40-485 User Manual

PXI Dual 16-Channel Automotive Switch Simulator



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pickeringtest.com

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ISO 9001
Reg No. FM38792

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For Technical Support please contact Pickering Interfaces either by phone, the website or via e-mail.

WARRANTY

All products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years, excluding programmable power supplies, from the date of delivery to the original purchaser. Any product found to be defective within this period will, at the discretion of Pickering Interfaces be repaired or replaced.

Products serviced and repaired outside of the warranty period are warranted for ninety days.

Extended warranty and service are available. Please contact Pickering Interfaces by phone, the website or via e-mail.

ENVIRONMENTAL POLICY

Pickering Interfaces operates under an environmental management system similar to ISO 14001.

Pickering Interfaces strives to fulfil all relevant environmental laws and regulations and reduce wastes and releases to the environment. Pickering Interfaces aims to design and operate products in a way that protects the environment and the health and safety of its employees, customers and the public. Pickering Interfaces endeavours to develop and manufacture products that can be produced, distributed, used and recycled, or disposed of, in a safe and environmentally friendly manner.

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PRODUCT SAFETY

SAFETY SYMBOLS

The following safety symbols may be used on the product and throughout the product documentation.

MEANING / DESCRIPTION	SYMBOL
PROTECTIVE EARTH (GROUND) To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.	
DANGEROUS VOLTAGE To indicate hazards arising from dangerous voltages.	
WARNING / CAUTION An appropriate safety instruction should be followed or caution to a potential hazard exists. Refer to the relevant instructions detailed within the product manual.	
HEAVY If this product is heavy reference should be made to the safety instructions for provisions of lifting and moving.	
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.	

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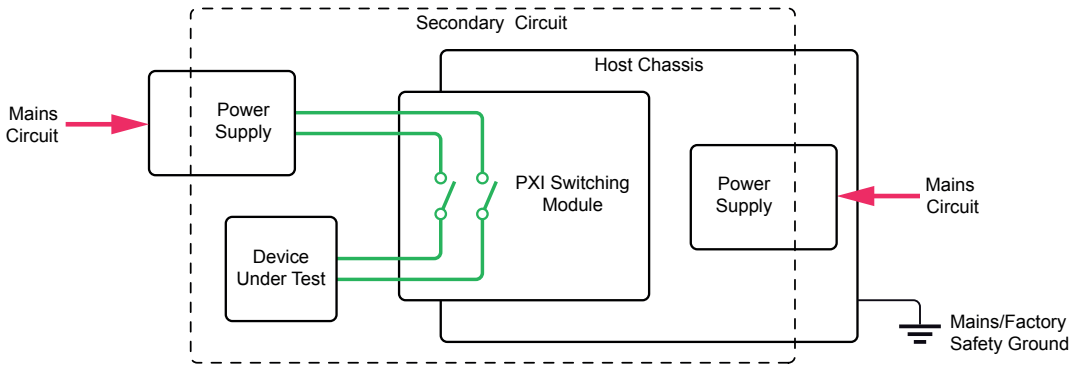
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WARNINGS AND CAUTIONS

WARNING - HAZARDOUS ENVIRONMENTS	SYMBOL
This product is not specifically designed for use in hazardous environments, for example in explosive atmospheres. If the product is to be used in hazardous environments we recommend that the user ensures suitable protective measures are taken.	

WARNING - DANGER OF ELECTRIC SHOCK	SYMBOL
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the host chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals. Not to be used in safety critical circuits, refer to the Pickering Interfaces' terms & conditions of sale. This module must not be used for the switching of Mains Circuits. For the switching of voltages up to the module's full specification, Secondary Circuit power supplies and the Device Under Test must be fully isolated from the Mains Circuit and the safety earth. The host chassis must be correctly installed and be connected to mains or factory safety ground, please refer to your chassis installation manual.  **Diagram Showing Separation Between The Mains Circuit and Secondary Circuit / DUT** For the purposes of this document, a Mains Circuit is an installation classified as Overvoltage Category II up to 300V. Separation between the Secondary Circuit and Mains Circuit is achieved by a transformer in which the primary windings are separated from the secondary windings by reinforced insulation, double insulation, or a screen connected to the protective conductor terminal.	

CAUTION - HANDLING OF ELECTROSTATIC-SENSITIVE DEVICES	SYMBOL
Certain semiconductor devices used in this equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their unterminated state, or sub-assemblies containing these devices: 1. Persons removing sub-assemblies from equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment. 2. Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer. 3. Outer clothing worn must be unable to generate static charges. 4. Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.	

CAUTION - PRODUCT DOCUMENTATION	SYMBOL
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.	

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS
All cleaning and servicing requires the equipment to be isolated and disconnected from the power source and user I/O signals (refer to the Maintenance Section). • Appropriate manual handling procedures should be followed as dictated by the weight of the individual module or the combined weight of the modules & chassis. • Should a fault occur with the module or chassis, immediately isolate and disconnect the incoming power to the chassis and the user I/O signals. • Ensure the equipment is installed, operated and maintained by trained and authorised personnel. • For suitably equipped products in the event of an emergency press the red “emergency stop” button situated on the front of the unit.

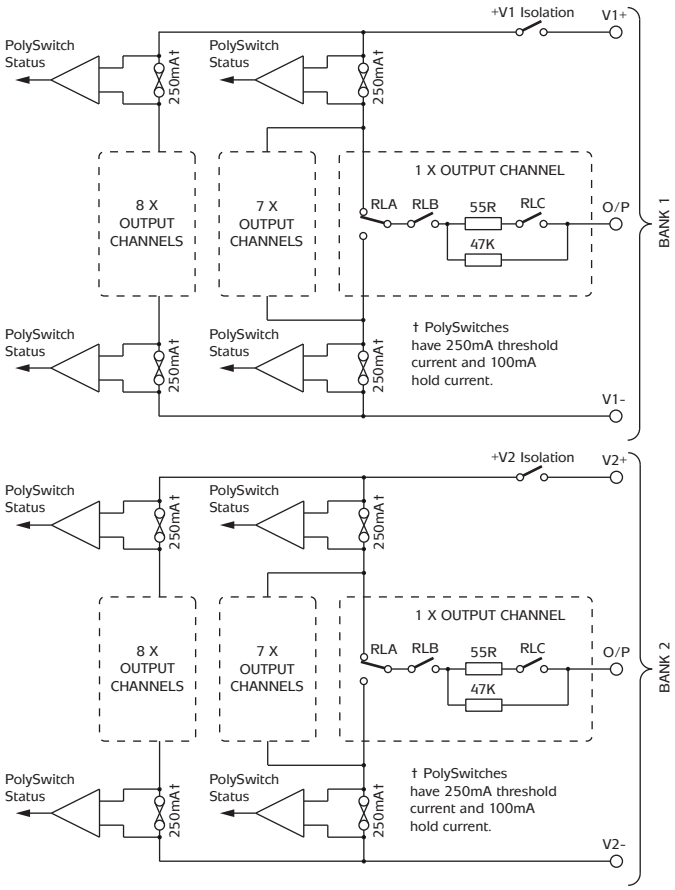
SECTION 1 - TECHNICAL SPECIFICATION

- 2 Banks of 16 Switch Simulator Channels
- Also Available as 1 Bank of 16, 1 Bank of 8 or 2 Banks of 8 Channels
- Simulates Leaky or Dirty switches
- Protects UUT From Fault Conditions
- Suitable for 12V and 24V Systems
- Suitable For Switch Simulation In Transportation Electronics Module Testing
- VISA & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-485 is designed to simulate the operation of automotive switches. It can be used to test the capability of automotive controllers to cope with dirty contacts or leaking current caused by switch contamination. It allows automotive I/O devices to be tested for correct operation under adverse conditions. The design includes protection circuits that ensure module damage cannot be caused by wiring faults or UUT failures. The module is available with one or two banks of 8 or 16 channels and is suitable for both 12V and 24V automotive applications.

The module uses high quality instrument grade reed relays to ensure long service life, fast response and repeatable performance.



Functional Block Diagram for the 40-485 Dual Bank16 Channel Switch Simulator Module

Relay Type

The 40-485 is fitted with ruthenium sputtered reed relays, these offer very long life with good low level switching performance and excellent contact resistance stability. Spare relays are built onto the circuit board to allow easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: pickeringrelay.com

Specification

Input Voltage Range:	8V-24VDC*
Power Rating:	2W per channel
PolySwitch Rating:	250mA threshold current, 100mA hold current (each bank).
Switch Simulation (typical):	55Ω, 47kΩ or open circuit to ground or input voltage.
Off State Resistance:	$>10^9\Omega$
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life, low power load:	$>1x10^8$ operations

* For full voltage rating, signal sources must be fully isolated from mains supply and safety earth.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.1A Max (typ 400mA)	0	0

Module Operation

Each bank has its own input voltage connections which are common to all channels within the bank. The positive voltage inputs have an isolation relay. Each output can be set as an open circuit by opening all the relays. With RLB closed (see diagram overleaf) the output can simulate a switch with a leakage resistance of 47kΩ to the supply voltage, simulating a condition caused by oil or dirt contamination across the terminals or contacts of an automotive switch.

With the output set to simulate a switch closure, channels can be set to have a contact resistance of 55Ω by closing RLB and RLC. This simulates a switch with a high contact resistance caused by contamination. The module can be configured to simulate switches operating to ground or to the common input voltage.

The Module is available in the following configurations:

- Single Bank 8-Channel Switch Simulator
- Dual Bank 8-Channel Switch Simulator
- Single Bank 16-Channel Switch Simulator
- Dual Bank 16-Channel Switch Simulator

The 40-485 includes protection systems to ensure that the device under test or the module can be easily damaged by programming errors, faulty wiring or faults in the device under test. The channels are protected with PolySwitches whose condition can be monitored via the PXI interface when voltage is applied to the channel.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-pin male D-type connector, for pin outs please refer to the operating manual.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.

Product Order Codes

8 Channel Switch Simulator Module	40-485-021
Dual 8 Channel Switch Simulator Module	40-485-121
16 Channel Switch Simulator Module	40-485-221
Dual 16 Channel Switch Simulator Module	40-485-321

Product Customization

Pickering PXI modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

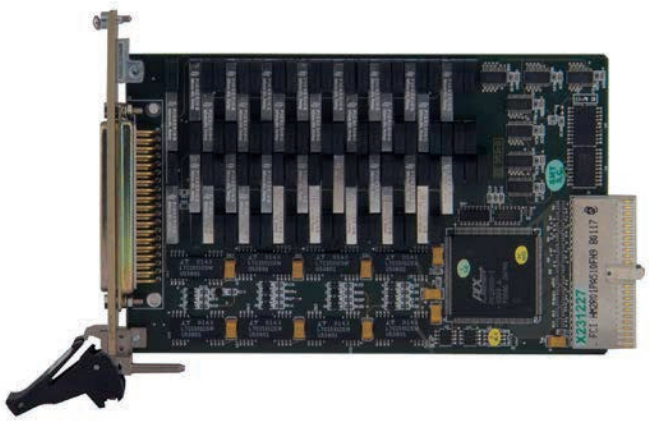
Customization can include:

- Alternative reed relay types
- Mixture of reed relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

Mating Connectors & Cabling

For connection accessories for the 40-485 module please refer to the 90-007D 37-pin D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Chassis Compatibility

This PXI module must be used in a suitable chassis. It is compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis



Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

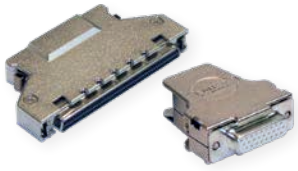
Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system



Connectivity Solutions

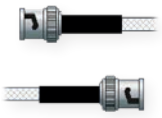
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.



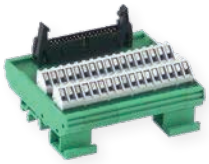
Connectors & Backshells



Multiway Cable Assemblies



RF Cable Assemblies



Connector Blocks

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications.
Visit: pickeringtest.com/cdt to start your design.



Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our sister company, Pickering Electronics. These instrument grade reed relays feature ***SoftCenter***® technology, ensuring long service life and repeatable contact performance.

To learn more, please go to: pickeringrelay.com



Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Keysight** VEE and OpenTAP
- **Mathworks** Matlab
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.
To learn more about software drivers and development environments, please go to: pickeringtest.com/software

Signal Routing Software



Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development. To learn more, please go to: pickeringtest.com/spm

Diagnostic Relay Test Tools



eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.
To learn more, please go to: pickeringtest.com/ebirst

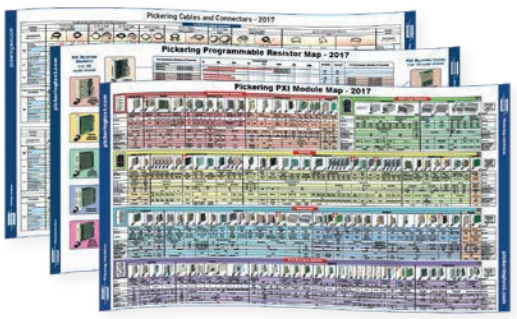
Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector solutions you need. We have also published handy reference books on Switching Technology and for the PXI and LXI standards.







To view, download or request any of our product resources, please visit: pickeringtest.com/resources

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The Module accepts a +5V supply from the PXI backplane via Compact PCI connector J1. The interface to the device under test is via the front panel mounted 37-pin D-type connector, J2. Up to 32 devices may be connected to the module. The module comprises a PCB populated with reed relays, resettable fuses and control logic.

Each bank has separate input voltage connections which are common to all channels within the bank. The positive input voltage connections have an isolation relay for each bank. Each output can be set to be an open circuit by opening all the relays. With RLB closed the output can simulate a switch with a leakage resistance of 47kΩ to the supply voltage, conditions that can be caused by the presence of oil or dirt across the switch terminals or contacts of an automotive switch.

With the output set to simulate a switch closure each channel can be set to have a contact resistance of 55Ω by closing RLB and RLC, simulating the effect of a switch with a high contact resistance caused by dirt or oil. The module can be configured to simulate switches operating to ground or to the common input voltage.

The 40-485 includes protection systems that ensure neither the device under test or the module can be easily damaged by programming errors, faulty wiring connections or faults in the device under test. Each channel is supplied with PolySwitches whose condition can be monitored over the PXI interface when voltage is applied to the channel.

The module configuration is determined by data stored in EEPROM U7. Relay Drivers U8 to U14 are addressed by PCI bridge U1 to output the required signal in order to open or close specific relay contacts. PCI Bridge U1 is configured by EEPROM U2.

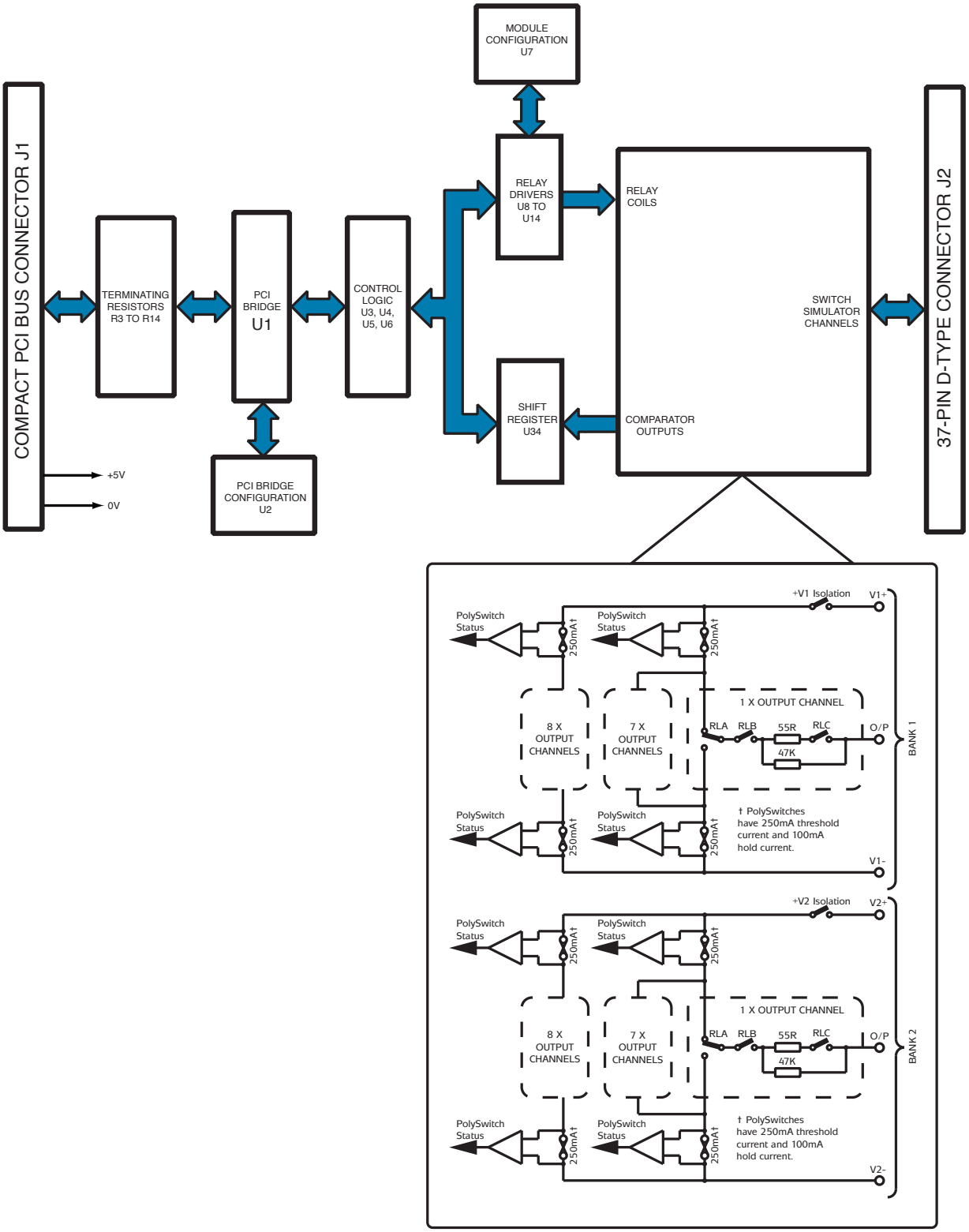


Figure 2.1 - Dual 16 Channel Switch Simulator Module 40-485: Functional Block Diagram

SECTION 3 - INSTALLATION

Refer to the Warnings and Cautions at the front of this manual

Modular products require installation in a suitable PXI/LXI chassis. The module is designed for indoor use only.

PREOPERATION CHECKS (UNPACKING)

1. Check the module for transport damage and report any damage immediately to Pickering Interfaces. Do not attempt to install the product if any damage is evident.
2. Position the chassis relative to any other equipment the module(s) will connect with. Ensure the chassis is not connected to the electrical supply.
3. Ensure that the designated area for the chassis containing the module is of flat and solid construction to withstand and support the combined weight of the module(s) and chassis.

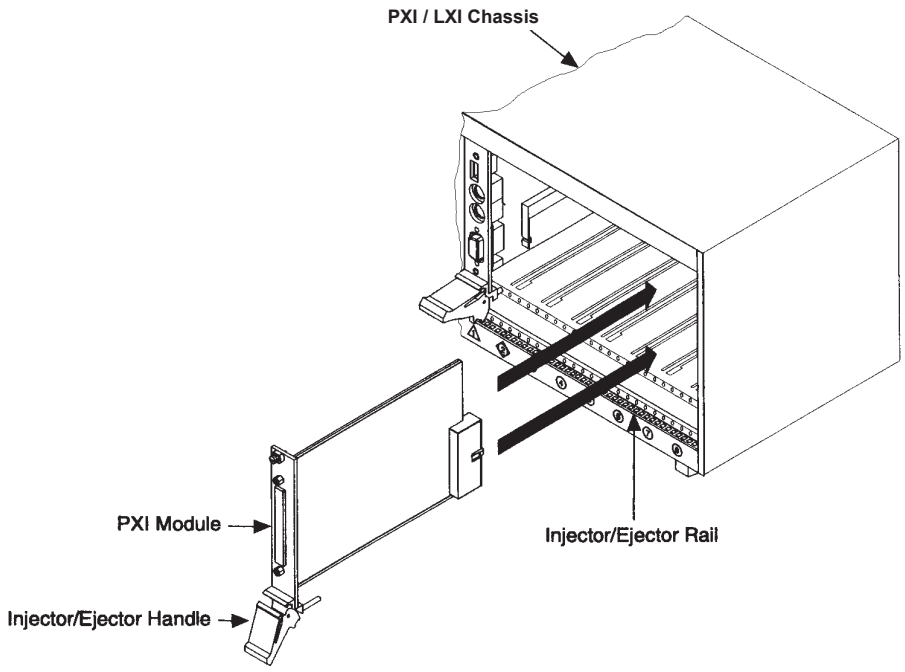


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

HARDWARE INSTALLATION
ELECTRICAL CONNECTION (CHASSIS)

1. The chassis must be electrically installed in accordance with local regional electrical codes by a qualified engineer.
2. The chassis must be grounded.

Electrostatic discharge can damage the components on the module. To avoid such damage in handling the board refer to page VII.

Ensure that there is adequate ventilation.

The module should be installed in accordance with the following procedure:

1. Ensure that the system is turned OFF but still connected to mains so that it remains grounded.
2. Choose an appropriate slot in the rack.
3. Remove the blanking plate for the chosen slot.
4. Ensure that the injector/ejector handle is in its downward position. Align the module with the card guides on the top and bottom of the slot.

   Do not raise the injector/ejector handle whilst inserting the module as the module will not insert properly.
5. Hold the handle whilst slowly sliding the module into the card guides until the handle catches on the injector/ejector rail (refer to Figure 3.1).
6. Raise the injector/ejector handle until the module firmly seats into the backplane. The front panel of the module should be flush with the front panel of the chassis.
7. Secure the front panel of the module using both screws to the chassis front panel mounting rails.
8. In a system employing a remote control interface to connect an external controller to a PXI chassis or to link multiple chassis, power-up the system as follows:
   a. For a system comprising an external controller and one chassis, power up the chassis before powering up the external controller.
   b. For a system comprising more than one chassis, turn ON the last chassis in the system followed by the penultimate, etc, and finally turn ON the external controller or chassis containing the system controller.
9. For Pickering Interfaces modular LXI installation there is no requirement to use any particular power up sequence.

SOFTWARE INSTALLATION

First install the appropriate Pickering PXI switch card drivers by running the installer program Setup.exe (provided in a compressed zip file), either from the CD-ROM supplied, or by downloading the latest version from our website **pickeringtest.com** - the recommended method. Setup is accompanied by a ReadMe file containing additional installation information. A single installation covers all cards in the System 40, System 45 and System 50 ranges.

When installation completes, the installed drivers' ReadMe file is offered for display. It can also be displayed later using a shortcut on the Programs>>Pickering menu.

If you are not a LabVIEW user you should choose the "full" version, and once that has been installed run the LabVIEW Runtime Engine installer via the shortcut on the Programs>>Pickering menu. In the absence of LabVIEW the Runtime Engine is required to support the Pickering Test Panels application.

TESTING OPERATION

After installation of the hardware and Pickering PXI Driver software package start the General Soft Front Panel (GSFP) using the desktop icon or via the Start menu (***Start Menu-> Pickering Interfaces Ltd -> General Soft Front Panel***).



Figure 3.2 - General Soft Front Panel Icon

A selector panel will appear, listing all installed Pickering PCI, PXI or LXI switch cards and resistor cards. Click on the card you wish to control, and a graphical control panel is presented allowing operation of the card. Panels can be opened simultaneously for all the installed cards.

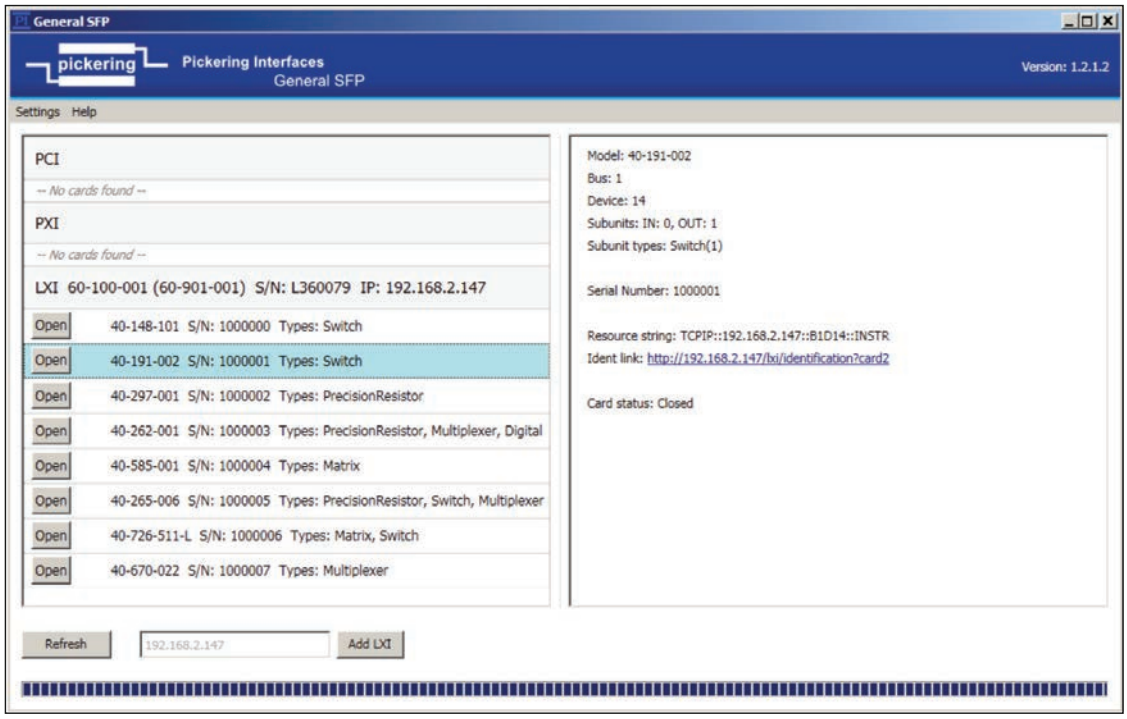


Figure 3.3 - General Soft Front Panel Selector

More details how to use the GSFP can be found in the manual, via menu ***Help\Manual***

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SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI MODULES

For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

This is available as a download from:
https://www.pickeringtest.com/support/software-drivers-and-downloads

Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Software-Manual.pdf

MODULE ARCHITECTURE 40-485

The card presents a number of identical channels of simulated switches.

40-485-021: 8 Channels

40-485-121: Dual 8 Channels

40-485-221: 16 Channels

40-485-321: Dual 16 Channel

The schematic diagram of a single channel is shown in Figure 4.1 below:

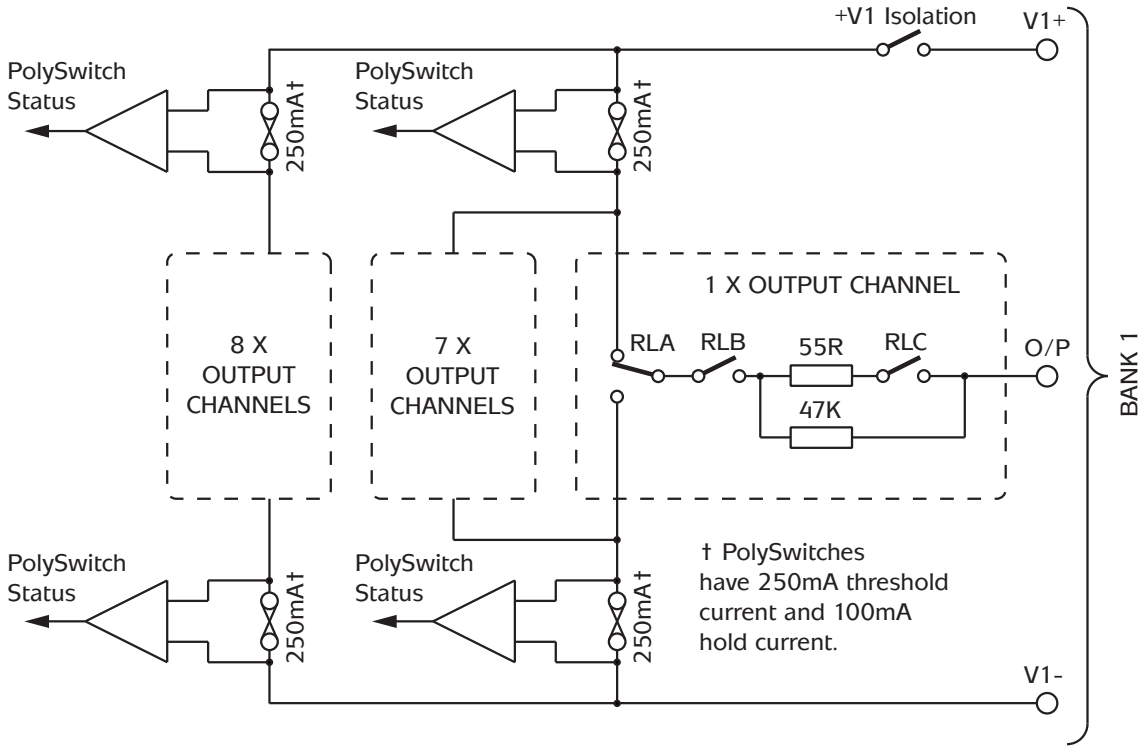


Figure 4.1 - Schematic Diagram of One Bank of the 40-485-321 Switch Simulator

Each bank has separate input voltage connections which are common to all channels within the bank. The positive input voltage connections have an isolation relay for each bank. Each output can be set to be an open circuit by opening all the relays. With RLB closed (see Figure 4.1) the output can simulate a switch with a leakage resistance of 47kΩ to the supply voltage, conditions that can be caused by the presence of oil or dirt across the switch terminals or contacts of an automotive switch.

With the output set to simulate a switch closure each channel can be set to have a contact resistance of 55Ω by closing RLB and RLC, simulating the effect of a switch with a high contact resistance caused by dirt or oil. The module can be configured to simulate switches operating to ground or to the common input voltage.

The following tables provide switching information for the 40-485 module. Refer to Figure 4.1 for the positions of Relays RLA, RLB and RLC.

Table 4.1 - Pin 1 to V+ and 0V to output, or pin 18 to 0V and V+ to output. Isolation on V+ = RL4 (SC49)

OUTPUT	RELAYS	FIGURE 4.1	SC No
100	RL1	RLC	SC 1
100	RL2	RLB	SC 2
100	RL3	RLA	SC 3
101	RL5	RLC	SC 4
101	RL6	RLB	SC 5
101	RL7	RLA	SC 6
102	RL8	RLC	SC 7
102	RL9	RLB	SC 8
102	RL10	RLA	SC 9
103	RL11	RLC	SC 10
103	RL12	RLB	SC 11
103	RL13	RLA	SC 12
104	RL14	RLC	SC 13
104	RL15	RLB	SC 14
104	RL16	RLA	SC 15
105	RL17	RLC	SC 16
105	RL18	RLB	SC 17
105	RL19	RLA	SC 18
106	RL20	RLC	SC 19
106	RL21	RLB	SC 20
106	RL22	RLA	SC 21
107	RL23	RLC	SC 22
107	RL24	RLB	SC 23
107	RL25	RLA	SC 24

OUTPUT	RELAYS	FIGURE 4.1	SC No
108	RL26	RLC	SC 25
108	RL27	RLB	SC 26
108	RL28	RLA	SC 27
109	RL29	RLC	SC 28
109	RL30	RLB	SC 29
109	RL31	RLA	SC 30
110	RL32	RLC	SC 31
110	RL33	RLB	SC 32
110	RL34	RLA	SC 33
111	RL35	RLC	SC 34
111	RL36	RLB	SC 35
111	RL37	RLA	SC 36
112	RL38	RLC	SC 37
112	RL39	RLB	SC 38
112	RL40	RLA	SC 39
113	RL41	RLC	SC 16
113	RL42	RLB	SC 17
113	RL43	RLA	SC 18
114	RL44	RLC	SC 19
114	RL45	RLB	SC 20
114	RL46	RLA	SC 21
115	RL47	RLC	SC 22
115	RL48	RLB	SC 23
115	RL49	RLA	SC 24

Table 4.2 - Pin 20 to V+ and 0V to output, or pin 18 to 0V and V+ to output. Isolation on V+ = RL98 (SC49)

OUTPUT	RELAYS	FIGURE 4.1	SC No
200	RL50	RLC	SC 1
200	RL51	RLB	SC 2
200	RL52	RLA	SC 3
201	RL53	RLC	SC 4
201	RL54	RLB	SC 5
201	RL55	RLA	SC 6
202	RL56	RLC	SC 7
202	RL57	RLB	SC 8
202	RL58	RLA	SC 9
203	RL59	RLC	SC 10
203	RL60	RLB	SC 11
203	RL61	RLA	SC 12
204	RL62	RLC	SC 13
204	RL63	RLB	SC 14
204	RL64	RLA	SC 15
205	RL65	RLC	SC 16
205	RL66	RLB	SC 17
205	RL67	RLA	SC 18
206	RL68	RLC	SC 19
206	RL69	RLB	SC 20
206	RL70	RLA	SC 21
207	RL71	RLC	SC 22
207	RL72	RLB	SC 23
207	RL73	RLA	SC 24

OUTPUT	RELAYS	FIGURE 4.1	SC No
208	RL74	RLC	SC 25
208	RL75	RLB	SC 26
208	RL76	RLA	SC 27
209	RL77	RLC	SC 28
209	RL78	RLB	SC 29
209	RL79	RLA	SC 30
210	RL80	RLC	SC 31
210	RL81	RLB	SC 32
210	RL82	RLA	SC 33
211	RL83	RLC	SC 34
211	RL84	RLB	SC 35
211	RL85	RLA	SC 36
212	RL86	RLC	SC 37
212	RL87	RLB	SC 38
212	RL88	RLA	SC 39
213	RL89	RLC	SC 16
213	RL90	RLB	SC 17
213	RL91	RLA	SC 18
214	RL92	RLC	SC 19
214	RL93	RLB	SC 20
214	RL94	RLA	SC 21
215	RL95	RLC	SC 22
215	RL96	RLB	SC 23
215	RL97	RLA	SC 24

Programming the Module

The 40-485-321 Module software utilises 1 Output subunit of 49 bits for each bank, and 1 Input subunit of 8 bits to read the Polyswitch states.

Using PILPXI non-VISA driver:

Output Sub-Unit

`PIL_OpBit`	control an individual bit in the output sub-unit.
`PIL_WriteSub`	simultaneously control all bits in the output sub-unit.
`PIL_ViewBit`	monitor the current state of a single output in the output sub-unit
`PIL_ViewSub`	monitor the current states of all the outputs in the output sub-unit

Input Sub-Unit

`PIL_ReadBit`	read the logic state of a single bit in the input sub-unit
`PIL_ReadSub`	read the logic states of all the bits in the input sub-unit

Using PIPX40 VISA driver:

Output Sub-Unit

`PIPX40_setChannelState`	control an individual bit in the output sub-unit.
`PIPX40_setChannelPattern`	simultaneously control all bits in the output sub-unit.
`PIPX40_getChannelState`	get the state of a single output bit
`PIPX40_getChannelPattern`	get the states of all output bits

Input Sub-Unit

`PIPX40_readChannelState`	read the logic state of a single bit in the input sub-unit
`PIPX40_readChannelPattern`	read the logic states of all the bits in the input sub-unit

Using pi40iv IVI driver:

Class Compliant Operation

This card is provided in the pi40iv driver definition file and so is usable from the IVI driver.

```
ViStatus pi40iv_Connect (ViSession vi, ViConstString channel1,ViConstString
channel2);
```

```
ViStatus pi40iv_Disconnect (ViSession vi, ViConstString channel1, ViConstString
channel2);
```

```
ViStatus pi40iv_DisconnectAll (ViSession vi);
```

These functions may be used to control ONLY the output sub-unit. The driver will assign channel names:

‘com1/ch1’, ‘com2/ch2’ etc. through to ‘com96/ch96’ in the case of the 32 channel card.

However the IVI-Swtch specification provides no means to read back the input states.

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SECTION 5 - CONNECTOR INFORMATION

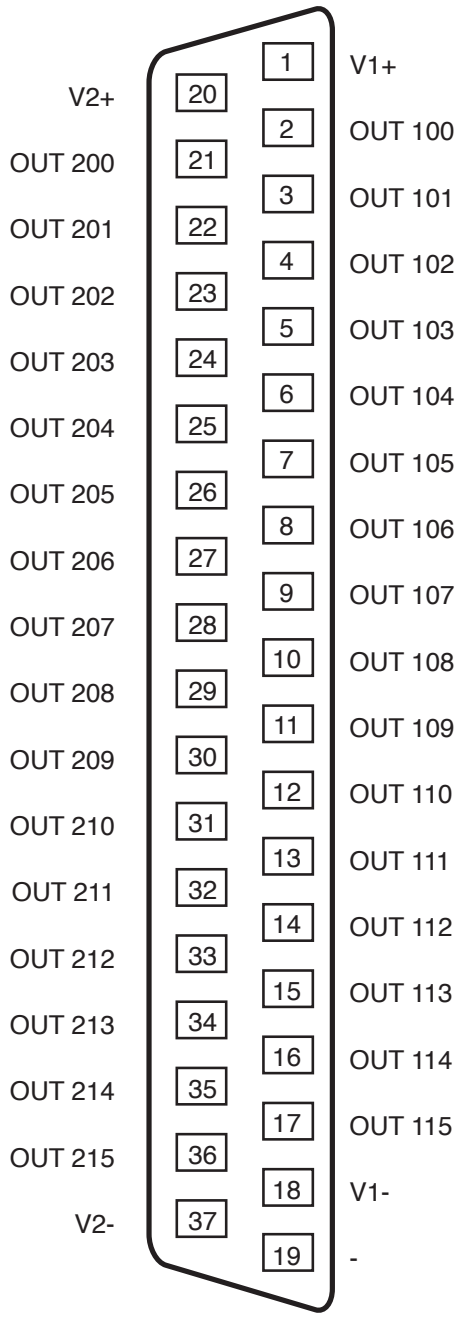


Figure 5.1 - Dual 16 Channel Switch Simulator Module 40-485: Pinouts (37-pin male D-type connector viewed from front of module)

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SECTION 6 - TROUBLE SHOOTING

Refer to the Warnings and Cautions at the front of this manual 

INSTALLATION PROBLEMS

The Plug & Play functionality of Pickering switch cards generally ensures trouble-free installation.

If you do experience any installation problems you should first ensure that all cards are properly seated in their slots. Improperly mated cards may go undetected by the operating system, or may be detected as a card of an unknown type. They can also cause the computer to freeze at various stages in the boot sequence.

If your system employs a remote control interface you should check the integrity of all remote control interface links. When the system is powered up, and during Windows start-up, you should expect to see periodic activity on the remote control interface RX/TX (yellow) indicators, clearing to leave only the PWR/LNK (green) LEDs illuminated. The RX/TX indicators should show activity when you attempt to access a card.

DIAGNOSTIC UTILITY

The Pickering Diagnostic Utility (accessible through the Programs>>Pickering>>PXI Utilities menu) generates a diagnostic report of the system's PCI configuration, highlighting any potential configuration problems. Specific details of all installed Pickering switch cards are included. All the installed Pickering switch cards should be listed in the "Pilpxi information" section - if one or more cards is missing it may be possible to determine the reason by referring to the PCI configuration dump contained in the report, but interpretation of this information is far from straightforward, and the best course is to contact Pickering support: support@pickeringtest.com, if possible including a copy of the diagnostic report.

In the "VISA information" section, if VISA is not installed its absence will be reported. This does not affect operation using the Direct I/O driver, and is not a problem unless you wish to use VISA. VISA is a component of National Instruments LabWindows/CVI and LabVIEW, or is available as a standalone environment.

If VISA is present and is of a sufficiently recent version, the section "Pipx40 information" should present a listing similar to "Pilpxi information".

Please note that the Diagnostic Utility cannot access cards if they are currently opened by some other application, such as the Test Panels or Terminal Monitor.

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SECTION 7 - MAINTENANCE INFORMATION

Refer to the Warnings and Cautions at the front of this manual

PERIODIC MAINTENANCE

This product and its corresponding chassis do not require any periodic maintenance.

GENERAL CLEANING

- Isolate the electrical power from the chassis and ensure that no user I/O signals are being applied.
- Wipe the product & chassis surfaces with a clean dry anti-static cloth only.

SOFTWARE UPDATE

For PXI modules operating in a PXI chassis, no module software updates are required. For the latest version of the driver please refer to our web site **pickeringtest.com** where links to our Software Download page will provide the latest version of the driver software for the various programming environments encountered.

For PXI modules which are supported in one of Pickering Interfaces' Modular LXI Chassis (such as the 60-102B and 60-103B) no module software update is required. If the module was introduced after the LXI chassis was manufactured the module may not be recognized, in this case the chassis firmware may need upgrading. This is a simple process which is described in the manual for the Modular LXI Chassis.

RELAY LOOK-UP TABLES

The following pages provide a cross reference between the signal paths of the Relay Module and the physical relays on the PCB. The tables can be used in the fault finding process and should be used in conjunction with the corresponding PCB layout diagrams to identify the position of faulty relays.

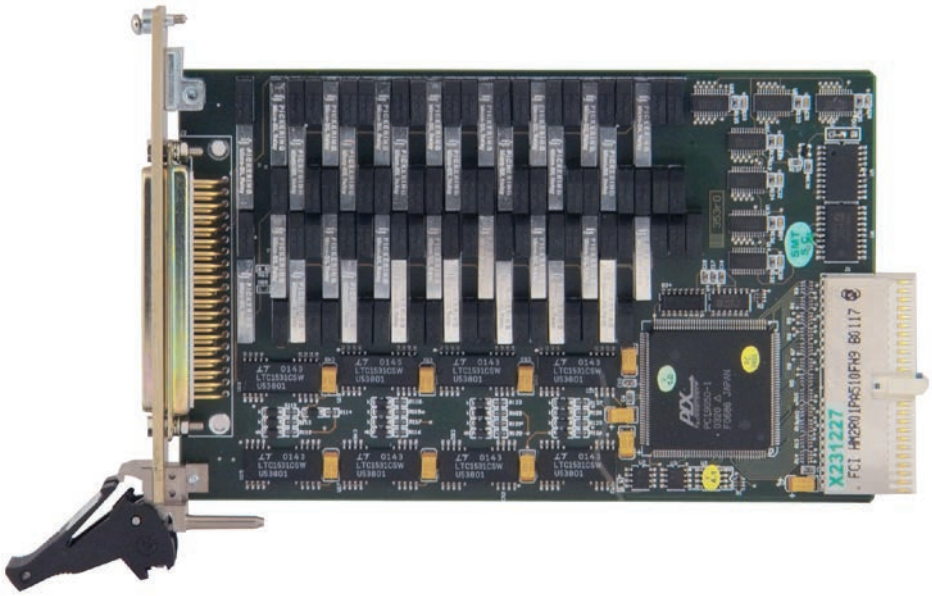


Figure 7.1 - Dual 16 Channel Switch Simulator Module: 40-485

Table 7.1 - Automotive Switch Simulator Module 40-485-321: Relay Numbering

Bank	Channel Number	Relay Function	Relay Number
1	100	RLC	RL1
		RLB	RL2
		RLA	RL3
		Isolation	RL4
	101	RLC	RL5
		RLB	RL6
		RLA	RL7
	102	RLC	RL8
		RLB	RL9
		RLA	RL10
	103	RLC	RL11
		RLB	RL12
		RLA	RL13
	104	RLC	RL14
		RLB	RL15
		RLA	RL16
	105	RLC	RL17
		RLB	RL18
		RLA	RL19
	106	RLC	RL20
		RLB	RL21
		RLA	RL22
	107	RLC	RL23
		RLB	RL24
		RLA	RL25
	108	RLC	RL26
		RLB	RL27
		RLA	RL28
	109	RLC	RL29
		RLB	RL30
		RLA	RL31
	110	RLC	RL32
		RLB	RL33
		RLA	RL34
	111	RLC	RL35
		RLB	RL36
		RLA	RL37
	112	RLC	RL38
		RLB	RL39
		RLA	RL40
	113	RLC	RL41
		RLB	RL42
		RLA	RL43
	114	RLC	RL44
		RLB	RL45
		RLA	RL46
	115	RLC	RL47
		RLB	RL48
		RLA	RL49
2	200	RLC	RL50
		RLB	RL51
		RLA	RL52
	201	RLC	RL53
		RLB	RL54
		RLA	RL55
	202	RLC	RL56
		RLB	RL57
		RLA	RL58
	203	RLC	RL59
		RLB	RL60
		RLA	RL61
	204	RLC	RL62
		RLB	RL63
		RLA	RL64
	205	RLC	RL65
		RLB	RL66
		RLA	RL67
	206	RLC	RL68
		RLB	RL69
		RLA	RL70
	207	RLC	RL71
		RLB	RL72
		RLA	RL73
	208	RLC	RL74
		RLB	RL75
		RLA	RL76
	209	RLC	RL77
		RLB	RL78
		RLA	RL79
	210	RLC	RL80
		RLB	RL81
		RLA	RL82
	211	RLC	RL83
		RLB	RL84
		RLA	RL85
	212	RLC	RL86
		RLB	RL87
		RLA	RL88
	213	RLC	RL89
		RLB	RL90
		RLA	RL91
	214	RLC	RL92
		RLB	RL93
		RLA	RL94
	215	RLC	RL95
		RLB	RL96
		RLA	RL97
		Isolation	RL98

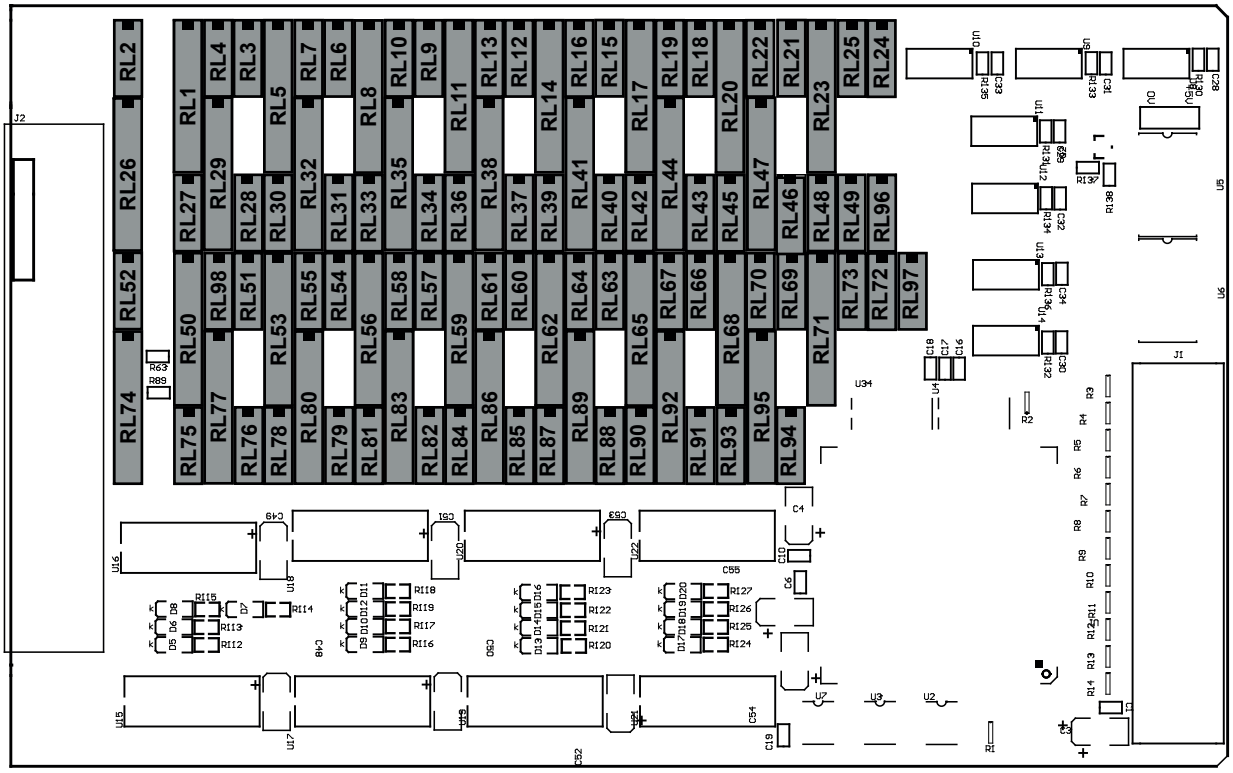


Figure 7.2 - Dual 16 Channel Switch Simulator Module 40-485-321: Component Layout

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