S530/S535/S540 KTE Version 5.8.2
Release Notes

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Contents

General information

Overview

Keithley Test Environment (KTE) version 5.8.2 is service release containing many bug fixes in KTE as well as the instrument-level firmware. Please be sure to verify each instrument below is flashed with the latest firmware version listed in the Supported Firmware table.

> ## NOTE
>
> **IMPORTANT: KTE version 5.7.0 released new firmware for the Keithley DMM7510 Multimeter. You must flash the DMM7510 after installing KTE 5.7.0 or later.**
>
> **KTE version 5.6.5 released new firmware for the Keithley 707B Switch Matrix Mainframe. You must flash the Keithley 707B switch matrix if upgrading from any version earlier than KTE version 5.6.5.**
>
> **Between the releases of KTE version 5.6.0 and KTE version 5.6.5, the firmware for the Model 2410 1100 V SMU was changed from C32 to C33. These firmware changes do not affect the S530, and updating the firmware from C32 to C33 is optional.**

Starting with KTE version 5.6, KTE requires the minimum firmware version listed in the table below for the Model 2636 source-measure unit (SMU). KTE version 5.6 will not run if the SMU firmware is not the proper version.

Supported firmware

	2636A SMU	2636B SMU	2410 HV SMU	707B Matrix	7510 DMM	2450 (S535 controller only)	2657A (S540 only)	HVM1212 (S540 only)	2461-SYS (S535 only)
KTE version 5.8.1 or later	2.2.7	3.3.5	C33	1.04c	1.6.7d	1.6.7c	1.1.8	5.0.507	1.6.7c
KTE version 5.8.0	2.2.7	3.3.2	C33	1.04c	1.6.6s	1.6.6s	1.1.6	5.0.407	1.6.6s
KTE version 5.7.0	2.2.6	3.2.2	C33	1.04c	1.6.4c	Not supported	1.1.6	5.0.407	Not supported
KTE version 5.6.5	2.2.6	3.2.2	C33	1.04c	1.6.1a	Not supported	Not supported	Not supported	Not supported
KTE version 5.6.0	2.2.6	3.2.2	C32	1.03h	1.3.0s	Not supported	Not supported	Not supported	Not supported
KTE version 5.5.1	2.2.5	3.1.0	C32	1.03h	Not supported	Not supported	Not supported	Not supported	Not supported

NOTE

KTE version 5.5.1 and later requires a compatible version of S530-PM-200 protection modules in your S530 system. Compatible versions are S530-PM-200 with "Waiver 8243" label or later, or S530-PM-200 with a "1.0" sticker. S530 systems that shipped from the factory with KTE version 5.5.0 or later already include compatible protection modules. S530 systems in the field that are being upgraded from a version earlier than KTE version 5.5.0 must have their protection modules replaced with compatible versions.

Starting with KTE version 5.7.0, Keithley began shipping S530-PM-200 version 2.0 protection modules. Keithley recommends that all S530-PM-200s are the same version.

As of KTE v5.8.1, the latest version of the S530-PM-200 protection module is version 2.4.

Contact your field service engineer (FSE) for more information.

Version 1.0 and earlier protection modules

Version 2.0 protection modules (started shipping with KTE version 5.7.0)

Version 5.8.2 release

S530 KTE version 5.8.2 software includes all items from previous releases and the following items. KTE version 5.8.2 supports S530, S535, and S540.

Enhancements

SYS-895   Added a new module to `KI_Multisite` called `multi_site_get_row_col()`. Add the following line of code shown below to a Keithley test module (KTM) to retrieve multisite row and column site location values.

```
multi_site_get_row_col(siteRow, siteCol);
```

Make sure that multisite is enabled for this function to work properly.

Models affected:
S535

SYS-899   Added a new environmental variable `KI_KULT_BUILD_MULTI`. When building the included multisite usrlib `KI_MultiSite` or building any user-generated multisite usrlib, set the environmental variable to `1` before opening the Keithley User Library Tool (KULT). For example:

```
setenv KI_KULT_BUILD_MULTI 1
kult &
```

Models affected:
S535

Critical fixes

SYS-879   Data pool entries `total_sites` and `site_tested` were not being properly updated when in multisite mode. This issue has been fixed in KTE v5.8.2.

Models affected:
S535

SYS-885   When running tests over a long period of time using the 2461-SYS, a memory leak caused normal test times to become two to three times slower.

This issue was introduced in KTE v5.8.0 has been fixed in KTE v5.8.2.

Models affected:
S535

SYS-887
SYS-889

A problem with the KTE installer caused an error when installing KTE v5.8.1 onto older S530 systems running CentOS 5.5. The error generated is as follows:

```
cat: /etc/centos-release: No such file or directory

expr: warning: unportable BRE: `^CentOS.*release.\\(7\\)\\.\\d*': using `^'
as the first character
of the basic regular expression is not portable; it is being ignored
```

This issue was introduced in KTE v5.8.1 and has been fixed with KTE v5.8.2.

Models affected:
S530

SYS-891

A Keithley Test Execution Engine (KTXE) performance issue has been repaired. When running thousands of sites in KTXE, memory usage would increase and CPU usage would go up to 90% or more.

This issue was introduced in KTE v5.8.0 and has been fixed in KTE v5.8.2.

Models affected:
S530, S535, S540

SYS-897

An issue was repaired that prohibited diagnostics from running on older S530 systems running CentOS 5.5.

This issue has been fixed with KTE v5.8.2

Models affected:
S530

SYS-900

An issue was repaired that failed to populate the Keithley data file (KDF) correctly when running in dual-site mode and one of the sites is aborted programmatically.

This issue has been fixed in KTE v5.8.2

Models affected:
S535

Known issues

PR48208	Using the `avgc` command with the CMTR may fail when large numbers of samples are requested (>3000, for example). The workaround is to request fewer samples.
PR50937	Be aware that the `secnds()` and `imeast()` functions (used for timing) show variation in repeatability due to normal variations in execution time on the Linux® operating system. Variations of several tens of milliseconds should be expected. Based upon observations, the `imeast()` function seems to produce more consistent results.
PR51287	Older S530 sensitive systems configured for 2-wire mode may incorrectly report failures when KTE v5.5.0 or later diagnostics are run. Diagnostic failures on 2-wire sensitive systems should be manually double-checked using standard troubleshooting techniques.
PR51296	Under certain circumstances libraries extracted from version control using the recipe manager will fail. A temporary workaround is to add an additional module (it can be an empty module) to the library.
PR51483	Under certain rare conditions when testing devices that experience avalanche breakdown involving a rapid transition from a high impedance to very low impedance on the 100 mA and 1 A ranges, the SMU involved in the test may begin to return slightly inaccurate current measurements. The workaround for this condition is to test on a lower current range. Sending a `devclr()` or `devint()` command immediately following any avalanche breakdown test will also restore the SMU to accurate current measurement operation.
PR56701	In certain circumstances when a high-current test is immediately followed by a low-current test using the same SMU, the values measured in the low-current test may be too high (tens of pA rather than less than a few pA). This problem is due to the revision E and waiver 8243 versions of the S530-PM-200. One workaround is to use different SMUs in the two tests. Another workaround is to add a delay between the tests.
PR56813	For systems that have eight 2636 SMUs and a DMM7510, it is possible that the system will stop responding if multiple `run_ic.pl` calls are made within a short period. If this happens, all SMUs and the DMM must be power cycled.
PR56893	For S530 systems with a DMM7510 or 2010 DMM, tests using a VMTR may not correctly abort.
PR56900 PR56887	There are several inconsistencies in the Programmer's Manual: • The manual states that `resv()` limits current at 200 mA; the module actually limits to 10 mA. • The manual prototype for function `idvsvg()` is incorrect. The correct prototype is: ```double idvsvg(int drain, int gate, int source, int subst, double vlow, double vhigh, double vds, double vbs, int npts, double *id, int idSize, double *vg, int vgSize```
PR56914	The NPLC setting for a DMM7510 in the S530 is fixed at 1.0 and cannot be changed. Attempts to change the NPLC will have no effect.
SYS-577	Improve dual-site mode functionality for usrlib in the Keithley Interactive Test Tool (KITT) and KTXE. For dual-site mode only, there is a known issue when using a usrlib in KTXE with a sweep array as a usrlib output parameter. The workaround is to programmatically split the sweep array into two separate usrlib output parameters in the usrlib for SITE0 and SITE1.

SYS-861   On S530HV systems, using the `KI_SYSTEM` instrument ID with `setmode` commands does not work (for example, `setmode(KI_SYSTEM, KI_TRIGMODE, KI_ABSOLUTE)`). Instead, call `setmode` with each individual instrument ID.

SYS-864   If you execute the `kiweb` command to launch your web browser and open the documentation page (either through the Keithley Tools Palette (KTP) or from a command line), when you select any of the links, you get the following warning message in the terminal window:

```
content window passed to PrivateBrowsingUtils.isWindowPrivate. Use
isContentWindowPrivate instead (but only for frame scripts).
pbu_isWindowPrivate@resource://gre/modules/PrivateBrowsingUtils.jsm:25:14
nsBrowserAccess.prototype.openURI@chrome://browser/content/browser.js:151
74:21
```

This does not happen if you already have your web browser open before you execute the `kiweb` command. This is a cosmetic warning message that will be repaired in the next KTE release.

Usage Notes

PR57451   S540 usage: When using a Model 2657A that is connected to multiple pins, performing a low-voltage sweep with a current limit set to a low value may cause the SMU to return readings made when the SMU had already reached the current limit (was in compliance). If this occurs, add a delay to the sweep to avoid SMU compliance.

Models affected:
S540

PR60209   The `UNUSED_PINS` mnemonic is used as an alias for all presently disconnected pins. It is accepted as a parameter for `conpin()` or `addcon()` calls, for example:

```
conpin(SMU1, UNUSED_PINS);
conpin(GND, UNUSED_PINS);
```

In the first example, SMU1 is connected to all pins in the system that are presently not connected. In the second example, GND is connected to all pins in the system that are presently not connected.

The `UNUSED_PINS` parameter is not supported on the S540 for connections made on the HVM1212A high-voltage matrix. The workaround for the S540 is to explicitly connect any pins you want (all unused or any subset) with an explicit call to `conpin()`. For example, in an eight-pin 3000 V system:

```
conpin(HVSMU1, 1);
conpin(HVGND, 2, 3, 4, 5, 6, 7, 8);
```

NOTE

For regular low-voltage connections on the KI707B, the `UNUSED_PINS` mnemonic works as in previous KTE versions.

Models affected:
S540

Practice Task   This usage note only applies to the S530 systems using CentOS6.7. If you want to set user environment variables that are needed by the program running in a practice task, they must be added to the existing or new `.cshrc` file in your home directory.

Models affected:
S530 (CentOS 6.7)

SYS-628   Special care must be taken when calling user library (usrlib) functions from other usrlib functions.

When returning values from one usrlib module to another usrlib, it is important to use a `#include` to ensure that the correct values are received by the calling module. The syntax fir the `#include` is:

```
#include <[libraryname]_proto.h>
```

Where `[libraryname]` is replaced by the name of the library that contains the module being called by the calling module. This is required even when both modules are in the same library.

For example, if there are two modules (ModuleOne and ModuleTwo) in the same library (Modules), and ModuleOne needs to receive a return value from ModuleTwo, then ModuleOne must have the following in the `Include Files` portion of the KULT Parameters window (see the following figure):

```
#include <Modules_proto.h>
```

The same is true for any module that needs a value from another module in another library. The `_proto.h` file of the library that contains that module must be included in the `#include` list.
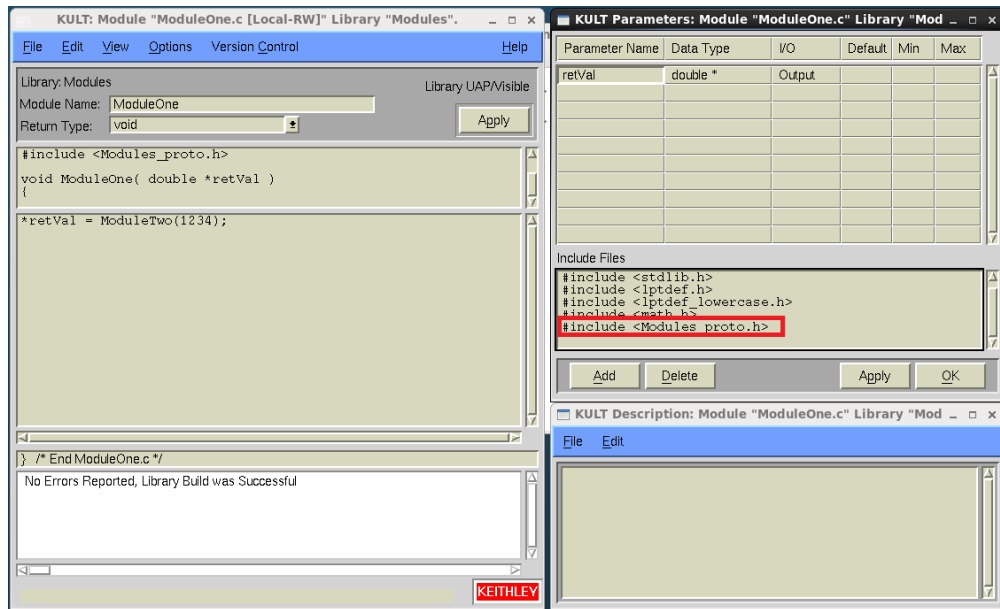
SYS-754
AR-62203

When using a Model 2410 1100 V SMU, the bsweep() command does not stop as expected under certain circumstances. The instrument driver for the 2410 takes two measurements during a sweep: One for the user's measurement (if requested) and one for the trigger point that terminates the sweep. In most cases, this is not a problem, but when a device reacts very quickly to a stimulus (for example, in breakdown scenarios), it is possible to cause spurious or inaccurate results. If this occurs, the recommended solution is to create a custom user library to replace bsweep() that uses only one measurement. Use the following example code to create the customer user library.

```
// Example of voltage bsweep that halts when the measured current is
greater than a certain level

int MyBSweepV( double *inst_id, double trigval, double startval, double
endval, int numpoints, double delayval, double *result )
{
    /* USRLIB MODULE CODE */
    double stepval = (endval - startval) / numpoints;
    double forceval = startval;
    double irdg;
    *result = MEAS_NOT_PERFORMED;
    int idelay = (int)(delayval * 1000.0);
    int i;

    for(i=0; i<numpoints; i++)
    {
        forcev(SMU1, forceval);
        delay(idelay);

        intgi(SMU1, &irdg);

        if(fabs(irdg) >= trigval)
        {
            *result = forceval;
            return OK;
        }

        forceval += stepval;
    }

    return !OK;
    /* USRLIB MODULE END  */
}           /* End bsweepOneMeas.c */
```

Version 5.8.1 release

S530 KTE version 5.8.1 software includes all items from previous releases and the following items. KTE version 5.8.1 supports S530, S535, and S540.

Enhancements

SYS-179 SYS-584	In 2018, S5XX systems purchased with KTE v5.8.0 and the Ring Oscillator application included the RSA306B Spectrum Analyzer to support this application. Systems shipped with KTE v5.8.1 and later included the new RSA306B-PM protection module, which replaces the previous collection of splitters and bias-tees. The RSA306B-PM protection module is a more streamlined solution that takes up less space and uses fewer components in the cabinet. **Models affected:** S530, S535, S540
SYS-202	A new Model 9139B-PCA Probe Card Adapter has been released. The 9139B-PCA supports 1100 V on each of 64 Kelvin pins. See the 9139B-PCA datasheet for details. New models include the following: 9139B-PCA-01 PROBE CARD ASSY, VAC ASST 1.492 LG STRN RLF (64-PIN,1100 V, LOW LEAKAGE) 9139B-PCA-02 PROBE CARD ASSY, VAC ASST,1.330 LG STRN RLF (64-PIN,1100 V, LOW LEAKAGE) **Models affected:** S530, S535
SYS-496 AR-61348 AR-62142	Starting with KTE v5.8.1, when KTE is installed, all installed user libraries (usrlibs) are backed up to the following location in case of accidental modification or deletion: `/opt/kiS530/src` Same as `$KIHOME/src` **Models affected:** S530, S535, S540

SYS-642
AR-61776
	Compiling certain prober library functions generated an error similar to the following:
	
	`/usr/bin/ld: i386:x86-64 architecture of input file`
	`` `/opt/kiS530/tmp/27398field_version.o' is incompatible with i386 ``
	`   output`
	`collect2: ld returned 1 exit status`
	
	This issue has been fixed in KTE v5.8.1.
	
	Models affected:
	S530, S535, S540

SYS-650 AR-61651	KTE v5.8.1 now properly supports General Purpose Terminals (GPTs) `GPT1` through `GPT8`. These instrument identifiers are not documented anywhere. **Models affected:** S530, S535, S540

NOTE

General-purpose terminals (GPTs) are not supported on the S535 in multisite mode.

|	
SYS-664 SYS-690	The instrument controller Run-IC and Stop-IC scripts have been rewritten as Python modules to improve reliability and provide more feedback in case of failure. Two legacy scripts, `run_ic.pl` and `stop_ic.pl` now redirect execution and command-line arguments to `run_ic.py` and `stop_ic.py`, respectively. The following changes were made to the default `run_ic.pl` behavior: - If execution completes successfully, the exit code is `0`; otherwise, the exit code is a nonzero value. - Retries are not performed by default during the initial instrument discovery phase of the `run_ic.pl` script. This behavior can be controlled with the `{{-r N}}` argument, where `{{N}}` specifies the number of retries. **Models affected:** S530, S535, S540
SYS-667 SYS-780 SYS-785 SYS-786 AR-56830	Add support for Keithley Recipe Manager (KRM) on the S5XX. The KRM documentation has been rewritten for the S5XX systems. This functionality was originally ported from the S600, but some of the functionality did not work like the S600. KRM functionality has been fully verified and audited on the S5XX systems and should now match the updated documentation starting with KTE v5.8.1. The KTE installer has a new command-line switch that will unmount any KRM mounted directories before installing KTE. This prevents warning messages from appearing during installation. The directories are remounted after installation. `# ./install_s530sw_v5.8.2.sh –unmount_client` **Models affected:** S530, S535, S540
SYS-669 AR-61830	Use of the `HVGND` enumerator conflicts with GND. This issue was introduced in KTE v5.8.0 and is fixed in KTE v5.8.1 **Models affected:** S530, S535, S540
SYS-678	TEL P8 Prober: Add support for Random Wafer Testing mode. The issue reported was that the prober error-handler routines worked for second and subsequent wafers, but not on the first wafer. This is because KTE did not support Random Wafer Testing mode on TEL probers. When a TEL prober was not in Random Wafer Testing mode: - The prober automatically loaded the first wafer onto the chuck when a cassette was placed and loaded on the prober. Because this happened before the Keithley Test Execution Engine (KTXE) ran, the prober error-handler routine did not get called on the first wafer. - The prober does not support GPIB commands for loading wafers from specific slots. It only accepts the `U` command to unload the wafer on the chuck and load the next wafer. As a result, we only supported `All` mode in our cassette plan files (`.cpf`). To solve this problem, KTE now supports Random Wafer Testing mode. When Random Wafer Testing mode is enabled on a TEL prober: - The prober does not automatically load the first wafer when a cassette is placed and loaded on the prober. KTXE loads all the wafers. This allows the prober error-handler routine to get called every time.

- The prober accepts the `l` (lower-case letter L) command to load wafers from specific slots, enabling KTE to support for All, Relative, Absolute, and Operator modes.

To use Random Wafer Testing mode:

1. After powering-up and initializing the prober, select **Main Menu > Setup > Operation Parameters > GPIB > Random Wafer Testing > Yes** on the prober.
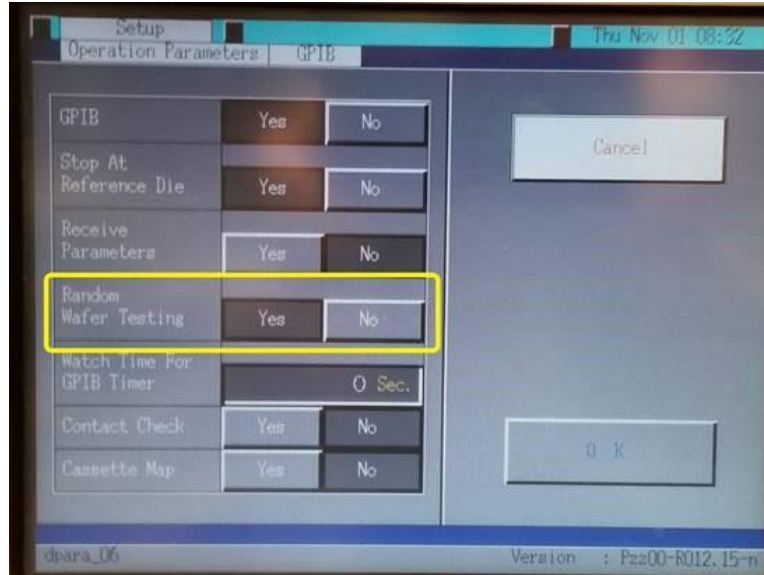
2. In the `$KIDAT/prbcnfg_xxxx.dat` file (where `xxxx` is the QMO number of the tester), set `PROBER_1_P8_RND_MODE=` to `Y`.

NOTE

If upgrading from an earlier version of KTE, add this new parameter to the end of the file. See the `$KIDAT/prbcnfg_P8.dat` file for reference.

3. Sign in as root user and restart proberio by running the `kte_system restart` script.
4. If applicable, modify your cassette plan files (`.cpf`) and global data files (`.gdf`) following these guidelines:
   - Do not call `KTXEOperatorLoadAlign` at `UAP_WRITE_LOT_INFO`.
   - Do not set data pool variable `skip_first_wafer_load` to `1`.
   - If using the Operator mode, make sure that datapool variables `ktxe_fill_opr_dlg` and `confirm_oper_wafers` are set to `1`.

Models affected:
S530, S535, S540

SYS-703
AR-62051

Support for the following Linear Parametric Test (LPT) library commands has been added with KTE v5.8.1:

```
int sintgc(int instr_id, double *result);
int sintgg(int instr_id, double *result);
```

These commands make an integrated measurement for every point in a sweep. See the *Keithley Test Environment (KTE) Programmer's Manual* (part number S500-904-01) for details.

Models affected:
S530, S535, S540

Critical fixes

SYS-556   New S540 system-level rules have been implemented with KTE v5.8.1 as follows:

Rule 1   Differential voltage system-wide shall not exceed 3000 V.
Rule 2   The `sweepi(HVSMUx, …)` command shall be subject to the same rules as the `forcei()` command in Rule 1. This means that an LPT error is generated if Rule 1 is violated for sweeps.
Rule 3   No high-voltage source-measure unit (HVSMU) shall be allowed to force current when any other SMU in the system (including a non-HVSMU) is forcing current.

Models affected:
S540

SYS-629   In KTE v5.8.0 on the S535 Multi-Site Wafer Acceptance Test System, the SITE1 X and Y offset adjustment values were applied backwards.

This issue has been fixed in KTE v5.8.1.

Models affected:
S535

SYS-630
AR-61543   Under certain conditions, the Keithley Interactive Test Tool (KITT) returned only two decimal points of precision.
Example:
```
NUM1 = 1.230226e+00
NUM2 = 1.229509e+00
NUM3 = 1000 x fabs(NUM1 - NUM2)
```
The expected result is `0.717`, but KITT returned `0.72`.

This issue has been fixed in KTE v5.8.1.

Models affected:
S530, S535, S540

SYS-635
AR-61309   When running an LPT test sequence where the `measi()` function is called before a `sintgi()` function, the NPLC setting gets overwritten unintentionally. For example:
```
conpin(SMU1, 1)
rangei(SMU1, 1e-8)
setmode(SMU1, KI_INTGPLC, 1.0)
forcev(SMU1, 0)
//measi(SMU1, i1)
enable(TIMER1)
smeast(TIMER1, t)
sintgi(SMU1, i_sweep)
sweepv(SMU1, 0, 0, 100, 0)
```
When the `measi()` command is commented out, there are no problems. If the `measi()` command is uncommented, the sweep incorrectly runs the `sintgi()` command with NPLC set to `0.01`, despite the fact it was set to `1.0` before. This results in noisy data.

This problem has been fixed in KTE v5.8.1.

Models affected:
S530, S535, S540

SYS-643 AR-62079	KTXE does not write array data properly to the KDF files on single-site systems. This issue was introduced in KTE v5.8.0 and was fixed in KTE v5.8.1 **Models affected:** S530, S535, S540
SYS-662 AR-61804	In KTE v5.8.0, certain tests may generate error code −286. This issue has been fixed in KTE v5.8.1 **Models affected:** S530, S535, S540
SYS-675 AR-61874	Under certain conditions, addcon() and delcon() commands may not have worked properly. These commands have been repaired and should now work properly, as documented in the *Keithley Test Environment (KTE) Programmer's Manual* (part number S500-904-01). **Models affected:** S530, S535, S540
SYS-696	Certain test sequences may allow 1100 V to be sourced to 200 V pathways. To prevent this potential damage-causing situation, logic has been added to prevent use of a VMTR, RSA, PGU, or SCOPE instrument when an 1100 V SMU is in use. **Models affected:** S530-HV (1100 V S530 systems only)
SYS-707	Under certain conditions, the following commands may crash Keithley Sequential Executor (KSOX) with a memory corruption error: avgc(), avgg(), and avgcg() This problem has been fixed. **Models affected:** S530, S535, S540
SYS-711	On systems with two Model 707B switch matrices, sometimes one of the 707Bs did not go into remote operation or did not stay in remote operation after calling run_ic.pl. This problem was introduced in KTE v5.8.0 and has been fixed in KTE v5.8.1. **Models affected:** S530
SYS-736	On the S540, if you need to connect the CHUCK to a low-voltage matrix column, but it is not working, the following line must be added to the icconfig_xxxx.ini file, where xxxx is the QMO number of the system: CHUCK=MATRIX1 Example:

```
[INSTRUMENTATION]
VERSION_ID=1
LIST= GNDU,HVGNDU,SMU1,SMU2,HVSMU1,HVSMU2,MTRX1,MTRX2
FULL_LIST=MTRX1,SMU1,SMU2,SMU3,SMU4,SMU5,SMU6,SMU7,GNDU,CMTR1,VMTR1,KIB,KIP,
    GPT1,PGU1A,PGU1B,SCP1A
DIAG= DIAG=SMU1,SMU2,SMU3,MTRX1,CMTR1,PGU1A,PGU1B,PGU2A,PGU2B,SCP1A
HARDWARE_ONLINE=TRUE
KELVIN_ENABLE=TRUE
```

```
PCA_INSTALLED=TRUE
PLC=60HZ
SWITCH=HV_HYBRID
MAX_HV=3002
CHUCK=MATRIX1 ***ADD THIS LINE***
```

Models affected:
S540

SYS-775   Model 4200A remote log is not working. If remote log in is not working from the S5xx controller, do the following:

1. On the S5XX controller computer, install the `freerdp` software by typing the following command as root user:
    `#yum install freerdp`

2. On the 4200A Windows® system, enter `regedit` form the command prompt or in the Windows Start menu to open the registry editor

3. In the left pane, navigate to:

    `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System`

4. Select the **System** entry, and in the right pane, right-click and select **New > DWORD (32-bit) Value**.

5. After regedit shows the new value in the right pane as `New Value #1`, click it to rename it to `LocalAccountTokenFilterPolicy` and press **Enter**.

6. Change the value of `LocalAccountTokenFilterPolicy` to `1` by double-clicking it.
    Alternatively, you can copy the following into a new text file and rename the extension to `.REG`, then transfer that file to the 4200A:

    `[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System]"LocalAccountTokenFilterPolicy"=dword:00000001`

    Double-clicking this file from Windows Explorer enters the information in the registry.

After the 4200A-SCS and S5XX controlling computer have been configured, execute the following command on the S5XX controlling computer as `root` user:
```
xfreerdp -g 1920x1080 -u kiuser -p kiuser1 --ignore-certificate
  192.168.1.12 &
```

Models affected:
S530, S535, S540

SYS-787   A problem with single-point sweeps was introduced in KTE v5.8.0. This issue returned two different points, but the second point returned had an incorrect value.

This issue has been fixed in KTE v5.8.1.

Models affected:
S530, S535, S540

SYS-814   The `delcon()` command did not work properly on the S540.

This command now works as expected starting with KTE v5.8.1.

Models affected:
S540

Noncritical fixes

SYS-65   KTE v5.7.0 and later does not prevent you from connecting two different SMUs to the same pin. This should never happen.

Starting with KTE v5.8.1 and later, the system will never allow two different SMUs to be connected to the same pin.

Models affected:
S530, S535, S540

SYS-545   The LPT command `rttrigary()` was never properly documented in the S5XX documentation. Starting with KTE v5.8.1, the `rttrigary()` command has been added to the *Keithley Test Environment (KTE) Programmer's Manual* (part number S500-904-01).

An excerpt from the manual follows:

```
int rttrigary(double *results);
```

results   The floating-point array where the measured values are stored

Details: When used with the `bsweepX` or `searchX` commands, this command allows you to view the data results from the measure command used for a trigger.

Models affected:
S530, S535, S540

SYS-565   The S5XX Reference Manuals had an error in the KTE shutdown procedure. The manuals now contain the correct sequence of commands to properly shut down the S5XX controlling computer.

To shut down using the Keithley Test Environment (KTE) software:

1. Close all KTE programs.
2. In the LINUX® terminal, type the following command:

```
sudo $KIBIN/shutdown_s530.pl
```

3. Enter the requested password.
4. Wait for the system computer to stop.
5. Turn off power to the cabinet

Models affected:
S530, S535, S540

SYS-647   Starting with KTE v5.8.0, some customers have reported a broken pipe error when starting the instrument controller by calling `run_ic.pl`.

This issue has been fixed in KTE v5.8.1.

Models affected:
S530, S535, S540

SYS-677   The Model 2636B SMU ignored the NPLC integration time on the first run and ran unconditionally at 0.1 NPLC. After the first run, the NPLC setting was properly applied.

This issue has been fixed in KTE v5.8.1.

Models affected:
S530, S535, S540

SYS-782   The Y-axis direction is reversed on the P8 prober driver. This has been an issue since the S400 and S600 KTE software versions.

This issue was originally reported on the TEL Precio XL prober.

Because this is a long-standing issue, we have repaired this issue without affecting existing customers with TEL probers unnecessarily. All existing users will not be affected by this change unless explicitly changing a new parameter in the `prbcnfg_xxxx.dat` file (where `xxxx` is the QMO number of the tester). See details below.

A new parameter has been added to the `$KIDAT/prbcnfg_xxxx.dat` file:

`PROBER_1_INVERT_Y_AXIS=Y`
*** Default setting for existing customers because the Y-axis is already inverted.***

`PROBER_1_INVERT_Y_AXIS=N`
*** For new customers, the `INVERT` setting is set to `No` so the Y-axis moves as expected. ***

NOTE

If upgrading from an earlier version of KTE, add this new parameter to the end of the file. See the `$KIDAT/prbcnfg_P8.dat` file for reference.

This issue affects the Y-axis direction for both site and subsite movement.
The updated prober commands are:
`PrMove()`, `PrAbsMove()`, `PrRelMove()`, and `PrRelReturn()`

Models affected:
S530, S535, S540

Version 5.8.0 release

S530 KTE version 5.8.0 software includes all items from previous releases and the following items. KTE version 5.8.0 supports both the S530, the S540, and starting with v5.8.0, the new Model S535 Wafer Acceptance Test System.

Enhancements

KEY FEATURE	KTE version 5.8.0 supports the new S535 Wafer Acceptance Test System. This new system supports dual-site execution using identical sets of SMU, DMM, and switching hardware. Overall system performance is also enhanced by using TSP-Link control on all instruments in dual execution mode. Additional information about the S535 is in the *S535 Administrative Guide*, *S535 Reference Manual*, and *KTE Programmer's Manual* and on our website at tek.com/keithley. **Models affected:** S535
KEY FEATURE SYS-180	KTE version 5.8.0 now supports the 4200A-SCS. The 4200A-SCS provides support for the 4210-CVU (Capacitance-Voltage Unit) and 4220-PGU (Pulse Generator Unit). **Models affected:** S530, S535, S540
SYS-37	Add `gate_charge()` test to HVLib. A new function has been added to the HVLib user library. For more information, see the following application note: `1KW-61389-0_Gate_Charge_S5XX_AppNote_042618.pdf` **Models affected:** S540
SYS-129	Add dual-site support for the KDF file. KTE version 5.8.0 now supports the S535, which supports dual-site data collection and formatting. For more information, see the *S535 Reference Manual*. **Models affected:** S535
SYS-201	Only install TSP scripts on individual instruments after a fresh installation of KTE. A change was made to `run_ic.pl` so that checks are made to see if the system instruments already have the latest scripts. If so, the step to reload the scripts is skipped. This significantly improves the time it takes to start the instrument controller (IC). **Models affected:** S530, S535, S540
SYS-203 AR57145	The S5xx system hard drive image has been modified to split the partitions into roughly equal sizes. Before, 50 GB was reserved for `root` and 814 GB was reserved for `/home`. New systems built after the release of KTE version 5.8.0 have both partitions with 432 GB reserved. This allows more space by default for customer data files. If existing customers would like to make this optimization on systems shipped prior to KTE version 5.8.0 (May 2018), the following command can be executed as root user on the S5xx system.

```
$KIBIN/hard_drive_volume_resize.sh
```

Models affected:

S530, S535, S540

SYS-211   For new systems after the release of KTE version 5.8.0, FTP and Telnet services have been preinstalled.

Models affected

S530, S535, S540

Critical fixes

SYS-116
AR60939

Problems with KOP. KOP does not build `LD_LIBRARY_PATH` correctly, which manifests itself with the following error: 'cannot connect to DATAHUB.' `LD_LIBRARY_PATH` is missing the following path: "`$KIHOME/dmh/lib`". This problem has been fixed.

Models affected:

S530, S535, S540

SYS-156
AR58286

KTE installation problems. Under certain conditions, the S5xx system has ethernet problems after installing a newer version of KTE. This issue has been fixed.

Models affected:

S530, S535, S540

SYS-330
AR61194

2410 autorange issue. For S530s with a Model 2410 SMU, logic was changed in KTE to force a limit change even before a measurement is taken. This new logic is active when forcing current, measuring voltage, and setting a voltage limit.

Models affected:

S530 (high-voltage) systems only

SYS-511   Under certain conditions, the delay() command in KITT does not observe the correct time delay. This issue was introduced in KTE v5.7.2 and was repaired with KTE v5.8.0.

Noncritical fixes

SYS-164   Integrate 4200A into S500, S530, S535, S540 systems and provide way to remotely control the 4200A through the system keyboard and mouse.

In order to remotely control the 4200A-SCS through the S5xx system keyboard and mouse, send the following command from the command line of the controlling computer.

```
xfreerdp -g 1920x1080 -u kiuser -p kiuser1 --ignore-certificate
192.168.1.12 &
```

SYS-219   KTE installer is overwriting `kitester.dat`.

When installing KTE on a system with a new master hard drive, the `kitester.dat` file was not properly updated under certain conditions. This issue has been fixed.

Models affected:

S530, S535, S540

SYS-346   Under certain conditions, after installing a new version of KTE and running KRM, the system would report the error "`Cannot connect to DATAHUB: Not licensed`".
This error has been fixed.

Models affected:

S530

SYS-380   2636 needs to default to 4-wire mode after a `devint()` call.

Before, when `devint()` was called on a 2636A/B SMU, the instrument was set to 2-wire mode. Now the 2636A/B is set to 4-wire mode after a `devint()` call.

Models affected:

S530, S535, S540

SYS-392   S530-PM-200s have been revised to version v2.4. Improvements made to improve current transient suppression.

Models affected:
S530, S535, S540

Version 5.7.2 release

S530 KTE version 5.7.2 software includes all items from previous releases and the following items.

Noncritical fixes

SYS-122	Cosmetic update to S540 Diagnostics. Sense-side column isolation relay summary updated. **Models affected:** S540
SYS-279	Power down sequence error. When using multiple instruments in a test, the instruments were not consistently turned off in the proper sequence at the end of the test. Instruments will now be powered off in the reverse order they were turned on. This issue has been corrected in KTE v5.7.2. **Models affected:** S530, S540

Version 5.7.1 release

S530 KTE version 5.7.1 software includes all items from previous releases and the following items.

Noncritical fixes

SYS-68	If a pin guard test fails when running the pin leakage tests, diagnostics incorrectly summarizes the test results. This issue has been resolved.
	Models affected: S530, S540

SYS-94   When running diagnostics on a 1-kV S530 system with more than 24 pins, there was an error in one of the matrix leakage tests that could cause spurious failures. This issue has been resolved.
Models affected:
S530 (1kV)

SYS-125   The high-voltage matrix (HVM) relay settling tests used incorrect limit values. This issue has been resolved.

Models affected:
S540

SYS-149   In the diagnostics and system verify SMU range tests, when forcing with the 2636B 100 pA range on a 3-kV pin, the 90% test point had an incorrect limit value. This issue has been resolved.
Models affected:
S540

SYS-206
SYS-207
SYS-646   Occasionally, when running S540 diagnostics, some 3-kV matrix leakage and settling tests would fail. This issue has been resolved.
Models affected:
S540

SYS-208   Some modules in the S540_3kV_diagnostics usrlib had parameter lists that did not match those in the Keithley Interactive Test Tool (KITT). When the parameter lists do not match, the modules cannot be called from KITT. This issue has been resolved.
Models affected:
S540

Version 5.7.0 release

S530 KTE version 5.7.0 software includes all items from previous releases and the following items. KTE version 5.7.0 supports both the S530 and S540.

Enhancements

KEY FEATURE	KTE version 5.7.0 supports the new S540 Power Semiconductor Test System.
	The Keithley S540 is a fully automated, wafer-level parametric test system that can perform all high-voltage, low-voltage, low-current, and capacitance tests up to 3kV in a single probe touch-down to maximize productivity and minimize cost of ownership. See www.tektronix.com/keithley for more information on the S540
	Models affected: S540
KEY FEATURE PR60686	KTE version 5.7.0 adds support for a high-voltage C-V user library that supports C-V measurements up to 3kV on the S540 Power Semiconductor Test System. See the S540 High-Voltage Library Reference Manual (HVLib) for more information on high-voltage C-V (S540-908-01).
	Models affected: S540
PR57203	Add serial number for 707B matrix. Starting with KTE version 5.7.0, Keithley supports electronic retrieval of the serial numbers saved on each card. This allows each card to be queried and identified electronically. The firmware of the 707B must be version 1.04c or later to support serial number storage. Also, only version 2.0 or later of the 7072-HVD and 7531 cards has this capability.
	Models affected: S530, S540
PR57371	Add a Chuck Pin Kelvin Test to system diagnostics. The S530/S540 system diagnostics software has a 'Pin Kelvin' test, that verifies that force and sense are connected (with a maximum resistance limit) for each probe-card adapter (PCA) pin. However, there is no such test for a Kelvin chuck connection. KTE V5.7.0 adds this test.
	Note: Even on systems that connect to a non-Kelvin chuck, the installation method uses both force and sense cables and connects them with tees as close to the prober chuck (electrically) as possible. It is important to make sure force and sense are connected in the same way as the pins.
	Models affected: S530, S540
PR58274	Add informative error message for `mpulse()` command There are now two errors that can be generated. The text of the error message has been revised for greater clarity. Case 1:

```
conpin(SMU1, 1, 0)

setmode(SMU1, KI_INTGPLC, 0.01)
mpulse(SMU1, 10, 2E-4, vmeas, imeas)
```

Error message: `"Illegal parameter value pulse duration of 0.0002 is too small for nplc of 0.01. Duration must be greater than 0.00201667."`

Case 2:
```
conpin(SMU1, 1, 0)

setmode(SMU1, KI_INTGPLC, 0.001)
mpulse(SMU1, 10, 9E-5, &vmeas, &imeas)
```

Error message: `"Illegal parameter value pulse duration of 0.00009 is too small. Must be >= 100E-6 seconds."`

Models affected:
S530, S540

PR59498   Add capability for Keithley field service personnel to calibrate a 2657A SMU in the field.
Before the release of the S540 and KTE version 5.7.0, all 2657A source-measure units (SMUs) had to be sent back to a Keithley calibration facility. Now, Keithley field service engineers (FSEs) can perform 2657A calibration at the customer facility.

Models affected:
S540

PR60371   Add support for more than one capacitance-voltage unit (CVU).

Starting with KTE version 5.7.0, up to two CVUs can be supported on the S540. The S530 still only supports one CVU.
Models affected:
S540

PR60527   The S540 introduces three new `setmode()` modifiers:

```
KI_CVU_CABLE_CORR_LV
KI_CVU_CABLE_CORR_HV
KI_CVU_CABLE_CORR_LV_HV
```

Use the first `setmode()` modifier for CMTR1 on pins 13 through 48, the second modifier for CMTR2 with pins 1 through 12, and the third modifier for CMTR1 when connecting to pins 1 through 12. For best results, set these values before calling the `setmode()` command. See example below.

```
setmode(CMTR1, KI_CVU_LENGTH, 3)
setmode(CMTR1, KI_CVU_LENGTH, 1.5)
setmode(CMTR1, KI_CVU_LENGTH, 0)

setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_3M)
setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_1p5M)
setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_0M)

setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_CORR_LV)
setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_CORR_HV)
setmode(CMTR1, KI_CVU_LENGTH, KI_CVU_CABLE_CORR_LV_HV)
```

Models affected:
S540

PR60376	Add a check to make sure any SMU does not exceed the 3000V differential.
	An error check has been added to prevent any SMU from forcing more than a 3000V differential.
	Models affected:
	S540

Critical fixes

PR59010	`Shutdown_s530.pl` fails to shut down the Model 4200-SCS.
	When shutting down the S530/S540, sometimes the 4200-SCS fails to shut down properly.
	This issue has been repaired.
	Models affected:
	S530, S540

PR60347	Default system configuration needs to add the xmessage application.
	When sent from the Keithley Interactive Test Tool (KITT), Keithley User Library Tool (KULT) user library (usrlib) messages do not display. This is because the 'xmessage' application was not installed on the S530 by default. New S530 and S540 systems will come with the xmessage application preinstalled on the system. If you need this functionality on older systems, install the xmessage application by sending the following command from a command terminal.

```
yum -y install xmessage (for newer 64-bit systems)
yum install xorg-x11-apps-7.7.6.el6.x86_64 (for older 32-bit
systems)
```

	Models affected:
	S530, S540

PR60378	The S530 `PrNeedleClean()` command does not work.
	Executing the `PrNeedleClean()` command generates error -1079. This bug has been fixed.
	Models affected:
	S530, S540

PR60380	The Linear Parametric Test Library (LPTLib) code error in either the `bsweepv, bsweepi` `asweepv` or `asweepi` crashes the instrument control (IC).
	When using High-C mode on the 2636A/B, setting the current range to 100nA or below crashes the instrument controller (IC). This problem was introduced in KTE version 5.6.5 and will happen if an LPT error happens before the `bsweepv()`, `bsweepi()`, `searchi()`, or `search()` commands. This bug has been fixed.
	Models affected:
	S530, S540

PR61158	KITT abort does not stop SMU sweeps.
	When pressing Abort in KITT, SMU sweeps finish to completion. This bug has been fixed.

After aborting KITT, remember to restart the IC process by typing the following command in a console window:

```
$KIHOME/IC/bin/run_ic.pl
```

Models affected:
S530, S540

AR56830
PR61303

KRM (Keithley Recipe Manager) does not work with the CentOS v6.7.
In order for KRM to work on new controlling computers running CentOS v6.7, a perl-Rcs package needs to be installed. If you are having trouble running KRM, execute the following command by typing the following in a console window:

```
yum info perl-rcs
```

Models affected:
S530, S540

PR60665

Add a utility to flash upgrade the HVM1212A 3kV Switch Mainframe.
To flash upgrade the HVM1212 3kV Switch Mainframe, perform the following steps:

1) From the front panel of the HVM1212, set the mode to LAN
2) From the CentOS/LINUX controlling workstation, open a terminal window and the type of following commands:

```
cd /opt/kiS530/IC/bin
/updateHVM 192.168.1.7 xxx.bin,  where xxx.bin is the name of the
```
firmware file

Models affected:
S540

Noncritical fixes

PR51710	CD ROM: Shelexec utility on the CD-ROM just spins on a blank page.

After inserting the KTE CD-ROM on a computer with the Microsoft® Windows® operating system, it does not auto-launch. On certain computers, security settings may be set to prohibit the auto-launch feature. A statement has been added to the CD Label that says "After inserting this CD, open index.html."

Models affected:

S530, S540

PR55563	Clarify data hub licensing documentation and installation.

The data hub documentation has been updated and clarified in the S530 and S540 Administration Guides. See document numbers S530-924-01D and S540-924-01A.

Models affected:

S530, S540

PR56884	Need to add help text in KITT for PARLib `idvsvg()` and `vtext3()` subroutines.

Help has been added in KITT for these PARLib subroutines.

Models affected:

S530, S540

PR60000	Inconsistency between KITT functions and LPT functions.

The LPTLib manual defines all the functions as returning integers. However, if you run them in KITT none of the functions return any value. For example, if you try to run the following command:

```
x = pgu_init()
```

the test fails and gives you the error "`Syntax error: pgu_init returns 'void' but a return value is declared.`"

The help files in KITT have been updated to declare that all LPTLib functions have no return values when used in KITT.

Models affected:

S530, S540

PR60104	The `idvsvd()` subroutine is missing from the PARLib manual.

The PARLib manual (document number S530-907-01B) has been updated to include the function `idvsvd()`.

Models affected:

S530, S540

PR60206	In the S530 1100V high-voltage system, the Model 2410 SMU was set to auto-range in error.

There was a bug in the 2410 instrument driver that when setting the 1uA range would instead set the instrument to auto-range. This bug has been fixed.

Models affected:

S530

PR60221   S530 Administrative Guide missing unpacking reference to cable support arm.

Cable support arm is now referenced in both the S530 and S540 Administrative guides. See document numbers S530-924-01D and S540-924-01A.

Models affected:

S530, S540

Version 5.6.6 release

S530 KTE version 5.6.6 software includes all items from previous releases and the following items:

Critical fixes

PR60316   A problem was introduced in KTE version 5.6.5 that caused issues with diagnostic tests for high-voltage (HV) systems with one matrix. This has been resolved with the KTE version 5.6.6 release.

Version 5.6.5 release

S530 KTE version 5.6.5 software includes all items from previous releases and the following items:

NOTE

IMPORTANT: KTE version 5.6.5 releases new firmware for the Keithley DMM7510 and the Keithley 707B Switch Matrix Mainframe. You must flash update both products after updating the KTE Software to version 5.6.5 or later. Between the releases of KTE 5.6.0 and KTE 5.6.5, the firmware for the 2410 HV SMU has changed from C32 to C33. These firmware changes do not impact the S530, and updating the firmware from C32 to C33 is optional.

Enhancements

PR54325 PR58566	SPEED: Update TSP error model to improve overall testing performance. Starting with KTE version 5.6.5, overall system performance will be improved due to an optimized error model that effectively batches error responses rather than sending and receiving an error response after every command. See the Linear Parametric Test Library section of the *S530 LPTLib User's Manual* for further details. With the combined speed improvements of KTE versions 5.6.0 and 5.6.5, the S530 now delivers speed and performance equal to or better than the S400 in nearly all test cases.
PR57064	LPT functions `idvsvd` and `idvsvg` have been added to PARLIB.
PR59454	LPT `trigXx` commands have been optimized for improved speed. LPT `trigXx` commands will determine if a previous `smeasX` or `sintgX` measurement was performed and use that measurement instead of taking another measurement, where possible. This performance improvement will be disabled in LEGACY mode.
PR59967 PR60057	S530 high-voltage systems were previously limited to 24 pins. With the release of KTE version 5.6.5, the S530 high-voltage system can support up to 60 pins. Systems can be ordered with 36-, 48-, or 60-pin configurations. Note that the Keithley 9139 Probe Card Solution is still limited to 24 pins maximum, however, a 60-pin probe card solution is in development now and will be released soon.

NOTE

The Keithley 9139 Probe Card Solution can still only support up to 24 pins. A new PCA solution that can support up to 60 pins will be available soon.

Critical fixes

PR55927	Under certain conditions, and randomly, communication from the S530 and a prober will stop, leaving the communication channel broken. The only known workaround for this situation is to power cycle the controlling computer and re-establish communication. This issue has been traced to a problem with the NI GPIB-USB-HS controller running through CentOS/LINUX. This issue can be permanently avoided by purchasing the S530-COMP-UPG. This problem is avoided because the new controlling computer uses up to two separate internal PCIe/GPIB cards, and the GPIB/USB controller is not used.
PR56813	Under certain conditions, Test Script Processor (TSP®) communication between the DMM7510 and the SMUs may be stopped. To minimize this issue, update the firmware of the DMM7510 to version 1.6.1. The new DMM7510 firmware improves long-term DMM communication stability.
PR60166 PR60167	Updates have been made to KTE version 5.6.5 that significantly reduce the likelihood of hot-switching.

Noncritical fixes

AR52823 PR58515	Under specific conditions, system diagnostics would report PASSED even though failures may have occurred. In these cases, the error was documented in the error log, but the overall status showed PASSED. This issue has been repaired.
PR52418	For S530 systems with only one 2636 source-measure unit (SMU), an error occurred during system startup. This issue has been fixed.
PR58207	The `devint()` and `devclr()` commands do not turn off instruments in the correct order. When running tests that use multiple instruments, the instruments should be reset in the opposite order in which they were activated. Before KTE version 5.6.5, this did not always work as expected. This issue has been fixed.
PR58327	Using the `forcev(. . .)` command with a CVU causes incorrect operation when commands are sent in certain sequences. If `forcev(CMTRH1, n)` is sent before `forcev(CMTRL, n)`, the voltages may not be set in the proper order. This issue has been fixed.
PR58572	The Model 2636 `bsweep(. . .)` command may not trigger properly when used with the `smeasi(. . .)` command. This issue has been fixed. After the improvements, the LPT `trigXX` commands determine if an `smeasX` or `sintgX` measurement was already done and use that measurement instead of taking another one, when possible. An example LPT sequence that would benefit from this new behavior is:

```
smeasi(SMU1, current)
trigig(SMU1, 1E-6)
bsweepv(SMU1, 1, 100, 100, 0, breakdown)
```

This improved sweep design is used for every mode except Legacy mode.

Version 5.6.0 release

S530 KTE version 5.6.0 software includes all items from previous releases and the following items:

System upgrades

S530-COMP-UPG	This is a new system option that can be purchased to upgrade the existing S530 system controlling computer and CentOS 5.5 operating system with a new controlling computer and a newer version of the CentOS operating system. Details are as follows:

- Intel 64-bit 3.6 GHz i7-4790S (4-core) microprocessor
- 16 GB memory
- Six USB 3.0 ports and four USB 2.0 ports
- Two 1 TB enterprise hot-swappable hard drives (RAID 1 mirrored)
- Two extra hard drive slots for customer expandability or additional redundancy
- 24-inch HDMI LCD monitor
- Full-sized keyboard
- CentOS 6.7 with KTE version 5.6.0
- On-site installation by a Keithley Field Service Engineer (FSE)

NOTE

S530-COMP-UPG is required to run the new CentOS operating system. CentOS 6.7 is not supported on the old controlling computers.

KTE version 5.6.0 can be installed on both existing controlling computers and new 64-bit controlling computers.

DMM7510-S530	

- This is a new system option that can be purchased to upgrade the existing S530 system with the latest digital multimeter (DMM), or replace an existing 2010 DMM. Details are as follows:DMM7510 7.5-digit DMM
- Rack mount hardware and cabling
- On-site installation by a Keithley FSE

NOTE

The new DMM7510 only works with KTE version 5.6.0 and will not work with earlier releases. For customers with ACS on their S530s, the DMM7510 will only work with ACS version 5.2.1 and later.

For customers adding the DMM7510 where no 2010 DMM was previously installed, additional hardware such as an additional switch card may be required.

Enhancements

PR54016 PR54114 PR55559 PR56217 PR56300 PR56371 PR56372 PR56663	Significant changes were made in KTE version 5.6 to improve overall test speed. The system now provides three system speed modes: FAST, LEGACY, and CUSTOM. FAST mode is the default. LEGACY mode matches KTE version 5.5.1 performance. CUSTOM mode can be used to tune performance. For more information, refer to Other Information at the end of this section.
PR51047	KTE version 5.6.0 supports the Keithley DMM7510. This DMM is significantly faster than the 2010 DMM.
PR54271	The Parametric Test Library (PARLib) is now a fully supported library. Functions have been converted from the S400 code, updated to match the new hardware, and fully tested. The code resides in `$KIHOME/usrlib/libPARLIB`.

NOTE

PARLib command names no longer have `_400` appended to them. For more information, please refer to the *S530 Test Subroutine Library (PARLib) Manual*.

Critical fixes

PR56618	New 2636 firmware repairs an issue in which problems occur if a test is run immediately after the interlock is engaged (when the S530 door is closed). The new firmware waits the required time to ensure the SMUs are completely stabilized before executing any tests.

Noncritical fixes

PR55904	KTE diagnostics and system verify now runs the SMU-to-SMU tests on more pairs of SMUs. This improves the diagnostic power of the program and may result in newly detected failures.
PR56525 PR54649	Some tests were added and others removed from diagnostics. The newly added tests allow diagnostics to detect more failures. The removed tests reduce the chance of false failures.
PR55563	The *S530 Administrative Guide* was updated to better document the S530 Data Hub License and how it operates.

Other information

KTE version 5.6.0 speed modes

KTE 5.6 supports three new speed modes: FAST, LEGACY, and CUSTOM. FAST is the default mode, which provides faster test times than KTE version 5.5.1. LEGACY mode and will match performance to KTE version 5.5.1. To manually configure settings, use the CUSTOM speed mode.

To change the speed mode, you must edit the $KIHOME/IC/icconfig_xxxx.ini file, where xxxx is your system QMO number. In this file, there is a section labeled [SYSTEM SPEED MODE]. To change from FAST to LEGACY, for example, change the line MODE=FAST to read MODE=LEGACY. Then restart the ic process using run_ic.pl.

The system speed mode applies systemwide. However, you can change the system speed mode on a test-by-test basis using a new setmode() command with the KI_SYSTEM_SPEED_MODE argument.

For more information on KTE speed modes, refer to the *S530 Linear Parametric Test Library (LPTLib) User's manual* or the following application note: Achieving Maximum Throughput with Keithley S530 Parametric Test Systems.

NOTE

In FAST or CUSTOM speed modes, the KTE software enforces a minimum NPLC value of 1 if the current measure range is less than or equal to 10 nA. This does not happen if the NPLC is set using the setmode command or if the speed mode is set to LEGACY.

Version 5.5.1 release

S530 KTE version 5.5.1 software includes all items from previous releases and the following items:

Enhancements

PR44617   Added support for the `refctrl` LPT command.

To ensure accuracy, source-measure units (SMUs) in the S530 must periodically obtain fresh measurements of internal ground and voltage references. By default, the SMU automatically takes these reference measurements as needed when making a measurement. If the reference measurements are out of date when making a measurement, the instrument will automatically take more analog-to-digital (A/D) conversions before returning the result. The effect is that occasionally, a SMU measurement will take longer than normal.

This extra time can cause problems in sweeps and other test sequences in which measurement timing is critical. To avoid this extra time, the `refctrl` command can be used to disable automatic reference measurements. Note that with automatic reference disabled, the instrument may gradually drift out of specification.

The command values are:

`REF_ON 1`	Turn automatic reference measurement on.
`REF_OFF 2`	Turn automatic reference measurement off.

PR51313   Added support for a new `setmode` parameter, `KI_MEAS_DELAY`. This parameter, which applies to 2636 SMUs, changes how long a SMU delays before a measurement. Valid settings for the `KI_MEAS_DELAY` command are:

`KI_DELAY_OFF`	Turn off measure delay.
`KI_DELAY_AUTO`	Enable default SMU-determined measure delay.
`<value>`	Set measure delay to `<value>` seconds. The `<value>` parameter is a floating-point number and must be positive.

NOTE
Reducing measure delays may cause the SMU to return unsettled or inaccurate readings.

`KI_DELAY_AUTO` is the default setting. The SMU is reset back to this setting when a `devint` command is called.

PR53060   Improved LPT debugging so that the `KI_LPT_DEBUG` mode LPT command output shows returned data values, rather than data pointers. To enable LPT debugging, set the `KI_LPT_DEBUG` environment variable to the name of a file or device you want to output to before running the IC process. For example, to output to the presently open terminal, set the variable to `/dev/tty`.

Critical fixes

N/A

Noncritical fixes

PR51586, PR52504, PR53191, PR53192	Sometimes, during the matrix leakage test in diagnostics or system verify, the system returns noisy readings, resulting in intermittent test failure. Another similar problem can occur in this test whereby the system returns overflow readings, again causing failure. These issues have been corrected.
PR53373	Removed the Smartclear feature. This feature, first introduced in KTE version 5.3p01, significantly slowed down test execution in many cases. This feature has been replaced with improved hardware for high-voltage (HV) systems (7072-HVD) and improved software (KTE version 5.5.1). All issues causing hot switching have been corrected with these changes.
PR53935	On systems with a 2010 DMM, Keithley Interactive Test Tool (KITT) execution at the beginning of a macro was unnecessarily slow. This issue has been corrected.
PR53370	In KTE version 5.5.0, the maximum allowed voltage of the 2410 SMU in a high-voltage system was changed from 1100 V to 1000 V. In KTE version 5.5.1, this has been changed back to 1100 V.

Version 5.5.0p02 release

S530 KTE version 5.5.0p02 software includes all items from previous releases and the following items:

Enhancements

N/A

Critical fixes

PR51781   Starting in KTE version 5.5, the tester is unable to communicate with serial probers. This issue has been corrected in KTE version 5.5.0p02.

> ### NOTE
> In addition to setting up the prober configuration file for serial communications, you must add the following line to `/etc/rc.d/rc.local` as root in order for serial communications to work:
> `chmod 666 /dev/ttyUSB*`

Noncritical fixes

PR51826   When running pathway capacitance tests during the matrix leakage tests in diagnostics, test timing uncertainty can cause noisy, and sometimes inaccurate, capacitance measurements. This can lead to intermittent or incorrect failures. This issue has been resolved.

Version 5.5.0p01hf2 release

S530 KTE version 5.5.1p01hf2 software includes all items from previous releases and the following items:

Enhancements

N/A

Critical fixes

N/A

Noncritical fixes

PR52693, PR52670	The `.csv` files generated during system verify were not displaying the status of each test, limits, and percent of limit information. This has been corrected.
PR52908	During diagnostics, intermittent 100 pA range failures would occur as a result of dielectric absorption during previous tests. This had been corrected for earlier high-voltage systems; this corrects the issues for sensitive systems.

Version 5.5.0p01hf1 release

S530 KTE version 5.5.1p01hf1 software includes all items from previous releases and the following items:

Noncritical fixes

PR52551   During diagnostics, intermittent 100 pA range failures would occur as a result of dielectric absorption during previous tests. This has been corrected for high-voltage systems.

Version 5.5.0p01 release

S530 KTE version 5.5.0p01 software includes all items from previous releases and the following items:

Noncritical fixes

PR51603	Under certain conditions, diagnostics would not properly report a failure of the 2010 VMTR tests. This has been corrected. This fix was originally delivered as Hot Fix 1 but has been incorporated into this release.
PR51870	The current limit used for certain diagnostic tests has been changed to minimize the chance of system damage under certain unusual fault conditions.
PR51295	Under certain conditions, the user would be incorrectly prevented from starting the IC process. This has been corrected.

Version 5.5.0 release

S530 KTE version 5.5.0 software includes all items from previous releases and the following items:

Enhancements

Diagnostics: The diagnostics software for KTE version 5.5.0 has been completely rewritten to improve its capabilities and performance. In addition, the diagnostic engine is now common between the Keithley Test Environment (KTE) and Automated Characterization Suite (ACS) software for the S530. Please refer to the new S530 *Diagnostics and Verification Manual* for information on using the diagnostics software.

System Verify: KTE version 5.5.0 now includes a System Verify capability that you may run at any time to verify that the S530 is operating within its published specifications. Note that the diagnostics suite must be run before running System Verify. As with the diagnostics software, the System Verify engine is common between KTE and ACS for the S530. Refer to the new *S530 Diagnostics and Verification Manual* for information on using the System Verify Software. Note that the System Verify capability requires the use of a special shorted probe card. Customers who purchased a Keithley probe card adapter with their S530 automatically received a shorted probe card with their system.

PR49677 KTE version 5.5.0 now supports differential CVU biasing. The `forcev` command now accepts both `CMTR1H` and `CMTR1L` for the `inst_id` parameter. By forcing one polarity on CMTR1H and the opposite polarity on CMTR1L, total bias can be up to 60 V, centered with respect to ground.

It is not possible to exceed ± 30 V with respect to ground.

PR50572 KTE version 5.5.0 adds `sweepv`, `smeasc`, and `smeasg` command support for the CMTR. Note that the `sintgc` and `sintgg` commands are not currently implemented. If necessary, the CMTR can be put into quiet mode using the `setmode` call.

Pulse support The `mpulse`, `pulsev`, and `pulsei` commands are now supported in KTE.

Miscellaneous KTE version 5.5.0 now includes and supports ProberIO, KISA, and Data Hub. These are generally transparent to users, except that Data Hub requires a license installation. License installation will be handled by the factory for new systems or by the field technician for system upgrades to version 5.5.0.

Critical fixes

PR50909   When using one of the following sweep commands: `sweepi`, `sweepv`, `asweepi`, `asweepv`, `bsweepi`, or `bsweepv`, and specifying a number of power line cycles (NPLC) value to the function, the NPLC setting was applied only to the sweeping SMU and not to other SMUs measuring during the sweep. This has been changed so that the NPLC value is applied to all SMUs participating in the test. This causes sweeps to execute faster when small NPLC values are used.

Noncritical Fixes

PR49945   The `measX` and `intgX` commands on the DMM used the wrong NPLC value. This has been corrected and these commands now set NPLC to 1.0.

PR51269   The `pgu_xxxxx` LPT commands for timing were not using the voltage range to check the minimum value of the timing parameters. The minimum value of the timing parameters is different for the two voltage ranges (5 V (FAST) and 20 V (SLOW)). This was allowing invalid parameters to be sent to Keithley External Control Interface (KXCI) and errors in the KXCI checkers would occur but would not be seen by the user. Now these errors are caught in LPT and displayed in the terminal window. The following PGU LPT commands were changed: `pgu_period`, `pgu_rise`, `pgu_fall`, and `pgu_width`. See the S530 LPTLib User's Manual for details. It is still possible to send an invalid parameter value if one channel is set to 20 V and the other is set to 5 V. In this case, the PGU uses the SLOW setting limits and may not catch an invalid value sent to the 5 V channel. The workaround is to ensure only valid parameter values are sent for each channel and not to rely on the software to identify invalid values.

Version 5.4.0p03 release

S530 KTE version 5.4.0p03 software includes all items from version 5.4.0p02 and the following enhancements:

Enhancements

PR51196	Added support for the 7072-HVD card.
PR51072	Added an isolation relay driver test to the diagnostics suite to detect if an isolation relay hardware failure has occurred on the 7072-HV and 7072-HVD matrix cards.
PR51073	Added a check to ensure that 707B Matrix Mainframe firmware is at the correct level to support the 7072-HVD matrix cards.
PR51074	Added a diagnostic to test proper functioning of a discharge circuit on the 7072-HVD cards.

Version 5.4.0p02 release

S530 KTE version 5.4.0p02 software includes all items from version 5.4.0p01 and the following enhancements and fixes:

Enhancements

PR50388	Added LPT debugging during Keithley Test Execution Engine (KTXE) execution. The `KI_KTXE_LPT_DEBUG` environment variable can be set to `1` to enable this feature. The LPT debug logging will be enabled and data saved in the `$KILOG/ktxe_lpt` directory. Each execution of KTXE will create a timestamped file that will contain the LPT debug information, Keithley Test Module (KTM) name, and user library (USRLIB) names to assist with debugging of test sequences.

Critical fixes

PR49948	Row isolation relay tests do not use correct relay combination. Corrected logic to properly test relays on card 6 instead of reusing card 4.
PR50498	Row isolation relay test uses the sense column for the forcing SMU. Corrected the matrix connection so that the test uses column 2 on card 4 instead of column 1 if SMU1 is used as the forcing SMU. This will prevent the current from flowing into the sense side of the SMU, which may provide a false-positive test.
PR50546	Aborting a Keithley Interactive Test Tool (KITT) macro will sometimes cause a GPIB instrument to stop responding. Added logic to abort the command execution on GPIB-based instruments when a KITT macro execution is aborted.
PR50547	Aborting a KITT macro does not abort the SMU execution. Added logic to abort the command execution on the TSP-based instruments when a KITT macro execution is aborted.

Noncritical fixes

PR50545	`LD_LIBRARY_PATH` is not being set correctly when the Keithley Original project is selected. Corrected the reset of `LD_LIBRARY_PATH` when the `select_project` script is used so that the previous project's `KI_KULT_PATH` is not included.
PR50548	The diagnostics Guard Test description is misleading. Changed the name of the diagnostics Guard-to-shield shorts test to Guard Tests because guard-to-shield shorts are not the only items detected.

Version 5.4.0p01 release

Enhancements

- Added additional diagnostics tests to:
  - o Test for guard-to-ground shorts in the matrix pathways
  - o Test for guard-to-ground shorts in the device under test (DUT) cables to the probe card adaptor
  - o Test the row and column isolation relays on the 7072-HV matrix cards
- The IC process log filename now contains the timestamp of when the process was started. As a result, the $KILOG directory will contain multiple log files. This directory should be cleaned up to purge old log files.
- The 2410 SMU bsweepX operation has been optimized if only the 2410 is used for any smeasX, trigvX, trigiX, trigtX, and rtfary commands for the bsweepX/smeasX/trigger configuration. Other combinations use the existing default mode of mixed-sweep operation.
- Added the UNUSED_PINS keyword for matrix commands. This will also include the CHUCK if the chuck is configured in the icconfig_QMO.ini file and the CHUCK is unused.
- Added the ability to automatically connect all unused pins and CHUCK to GND. See the Other Information section below for details.

Critical fixes

PR46182	Using a negative value for the rangei command on the 2636 SMU caused an error. The code has been corrected to allow the use of negative range values. The instrument uses the absolute value of the entered rangei value.
PR46213	CMTR diagnostics does not make a proper matrix connection. The diagnostic test has been corrected to make the proper matrix connections and provide the correct measurement data.
PR46268	The addcon LPT command allocates a new pathway instead of adding to an existing pathway. The addcon behavior has been corrected to add new connections to an existing pathway instead of allocating a new pathway.
PR46326	The pulse generator was not being triggered properly when multiple channels were used. Logic has been corrected to properly trigger multiple pulse channels.
PR47534	The bsweepX command using the 2410 SMU as the forcing SMU can damage devices at the end of the sweep. Corrected the 2410 SMU driver to eliminate the range change event at the end of the sweep operation. This range change can cause a voltage spike that may damage the DUT.
PR47655	A hot-switch event can occur during the 2410 SMU devclr() operation. Corrected the 2410 SMU driver to wait for the devclr() command to complete before processing subsequent commands.
PR47838	A hot-switch event can occur during the 2410 SMU devint() operation. Corrected the 2410 SMU driver to wait for the devint() command to complete before processing subsequent commands.
PR48562	Using a -1 argument to matrix commands can corrupt the matrix state. Corrected the matrix driver to properly process any parameters set to -1.

Noncritical fixes

PR46489	Added bsweepv LPT command speed improvements. Some redundant settling delays were removed from the bsweepv command loop processing.

Other information 47

Autoconnect unused pins and CHUCK to GND

The possibility exists that the CHUCK and the cables connected to any unused pins during a test sequence can get charged up due to DUT interactions. This energy would then be discharged through the matrix relays if one of these pins is used for the next test while precharged. This discharge can cause a small amount of damage to the relay contacts which can accumulate over time. This can cause a relay to stick closed or experience other failure mode.

A best practice for high-voltage testing is to modify your test sequences to properly control these unused pins and the CHUCK connection if device interaction can occur. Another less-preferred method is to enable the autoconnect feature within the matrix driver.

The matrix driver can now automatically connect all unused pins (including the CHUCK) to GND. The default state of this feature is OFF. The KI_GND_UNUSED environment variable can be used to change the default mode. Setting this environment variable to any nonzero value will change the default state to ON.

The setmode command can be used to enable or disable this feature within a test sequence.

NOTE

Any environment variable changes will not take effect until the IC process is restarted by using the run_ic.pl command.

Version 5.4.0 release

Enhancements

- Added support for the new 7530 (8×12 low current, high-speed Kelvin) Matrix Card.
- Added support for the 4220-PGU pulse card.
- Added support for the 4200-SCP2HR matrix card for ring-oscillator measurements.
- Added support for the 2010 DMM for use in low-voltage measurements (V-meter).
- Added additional diagnostics tests to:
  o Validate Kelvin connections between all SMUs and all pins
  o Allow diagnostics to test only MATRIX, SMUS, or OTHER instruments
  o Test SMU force-measure behavior for all current and voltage ranges
- Added `sudo` support for `kthmgr`, `kthprg`, and `kthopr` accounts to provide access to the `$KIBIN/shutdown_s530.pl` script.

Critical fixes

PR45919   Practice task routines do not work with prober commands. Practice task routines will now start communication with the prober correctly.

PR46010   The IC process sometimes crashes after multiple client access. The IC error channel logic has been corrected to support multiple client connections.

PR46040   KITT macros that use prober commands may stop processing at the end of execution. The prober control thread has been corrected to terminate properly. The GPIB timeout value for the prober's GPIB controller must be set to 1 instead of 10. If you are upgrading from KTE version 5.3.0, use `gpibexplorer` as the root user to modify this setting for GPIB1.

Noncritical fixes

PR45912   The `$KIHOME/kth.ini` file was being overwritten by the latest released version during a software upgrade, undoing any user modifications that had been made. This has been changed so that the latest released version of the file (without any user modifications) is saved as `$KIHOME/kth.ini.s530`. After an upgrade, you are responsible for editing the existing `$KIHOME/kth.ini` file to add any new content needed by the new software release. This can be identified by comparing the two files and merging any new information in the `$KIHOME/kth.ini.s530` file into the `$KIHOME/kth.ini` file.

NOTE

If there is no `$KIHOME/kth.ini` file present at the time of upgrade, the latest released version is also copied to `$KIHOME/kth.ini`.

Version 5.3.0p02 release

Enhancements

- Added shorts and continuity check to the matrix diagnostics test suite. Refer to Additional documentation below for details.
- Command-line switches have been added to the diagnostics program. Refer to Additional documentation below for details about these switches.

Critical fixes

PR45623   High-voltage source-measure unit (SMU) diagnostics would not pass. The high-voltage SMU instrument driver logic was corrected to properly synchronize commands.

Noncritical fixes

The default voltage limit for the 2410 SMU has been changed to 20 V instead of 200 V.

Version 5.3.0p01 release

KTE version 5.3.0p01 is a maintenance release of the KTE version 5.3.0 software that supports the use of the S530 Parametric Test System platform. This release provides a software update to add new functionality and correct reported bugs.

Enhancements

PR45502   System diagnostics can now detect interlock events. The diagnostics program will not start execution if the interlock has been tripped. Diagnostics will abort execution if the interlock is opened while the program is running.

Critical fixes

PR45500   The IC process will randomly stop responding at startup. An internal variable is now initialized to the correct value. This variable was previously uninitialized, causing the problem.

PR45487   Two-wire system diagnostics would fail. The logic for 2-wire diagnostic tests for matrix relays has been corrected. There was an incorrect configuration condition that could allow the system to think that 4-wire mode was active.

PR45566   High-voltage tests could damage matrix relays. A Smartclear feature has been implemented to allow the matrix to discharge before opening any relays. This will protect the matrix relays by avoiding any hot-switching events.

PR45592   The `addcon` command clears matrix connections instead of adding connections. The `addcon` behavior has been corrected to add connections to the matrix instead of clearing existing connections first. Workaround: Make the `addcon` command the last matrix command before other LPT commands are called.

Noncritical fixes

PR45397   The `clrscn()` command will not work correctly if SMU1 is not included in the test sequence. The `clrscn()` logic has been corrected to operate with any SMU, not just SMU1. Workaround: Use `forcev(SMU1, 0.0)` in the test sequence to use this SMU.

Version 5.3.0 release

Enhancements

KTE version 5.3.0 is the first release of KTE that supports the S530 instrument platform. This release provides a means for existing S400 users to migrate to a new hardware platform, while leveraging their existing investment in test routines and system integration software.

Installation

<div style="text-align:center">**NOTE**</div>

You must install as root user in order to configure the account and network settings correctly.

The software can be installed using a self-extracting script. The software image file is named `install_s530sw_v5.8.2.sh`. Copy this file to the desktop. Next, add execute permissions for the file by right-clicking the file, selecting **Properties**, selecting the **Permissions** tab, and selecting **Allow executing file as program**.

To execute as root, open a new terminal, run `su`, and enter the root password. Then execute the installation file. For example, assuming you copied the file to the desktop of `kthmgr`, execute the script by typing:

```
$ cd ~/Desktop
$ su
# ./install_s530sw_v5.8.2.sh
```

You will be prompted to enter the name of the installation directory. Pressing **Enter** will accept the default path of `/opt/kiS530`. Enter a different path name if desired before you press the **Enter** key.

You will be presented with a menu to allow you to change various setup parameters. Option 8 will display all items on one screen for your review. Use the various menu choices to configure the system. Use option 9 to configure the software and complete the installation process.

<div style="text-align:center">**NOTE**</div>

The user ID and group ID default values are different than what was used for S600LX installations. If you want to share test recipes between the two platforms, make sure that you enter the correct values for the Series 500 KTE installation. The account and group ID values need to match each other for file access on shared servers.

You must now log off and log back on to the workstation to complete the configuration of your KTE environment.

How to upgrade the 707B Matrix Mainframe firmware

Series 500 KTE version 5.5.0 (and later) requires that the 707B Matrix Mainframe firmware be at version 1.03h or later to support the new 7072-HVD matrix card. Even if you are not using the high-voltage capabilities of the S530, this firmware upgrade is required.

Exit all KTE tools and execute the following commands to upgrade the firmware:

```
$KIHOME/IC/bin/stop_ic.pl
cd $KIHOME/fw/707B
update707B 192.168.1.5 ./main_p70xB_0103h.zip
```

The IP address shown above is the default address for the mainframe. Please change this value if necessary to match your system configuration.

The `update707B` program will send the flash image to the mainframe and initiate an install process.

⚠ CAUTION

You must wait for this process to complete and the mainframe to reboot before attempting to use the system. Interruption of the update process may cause damage to the mainframe installed firmware image, rendering the box inoperable.

Once the update has completed and the mainframe has rebooted, restart the IC process again by executing the `$KIHOME/IC/bin/run_ic.pl` command.

Additional documentation

Shellshock vulnerability information

In September 2014, a significant security vulnerability within the bash shell on nearly all Linux distributions was identified and named "Shellshock." See https://rhn.redhat.com/errata/RHSA-2014-1306.html for more information. CentOS released a fix for this security vulnerability. The full name of the RPM package that fixes this problem is: `bash-3.2-33.el5_11.4.i386.rpm`.

The cryptographic checksums of this file are as follows:
```
MD5: e579bd3f1fe173393483db540ec1ab13
SHA-256: ca1964b824f69e6ff5bfeb16ec0568ec32675e88fa00bc5ca887a528bbaf2628
```

In general, Keithley cannot guarantee support for customers who update their CentOS packages. However, in this particular case, Keithley has tested that this shellshock security fix does not cause any problems with the KTE installation.

If you want to update your system with this file, assuming it is in the current directory, you may do so with the following command (run as root):

```
# yum install ./bash-3.2-33.el5_11.4.i386.rpm
```

GPIB adaptor setting for prober control

The GPIB timeout value for the prober's GPIB controller must to be set to 1 second instead of 10 seconds. If upgrading from KTE version 5.3.0, use `gpibexplorer` as root user to modify this setting for GPIB1.

Notes about upgrading from KTE version 5.3.0, including version 5.3.0pX

The `$KIHOME/IC/icconfig_<QMO>.ini` file (where `<QMO>` is the system QMO number) must be edited manually if you are upgrading from KTE version 5.3.0.

The CMTR1 section of the file needs to have a `GROUP_ID=GROUP4` line added. After installing the version 5.5.0 software, use a text editor and add the missing information to the CMTR1 section of the file. To make this change active, stop and restart the IC process after the edit has been completed and the file saved.

If you are using a 4220-PGU Pulse Card or a 4200-SCP2HR Scope Card in the system, the `GROUP_ID` values must match the `GROUP_ID` values in the appropriate PGU and SCP sections.

Other LPT-related information

Each parametric test system has a single timer. For compatibility with older systems, you can use `TIMER1` through `TIMER4` for the `timerid` parameter, but any use of `TIMER2`, `TIMER3`, or `TIMER4` will refer internally to `TIMER1`.

Diagnostics and system verification

While diagnostics and system verification software is running, test signals, including potentially harmful high voltages, are present at the probe card adaptor and the probe card. Diagnostics and system verification require the use of two special probe cards: A blank probe card and a shorted probe card. These are supplied with Series 500 systems when the Keithley probe card adaptor is also ordered. Refer to the "Diagnostics and system verification" section in the Reference Manual for your system for details.

⚠ CAUTION
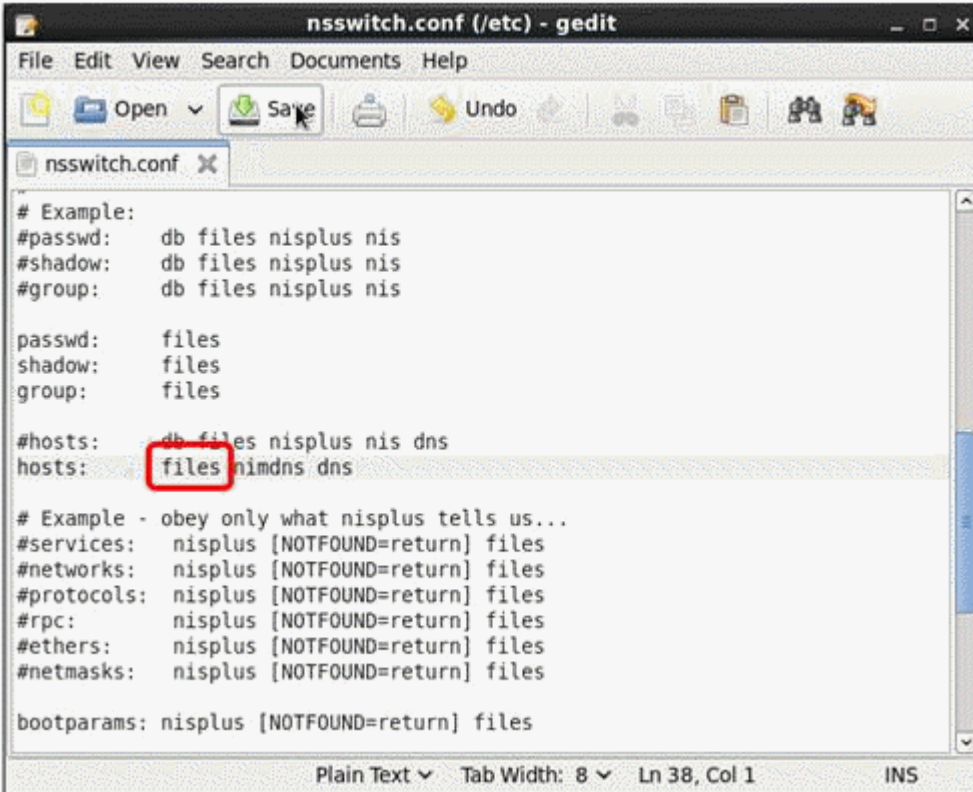
Diagnostics and system verification software should never be run with a customer probe card installed and should never be run in a probes down situation. Doing so will cause false diagnostics results and may result in system damage.

Problems running diagnostics?

Hosts entries in nsswitch.conf file

If you are having problems starting the Series 500 diagnostics software, the problem may be the order in which hosts are listed in the `/etc/nsswitch.conf` file.

To check this, open the *nsswitch.conf* file and make sure that the `files` host is listed first on the `hosts:` line, as shown in the following figure.

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 corporate headquarters of Keithley Instruments (toll-free inside the U.S. and Canada only) at 1-800-935-5595, or from outside the U.S. at +1-440-248-0400. For worldwide contact numbers, visit the Keithley Instruments website.