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## General Information

### Supported models

This firmware is used on the following Keithley Instruments products:

Models 3706, 3706-S, 3706-NFP, 3706-SNFP, and all Series 3700 cards

### Installation instructions

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**NOTE** Upgrading to firmware version 1.40 or greater may require special installation steps that are not required for other firmware upgrades. Carefully read the [Version 1.41 installation notes](#) below before upgrading your Series 3700.

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For other releases, firmware installation instructions are given in the “Upgrade Procedure using the USB Flash Drive” section in the Series 3700 User’s Manual (document number: 3700S-900-01). This manual is available the Keithley Instruments website at <http://www.keithley.com/support>. Alternatively, you can get upgrade assistance from Keithley by calling your local Keithley support office.

### Upgrade considerations for Models 3706, 3706-S, 3706-NFP, 3706-SNFP

This release updates the firmware for the Series 3706 mainframe and the optional digital multimeter (DMM).

The following table lists the considerations that should be made when deciding whether or not to upgrade to this version from any previous version.

| Upgrade considerations    |                         |                            |                                  |  |
|---------------------------|-------------------------|----------------------------|----------------------------------|--|
| Existing firmware version | Recalibration required? | Requalification suggested? | Backward compatibility concerns? | Should you upgrade?  |
| 1.00                      | No                      | Yes                        | No                               | Yes  |
| 1.03                      | No                      | Yes                        | No                               | Yes  |
| 1.10                      | No                      | Yes                        | No                               | Yes  |
| 1.20                      | No                      | Yes                        | No                               | Yes  |
| 1.21                      | No                      | Yes                        | No                               |  |
| 1.22c                     | No                      | No                         | No                               | Yes, if using a Model 3740 card                                |
| 1.22d                     | No                      | No                         | No                               | Yes, if using a Model 3740 card                                |
| 1.24b                     | No                      | No                         | No                               | Yes, for web-based charting feature; Model 3731 card supported |
| 1.30j                     | No                      | No                         | No                               | Yes, to avoid security warning                                 |
| 1.31a                     | No                      | No                         | No                               | Yes, if using Ethernet   |
| 1.32a                     | No                      | No                         | No                               | Yes, if using a Model 3732 card                                |
| 1.40                      | No                      | No                         | No                               | Yes  |

## Version 1.41 Release

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### Overview

The Series 3700 version 1.41 firmware is an enhancement and problem fix release. Some problem corrections may impact compatibility, please review the corrections prior to installation.

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**NOTE** Upgrading to firmware version 1.41 from a version below 1.40 requires special installation steps that are not required for other firmware upgrades. Carefully read the [Version 1.41 installation notes](#) below before upgrading your Series 3700.

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The following table lists the exact version numbers of the available Series 3700 components when the firmware upgrade is complete.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.41c   |
| Series 3700 High Performance DMM                 | 1.41b   |
| 3720 Dual 1x30 Multiplexer                       | 1.40h   |
| 3721 Dual 1x20 Multiplexer                       | 1.40h   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.40h   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.40j   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.40j   |
| 3730 Dual 6x16 High Density Matrix               | 1.40h   |
| 3731 Dual 6x16 High Speed Reed Matrix            | 1.40j   |
| 3732 Quad 4x28 High Speed Reed Matrix            | 1.40m   |
| 3740 32 Channel Isolated Switch                  | 1.40h   |
| 3750 Multifunction I/O Card                      | 1.40j   |

### Version 1.41 installation notes

Upgrading to firmware version 1.41 requires special installation steps that are not required for other firmware upgrades. Carefully perform the following procedures to successfully upgrade to version 1.41.

First, determine your instrument's current firmware revision. With the instrument powered on, press the **SLOT** key. The instrument's current firmware version is displayed. Based on the current firmware revision, follow the instructions in the appropriate section below.

#### Upgrading from firmware version 1.31a or any earlier version

Download the `nk_5001607.nb0` and `main_p37xx_0141c.CAB` files from the Keithley Instruments website ([www.keithley.com](http://www.keithley.com)).

##### To perform the upgrade:

1. Place the `nk_5001607.nb0` and `main_p37xx_0141c.CAB` files in the root directory of a blank USB flash drive (make sure drive size is large enough for the size of the upgrade files).
2. Ensure that the Series 3700 mainframe power is turned off, and then connect the flash drive to the Series 3700 and turn on power to initiate the upgrade process.

---

**NOTE** The upgrade process will take three to five minutes and the instrument will reboot several times during the process. Do not disturb the instrument until the normal front panel display has been present for at least 30 seconds.

---

3. On the front panel, press the **MENU** key, select **LAN**, select **APPLY**, and then press **ENTER** to resume normal Ethernet connectivity following the upgrade.
4. Disconnect the USB flash drive from the Series 3700 mainframe.

---

**NOTE** Alternatively, you can have Keithley Instruments assist you with the upgrades by calling your local Keithley support office.

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### Upgrading from firmware version 1.32a

Download the `main_p37xx_0141c.CAB` files from the Keithley Instruments website ([www.keithley.com](http://www.keithley.com)).

---

**NOTE** The following steps force the instrument to upgrade its firmware twice. This is necessary to ensure everything is upgraded properly. Follow the steps below carefully.

---

#### To perform the upgrade:

1. Copy the `main_p37xx_0141c.CAB` file to a blank USB flash drive (make sure drive size is large enough for the size of the upgrade file).

---

**NOTE** Verify that the USB flash drive is blank.

---

2. Turn on the Series 3700 power.
3. Install the USB flash drive in the front panel connector.
4. On the front panel, press the **MENU** key.

---

**NOTE** If your model does not have a front panel, upgrade over the bus using the `upgrade.unit()` command.

---

5. Turn the navigation wheel to scroll to **UPGRADE**, and then press the navigation wheel.
6. The question `UPGRADE UNIT?` displays. Select **Yes**, and then press the navigation wheel. The Series 3700 upgrade status displays on the front panel, including the percentage completed. When the file has been unpacked, the upgrade status is displayed as the upgrade progresses (first cards installed in the slots are upgraded (including the DMM, if installed), and then the Series 3700 mainframe).

---

**NOTE** For models without a front panel, the LAN status and clock status LEDs blink in unison during the upgrade process.

---

7. Wait for the Series 3700 to reboot automatically. When the reboot is complete, press the **MENU** key on the front panel.

---

**NOTE** If your model does not have a front panel, upgrade over the bus using the `upgrade.previous()` command.

---

8. Turn the navigation wheel to scroll to **UPGRADE** and press the navigation wheel.
9. The question `UPGRADE UNIT?` is displayed. Select **Previous**, and then press the navigation wheel (note that in this step you are selecting "Previous" instead of "Yes," as was done in step 6). The Series 3700 upgrade status displays on the front panel, including the percentage completed. When the file has been unpacked, the upgrade status is displayed as the upgrade progresses (first cards installed in the slots are upgraded (including the DMM, if installed), and then the Series 3700 mainframe).  
The Series 3700 reboots automatically when the upgrade is complete.

## Critical fixes

**PR42627 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The instrument may generate a fatal error if another node on the TSP-Link network performs a `tsplink.reset()` while the instrument is powering up.

**Resolution:**

This issue has been corrected.

**PR42632 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Selecting a script to load from a sub-directory on the thumb drive may cause the unit to lock up or reset.

**Resolution:**

Scripts can now be loaded from any thumb drive directory level without issue.

**PR41811 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

In version 1.40, single channel scans with high scan counts would sometimes yield an out of power error.

**Resolution:**

This problem has been resolved.

**PR41968 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The node parameter being returned by `errorqueue.next()` is always nil.

**Resolution:**

The node parameter is correctly returned as described in the manual.

**PR42189 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Some thumb drives are not recognized quick enough to perform an OS upgrade.

**Resolution:**

If available, try another thumb drive.

**PR42473 Models affected:**

3706, 3706-NFP

**Symptom:**

External reference temperature may not function properly.

**Resolution:**

In 1.40, external temperature reference only worked on slot 1. Slot 2-6 are now available. Four wire external temperature reference is now available on all slots.

**PR42528 Models affected:**

3706, 3706-NFP

**Symptom:**

Occasionally when using the `tspnet.tsp.rhtablecopy()` ICL, the error "2413, TSPnet invalid reading buffer table" would be generated when asking for the some of the synchronous tables like `relativetimestamps` but, not for `readings`.

**Resolution:**

The issue has been resolved.

**PR42680 Models affected:**

3706, 3706-NFP

**Symptom:**

The reading buffer channel names are not as expected according to the manual guidelines..

**Resolution:**

Channel patterns only use the first 7 characters in the channel names if the pattern name exceeds 7 characters. Also, patterns now have a + at the end of them to indicate multiple items closed.

**PR42751 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

In previous versions, TSPnet would not connect to some telnet servers.

**Resolution:**

TSPnet now connects to all Telnet servers.

## Enhancements

**PR42773 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Error checking when using temperature with an external reference junction has been improved. This improvement prevents the use of an external reference junction for channel one (which is the external reference junction) and forces the user to measure the external reference junction before it using it for another channel.

**PR40792 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

A Save button has been added to the Web page Channel Pattern Dialog to better guide the user to their desired operation.

**PR41493 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The `tspnet.tsp.rtablecopy()` command will default and use the readings synchronous table to a reading buffer if one isn't specified in the name parameter.

**PR41938 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The System Web page now allows the creation of a script representing the state of the unit (see Create Config Script feature in the manual).

**PR41976 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

A screen containing the status of memory usage has been added to the front panel display. It can be accessed from the menu item MENU->SYSTEM-INFO->MEMORY-USAGE.

**PR 39612 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The front panel display now indicates when a scan is being run. The selected channel will be replaced with the word SCAN for the duration of the scan. Any DMM attribute information will also be removed.

**PR41936 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Scripts generated with the `createscript` command or front panel option under MAIN MENU -> SETUP -> CREATE-SCRIPT no longer have a warning message to not modify the file since auto generated.

## Noncritical fixes

**PR41691 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**



In 1.40a labels were no longer allowed in channel lists when used to denote a range (for example, START:END).

**Resolution:**

The feature has been restored.

**PR41801 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

In some cases when DMM math was enabled, the front panel units continued to follow the selected function.

**Resolution:**

The units now follow the math option.

**PR41947 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The `eventlog.overwritemethod` attribute is not stored when using the save setup feature or when generating a script by `createscript`.

**Resolution:**

The attribute is properly stored.

**PR42129 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Connecting to the web page of an instrument with a running scan will cause the scan to stop.

**Resolution:**

Connecting and disconnecting from the web page does not impact the state of a scan.

**PR42302 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

After running a script generated by `createscript`, a scan list may be incorrect. Scan steps that were added to a scan with the command `scan.addimagestep()` are not being recreated correctly with `createconfigscript()`

**Resolution:**

A scan is accurately recreated.

**PR42303 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Some commands are not included in a script generated by command createscript.

**Resolution:**

The following commands are now included: `lan.trigger[N].ipaddress`, `trigger.timer[N].delaylist`, `tsplink.writeprotect`, `tsplink.trigger[1].pulsewidth`, `tspnet.tsp.abortonconnect`, `tspnet.timeout`, `scan.bypass`, `scan.mode`.

**PR42309 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The script created from createscript doesn't have commands for row and column label settings.

**Resolution:**

Issue has been resolved.

**PR42364 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The Scan Start Event and Scan Complete event may be out of order when the scan count is greater than one.

**Resolution:**

When a scan has greater than one scan count, the Scan Start Event and Scan Complete Event on a scan pass greater than one are now in the correct order.

**PR42548 Models affected:**

3706, 3706-NFP

**Symptom:**

DMM Auto Delay set to Once does not give expected performance.

**Resolution:**

DMM Auto Delay set to Once, for readings greater than 1, gives performance equal to DMM Auto Delay Off.

**PR42735 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An aperture setting is not saved with "create config script" for period and frequency. Recalling a setup or executing a script from "create config script" generates a data type error message (-104).

**Resolution:**

Issue has been resolved. In addition, the following settings are not part of a setup or create config script:

```
schedule.alarm[N].enable  
schedule.alarm[N].seconds  
schedule.alarm[N].fractionalseconds  
schedule.alarm[N].ptpseconds
```

**PR41753 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The `beeper.enable` setting is not affected by a system reset, saved in a setup, or saved in a script generated by `createconfigscript()`.

**Resolution:**

A `reset()` command will set the `beeper.enable` attribute back to 1. The setting will be maintained by a setup file or script generated by `createconfigscript()`.

**PR42033 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Setting the period, repetition, seconds, fractionalseconds or ptpseconds of a schedule alarm with a negative value doesn't generate an error. Afterwards, the setting has an incorrect value when queried.

**Resolution:**

An out of range argument generates an error. The value for fractionalseconds needs to be less than 1 and greater than or equal to 0 to not generate an error message.

**PR42058 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

None

**Resolution:**

The undocumented `createscript()` ICL command has been changed to `createconfigscript()`. Calling the original function will result in an error.

The location of the feature on front panel has changed from the CREATE-SCRIPT option of SETUP submenu under MAIN menu, to CREATE-CONFIG option of SCRIPT submenu under MAIN menu.

On the System Web page, a Create Config Script button has been added.

**PR42613 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Some users may experience inappropriately degraded performance when using the Ethernet raw socket and telnet sockets. The degradation may occur when a number of small packets are exchanged across the socket. This is caused by the Nagle algorithm which delays Ethernet packets for up to 200 mS waiting to combine small packets for network efficiency.

**Resolution:**

In most cases packet immediacy is more desirable than network efficiency. The Nagle algorithm is now disabled by default to eliminate this delay. If necessary for Ethernet efficiency, use the `lan.nagle ICL` to enable the algorithm.

**PR41324 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An error is not logged when an empty parameter string is passed to `dmm.configure.delete()`, `dmm.configure.query()`, or `dmm.configure.recall()`.

**Resolution:**

Issue has been resolved.

**PR42057 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

In 1.40 the front panel calibration screen did not display the calibration information.

**Resolution:**

The information is now properly displayed. At no time was the calibration information lost.

**PR42310 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The user screen is blank at power up and after a reset.

**Resolution:**

At power up, the user screen now shows USER SCREEN and is not cleared with a reset operation.

**PR42519 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The password mode ICL is not be utilized by the web pages.

**Resolution:**

The applet will read the password mode at logout time and at powerup/initialization only. If the user changes the password mode via non-web interface while the applet is running, the applet will not be notified of this change until a reload or logout event.

**PR41691 Models affected:**

3706, 3706-NFP

**Symptom:**

The command `dmm.calibration.unlock()` generates a -151, Invalid string data error message.

**Resolution:**

Now, the command generates a -150, String data error message.

**Known issues****PR41421 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The maximum number of characters that can be sent to the instrument without a newline character depends on which remote interface is being used. Limiting line length to less than 950 characters without a newline character will ensure interface independence.

**PR41556 Models affected:**

3706, 3706-NFP, 3706-S, 3706-SNFP

**Symptom:**

Creating a reading buffer with the same name as a script already in the system will prevent normal access to the reading buffer. Choose unique names for reading buffers.

## Version 1.40 Release

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### Overview

The Series 3700 version 1.40 firmware is an enhancement release including control and operation of the Model 3732 Quad 4 x 28 Ultra-High Density Reed Relay Matrix Card, as well as some problem fixes. Some problem corrections may impact compatibility, please review the corrections prior to installation.

---

**NOTE** Upgrading to firmware version 1.40 requires special installation steps that are not required for other firmware upgrades. Carefully read the [Version 1.40 installation notes](#) below before upgrading your Series 3700.

---

The following table lists the exact version numbers of the available Series 3700 components when the firmware upgrade is complete.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.40k   |
| Series 3700 High Performance DMM                 | 1.40k   |
| 3720 Dual 1x30 Multiplexer                       | 1.40h   |
| 3721 Dual 1x20 Multiplexer                       | 1.40h   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.40h   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.40j   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.40j   |
| 3730 Dual 6x16 High Density Matrix               | 1.40h   |
| 3731 Dual 6x16 High Speed Reed Matrix            | 1.40j   |
| 3732 Quad 4x28 High Speed Reed Matrix            | 1.40m   |
| 3740 32 Channel Isolated Switch                  | 1.40h   |
| 3750 Multifunction I/O Card                      | 1.40j   |

### Version 1.40 installation notes

Upgrading to firmware version 1.40 requires special installation steps that are not required for other firmware upgrades. Carefully perform the following procedures to successfully upgrade to version 1.40.

First, determine your instrument's current firmware revision. With the instrument powered on, press the **SLOT** key. The instrument's current firmware version is displayed. Based on the current firmware revision, follow the instructions in the appropriate section below.

#### Upgrading from firmware version 1.31a or any earlier version

Download the nk\_5001607.nb0 and main\_p37xx\_0140k.CAB files from the Keithley Instruments website ([www.keithley.com](http://www.keithley.com)).

#### To perform the upgrade:

- Place the nk\_5001607.nb0 and main\_p37xx\_0140k.CAB files in the root directory of a blank USB flash drive (make sure drive size is large enough for the size of the upgrade files).
- Ensure that the Series 3700 mainframe power is turned off, and then connect the flash drive to the Series 3700 and turn on power to initiate the upgrade process.

---

**NOTE** The upgrade process will take three to five minutes and the instrument will reboot several times during the process. Do not disturb the instrument until the normal front panel display has been present for at least 30 seconds.

---

12. On the front panel, press the **MENU** key, select **LAN**, select **APPLY**, and then press **ENTER** to resume normal Ethernet connectivity following the upgrade.
13. Disconnect the USB flash drive from the Series 3700 mainframe.

---

**NOTE** Alternatively, you can have Keithley Instruments assist you with the upgrades by calling your local Keithley support office.

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### Upgrading from firmware version 1.32a

Download the `main_p37xx_0140k.CAB` files from the Keithley Instruments website ([www.keithley.com](http://www.keithley.com)).

---

**NOTE** The following steps force the instrument to upgrade its firmware twice. This is necessary to ensure everything is upgraded properly. Follow the steps below carefully.

---

#### To perform the upgrade:

14. Copy the `main_p37xx_0140k.CAB` file to a blank USB flash drive (make sure drive size is large enough for the size of the upgrade file).

---

**NOTE** Verify that the USB flash drive is blank.

---

15. Turn on the Series 3700 power.
16. Install the USB flash drive in the front panel connector.
17. On the front panel, press the **MENU** key.

---

**NOTE** If your model does not have a front panel, upgrade over the bus using the `upgrade.unit()` command.

---

18. Turn the navigation wheel to scroll to **UPGRADE**, and then press the navigation wheel.
19. The question `UPGRADE UNIT?` displays. Select **Yes**, and then press the navigation wheel. The Series 3700 upgrade status displays on the front panel, including the percentage completed. When the file has been unpacked, the upgrade status is displayed as the upgrade progresses (first cards installed in the slots are upgraded (including the DMM, if installed), and then the Series 3700 mainframe).

---

**NOTE** For models without a front panel, the LAN status and clock status LEDs blink in unison during the upgrade process.

---

20. Wait for the Series 3700 to reboot automatically. When the reboot is complete, press the **MENU** key on the front panel.

---

**NOTE** If your model does not have a front panel, upgrade over the bus using the `upgrade.previous()` command.

---

21. Turn the navigation wheel to scroll to **UPGRADE** and press the navigation wheel.
22. The question `UPGRADE UNIT?` is displayed. Select **Previous**, and then press the navigation wheel (note that in this step you are selecting "Previous" instead of "Yes," as was done in step 6). The Series 3700 upgrade status displays on the front panel, including the percentage completed. When the file has been unpacked, the upgrade status is displayed as the upgrade progresses (first cards installed in the slots are upgraded (including the DMM, if installed), and then the Series 3700 mainframe).  
The Series 3700 reboots automatically when the upgrade is complete.

## Critical fixes

**PR38770 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Functions on the advanced trigger web page do not operate correctly.

**Resolution:**

The advanced trigger web page now operates correctly.

**PR39078 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Recalling a saved setup takes too long to complete.

**Resolution:**

This issue is resolved.

**PR39569 Models affected:**

3706, 3706-NFP

**Symptom:**

Measurement timestamps show excessive jitter.

**Resolution:**

Measurement timestamp jitter has been significantly reduced.

**PR39802 Models affected:**

3706, 3706-NFP

**Symptom:**

When measuring temperature, the internal measured reference junction value is not used when using the `dmm.close()` command for a configuration that includes an internal reference junction or when changing the DMM transducer type with a channel closed on the temperature function.

**Resolution:**

This issue has been corrected.

**PR39903 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Having a reset command in the `autoexec` script causes the instrument to generate a `-222, parameter data out of range` error message, and the `reset` command is not executed.



**Resolution:**

The issue has been corrected.

**PR39944 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The lan config DNS verify setting and the lan config DNS dynamic setting operate incorrectly when accessed from the instrument's front panel.

**Resolution:**

This issue has been corrected.

**PR40259 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An instrument downgraded below version 1.30b may no longer be capable of upgrading back to a higher revision. The upgrade process now warns of this possibility. Instruments without front panels will no longer downgrade past 1.30b.

**Resolution:**

Do not downgrade an instrument's firmware to 1.30b or earlier unless you are certain you will not want to upgrade to a newer firmware version.

**PR40353 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Using `os.date` with invalid format specifiers may cause the instrument to stop responding.

**Resolution:**

Invalid format specifiers now return an `Invalid Format message`.

**PR40953 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Changing the TSP-N termination in the middle of a connection to a TSP instrument will confuse the processing of the connection.

**Resolution:**

TSP-Net termination will generate an error if modified during a connection to a TSP instrument. The termination is always set to linefeed.

**PR41359 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

For the Models 3723, 3724, and 3731 cards, the user settle delay (`channel.setdelay()` command) is incorrectly applied to open actions, rather than close actions only.

**Resolution:**

This issue has been corrected.

**PR 41891 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Disabling the Ethernet Ping protocol also disables most other Ethernet functionality

**Resolution:**

The ability to disable Ethernet Ping protocol has been removed. Ping is now always enabled.

## Enhancements

**PR33446, Models affected:**

PR39259

3706, 3706-S, 3706-NFP, 3706-SNFP

Firmware updates can now be initiated from the web interface by pressing the **Upgrade Firmware** button on the system web page. Download the firmware image file from [www.keithley.com](http://www.keithley.com) before initiating the update from the instrument's web interface. Follow the dialog box prompts after selecting this button. During the upgrade, the instrument will disconnect from the web interface. After the upgrade finishes and the instrument reboots, close all browser windows to clear any cached information, and then open a new browser window to reconnect to the web interface.

**PR 36048 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Scripts that utilize the `channel.*()` ICL commands may exhibit performance improvements. This improvement may be most noticeable when the channel list contains a high number of channels.

**PR37683 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The instrument will no longer support specifying a pseudocard using a constant, for example, `slot[2].pseudocard = slot.PSEUDO_3722`. Pseudocards will now be specified by using the model number only, for example, `slot[2].pseudocard = 3722`. For consistency, Keithley recommends using this new convention for all cards. However, to ensure backward compatibility, constants for existing cards will continue to be available, but constants will not be added for future cards.

**PR 38853 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The Log menu item on the instrument's main web page has been moved to the main LXI web page.

**PR 39230 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The system web interface now contains the card serial numbers in the report list.

**PR 39612 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Front panel and web interface enhancements have been made to support the large number of channels available on the Model 3732 card. For details about these enhancements, refer to PA-1021, Model 3732 Reed Relay Matrix Card Connection Information, which is supplied with the Model 3732.

**PR39911 Models affected:**

PR39915

3706, 3706-S, 3706-NFP, 3706-SNFP

The following ICL commands have been added:

```
trigger.blender[N].reset()
trigger.timer[N].reset()
digio.trigger[N].reset()
tsplink.trigger[N].reset()
```

These commands reset the associated *N* blender, timer, or trigger attributes back to the factory default settings, as indicated below.

---

**NOTE** For details, including default settings for each command, refer to the Series 3700 Reference Manual (document number 3700S-901-01).

---

The `trigger.blender[N].reset()` command resets the following back to factory defaults:

```
trigger.blender[N].orenable
trigger.blender[N].stimulus[M]
```

It also clears the overrun:

```
trigger.blender[N].overrun
```

The `digio.trigger[N].reset()` command resets the following back to factory defaults:

```
trigger.timer[N].count
trigger.timer[N].delay
trigger.timer[N].delaylist
trigger.timer[N].passthrough
trigger.timer[N].stimulus
```

It also clears the overrun:

```
trigger.timer[N].overrun
```

The `digio.trigger[N].reset()` command resets the following back to factory defaults:

```
digio.trigger[N].mode
digio.trigger[N].pulsewidth
digio.trigger[N].stimulus
```

It also clears the overrun:

```
digio.trigger[N].overrun
```

The `tsplink.trigger[N].reset()` command resets the following back to factory defaults:

```
tsplink.trigger[N].mode
tsplink.trigger[N].stimulus
```

It also clears the overrun:

```
tsplink.trigger[N].overrun
```

**PR 40328 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The `eventlog.next()` command takes an optional integer parameter ranging from 1 to 50, indicating the number of events desired in the response. If the parameter is not specified, then it defaults to 1 to mimic the behavior of the command before the enhancement.

**PR 40661 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

A new ICL function that creates a string channel descriptor from a series of card-dependent integer arguments has been added:

```
channel.createspecifier()
```

Usage:

There are five variants of this function that can be used, depending on the type of card in the specified slot:

```
<string> = channel.createspecifier(<slot>, <bank>, <row>, <column>)
<string> = channel.createspecifier(<slot>, <row>, <column>)
<string> = channel.createspecifier(<slot>, <bank>, <index>)
<string> = channel.createspecifier(<slot>, <index>)
<string> = channel.createspecifier(<slot>, <backplane>)
```

Where:

|                  |  |
|------------------|--|
| <i>slot</i>      | Specifies the slot number to use                 |
| <i>bank</i>      | Specifies the bank number to use (if applicable) |
| <i>row</i>       | Specifies the row number to use                  |
| <i>column</i>    | Specifies the column number to use               |
| <i>index</i>     | Specifies the index to use                       |
| <i>backplane</i> | Specifies the backplane to use                   |

This function creates a string channel descriptor from a series of card-dependent integer arguments.

The arguments are dependent on the card type in the specified slot. The `channel.createspecifier` command can only create valid channel descriptors; if an illegal argument is sent for the type of card in the specified slot, an error is generated.

Variants of this function can be used, depending on the type of card in the specified slot:

| Type of card in slot         | Function variants to use |
|------------------------------|--------------------------|
| Matrix card containing banks | Variant 1 or 5           |
| Matrix card without banks    | Variant 2 or 5           |
| Multiplexer cards            | Variant 3, 4, or 5       |

#### Example 1:

To create a channel descriptor on the Model 3732 card configured as a single 4x112 matrix in Slot 3, Bank 1, Row 2, Column 101:

```
cd = channel.createspecifier(3, 1, 2, 101)
print(cd)
312A1
```

#### Example 2:

To set the pole setting to 2 for all channels in Bank 1 on a Model 3732 card configured as a dual 8x28 matrix in Slot 1:

```
for row = 1,8 do
  for col = 1,28 do
    ch = channel.createspecifier(1,1,row,col)
    channel.setpole(ch, 2)
  end
end
```

#### Example 3:

To create a channel descriptor on a Model 3724 multiplexer card in Slot 2, Bank 2, Index 1:

```
cd = channel.createspecifier(2, 2, 1)
print(cd)
2031
```

#### Example 4:

To create a channel descriptor on a Model 3724 multiplexer card in Slot 1, Backplane 911:

```
cd = channel.createspecifier(1, 911)
print(cd)
1911
```

#### PR40699 **Models affected:**

3706, 3706-S

The front-panel display functionality has been improved to increase usability. The plus (+) sign indicator has moved to the second line of the display and is no longer after the selected channel description. Now, the plus (+) sign denotes that a channel other than the selected channel is closed. To see which channels are closed, use the **DISPLAY** button to cycle to a new front-panel screen that

lists the closed channels. If the closed channel list exceeds the screen size, use the navigation wheel to scroll through the list.

**PR 40707 Models affected:**

3706, 3706-S

A new ICL function that allows inclusion of multiple channels in a single scan step has been added:

```
scan.addimagestep()
```

Usage:

```
scan.addimagestep(<channel list>, [<dmm config>])
```

Where:

|                                   |  |
|-----------------------------------|--|
| <code>&lt;channel list&gt;</code> | String specifying a list of channels           |
| <code>&lt;dmm config&gt;</code>   | Optional string specifying a DMM configuration |

This function adds a list of channels to be closed simultaneously in a single step of a scan. An optional DMM configuration can be added to force the scan to take a measurement during the same step.

The `scan.addimagestep` function is an advanced command; the channel list parameter must specify appropriate relays to support the requested DMM configuration, or an invalid measurement will result.

Unlike the `scan.add()` function, paired channels and backplanes necessary for measurement are not automatically added to the step. Use the `channel.setpole()` command to indicate if the paired channel should be added or not. Backplanes assigned to channels by the `channel.setbackplane()` command will not be added to the image step automatically. For example, if a measurement is taken on a 4-wire ohms configuration without designating 4-pole with the `channel.setpole()` command, the corresponding paired channel will not be added, and the specified "dmm config" will not cause additional relay closures as it normally would. Backplane channels that are needed for the desired measurement must be specified in the channel list parameter.

If you have changed the pole setting on any of the channels in the list (using `channel.setpole()`), an additional paired channel will be added or removed appropriately. For example, to ensure that the proper channels close to enable a 4-wire measurement, set the pole setting in addition to using the 4-wire ohms DMM configuration.

When a DMM configuration (other than "nofunction") is specified, the instrument will take the appropriate measurement based on the function set in the configuration; if no DMM configuration is specified with the command, no measurement will be taken.

Example 1:

This example adds a single step that closes Channel 1001 and takes a DC voltage measurement. Note that the voltage measurement will be inaccurate if this is the only step in the scan (because the backplane channels are not closed).

```
scan.addimagestep("1001", "dcvolts")
```

**Example 2:**

To add a single step that closes Channels 1001 and 1911, and then takes a DC voltage measurement:

```
scan.addimagestep("1001, 1911", "dcvolts")
```

**Example 3:**

This example first sets Channel 1001 to 4-pole, then adds a single step that closes Channels 1001, 1031, and 1911, and then takes a DC voltage measurement.

```
channel.setpole("1001", 4)
scan.addimagestep("1001, 1911", "dcvolts")
```

**Example 4:**

This example adds three steps with the following actions:

- Closes Channels 1101, 2202, and 1911, and then takes a DC voltage measurement
- Opens Channel 1101, closes Channel 1102 and maintains Channel 1911 closed, and then takes a DC voltage measurement
- Opens Channel 1102, closes Channel 1103 and maintains Channel 1911 closed, and then takes a DC voltage measurement.

```
scan.addimagestep("1101, 2202, 1911", "dcvolts")
scan.addimagestep("1102, 2202, 1911", "dcvolts")
scan.addimagestep("1103, 2202, 1911", "dcvolts")
```

**PR 41141 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Three new ICL commands have been added, described in the table below.

| ICL command              | Variable                           | Description  | Example  |
|--------------------------|------------------------------------|--|--|
| slot[<n>].rows.matrix    | <i>n</i> = Integer slot number     | Returns the number of rows in the matrix on the card in Slot <n>. If no matrix or no card exists, it returns nil.    | To return the number of rows in the matrix on the card in Slot 4 (12 rows):<br><br>print(slot[4].rows.matrix)<br>12          |
| slot[<n>].columns.matrix | <i>n</i> = Integer slot number     | Returns the number of columns in the matrix on the card in Slot <n>. If no matrix or no card exists, it returns nil. | To return the number of columns in the matrix on the card in Slot 4 (12 columns):<br><br>print(slot[4].columns.matrix)<br>12 |
| slot[<n>].banks.matrix   | <i>n</i> = The integer slot number | Returns the number of banks in the matrix on the card in Slot <n>. If no matrix or no card exists, it returns nil.   | To return the number of banks in the matrix on the card in Slot 1 (4 banks):<br><br>print(slot[1].banks.matrix)<br>4         |

**PR41374 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Several changes have been made to the way certain channel functions operate.

Using `channel.close()`, `channel.exclusiveclose()`, or `channel.exclusiveslotclose()` will no longer return an error if a `range`, `slot`, or `allslots` is specified and a channel in the channel list is forbidden. The forbidden channel is ignored.

Using `channel.reset()` with `slotX` on an empty slot or `allslots` on an empty instrument (no cards installed) will now generate an error.

The error generated by `channel.exclusiveclose` of forbidden channel was 1114 (settings conflict) and is now 1115 (parameter error).

**Noncritical fixes****PR36831 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Opening a digital I/O channel on the Model 3750 card using the `channel.open` command is not a supported operation, but no error is reported.

**Resolution:**

This issue has been corrected.

**PR36869 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Executing the `channel.getimage()` ICL command on a Model 3750 digital I/O, DAC, or totalizer channel incorrectly generates an error.

**Resolution:**

This issue has been corrected.

**PR37512 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Executing the `tspnet.tsp.rhtablecopy()` ICL command without furnishing the optional `start_index` or `end_index` parameters incorrectly generates an error.

**Resolution:**

This issue has been corrected.



**PR38592 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Executing the `channel.setpole()` ICL command with multiple `slotx` arguments or the `allslots` argument generates an error, even though all cards in those slots support 1-pole operation.

**Resolution:**

This issue has been corrected.

**PR39019 Models affected:**

PR39511

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Enabling the `status.questionable.CALIBRATION` bit does not work.

Enabling Bit 14 in the `status.questionable.enable` register does not work.

`Status.system5.EXT` does not extend to an additional register as listed in the manual. The `status.system5` registers do not have an EXT bit like the other system registers in status model.

The `status.system5.EXT` and `status.system5.EXTENSION_BIT` functions return 1 instead of `nil`.

**Resolution:**

These issues have been corrected.

**PR39330 Models affected:**

3706-S, 3706-SNFP

**Symptom:**

The `localnode.linefreq` ICL command returns an incorrect value on systems with no DMM.

**Resolution:**

The `localnode.linefreq` ICL command will return `nil` on systems with no DMM.

**PR39636 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

If an error occurs while saving a setup, a read error is generated rather than write error.

**Resolution:**

This issue has been corrected.

**PR40262 Models affected:**

3706, 3706-NFP

**Symptom:**

The `dmm.savebuffer()` command may not correctly add the `.csv` extension to a user-specified filename. The created file may include no extension, or may append an extra `.csv` extension.

**Resolution:**

This issue has been corrected.

**PR40718 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Cannot create a channel pattern containing backplane relays from the instrument's web interface.

**Resolution:**

This issue has been corrected.

**PR40739 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions, the instrument may report the presence of a physical card in a slot when it should report the presence of a pseudocard instead.

**Resolution:**

This issue has been corrected.

**PR40838 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions, repeating a scan a many times will cause the instrument to stop responding.

**Resolution:**

This issue has been corrected.

**PR40891 Models affected:**

3706, 3706-NFP

**Symptom:**

The `dmm.appendbuffer` command does not properly append data to the buffer.

**Resolution:**

This issue has been corrected.

**PR40892 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions, the command `status = fs.is_dir('/usb1')` returns `true` even when there is no USB flash drive present.

**Resolution:**

This issue has been corrected.

**PR40896 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions, repetitively connecting and disconnecting from the instrument many times will cause the instrument to stop responding.

**Resolution:**

This issue has been corrected.

**PR40982 Models affected:**

3706, 3706-NFP

**Symptom:**

The `dmm.configure.query` commands may return results containing letters for the values of `nplc`, `filter window`, `relative level`, `limit settings`, `math settings`, and so on, instead of the correct numerical value.

**Resolution:**

This issue has been resolved.

**PR41058 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The instrument allows more than 32 TSP nodes.

**Resolution:**

The maximum number of TSP nodes using TSP-Link is now 32.

**PR41124 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The line termination used by the Telnet server does not match the Telnet protocol.

**Resolution:**

This issue has been corrected. The old termination was `LF CR` and the corrected termination is `CR LF`.

**PR41396 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Certain ICL commands accept string arguments that are too long when using a label or pattern name.

**Resolution:**

This issue is corrected. The maximum length for pattern names and channel labels is 19 characters.

**PR41501 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Using the `tspnet.execute()` function to run a command on a remote device does not clear old data from the device's buffer before executing the command.

**Resolution:**

Using the `tspnet.execute()` command will now clear the buffer containing the data from the remote device before executing the command on the remote device. This ensures the data read from the device is the data returned from the command and not a previous command.

## Known issues

**PR41405 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions, a Model 3706 connected to other instruments using TSP-Link can get stuck in the "Initializing" state when its power is turned off and then on again while communicating over TSP-Link.

**PR41421 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The maximum number of characters that can be sent to the instrument without a newline character depends on which remote interface is being used. Limiting line length to less than 950 characters without a newline character will ensure interface independence.

**PR41556 Models affected:**

3706, 3706-NFP, 3706-S, 3706-SNFP

**Symptom:**

Creating a reading buffer with the same name as a script already in the system will prevent normal access to the reading buffer. Choose unique names for reading buffers.

**PR41691 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Commands like `channel.getimage()` or `channel.close()` that accept a channel list parameter do not accept channel labels when specifying a channel range argument in the channel list parameter. Use channel numbers for the channel range argument. For example, use `3003:3005` instead of `MyChan3:MyChan5` if the label for Channel 3003 is `MyChan3` and label for Channel 3005 is `MyChan5`.

**PR41801 Models affected:**

3706, 3706-S

**Symptom:**

When using the math percent and reciprocal functions under some conditions, the front panel reading will show the units of the function instead of the percent symbol (%) or the letter "R." For example, with math percent enabled on the voltage function, the front-panel display may show "100 V" instead of "100 %."

**PR41811 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

When a scan is run with a scan count of 500 or greater and the scan list contains only a single channel, an error message will eventually be displayed indicating the relay power limit has been exceeded. To avoid this issue, list the channel twice in the scan list and cut the scan count in half. This issue only occurs when the scan list contains a single channel.

## Version 1.32a Release

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### Overview

The Series 3700 version 1.32a firmware is a maintenance release. This release corrects an issue where the Series 3700 instrument may stop responding to the web interface, remote commands, or front panel commands when using an Ethernet connection to communicate with the instrument.

---

**NOTE** Upgrading to firmware version 1.32a requires special installation steps that are not required for other firmware upgrades. Carefully read the [Version 1.32a installation notes](#) below before upgrading your Series 3700.

---

The following table lists the exact version numbers of the available Series 3700 components when the firmware upgrade is complete.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.32a   |
| Series 3700 High Performance DMM                 | 1.30i   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3731 Dual 6x16 High Speed Reed Matrix            | 1.30b   |
| 3740 32 Channel Isolated Switch                  | 1.30e   |
| 3750 Multifunction I/O Card                      | 1.30f   |

### Version 1.32a installation notes

Upgrading to firmware version 1.32a requires special installation steps that are not required for other firmware upgrades. Carefully perform the following procedures to successfully upgrade to version 1.32a.

Download the `nk_5001607.nb0` and `main_p37xx_0132a.CAB` files from the Keithley Instruments website ([www.keithley.com](http://www.keithley.com)).

#### To perform the upgrade:

1. Place the `nk_5001607.nb0` and `main_p37xx_0132a.CAB` files in the root directory of a USB flash drive.
2. Ensure that the Series 3700 mainframe power is turned off, and then connect the drive to the Series 3700 and turn on power to initiate the upgrade process.

---

**NOTE** The upgrade process will take three to five minutes and the instrument will reboot several times during the process. Do not disturb the instrument until the normal front panel display has been present for at least 30 seconds.

---

3. On the front panel, press the MENU key, select LAN, select APPLY, and then press ENTER to resume normal Ethernet connectivity following the upgrade.
4. Disconnect the USB flash drive from the Series 3700 mainframe.

---

**NOTE** Alternatively, you can have Keithley Instruments assist you with the upgrades by calling your local Keithley support office.

---

## Critical fixes

**PR40055 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Under certain conditions the 3706 may stop responding to Web pages, remote commands, and/or front panel commands. This issue may occur when the 3706 Ethernet LAN interface is in use and high levels of Ethernet LAN traffic are present or when frequent Ethernet broadcast messages are present on the network. Using the PTP (Precision Time Protocol) feature of the 3706 will create these conditions, but the issue may occur even when PTP is not in use.

**Resolution:**

This issue is resolved in this release. However, installing the upgrade requires following a different installation process than normal firmware releases. Follow the instructions in the Version 1.32a Installation Notes section above to install the upgrade.

**PR39801 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Disconnecting and reconnecting the Ethernet LAN cable can enable PTP (Precision Time Protocol) operation even though PTP is disabled by default and may not have been enabled by the user. Once enabled in this way, the user may inadvertently make the change permanent by saving the instrument setup while PTP is enabled, which results in PTP being enabled even after a power cycle.

**Resolution:**

This issue is resolved in this release. However, PTP may currently be enabled on your 3706 because of this issue. If you are not using PTP, you should make certain PTP is off by using the ICL "ptp.enable = 0" command.

## Enhancements

None

## Noncritical fixes

None

## Known issues

PR38674 **Models affected:**

3706

**Symptom:**

During a scan operation, the information shown on the front panel display and the DMM web page may not correctly display the measurement being made if the scanned channel's function is not the same as the DMM's function prior to the start of the scan. The measurement as well as the stored data is correct.



## Version 1.31a Release

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### Overview

The Series 3700 1.31a firmware is a maintenance release. This release corrects an issue where a user may see a security warning when opening the Series 3700 instrument's web interface.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.31a   |
| Series 3700 High Performance DMM                 | 1.30i   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3731 Dual 6x16 High Speed Reed Matrix            | 1.23a   |
| 3740 32 Channel Isolated Switch                  | 1.30e   |
| 3750 Multifunction I/O Card                      | 1.30f   |

### Critical fixes

#### PR39381 **Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

#### **Symptom:**

When accessing certain Model 3706 web pages, a pop-up dialog warning would occur when the Java Applet is loaded into the browser.

The warning would state:

"The application's digital signature has an error. Do you want to run the application?"

The warning was issued by the PC to protect a user from accidentally running an unknown program from the browser.

The digital signature of the Model 3706 web page had expired causing previously released firmware to produce the current warning pop-up dialog message.

#### **Resolution:**

This issue is resolved.

Note: Depending upon your browser security settings, a one-time warning may still be displayed the first time a Model 3706 web page is opened. The warning states:

"The application's digital signature has been verified. Do you want to run the application?"

Press the **Run** button, leaving the Always option checked, and the warning will not appear again.

## Enhancements

None:

## Noncritical fixes

None

## Known issues

PR38674 **Models affected:**

3706

### **Symptom:**

During a scan operation, the information shown on the front panel display and the DMM web page may not correctly display the measurement being made if the scanned channel's function is not the same as the DMM's function prior to the start of the scan. The measurement (as well as the stored data) is correct.

## Version 1.30j Release

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### Overview

The Series 3700 1.30j firmware is an enhancement release including control and operation of the Model 3731 6x16 High Speed Reed Relay Matrix Card, as well as some other problem fixes. Some problem corrections may impact compatibility; please review the corrections prior to installation. Enhancements include a web-based graphing toolkit that enables you to easily chart reading buffer data. This toolkit is included in the Model 3706 firmware and does not require a separate software installation.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.30j   |
| Series 3700 High Performance DMM                 | 1.30i   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3731 Dual 6x16 High Speed Reed Matrix            | 1.23a   |
| 3740 32 Channel Isolated Switch                  | 1.30e   |
| 3750 Multifunction I/O Card                      | 1.30f   |

### Critical fixes

**PR39315 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

When a scan is created using multiple `scan.add()` commands and destroyed, some allocated memory may not be freed. When that sequence is contained in a loop, the system will eventually run out of memory and the script will fail with an `out of memory` error, or the instrument will stop responding, which requires the instrument power to be turned off and then turned on again.

**Resolution:**

This has been corrected. However for performance reasons, the re-creation of a scan within a loop is not recommended.

**PR38716 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Timers and delays are not accurate. Actual time is up to one percent faster than the programmed setting.

**Resolution:**

The issue has been resolved.

**Web page enhancements**

DMM web page:

- Offline access to reading buffer data is now enabled. You can now view reading buffer data without the necessity of a login.
- Added view plot button which enables the graphing toolkit.

Scan web page:

- Added view plot button which enables the graphing toolkit.

**Noncritical fixes****PR38470 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Web page scans that utilized delays between channels would pause while the LAN cable was disconnected and then continue when reconnected.

**Resolution:**

The scans now continue if the LAN cable is disconnected.

**PR38524 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Initial login failed on some telnet servers. During the telnet protocol terminal negotiation an extra character was sent to the telnet server.

**Resolution:**

The issue only exists in version 1.22. If a script was written to compensate for this issue, it may need to be revised.

**PR38591 Models affected:**

3706, 3706-NFP

**Symptom:**

Incorrect readings in the buffer. The `dmm.savebuffer` command writes the wrong data. This occurs when a reading buffer is created with the same name as a previous reading buffer. The system may or may not reference the older reading buffer.

**Resolution:**

The issue has been resolved. Please remember to set unused reading buffers to `nil` and use the `collectgarbage()` command to free unused memory.

**PR38715 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

From the web page, choosing 3- and 4-wire RTDs as the transducer type for the temperature function in the active DMM settings or configuration window produced an error message.

**Resolution:**

This issue has been resolved.

**PR38715 Models affected:**

3750

**Symptom:**

The init (reset) function for the DAC channels does not initialize the current value only when using the 0-20ma mode.

**Resolution:**

This issue has been resolved.

**Known issues****PR38674 Models affected:**

3706

**Symptom:**

During a scan operation, the information shown on the front panel display and the DMM web page may not correctly display the measurement being made if the scanned channel's function is not the same as the DMM's function prior to the start of the scan. The measurement as well as the stored data is correct.

## Version 1.24b Release

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### Overview

The Series 3700 1.24b firmware is a maintenance release. This release fixes problems found with the Model 3740 32-channel isolated switch card and upgrading it.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.24b   |
| Series 3700 High Performance DMM                 | 1.22a   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3740 32 Channel Isolated Switch                  | 1.30e   |
| 3750 Multifunction I/O Card                      | 1.20i   |

### Critical fixes

PR38712 **Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Opening a channel in the range of 1-24 also opens Channels 29-32.

**Resolution:**

The issue has been resolved.

### Enhancements

None.

### Noncritical fixes

PR38693 **Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The Model 3706 1.22d release package did not automatically update the Model 3740 card from version 1.20i to 1.30d. A Model 3740 card with an earlier revision does upgrade correctly. A workaround would be to use the **UPGRADE >PREVIOUS** menu option.

**Resolution:**

The issue has been resolved.

### Known issues

None.

## Version 1.22d Release

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### Overview

The Series 3700 1.22d firmware is a maintenance release. This release is to fix a problem found with the Model 3740 32-channel isolated switch card.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.22d   |
| Series 3700 High Performance DMM                 | 1.22a   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3740 32 Channel Isolated Switch                  | 1.30d   |
| 3750 Multifunction I/O Card                      | 1.20i   |

### Critical fixes

PR37606 **Models affected:**

PR38490 3706, 3706-S, 3706-NFP, 3706-SNFP

#### Symptom:

Closing a channel in the range of 1-24 also closed channels 29-32. They remain closed until an 'open all' command was executed.

#### Resolution:

The issue has been resolved.

### Enhancements

None.

### Noncritical fixes

None.

### Known issues

None.

## Version 1.22c Release

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### Overview

The Series 3700 version 1.22 firmware is a maintenance release. The mainframe, optional DMM, and switch modules all have installed firmware. Although each can be at various firmware revisions, it is a good practice that the mainframe always have a firmware version equal to later than the firmware version that is installed on the DMM or the switch modules.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.22c   |
| Series 3700 High Performance DMM                 | 1.22a   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.22b   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3740 32 Channel Isolated Switch                  | 1.20i   |
| 3750 Multifunction I/O Card                      | 1.20i   |

### Critical fixes

**PR37901 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

DMM readings read 'overflow' intermittently or an error is generated: 5701 A/D timeout. This can occur when the AC input power to the Model 3706 has a moving flat line region in its normally sinusoid shape.

**Resolution:**

The issue has been resolved.

**PR37939 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Web page: When a thermocouple type was changed from the default K type, the change was not used by the measurement.

**Resolution:**

This has been corrected to properly set the thermocouple type



**PR37973 Models affected:**

3723

**Symptom:**

Possible noisy readings if scanning at the fastest aperture. The close and open delays of 0.5ms and 0.1ms, respectively, were not being enforced. Command processing time usually absorbed any relay bounce time.

**Resolution:**

This issue occurred after the 1.20i release and has been resolved.

## Enhancements

**PR37642 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

The Model 3706 will now filter out escape (ESC) characters coming in on the Telnet client. Some commercial Telnet servers send these ESC characters, which are not relevant for processing in the TSP environment.

## Noncritical fixes

**PR37680 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The Model 3730 matrix card does not correctly report the channel closure counts or the delay times. Also, additional channel delay times cannot be set.

**Resolution:**

The issue occurs after the 1.20 release and has been resolved.

**PR37695 Models affected:**

3706, 3706-NFP

**Symptom:**

The `dmm.savebuffer()` ICL command may halt the device operation when the reading buffer argument is passed as a string (quotes around name) and there are multiple active reading buffers in the system already.

**Resolution:**

The issue has been resolved.

## Known issues

None.

## Version 1.21 Release

---

### Overview

The Series 3700 version 1.21 firmware release addresses the PRs listed below. The mainframe, optional DMM, and switch modules all have installed firmware. Although each can be at various firmware revisions, it is a good practice that the mainframe have a firmware version equal to later than the firmware version that is installed on the DMM or the switch modules.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.21d   |
| Series 3700 High Performance DMM                 | 1.21d   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.20i   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3740 32 Channel Isolated Switch                  | 1.20i   |
| 3750 Multifunction I/O Card                      | 1.20i   |

### Critical fixes

**PR37367 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

When using the web interface and opening switches with the Channel Action Type set to DMM Close, the backplane channels and any paired channel did not open (the screen reflected that they did not open).

**Resolution:**

The issue has been resolved.

**PR37200 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Web page: When the dcvolts configuration is displayed immediately after turning instrument power on, the linesync is shown as ON, but linesync is actually OFF.

**Resolution:**

This has been corrected to properly show it as being OFF.

**PR37201 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

If any configuration used in a scan list changes the default state of the autozero parameter, it may not be restored as indicated by the instrument at the completion of a scan.

**Resolution:**

It is now restored to the state it was programmed to after a scan, and will be the same as it was before the scan.

**PR37256 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Model 3722 backplane relays could not be closed using the web interface.

**Resolution:**

The issue has been resolved.

**PR37281 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The NPLC setting for the Temperature function does not change appropriately when a multifunction scan is created with at least one channel function set to Temperature.

**Resolution:**

The issue has been resolved.

## Enhancements

**PR37338 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Improved the behavior when closing raw socket or Telnet sessions. Disconnecting and reconnecting no longer disturbs a running script or background scan. This functionality change allows you to disconnect from a unit and reconnect later in order to check the status. In previous behavior, closing a raw socket or Telnet session would return the unit to LOCAL mode, terminating any running script or background scan. Now, you must either press **EXIT** on the front panel or reconnect and issue an abort command to halt a running or background script. In summary, reconnecting now does not disturb a running script or background scan.

The web interface was also modified to this same new behavior (does not stop scripts/scans on logout or disconnect). However, once disconnected, the output of a script is lost and cannot be regained. The script will run until completion.

**PR37369 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Ethernet network improvement with regard to the VXI-11 Discovery execution. The Model 3706 no longer aborts scripts that are currently executed when the \*IDN? command is sent. The Model 3706 will still respond with its IP address, but will not respond to the \*IDN? Command and will not abort any scripts or any Ethernet sessions.

**Web page enhancements**

Cards web page modifications:

- Added an 'Open All' button (also exists on System Tab).

**Noncritical fixes****PR37223 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Scanning channels that use different NPLC rates are slower than expected. This occurs when only changing between rates of <0.2NPLC to >=0.2NPLC.

**Resolution:**

The scanning speed has been improved.

PR37224

**PR37225 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Changing functions from Temperature, Frequency, or Period to a DC function during a scan slows down the scan rate.

**Resolution:**

The scanning speed has been improved.

**PR37571 Models affected:**

3706, 3706-NFP

**Symptom:**

The line frequency command (`localnode.linefreq`) may report 60Hz when on a 50Hz AC power line. It is more likely to falsely report when fully loaded with switch cards. However, the DMM is always using the correct line frequency and aperture for the measurement; it was only a reporting problem.

**Resolution:**

The issue has been resolved.

**Known issues**

None.

## Version 1.20 Release

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### Overview

The Series 3700 version 1.20 firmware release supports two new scanner cards: The Models 3724 and 3750. It also includes a number of enhancements and notable corrections on both the mainframe and switch modules. The mainframe, optional DMM, and switch modules all have installed firmware. Although each can be at various firmware revisions, it is a good practice that the mainframe have a firmware version equal to or later than the firmware version that is installed on the DMM or the switch modules.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.20i   |
| Series 3700 High Performance DMM                 | 1.20i   |
| 150 Test Card                                    | 1.20i   |
| 3720 Dual 1x30 Multiplexer                       | 1.20i   |
| 3721 Dual 1x20 Multiplexer                       | 1.20i   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.20i   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.20i   |
| 3724 Dual 1x30 FET Multiplexer                   | 1.20i   |
| 3730 Dual 6x16 High Density Matrix               | 1.20i   |
| 3740 32 Channel Isolated Switch                  | 1.20i   |
| 3750 Multifunction I/O Card                      | 1.20i   |

### Critical fixes

**PR36378 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Writing large reading buffers to the flash drive, the timestamp for the last set of readings written would be seen as all zeroes.

**Resolution:**

The issue has been resolved.

**PR36408 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Possible incorrect readings for RTD measurements when performing a scan operation.

**Resolution:**

Three- and 4-wire RTD configurations were not used during a scan if they were different from the DMM settings for them. The issue has been resolved.

**PR36477 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An overflow reading can be generated every other time when using 4W autorange with open lead detect ON and measuring on the 100K range, should the Sense Hi input become open.

**Resolution:**

The issue has been resolved.

**PR36495 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Frequency, period, or continuity functions are not updated when the aperture and threshold settings are configured differently from the default settings.

**Resolution:**

The issue has been resolved.

**PR36498 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An `out of memory` error message or possible other non-useful, generic error message is generated while attempting to save the maximum size reading buffer (650k) to the flash drive.

**Resolution:**

The issue has been resolved.

**PR36528 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Incorrect RTD readings when using the PT100 transducer.

**Resolution:**

PT100 transducer values were not being correctly set when measuring that RTD type. The alpha, beta, delta, and rzero values that were used came from the USER\_RTD type instead. The issue has been resolved.

**PR36822 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Limited front-panel access and remote functionality due to a memory leak when there are 25,000 or more `io_output()` operations between unit power being turned off and then turned on again.

**Resolution:**

The issue has been resolved.

**PR36888 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

A scan list operation may not initiate after a series of abort commands.

**Resolution:**

The issue has been resolved.

**Enhancements**

Added support for Models 3724 and 3750 cards. This support adds ICL commands for new functionality and provides web pages for each card. See Series 3700 Reference Manual for details.

**PR35083 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

Previously, a scan executed without the interlock to the switch card being engaged. This has been changed so that a scan cannot execute unless the interlock is hardware satisfied or firmware overridden.

**Web page enhancements**

Added System web page:

- Added Mainframe Digital I/O control
- Added Channel Connect configuration
- Added Save and Recall Setup buttons enabling mainframe configuration settings to either internal memory or USB memory stick
- Report generation utilities

DMM web page modifications:

- Added button to store reading buffers direct to USB memory stick, button: "Save All to USB"

Cards web page modifications:

- Added support for Models 3724 and 3750 cards

Moved the following buttons to the System Tab:

- Open All
- About
- Reset Unit

TSB Embedded:

- Added button for exporting script to USB memory stick, button: "Export script to USB"

**Noncritical fixes****PR35086 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The `reset` command does not remove the prior reading from the front panel.

**Resolution:**

The `reset` command now clears the front panel reading.

**PR35934 Models affected:**

3706-S, 3706-SNFP

**Symptom:**

The error message, 1116, Configuration error failed to get system setting successfully to save, is generated when trying to save a setup.

**Resolution:**

This issue has been corrected.

**PR35938 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Model 3721 only: When queried, Channels 917, 927, and 928 return at the end of a channel list instead of in numerical order. These backplane channels support commonside ohms.

**Resolution:**

Any query, such as the `channel.getstate` command, now returns the channel list in numerical order for cards that support commonside ohms functionality.

**PR36015 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

An error is generated when the channel list contains a forbidden channel. For example, the `dmm.open()` command does not allow a forbidden channel to be opened.

**Resolution:**

The `dmm.open()` command no longer generates an error message if the channel list contains a forbidden channel.

**PR37056 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The percent math function incorrectly applied the  $m \times b$  function, which did not change the reading because  $m$  and  $b$  defaulted to 1 and 0, respectively. Also, the reciprocal math function was incorrectly using the percent math function.

**Resolution:**

This issue has been corrected.

**Known issues**

None.



## Version 1.10 Release

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### Overview

The Series 3700 version 1.10 firmware release represents a number of enhancements and notable corrections on both the mainframe and switch modules. The mainframe, optional DMM, and switch modules all have installed firmware. Although each can be at various firmware revisions, it is a good practice that the mainframe have a firmware version equal to or later than the firmware installed on the DMM or switch modules.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.10h   |
| Series 3700 High Performance DMM                 | 1.10h   |
| 150 Test Card                                    | 1.03f   |
| 3720 Dual 1x30 Multiplexer                       | 1.03f   |
| 3721 Dual 1x20 Multiplexer                       | 1.03f   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.03f   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.03f   |
| 3730 Dual 6x16 High Density Matrix               | 1.03f   |
| 3740 32 Channel Isolated Switch                  | 1.03f   |

### Critical fixes

**PR34747 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The DMM web page does not format timestamps correctly. When the subsecond field is created, any leading zeroes are omitted. For example, 10:10:10.00010 appears as 10:10:10.10.

**Resolution:**

The issue has been resolved.

**PR34800 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The Model 3706 stops responding when recalling a user setup either internally or from the flash drive if the user DMM configuration contains the temperature function.

**Resolution:**

The issue has been resolved.

**PR34941 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

In the previous firmware version, the scan list ICL shows a final step that opens all channels. This step was removed from the list because the scan, by definition, leaves the last channel closed.

**Resolution:**

The issue has been resolved.

**PR35699 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

5701 A/D timeout errors were generated due to excess noise on the AC mains.

**Resolution:**

The issue has been resolved with an upgraded FPGA algorithm (automatically included in the DMM firmware) for determining AC mains zero crossings.

**PR35702 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

High noise on 2W or 4W measurements after autozero once, affecting the 100, 1K, 100K and 1M ranges.

**Resolution:**

The issue has been resolved.

**PR35769 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Incorrect channels opening or remaining closed when scanning Model 3723 if in one-pole operation and if the scan mode is set to 'open selective.'

**Resolution:**

The issue has been resolved.

**Enhancements****PR34077 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

Trigger tabs were added for additional new capabilities of setting up simple and complex triggers.

**PR34724 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

Improved the speed of updating DMM settings with intelligent updates. For example, DMM ICLs to run faster when redundant commands are sent to the instrument or `dmm.close` to be faster when using the same configuration for all channels walking close in a for loop. Commands effecting the DMM configurations set, recall, and query, as well as one for channel patterns (set and delete), will process faster.

**PR34888 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

Making changes to a scan list will now not invalidate it but it will rebuild it automatically.

**PR34946 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

A new ICL was added to support appending reading buffer data to a file: `dmm.appendbuffer()` function. It takes the same exact parameter settings as `dmm.savebuffer`. The `appendbuffer` command appends the data and does not write header information. When appending data, the index counter restarts at 1. This is necessary because the user may append data in different formats – there is no attempt to enforce any consistency of data; it is just append to what is already in the file.

**PR34958 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

Added a new option (PREVIOUS) to the front-panel menu that is related to firmware upgrades. This option allows you to revert back to an earlier software version. Although upgrading to a newer software version is typical, in rare instances downgrading or reverting to a previous software version is desired. A “normal” upgrade will not upgrade any cards or DMM already at the correct revision level. However, a “previous” upgrade will force an upgrade on cards or DMM, even when already at the correct revision.

**PR34959 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

The default front-panel reading buffer size has been increased to 1000. This was found to be a more useful default value than the previous value of 10.

**PR35653 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

The `tsplink.reset()` function has been modified to accept one optional parameter and always return a value. The return value is the number of nodes detected. If no parameter is passed, it behaves as previous versions did.

The optional parameter is the number of nodes expected. It can be a number from 1 to 64. If specified, no error will be generated if no nodes are found. A new error will be generated if fewer nodes than specified are found.

**PR34940 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

The component of the scan trigger model stimulus, which waits to begin the channel action step and waits for the sequence step to begin, must be set to a specific event in order for the scan to function properly. However, since it is common to set other trigger model stimuli to zero in order to reset them, setting these stimulus values to zero now forces them to their default values instead of leaving them at zero.

## Web page enhancements

Scan Builder web page:

- Simple Trigger tab.
  - Enables users to define triggers for starting, per step, and per measurement actions.
- Advanced Trigger tab.
  - Enables full web access control to the Model 3706 trigger model.
- Expanded scan reset to scan and trigger reset.

DMM web page:

- Modified data display table to match reading buffer format.

## Noncritical fixes

**PR34632 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The web applet "Overview" was not updating the backplane closure counts.

**Resolution:**

This issue has been corrected.

**PR34795 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The `scan.state` variable brings back the wrong scan count number during a background scan.

**Resolution:**

This issue has been corrected.

For clarification: 'Scan count' represents the number of the current iteration through the scan portion of the trigger model. This number does not increment until after the scan begins. Therefore, if a unit is

waiting for an input to trigger a scan start, the 'scan count' will represent the previous number of scan iterations. If no scan has yet to begin, the 'scan count' will be zero.

'Step count' represents the number of times the scan has completed a pass through the channel action portion of the trigger model. This number does not increment until after the action completes. Therefore, if unit is waiting for an input to trigger a channel action, the 'step count' will represent the previous step. If no step has yet to complete, the 'step count' will be zero. If the 'step count' has yet to complete the first step in a subsequent pass through a scan, the 'scan count' represents the last step in the previous scan pass..

**PR34831 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The wrong slot is reported in message for the interlock connection status on the web page (for example, if the card in Slot 1 has an interlock broken, it indicates Slot 0).

**Resolution:**

The proper slot is now reported.

**PR34886 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The `channel.reset` ICL command does not reset the channel delay values on the switch cards.

**Resolution:**

The `channel.reset ()` command now resets the delay values.

**PR34939 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

If the instrument was waiting for a scan start trigger, it could not be aborted and had to power turned off and then on again to reset it.

**Resolution:**

The instrument now recognizes an abort for the above condition.

**PR34983 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

May fail to open channels used in a scan if changes are made to scan triggers or scan mode after scan is created. This occurs when scan mode is set to OPEN SELECTIVE.

**Resolution:**

The channels now open.

**PR35735 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Incorrect internal instrument system time. It may lose days, gain days, or revert to the month of Jan in the year 1970 if it was turned off on or around February 28th and February 29<sup>th</sup>, 2008.

**Resolution:**

This issue is corrected with an operating system upgrade to 5.00.16.05, which can be found on the Keithley Instruments website.

**PR34645 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Channel patterns containing over 25 patterns cannot be inserted into a scan list. Adding these patterns to a scan will cause the unit to stop responding.

**Resolution:**

Patterns with large channel counts can now be inserted.

**Known issues**

None.

## Version 1.03 Release

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### Overview

The Series 3700 1.03 firmware release represents a number of enhancements and notable corrections on both the mainframe and switch modules. The mainframe, optional DMM and switch modules all have installed firmware. Although each can be at various firmware revisions, it is a good practice that the mainframe have a firmware version equal to or later than what is installed on the DMM or switch modules.

When the firmware upgrade is complete, the following table lists the exact version numbers of the available Series 3700 components.

| Model  | Version |
|--|---------|
| Series 3700 Mainframe                            | 1.03f   |
| Series 3700 High Performance DMM                 | 1.03e   |
| 150 Test Card                                    | 1.03f   |
| 3720 Dual 1x30 Multiplexer                       | 1.03f   |
| 3721 Dual 1x20 Multiplexer                       | 1.03f   |
| 3722 Dual 1x48 High Density Multiplexer          | 1.03f   |
| 3723 Dual 1x30 High Speed Reed Relay Multiplexer | 1.03f   |
| 3730 Dual 6x16 High Density Matrix               | 1.03f   |
| 3740 32 Channel Isolated Switch                  | 1.03f   |

### Critical fixes

**PR34577 Models affected:**

3706, 3706-S

**Symptom:**

From the front panel, deleting a channel from a scan list deletes the first occurrence and every occurrence after, not including the last occurrence. This is not the intended delete algorithm.

**Resolution:**

Deleting a channel from the scan list now deletes only the first occurrence of the channel in the scan. To delete multiple occurrences, use the delete functionality multiple times.

**PR34650 Models affected:**

3706-S

**Symptom:**

From the front panel, opening or closing any single switch causes the unit to stop responding. Unit must be turned off and then on again.

**Resolution:**

The issue has been resolved.

**PR34673 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

The channel user delay attribute should apply to the switch close settle time only. However, this time is also being applied to the switch open settle time. See the ICL command `channel.setdelay()` for more information on functionality.

**Resolution:**

Additional user delay, as specified using `channel.setdelay()`, is now only additive on close switch actions.

**PR34746 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Intermittent card communication errors, invalid interlock status returned or incorrect closure count. Card functionality related to interlock and closure count may fail. Failure will be very infrequent, but increase in probability over time.

**Resolution:**

The issue has been resolved with the card firmware update.

**PR34630 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Symptom:**

Disconnecting the LAN cable and then reconnecting causes the unit to stop responding. Unit must be turned off and then turned on again.

**Resolution:**

The issue has been resolved.

**PR34667 Models affected:**

3706, 3706-NFP

**Symptom:**

With DMM attribute AutoZero enabled, a timeout may occur when changing the DMM NPLC attribute from the default of 1.0 to <0.2.

**Resolution:**

The timeout no longer occurs. However, expect this change to take from 5 to 15 seconds. If using different NPLC settings (like 0.1 to 0.2), the time could be much less.

## Enhancements

**PR34540 Models affected:**

PR34539 3706, 3706-S

**Enhancement:**

Added the ability to delete an internally stored script. The front-panel menu tree related to the saving and loading of scripts from a flash drive was changed to support this capability.



**PR34513 Models affected:**

3706, 3706-NFP

**Enhancement:**

This release adds the capability to list the reading buffers and obtain the size and capacity of the listed buffers. The `dmm.buffer.catalog()` and `dmm.buffer.info()` ICL commands added to support this capability.

The `dmm.buffer.catalog()` command provides an iterator on the list of local DMM reading buffer in system.

**Example:**

```
TSP> for n in dmm.buffer.catalog() do print(n) end

buf2
buf4
buf5
buf3
buf1

TSP>
```

The `dmm.buffer.info()` command provides the count (“n” buffer attribute) and capacity of given reading buffer string name. The input parameter to command is a string representing the name of the buffer to get its count and capacity. The output parameters are buffer count and buffer capacity.

**Example:**

```
TSP>for name in dmm.buffer.catalog() do count, cap = dmm.buffer.info(name)
print(name, 'count = ' .. count, 'capacity = ' .. cap) end

buf2 count = 0   capacity = 2000
buf4 count = 0   capacity = 4000
buf5 count = 0   capacity = 5000
buf3 count = 0   capacity = 3000
buf1 count = 0   capacity = 1000

TSP>
```

See the Series 3700 Reference Manual for a broader explanation of reading buffer description, usage, and attributes.

**PR34419 Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

**Enhancement:**

Added the capability to query the percentage of available and used memory resources. This capability should be used to help determine the system resources available for creating additional patterns, DMM configurations, scripts, or Lua constructs.

The following ICL commands were created:

```
memory.available()
memory.used()
```

Both commands take no input parameters and return 4 parameters (comma-delimited), as noted below:

1. System memory percentage (available or used depending on command)
2. Script memory percentage (available or used depending on command)
3. Channel pattern memory percentage (available or used depending on command)
4. DMM configuration memory percentage (available or used depending on command)

For a switch only system like the Model 3706-S, the percent used for DMM configuration will be 0 and percent available will be 100.

For example, here is a sample output for a Model 3706-S unit:

```
TSP> *idn?  
KEITHLEY INSTRUMENTS INC.,MODEL 3706-S,00000170,01.02a
```

```
TSP> print(memory.used()) print(memory.available())  
39.65, 0.14, 0.00, 0.00  
60.35, 99.86, 100.00, 100.00
```

For a Model 3706 unit:

```
TSP> *idn?  
KEITHLEY INSTRUMENTS INC.,MODEL 3706,00000170,01.02a
```

```
TSP> print(memory.used()) print(memory.available())  
39.84, 0.14, 0.00, 0.00  
60.16, 99.86, 100.00, 100.00
```

```
TSP> setup.recall(1)
```

```
TSP> print(memory.used()) print(memory.available())  
88.87, 0.14, 99.84, 2.97  
11.13, 99.86, 0.16, 97.03
```

## Noncritical fixes

### PR34578 **Models affected:**

3706, 3706-S, 3706-NFP, 3706-SNFP

### **Symptom:**

With the web page connected, the beginning of a scan or other script may exhibit a brief pause.

### **Resolution:**

This issue has been corrected.

### **Models affected:**

3706, 3706-NFP

**PR34671 Symptom:**

PR34670

PR34669

PR34668

PR34678

Excessive delays are possible when making changes in three situations:

1. Changing the open detector for temperature or four-wire ohm functions.
2. Changing the NPLC setting or dry circuit mode on four-wire ohm function.
3. Changing from DC volts to four-wire ohm function with autorange ON.

**Resolution:**

This has been corrected

## Version 1.00 Release

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### Overview

Initial product release.