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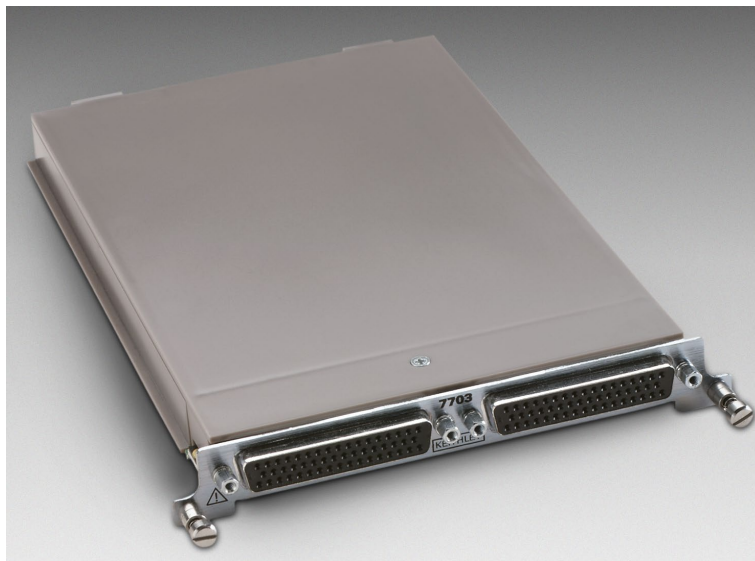
## Introduction

### NOTE

This 7703 can be used with the DAQ6510 Data Acquisition and Multimeter System or the 2750 Multimeter/Switch System. If you are using the 7703 with the DAQ6510, refer to *Model 7703 Multiplexer Module Instructions for use with DAQ6510*, document number 0771448xx.

The 7703 32-Channel High-Speed Differential Multiplexer Module offers 32 channels of 2-pole or 16 channels of 4-pole multiplexer switching that can be configured as two independent banks of multiplexers. The nonlatching reed relays provide high speeds and are designed for 300 V, 500 mA; 10 VA. The relay closures are stored in onboard memory. The 7703 is ideal for RTD and thermistor temperature applications.

**Figure 1: Model 7703 32-Channel High-Speed Differential Multiplexer Module**



*Item shipped may vary from model pictured here.*

The 7703 includes the following features:

- 32 channels for general purpose measurements.
- Relay actuation time of less than 1ms for high-speed scanning.
- Two- or four-wire measurement.
- Two 50-pin female D-sub connectors are standard for secure hook-up and quick teardown.
- 50-pin D-subminiature connector kit (part number 7703-306A (7788), which includes two D-sub connectors. This kit has 18 AWG solder-cup contacts and is gold-plated (flash) over nickel on entire contact (brass pin).



## Connections

The following information describes how to make connections to the switching module and define the channel designations. A connection log is provided that you can use to record your connections.

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### **⚠ WARNING**

Connection and wiring procedures in this document are intended for use by qualified personnel only, as described by the types of product users in the [Safety precautions](#) (on page 8). Do not perform these procedures unless qualified to do so. Failure to recognize and observe normal safety precautions could result in personal injury or death.

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## Module connections

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### **⚠ WARNING**

Do not exceed the maximum specifications for the 7703 switching module. Refer to the specifications provided in the datasheet. Failure to recognize and observe normal safety precautions could result in personal injury or death.

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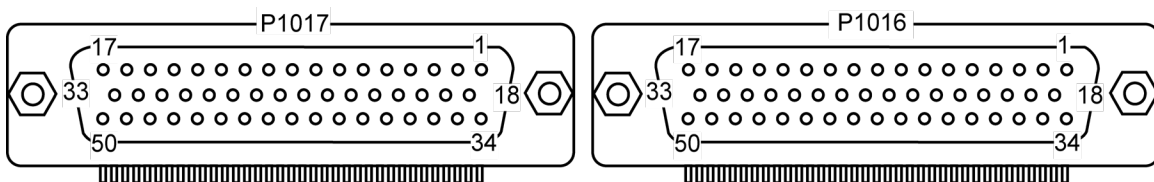
### **⚠ WARNING**

You must install a connector cover on an unused D-sub connector. If the connector is left open, an electrical shock hazard may be present. Failure to recognize and observe normal safety precautions could result in personal injury or death.

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When you are looking at the rear connectors of the 7703 switching module, the connector on the left is P1017 and the connector on the right is P1016.

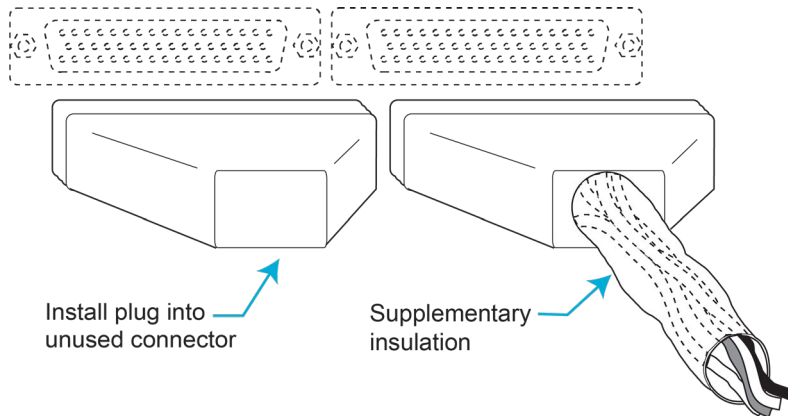
**Figure 2: Model 7703 Pinouts (P1017 and P1016)**



**To wire the 7703-306 connector kit:**

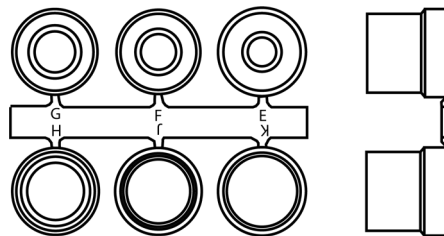
1. Disassemble the connector shell by removing the #4-40 fillister head screws and hex nuts.
2. Make all connections using the correct wire size (up to 20 AWG). Add supplementary insulation around the harness for voltages above 42 V<sub>PEAK</sub>, as shown in the following figure.
3. If one of the connectors is not used, install the extra 50-pin D-shell as a plug on the open connector, as shown in the following figure.

**Figure 3: Covering an unused connector**



4. Use the appropriate grommet for the cable size, as shown in the following list and following figure.
  - For cable size 0.270 inches, use grommet E
  - For 0.310, use grommet F
  - For 0.350, use grommet G
  - For 0.390, use grommet H
  - For 0.430, use grommet J
  - For 0.470, use grommet K

**Figure 4: Grommet sizes**



5. Make sure jackscrews are installed.
6. Assemble the Model 7788 shell, securing with the #4-40 fillister head screws and hex nuts.

**⚠ WARNING**

All wiring must be rated for the maximum voltage in the system. For example, if 1000 V is applied to the front terminals of the instrument, the switching module wiring must be rated for 1000 V. Failure to recognize and observe normal safety precautions could result in personal injury or death.

## Channel designations

P1017						P1016					
Pin	CH	Pin	CH	Pin	CH	Pin	CH	Pin	CH	Pin	CH
18	9 HI	30	15 HI	42	29 HI	1	Sense HI	26	5 HI	38	19 HI
19	9 LO	31	15 LO	43	29 LO	2	Sense LO	27	5 LO	39	19 LO
20	10 HI	32	16 HI	44	30 HI	4	Input HI	28	6 HI	40	20 HI
21	10 LO	33	16 LO	45	30 LO	6	Input LO	29	6 LO	41	20 LO
22	11 HI	34	25 HI	46	31 HI	18	1 HI	30	7 HI	42	21 HI
23	11 LO	35	25 LO	47	31 LO	19	1 LO	31	7 LO	43	21 LO
24	12 HI	36	26 HI	48	32 HI	20	2 HI	32	8 HI	44	22 HI
25	12 LO	37	26 LO	49	32 LO	21	2 LO	33	8 LO	45	22 LO
26	13 HI	38	27 HI			22	3 HI	34	17 HI	46	23 HI
27	13 LO	39	27 LO			23	3 LO	35	17 LO	47	23 LO
28	14 HI	40	28 HI			24	4 HI	36	18 HI	48	24 HI
29	14 LO	41	28 LO			25	4 LO	37	18 LO	49	24 LO

## Schematic

The simplified schematic of the 7703 is shown in the following figure.

Channels 1 to 32 are used for all measurements.

There are two backplane relays (channels 33 and 34) to connect the input channels to the backplane of the instrument. With a 2-wire function selected, channel 33 closes. With a 4-wire function selected, channels 33 and 34 close.

There is a 2-pole/4-pole relay (channel 35) between channels 1 to 16 and channels 17 to 32. When a 2-wire function (such as DCV) is selected, channel 35 closes (2-pole position) to allow any of the 32 channels to be connected to the input backplane.

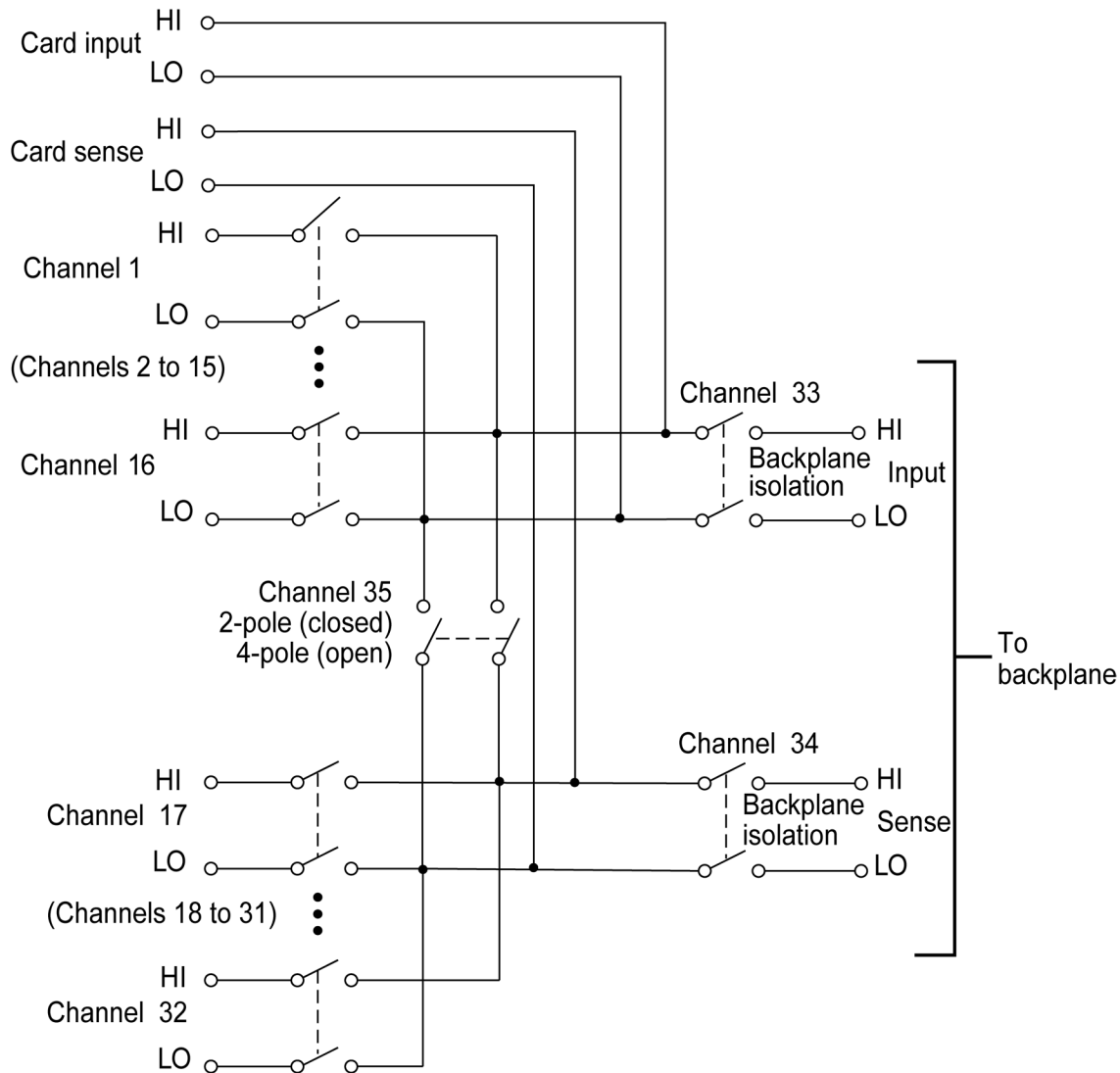
When a 4-wire function is selected, channel 35 opens (4-pole position) to isolate channels 1 to 16 from channels 17 to 32. When one of the channels 1 to 16 is closed, its paired channel (17 to 32) also closes to connect the sense channel to the sense backplane.

The Input and Sense terminals are connected to the inputs of channels 33 and 34 (isolation relays).

## NOTE

Channels 33 to 35 in this schematic refer to designations used for control and not actual available channels. For more information, refer to the applicable instrument reference manual.

**Figure 5: 7703 simplified schematic**



## Connection log

You can use the following table to record your connection information.

### Connection log for the 7703

Channel		Color	Description	Description	Color	Channel
INPUT	H					
	L					
SENSE	H					
	L					
CH1	H				H	CH17
	L				L	
CH2	H				H	CH18
	L				L	
CH3	H				H	CH19
	L				L	
CH4	H				H	CH20
	L				L	
CH5	H				H	CH21
	L				L	
CH6	H				H	CH22
	L				L	
CH7	H				H	CH23
	L				L	
CH8	H				H	CH24
	L				L	
CH9	H				H	CH25
	L				L	
CH10	H				H	CH26
	L				L	
CH11	H				H	CH27
	L				L	
CH12	H				H	CH28
	L				L	
CH13	H				H	CH29
	L				L	
CH14	H				H	CH30
	L				L	
CH15	H				H	CH31
	L				L	
CH16	H				H	CH32
	L				L	

## Installation

For information on installing the switching module into the 2750, refer to the *Model 2750 User's Manual*, 2750-900-0xx available at [tek.com/keithley](http://tek.com/keithley).

## Operation

This module is similar to the 7700, except that the 7703 does not support amps measurement and has a different number of available channels. Channel number designations for the 7703 are provided in [Schematic](#) (on page 4).

When a module that does not support amps measurements is installed in the 2750, system channel operation cannot be used to close channels while an amps function (DCI or ICI) is selected. If an amps function is selected and you attempt to close a system channel, the message "NO AMPS CHAN" is displayed briefly. For remote programming, error -222, Parameter data out of range, is generated.

If a system channel is already closed and you attempt to select the DCI or ACI function, the message "INVALID FUNC" is displayed briefly. For remote programming, error -221, Settings conflict, is generated.

Refer to the documentation for the 2750 for detailed operating instructions.

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### WARNING

**Before operating an instrument with a switching module, verify that the switching module is properly installed and the mounting screws are tightly fastened. If the mounting screws are not properly connected, an electrical shock hazard may be present.**

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### CAUTION

**To prevent overheating or damage to the 7703 switching module relays, never exceed the following maximum signal levels between any two inputs or chassis: Channels 1 to 32: 300 V dc or 300 V<sub>RMS</sub> (425 V<sub>PEAK</sub>) for ac waveforms, 0.5 A switched, 10 W maximum.**

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## Factory service

To return your 7703 for repair or calibration, call 1-800-408-8165 or complete the form at [tek.com/services/repair/rma-request](http://tek.com/services/repair/rma-request). When you request service, you need the serial number and firmware or software version of the instrument.

To see the service status of your instrument or to create an on-demand price estimate, go to [tek.com/service-quote](http://tek.com/service-quote).

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.