PXI Avionics/Automotive 1 Amp Fault Insertion Switch



PXI

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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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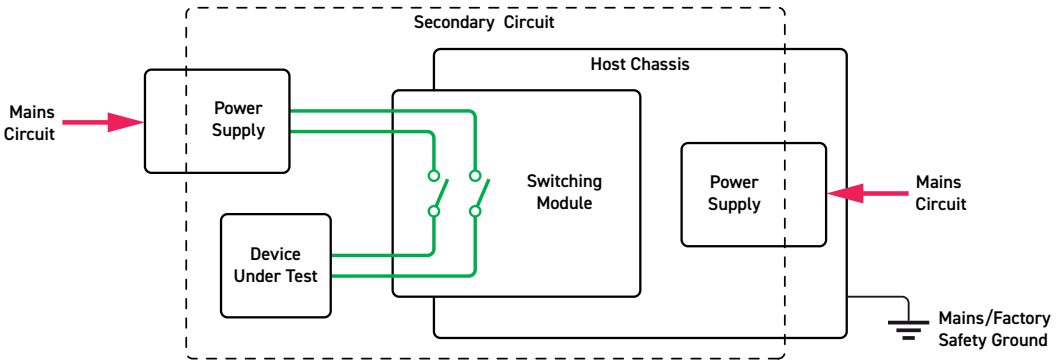
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Warnings & Cautions

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 PXI/PXIe/LXI 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 300 V. 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: • 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. • 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. • Outer clothing worn must be unable to generate static charges. • 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

- 22 Fault Insertion Channels
- Suitable for Automotive or Avionics Test Applications
- Multiple Channels Can Be Combined To Form More Complex Networks
- High Density Low Cost Solution
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing & Simulation
- 1A Hot or Cold Switching
- Switch up to 150 V DC with 60 W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST* ™
- 3 Year Warranty



The 40-195 is a 22 Channel Fault Insertion Switch, primarily designed for the simulation of fault conditions in automotive and avionics applications involving the reliability testing of safety critical controllers.

It is designed to be able to insert fault conditions on pairs of signals between the test fixture and the equipment under test including:

- Open-Circuit
- Short-Circuit between signal pairs
- Short-Circuit between signal pairs and user applied signals such as Power or Ground.

Relays in-line with the signal paths allow open circuit conditions to be simulated on either side or both sides of a signal pair. Relays between each channel pair enable adjacent signals to be shorted, and relays between signal paths and the Fault connection allow the application of externally applied fault conditions.

The 40-195's architecture allows channels to be interconnected allowing complex fault insertion systems to be constructed.

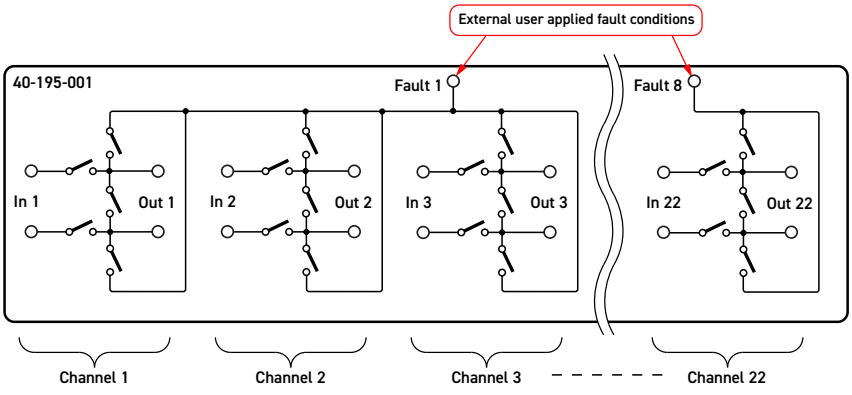
Supported by *eBIRST*

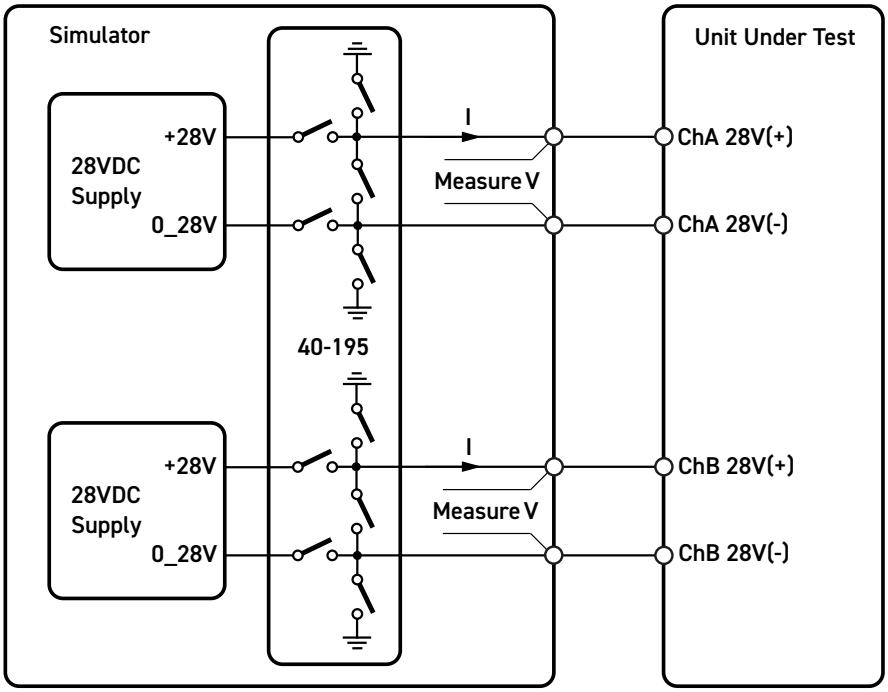
eBIRST switching system test tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

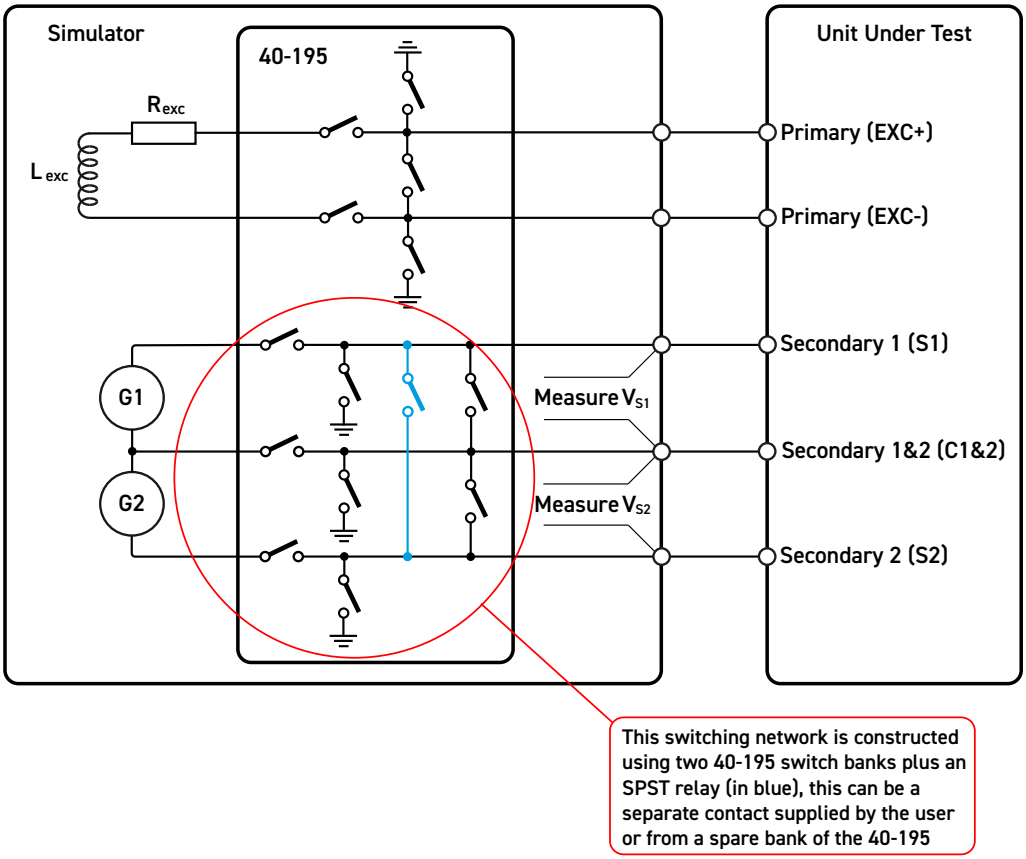
For more information go to: pickeringtest.com/ebirst

40-195 22-Channel Fault Insertion Switch Schematic Diagram

Note: There are 8 inputs that can be used to inject external fault conditions (one Fault input for every 3 switch channels, with channel 22 having its own Fault input).







Two application examples showing how multiple switch banks of the 40-195 Fault Insertion Switch can be used to create a simulation system for automotive or avionics fault testing.

Section 1 - Technical Specification

Relay Type

The 40-195 series of modules are fitted with high quality electro-mechanical relays with palladium-ruthenium, gold covered contacts. A spare relay is built onto the circuit board to allow easy maintenance with minimum downtime.

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150 VDC/100 VAC*
Max Power:	60 W
Max Switch Current:	1 A
Max Carry Current:	1 A
Initial On Path Resistance:	< 500 mΩ
Off Path Resistance:	$>10^9$ Ω
Thermal Offset:	<5 µV per relay
Operate Time:	<3 ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2 W):	$>1.5x10^7$ (0.1 A, 20 VDC)
Medium power load (30 W):	$>5x10^6$ (1 A, 30 VDC)
Full power load (60 W):	$>1x10^5$ (1 A, 60 VDC)

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

Power Requirements

+3.3 V	+5 V	+12 V	-12 V
0	typically 1.4 A	0	0

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 96-pin male 1.27 mm pitch 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:	5000 m

Storage and Transport Conditions

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

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 33 MHz 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

22-Channel, 1A Fault Insertion Switch	40-195-001
11-Channel, 1A Fault Insertion Switch	40-195-101

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 relay types
- Mixture of 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.

Support Products

eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below. For more information go to: pickeringtest.com/ebirst

Product	Test Tool	Adaptor	Termination
All Types	93-002-001	93-002-226	93-016-103

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	91-100-001

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-195 series please refer to the 90-016D 96-pin 1.27 mm pitch Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the website.

The 40-195 is part of a range of switching modules suitable for fault insertion applications.

Pickering's Range of PXI/PXIe Fault Insertion Switch Modules					
Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current	Model No.
74, 64 or 32	1 or 2	4 or 8	165 V	2 A	40/42-190C
6	2	2	40 V	30 A	40-191B
6	2	2	200 V	10 A	40-192
7	1 or 2	1 or 2	16 V	20 A, 1A min	40-193
7	1 or 2	1 or 2	16 V	20 A, no min	40-194A
22 or 11 pairs	-	8 or 4	150 V	1A	40-195
10 or 5 pairs	-	10 or 5	110 V	5 A	40-196
34 or 16	4	8	300 V	2 A	40-197A
20	1 or 2	3 or 6	250 V	5 A	40-198
10	1 or 2	2	250 V	10 A	40-199
22 or 11 Pairs	-	22 or 11	150 V	1A	40-202





Functional Description

A functional block diagram is provided in Figure 2.1. The Fault Insertion Switch is powered by a +5 V input via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted 96-pin 1.27 mm pitch connector, J2. The module comprises a PCB populated with 111 miniature electro-mechanical relays with 1A current handling. The relays are energised via control signals from relay drivers U8-14. The relay drivers are addressed by PCI bridge U1 to output the required signal. Module configuration is determined by data stored in EEPROM U7. PCI Bridge U1 is configured by EEPROM U2.

The relay contacts are arranged in a fault insertion switch configuration, for details, please refer to the figure in Section 1.

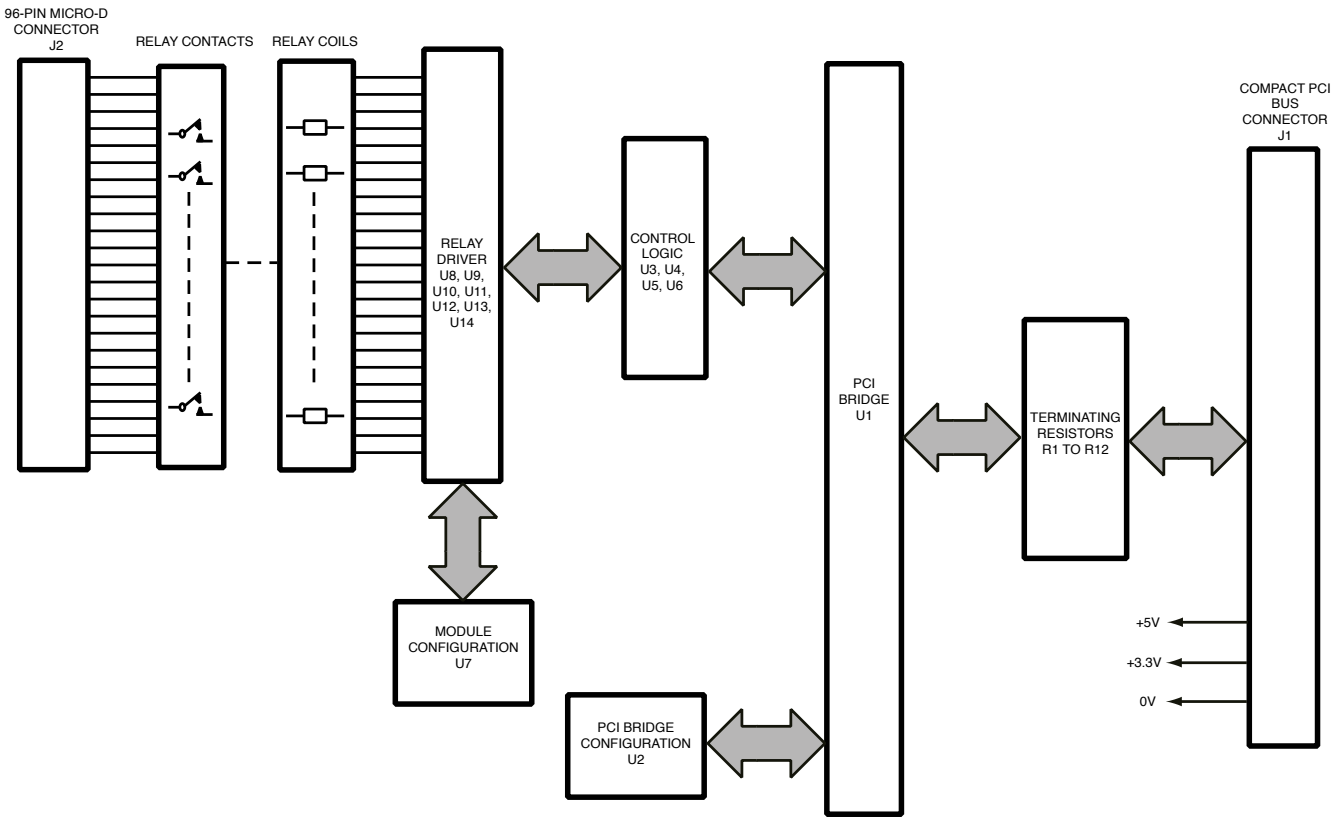


Figure 2.1 - 1A Fault Insertion Switch: Functional Block Diagram

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.

Pre-operation 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.

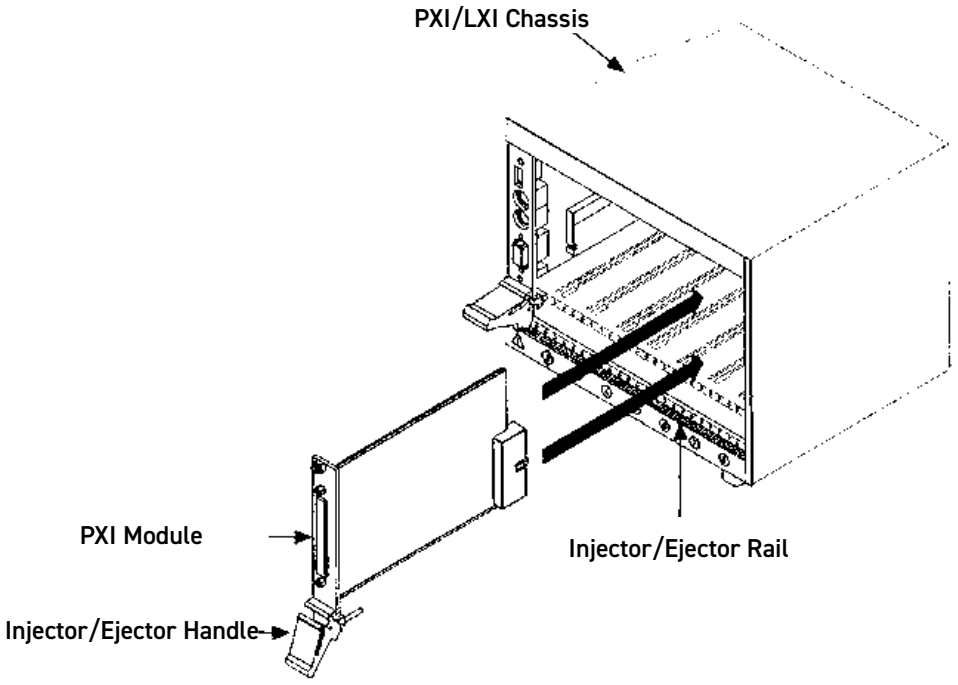


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

Hardware Installation Electrical Connection (Chassis)

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

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 vi.

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 Pickering switching and simulation PCI, PXI and PXIe products.

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.

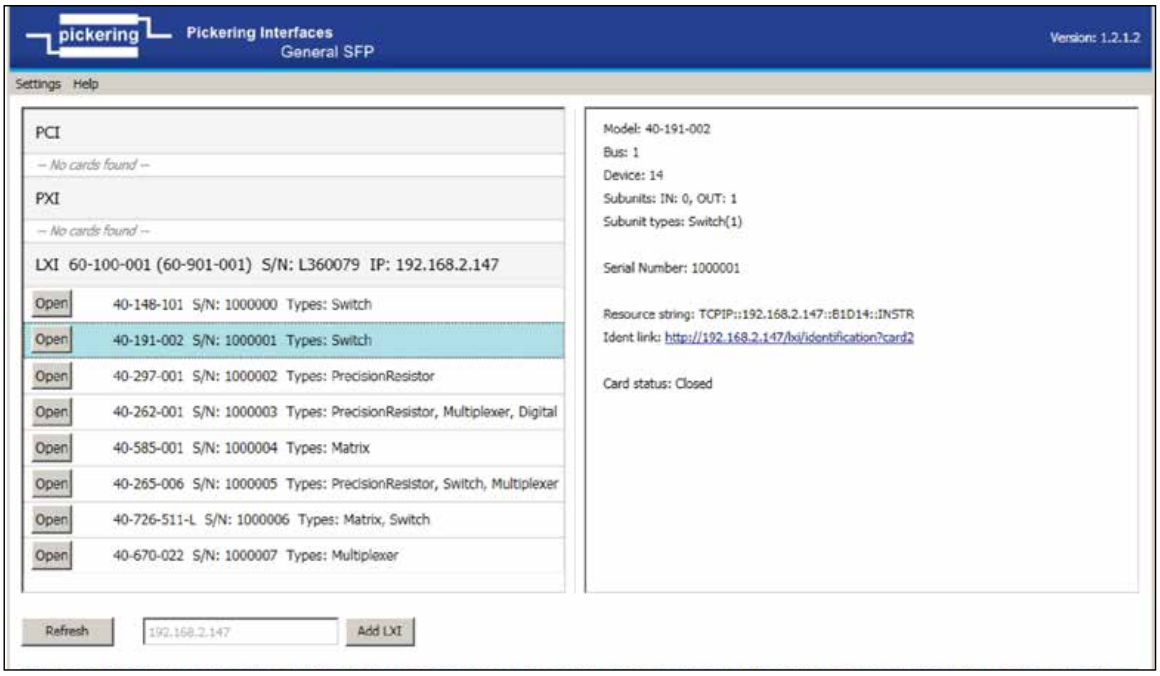


Figure 3.3 - General Soft Front Panel Selector

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

Section 4 - Programming

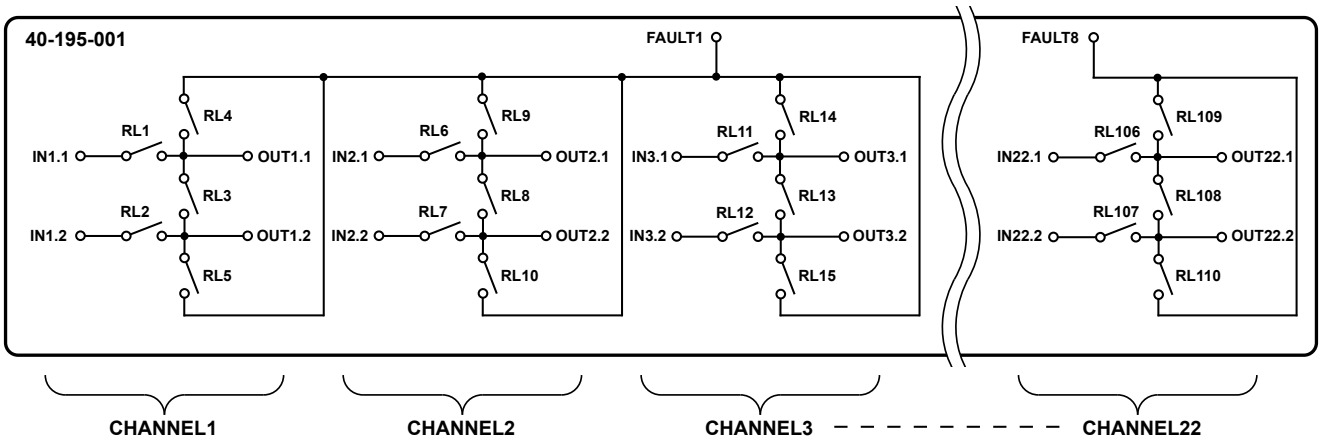
Programming options for Pickering Interfaces PXI Modules

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:
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



The Pickering 40-195-001 PXI card contains one sub-unit to control all 22 channels of fault insertion switches.

The sub-unit is 110 bits long, 5 bits per channel, organised as follows:

Bit	Function
1	Channel-n.1 Isolation
2	Channel-n.2 Isolation
3	Channel-n short
4	Channel-n.1 Fault
5	Channel-n.2 Fault

This data pattern is repeated for each channel, please refer to the table at the end of this section for the full listing.

Programming The Module

Here are examples of using the drivers with the 40-195:

Using PILPXI

To operate a relay the user could use the simple OpBit command or the WriteSub commands

OpBit

```
DWORD sub_unit = 1;
PIL_OpBit( card_num, sub_unit, 1, 1);   // Operates the channel 1.1 isolation relay
PIL_OpBit( card_num, sub_unit, 1, 0);   // Releases the channel 1.1 isolation relay
PIL_OpBit( card_num, sub_unit, 6, 1);   // Operates the channel 2.1 isolation relay
```

WriteSub

```
// Sub-unit is 110 bits wide, so 4 DWORDS are needed to hold the entire pattern
DWORD data[4];
data[0] = 1;       // Sets lowest bit to 1, channel1.1 isolation relay
data[1] = 0;
data[2] = 0;
data[3] = 0;
PIL_WriteSub( card_num, sub_unit, data);
data[0] = 0x20;    // Sets 6th bit, channel2.1 isolation relay
data[1] = 0;
data[2] = 0;
data[3] = 0;
PIL_WriteSub( card_num, sub_unit, data);
```

Using PIPX40

setChannelState

```
ViUInt32 sub_unit = 1;
pipx40_setChannelState(vi, sub_unit, 1, VI_ON);   // Operates the channel 1.1    isolation
relay
pipx40_setChannelState(vi, sub_unit, 1, VI_OFF);  // Releases the channel 1.1    isolation
relay
pipx40_setChannelState(vi, sub_unit, 6, VI_ON);   // Operates the channel 2.1    isolation
relay
```

setChannelPattern

```
// Sub-unit is 110 bits wide, so 4 ViUInt32 values are needed to hold the entire pattern
ViUInt32 data[4];
data[0] = 1;       // Sets lowest bit to 1, channel1.1 isolation relay
data[1] = 0;
data[2] = 0;
data[3] = 0;
pipx40_setChannelPattern( vi, sub_unit, data);
data[0] = 0x20;    // Sets 6th bit, channel2.1 isolation relay
data[1] = 0;
data[2] = 0;
data[3] = 0;
pipx40_setChannelPattern( vi, sub_unit, data);
```

Using pi40iv

The IVI driver has no special labelling for this card and treats the array of switches as a simple array, labelling the channels using the normal com./ch labelling tags.

```
pi40iv_Connect(vi, com1, ch1);     // Operates the channel 1.1 isolation relay
pi40iv_Disconnect(vi, com1, ch1); // Releases the channel 1.1 isolation relay
pi40iv_Connect(vi, com6, ch6);     // Operates the channel 2.1 isolation relay
```

The IVI Swtch driver specification contains no bulk setting capabilities.

Sub-unit Bit Lookup Tables

Sub-Unit	Bit	Function		Sub-Unit	Bit	Function
1	1	CH1.1 Isolation		1	26	CH6.1 Isolation
1	2	CH1.2 Isolation		1	27	CH6.2 Isolation
1	3	CH1 Short		1	28	CH6 Short
1	4	CH1.1 Fault		1	29	CH6.1 Fault
1	5	CH1.2 Fault		1	30	CH6.2 Fault
1	6	CH2.1 Isolation		1	31	CH7.1 Isolation
1	7	CH2.2 Isolation		1	32	CH7.2 Isolation
1	8	CH2 Short		1	33	CH7 Short
1	9	CH2.1 Fault		1	34	CH7.1 Fault
1	10	CH2.2 Fault		1	35	CH7.2 Fault
1	11	CH3.1 Isolation		1	36	CH8.1 Isolation
1	12	CH3.2 Isolation		1	37	CH8.2 Isolation
1	13	CH3 Short		1	38	CH8 Short
1	14	CH3.1 Fault		1	39	CH8.1 Fault
1	15	CH3.2 Fault		1	40	CH8.2 Fault
1	16	CH4.1 Isolation		1	41	CH9.1 Isolation
1	17	CH4.2 Isolation		1	42	CH9.2 Isolation
1	18	CH4 Short		1	43	CH9 Short
1	19	CH4.1 Fault		1	44	CH9.1 Fault
1	20	CH4.2 Fault		1	45	CH9.2 Fault
1	21	CH5.1 Isolation		1	46	CH10.1 Isolation
1	22	CH5.2 Isolation		1	47	CH10.2 Isolation
1	23	CH5 Short		1	48	CH10 Short
1	24	CH5.1 Fault		1	49	CH10.1 Fault
1	25	CH5.2 Fault		1	50	CH10.2 Fault

Sub-Unit	Bit	Function		Sub-Unit	Bit	Function
1	51	CH11.1 Isolation		1	81	CH17.1 Isolation
1	52	CH11.2 Isolation		1	82	CH17.2 Isolation
1	53	CH11 Short		1	83	CH17 Short
1	54	CH11.1 Fault		1	84	CH17.1 Fault
1	55	CH11.2 Fault		1	85	CH17.2 Fault
1	56	CH12.1 Isolation		1	86	CH18.1 Isolation
1	57	CH12.2 Isolation		1	87	CH18.2 Isolation
1	58	CH12 Short		1	88	CH18 Short
1	59	CH12.1 Fault		1	89	CH18.1 Fault
1	60	CH12.2 Fault		1	90	CH18.2 Fault
1	61	CH13.1 Isolation		1	91	CH19.1 Isolation
1	62	CH13.2 Isolation		1	92	CH19.2 Isolation
1	63	CH13 Short		1	93	CH19 Short
1	64	CH13.1 Fault		1	94	CH19.1 Fault
1	65	CH13.2 Fault		1	95	CH19.2 Fault
1	66	CH14.1 Isolation		1	96	CH20.1 Isolation
1	67	CH14.2 Isolation		1	97	CH20.2 Isolation
1	68	CH14 Short		1	98	CH20 Short
1	69	CH14.1 Fault		1	99	CH20.1 Fault
1	70	CH14.2 Fault		1	100	CH20.2 Fault
1	71	CH15.1 Isolation		1	101	CH21.1 Isolation
1	72	CH15.2 Isolation		1	102	CH21.2 Isolation
1	73	CH15 Short		1	103	CH21 Short
1	74	CH15.1 Fault		1	104	CH21.1 Fault
1	75	CH15.2 Fault		1	105	CH21.2 Fault
1	76	CH16.1 Isolation		1	106	CH22.1 Isolation
1	77	CH16.2 Isolation		1	107	CH22.2 Isolation
1	78	CH16 Short		1	108	CH22 Short
1	79	CH16.1 Fault		1	109	CH22.1 Fault
1	80	CH16.2 Fault		1	110	CH22.2 Fault

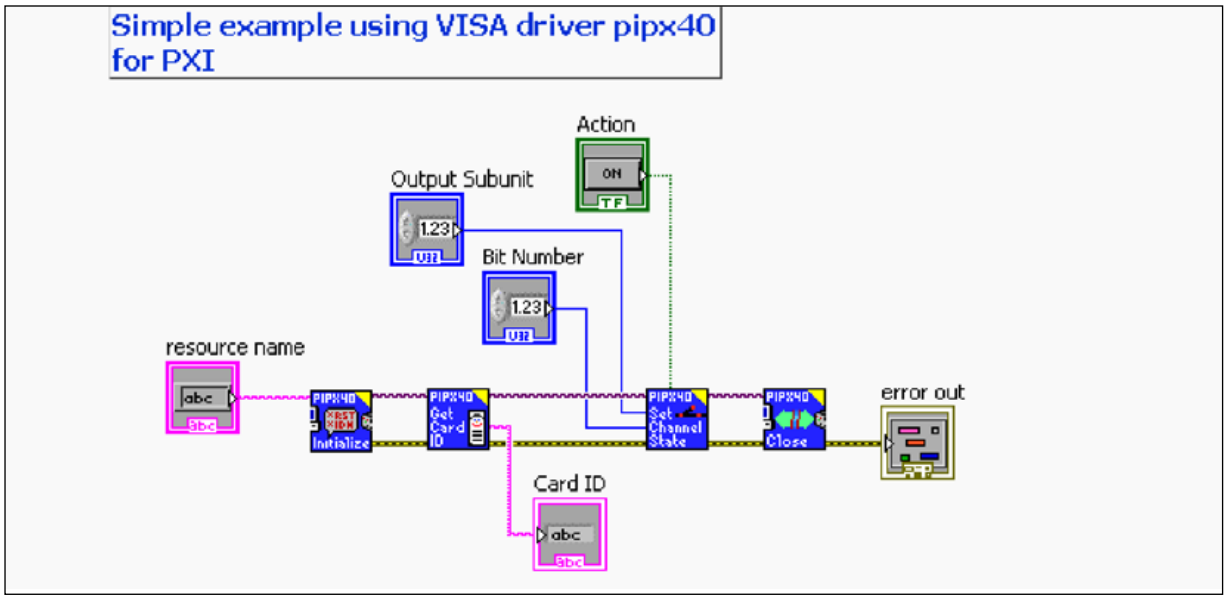
Using Pickering Drivers In LabVIEW

Most Pickering drivers include a LabVIEW wrapper to permit full operation of the Pickering product from the LabVIEW environment. These wrappers are normally installed to the current LabVIEW folder system during installation of the Pickering driver.

The process of controlling a Pickering product normally consists of the following steps:

1. Open a control session on the product.
2. Use functions in the library to operate the product.
3. Close the control session.

Following is a simple example of the use of the most common Pickering drivers:



Example Use of Pickering Drivers in LabVIEW

To download LabVIEW examples, please go to:

Using Pickering Drivers in LabVIEW

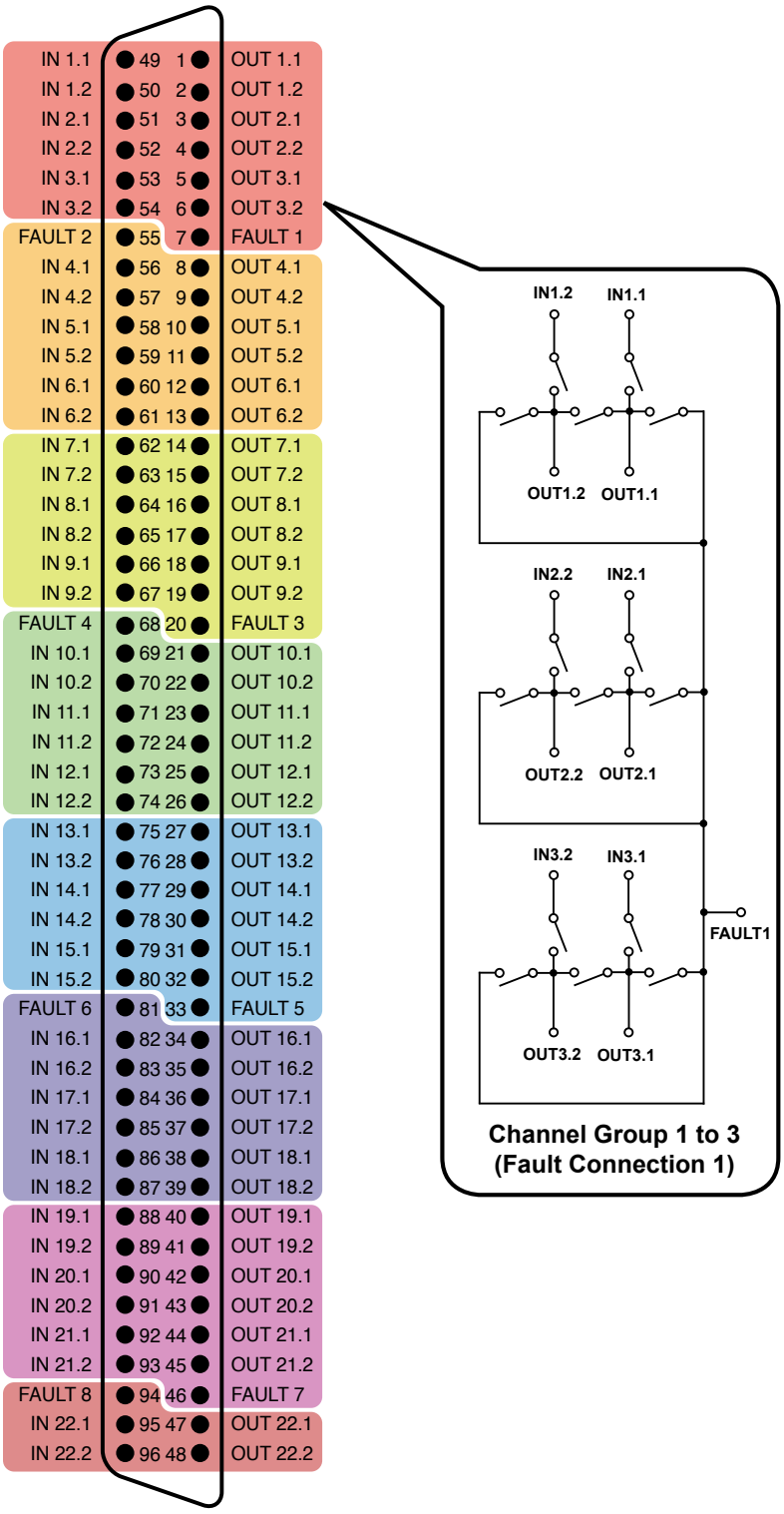


Figure 5.1 - Pinouts: 1A Fault Insertion Switch 40-195-001 showing the channel groupings for each of the eight fault connections (96-pin male 1.27 mm pitch Connector Viewed from Front of Module)

Section 6 - Troubleshooting

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.

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.

Switching System Test Tools

We recommend the use of ***eBIRST*** to provide a check of the correct operation of relays and to identify the location of any faulty relay. For more information visit: pickeringtest.com/ebirst

Relay Look-up Tables

The following pages provide a cross reference between the signal paths of the product 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. Users of ***eBIRST*** switching system test tools do not need to use this information to locate faulty relays.

RELAY FUNCTION CROSS REFERENCE TABLE							
Relay	Function		Relay	Function		Relay	Function
RL1	CH1.1 Isolation		RL38	CH8 Short		RL75	CH15.2 Fault
RL2	CH1.2 Isolation		RL39	CH8.1 Fault		RL76	CH16.1 Isolation
RL3	CH1 Short		RL40	CH8.2 Fault		RL77	CH16.2 Isolation
RL4	CH1.1 Fault		RL41	CH9.1 Isolation		RL78	CH16 Short
RL5	CH1.2 Fault		RL42	CH9.2 Isolation		RL79	CH16.1 Fault
RL6	CH2.1 Isolation		RL43	CH9 Short		RL80	CH16.2 Fault
RL7	CH2.2 Isolation		RL44	CH9.1 Fault		RL81	CH17.1 Isolation
RL8	CH2 Short		RL45	CH9.2 Fault		RL82	CH17.2 Isolation
RL9	CH2.1 Fault		RL46	CH10.1 Isolation		RL83	CH17 Short
RL10	CH2.2 Fault		RL47	CH10.2 Isolation		RL84	CH17.1 Fault
RL11	CH3.1 Isolation		RL48	CH10 Short		RL85	CH17.2 Fault
RL12	CH3.2 Isolation		RL49	CH10.1 Fault		RL86	CH18.1 Isolation
RL13	CH3 Short		RL50	CH10.2 Fault		RL87	CH18.2 Isolation
RL14	CH3.1 Fault		RL51	CH11.1 Isolation		RL88	CH18 Short
RL15	CH3.2 Fault		RL52	CH11.2 Isolation		RL89	CH18.1 Fault
RL16	CH4.1 Isolation		RL53	CH11 Short		RL90	CH18.2 Fault
RL17	CH4.2 Isolation		RL54	CH11.1 Fault		RL91	CH19.1 Isolation
RL18	CH4 Short		RL55	CH11.2 Fault		RL92	CH19.2 Isolation
RL19	CH4.1 Fault		RL56	CH12.1 Isolation		RL93	CH19 Short
RL20	CH4.2 Fault		RL57	CH12.2 Isolation		RL94	CH19.1 Fault
RL21	CH5.1 Isolation		RL58	CH12 Short		RL95	CH19.2 Fault
RL22	CH5.2 Isolation		RL59	CH12.1 Fault		RL96	CH20.1 Isolation
RL23	CH5 Short		RL60	CH12.2 Fault		RL97	CH20.2 Isolation
RL24	CH5.1 Fault		RL61	CH13.1 Isolation		RL98	CH20 Short
RL25	CH5.2 Fault		RL62	CH13.2 Isolation		RL99	CH20.1 Fault
RL26	CH6.1 Isolation		RL63	CH13 Short		RL100	CH20.2 Fault
RL27	CH6.2 Isolation		RL64	CH13.1 Fault		RL101	CH21.1 Isolation
RL28	CH6 Short		RL65	CH13.2 Fault		RL102	CH21.2 Isolation
RL29	CH6.1 Fault		RL66	CH14.1 Isolation		RL103	CH21 Short
RL30	CH6.2 Fault		RL67	CH14.2 Isolation		RL104	CH21.1 Fault
RL31	CH7.1 Isolation		RL68	CH14 Short		RL105	CH21.2 Fault
RL32	CH7.2 Isolation		RL69	CH14.1 Fault		RL106	CH22.1 Isolation
RL33	CH7 Short		RL70	CH14.2 Fault		RL107	CH22.2 Isolation
RL34	CH7.1 Fault		RL71	CH15.1 Isolation		RL108	CH22 Short
RL35	CH7.2 Fault		RL72	CH15.2 Isolation		RL109	CH22.1 Fault
RL36	CH8.1 Isolation		RL73	CH15 Short		RL110	CH22.2 Fault
RL37	CH8.2 Isolation		RL74	CH15.1 Fault			

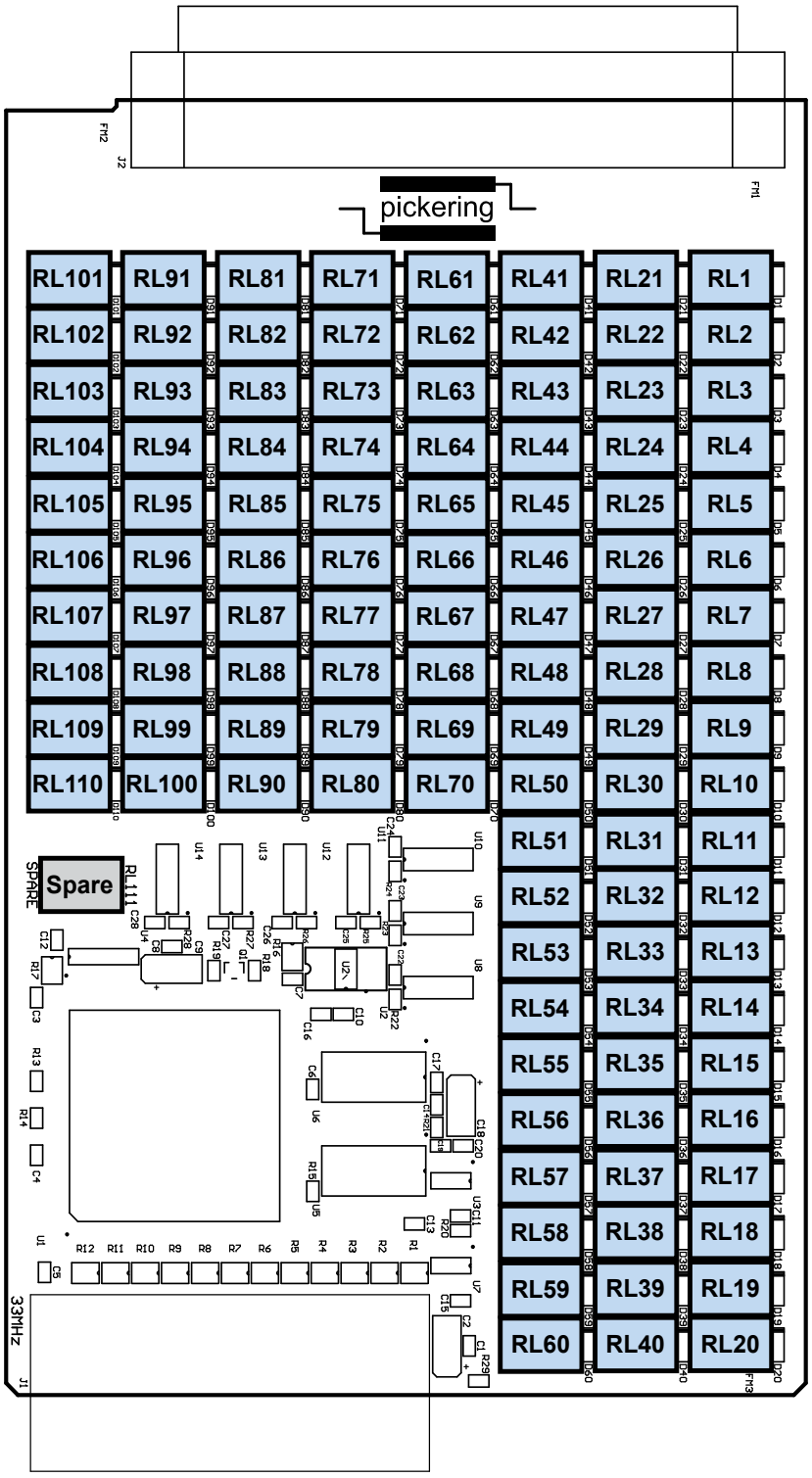


Figure 7.1 - Fault Insertion Switch 40-195-001: Component Layout