KEITHLEY

Model 2450 System SourceMeter®

Version v1.6.3d Firmware Release Notes

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Contents

General Information

Supported models

This firmware is intended for use on the following Keithley Instruments product models:

2450, 2450-NFP, 2450-RACK, 2450-NFP-RACK

*** ATTENTION CRITICAL ATTENTION CRITICAL ATTENTION CRITICAL ***

If you are upgrading firmware from v1.0.0i **TO ANY OTHER FIRMWARE REVISION EVER**, it is critical that firmware upgrade be run 2 TIMES in order for all firmware components to be upgraded correctly.

Firmware v1.1.0s fixes an issue with the firmware upgrade code inside the 2450 and this requires that the upgrade be performed 2 TIMES either from the front panel or any remote upgrade process. If you are at firmware revision v1.1.0s or later, then you only need to run firmware upgrade one time.

NOTE: When using Test Script Builder (TSB) to Flash from v1.0.0i, the same requirement applies and the UPGRADE/DOWNGRADE option needs to be run twice.

Firmware Upgrade/Downgrade Instructions

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

From the front panel:

1. Copy the firmware upgrade file to a USB flash drive. The file is: `ki_2450_v1_6_3d.upg`.
2. Verify that the upgrade file is in the root subdirectory of the flash drive and that it is the only firmware upgrade file in that location. 2450 firmware files end with the file extension .upg. (example: H:\ki_2450_v1_6_3d.upg)
3. Disconnect any input and output terminals that are attached to the instrument.
4. Turn on instrument power.
5. Insert the flash drive into the USB port on the front panel of the instrument.
6. From the instrument front panel, press the **MENU** key.
7. Under System, select **Manage**.
8. Select the type of upgrade you want to do:
   To upgrade to a newer version of firmware: Select **Upgrade to New**.
   To force downgrading to an older version of firmware: Select **Downgrade to Older**.
9. If the instrument is controlled remotely, a message is displayed. Select **Yes** to continue.
10. When the upgrade is complete, reboot the instrument.
11. If you started with firmware revision v1.0.0i, then GO TO STEP 6 and RUN STEPS 6 THROUGH 10 A SECOND TIME

NOTE: A message is displayed while the upgrade is in progress.

For additional information about upgrading the firmware, refer to the “How do I Upgrade Firmware?” topic in the “Frequently Asked Questions (FAQs)” section of the Model 2450 Interactive SourceMeter® Instrument Reference Manual (document number: 2450-901-01). This manual is available online at http://www.tek.com/support, Search for “2450 Reference Manual” when you get there.

Upgrade considerations for the Model 2450.

ATTENTION: Once the 2450 is upgraded to v1.2.0f, the unit can NEVER be downgraded to an older firmware version. Subsequent versions of firmware will be able to downgrade back to v1.2.0f but no earlier version.

Upgrade files are available on the Keithley Instruments website (http://www.tek.com/keithley).
To find firmware files on the Keithley Instruments website:

1. Select the **Support** tab.
2. In the model number box, type **2450**.
3. Select **Firmware**.
4. Click the search button. A list of available firmware updates and any available documentation for the instrument is displayed.
5. Click the file you want to download.

Version v1.6.3d Release

Overview

Version 1.6.3d is an audited minor release which fixes a number of different bugs all listed below.
RELEASED 18-APR-2017

Critical Fixes

AR54361
PR60339

2450 Measure Configuration Lists do not save Auto Range setting.

Models affected:

All 2450 models, 2460 models, 2461 models

Symptom:

The Auto Range attribute was not being saved correctly when Config Lists were created. Auto Range was always set to "Off".

Resolution:

This issue has been corrected.

AR54920
AR60477

Trigger timer does not work correctly for counts > 65535

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Before this enhancement, the TTI products had a limit of 65,535 points for the trigger timer. This limit has been increased to 1,048,575 to match how the 26xx products behave. The trigger timer will now work up to 1,048,575 points.

Resolution:

This enhancement has been made.

PR60362

Output button cannot turn off the output without a power cycle.

Models affected:

All 2450 models, 2460 models, 2461 models

Symptom:

Under certain conditions, when in Ohm Meter mode and changing source values, the instrument will display +0.00000GV or !DispNAN!V and the output button cannot turn off the output without a power cycle.

Resolution:

This issue has been corrected.

PR60377 ENHANCEMENT: Add firmware version and program counter to blue screen information.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Whenever a rare system crash occurs and displays a blue screen, valuable information such as firmware revision and program counter (PC) will be displayed to help pinpoint the exact location of the crash.

Resolution:

This enhancement has been made.

PR60504 Trigger model based upon trigger timer sometimes hangs during a long-term test

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Under certain conditions, creating a trigger model based upon the trigger timer will hang right in the middle of a test that runs for many minutes or longer. This bug was introduced in firmware revision 1.5.0.

Resolution:

This issue has been corrected.

Version v1.6.1a Release

Overview

Version 1.6.1a is a Hot Fix against Service Pack 6 firmware v1.6.0i. Only one critical fix was made and no other changes were introduced.
RELEASED 25-JUL-2016

Critical Fixes

PR59438 HF1: Cannot graph digitizer with track group

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

When customers enable track groups on the graph, data is either wrong or completely missing. This is especially problematic for graphing digitized data and for Demo mode.

Resolution:

This issue has been corrected.

Version v1.6.0i Release

Overview

Version 1.6.0i is the sixth official firmware upgrade release for the Model 2450. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 18-JUL-2016

Compatibility concerns

n/a

Critical Fixes

PR57048 Instrument not reliably responding to NI VISA “go to local” function
PR57905
AR50675

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Under certain conditions customers are not able to reconnect to the 2450 after remote operation and manually placing the 2450 into local mode.

Resolution:

This issue has been corrected. The instrument will now go into “local mode” after issuing the “logout” command.

PR58210 Buffer file contains extra NULL values.
AR52304

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

When saving a databuffer on the DMM7510 form the internal webpage the databuffer will insert NULL values into the CSV file. When saving a buffer from the front panel of the instrument there are no NULL values inserted for the same data set.

Resolution:
This issue has been corrected. Extra NULL characters are no longer generated.

PR58329 There are complaints about swipe screen performance.
AR52702

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Most swipe screens appear to move more slowly than in previous firmware revisions.

Resolution:

This issue has been corrected. Swipe screen action has been restored to previous versions of firmware and has been slightly sped up.

PR58384 AR52713 Downgrading from firmware revision v1.5.0 to v1.3.0 will cause the unit to reboot unnecessarily.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

When downgrading firmware from v1.5.0 to v1.3.0, a warning message window instructing the user to remove existing scripts will display and then the unit will reboot unconditionally.

Resolution:

This issue has been corrected in version v1.6.0 and later. The unit will only reboot if the user proceeds with the downgrade.

PR58469 AR52717 Pressing the <HOME> button 2 times behavior changes from v1.3.0 to v1.5.0.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Feature definition on FW 1.3.0s or earlier is push HOME key once goes to last swipe screen on the home screen. Pushing HOME key a 2nd time takes you back to home swipe on the home screen. FW1.5.0g does not do that 2nd HOME key action.

Resolution:

This issue has been corrected. Previous behavior has been restored.

PR58719 AR52324 The trigger model locks up when using a Delay List.

Models affected:

All 2450 models

Symptom:

Under certain conditions, when programming one of the timers to use a delay list, the trigger model task 'locks up'. The only remedy is to abort operation and reset the instrument.

Resolution:

This issue has been corrected.

PR51021 TSP-Link: Inactive nodes are not removed after the next tsplink reset().

Models affected:

All 2450 models

Symptom:

The 26xxA/B correctly removes index in the "node" table that are no longer present. On the 2450, a second tsplink reset() does not remove a tsplink node that had its address changed or was reconfigured from the node table after a tsplink reset().

Resolution:

This issue has been corrected.

PR56486 Calling tsplink.initialize() under specific conditions can cause slave to lockup.

Models affected:

All 2450 models

Symptom:

Under certain conditions, when connecting 2 or more 2450s, certain scripts will cause the Master SMU to no longer respond over the bus or from the front panel.

Resolution:

This issue has been corrected.

PR56487 Calling tsplink.initialize() under specific conditions can cause slave to lockup.

Models affected:

All 2450 models

Symptom:

Attempting to initialize TSP-Link using `tsplink.initialize()` may result in the following error being reported:

```
TSP-Error 1202: Link initialization failed
```

One or more of the slave instruments may lockup.

Resolution:

This issue has been corrected.

PR56812 TTI Instruments do not work well when TSP-Linked to a Model 26xx.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

When hooking up (4) 26xx-X SMUs to each other in series (one of which is the master) and then putting a TTI Instrument on the end, the box will lock up after the 3rd tsplink.reset(). The problem gets worse if you start hooking instruments in parallel.

Resolution:

This issue has been corrected.

PR57761 TSP-Link node at address 64 error when using "enum" eg. trigger.EVENT_DISPLAY.

Models affected:

All 2450 models

Symptom:

TSP-Link enum sharing was not properly accounting for 1-based node numbers when generating bit masks. Therefore, node 64 would get completely shifted away and become zero.

Resolution:

This issue has been corrected.

PR58964 Timing problem with Autoexec scripts.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Certain scripts that have been designated as ‘default’ or Autoexec scripts will start running before the system has completely booted up. This may cause the Autoexec script to get skipped and not executed at all upon first boot up.

Resolution:

This issue has been corrected.

Enhancements

PR56495 **Models affected:**

All 2450 models, 2460 models, 2461 models, 7510 models

Enhancement:

When turning on REL, the units on the graph should not change. This behavior has been implemented.

PR58734 **Models affected:**

All 2450 models, 2460 models, 2461 models, 7510 models

Enhancement:

The reading tables have been enhanced to visually differentiate between OVERFLOW and LIMITS. Overflow readings will now be set to **RED TEXT** and Limits will be set to YELLOW TEXT.

Noncritical Fixes

PR58864 Swipe screen content disappears after pressing the home key on large reading screen.

Models affected:

All 2450 models, 2460 models, 2461 models, 7510 models

Symptom:

Under certain sequences of events, after minimizing the default swipe screen and then pressing the HOME button, certain content on the swipe screen will be missing.

Resolution:

This issue has been corrected.

Known issues

n/a

Version v1.5.0g Release

Overview

Version 1.5.0g is the fifth official firmware upgrade release for the Model 2450. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 11-MAR-2016

Compatibility concerns

Firmware revision v1.5.0g can be installed on any vintage 2450. After upgrading to v1.5.0g, be advised that in order to downgrade back to previous versions of firmware, you MUST archive and remove all saved scripts before the downgrade will be allowed.

Critical Fixes

PR56630 AR50775 Problem with Trigger Model not waiting.

Models affected:

All 2450 models

Symptom:

Under certain conditions when an SMU is connected to a digitizing instrument (2461 or DMM7510) the digitizer will start digitizing before the trigger has been sent to start it.

Resolution:

This issue has been corrected.

PR57147 AR51367 Generating Sweep parameters does not save correctly in the Config List.

Models affected:

All 2450 models

Symptom:

When creating a new Source Config List and then immediately saving this Config List to a script, the instrument will hang.

Resolution:

This issue has been corrected.

PR57991 AR52304 Hardware is in the wrong state at boot up.

Models affected:

All 2450 models

Symptom:

From initial boot-up and factory default settings, if you have the 2450 force 1 volt into 1GΩ, we expect 1nA of current. But instead 2450 reports only 0.100 nA. If one configures the instrument to force current (1nA) and measure voltage, the expected 1 volt is measured. Thereafter, returning to force 1V and measure current will yield the expected 1nA value. This issue can be observed from both the front and rear terminals.

Resolution: This issue has been corrected. The 2450 now boots up into the exact desired state.

PR56931 Throw an error is auto-range low is set and the source and measure function match.

Models affected:

All 2450 models

Symptom:

Certain command sequences will cause the SMU to display an error and this error is not consistent between the 2450, 2460, and 2461.

Resolution:

This issue has been corrected and the error message between the 2450, 2460, and 2461 now match.

PR56942 Sort binning template's constant limit blocks are jumping to the wrong blocks.

Models affected:

All 2450 models

Symptom:

When the SortBinning template was originally ported to the 2450, it correctly moved the notify block for external output. However, it did not correctly renumber the constant limit block's branch to block value.

Resolution:

This issue has been corrected.

PR56964 Virtual front panel scrolling issue.

Models affected:

All 2450 models

Symptom:

When using the virtual front panel, the user is unable to scroll up and down in the system settings menu. Using the web interface, the user should be allowed to at least scroll through the system settings.

Resolution:

This issue has been corrected.

PR57014 Memory corruption when using a Config List over 60,000 indexes.

Models affected:

All 2450 models

Symptom:

When creating a Config List of greater than 60,000 indexes, when trying to retrieve values above index 60,000, the wrong index was retrieved and the number of indexes over-flowed.

Resolution:

This issue has been corrected. The maximum number of indexes is correctly supported up to 1,000,000.

PR57059 Limit is wrongly reported after a range change.

Models affected:

All 2450 models

Symptom:

Under certain conditions, the Limit indicator is on in error. This was likely to occur when sourcing voltages at or very close to the source limit and sourcing into an OPEN and changing the measure range to a higher range.

Resolution:

This issue has been corrected.

PR57207 Incorrect source value after using OCOMP ohms.

Models affected:

All 2450 models

Symptom:

Under certain conditions, after running OCOMP ohms and immediately switching ranges while digitizing, an incorrect source value is returned.

Resolution:

This issue has been corrected.

PR57265 Certain scripts cause error code 5093 “Cannot change the source function, range, level, or limit when using the Resistance measure function.”

Models affected:

All 2450 models

Symptom:

Certain scripts cause the “createconfigscript()” function to put a source function call after the measure resistance function.

Resolution:

This issue has been corrected.

PR57512 Cursor statistics don't display if x1 > x2.

Models affected:

All 2450 models

Symptom:

Notice that the stats are displayed as long as x2 is to the right of x1. As soon as they cross, hash marks are displayed for all stats.

Resolution:

This issue has been corrected.

Enhancements

No PR **Models affected:**

All 2450 models

Enhancement:

The behavior of the command `display.waitevent()` has changed. When the example below is run, a dialog will be shown. If Yes or No is not pressed within 1 second, then `display.waitevent()` will time out. The `buttonId` will now contain `display.BUTTON_SELF` instead of 0 (zero). It will also return `display.BUTTON_SELF` if the prompt is removed with `display.delete()`.

```
display.prompt(display.BUTTONS_YESNO, "Press Yes or No…")
objectID, buttonId = display.waitevent(1)
```

PR57905
AR50675 **Models affected:**

All 2450 models

Enhancement:

Add a command to put the instrument into LOCAL mode.

The command `logout` can be used to log out of remote mode and force the instrument into LOCAL mode. This command was previously failing in certain situations. This command is now fully supported.

Noncritical Fixes

n/a

Known issues

n/a

Version v1.3.0s Release

Overview

Version 1.3.0s is the fourth official firmware upgrade release for the Model 2450. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 10-JUN-2015

Compatibility concerns

Firmware revision v1.3.0s can be installed on any vintage 2450.

Active Buffer Behavior

Starting with v1.3.0s, the behavior of the Active Buffer has changed. Prior to v1.3.0s, the Active Buffer was always defbuffer1 by default. Now with v1.3.0s, the Active Buffer will be the most recently created or selected buffer. Additionally, while graphing data, when a user creates or selects a new buffer, that data will automatically be graphed. This feature can be disabled by manually selecting another trace and deleting (if desired) the active trace. The user can also just select a different buffer.

Critical Fixes

PR50999
AR39793

Need better indication when unit is in continuous trigger mode when set to 10PLC and 100 count repeat filter

Models affected:

All 2450 models

Symptom:

During some types of measurements the 2450 will appear to be stuck with no activity. The solution is to add an animated indicator to show that measurements are still taking place and the 2450 is active.

Resolution:

This issue has been corrected. There is now an active indicator for continuous readings, even when the reading will be coming in very slowly, the indicator displays that the test is still running.

PR51112
AR39909

USBTMC: Error returned every other time status byte requested via USB

Models affected:

All 2450 models

Symptom:

This issue was discovered after writing a Status Byte routine in LabVIEW™ which enables the user to query the status byte in a loop. Every other time STB was requested, an error was returned.

Resolution:

This issue has been corrected.

PR51359
AR40280

Resistor Sorting Trigger Model Example Incorrect

Models affected:

All 2450 models

Symptom:

The examples which are explained on page 3-78 in 2450 Reference Manual (2450-901-01 Rev. B / September 2013) are wrong.

Resolution:

This issue has been corrected. All diagrams and coding examples have been updated and verified.

PR51544 AR40577 Y-Axis units on the graph do not update properly when changing functions

Models affected:

All 2450 models

Symptom:

When graphing measurements as a function of time, and then you change functions (say from resistance to current), the units do not update properly on the Y-axis unless you go to one of the tabs on screen and then go back to the Graph or if the unit auto scales.

Resolution:

This issue has been corrected.

PR51545 AR40578 Unit intermittently hangs up when pressing the HOME key from the Graph Page

Models affected:

All 2450 models

Symptom:

Intermittently when on the Graph page and then pressing the HOME key, the unit will hang up and must be rebooted.

Resolution:

This issue has been corrected.

PR55123 AR42424 Autoexec script cannot be aborted

Models affected:

All 2450 models

Symptom:

If there is a problem with any script that has been set to run automatically at power up (autoexec), it cannot be aborted.

Resolution:

This issue has been corrected.

PR55188 :READ? Query always returns the last reading at the end of the continuous butter.
AR42592

Models affected:

All 2450 models

Symptom:

For example, if a basic measurement is set up to defbuffer1 (size 10000) and then takes 11000 readings, the last 1000 readings will all return the same value. This should act as a circular buffer.

Resolution:

This issue has been corrected.

PR55281 Problem with certain trigger block configurations
AR42407

Models affected:

All 2450 models

Symptom:

If setting several Notify Blocks with Line#1 as PASS signal trigger, Line#2 as FAIL signal trigger, and Line#4 as EOT signal trigger, for example, in the Trigger Flow, you will find any single Notify Block with Line#X would give out trigger out signals on Line#1,#2,#4 in the same time.

Resolution:

This issue has been corrected.

PR55600 *TRG command trigger source does not work in SCPI mode trigger model.

Models affected:

All 2450 models

Symptom:

Using a trigger model .wait block with the command event in SCPI does not work when *TRG is sent.

Instead, it generates the following error ==> Error 2713 - "No trigger model engine available".

Resolution:

This issue has been resolved. Now, the *TRG command will satisfy the wait block when sent if waiting for a command event.

PR55867 1uA Current Source error when using Config List
AR43082

Models affected:

All 2450 models

Symptom:

Under a very specific sequence of events, setting the Source Config List source value to 1.0uA will revert to 0uA after pressing the Trigger button on the front panel.

Resolution:

This issue has been corrected.

PR56135
AR50078 QuickSet Performance Setting does not work on fastest setting

Models affected:

All 2450 models

Symptom:

On the QuickSet Menu, when editing the Performance Slide bar, if you choose the fastest speed, the dial indicates a speed of ~1700/sec. However, the actual speed is only 10/sec no matter how much the other settings are optimized. The only way to achieve this speed is to create a simple trigger model configuration that sources, measures, and loops back continuously, then manually set NPLC to .01, turn auto ranging for source and measure off, and set source delay to 0.

Resolution:

This issue has been corrected and the Performance Slide bar works correctly for all settings.

Enhancements

GENERAL **Models affected:**

All 2450 models

Enhancement:

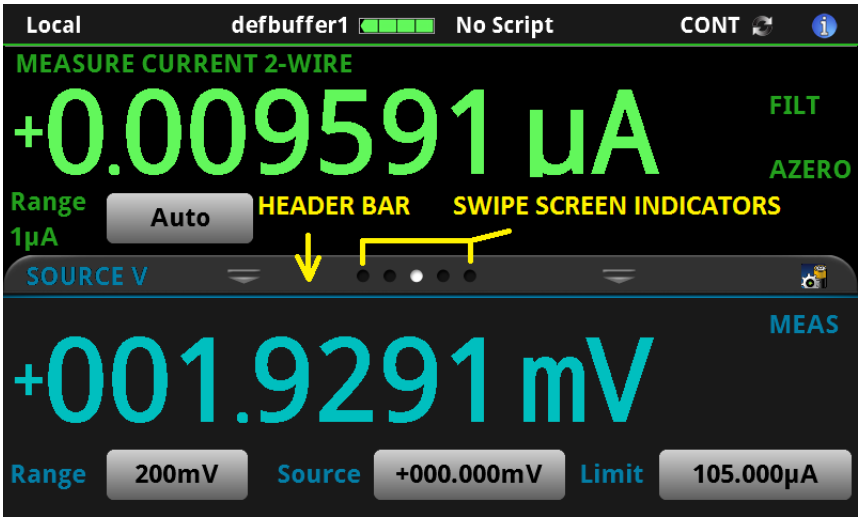
A number of improvements have been made to the overall Graphical User Interface as follows:

1. Screen Colors: All screen colors have been modified for better contrast and easier readability.

2. Pinch-to-Zoom Performance: Throughout the user interface, the "Pinch-to-zoom" touch screen motion has been improved and is more responsive.

3. Improve Swiping:
   a. The swipe user interface gesturing has been dramatically improved and is more responsive.
   b. Added Vertical Swiping in various screens in the GUI.
   c. Horizontal swiping has been made more smooth and is consistent with Vertical Swiping.
   d. "Fling" swiping has been implemented where faster swiping actions result in rapid scrolling followed by decay based on the velocity of the "fling."
   e. Swipe Down on the Home screen will display larger readings.

4. Tabs and Buttons: Throughout the user interface multiple data display options have been made available through tabs (header bars) with swipe screen indicators to show how many options are available and which display tab is active.

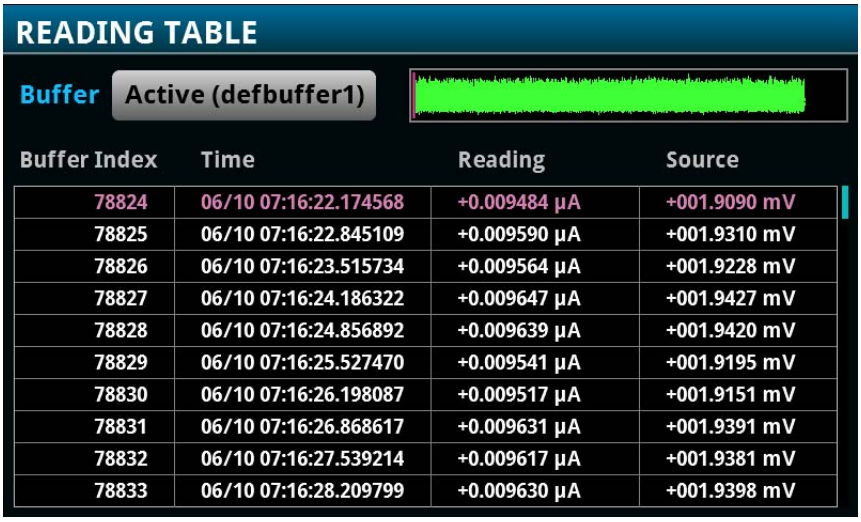


5. Graphing:
   a. New Auto Scale Options (X-Axis) ➔ Track Latest, Track Group
   b. New Auto Scale Options (Y-Axis) ➔ y-swim lanes, y-shared, y-per trace
   c. Multi-Trace Line Plots
   d. Multi-Trace Scatter Plots
   e. Various refresh and performance improvements

6. Histogram:
   a. New Auto-Scale, Auto-Bin, and Fit
   b. Smartscale choose best scaling option
   c. Various refresh and performance improvements

7. TTI Synchronization: All Touch, Test, Invent® Keithley Models including the 2450, 2460, and 7510 have been carefully updated so that they are all consistent in look, feel, and general navigation.

8. Updated Reading Table: Added new reading table features and a new Reading Preview Graph. Please see the Reference Manual for further details.



PR50885
AR39690

Models affected:

All 2450 models

Enhancement:

Add a direct shortcut from the HOME view measurement line to the measurement settings menu.

A shortcut icon has been added to the swipe bar on the HOME source/measurement tab.

PR51356
AR40325

Models affected:

All 2450 models

Enhancement:

Add a CLEAR or ENTER parameter to the WAIT block of the trigger model.

The CLEAR of ENTER or NEVER was added the WAIT block on the trigger screen.

PR53815

Models affected:

All 2450 models

Enhancement:

Add a :TRIGger:LOAD command that takes a template name as a first argument

Old Command	New Command
:TRIGger:LOAD:EMPTy	:TRIGger:LOAD "Empty"
:TRIGger:LOAD:CONFiguration:LIST	:TRIGger:LOAD "ConfigList", <parameter list as before>
:TRIGger:LOAD:TRIGger:EXTernal	:TRIGger:LOAD "LogicTrigger", <parameter list as before>
:TRIGger:LOAD:LOOP:SIMPle	:TRIGger:LOAD "SimpleLoop", <parameter list as before>
:TRIGger:LOAD:LOOP:DURation	:TRIGger:LOAD "DurationLoop", <parameter list as before>
<not present>	:TRIGger:LOAD "LoopUntilEvent", <parameter list as before>
<not present>	:TRIGger:LOAD "GradeBinning", <parameter list as before>
<not present>	:TRIGger:LOAD "SortBinning", <parameter list as before>

Example:

before:

```
:TRIGger:LOAD:LOOP:DURation <duration>, <delay>, “<reading buffer>”
```

after:

```
:TRIGger:LOAD <duration>. <delay>, “<readingBuffer>”
```

Usage Notes:

- The template name is not case-sensitive
- The template name needs to be in quotes
- This makes the SCPI command more like the TSP equivalent trigger.model.load() command
- See the Reference Manual for more details

PR55190
AR42567

Models affected:

All 2450 models

Enhancement:

Change the Voltmeter default source range from 10uA to 10mA.

It order to speed things up, and to better measure voltages on more inductive loads, the default source range for the Voltmeter QuickSet has been changed from 10uA to 10mA.

PR56127 **Models affected:**

All 2450 models

Enhancement:

Add an API command to mark the start of a group for writable buffers.

A status optional parameter has been added to the following TSP and SCPI commands:

SCPI

```
TRACe:WRITe:READing <standard writable reading buffer>, <reading value>,
[<time sec>, <time nsec>,[<status>]]

TRACe:WRITe:READing <full writable reading buffer>, <reading value>,
<extra value>, [<time sec>, <time nsec>,[<status>]]
```

TSP

```
buffer.write.reading(<standard writable reading buffer>, <reading value>,
[<time sec>, <time nsec>], [<status>])

buffer.write.reading(<full writable reading buffer>, <reading value>,
<extra value>, [<time sec>, <time nsec>],[<status>])
```

The optional status parameter indicates if the reading being added is start of group for plotting on the graph. The default is 0. Set this to 0 if not start of group or set to 256 if start of group. This parameter only accepts 0 or 256 - any other value generates an error. For TSP, `buffer.STAT_START_GROUP` can be used to set it. You would set status to 256 to help graph a family of curve traces on the graph.

Noncritical Fixes

PR50249 **Models affected:**

All 2450 models

Symptom:

GPIB: The SRQ annunciator does not get lit for GPIB, works ok for USB and VXI-11.

Resolution:

This issue has been corrected.

PR50426 **Models affected:**

All 2450 models

Symptom:

Clearing Limit 2 will clear the Limit 1 annunciator on the display instead of the Limit 2 annunciator.

Resolution:

This issue has been corrected.

Known issues

Version v1.2.0f Release

Overview

Version 1.2.0f is the third official firmware upgrade release for the Model 2450. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 7-JAN-2015

Compatibility concerns

Firmware revision v1.2.0f can be installed on any vintage 2450.

Critical Fixes

AR40324
PR51382

Models affected:

All 2450 models

Symptom:

The limit values in trigger.BLOCK_BRANCH_LIMIT_CONSTANT are saved incorrectly in the Create Config operation.
Under certain conditions, limit values are saved as zero.

Resolution:

This issue has been corrected.

AR40457
PR51440
PR51987

Models affected:

All 2450 models, SCPI2400 mode only

Symptom:

Source Memory Sweep does not work properly when Source Auto Clear is enabled.

Resolution:

This issue has been corrected.

AR40488
AR40573
AR40575
PR51449

Models affected:

All 2450 models

Symptom:

Calibration date is set to 03/16/1996 after updating from v1.0.0i to v1.1.0s. This is due to the fact that a new field was added between v1.0.0i and v1.1.0s and the new field was not initialized properly.

Resolution:

This issue has been corrected and Calibration Date will be set to the old Calibration Adjust Date if not already initialized.

AR40579
PR51546

Models affected:

All 2450 models

Symptom:

Black bars appear across the bottom of the screen capture image.

Resolution:

This issue has been corrected.

AR40591
PR51537

Models affected:

All 2450 models

Symptom:

When capturing multiple screen shots in succession, the following error would sometimes occur.

```
2350   Internal: SPLAT! drop packet to input queue
```

Resolution:

This issue has been corrected.

AR41514
PR52399

Models affected:

All 2450 models

Symptom:

VISA Device Clear over USB sometimes causes timeout and data loss.

Resolution:

This issue has been corrected.

AR41552
PR52941

Models affected:

All 2450 models

Symptom:

Under certain test setups, *RST (and front panel reset) will cause voltage spike at the output.

Resolution:

Voltage spikes after *RST (and front panel reset) have been greatly reduced.

AR41757
PR53544
PR54481

Models affected:

All 2450 models

Symptom:

When sourcing current on the 100mA range or lower, and the instrument ranges up to the 1A range, the source value may be incorrectly rounded.

Resolution:

This issue has been corrected.

AR42086
PR54659 **Models affected:**

All 2450 models

Symptom:

When source read-back is turned off, the programmed source values are returned. If the programmed values are less than 1 volt, the returned values are incorrect due to rounding problems.

Resolution:

This issue has been corrected.

Enhancements

PR48621 **Models affected:**

All 2450 models

Enhancement:

Implement and document procedure for Clearing Memory and Data Sterilization for the Model 2450. This document can be requested from the Keithley Instruments Quality team.

PR53367 **Models affected:**

All 2450 models

Enhancement:

Add SCPI equivalent for `trigger.LOG_WARN_ABORT`.

added `ABORt` as the equivalent

```
trig:bloc:log:even 1, abort, "abort message"

trig:bloc:list?

LOG_EVENT EVENT: # 2733  MESSAGE: "abort message"
```

Noncritical Fixes

PR50249 **Models affected:**

All 2450 models

Symptom:

GPIB: The SRQ annunciator does not get lit for GPIB, works ok for USB and VXI-11.

Resolution:

This issue has been corrected.

PR50426 **Models affected:**

All 2450 models

Symptom:

Clearing Limit 2 will clear the Limit 1 annunciator on the display instead of the Limit 2 annunciator.

Resolution:

This issue has been corrected.

PR51390 **Models affected:**

All 2450 models

Symptom:

The command

```
value = display.input.prompt(display.BUTTONS_YESNO, “Do you want to
continue?”)
```

will cause the variable “value” to return `nil`.

Resolution:

This issue has been corrected.

PR51807 **Models affected:**

All 2450 models

Symptom:

Some measure attributes are not saved in the Measure Configuration List.

smu.measure.configlist.recall() does not restore the following attributes:

- Display digits
- Limit auto clear
- Math percent

- User delay (1 through 5)

If the filter is not enabled, the following attributes are not restored:

- Filter count
- Filter type

If relative offset is not enabled, the following attribute is not restored:

- Relative offset value

Resolution:

This issue has been corrected.

PR54651 **Models affected:**

All 2450 models

Symptom:

Changing the measure range low setting (used for auto-range) could result in incorrect operation if the range is higher than the active measure range.

Resolution:

This issue has been corrected.

Known issues

N/A

Version v1.1.0s Release

Overview

Version 1.1.0s is the second official firmware upgrade release for the Model 2450. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 14-FEB-2014

Compatibility concerns

This version of firmware cannot be installed on newer 2450 systems. Also, once any system is updated to firmware revision v1.2.0f or later, firmware version v1.0.0s can NEVER be installed again.

Critical Fixes

PR50333
AR39747

Models affected:

All 2450 models

Symptom:

2450 should not measure resistance with output off.
Because resistance measurements are dependent on the current or voltage source, resistance measurements with the source off are meaningless and will be confusing to the user.

Resolution:

This issue has been corrected. Once the output has been turned on/off once, the 2450 will display UNAVL (unavailable) in the upper right corner and the measurement fields will display dashes.

PR50703
AR39206

Models affected:

All 2450 models

Symptom:

The graph shows voltage drop as current instead of current when sourcing current and then selecting source as the Y-axis.

Resolution:

This issue has been corrected.

PR50704
AR39257

Models affected:

All 2450 models

Symptom:

When certain sequences of SCPI commands using the :TRIG:LOAD:LOOP command were sent, the 2450 would throw a Fatal System Error requiring a 2450 power cycle to recover.

Resolution:

This issue has been corrected.

PR50750
AR39364

Models affected:

All 2450 models

Symptom:

When setting up a source configuration list, in some cases the source configuration list screen on the front panel GUI will show a source limit value of “None” if a config list point is selected.

Resolution:

This issue has been corrected.

PR50860
AR39658

Models affected:

All 2450 models

Symptom:

When zooming in on the graph, the magnitude of the data changes incorrectly. Sometimes the actual graph area of interest will scroll out of sight.

Resolution:

This issue has been corrected. The overall graph zooming capability has been dramatically improved.

PR50998
AR39795

Models affected:

All 2450 models

Symptom:

In certain cases, when setting up a Dual Sweep, the last point of the Source Configuration List is incorrect.

Resolution:

This issue has been corrected.

PR51005
AR39859

Models affected:

All 2450 models

Symptom:

There was an inconsistency in the *CLS command behavior with SCPI and 2400SCPI modes. In SCPI and 2400SCPI modes, the Output Queue was not always cleared properly. In TSP mode, the command sometimes returned Error Code -410 Query Interrupted or Error Code -420 Query Unterminated.

Resolution:

This issue has been corrected.

PR51046
AR39957

Models affected:

All 2450 models

Symptom:

When a Source Configuration List is generated in the Trigger Flow Model, everything works OK. When the Source Configuration List is saved and then recalled, the 2450 sometimes returns the Error Code -221 Conflict Error because the Currrent Range of all of the Source Points is always saved to the 100uA range.

Resolution:

This issue has been corrected.

PR51263
AR40267

Models affected:

All 2450 models

Symptom:

Sometimes, the Abort on Source Limit setting does not work when the 2450 performs Voltage Sweeping and reaches the Source Limit.

Resolution:

This issue has been corrected.

PR51051
AR40159

Models affected:

All 2450 models

Symptom:

Extra Current Steps occur between Current Source Range transitions when using the Source Configuration List.

Resolution:

This issue has been corrected.

PR51186
AR39968

Models affected:

All 2450 models

Symptom:

2450 crashes after long period of time running through LabVIEW™.

Resolution:

This issue has been corrected.

Enhancements

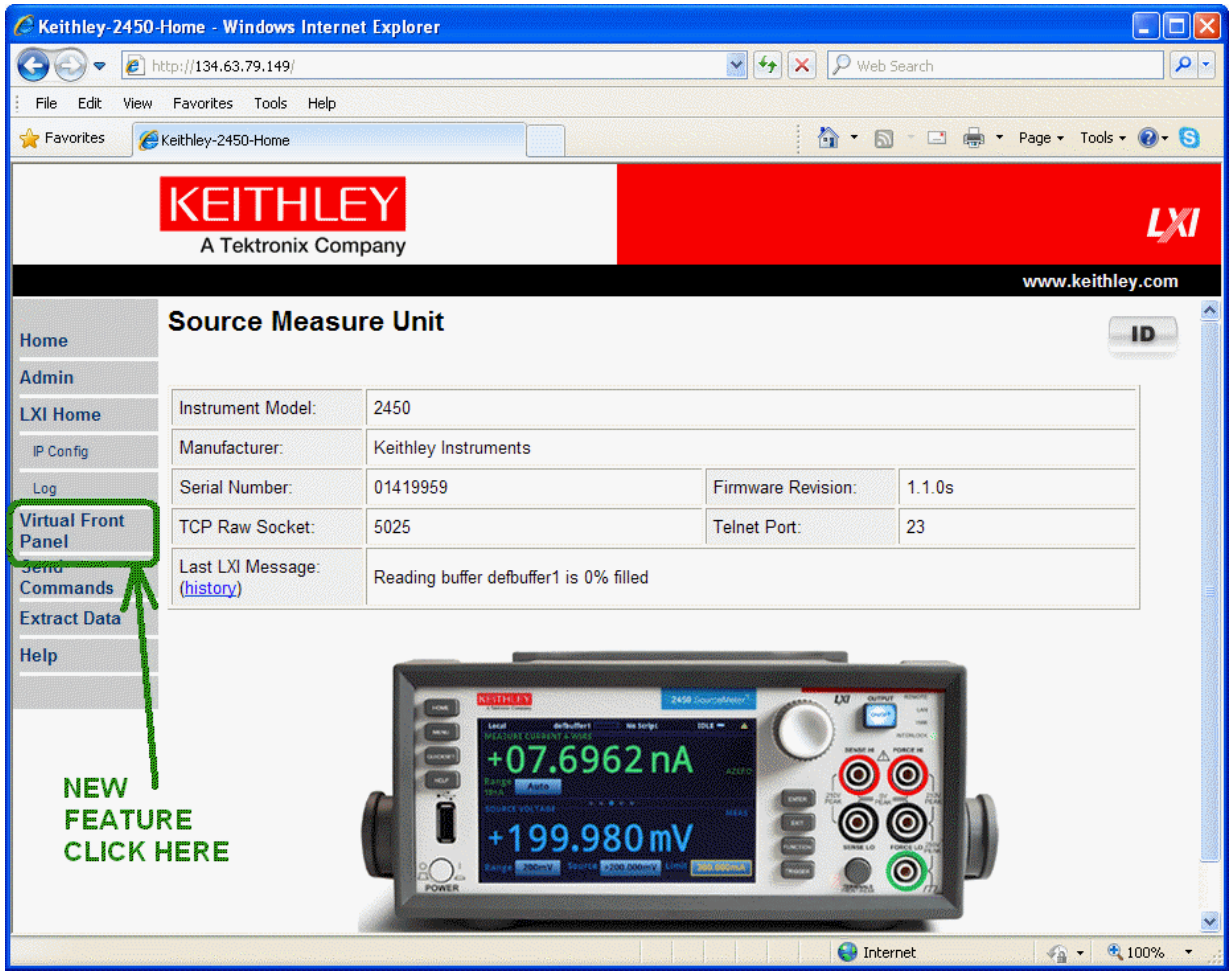
PR50774 **Models affected:**

All 2450 models

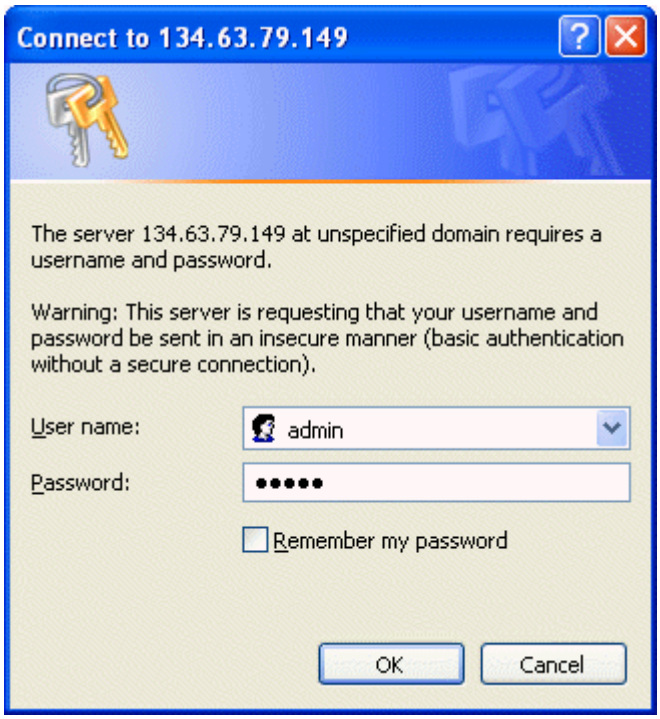
Enhancement:

Implement new Virtual Front Panel capability.

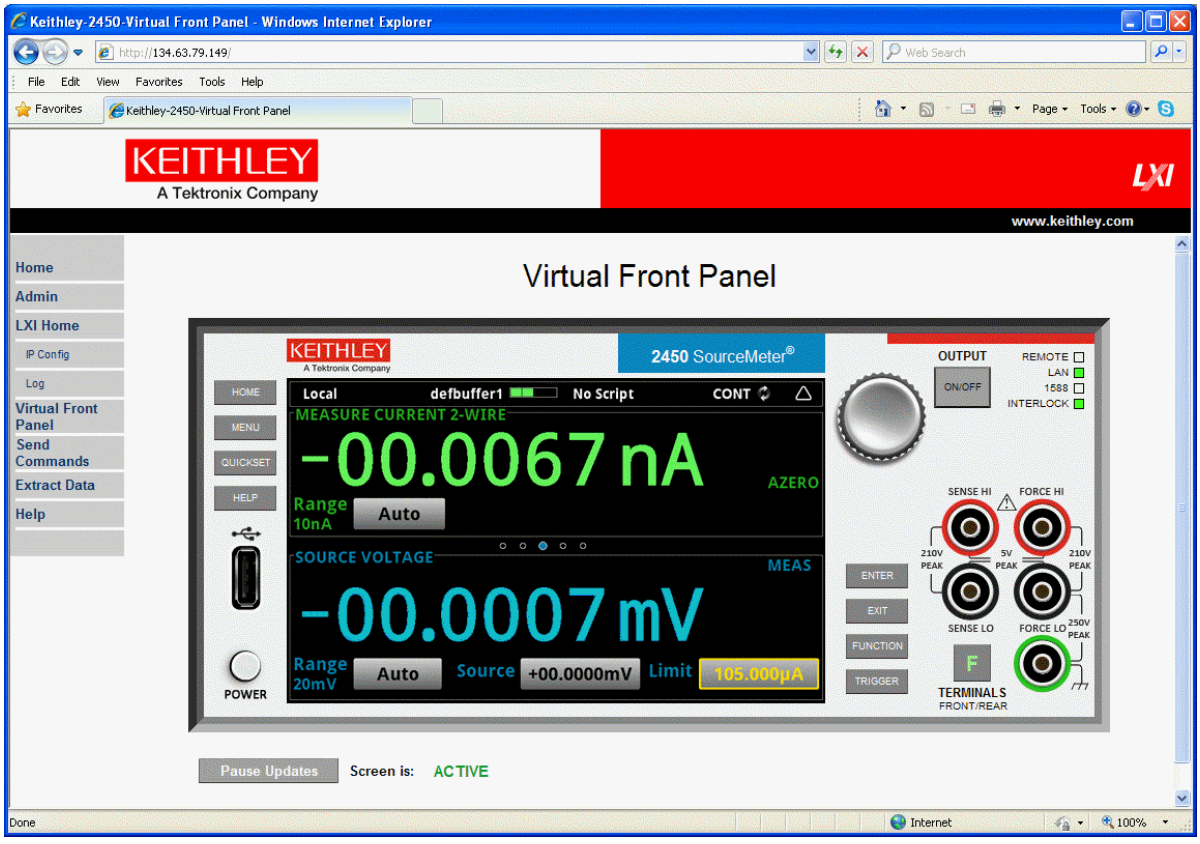
To access the new Virtual Front Panel, access the 2450 through Ethernet using your favorite Internet browser.



When asked for a Username and Password: enter the Username and Password for that particular 2450. The default Username is `admin` and the default Password is `admin`.



An example of the 2450 Virtual Front Panel is shown below. Users can use their mouse from a standard PC to control the instrument. Users can also use touch screens from most touch screen devices that can access the 2450 IP address.



PR50906 **Models affected:**

All 2450 models

Enhancement:

2450 Quick Start Guide, User Manual, and Reference Manuals have all been updated.

The 2450 Release Notes for Firmware Revision v1.1.0s have also been updated and are available at the Keithley Instruments, Inc. website.

Click Here ➔ http://www.keithley.com/products/dcac/currentvoltage/2450smu/?path=2450/Documents

PR50231 **Models affected:**

All 2450 models

Enhancement:

Implement and document procedure for Customer onsite Calibration of Model 2450.

This capability is scheduled to be available late Q1'2014. Please check back at www.keithley.com for updates in early April 2014.

PR48744 **Models affected:**

All 2450 models

Enhancement:

Provide capability for customers to save screen capture files from the front panel to the USB Flash Drive.

This capability is documented in Rev-C of the 2450 Reference Manual in Section 2 Page 44 (2-44).

In short, with a valid USB Flash Drive inserted into the front USB port of the 2450, press the <HOME> and <ENTER> keys simultaneously and the current screen image will be saved to the USB Flash Drive.

PR50657 **Models affected:**

All 2450 models

Enhancement:

The maximum number of characters allowed for naming a Reading Buffer on the front panel GUI was 18 characters. The bus commands allow up to 32 characters. The GUI maximum number of characters has been updated to 32 to match the bus command limit.

PR50662 **Models affected:**

All 2450 models

Enhancement:

Add a password verification method to the 2450 GUI.

When changing the 2450 system password, the user will be prompted to enter the password a second time. The second entry will be used to verify that the first and second passwords match and that the intended password has indeed been entered. If the two passwords do not match, an error dialog is displayed and the users is instructed to try again.

PR50758 **Models affected:**

All 2450 models

Enhancement:

Scripts can be written in TSB and downloaded to the model 2450. However, scripts do not enable the user to input values from the front panel. The 26xx family of SMUs allows users to input values into their scripts real time.

Starting with firmware revision v1.1.0s, functionality has been added to the 2450 that allows users to input values into the scripts real-time from the front panel.

The new commands are as follows:

```
display.input.number()
display.input.option()
display.input.prompt()
display.input.string()
```

These commands are documented in Rev-C of the 2450 Reference Manual in Section 8 Page 51 (8-51).

PR50866 **Models affected:**

All 2450 models

Enhancement:

The 2450 System Information window has been updated to show calibration adjustments vs. calibration without adjustment dates. The System Information window now presents these dates as follows.

Adjust Date	11/19/2013
Adjust Count	1
Calibration Date	4/17/2014

PR50876 **Models affected:**

All 2450 models

Enhancement:

The behavior of the *LANG? command on the 2450 has been changed as follows.

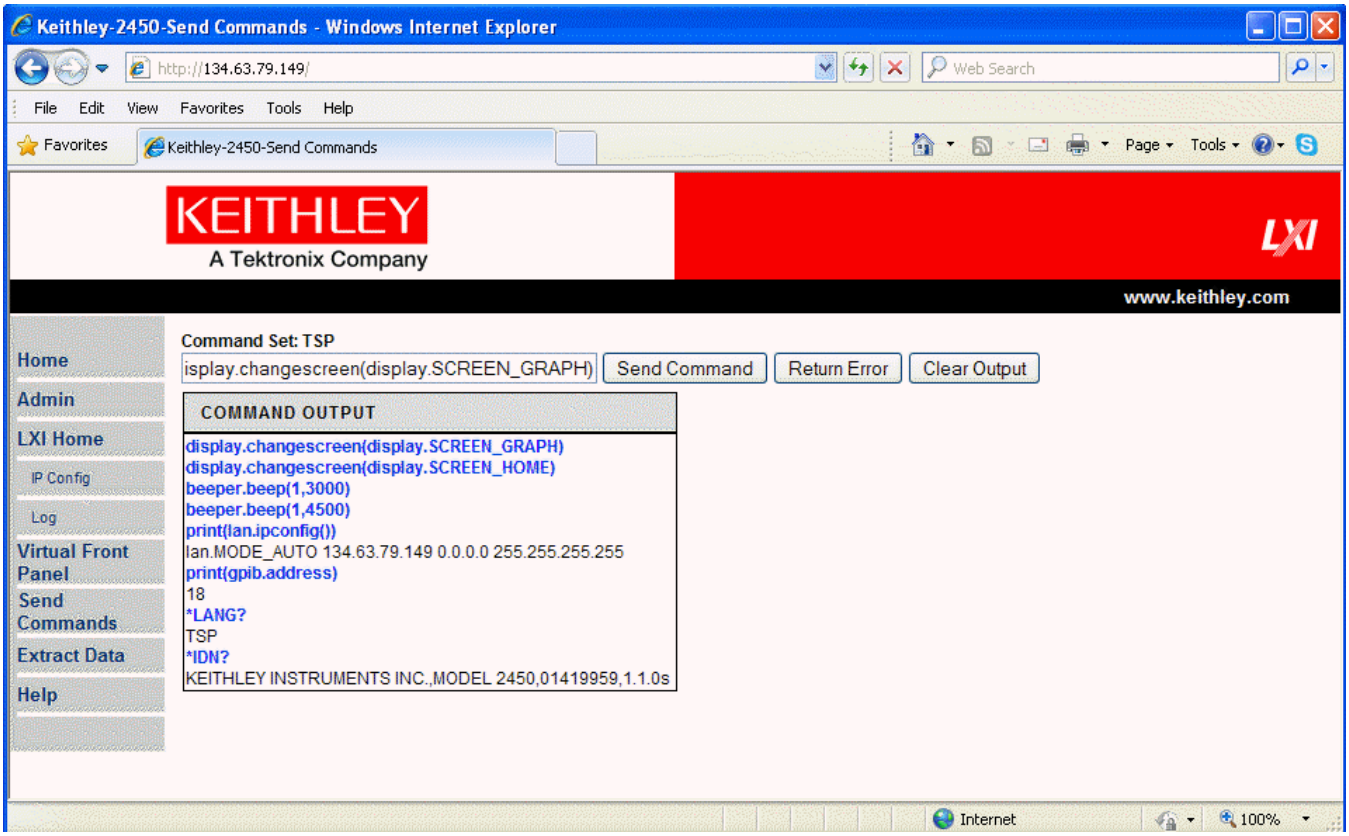
Sending the query *LANG? over a non-controlling interface will no longer change the interface control of the unit. For example, if the unit is under local control, then sending the *LANG? over Telnet, USB, or GPIB will leave the unit under local control. This was done in order for KickStart (or any other remote control software) to query connected/accessible instruments without resetting them or changing or disturbing the current trigger model.

PR51248 **Models affected:**

All 2450 models

Enhancement:

The 2450 built-in webpage has been enhanced to show a historical list of commands recently sent to the instrument. This new COMMAND OUTPUT window has been added to the Send Commands section of the webpage.



PR51249 **Models affected:**

All 2450 models

Enhancement:

The 2450 built-in webpage has been enhanced. A new button “Return Error” has been added to allow users to easily query the last unread error number and error message. This new functionality works in both TSP and SCPI modes.

Noncritical Fixes

PR50285 **Models affected:**

All 2450 models

Symptom:

On the Manage Scripts window, the Left Arrow and Delete buttons remain enabled and active even after a USB Flash Drive has been removed from the instrument.

Resolution:

This issue has been corrected.

PR50404 **Models affected:**

All 2450 models

Symptom:

TSP-Link reset or initialization may consistently fail on some 2450 units. The unit being reset may ignore the reset, stop responding to bus commands, and/or display “Slave” in the Communication Status Indicator.

Resolution:

This issue has been corrected.

PR50670 **Models affected:**

All 2450 models

Symptom:

The LAN Reset button on the back of the 2450 failed to reset the system password.

Resolution:

This issue has been corrected and the system password is reset to the default, **admin**.

PR50772 **Models affected:**

All 2450 models

Symptom:

Offset Compensation for SVMI (ohms) and Offset Compensation for SIVM (ohms) did not perform the offset measurement correctly.

Resolution:

This issue has been corrected.

PR50785 **Models affected:**

All 2450 models

Symptom:

On the Trigger Flow Screen, the default Bit Pattern and Bit Mask show 255. Since there are only 6 trigger lines on the 2450, the maximum Bit Pattern should be no more than 63.

Resolution:

This issue has been corrected. The maximum value for Bit Pattern is now 63. The maximum value for Bit Mask remains 255.

PR50786 **Models affected:**

All 2450 models

Symptom:

Digital I/O Trigger blocks behavior functionality was not correct.

Resolution:

For Digital I/O Trigger blocks, as the mask setting changes, any bits that are set to 1 will have the corresponding Digital I/O line set to Digital I/O Output Mode. For bits set to 0, those corresponding Digital I/O line modes remain unchanged.

PR50899 **Models affected:**

All 2450 models

Symptom:

The default value for Source Current Range displayed on the front panel does not match the actual Source Current Range value.

Resolution:

The default Current Source Range is now 10nA in (2450) SCPI mode.

PR50903 **Models affected:**

All 2450 models

Symptom:

Source Current and Source Voltage Levels have incorrect Min and Max Values.
`:SOURce[1]:CURRent[:LEVel][:IMMediate][:AMPLitude]`reports that the minimum acceptable value is -1.00 and maximum is 1.00 when they should be -1.05 and 1.05, respectively.

Resolution:

This issue has been corrected.

PR50979 **Models affected:**

All 2450 models

Symptom:

If a Sweep Function encounters a Source Limit Value Event, the Source will not turn off.

Resolution:

This issue has been corrected. The 2450 will now automatically turn off the Source Output if a Source Limit Event occurs.

PR51033 **Models affected:**

All 2450 models

Symptom:

Sending `*IDN?` over USB TMC causes the unit to switch into USBTMC control instead of staying with the current active interface. It also puts the trigger model back into IDLE mode.

Resolution:

This issue has been corrected.

PR51205 **Models affected:**

All 2450 models

Symptom:

ICL command “display.changescreen()” can lock up after the command “reset()” is called over and over again.

Resolution:

This issue has been corrected.

Known issues

PR48636 Model 2450 does not respect a USB Flash drive file that is read only.

Models affected:

2450

Symptom:

The 2450 will write over read-only files on flash drives. For example, if the 2450 attempts to write to file aaa.txt and aaa.txt is marked read-only, the 2450 will rewrite file aaa.txt without warning. This problem does NOT suggest the 2450 randomly overwrites arbitrary files on a flash drive.

Workaround:

There is no known workaround for this issue at this time.

PR49308 `trigger.BLOCK_BRANCH_COUNTER` loop without a measure or delay block appears to hang.
SCPI: `:TRIGger:BLOCk:BRANch:COUNter`
TSP: `trigger.model.setblock() with trigger.BLOCK_BRANCH_COUNTER`

Models affected:

2450

Symptom:

When running a tight trigger loop without a measurement or delay in the sequence, the 2450 will be unresponsive until the loop ends.

Workaround:

Add any measurement or short delay in the trigger loop and the 2450 will perform normally. A future firmware release will work around this problem automatically.

Version v1.0.0i Release

Overview

Version 1.0.0i is the initial firmware release for the Model 2450. No fixes are listed since this is the very first firmware release. Known Issues, Usage Notes, and Upcoming Enhancements are listed below in this document.
RELEASED 31-JUL-2013

Compatibility concerns

This version of firmware cannot be installed on newer 2450 systems. Also, once any system is updated to firmware revision v1.2.0f or later, firmware version v1.0.0i can NEVER be installed again.

Critical fixes

N/A

Enhancements

N/A

Noncritical fixes

N/A

Known issues

PR48636 Model 2450 does not respect a USB Flash drive that is read only.

Models affected:

2450

Symptom:

The 2450 will write over read-only files on flash drives. Specifically, if the 2450 attempts to write to file aaa.txt and aaa.txt is marked read-only, the 2450 will rewrite file aaa.txt without warning. This problem does NOT suggest the 2450 randomly overwrites arbitrary files on a flash drive.

Workaround:

There is no known workaround for this issue at this time.

PR49308 `Trigger.BLOCK_BRANCH_COUNTER` loop without a measure or delay block causes hang.
SCPI: `:TRIGger:BLOCk:BRANch:COUNter`
TSP: `trigger.model.setblock() with trigger.BLOCK_BRANCH_COUNTER`

Models affected:

2450

Symptom:

When running a tight trigger loop without a measurement or delay in the sequence, the 2450 will be unresponsive until the loop ends.

Workaround:

Simply add any measurement or short delay in the trigger loop and the 2450 will perform normally. A future firmware release will work around this problem automatically.

PR49812 MANUAL: Better explanation of sweep delay needed.

Models affected:

All 2450

Symptom:

Recent changes to the sweep commands did not get added to the 2450 Reference Manual in time for first release.

Workaround:

The sweep commands accept a delay setting of 0 for no delay, -1 for auto delay (excluding the list command), or constant value between 50 us and 10000 s.

The TSP sweep commands are:

```
smu.source.sweeplinear()
smu.source.sweeplinearstep()
smu.source.sweeplist()
smu.source.sweeplog().
```

The SCPI sweep commands are :

```
:SOURce[1]:SWEep:<function>:LINear
:SOURce[1]:SWEep:<function>:LINear:STEP
:SOURce[1]:SWEep:<function>:LIST
:SOURce[1]:SWEep:<function>:LOG
```

For `smu.source.sweeplist()` and `:SOURce[1]:SWEep:<function>:LIST`, the delay setting configures a constant delay trigger block in the trigger model.

A delay of zero omits the trigger block.

The configuration list delay settings act independently of the delay specified in the command. Therefore, a double delay may result by utilizing both.

The next version of the 2450 Reference Manual will be updated.

PR49835 Recalling measure configuration list causes error 823.

Models affected:

All 2450

Symptom:

When recalling the measure configuration list before the source configuration list, the error code 823 may be displayed.

Workaround:

When recalling both source and measure configuration lists, always recall the source configuration list before the measure. This order ensures that dependencies between source and measure settings will be properly handled.

PR49885 MANUAL: Source delay is incorrect for default settings and resistance measure function.
SCPI: `:SOURce[1]:<function>:DELay`
TSP: `smu.source.delay`

Models affected:

All 2450

Symptom:

In the 2450 Reference Manual, the documentation for the command `smu.source.delay` claims the default setting is .001. This is NOT TRUE. There is no default value for the command `smu.source.delay` and if queried without being set, will return the last auto delay setting.

The manual also states “If you turn auto delay back on, the programmed source delay value is added to the auto delay time.” This is also incorrect.

Workaround:

Make sure to set an initial value for `smu.source.delay.`

The next version of the 2450 Reference Manual will be corrected.

PR49892 Changes to the Reference Manual.

Models affected:

All 2450

Symptom:

A number of miscellaneous late changes were not added in time to Rev-A revision of the 2450 Reference Manual. Some of the key issues have been documented here.

A) The following commands have been removed from the product:

SCPI: `SYSTem:BEEPer:STATe`
TSP: `beeper.enable`

These commands have been used in various places in the manual and in documented examples. These references will be removed in the next revision of the manual. No substitute commands have been provided.

B) Digital I/O behavior:

a. For digital I/O lines, changing the line mode to input will set the line state high.

b. For digital I/O lines, changing the line mode to output will set the line state low.

c. When configuring digital I/O, the output side of the line should be configured before the input side to avoid a false input trigger detection

C) Using the reset() command:

a. On page 3-125 in the Reference Manual, the following NOTE is INCORRECT. The command `tsplink.initialize()` DOES change the states of the individual nodes in the system.

NOTE

Using the `reset()` command in a TSP-Link network differs from using the `tsplink.reset()` or `tsplink.initialize()` command. The `tsplink.reset()` or `tsplink.initialize()` command reinitializes the TSP-Link network, but does not change the state of the individual nodes in the system.

D) Resistance Mode Changes: Auto Ohms vs. Manual Ohms:

a. Significant changes were made to the way resistance mode was documented in Revision A of the 2450 Reference Manual. Below is a summary of differences in the Reference Manual vs. the actual implementation. The Reference Manual will be updated to reflect these changes in Revision B of the 2450 Reference Manual.
Sections affected are 2-91, 6-46, 8-116, and 9-14.

b. The term “Auto Ohms” has been removed from the user interface. The user interface now presents “Ohmmeter” as a One-Touch Quick Setup (see diagram below).

c. The term “Manual Ohms” has been removed from the user interface. The user interface now presents “Resistance” as a Measure function vs. Voltage or Current Source (see diagram below).

d. The following commands have been eliminated

i. `[SENSe[1]]:RESistance:MODe AUTO | MANual` (SCPI, section 6-46)

ii. `smu.measure.resistancemode = smu.RESISTANCE_AUTO` or `smu.RESISTANCE_MANUAL` (TSP, section 8-116)

e. The following existing commands have a new argument as follows

i. `[SENSe[1]]:<function>:UNIT WATT | OHM | VOLT | AMP` (section 6)

ii. `smu.measure.unit = <WATT> <OHM> <VOLT> <AMP>`

f. New TSP Command Usage:

i. “Manual Ohms” ➔ Measures resistance by sourcing voltage, measuring current, and calculating the resistance reading.

- `smu.source.func = smu.FUNC_DC_VOLTAGE`
- `smu.measure.func = smu.FUNC_DC_CURRENT`
- `smu.measure.unit = smu.UNIT_OHM`

OR

- `smu.source.func = smu.FUNC_DC_CURRENT`
- `smu.voltage.func = smu.FUNC_DC_VOLTAGE`
- `smu.measure.unit = smu.UNIT_OHM`

ii. “Auto Ohms” ➔ Measures resistance by sourcing current, measuring voltage, and calculating the resistance reading. In this case, the source current and source limit are automatically calculated and set.

- `smu.measure.func = smu.FUNC_RESISTANCE`

g. New SCPI Command Usage:

i. “Manual Ohms” (see definition above)

- `SOURce:FUNC VOLTage`
- `[SENSe[1]]:FUNC “CURRent”`
- `[SENSe[1]]:CURRent:UNIT OHM`

OR

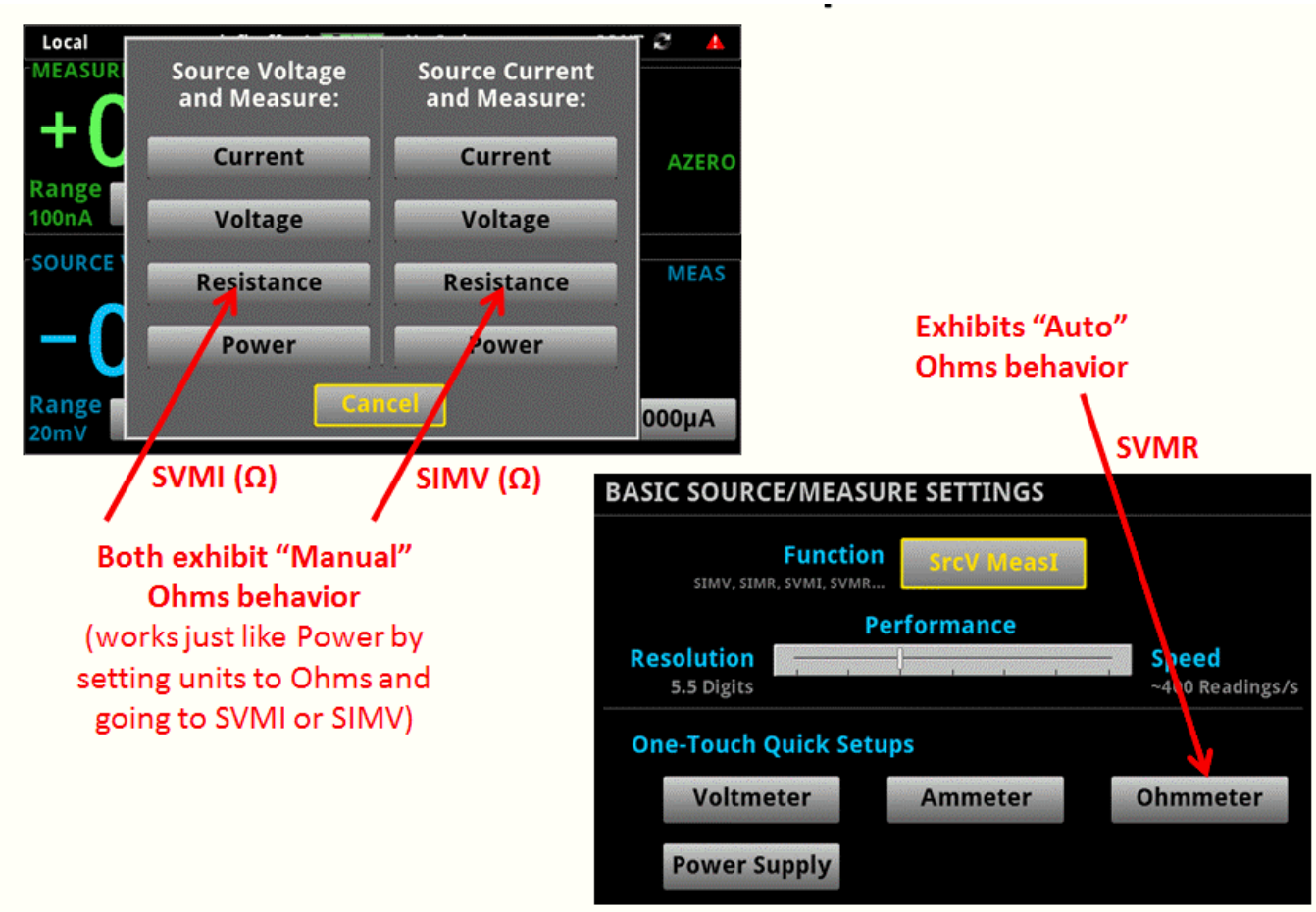
- `SOURce:FUNC CURRent`
- `[SENSe[1]]:FUNC “VOLTage”`
- `[SENSe[1]]:VOLTage:UNIT OHM`

ii. “Auto Ohms” (see definition above)

- `[SENSe[1]]:FUNC “RESistance”`

h. Front panel user interface setting of Manual vs. Auto Ohms measurements

<see the following figure for details>



PR49955 Cannot repeatedly reconnect with LAN triggers.

Models affected:

All 2450

Symptom:

Certain scripts (where LAN connections are quickly and repeatedly disconnected and reconnected in rapid succession) may cause a failed connection.

Workaround:

Due to limited socket resources, the safest rate of making LAN connections is 1 connection per second. If there is need for more than one LAN connection per second, the total number of socket resources available is approximately 180, and after a socket is closed, it will take 2 minutes to become available again.

PR50042 MANUAL: TSP-Link mode command only supports open drain.

Models affected:

All 2450

Symptom:

In the 2450 Reference Manual, the documentation erroneously states that the TSP command `tsplink.line[N].mode` accepts the following parameters:

```
tsplink.MODE_DIGITAL_IN
tsplink.MODE_DIGITAL_OUT
tsplink.MODE_TRIGGER_IN
tsplink.MODE_TRIGGER_OUT
```

Workaround:

Do not use the parameters listed above in the command `tsplink.line[N].`

The next version of the 2450 Reference Manual will be corrected.

PR50188 MANUAL: The source sweep list function does not support `smu.DELAY_AUTO.`

Models affected:

All 2450

Symptom:

In the 2450 Reference Manual, the documentation incorrectly states that the source sweep list function supports the setting `smu.DELAY_AUTO`.

Workaround:

Do not use the setting -1 for delay in the following command:

`:SOURce[1]:SWEep:<function>:LIST`

Do not use the setting **`smu.DELAY_AUTO`** in the following command:
`smu.source.sweeplist()`

The next version of the 2450 Reference Manual will be corrected.

PR50228 The `display.screen` command has been changed.

Models affected:

All 2450

Symptom:

The TSP attribute command, `display.screen`, has been replaced with a TSP function, `display.changescreen()`. The parameters to the new function are the same that `display.screen` previously took as a set attribute.

The SCPI query command `DISPlay:SCReen?` does not exist.
The `DISPlay:SCReen` command is only intended to change the screen view NOT to query which view is active

Workaround:

N/A

PR50231 Need to Add Customer Calibration.

Models affected:

All 2450

Symptom:

Because the 2450 added two lower current ranges and one lower voltage range, existing 2400 customer calibration hardware will not work on the 2450. Keithley is working on a recommended customer calibration equipment list, but for now, customer calibration of the 2450 is not supported.

Workaround:

Keithley plans to support customer calibration within six months after shipping the initial Model 2450. Please see www.keithley.com for updates.

PR50350 Trying to print beyond buffer dimensions causes timeout for new buffer.

Models affected:

All 2450

Symptom:

Attempting to print buffer elements that are outside the range of `[1, bufferVar.n]` may cause a script to hang or a bus command to timeout.

Workaround:

Prior to using `print()` command with a buffer or `printbuffer()`, the elements or bounds provided should be checked to ensure that they are between 1 and `bufferVar.n`, inclusively.

PR50378 Config lists generated by the sweep API don't get saved to the config script.

Models affected:

All 2450

Symptom:

Changes made to source config lists generated using the sweep API are not retained when saving the configuration.

Workaround:

Move all points in the config list generated using the sweep API to a new config list. This can be accomplished by first, creating a new config list. Next, iteratively recall each point from the sweep config list and store it to the new config list. Then delete the config list generated by the sweep API. Finally, build a custom trigger model that uses the new config list.

PR50379 Customer trigger model is overwritten when restoring pre-boxed sweep.

Models affected:

All 2450

Symptom:

Changes made to trigger models generated using the sweep API are not retained when saving the configuration.

Workaround:

Move all points in the config list generated using the sweep API to a new config list. This can be accomplished by first, creating a new config list. Next, iteratively recall each point from the sweep config list and store it to the new config list. Then delete the config list generated by the sweep API. Finally, build a custom trigger model that uses the new config list.

PR50404 TSP-Link does not reset properly on some units.

Models affected:

All 2450

Symptom:

TSP-Link reset or initialization may consistently fail on certain units. The unit being reset or initialized may ignore the reset or initialization command, stop responding to bus commands, and/or display "Slave" in the communications status indicator.

Workaround:

If the reset or initialization command is ignored, try calling it again. It may necessary to repeat this action up to ten times. If the command causes a time-out for bus communications and/or "Slave" is

displayed in the communications status indicator for the unit being reset or initialized, then it is necessary to choose a different unit to be the TSP-Link master.

PR50497 SCPI command syntax checking: Error is not generated if parameter is not valid long or short form of the specified command.

Models affected:

All 2450

Symptom:

The 2450 fails to generate an error when the parameter to a SCPI command does not match either the short or long form of the parameter being specified. Instead, the unit will accept any number of characters between the short and long form as being valid. For example, in the following list, only the first two examples should be allowed, however, the additional four examples are being accepted as valid. In a future firmware release, the additional four examples will generate an error message.

COMMAND	v1.0.0 Firmware	Future Firmware
`:SYSTem:EVENtlog:COUNt? INF`	OK	OK
`:SYSTem:EVENtlog:COUNt? INFORMATIONAL`	OK	OK
`:SYSTem:EVENtlog:COUNt? INFO`	OK	SYNTAX ERROR
`:SYSTem:EVENtlog:COUNt? INFORM`	OK	SYNTAX ERROR
`:SYSTem:EVENtlog:COUNt? INFORMAT`	OK	SYNTAX ERROR
`:SYSTem:EVENtlog:COUNt? INFORMATION`	OK	SYNTAX ERROR

Workaround:

Only send a valid short or long form of the SCPI command parameter. Based on the example listed, send either INF or INFORMATIONAL for the related command. This will avoid new syntax errors when upgrading to new 2450 firmware in the future.

PR51449 Calibration Date is set to 03/16/1996 after updating 1.0.0i to 1.1.0s.

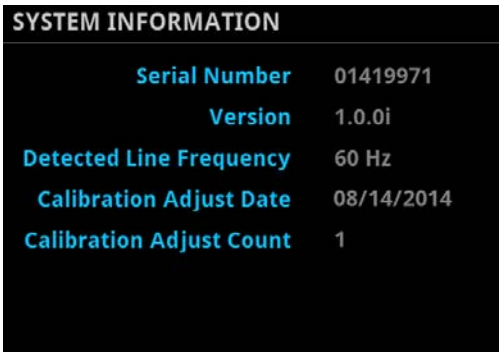
Models affected:

All 2450

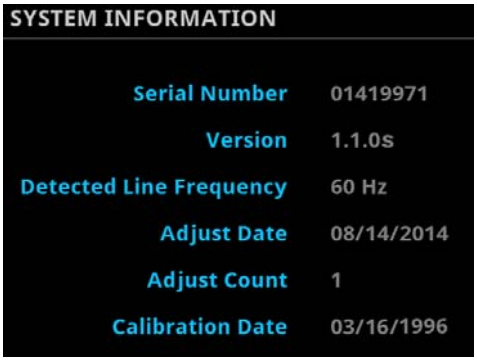
Symptom:

After upgrading the 2450 firmware from version v1.0.0i to v1.1.0s, the Calibration Date is 03/16/1996. Do NOT be alarmed. This issue has NO IMPACT on calibration and calibration values. The issue is that from v1.0.0i to v1.1.0s, a new date field was added and it has not been initialized properly. Also, the date headings have also changed to differentiate between Adjust Date and Calibration Date (e.g. Verification Date). See the diagrams below.

v1.0.0i firmware



v1.1.0s firmware



Before, there was only one date field named “Calibration Adjust Date.” This was the date that the 2450 was last calibrated WITH adjustment. Starting with the v1.1.0s firmware, a new date named “Calibration Date” was added to display and differentiate between the Adjust Date and Calibration (without adjust) Date. The new “Adjust Date” is the same field as the old “Calibration Adjust Date.” The new “Calibration Date” is brand new field and this will be the date the 2450 was last calibrated WITHOUT adjustment. Since the new “Calibration Date” field did not exist with v1.0.0i firmware, this new date is un-initialized and has defaulted to 03/16/1996. Again, this has zero impact on the original factory calibration and does not impact the factory stored calibration constants in any way.

Workaround:

This date will be properly set the next time the 2450 is returned to Keithley or a designated field service office for recalibration. If you insist on updating the “Calibration Date” to equal the “Adjust Date”, please refer to the “Model 2450 Interactive SourceMeter Calibration Manual.” This manual can be found at www.keithley.com. The document is 2450-905-01.