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## General Information

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### **Supported Models**

This firmware is used on the following Keithley products:

3706, 3706-S, 3706-NFP, 3706-SNFP, all 37XX cards

### **Installation Instructions**

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**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.

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For other releases, firmware installation instructions are given in the “Upgrade Procedure using the USB Flash Drive” section in Chapter 7 of the Series 3700 User Manual (Document Number: 3700S-900-01). This manual is available online at <http://www.keithley.com/support>. Alternatively, Keithley-assisted upgrades can be arranged by calling your local Keithley support office.

### **Upgrade Considerations for 3706, 3706-S, 3706-NFP, 3706-SNFP**

This release updates the firmware for the 3706 series mainframe and the optional DMM.

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

<b>Consideration</b>	<b>From v1.00</b>	<b>From v1.03</b>	<b>From v1.10</b>	<b>From v1.20</b>	<b>From v1.21</b>	<b>From v1.22c</b>
Recalibration Required	No	No	No	No	No	No
Re-qualification Suggested	Yes	Yes	Yes	Yes	Yes	No
Backward Compatibility Concerns	No	No	No	No	No	No
Should you upgrade?	Yes	Yes	Yes	Yes	Yes	If using a 3740 card

<b>Consideration</b>	<b>From v1.22d</b>	<b>From v1.24b</b>	<b>From v1.30j</b>	<b>From v1.31a</b>		
Recalibration Required	No	No	No	No		
Re-qualification Suggested	No	No	No	No		
Backward Compatibility Concerns	No	No	No	No		
Should you upgrade?	If using a 3740 card	Yes, for web based charting feature. 3731 card supported.	Yes, to avoid security warning	Yes, if using Ethernet		

## 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 Web pages, remote commands, or front panel commands when using an Ethernet connection to communicate with the instrument.

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**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.

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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	1.32a
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 thumb drive.
2. Ensure that the Series 3700 mainframe is powered off, then connect the drive to the Series 3700 and turn on power to initiate the upgrade process. The upgrade process will take 3 to 5 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 thumb drive from the Series 3700 mainframe.

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

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## **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:

## **Non-critical 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 pages.

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

<b>Model</b>	<b>Version</b>
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 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 3706 web page had expired causing previously released firmware to produce the current warning pop up dialog.

**Resolution:**

This issue is resolved.

Note: Depending on the user's browser security settings, a one-time warning may still be displayed the first time a 3706 Web page is opened. The warning would state:



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

The user should press the "Run" button, leaving the "Always" option checked, and the warning will not appear again.

### ***Enhancements***

None:

### ***Non-critical 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 along with some problem fixes. Some problem corrections may impact compatibility, please review the corrections prior to install. Enhancements include a web based graphing toolkit enabling users to easily chart reading buffer data. This toolkit is included in the 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 lock up which requires a power cycle.

#### **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 1% 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. Users can now view reading buffer data without the necessity of a login.
- Added view plot button which enables the graphing tool-kit.

Scan web page:

- Added view plot button which enables the graphing tool-kit.

### **Non-critical 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 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 'collectgarbage()' 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 is to fix problems found with the 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.

### Non-critical Fixes

PR38693 **Models Affected:**

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

**Symptom:**

The 3706 1.22d release package did not automatically update the 3740 card from version 1.20i to 1.30d. A 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 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.

### Non-critical Fixes

None.

### Known Issues

None.

## Version 1.22c Release

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### Overview

The Series 3700 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 should always be equal to or higher 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.

<b>Model</b>	<b>Version</b>
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 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 0.5msec and 0.1msec, 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 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.

## **Non-critical Fixes**

PR37680

**Models Affected:**

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

**Symptom:**

The 3730 matrix card does not correctly report the channel closure counts or the delay times properly. Also, additional channel delay times can not 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 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

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### Overview

The Series 3700 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 should always be equal to or higher 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 application 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 didn't 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 power up, 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 to 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 page.

**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 multi function 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 a user 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, the user 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 page 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 can not 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 3706 will still respond with its IP address but will not respond to the '\*IDN?' 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)

### **Non-critical 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) might 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 / 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 1.20 firmware release supports two new scanner cards, the 3724 and the 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 should always be equal to or higher 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 thumb 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 four 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 could be generated every other time when using 4W auto range 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:**

'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 thumb 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 the 25,000 or more io\_output() operations between power being cycled on the unit.

**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 ICLs for new functionality and provided web-pages for each card. See manual for ICL commands

PR35083 **Models Affected:**

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

Previously, a scan would execute 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”

## **Non-critical 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, & 928 return at the end of a channel list instead of in numerical order. These backplane channels support common side ohms .

#### ***Resolution:***

Any query, such as the command ‘channel.getstate’, now returns the channel list in numeric order for cards that support common side 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 would 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 was incorrectly applying the  $mx+b$  function, which would not change the reading since '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 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 should always be equal or higher firmware version 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.

<b>Model</b>	<b>Version</b>
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

#### **Models Affected:**

PR34747 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.

#### **Models Affected:**

PR34800 3706, 3706-S, 3706-NFP, 3706-SNFP

#### **Symptom:**

The 3706 crashes when recalling a user setup either internally or from the thumb 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:**

Previous version the scan list ICL shows a final step that opened 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 f/w) 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 was 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 on 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, along with 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` appends the data and doesn't write header info. 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's 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 related to firmware upgrading to allow reverting back to an earlier (lower) 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 for no nodes 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/or 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 3706 trigger model
- Expanded scan reset to scan and trigger reset

DMM web page:

- Modified data display table to match reading buffer format

## **Non-critical 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 . (i.e. 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 doesn't reset the channel delay values on the switch cards.

**Resolution:**

Channel.reset() 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 would have to be power cycled in order to reset it.

**Resolution:**

The instrument will now recognize 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 will 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 powered off on or around February 28th and February 29th 2008.

**Resolution:**

This issue is corrected with an operating system upgrade to 5.00.16.05, which can be found on the web site.

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 should always be equal or higher firmware version 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.

<b>Model</b>	<b>Version</b>
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 in any way. Unit must be power cycled.

**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 in any way. Unit must be power cycled.

**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 thumb drive was changed to support this capability.

PR34513 **Models Affected:**

3706, 3706-NFP

### Enhancement:

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

`dmm.buffer.catalog()` 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>
```

`dmm.buffer.info()` 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 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 of these take no input parameters and return 4 parameters (comma delineated) 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 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 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 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
```

## **Non-critical 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.

PR34671 **Models Affected:**

PR34670 3706, 3706-NFP

PR34669

PR34668 **Symptom:**

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

## **1.00 Release**

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### ***Overview***

Initial Product Release.