Tektronix®

Models 707B and 708B

Switching System

USER'S MANUAL

707B-900-01D January 2025

KEITHLEY
A Tektronix Company

Models 707B and 708B

Switching System

User's Manual

These are the original instructions in English.

Document number: 707B-900-01 Rev. D January 2025

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Safety precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.

Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.

If a  screw is present, connect it to protective earth (safety ground) using the wire recommended in the user documentation.

The  symbol on an instrument means caution, risk of hazard. The user must refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

The  symbol on an instrument means warning, risk of electric shock. Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.

The  symbol indicates a connection terminal to the equipment frame.

If this  symbol is on a product, it indicates that mercury is present in the display lamp. Please note that the lamp must be properly disposed of according to federal, state, and local laws.

The **WARNING** heading in the user documentation explains hazards that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

The **CAUTION** heading with the  symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument. Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley office for information.

Unless otherwise noted in product-specific literature, Keithley instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.

To clean an instrument, use a cloth dampened with deionized water or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

Safety precaution revision as of June 2018.

Table of contents

Section 1

Introduction

In this section:

Introduction to this manual

This manual provides an overview of the Keithley Model 707B or 708B Semiconductor Switching System. It includes installation information, front and rear panel descriptions, and maintenance and troubleshooting information.

For comprehensive information, including remote communications and TSP command descriptions, refer to the *Models 707B and 708B Reference Manual*, available on tek.com/keithley.

Extended warranty

Additional years of warranty coverage are available on many products. These valuable contracts protect you from unbudgeted service expenses and provide additional years of protection at a fraction of the price of a repair. Extended warranties are available on new and existing products. Contact your local Tektronix office, sales partner, or distributor for details.

Contact information

If you have any questions after you review the information in this documentation, please contact your local Tektronix office, sales partner, or distributor. You can also call the Tektronix corporate headquarters (toll-free inside the U.S. and Canada only) at 1-800-833-9200. For worldwide contact numbers, visit tek.com/contact-tek.

Additional resources

The documentation for the Models 707B and 708B is available at tek.com/keithley. The documentation includes:

- **Quick Start Guide:** Provides unpacking instructions, describes basic connections, reviews basic operation information, and provides a quick test procedure to ensure the instrument is operational.
- **Reference Manual:** Includes advanced operation topics, maintenance information, troubleshooting procedures, and in-depth descriptions of programming commands.
- **Accessories information:** Documentation for accessories that are available for the Models 707B and 708B.

Also see the website for the latest drivers and additional support information.

For additional information about the Model 707B or 708B, refer to tek.com/keithley, which contains the most up-to-date information. From the website, you can access:

- The *Low Level Measurements Handbook: Precision DC Current, Voltage, and Resistance Measurements*
- The *Semiconductor Device Test Applications Guide*
- Application notes
- Updated drivers
- Updated firmware

You can also contact your local Field Applications Engineer. They can help you with product selection, configuration, and usage. Check the website for contact information.

General ratings

The general ratings and connections of the Models 707B and 708B are listed in the following table.

Category	Specification
Supply voltage range	707B: 100 V AC to 240 V AC, 50 Hz to 60 Hz, 210 VA maximum 708B: 100 V AC to 240 V AC, 50 Hz to 60 Hz, 110 VA maximum
Input and output connections	See Rear-panel overview (on page 3-16).
Environmental conditions	For indoor use only **Altitude:** Maximum 2000 meters (6562 feet) above sea level **Operating:** 0 °C to 50 °C, ≤80 percent relative humidity at 35 °C; derate to 3% relative humidity per °C, 35 °C to 50 °C **Storage:** –25 °C to 65 °C **Pollution degree:** 2

Section 2

Installation

In this section:

Introduction

This section provides information on installing the 707B or 708B. It includes dimensions, weights, rack installation, digital I/O port, and power up information.

Dimensions

Dimensions:

- **707B:** 346.46 mm high × 431.4 mm wide × 574.68 mm deep (13.6 in. × 17.0 in. × 22.6 in.)
- **708B:** 89.00 mm high × 434.3 mm wide × 603.00 mm deep (3.5 in. × 17.1 in. × 23.7 in.)

Dimensions with card installed:

- **707B:** 356 mm high × 432 mm wide × 612 mm deep (14.0 in. × 17.0 in. × 24.1 in.)
- **708B:** 90 mm high × 432 mm wide × 612 mm deep (3.5 in. × 17.0 in. × 24.1 in.)

Figure 1: Dimensions - 707B top view

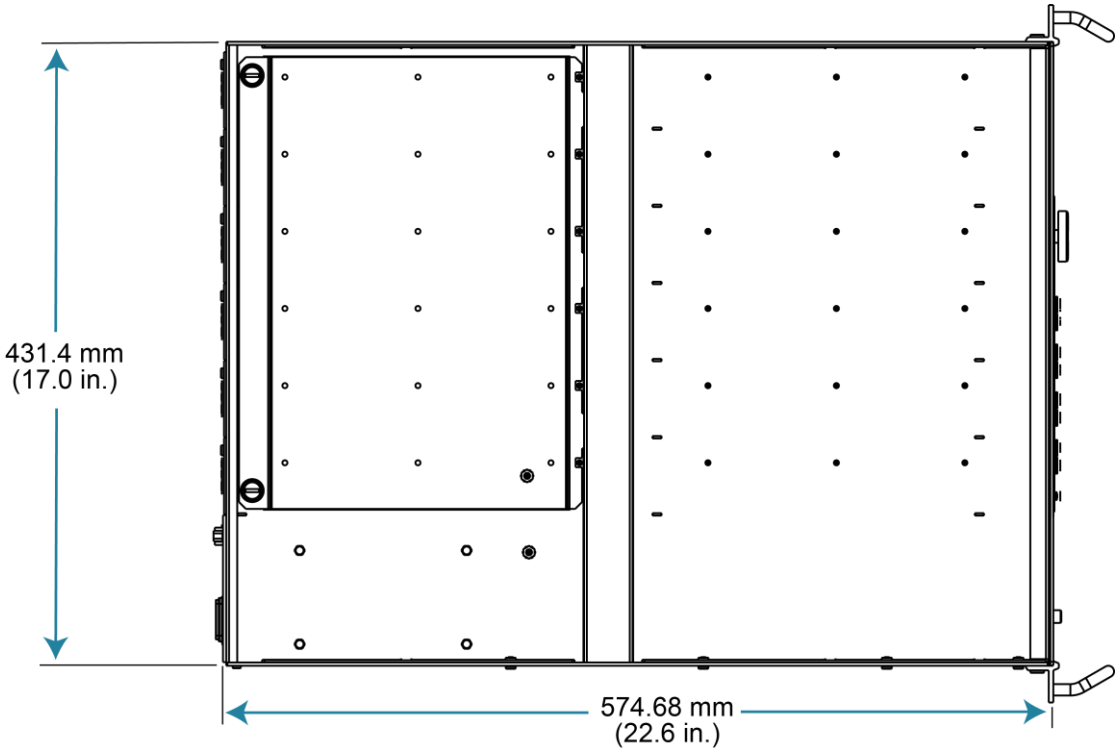


Figure 2: Dimensions - 707B side view

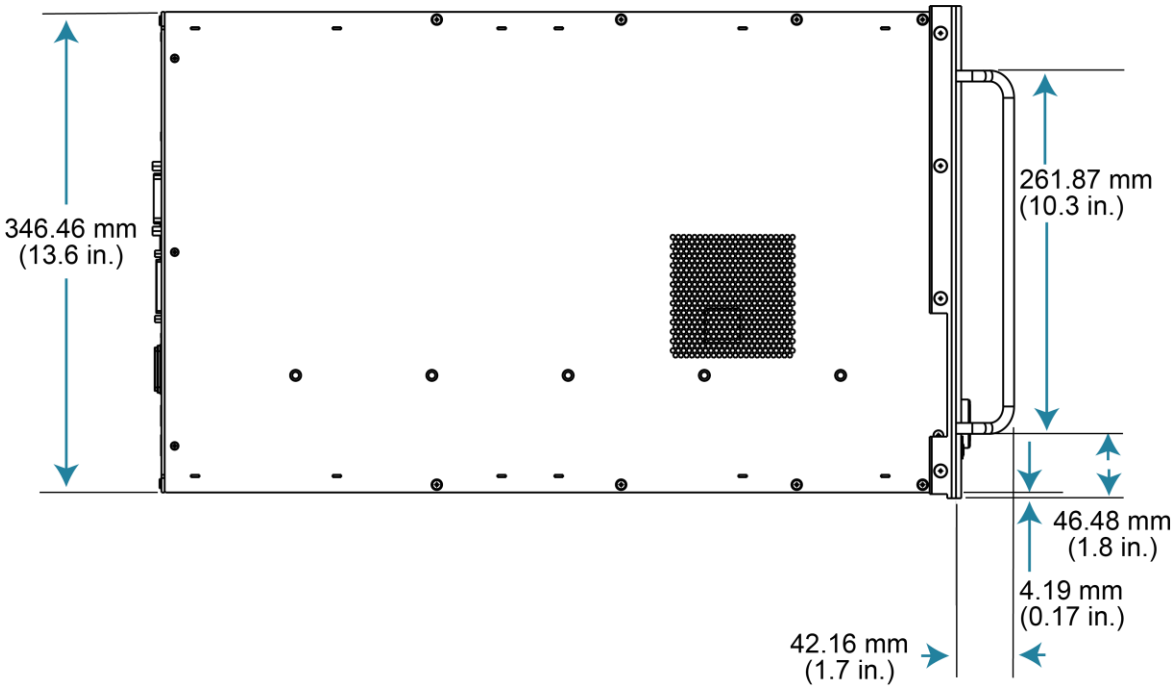


Figure 3: Dimensions - 707B front view

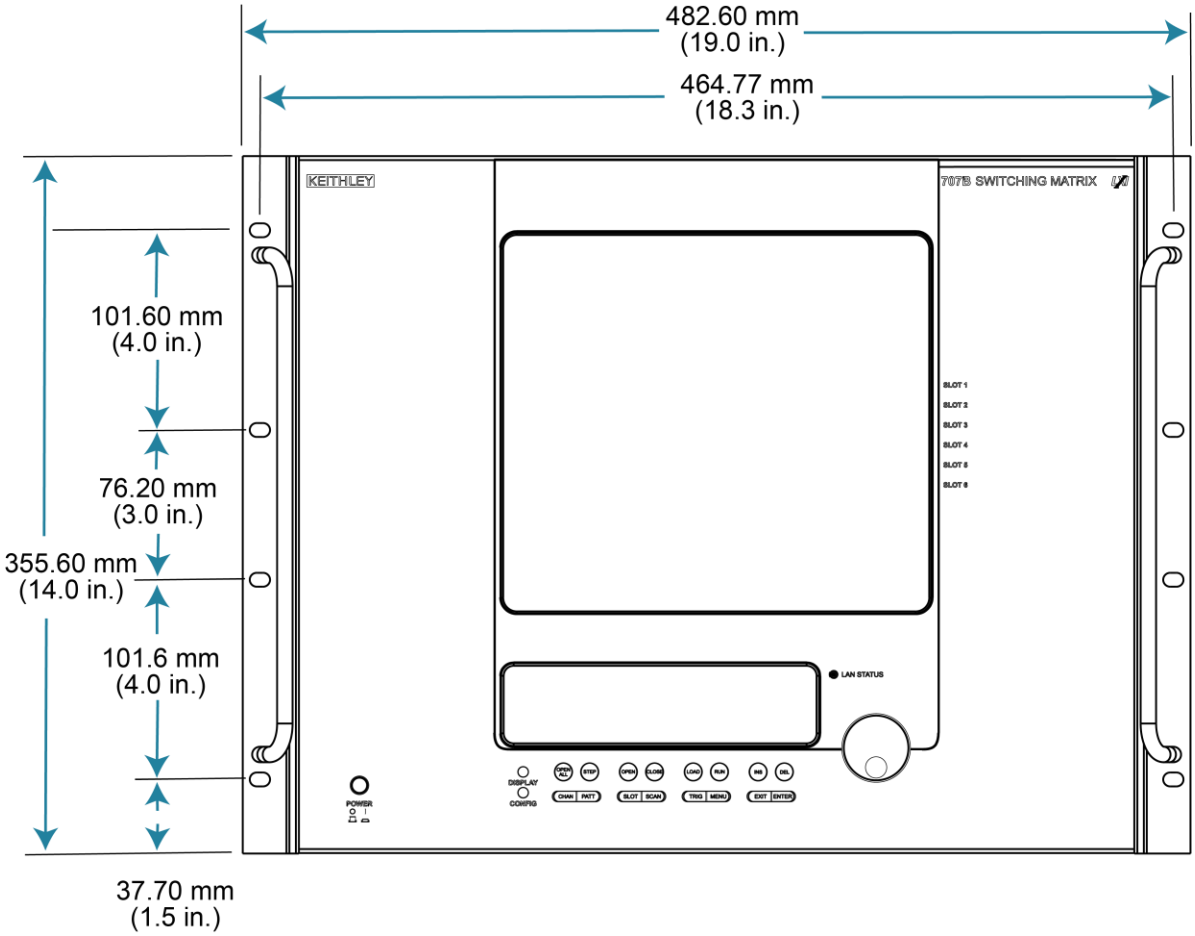


Figure 4: Dimensions - 708B top view

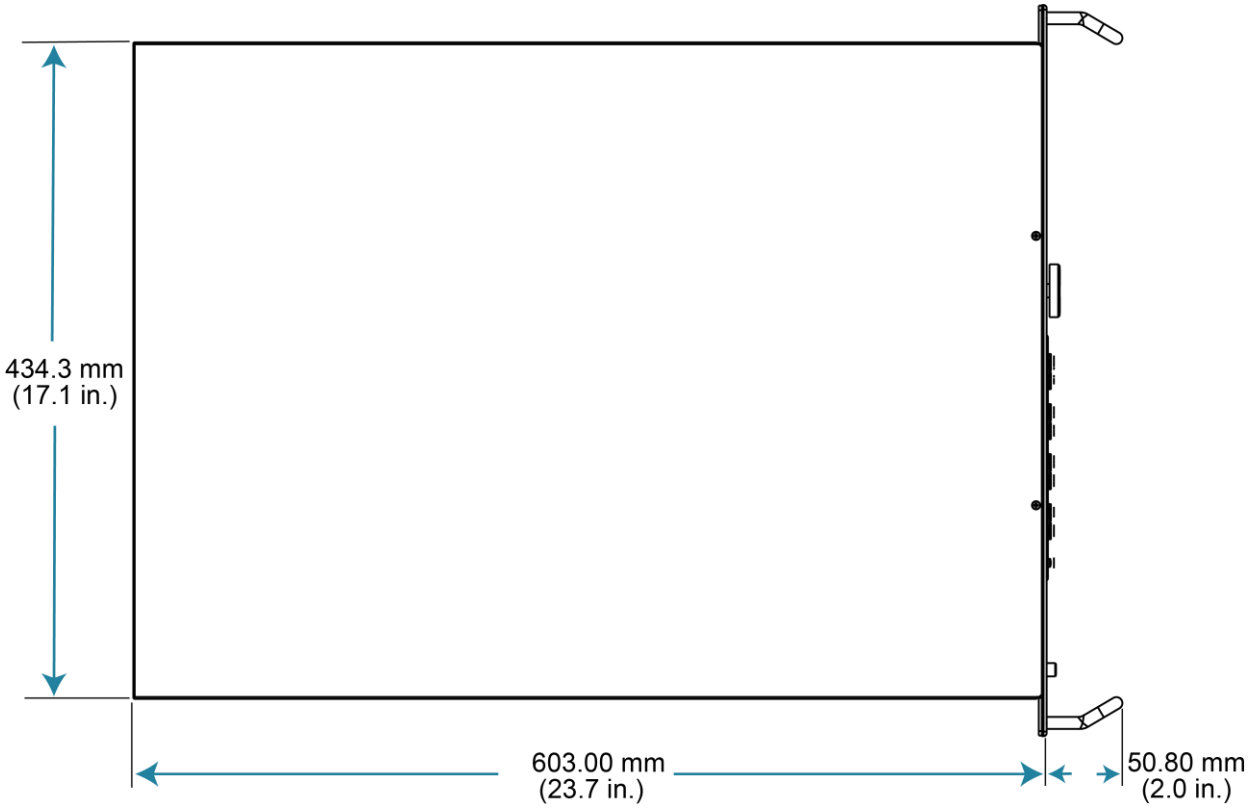


Figure 5: Dimensions - 708B side view

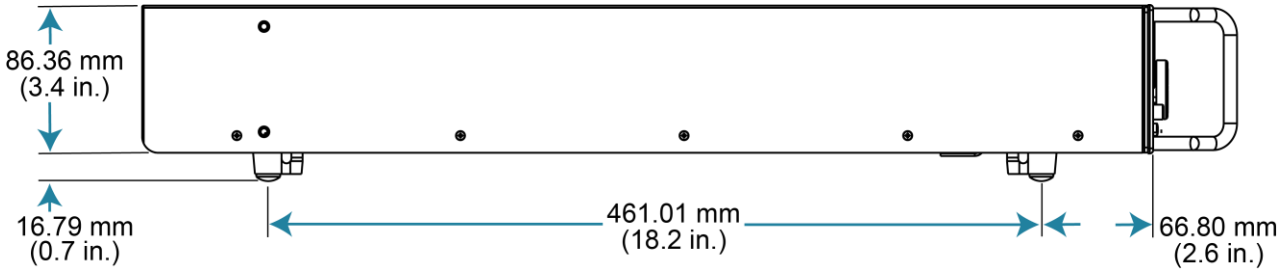
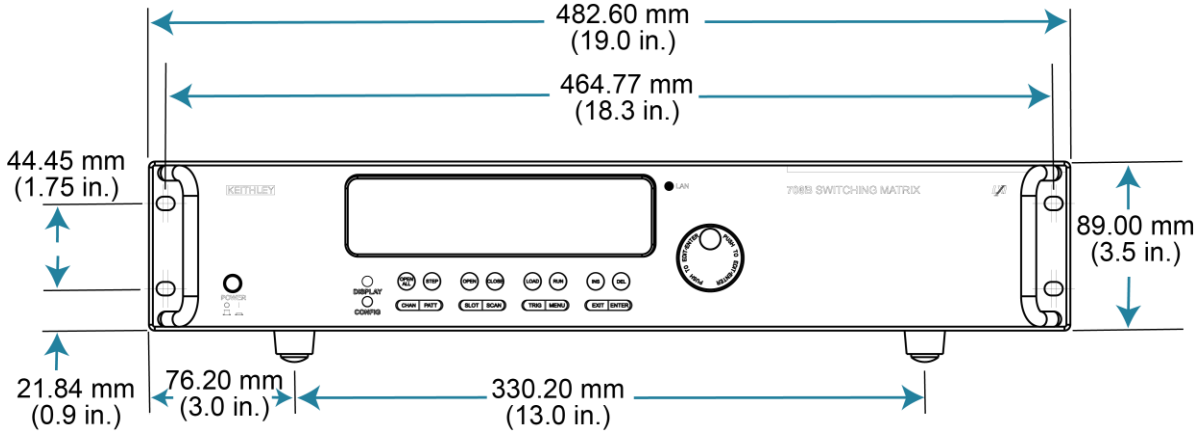


Figure 6: Dimensions - 708B front view



Weights

WARNING

With cards installed, the 707B or 708B weighs more than 23 kg (51 lb) and requires a two-person lift.

The weights of the Models 707B and 708B are provided in the following table.

Component	Weight
707B (no cards installed)	14.5 kg (32 lb)
708B (no cards installed)	7.3 kg (16 lb)

Fixed rack installation

The Model 708B ships with a rack-mount kit that includes instructions titled *Model 4299-6 Full-Rack Single-Unit Rack-Mount Kit Installation Instructions*. The instructions are also available at tek.com/keithley. Refer to those instructions for 708B installation information.

The Model 707B ships with a rear fixed rack mounting kit that is intended for mounting in a 48.26 cm wide × 60.96 cm tall × 76.20 cm deep (19 in. × 24 in. × 30 in.) rack. The following table lists the included hardware. Verify that you have all the necessary parts before starting the installation procedure.

Parts for Model 707B rack mounting

Item	Description	Keithley part number	Quantity
1	Truss-head screw, #10-32 × 5/8 in. Phillips	10-32X5/8PHTRSH	8
2	Threaded cage nut fastener, #10-32	FA-274	8
3	Keps™ nut, #10-32	10-32KEPNUT	8
4	Pan-head screw, 10-32 × 5/8" Philips	10-32X5/8PPH	8
5	Chassis support	60160-350E	2

Rack preparation

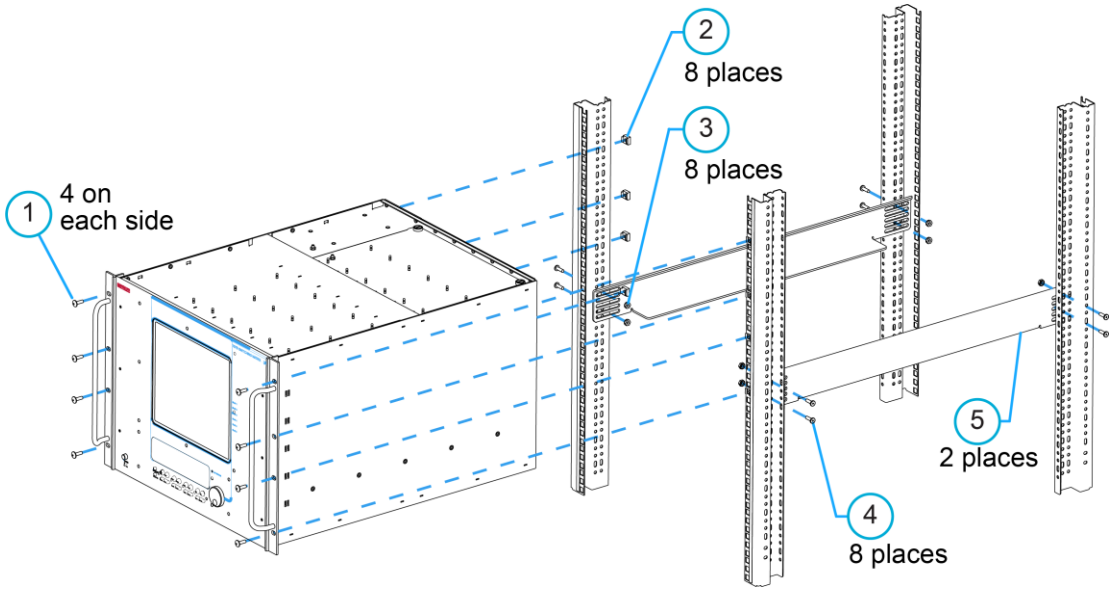
NOTE

The air intakes for the fan are on the rear panel above the IEEE-488 connector and on the side panel. The space around these areas should be free of obstructions to ensure proper fan operation.

To prepare the rack for Model 707B installation:

1. Select a location in the cabinet. In most cases, the weight of the instrument dictates a position in the lower half of the rack. The Model 707B fills 35.56 cm (14 in.) of vertical space.
2. With a second person assisting, hold the 707B up to the selected location in the cabinet.
3. Determine and mark where the cage nut fasteners and chassis supports will be installed.
4. Carefully set the 707B to the side.
5. Install the cage nut fasteners (item 2) at the locations marked previously.
6. Install the chassis supports (item 5) in the rack using the supplied pan-head screws (item 4) and Keps™ nuts (item 3).

Figure 7: 707B rack-mount installation



Mainframe installation

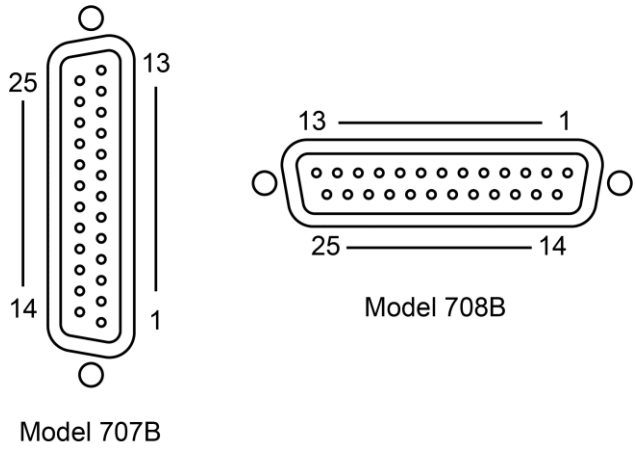
To install the mainframe in the rack:

1. Lift the Model 707B or 708B mainframe onto the chassis supports (item 5) and slide it into the rack. Make sure that the mounting holes on the front of the chassis line up with the installed cage nut fasteners.
2. Secure the mainframe to the front of the rack using the supplied truss-head screws (item 1) and cage nut fasteners (item 2).

Digital I/O port

The Models 707B and 708B have a digital input/output port that can be used to control external digital circuitry. For example, a handler that is used to perform binning operations can be used with a digital I/O port. The digital I/O port is a standard female DB-25 connector, as shown in the following figure.

Figure 8: Models 707B and 708B digital I/O ports



Pin	Description
1 ... 14	Digital I/O #1 ... Digital I/O #14
15 to 21	Ground
22	+5 VDC, limited to 600 mA, solid-state fuse protected
23	Not connected; pin reserved for future use
24	Not connected; pin reserved for future use
25	+5 VDC, limited to 600 mA, solid-state fuse protected

NOTE

If you are moving from a Model 707A or 708A, the digital I/O lines were fixed as follows:

- **Digital input:** Digital I/O lines 1 to 6
- **Digital output:** Digital I/O lines 7 to 12
- **External trigger:** Digital I/O line 13
- **Matrix ready:** Digital I/O line 14

Connect cables

Use a cable equipped with a standard male DB-25 connector (L-com part number CSMN25MF-5).

Digital I/O lines

The port provides 14 digital I/O lines (pins 1 through 14). Each output is set high (+5 V) or low (0 V) and can read high or low logic levels.

+5 V output

The digital I/O port provides three +5 VDC output lines that you can use to drive external logic circuitry. The maximum combined current output for all lines is 250 mA. These lines are protected by a self-resetting fuse with a one-hour recovery time.

Control digital I/O lines

Although the digital I/O lines are primarily intended for use with a device handler for limit testing, you can also use them for other purposes, such as controlling external logic circuits. You can control lines either from the front panel or over a remote interface.

You must write a `1` to all digital I/O lines that are to be used as inputs. The trigger mode for the line must be set to `digio.TRIG_BYPASS` to use the line for digital I/O. Refer to “Trigger model” in the *Models 707B and 708B Reference Manual* for more information.

The digital I/O lines are not affected by any reset. However, they are affected by a power cycle.

NOTE

For the decimal values of the digital I/O lines, refer to the table in Digital I/O bit weighting (on page 2-10).

To set digital I/O values from the front panel:

1. Press the **MENU** key, select **DIGIO**, and then press the **ENTER** key or press the navigation wheel ◔.
2. Select **DIG-IO-OUTPUT**, and then press the navigation wheel ◔.
3. Set the decimal value as required to set digital I/O lines in the range of 0 to 16,383. For example, to set digital I/O lines 3 and 8, set the value to `132`.
4. Press the navigation wheel ◔.
5. Press the **EXIT (LOCAL)** key as needed to return to the main menu.

To write-protect specific digital I/O lines to prevent their values from being changed:

1. Press the **MENU** key, then select **DIGIO**, and then press the navigation wheel ◔.
2. Select **WRITE-PROTECT**, and then press the navigation wheel ◔.
3. Set the decimal value as required to write-protect digital I/O lines within the range of 0 to 16,383. For example, to write-protect digital I/O lines 4 and 10, set the value to `520`.
4. Press the navigation wheel ◔.
5. Press the **EXIT (LOCAL)** key as needed to return to the main menu.

To remove write protection, reset the decimal value to include only the lines that you want to write protect. To remove write protection from all lines, set the value to `0`.

Digital I/O bit weighting

Bit weighting for the digital I/O lines is shown in the following table.

Digital bit weight

Line #	Bit	Decimal weighting	Hexadecimal weighting
1	B1	1	0x0001
2	B2	2	0x0002
3	B3	4	0x0004
4	B4	8	0x0008
5	B5	16	0x0010
6	B6	32	0x0020
7	B7	64	0x0040
8	B8	128	0x0080
9	B9	256	0x0100
10	B10	512	0x0200
11	B11	1,024	0x0400
12	B12	2,048	0x0800
13	B13	4,096	0x1000
14	B14	8,192	0x2000

Connect line power

The Model 707B or 708B operates from a line voltage of 100 V to 240 V at a frequency of 50 Hz or 60 Hz. Line voltage is automatically sensed (there are no switches to set). Make sure the operating voltage in your area is compatible.

⚠ WARNING

The power cord supplied with the Models 707B and 708B contains a separate protective earth (safety ground) wire for use with grounded outlets. When proper connections are made, the instrument chassis is connected to power-line ground through the ground wire in the power cord. In the event of a failure, not using a properly grounded protective earth and grounded outlet may result in personal injury or death due to electric shock.

Do not replace detachable mains supply cords with inadequately rated cords. Failure to use properly rated cords may result in personal injury or death due to electric shock.

CAUTION

Operating the instrument on an incorrect line voltage may cause damage to the instrument, possibly voiding the warranty.

To connect the Model 707B or 708B to line power and turn on the instrument:

1. Make sure that the front-panel power switch is in the off (0) position. Refer to Front-panel operation (on page 3-1) for the switch location.
2. Connect the socket of the supplied power cord to the power connection (AC receptacle) on the rear panel. Refer to Rear-panel overview (on page 3-16) for the connector location.
3. Connect the plug of the power cord to a grounded AC outlet.
4. Turn on the instrument by pressing the front-panel power switch to the on (I) position.

Power-up sequence

When the instrument is turned on, the instrument performs self-tests and momentarily lights all segments and indicators on the display. If a failure is detected, the instrument momentarily displays an error message. For a list of error messages, refer to “Error and status messages” in the *Models 707B and 708B Reference Manual*.

If there are no errors, three dots are briefly displayed. On the Model 707B, the crosspoint display shows the text `Wait for Init to End`. When initialization is complete, the bottom display shows `KEITHLEY Model 707B`. The Model 708B displays `KEITHLEY Model 708B`.

Section 3

Instrument description

In this section:

Front-panel operation

The front panel of the Keithley Model 707B or 708B contains:

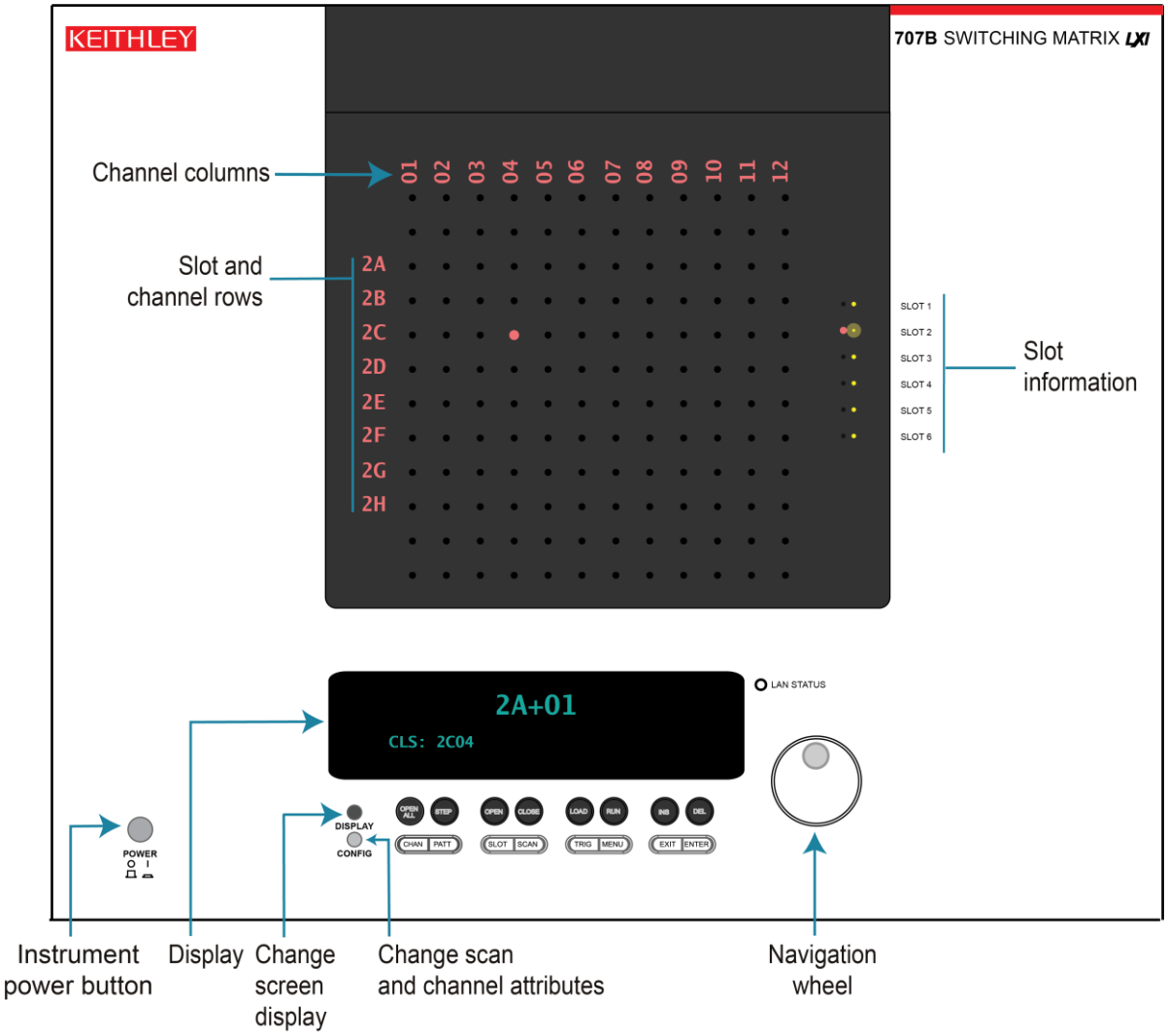
- The display
- The crosspoint display (Model 707B only)
- The keys and navigation wheel
- The LAN status indicator
- The POWER button

You can use the displays, keys, and the navigation wheel to change the selected channel or channel pattern. You can also use them to access, view, and edit the menu items. The crosspoint display on the Model 707B shows you which channels are open and closed.

Model 707B front panel

The front panel of the Model 707B is shown in the following figure.

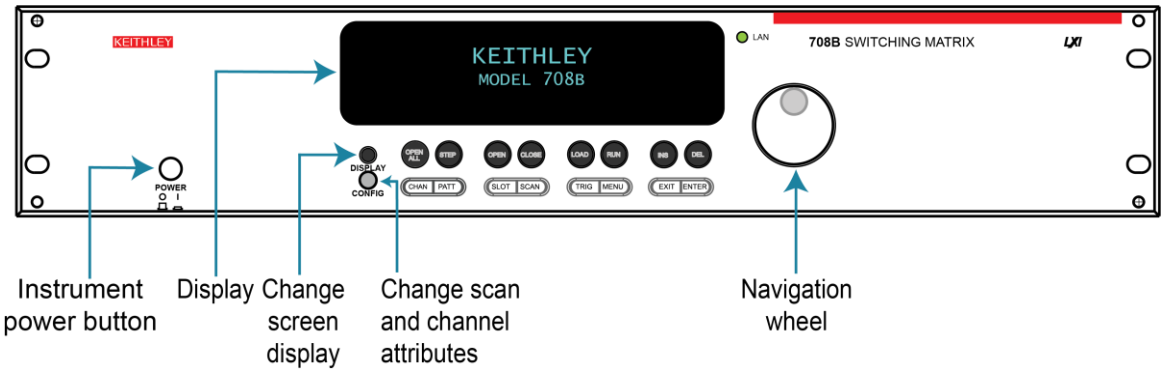
Figure 9: 707B front panel



Model 708B front panel

The front panel of the Model 708B is shown in the following figure.

Figure 10: 708B front panel



Display

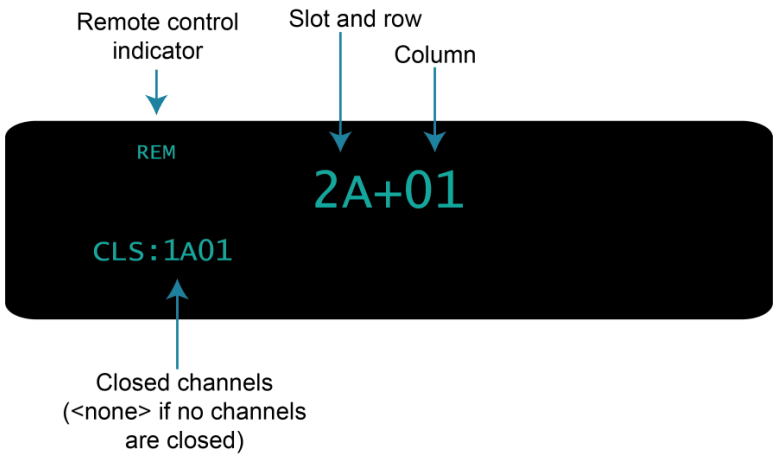
This section describes the front-panel display of the Model 708B and the bottom display of the Model 707B. During operation, the display provides information about the selected channel, channel pattern, channel state, and errors. You can press **DISPLAY** to cycle between the display of the channel or pattern, the closed channel list, or a screen message.

During setup, the display shows menu choices that you can use to configure the instrument.

Display during operation

During operation, the display shows the control status (local or remote) and the present channel. If the remote control indicator `REM` is not displayed, control is through the front panel. The display also lists any channels that are closed. An example is shown in the following figure.

Figure 11: Display during operation



The control status is shown in the upper left corner of the display. If REM is displayed, the instrument is being controlled remotely (through GPIB, LAN, or USB).

If you are connecting to the instrument through GPIB, you may also see the following indicators:

- **TALK:** Instrument is addressed to talk
- **LSTN:** Instrument is addressed to listen
- **SRQ:** Service request
- **REM:** Remote communications

By default, the top line of the display shows the slot, row, and column of the selected channel. If labels have been set up for your instrument, you might see four-character labels for your channels, such as GATE+SMU1. Refer to “Set up labels” in the *Models 707B and 708B Reference Manual* for information on setting up labels.

To change the selected channel:

1. Press the navigation wheel ◔ to select the row.
2. Turn the navigation wheel to go to a different row.
3. Press the navigation wheel again to select the column.
4. Turn the wheel to go to a new column.
5. Press the navigation wheel when selection is complete. The new channel is displayed.

The closed channels are listed after CLS on the lower line of the display. If no channels are closed, <none> is displayed. If the list of closed channels extends past one screen, . . . is displayed at the end of the lower line. To see the full list of closed channels, press **DISPLAY** until the list of closed channels is displayed.

NOTE

For the Model 707B, see Select channels from the front panel (on page 3-7) to select a channel.

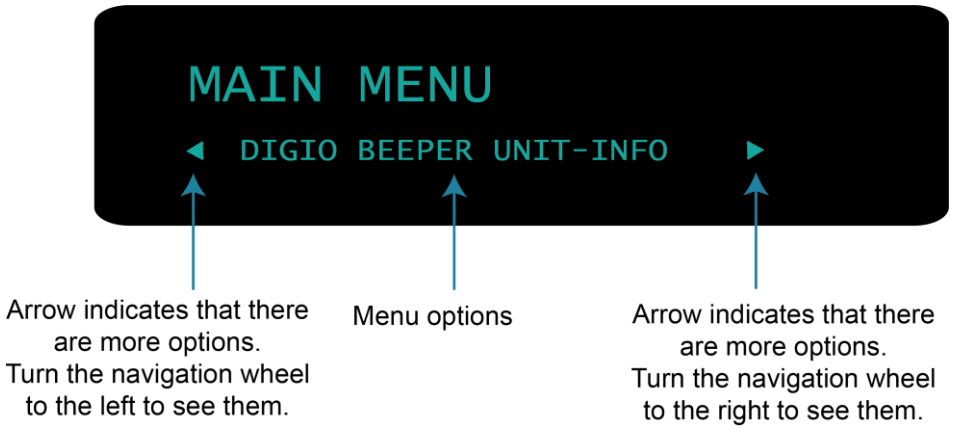
Display during setup

During setup, the display shows menu choices that you can use to configure the instrument.

To use the menus, you use the navigation wheel to scroll through menu options. When a menu item is selected, it blinks. Press the navigation wheel or **ENTER** to select an option.

In the following figure, the Main Menu is displayed, with arrows showing that there are additional menu items.

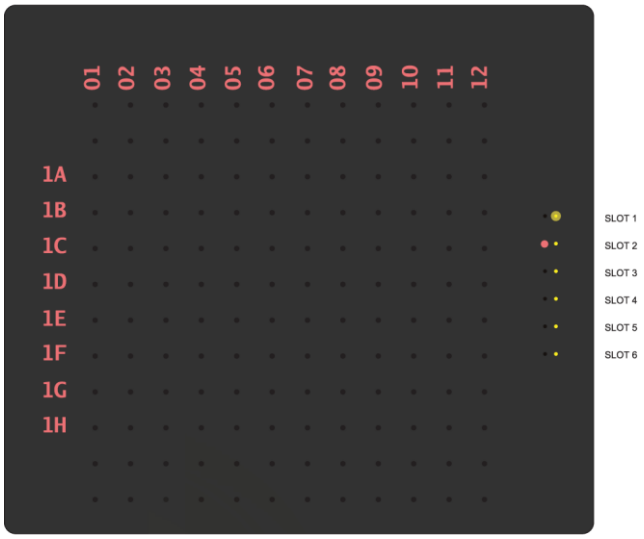
Figure 12: Front-panel Main Menu display



Crosspoint display (Model 707B only)

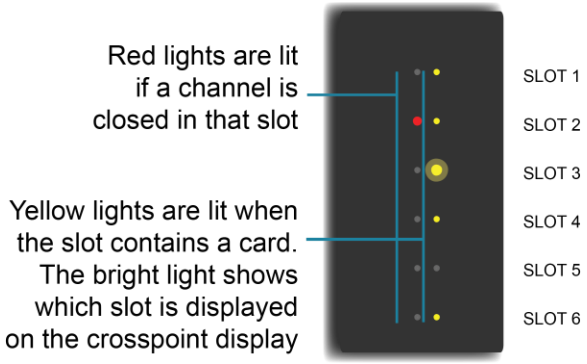
The crosspoint display on the front panel of the Model 707B displays information about the slots that contain cards and the open and closed state of the channels for one card slot at a time. If there are no cards in the slots of the instrument, the crosspoint display shows `No card in unit`.

Figure 13: Model 707B crosspoint display



The crosspoint display has a list of slots on the right. To the left of the slot list are lights that show you an overview of the cards in the slots of the instrument.

Figure 14: Model 707B slot indicators



The red lights indicate closed channels. If a red light is on, a channel in that slot is closed. If the red light is not lit for a slot, all channels in that slot are open. In the previous figure, the card in slot 2 has at least one closed channel.

The yellow lights indicate which slots contain a card and which slot is presently displayed on the crosspoint display. When a yellow light is on, the slot contains a card. If the yellow light is brighter than the others, that slot is being displayed on the crosspoint display. In the previous figure, there are cards in five slots, no card in slot 5, and the channels for the card in slot 3 are displayed on the crosspoint display.

The rows are labeled by default with the slot number following by the row number. For example, slot 1 would start with 1A, 1B and slot 2 would start with 2A, 2B. The columns are labeled by default as 01, 02, and so on. You can change the label names; refer to “Set up labels” in the *Models 707B and 708B Reference Manual*.

If a red light is on at a row-column crosspoint, the channel at the crosspoint is closed. If no red light is on, the channel is open. Channels appear in different LED intensities when a row is selected. Channels that are closed appear brighter than ones that are presently selected.

Select channels from the front panel

From the front panel, you can change the display to show another card slot, choose a specific channel, and open and close channels. For the 707B, the crosspoint display shows you the status of the channels for one card at a time.

To display a different slot on the 707B:

1. Press the navigation wheel ◔.
2. Turn the navigation wheel to the right to go to the next slot or to the left to go to the previous slot. You must go through all of the rows on one slot to go to the next slot.

To choose a specific row on the 707B:

1. When you are displaying the slot that contains the row, press the navigation wheel ◔. The red lights for that row are displayed.
2. Turn the navigation wheel to go to the row you want to select.
3. Press the navigation wheel to select the row. The red lights for each crosspoint in the row are on, as shown in the following figure.

Figure 15: One row selected

NOTE

On the Model 707B, if you scroll past the last row, you go to the next slot.

To choose a specific column in the selected row:

1. After choosing the row, press the navigation wheel. A column of red lights is displayed.
2. Turn the navigation wheel to go to the column. Note that scrolling through the columns does not scroll through slots as scrolling through rows does.
3. Press the navigation wheel to select the column and row. This channel is now displayed on the bottom display.

To open and close channels:

You can use the crosspoint display to view the open or closed status of a specific channel crosspoint.

After selecting the channel crosspoint so that the channel is displayed on the bottom display, you can press **OPEN** or **CLOSE** to open or close the channel.

Keys and navigation wheel

The keys and navigation wheel ◔ on the front panel allow you to turn on, set up, and operate the instrument from the front panel.

POWER switch

Press this switch to turn the instrument on (|). Press it again to turn the instrument off (0).

Navigation wheel

Turn the navigation wheel ◔ to scroll to a menu option or to change the selected value.

Push the navigation wheel to open menus or to select a menu option or a value. In most cases, pressing the navigation wheel performs the same action as pressing the **ENTER** key.

On the Model 707B, you can use the navigation wheel to select which slot is displayed on the crosspoint display.

To change a value with multiple characters:

1. Turn the navigation wheel ◔ to go to the character you want to change (the character blinks when selected).
2. Press the navigation wheel to edit that character.
3. Turn the navigation wheel to change the value.
4. Press the navigation wheel to keep the change.
5. Repeat these steps as needed to change the value.
6. Press the navigation wheel when you finish changing all the characters.

DISPLAY key

The **DISPLAY** key cycles between the following screens:

- The channel display or pattern display.
- The closed channel list.
- The user screen text, which is set with the remote command `display.settext()`.

When the closed channel listing is displayed, if the list of channels is longer than one screen, you can use the navigation wheel ◔ to scroll though the list of closed channels.

CONFIG key

The **CONFIG** key accesses attribute menus in which you can configure channels and scans.

Select **CONFIG** and then **CHAN** to open the Channel Attribute menu.

Select **CONFIG** and then **SCAN** to open the Scan Attribute menu.

Keys

The top row of keys under the display allows you to open and close channels, work with scan lists, and load and run scripts.

Figure 16: 707B and 708B top row of keys

Key descriptions

Key	Description
OPEN ALL	Opens all closed channels.
STEP	If a scan list has been defined, press **STEP** to step through the list. Each press is one scan step. Refer to “Basic scan procedure” in the *Models 707B and 708B Reference Manual*.
OPEN	Opens the selected channel or channel pattern.
CLOSE	Closes the selected channel or channel pattern.
LOAD	Loads code or scripts that can be run from the front panel.
RUN	Runs the last code or script selected through the **LOAD** key.
INS	Appends the selected channel or channel pattern to the scan list.
DEL	Deletes the first occurrence of the selected channel or channel pattern from the scan list.

Also refer to:

- For detail on using **OPEN ALL**, **STEP**, **OPEN**, and **CLOSE**: “Close and open channels” in the *Models 707B and 708B Reference Manual*.
- For detail on using **LOAD** and **RUN**: LOAD TEST menu options (on page 3-12).
- For detail on using **INS** and **DEL**: “Front-panel scan options” in the *Models 707B and 708B Reference Manual*.

The bottom row of keys allows you access menus and set up channels, patterns, cards, scans, triggers, and general instrument operation.

Figure 17: Bottom row of keys

Key descriptions	
Key	**Description**
CHAN	If a channel is displayed, opens the CHANNEL ACTION menu options (on page 3-13), which allows you to open and close channels. If a pattern is displayed, pressing **CHAN** switches to channel view.
PATT	If a pattern is displayed, opens the PATTERN ACTION menu options (on page 3-14), which allows you to manage patterns, open and close patterns, and reset them. If a channel is displayed, pressing **PATT** changes to display a pattern.
SLOT	Displays information about the installed cards and the instrument. Information includes the firmware revision, model name, and model number.
SCAN	Opens the SCAN ACTION menu options (on page 3-14), which allows you to run, manage, view, and reset scan lists. Refer to “Scan and trigger” in the *Models 707B and 708B Reference Manual*.
TRIG	Generates a trigger that can be used in a script or the trigger model. Refer to “Scan and trigger” in the *Models 707B and 708B Reference Manual*. This can be used with the `display.trigger.EVENT_ID` command.
MENU	Opens the Main menu options (on page 3-15), which allows you to manage scripts, manage communications, select channel connections, test the keys, test the display, manage digital I/O settings, set up the beeper, and display instrument information.
EXIT	This key: ■ Cancels the present selection and returns to the previous menu item. ■ Exits remote operation so you can control the instrument from the front panel. ■ Aborts a scan that is running. ■ Aborts a script that is executing.
ENTER	Accepts the present selection or opens the next menu option. In most cases, pressing **ENTER** is the same as pressing the navigation wheel ◔.

LAN status indicator

The LAN status indicator is lit when the instrument is connected through the local area network (LAN).

If this is not lit, the instrument is not connected through the LAN or there is a connection problem.

If you are using the web interface, the LAN status indicator blinks when you click the **ID** button in the upper right corner on the home page.

Refer to “LAN communications” in the *Models 707B and 708B Reference Manual* for more information.

Set beeper and key clicks

You can turn the instrument beeper and key click sounds on or off.

NOTE

Disabling the beeper also disables the keyclicks. To enable keyclicks, you must also enable the beeper.

To change the beeper or key click sounds from the front panel:

1. Press **MENU**.
2. Use the navigation wheel to select `BEEPER`.
3. Select `KEYCLICK` or `BEEP`.
4. Select `ENABLE` or `DISABLE`.
5. Press the navigation wheel to save the change.
6. Press **EXIT (LOCAL)** to return to the Main Menu.

Menu options

You can use the front-panel menus of the instrument to set up and run the instrument.

LOAD TEST menu options

You can run scripts and code from the front panel. The scripts and code can be created through a communications interface or saved from the SCRIPT > CREATE-CONFIG menu.

To open this menu, press **LOAD**. There are two options:

- **USER:** Loads code that was added to Load Test with the `display.loadmenu.add()` command.
- **Scripts:** Loads named scripts that were added to the runtime environment.

After selecting code or script from the User or Scripts option, you can press **RUN** to execute the selected code or script.

NOTE

For information on creating and loading scripts, refer to “Manage scripts” in the *Models 707B and 708B Reference Manual*.

Channel Attribute Menu options

The options in the Channel Attribute Menu allow you to configure channels from the front panel.

To open the Channel Attribute Menu, go to channel view. Select the channel for which you want to set attributes, then press **CONFIG**, then press **CHAN**.

The options are:

- **LABEL:** Sets the label that is displayed on the front panel for the specified channel.
- **LABEL-ROW:** Sets the label that is displayed on the front panel for the specified row.
- **LABEL-COL:** Sets the label that is displayed on the front panel for the specified column.
- **FORBID:** Allows you to prevent the channel from being closed.
- **DELAY:** Sets delay time (in addition to settling time) for the specified channels. Enter the value for the delay in 1 ms steps from 0 to 60 seconds for a channel.
- **COUNT:** Displays closure cycles for the specified channel.

For more information about channel attribute settings, refer to “Channel attributes” in the *Models 707B and 708B Reference Manual*.

Scan Attribute Menu options

Use the options in this menu to configure scans from the front panel.

To open this menu, press **CONFIG**, then press **SCAN**.

Options include:

- **ADD:** Reminds you that you need to use **INS** to add channels or channel patterns to a scan.
- **BYPASS:** Allows you to bypass the trigger for the first step of the first scan.
- **MODE:** Selects how the scan initializes the instrument when the scan is executed. Choose OPEN-ALL to open all channels or OPEN-SELECT to open only the channels used in the scan.
- **SCAN_CNT:** Sets the scan count, which is the number of times that the instrument repeats the steps in a scan. After repeating the steps this number of times, the instrument returns to idle.

For information on setting up the trigger model and configuring scans, refer to the *Models 707B and 708B Reference Manual*.

CHANNEL ACTION menu options

Allows you to change the state of channels from the front panel.

To open this menu, display a channel, then press **CHAN**.

Options include:

- **OPEN:** Opens the selected channel.
- **CLOSE:** Closes the selected channel.
- **EXCLOSE:** Closes the selected channel and opens any closed channels on the instrument.
- **EXSLOTCLOSE:** Closes the specified channel and opens any closed channels on the same slot. Channels on other slots remain closed.
- **RESET:** Restores the factory default settings to the selected channel. Resetting a channel deletes any channel patterns that contain that channel.

For more information, refer to “Work with channels” in the *Models 707B and 708B Reference Manual*.

PATTERN ACTION menu options

You can use channel patterns as a convenient way to refer to a group of switching channels with a single name. When you perform close or open operations on a channel pattern, only the channels that are in the channel pattern are affected. The options in the PATTERN ACTION menu allow you to configure and change patterns from the front panel.

To open this menu, in pattern view, press **PATT**.

Options include:

- **CREATE:** If no patterns have been created, this is the only option that is displayed. Allows you to create a new pattern.
- **OPEN:** Opens the channels in the selected channel pattern.
- **CLOSE:** Closes the channels in the selected channel pattern. These closures are appended to any channels that are already closed.
- **EXCLOSE:** Closes the channels in the selected pattern so that the channels associated with the pattern are exclusively closed. Any previously closed channels are opened.
- **EXSLOTCLOSE:** Exclusively closes the channels in the specified channel pattern for the selected slots.
- **VIEW:** Displays the channels that are in the selected pattern.
- **DELETE:** Deletes the channel pattern.
- **RESET:** Displays options that allow you to reset the channels in the selected channel pattern to factory default settings. Resetting a channel pattern causes that pattern to be deleted because when channels are reset, they delete patterns that contain them.

For information about working with channel patterns, refer to Channel patterns (on page 4-8).

SCAN ACTION menu options

Allows you to work with the scan lists from the front panel. You must have a scan list created before using this option. refer to “Basic scan procedure” in the *Models 707B and 708B Reference Manual* for information.

To open this menu, press **SCAN**.

Options include:

- **BACKGROUND:** Runs the scan while allowing front-panel operation.
- **CREATE:** Reminder that you must use the INS key to create a scan list.
- **LIST:** Displays the scan list. Use the navigation wheel ◔ to scroll through the channels.
- **CLEAR:** Clears the scan list.
- **RESET:** Resets the scan settings to the factory default settings, which includes clearing the scan list.

Main menu options

The options in the main menu allow you to create a configuration script, set up communications, verify and set some instrument operation, set up digital input/output, and get instrument information.

To open the main menu, press **MENU**.

Main Menu options

Option	Description	Also see
SCRIPT	Option to create a script that stores the present configuration of the instrument.	Save the present configuration (on page 3-18)
GPIB	Options for setting up GPIB communications.	"GPIB setup" in the *Models 707B and 708B Reference Manual*
DDC	Options that allow you to run existing 707A or 708A applications.	"Models 707A and 708A compatibility mode" in the *Models 707B and 708B Reference Manual*
LAN	Options for setting up LAN communications.	"LAN communications" in the *Models 707B and 708B Reference Manual*
TSPLINK	Options for configuring TSP-Link.	"TSP-Link system" in the *Models 707B and 708B Reference Manual*
CHANNEL	Select a connection rule to determine the order in which switch channels are opened and closed, and select whether to connect sequentially.	"Connection methods for close operations" in the *Models 707B and 708B Reference Manual*
DISPLAY	Verify operation of the keys, display, and crosspoint display LEDs.	"Test the display, keys, and channel matrix" in the *Models 707B and 708B Reference Manual*
DIGIO	Options for controlling the digital input and output lines.	Digital I/O port (on page 2-8)
BEEPER	Enables or disables the instrument key clicks and beeps.	Set beeper and key clicks (on page 3-11)
UNIT-INFO	Displays the firmware version, serial number, and memory usage. For the 707B, also includes fan status.	Check fan status (on page 5-2)
RESET	Resets the instrument.	"Reset" in the *Models 707B and 708B Reference Manual*

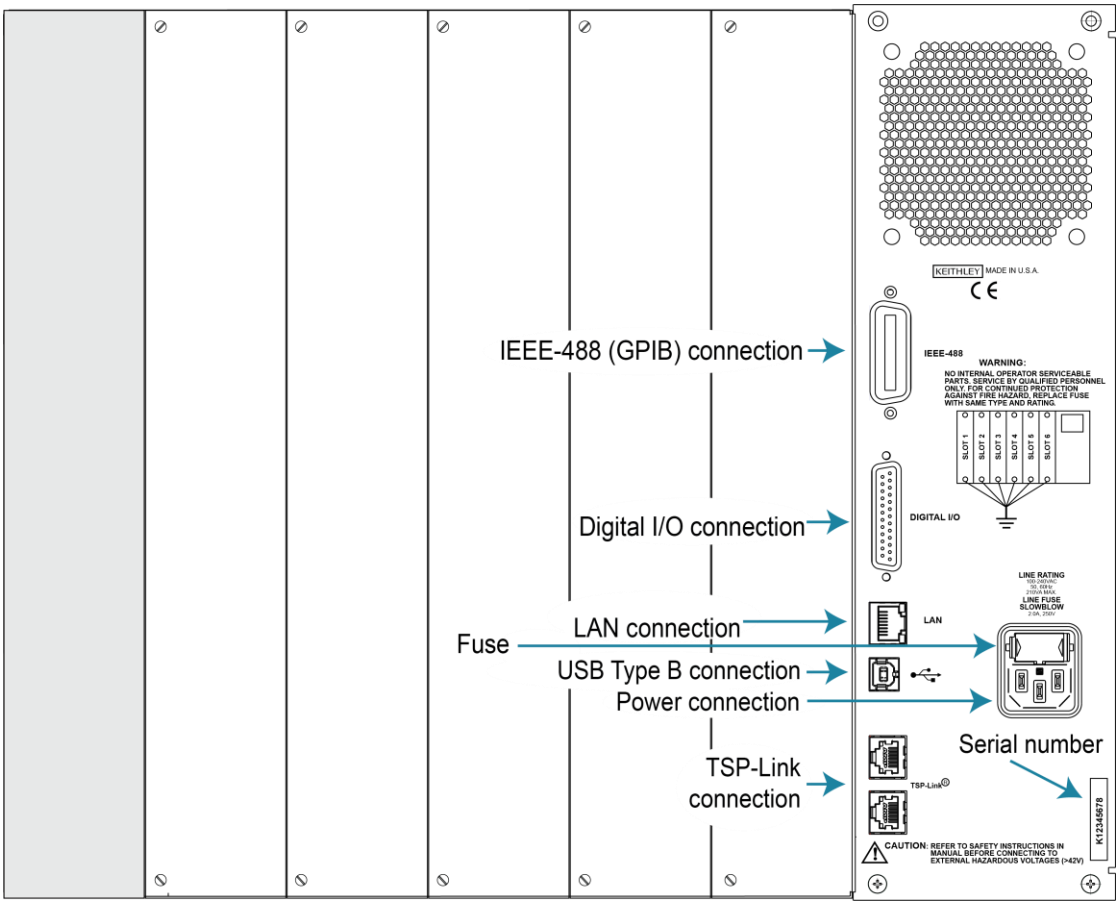
Rear-panel overview

You make power and communications connections to the rear panel of the instrument. The connections available are described in the following table. The following figures show the locations of the connections.

Rear-panel options

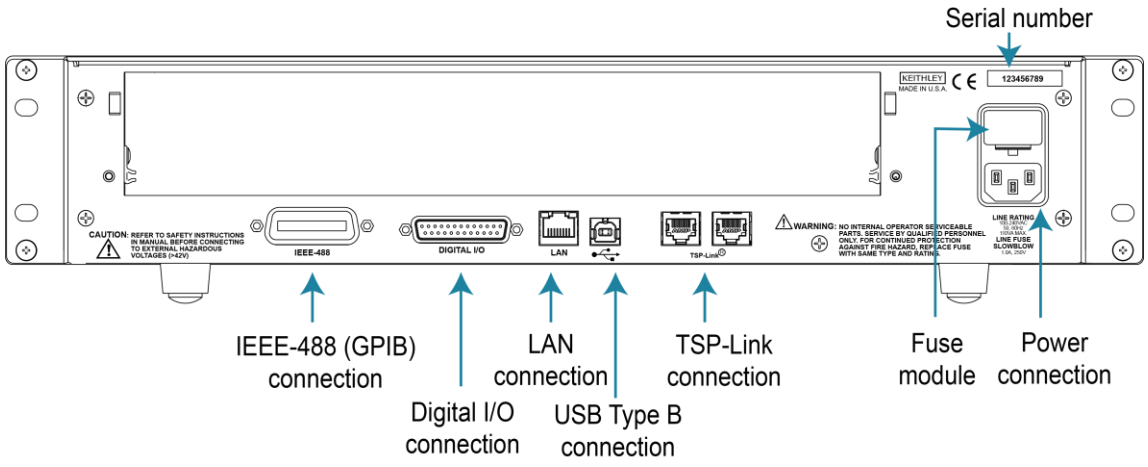
Option	Description
Slots	Use the slots in the Models 707B and 708B for the matrix cards. The Model 707B can accept up to six matrix cards. The Model 708B can accept one matrix card. If a slot does not contain a matrix card, make sure to cover the slot with a slot cover. For model and firmware version information on the installed matrix cards, press the **SLOT** key.
IEEE-488	IEEE-488 (GPIB) connector.
Digital I/O	Digital input/output connector. See Digital I/O port (on page 2-8) for connection information.
LAN	Ethernet (LAN) connector.
Fuse	Line fuse. To replace the fuse, see Replace the fuse (on page 5-2).
USB (Type B)	USB communications interface connection..
Power	Use the supplied line cord to connect to a grounded AC power outlet. See Connect line power (on page 2-11) for connection details.
TSP-LINK	Use with TSP-Link™ cable to expand the system. Refer to “Connect the TSP-Link cable” in the *Models 707B and 708B Reference Manual*.
Serial number	Serial number of the instrument.

Figure 18: Model 707B rear panel



Model 708B rear panel

Figure 19: Model 708B full rear panel



Save the present configuration

You can capture the present settings of the instrument using the create configuration script feature. When you run this feature, the configuration script is created and saved. You can run it later to return to that configuration, or set it up to be the `autoexec` script. The configuration script is a normal TSP script; once created, you can use it and modify it as you would any other script. The `autoexec` script runs automatically when the instrument is turned on.

The configuration script includes:

- Comment lines that identify the script as automatically created and list the date and time of creation.
- The cards that are installed and the slots in which they are installed.
- A reset command, which resets the instrument to the factory default settings.
- The commands to reconfigure the instrument. The configuration script only captures settings that have been changed from the factory defaults.

When you run the configuration script, the script verifies that the installed cards and slots match. If they do not, a message is displayed, the script stops, and the configuration is not restored.

The configuration script does not include the status of channels. The configuration script performs a reset, which opens all channels.

NOTE

You can modify the script to change the card models or slots. However, you must make sure that all subsequent commands are valid for the card model or slot change.

NOTE

For more information on scripts, refer to “Fundamentals of scripting for TSP” and “Autoexec script” in the *Models 707B and 708B Reference Manual*.

A sample configuration script is shown in the following example.

`--Auto created configuration script`	Indicates that this was created with the Create Configuration Script feature
`--Tue Jul 13 13:02:12 2010`	Date and timestamp

`if string.find(slot[1].idn, "7174") == nil then`
`  print(`
`  "Card installed in slot 1 needs to be a 7174.")`
`  display.clear()`
`  display.settext("Card installed in$N" ..`
`  "$Bslot 1$R needs to be a $B7174$R")`
	Code that verifies that physical card and slot assignments are the same

`else`	
`  reset()`	Reset command

`  channel.setlabel("1A01", "FirstRowCol")`
`  channel.setlabel("1A12", "LastRowCol")`
`  channel.setlabel("1B01", "FirstNextRow")`
`  channel.setlabel("1B12", "LastNextRow")`
`  channel.pattern.setimage("1A01,1B01","Row1_2_col_1")`
`  channel.pattern.setimage("1A02,1B02","Row1_2_col_2")`
`  channel.pattern.setimage("1A03,1B03","Row1_2_col_3")`
`  channel.pattern.setimage("1A04,1B04","Row1_2_col_4")`
`  channel.pattern.setimage("1A05,1B05","Row1_2_col_5")`
`  channel.pattern.setimage("1A06,1B06","Row1_2_col_6")`
`  channel.pattern.setimage("1A07,1B07","Row1_2_col_7")`
`  channel.pattern.setimage("1A08,1B08","Row1_2_col_8")`
`  channel.pattern.setimage("1A09,1B09","Row1_2_col_9")`
 	
`  channel.pattern.setimage("1A10,1B10","Row1_2_col_10")`
 	
`  channel.pattern.setimage("1A11,1B11","Row1_2_col_11")`
 	
`  channel.pattern.setimage("1A12,1B12","Row1_2_col_12")`
`  collectgarbage()`
`  scan.trigger.channel.stimulus =`
`  scan.trigger.EVENT_CHANNEL_READY`
`  scan.create()`
`  scan.mode = 0`
`  scan.bypass = 1`
`  scan.add("Row1_2_col_1")`
`  scan.add("Row1_2_col_2")`
`  scan.add("Row1_2_col_3")`
`  scan.add("Row1_2_col_4")`
`  scan.add("Row1_2_col_5")`
`  scan.add("Row1_2_col_6")`
`  scan.add("Row1_2_col_7")`
`  scan.add("Row1_2_col_8")`
`  scan.add("Row1_2_col_9")`
`  scan.add("Row1_2_col_10")`
`  scan.add("Row1_2_col_11")`
`  scan.add("Row1_2_col_12")`
	Code that captures the non-factory default settings

`end`	

Create a configuration script

When you run the create configuration script feature, it automatically generates a user script that is saved to a script with a name that you define. Create configuration script is available from the front panel of the instrument, the web interface, and the remote interface.

NOTE

When you specify the name of the script, be aware that if you specify a name that already exists (including `autoexec`), the existing script is overwritten with the new configuration script.

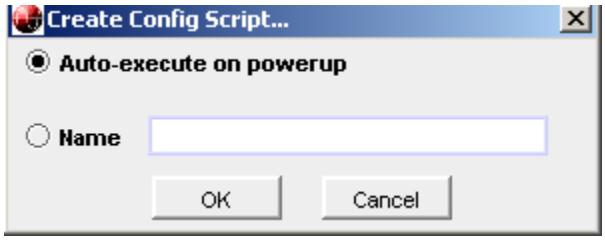
To create a configuration script from the front panel:

1. Press **MENU**.
2. Select **SCRIPT**.
3. Select **CREATE-CONFIG**. The AUTOEXEC ON PWR UP prompt is displayed.
4. Select **Yes** or **No**.
5. If AUTOEXEC is set to no, at the name prompt, enter the name of the script. The default name is `config01`.
6. Press **ENTER**.
7. The AUTOEXEC message is displayed again. Press **EXIT** several times to return to the normal display.

To create a configuration script from the web interface:

1. Open the **Unit** page.
2. Log in if necessary.
3. Click **Create Config Script**.

Figure 20: Create Config Script dialog box



4. To make the configuration script the autoexec script, select **Auto-execute on power-up**.
5. To assign a name (the script will not be the autoexec script), select **Name** and enter a name in the box.
6. Click **OK**. The configuration script is created.

To create a configuration script from the remote interface:

Send the command:

```
createconfigscript(name)
```

Where *name* is the name you want to assign to the configuration script.

Run the configuration script

You can run the configuration using the same methods as any other script. Refer to “Run scripts” in the *Models 707B and 708B Reference Manual* for information.

Section 4

Front-panel interface overview

In this section:

Introduction

Before starting this section, complete the tasks outlined in the *Models 707B and 708B Quick Start Guide* and install a matrix card in the switching matrix. This section provides basic information about using the 707B and 708B front-panel interfaces.

The front panel of the Keithley Model 707B or 708B contains:

- The display
- The crosspoint display (Model 707B only)
- The keys and navigation wheel
- The LAN status indicator
- The POWER button

You can use the displays, keys, and the navigation wheel to change the selected channel or channel pattern. You can also use them to access, view, and edit the menu items. The crosspoint display on the Model 707B shows you which channels are open and closed.

Display

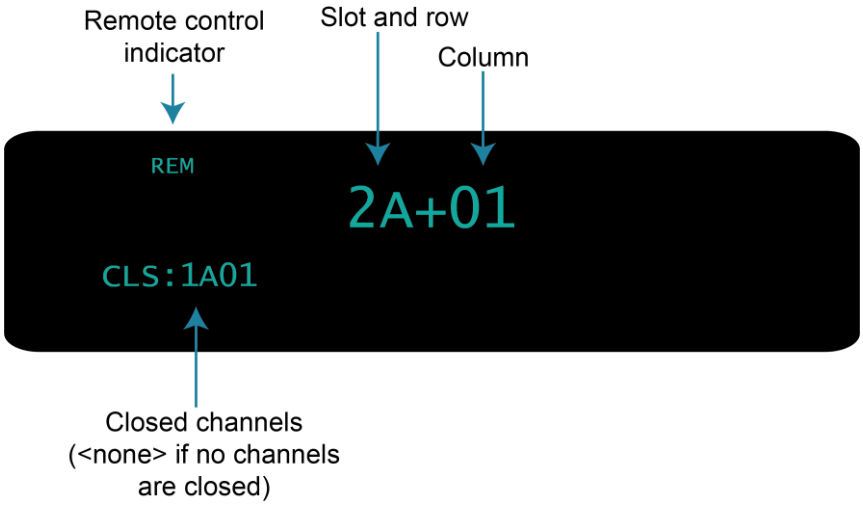
During operation, the 707B or 708B front-panel display provides information about the selected channel, channel pattern, channel state, and errors. You can press **DISPLAY** to cycle between the display of the channel or pattern, the closed channel list, or a screen message.

During setup, the display shows menu choices that you can use to configure the instrument.

During operation, the display shows the control status (local or remote) and the present channel and indicates if any channels are closed. An example is shown in the following figure.

The control status is shown in the upper left corner of the display. If `REM` is displayed, the instrument is being controlled remotely (through GPIB, LAN, or USB). If `REM` is not displayed, control is through the front panel.

Figure 21: Display during operation



By default, the top line of the display shows the slot, row, and column of the selected channel.

Specify a channel

The channels on the matrix cards that you can use with the Model 707B or 708B are referred to by a channel specifier. You use the specifier to identify channels for use with close and open operations, scans, and channel patterns. The specifier is used for all interfaces (front panel, web, and remote command).

A channel specifier is a four or five-digit alphanumeric sequence. The first digit is always the number of the slot in which the card is installed in the instrument. The remaining digits vary depending on the type of card.

The following sections describe the channel specifier in more detail and provide generic examples.

Channel types

The Models 707B and 708B support matrix cards with matrix channels. The documentation for your matrix card lists the available channel types.

Matrix card channel specifiers

The channels on the matrix cards are referred to by their slot, bank, row, and column numbers:

- **Slot number:** The number of the slot in which the card is installed.
- **Bank number:** The bank number, if used by your card. See your card documentation.
- **Row number:** The row number is either 1 to 8 or A to Z. See your card documentation.
- **Column number:** Always two digits. For columns greater than 99, use A, B, C and so on to represent 10, 11, 12, …; the resulting sequence is: 98, 99, A0, A1, …, A8, A9, B0, B1, …

Matrix card channel examples

Specifier	Slot number	Bank number	Row number	Column number
1A05 or 1105*	1	N/A	1	05
1C05	1	N/A	3	05
3C12	3	N/A	3	12

* Specifier depends on matrix card. See your matrix card documentation for detail.

Operate a channel from the front panel

CAUTION

Hot switching can dry-weld reed relays, causing them to always be on. Hot switching is recommended only when external protection is provided.

You can perform operations on a single channel from the front panel.

To select a channel:

1. If the instrument is being controlled remotely, press **EXIT** to allow control from the front panel.
2. Turn the navigation wheel ◔ until the channel specifier is displayed on the front panel.
3. To:
   - Close a channel without affecting any other channels: Select **CLOSE**.
   - Open the channel: Press **OPEN**.
   - Close a channel and open any other closed channels on the instrument: Select **CHAN** and select **EXCLOSE**. Press **ENTER** to close the selected channel.
   - Close a channel and open any other closed channels on the slot that contains the selected channel: Select **CHAN**, and then select **EXSLOTCLOSE**. Press **ENTER** to close the selected channel.

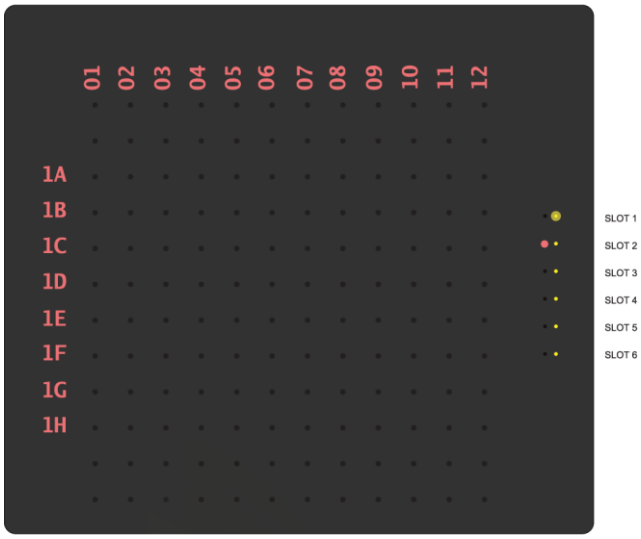
NOTE

Once a channel is selected, it is the selected channel for any subsequent front-panel operations.

Crosspoint display (Model 707B only)

The crosspoint display on the front panel of the Model 707B displays information about the slots that contain cards and the open and closed state of the channels for one card slot at a time. If there are no cards in the slots of the instrument, the crosspoint display shows `No card in unit`.

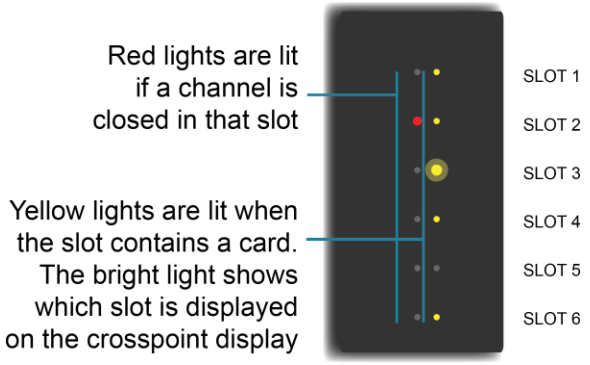
Figure 22: Model 707B crosspoint display



The crosspoint display has a list of slots on the right. The lights to the left of the slot list show you an overview of the cards that are installed in the slots of the instrument.

In the following figure, there are cards in five slots, no card in slot 5, and the channels for the card in slot 3 are displayed on the crosspoint display. At least one channel is closed on the card in slot 2.

Figure 23: Model 707B slot indicators



Select and close channels using the crosspoint display

From the front panel, you can change the display to show another card slot, choose a specific channel, and open and close channels. For the Model 707B, the crosspoint display shows you the status of the channels for one card at a time.

To display a different slot:

Turn the navigation wheel ◔ to the right to go to the next slot, or to the left to go to the previous slot.

Exercise: Select and close a crosspoint on slot 1

To select and close the crosspoint on slot 1, at row C and column 7:

1. To change the present row, press the navigation wheel ◔. The first two digits of the four-digit channel specifier flash, indicating edit mode.
2. Turn the navigation wheel ◔ to change the digit to `1C`.
3. Press the navigation wheel ◔. This accepts the row selection and selects edit mode for the column. The last two digits of the channel specifier flash, indicating edit mode.
4. Turn the navigation wheel ◔ to change the digits to `07`.
5. Press the navigation wheel ◔ or **ENTER** to accept the channel, exit edit mode, and return to the main display.
6. To:
   - **Open the channel:** Press **OPEN**.
   - **Close a channel without affecting any other channels:** Select **CLOSE**.
   - **Close a channel and open any other closed channels on the instrument:** Select **CHAN** and select **EXCLOSE**. Press **ENTER** to close the selected channels.
   - **Close a channel and open any other closed channels on the slot that contains the selected channel:** Select **CHAN**, and then select **EXSLOTCLOSE**. Press **ENTER** to close the selected channels.

Exercise: Select a crosspoint on slot 2

To select the crosspoint that is on slot 2, at row C and column 3:

1. When you are displaying slot 2, press the navigation wheel ◔. The red lights for that slot are displayed.
2. Turn the navigation wheel ◔ to go to row 2C.
3. Press the navigation wheel ◔ to select the row. The red lights for each crosspoint in the row are on, as shown in the following figure.

Figure 24: One row selected

NOTE

On the Model 707B, if you scroll past the last row of any slot, you go to the next slot.

4. After choosing the row, press the navigation wheel ◔. A column of red lights is displayed.
5. Turn the navigation wheel ◔ to go to column 03. Scrolling through the columns will not scroll through slots like scrolling through rows does.
6. Press the navigation wheel ◔ or **ENTER** to select the column and row. This channel is now displayed on the bottom display as `2C+03`.
7. To:
   - **Open the channel:** Press **OPEN**.
   - **Close a channel without affecting any other channels:** Select **CLOSE**.
   - **Close a channel and open any other closed channels on the instrument:** Select **CHAN** and select **EXCLOSE**. Press **ENTER** to close the selected channels.
   - **Close a channel and open any other closed channels on the slot that contains the selected channel:** Select **CHAN**, and then select **EXSLOTCLOSE**. Press **ENTER** to close the selected channels.

View the close or open status of a channel

Closed channels are shown separated by commas after the `CLS:` characters on the display of the instrument. If no channels are closed, `<none>` is displayed here. If the list of closed channels extends past one screen, an arrowhead is displayed at the end of the line. Press **DISPLAY** to display the full list of closed channels. Use the navigation wheel to scroll through the list. After viewing the list, press **DISPLAY** twice to return to the main display.

Figure 25: Multiple closed channels

Channel patterns

You can use channel patterns to refer to a group of switching channels with a single alphanumeric name. When you perform close or open operations on a channel pattern, only the channels that are in the channel pattern are affected.

There is no speed difference when performing close and open operations on channel patterns compared to performing the same operations on individual channels or a list of channels.

Create a channel pattern

When you create a channel pattern:

- Include all the channels that are needed for that channel pattern.
- Check that channels in the pattern are correct.
- Check that channels in the pattern create the correct path connection.
- Make sure that channels that you want to include in the pattern are not set to forbidden to close.

When naming the channel pattern, be aware:

- The first character of the name must be alphabetic (upper or lower case).
- Names are case sensitive.
- Pattern names must be different than row, column, and channel labels.

To create channel pattern `TEST01` using channels that are presently closed:

1. Close the channels you want to include in the channel pattern. For this example, close channels **1A01**, **1B02**, and **1C03**.
2. Press the **PATT** key.
3. From this menu, select the **CREATE** menu item.
4. From this menu, select the **SNAPSHOT** menu item.
5. At the prompt, enter a pattern name using the navigation wheel ◔. For this example, enter the name **TEST01**. Use the navigation wheel ◔ to select each character of the name.
6. Press the **ENTER** key to apply the selection.
7. Press the **EXIT** key to leave the menu.

NOTE

Refer to "Channel patterns" in the *Models 707B and 708B Reference Manual* for more details.

Perform close and open operations on channel patterns

⚠ WARNING

Careless channel pattern operation could create an electric shock hazard that could result in severe injury or death. Improper operation can also cause damage to the switching cards and external circuitry. The control of multiple channels using channel patterns should be restricted to experienced test engineers who recognize the dangers associated with multiple channel closures.

You can close and open channel patterns the same way you do for individual channels.

When you request a close or open operation, the Model 707B or 708B verifies that the channels exist for a pattern but does not verify that the switch path connection is correct. You must ensure the requested operation is safe for a channel pattern and that a good connection will result for your application with the channel pattern.

To close channel pattern `TEST01` from the front panel:

1. Press the **PATT** key to display a channel pattern.
2. Use the navigation wheel ◔ to select **TEST01**, the channel pattern you want to close. **Model 707B only:** Note that when you select a pattern, on the crosspoint display, the lights for the channels included in the pattern are dimly lit.
3. Perform any of the following actions:
   - **Open the channels in the channel pattern:** Press **OPEN**.
   - **Close the channels in the channel pattern without affecting any other channels:** Press **CLOSE**.
   - **Close the channels in the channel pattern and open any other closed channels on the instrument:** Select **PATT** and select **EXCLOSE**. Press **ENTER** to open or close the channels.
   - **Close the channels in the channel pattern and open any other closed channels on the slot:** Press **PATT** and select **EXSLOTCLOSE**. Press **ENTER** to open or close the channels.

Set up row, column, and channel labels

You can define labels for rows, columns, and channels. Using labels is a more descriptive way to refer to switching paths than the default channel identifiers.

Labels must be unique; they cannot be the same as the name of another row, column, channel, or channel pattern. Labels cannot contain spaces, and they do not persist through a power cycle.

Channel labels can be up to 19 characters. Row and column labels can be up to eight characters. On the crosspoint display, the first four characters of the label are displayed. On the bottom display, the full label is displayed.

You can only set labels for channels that are installed in the instrument.

Exercise: Create a row label for row D using the front panel

To create a row label for row D using the front panel:

1. If a pattern name is presently displayed on the bottom display, press **CHAN** to place the display in Channel view.
2. Use the navigation wheel ◔ to select a channel on row D. For example, select **1D01**.
3. Press **CONFIG**, and then press **CHAN**.
4. Use the navigation wheel ◔ to select **LABEL-ROW** to define a row label. The label selections are defined as:
   - **LABEL:** Sets the label that is displayed on the front panel for the specified crosspoint.
   - **LABEL-ROW:** Sets the label that is displayed on the front panel for the specified row.
   - **LABEL-COL:** Sets the label that is displayed on the front panel for the specified column.
5. Change the row label to **SMU1**, using the navigation wheel ◔ to change each character.
6. Press the navigation wheel ◔ or **ENTER** to save the change.
7. Press **EXIT** to return to the main display.

The bottom display now uses `SMU1` to refer to row D on slot 1. For example, selecting crosspoint `1D03` prints `SMU1+03` to the bottom display. Additionally, the crosspoint display on the 707B is updated to use the new row label.

Section 5

Maintenance

In this section:

Upgrade the firmware

You can upgrade the instrument firmware from the web interface.

To upgrade the firmware from the web interface:

1. From the left navigation area, select **Unit**.
2. Log in if necessary.
3. From the Unit buttons, click **Upgrade Firmware**.
4. A confirmation message is displayed. Click **OK**.
5. A version message is displayed. Select the appropriate option.
6. Select the file.
7. Click **Open**. A progress dialog is displayed. When the upgrade begins, the front-panel display also displays the progress.

   During the upgrade, you see messages that indicate that the connection has been lost. This is normal.
8. After the instrument power automatically turns off and then turns on again, it is ready for use.

NOTE

If you have a GPIB or USB connection, you can also use Test Script Builder to upgrade the firmware. Refer to the help in the TSB software for information.

Check fan status

You can check the status of the fan from the front panel of the Model 707B.

In addition, if the fan is not operating on power up, the message `Failed to sense fan` is displayed.

To check the fan status:

1. From the front panel, select **MAIN MENU > UNIT-INFO > FAN**.
2. Press the navigation wheel ◷. The status is displayed:
   - **Fan Normal:** Fan is operating normally.
   - **Fan Failure:** Fan is not moving.
3. Press **EXIT** to return to the menu.

If the fan is not operating, contact Keithley. Refer to Contacting support (on page 5-4).

Replace the fuse

The fuses on the Model 707B or 708B are accessible from the rear panel of the instrument, as shown in the following figure.

Figure 26: 707B fuse location

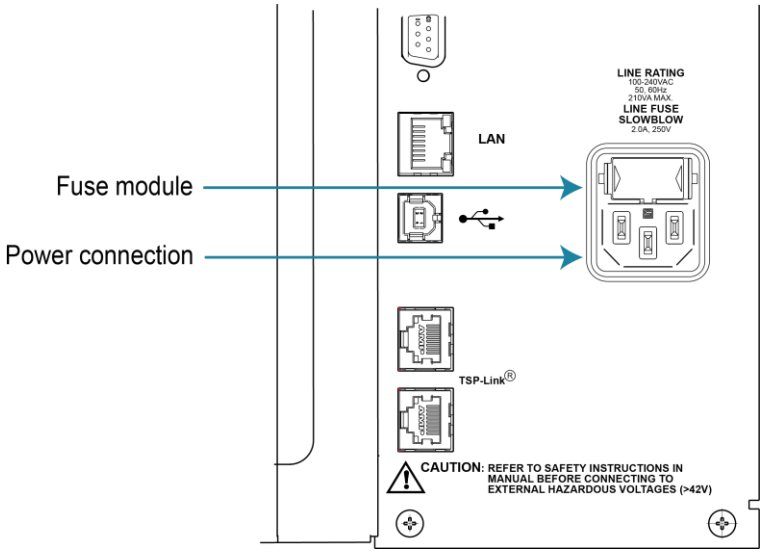
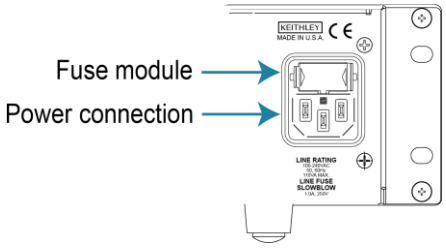


Figure 27: 708B fuse module location



Replacement fuses are listed in the following table.

Replacement fuses

Model	Rating	Keithley Instruments part number	Manufacturer part number
707B	250 V, dual 2.0 A slow blow	Two FU-106-2.0	Littelfuse 0218002.HXP
708B	250 V, 1.0 A slow blow	One FU-72	Littelfuse 0218001.HXP

WARNING

Disconnect all external power from the equipment and the line cord at the rear panel before performing any maintenance on the Model 707B or 708B. Failure to disconnect all power may expose the operator to hazardous voltages that could result in personal injury or death. Use appropriate safety precautions when working with hazardous voltages.

To replace a fuse:

1. Use a small flat-tip screwdriver to lift the tab at the bottom of the fuse module.
2. Pull the fuse module out.
3. Replace the fuse.
4. Re-install the fuse module.

If a fuse continues to become damaged, a circuit malfunction exists and must be corrected. Return the instrument to Keithley for repair. Refer to Contacting support (on page 5-4).

Support contact information

If you have any questions after reviewing this information, please contact your local Tektronix office, sales partner, or distributor. You can also call the Tektronix corporate headquarters (toll-free inside the U.S. and Canada only) at 1-800-833-9200. For worldwide contact numbers, visit tek.com/contact-tek.

When contacting Keithley, have the following information ready:

- The serial number of the instrument.
- The firmware revision of the instrument.
- The model and firmware revision of all installed cards.

When you call, have the information available, and, if possible, be near the instrument.

Identify the serial number version

The instrument serial number is on a label on the rear panel of the instrument. You can also access the serial number from the front panel using the front-panel keys and menus.

To display the serial number on the front panel:

1. If the Model 707B or 708B is in remote operation, press the **EXIT (LOCAL)** key once to place the instrument in local operation.
2. Press the **MENU** key.
3. Use the navigation wheel ◔ to scroll to the **UNIT-INFO** menu item.
4. Press the **ENTER** key. The UNIT INFORMATION menu is displayed.
5. Scroll to the **SERIAL#** menu item.
6. Press the **ENTER** key. The Model 707B or 708B serial number is displayed.

Identify installed switching cards

To identify installed matrix cards from the front panel:

Press the **SLOT** key to scroll through the model numbers, descriptions, and firmware revisions of the installed matrix cards.

To identify installed matrix cards from the web interface:

1. Select the **Unit** page.
2. In the Report area, select the slots that you want information about.
3. Select **Firmware Revision**.
4. Select **Generate Report**. Information about the cards in the slots is displayed below the button.

To identify installed matrix cards from the remote command interface:

Use slot[slot].idn to query and identify installed matrix cards.

For example, to get a list of all matrix cards installed in the slots of a Model 707B or 708B, send the following command over the remote command interface:

```
for x=1,6 do print (slot[x].idn) end
```

The response is similar to the following:

```
7174, 8x12 Fast Low-I Matrix, 01.00a, <Module Serial Number>
7072, 8x12 Semi Matrix, 01.00a, <Module Serial Number>
Empty Slot
Empty Slot
Empty Slot
Empty Slot
```

Section 6

Troubleshooting FAQs

In this section:

About this section

This section provides answers to the most common questions encountered with the Models 707B and 708B.

How do I change the line frequency or voltage?

The Models 707B and 708B operate from a line voltage of 100 V to 240 V at a frequency of 50 Hz or 60 Hz. Line voltage is automatically sensed (there are no switches to set). Make sure the operating voltage in your area is compatible.

Why doesn't the 4200A-SCS recognize the switch matrix?

To use the Models 707B and 708B with the 4200-SCS or 4200A-SCS, you must have DDC compatibility mode enabled and must communicate through GPIB.

You can select one of two options when enabling Model 707A or 708A DDC compatibility mode:

- **70xA-VERSION**: This option most closely matches Model 707A or 708A operation. Use this version if you are transferring applications directly from a Model 707A or 708A with few changes.
- **70xB-VERSION**: This options provides enhanced operation, including error checking and more robust settling time operation. Use this version if you are updating existing applications.

To enable Model 707A or 708A DDC compatibility mode:

1. From the front panel, select **MENU**.
2. Select **DDC**.
3. Select **ENABLE**.
4. Select the version.
5. Press **ENTER**.
6. Cycle instrument power.

To enable GPIB communications:

1. From the front panel, select **MENU**.
2. Select **GPIB**.
3. Select **ENABLE**.
4. Select **ON**.
5. Cycle power to the instrument.

If DDC compatibility mode is selected and GPIB is enabled, also verify that:

- The GPIB cable is connected to the instrument.
- The instrument has a unique GPIB address.

How do I run 707A or 708A software on the 707B or 708B?

Verify that DDC compatibility mode is enabled.

You can select one of two options when enabling Model 707A or 708A DDC compatibility mode:

- **70xA-VERSION**: This option most closely matches Model 707A or 708A operation. Use this version if you are transferring applications directly from a Model 707A or 708A with few changes.
- **70xB-VERSION**: This options provides enhanced operation, including error checking and more robust settling time operation. Use this version if you are updating existing applications.

To enable Model 707A or 708A DDC compatibility mode:

1. From the front panel, select **MENU**.
2. Select **DDC**.
3. Select **ENABLE**.
4. Select the version.
5. Press **ENTER**.
6. Cycle instrument power.

Review "Using Model 707A and 708A compatibility mode" in the *Models 707B and 708B Reference Manual* for additional information. Also see "Migrating from Models 707A and 708A."

Where are the Matrix Ready and External Trigger lines?

These signals are on the digital I/O connector. For information on the digital I/O capabilities, refer to "Controlling digital I/O lines" in the *Model 707B or 708B Reference Manual*.

Why doesn't the Model 707B or 708B recognize my switch card?

Card is not correctly seated in the slot

Make sure the card is seated correctly:

1. Remove power from the instrument.
2. Pull the card out of the slot.
3. Carefully guide the card inside the rails while reinstalling.
4. Make sure the outer shield is not inserted into the card rails.
5. Make sure that no other portions of the card catch on any part of the instrument frame while installing.
6. Make sure the card is seated correctly before restarting the instrument.

Edge connector is dirty

If the card was stored outside of the instrument, it is possible that the edge connector is dirty.

1. Check the edge connector. The gold edge connector fingers should have a bright surface when properly cleaned.
2. If necessary, clean the edge connector.
3. Reinstall the card.

Confirm that the card is supported in the Model 707B or 708B

See the Model 707B or 708B datasheet, available at tek.com/keithley.

Why can't I close a channel?

The channel might be set to be forbidden to close.

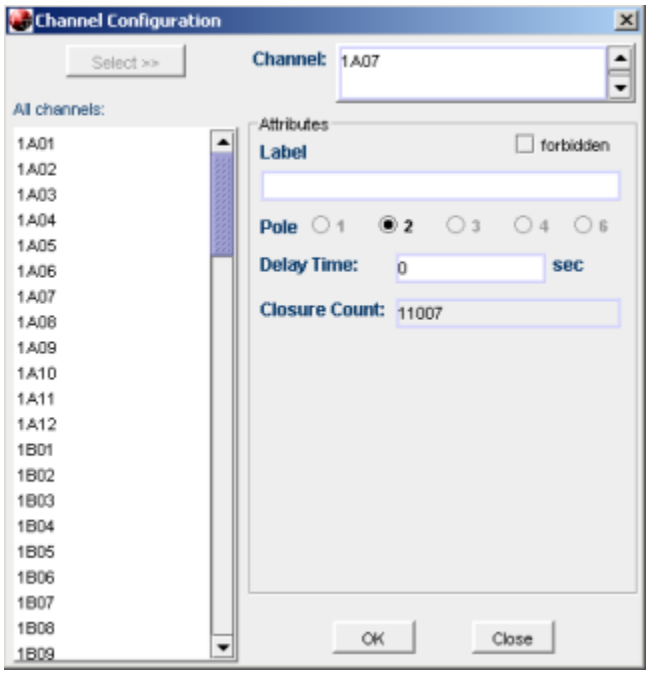
To check the forbidden state of a channel from the front panel:

1. Display a channel (you might need to press **DISPLAY**).
2. Use the navigation wheel ◔ to select the channel you want to check.
3. Press **CONFIG**, then press **CHAN**.
4. Select **FORBID**.
5. Press **ENTER**.
6. **Yes** and **No** are displayed. The present selection blinks. To change the setting to allow the channel to close, select **No**.

To check the forbidden state of a channel from the web interface:

1. From the list on the left, select the slot that contains the channel.
2. Right-click the channel. The Channel Configuration dialog is displayed.

Figure 28: Channel configuration dialog



3. If the forbidden box is selected, the channel is forbidden to close. To allow the channel to close, clear the box.
4. Select **OK** to save the change.

To check the forbidden state of a channel from a remote interface:

You can also clear, check, and set the forbidden state of channels using the following commands:

- `channel.clearforbidden()`
- `channel.getforbidden()`
- `channel.setforbidden()`

Why are the switch relays not closing?

Verify that the system power is sufficient to close the switch relays.

Check the front panel or script output for an error that might have been returned from the operation.

How do I save the present state of the instrument?

Use the Create Config Script option or the command `createconfigscript`. Refer to Save the present configuration (on page 3-18).

How do I access the internal web page of the instrument?

Ensure that the instrument has been assigned a valid IP address.

To view the IP address of the Models 707B and 708B:

1. Press **MENU**.
2. Select **LAN > STATUS > IP-ADDRESS**.

If a valid IP address is displayed, the instrument configuration is correct. If `0.0.0.0` is displayed, the instrument is not configured correctly. To fix the configuration:

- If you are using the automatic configuration method over a corporate network, contact your network administrator for assistance.
- If you are using the manual configuration method over a corporate network, verify that you have entered the IP address, gateway, and subnet mask provided by your network administrator.
- If you are using the manual configuration method and a one-to-one connection with the computer, verify that the subnet mask agrees with the settings of the computer.

If the above suggestions do not work, see the *Models 707B and 708B Reference Manual*, "Remote communications interfaces."

How do I get my LAN or web connection to work?

For troubleshooting suggestions and more detailed information about remote interface connections, refer to “Remote communications interfaces” in the *Models 707B and 708B Reference Manual*.

Section 7

Next steps

In this section:

Next steps

For more detailed information about the Model 707B or 708B, refer to the Keithley *Models 707B and 708B Reference Manual*, part number 707B-901-01, available at tek.com/keithley.

If you are migrating from a Keithley Model 707A or 708A and want to use the native commands for the Model 707B or 708B, refer to "Migrating from Models 707A and 708A" in the *Model 707B or 708B Reference Manual*. To use existing software that ran with the Model 707A or 708A without modification, refer to "Using Model 707A or 708A Compatibility Mode" in the *Model 707B or 708B Reference Manual*.

Keithley Instruments • 28775 Aurora Road • Cleveland, Ohio 44139 • 1-800-833-9200 • tek.com/keithley

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