the SMU output is limited by the programmed source limit or by the active measure range. A new autorange mode was also added to automatically set the measure range equal to the source limit range after a measurement is completed (see "Enhancements").

Reference number	**AR55036, AR62150, NS-339**
Symptom	Repeated creation and deletion of user-defined buffers may cause out-of-memory errors. Error messages indicating the maximum size for buffers being created are wrong and provide misleading guidance.
Resolution	Reading buffer memory management now allows users to easily allocate the largest size available when creating a reading buffer. Documentation has been clarified to explain the creation process. Improved buffer memory management also greatly reduces the possibility of getting out-of-memory errors.

Reference number	**AR56349, AR60259, NS-929**
Symptom	USB communication issues.
Resolution	To better accommodate the variety of VISA installation options available to users, the STALLing USBTMC is not active as it had been before.

Reference number	**AR61116, AR62660, NS-529, NS-1558**
Symptom	Repeatedly saving a buffer to a file on a USB flash drive using the `buffer.saveappend` command eventually causes Error 2203, "Cannot open file."
Resolution	This issue has been corrected.

Reference number	**AR62310**
Symptom	Exercising various combinations of front panel settings for the Event Log may cause the front panel to lock up.
Resolution	This issue has been corrected.

KNOWN ISSUES

Reference number	**AR62218, NS-1241**
Symptom	Rapidly changing the Quickset performance slider between medium and fast settings can result in the slider becoming unresponsive.
Workaround	Switch to another screen and back to Quickset.

ENHANCEMENTS

Category	**Reading buffers**
Enhancements	• Reading buffer memory management now allows users to easily allocate the largest size available when creating a reading buffer. • Additional options are now available when saving data to a USB flash drive. • Buffer statistics and options for accessing data from reading buffers have been added. • Added reading buffer math and unit support. • Added formatting options for writable buffers. • Added a method to clear the active buffer by pressing the MENU + EXIT keys. • When selecting the active buffer, an option now exists to create a new user buffer. • Added the `display.activebuffer` TSP command and `DISPlay:BUFFer:ACTive` SCPI command to specify the active buffer for the instrument using remote commands.

Category	**Configuration lists**
Enhancement	• Enhanced user interface screen for accessing configuration list settings. • Added the ability to use remote commands to store inactive source and measure function settings in a configuration list index. • Added the ability to use remote commands to query or configure inactive source and measure function attributes.
Category	**Trigger model**
Enhancement	The Measure and Digitize trigger blocks have been combined into a single Measure and Digitize block. The new trigger block either measures or digitizes based on the active function. When used with a Measure Configuration list, this trigger block lets you make sequential measurements with the analog-to-digital converter and the digitizer (when available) in the same trigger model. The SCPI command is `:TRIGger:BLOCk:MDIGitize`. The TSP command is `trigger.BLOCK_MEASURE_DIGITIZE`. Digitized measurements are not a feature on the 2470. The remote commands for the original Measure and Digitize trigger blocks are still accepted to provide compatibility with existing test programs and scripts. However, the trigger models generated with the original commands automatically use the new combined Measure and Digitize block.
Category	**LXI**
Enhancements	The instrument is now compliant with LXI version 1.5. An LXI/LAN ID indicator has been added to the System Communications screen. To discover the instrument, use the LXI Discovery Tool.
Category	**Apps**
Enhancement	When applications are available, the APPS Manager screen displays the apps for the instrument.

Category	**New commands and options**
Enhancements	• Added an interlock on and off setting to the user interface and remote commands, `:OUTPut[1]:INTerlock:STATe` (SCPI) and `smu.interlock.enable` (TSP). When enabled, the SMU will not allow the output to be turned on when the interlock is not engaged. • The interlock base behavior has also changed. The SMU output will turn off whenever the interlock is engaged or disengaged. • Added an autorange rebound setting to the user interface and the remote commands `[:SENSe[1]]:<function>:RANGe:AUTO:REBound` (SCPI) and `smu.measure.autorangerebound` (TSP). If autorange rebound is enabled, then after an autoranged measurement is completed, the measure range is restored to match the limit range. • Added a method to automatically install any scripts to internal storage memory that reside in an autoinstall directory on the USB drive when inserted into the instrument. • Added `fs.*` TSP commands for accessing and managing file system settings. • Added an option to show a Processing screen in the user interface to increase test execution speeds when screen updates are not required. • Added remote commands to set continuous measurement.
Category	**Ease of use**
Enhancements	• Numerical entries on the user interface now support Minimum, Maximum, and Infinite options when applicable to the setting. • Option to display the virtual front panel in low resolution to improve communication speed with the instrument. The default screen display resolution of 800 × 480 is reduced to 400 × 240 resolution. • Graph and histogram settings are now shared for ease of viewing data between the two screens. Also added other graphing enhancements.
Category	**General changes**
Enhancements	• The maximum TSP node ID is now 63. The previous maximum was 64. • The Access Mode option on the front panel has been changed to Interface Access. • The user swipe screen is only displayed if user text is defined. • The home screen indication of source limiting has been enhanced to show whether the source limit setting or the measure range is limiting the instrument output.

VERSION V1.6.8D RELEASE

OVERVIEW

Version 1.6.8d is the initial firmware release for the Model 2470. No fixes are listed.
RELEASED 5-APR-2019

COMPATIBILITY CONCERNS

N/A

CRITICAL FIXES

N/A

ENHANCEMENTS

N/A

NONCRITICAL FIXES

N/A

KNOWN ISSUES

N/A