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Find the *Pickering 40-860-222* at our website: ***Click HERE***

User Manual

PXI

MEMS Fiber Optic
Insert / Bypass Switch Module
(Model No. 40-860)



Issue 4.1 May 2017

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

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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 and reference should be made to the safety instructions for provisions of lifting and moving.	
LASER PRODUCT This product is capable of switching laser optical signals.	
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.	

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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 PXI/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.	

WARNING - RISK OF INJURY	SYMBOL
This product may be specifically designed to switch optical signals. Under no circumstances look into the end of an optical output or an optical cable attached to an optical output. LASER RADIATION CAN SERIOUSLY DAMAGE YOUR EYESIGHT. Read and understand the safety information of the laser source connected to the optical switch.	

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.	

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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.
- Modules are not accessed to EN 60825, users should observe the safety instructions and laser class for the 3rd party laser source. 
- The module may be capable of switching optical signals from a laser device; do not stare directly at the user I/O ports. 
- For suitably equipped products in the event of an emergency press the red “emergency stop” button situated on the front of the unit.

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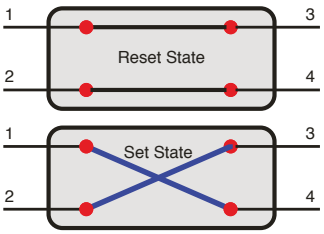
SECTION 1 - TECHNICAL SPECIFICATION

40-860
MEMS Optical Insert/Bypass Switch

- Single, Dual, Triple or Quad 2x2 Insert/Bypass Fiber Optic Switch
- High Density 1 or 2 Slot Width Modules
- FC/APC, FC/PC or SC/PC Connectors
- Small Form Factor Connectors LC or MU (mini SC)
- 1240 to 1640nm Single Mode
- 700 to 1700nm Multi-Mode
- Return Loss >55dB
- Long Operating Life >10^9 Operations with High Repeatability ± 0.01dB and Good Temperature Stability
- Crosstalk -60dB Typical
- 1ms Typical Switching Time
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



Block Diagram of 2x2 Insert/ Bypass Fiber Optic Switch (both Set and Reset states are shown)



Key Features

- Very fast operate time <1ms
- Very long life >10^9 operations
- Return loss greater than 55dB
- High repeatability over a broad range of environmental conditions
- High density

Applications

- Optical signal routing
- Fiber network configuration
- Fiber Optic Component Test

Pickering PXI Fiber Optic MEMS Switching modules are available in many high density formats with a choice of 5 different connector styles to suit most applications: FC/APC (for optimal performance), FC/PC and SC/PC for general applications and LC and MU for high density applications.

The fiber optic multiplexers connect the optical channel by redirecting the optical signal into a selected output fiber. This is achieved using Micro-Mechanical Mirrors driven by a highly precise mechanism and activated via an electrical control signal.

The range of MEMS (Micro-Electro-Mechanical-Systems) based optical switches is:

40-860-X12 – Single 2x2 Insert/Bypass Switch

40-860-X22 – Dual 2x2 Insert/Bypass Switch

40-860-X32 – Triple 2x2 Insert/Bypass Switch

40-860-X32[4] – Quad 2x2 Insert/Bypass Switch

Pickering will construct custom optical systems to customers precise requirements. We have a large range of electrical switching modules which can form a complete PXI based telecom switching solution.

MEMS technology offers many advantages over traditional Optical Prism Technology as used in module types 40-810/815/820. MEMS offer similar optical performance but with lower price, higher packing density, faster operate time and much longer operating life.



40-860-022 Fiber Optic Dual 2x2 Matrix

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General Specification (SM Versions)

Fiber Switch Type: Internal Fiber Type:	MEMS SM 9/125
Wavelength: Insertion loss (2x2): Return loss (APC version): Return loss (other versions): Polarization dependent loss (PDL): Repeatability: Crosstalk: Optical Input Power:	1240 to 1640nm 0.8dB Typ 60dB Min 55dB Min 0.05dB Max ±0.01dB Max -60dB Max 300mW Max
Thermal Stability: (-10 to 75°C insertion loss variation)	0.2dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time: Cycle Rate:	1ms 500/sec
Module Weight:	<0.8Kg typ.

Additional Specification (MM Versions)

Fiber Switch Type: Internal Fiber Type:	MEMS MM 62.5/125
Wavelength: Insertion loss (2x2): Return loss (other versions): Polarization dependent loss (PDL):	700 to 1700nm 0.8dB Typ 55dB Min 0.05dB Max

Power Requirements

+3.3V	+5V	+12V	-12V
0	300mA (typ 220mA)	0	0

Mechanical Characteristics

All modules are either 1 or 2 slot as indicated in model list.

Module weight: 420g (40-860-222)

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 fiber optic connectors (choice of FC/APC, FC/PC,SC/PC, MU or LC types).

Other Fiber Connector Styles

Pickering can manufacture Fiber Optic Switch modules with other connector styles, please contact sales office for further information.

Product Order Codes

2 x 2 Insert/Bypass Switch Versions	
FC/APC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-012**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-022**
FC/PC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-112**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-122**
SC/PC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 2 slot	**40-860-212**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-222**
MU (mini SC), 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-312**
Dual 2x2 Insert/Bypass Switch, 1 slot	**40-860-322**
Triple 2x2 Insert/Bypass Switch, 2 slot	**40-860-332**
Quad 2x2 Insert/Bypass Switch, 2 slot	**40-860-342**
LC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-412**
Dual 2x2 Insert/Bypass Switch, 1 slot	**40-860-422**
Triple 2x2 Insert/Bypass Switch, 2 slot	**40-860-432**
Quad 2x2 Insert/Bypass Switch, 2 slot	**40-860-442**
SC, 700 to 1700nm, Multi-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-212-M**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-222-M**
ST, 700 to 1700nm, Multi-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-512-M**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-522-M**



Pickering Interfaces Will Configure PXI Optical Switching Systems To Customers Exact Requirements Including Custom Cabling

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

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

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 EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

PXI & LXI Chassis Compatibility

Compatible with all chassis conforming to the 3U PXI and 3U cPCI specification. Compatible with Legacy and Hybrid peripheral slots in a 3U PXI Express chassis.
Compatible with Pickering Interfaces LXI Modular Chassis. For information on driving your switching solution in an LXI environment refer to the LXI Product Guide.



Latest Details

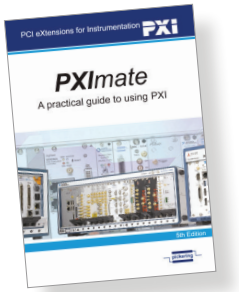
Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com



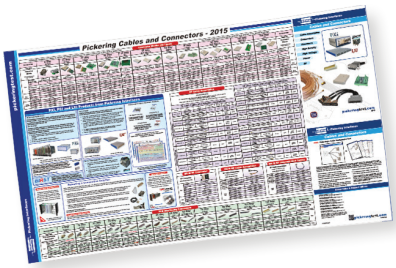
Please refer to the 200 page Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. Available in either print or as a download.
Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.



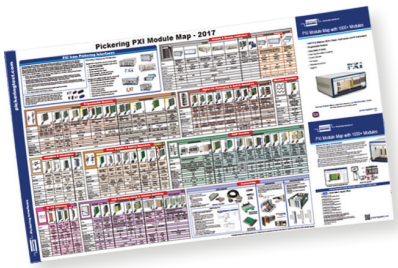
"**The Big PXI Catalog**" gives full details of Pickering's entire range of PXI switch modules, instrument modules and support products.
At over 500 pages, the Big PXI Catalog is available on request or can be downloaded from the Pickering website.



Ever wondered what PXI is all about?
Pickering Interfaces' "**PXImate**" explains the basics of PXI and provides useful data for engineers working on switch based test systems.
The PXImate is available free on request from the Pickering website.



The "**Cables & Connectors Map**" - outlines the cable and connector options available for all PXI Modules.



The "**PXI Module Map**" - a simple fold-out selection guide to all Pickering's 1000+ PXI Modules.

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

Functional block diagrams for the single and dual versions of the 40-860 are provided in Figures 2.1 and 2.2. The Fiber Insert/Bypass Module is powered by a +5V input via Compact PCI connector J1. The module comprises one or two fiber optic insert/bypass switches which connect two optical channel inputs to two corresponding outputs. When activated, the input signals are redirected to the opposite outputs, forming a “cross-over”. This is achieved using Micro-Mechanical Mirrors driven by a highly precise mechanism. This is activated by electrical control signals via buffers from driver devices. The registers of the drivers are addressed by PCI bridge U1 to output the required signal. PCI Bridge U1 is configured by EEPROM U2.

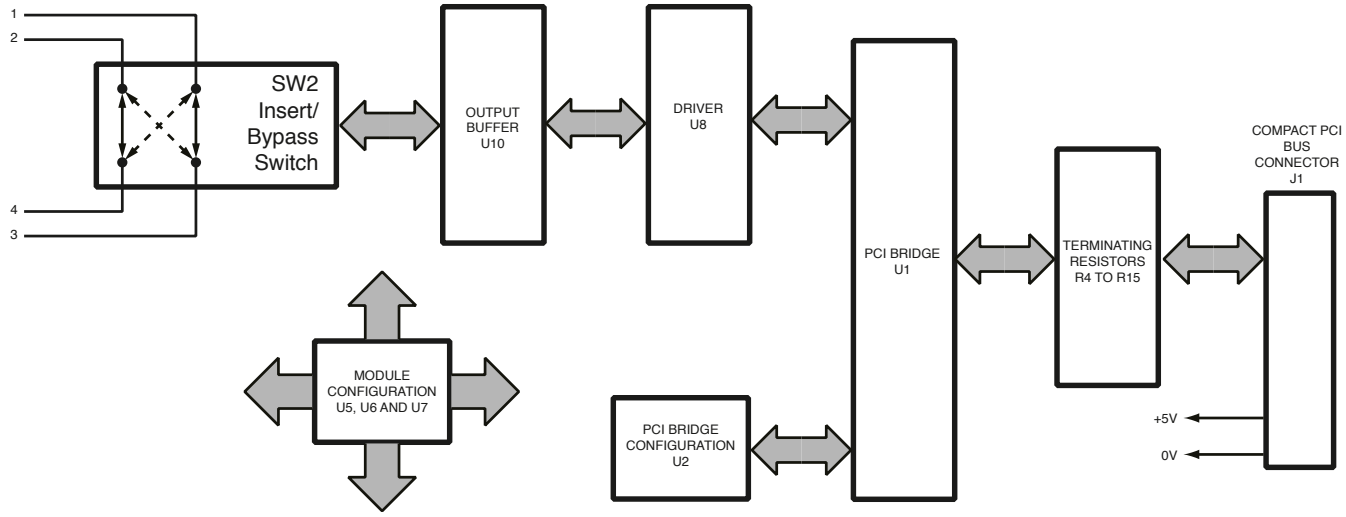


Figure 2.1 - Single Fiber Optic Insert/Bypass Module 40-860: Functional Block Diagram

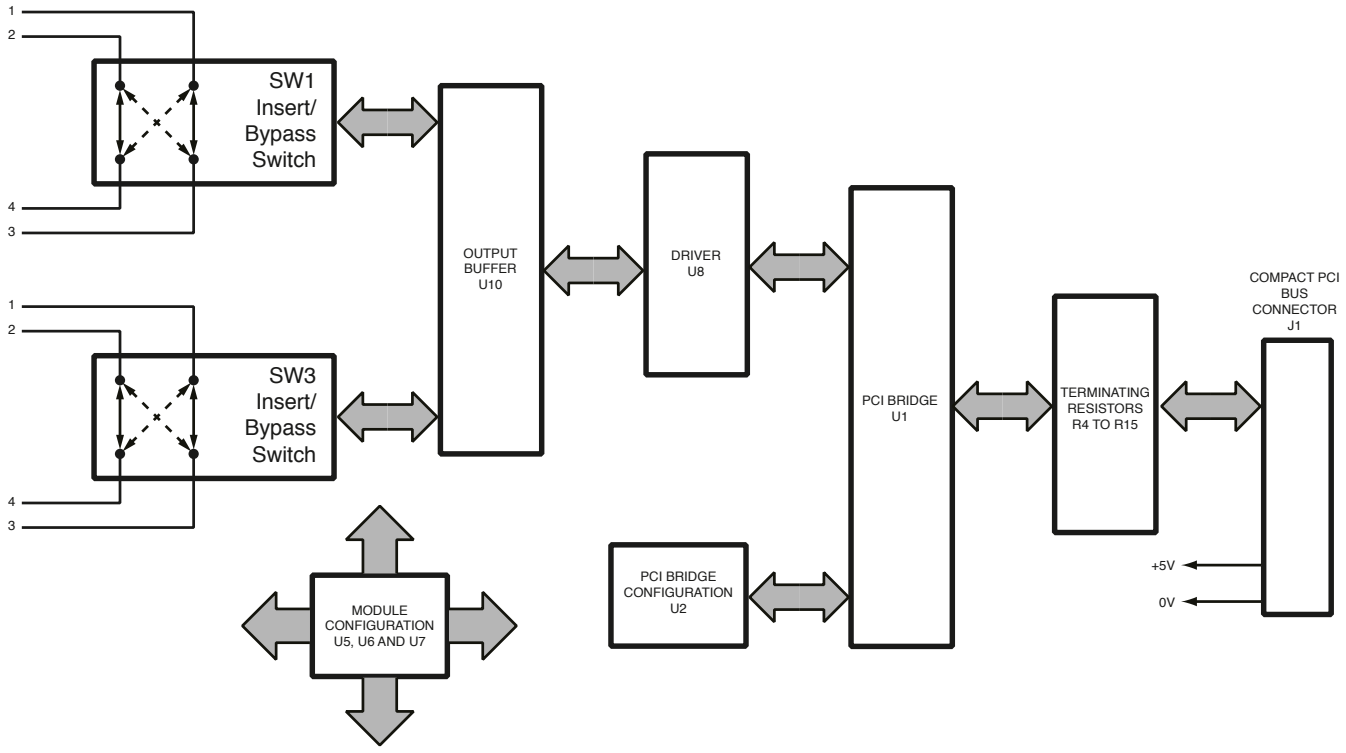


Figure 2.2 - Dual Fiber Optic Insert/Bypass Module 40-860: Functional Block Diagram

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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.

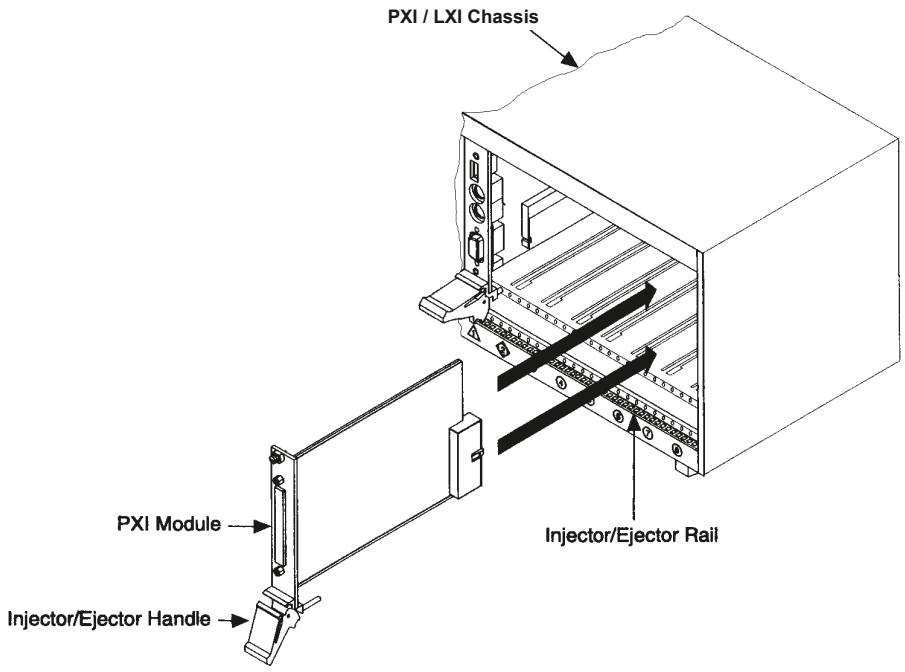


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

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.

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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.

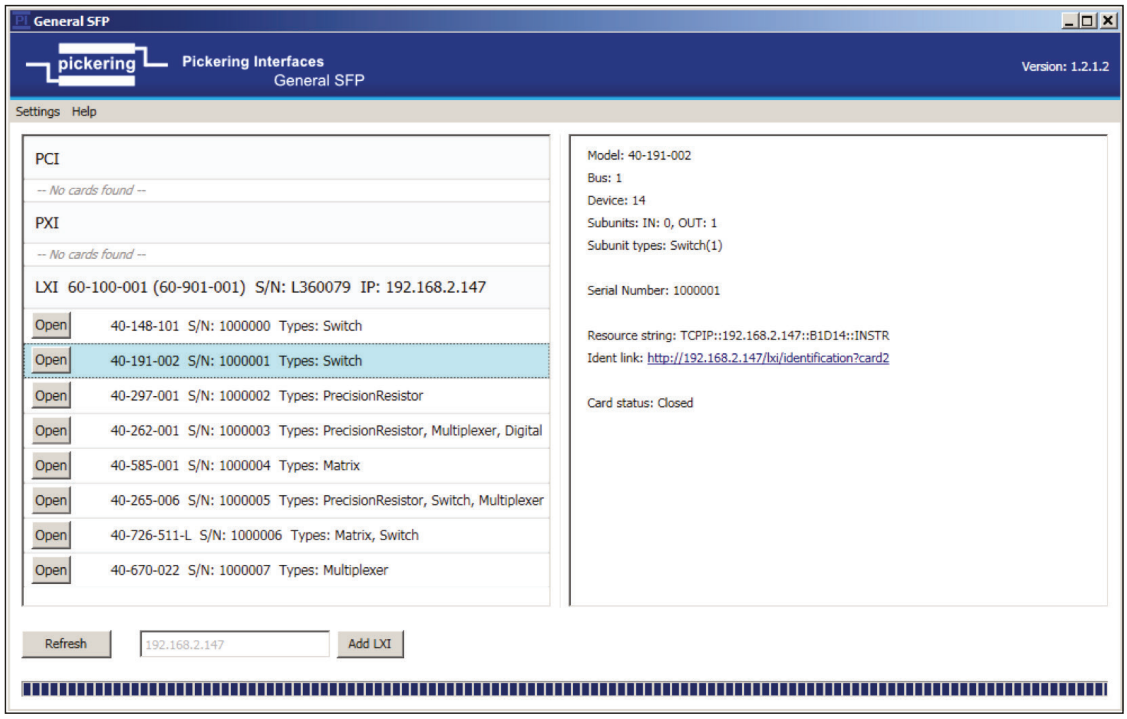


Figure 3.3 - General Soft Front Panel Selector

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 CARDS

Software drivers are supplied for Microsoft Windows operating systems, with specific support for the following development environments:

- Microsoft Visual Studio (VB, C++, C#)
- Borland C++
- National Instruments LabWindows/CVI
- National Instruments LabVIEW and LabVIEW RT

Windows drivers are supplied in the form of Dynamic Link Libraries, which should also be usable in any other development environment that supports them.

Some recent drivers developed for the LXI platform are capable of addressing both PXI and LXI domains. Such duality may be of help to users considering future migration from PXI based systems to LXI based systems, or indeed systems containing both PXI and LXI components.

Programming for PXI

A number of different Windows drivers are available to meet particular system requirements, and should none of these be suitable there is also the option of register-level programming. Drivers are generally ‘universal’, handling all models in the System 40, 45 and 50 ranges; however some models that are not compliant with the Ivi Swtch class cannot be used with the pi40iv IVI driver. The pipx40 and Pilpxi drivers are also applicable to certain models in the System 41 (PXI Instruments) range - see these drivers’ System 41 support list.

Please note that this documentation is available in its most up-to-date form as HTML help files, fully hyperlinked for easy access - both pipx40 and Pilpxi documents are included in the Pipx40vpp software installation.

IVI Driver for Windows - pi40iv

The pi40iv IVI (Interchangeable Virtual Instrument) driver supports all Pickering Interfaces PXI switch cards that are consistent with the Iviswtch class model - as are the great majority of cards in the System 40/45/50 ranges. It integrates well with LabWindows/CVI and LabVIEW, and is fully compatible with Switch Executive. It is also usable in general-purpose programming environments such as Visual C++ and Visual Basic.

Prior installation of the VISA and IviEngine from National Instruments are required for the correct installation and operation of this driver.

VISA Driver for Windows - pipx40

The pipx40 driver conforms to the VISA (Virtual Instrument Software Architecture) standard for programmable instrumentation. Instrument control environments such as LabVIEW and LabWindows/CVI are based on VISA, and pipx40 support libraries are provided for them.

Prior installation of VISA from National Instruments is required for the operation of this driver.

Where VISA is available, pipx40 can also be used in general-purpose programming environments such as Visual C++ and Visual Basic. When IVI is not a system requirement this driver will often yield faster operation than the pi40iv driver.

Direct I/O Driver for Windows - Pilpxi

The Pilpxi driver accesses cards directly, without using the VISA software layer, while offering similar overall functionality to pipx40. It is most commonly used in general-purpose programming environments such as Visual C++ and Visual Basic. Operating speed of the VISA and Direct I/O drivers is generally comparable.

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Register-level Programming

Where the supplied drivers are not suitable, register-level programming can be employed - for example:

- If the functionality of the supplied drivers does not meet the application requirements
- If security considerations demand full source-code for the application
- In development environments that have alternate mechanisms for accessing PCI bus
- For operating systems other than Windows

Programming for LXI

When Pickering PXI cards are inserted into an LXI Modular Chassis a different set of drivers is available.

IVI Driver for Windows - pi40iv

The pi40iv IVI also supports LXI inserted cards simply by changing the resource string to address string to the appropriate address.

Direct I/O Driver for Windows - Piplx

The piplx driver is based on the PXI Direct I/O driver pilpxi, but with added functionality to deal with the added need to address the chassis using an IP address. It integrates well with LabWindows/CVI and LabVIEW, and is fully compatible with Switch Executive. It is also usable in general-purpose programming environments such as Visual C++ and Visual Basic.

Please note that this driver may also be used in the PXI domain. If the addressed card is in the local computer PCI/PXI system, commands will be passed through to the PXI Direct I/O driver. This mechanism allows the piplx driver to be used for both PXI and LXI cards.

The LXI format offers additional interface options not available in PXI :

.NET

A .NET native driver is also available. Once again this may be used for both LXI and PXI card control.

SOAP

Pickering LXI products include a SOAP interface which is usable from a wide variety of platforms and languages.

SSH

Pickering LXI products include an SSH interface which allows remote command line access to control cards, or, using a suitable package, programmatic control.

The user is advised to visit the Pickering web site for further details of all the above drivers, where documentation, example programs, and further help with driver choice are available.

LabVIEW, LabWindows/CVI and Switch Executive are trademarks of National Instruments Corporation.

General Pickering Card Architecture

With most drivers, before programming a Pickering card it is important to understand the basic architecture of Pickering cards.

The switches on a Pickering card are organized into logical sub-units, each sub-unit containing a set of objects of similar type and use. These objects may be switches, digital outputs, digital inputs, resistors, power supplies etc, depending on the nature of the specific card.

For example a simple matrix card will usually contain a single sub-unit containing the switches arranged in a 2-dimensional array. However a similar card with additional isolating relays connected to the matrix will contain additional sub-units containing those isolation relays.

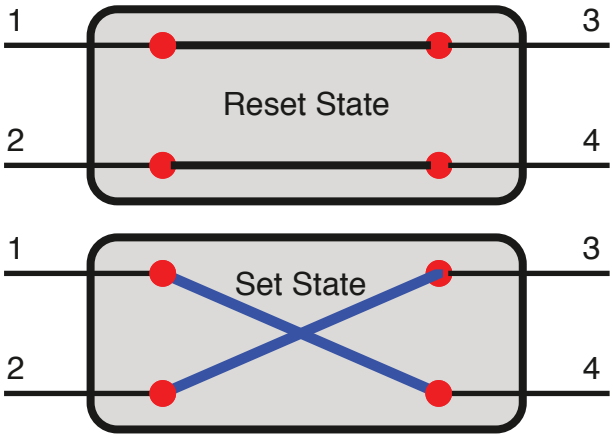
Low level drivers include functions to allow the programmer to query the card to ascertain the number of sub-units, and the size and type of each sub-unit.

For full details of the driver functions available the programmer should refer to the documentation provided.

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MODULE ARCHITECTURE 40-860

The 40-860 Modules utilise one or more MEMS switches depending on the option. In the default state the Channels selected are 1 to 3 and 2 to 4. Energising the MEMS switch appropriately switches the signal paths to the other output terminals. The relay module's switching architecture is shown in its default (Reset) state and energised (Set) state in the diagram below:



2 Channel Insert/Bypass Switch

The sub-units used to control the module's MEMS relays are as detailed below. Enabling a particular bit opens the corresponding Channels.

Table 7.1 - Fiber Optic Insert/Bypass Switch Module 40-860: Sub-Units

Sub-Unit	Bit	Bank	Signal Path	Board MEMS Relay: 40-860-012
1	Default	1	Channel 1 to Channel 3 Channel 2 to Channel 4	SW2
	1		Channel 1 to Channel 4 Channel 2 to Channel 3	

Table 7.1 - Dual Fiber Optic Insert/Bypass Switch Module 40-860: Sub-Units

Sub-Unit	Bit	Bank	Signal Path	Board MEMS Relay: 40-860-022/122/222
1	Default	1	Channel 1 to Channel 3 Channel 2 to Channel 4	SW2
	1		Channel 1 to Channel 4 Channel 2 to Channel 3	
	Default	2	Channel 1 to Channel 3 Channel 2 to Channel 4	SW3
	2		Channel 1 to Channel 4 Channel 2 to Channel 3	

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PROGRAMMING THE MODULE 40-860

Here are some simple examples of using the drivers with the 40-860 Insert/Bypass Switch Module.
Channels 1 to 3 and 2 to 4 are the defaults.
The Dual 2 Channel Switch Modules operate in the similar way but have a different number of bits in the sub-unit.

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);   // Connects channels 1 to 4, and 2 to 3.
PIL_OpBit( card_num, sub_unit, 1, 0);   // Disconnects channels 1 to 4, and 2 to 3.
                                           Reconnects channels 1 to 3, and 2 to 4.
```

WriteSub

```
// Sub-unit is 1 bit wide, so 1 DWORD is needed to hold the pattern
DWORD data[1];
data[0] = 1;            // Sets lowest bit to 1, channel 1 to 4, and 2 to 3.
PIL_WriteSub( card_num, sub_unit, data);
```

Using PIPX40

setChannelState

```
ViUInt12 sub_unit = 1;
pipx40_setChannelState(vi, sub_unit, 1, VI_ON);     // Connects channels 1 to 4, 2 to 3.
pipx40_setChannelState(vi, sub_unit, 1, VI_OFF);    // Disconnects channels 1 to 4,
                                                                          2 to 3.
                                                       Reconnects to default.
```

setChannelPattern

```
// Sub-unit is 1 bit wide, so 1 ViUInt32 value is needed to hold the entire pattern
ViUInt32 data[1];
data[0] = 1;            // Sets lowest bit to 1, channels 1 to 4, and 2 to 3.
pipx40_setChannelPattern( vi, sub_unit, data);
```

Using pi40iv

The IVI driver labels the channels using matrix x,y notation.

```
pi40iv_Connect(vi, com1, ch1);      // Connects channels 1 to 4, and 2 to 3.
pi40iv_Disconnect(vi, com1, ch1);   // Disconnects channel 1 from 4, and 2 from 3.
                                       Reconnects to default.
```

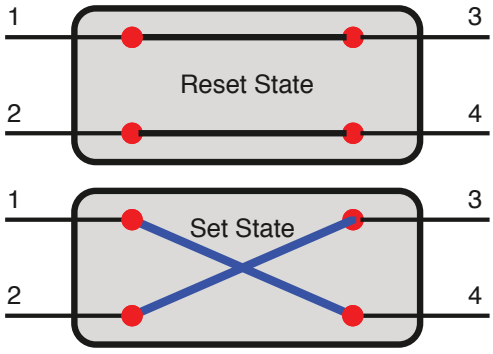
Dual 2 Channel Switch versions are labelled using the normal comA1/chA1 (etc) tags.

The IVI Switch driver specification contains no bulk setting capabilities.

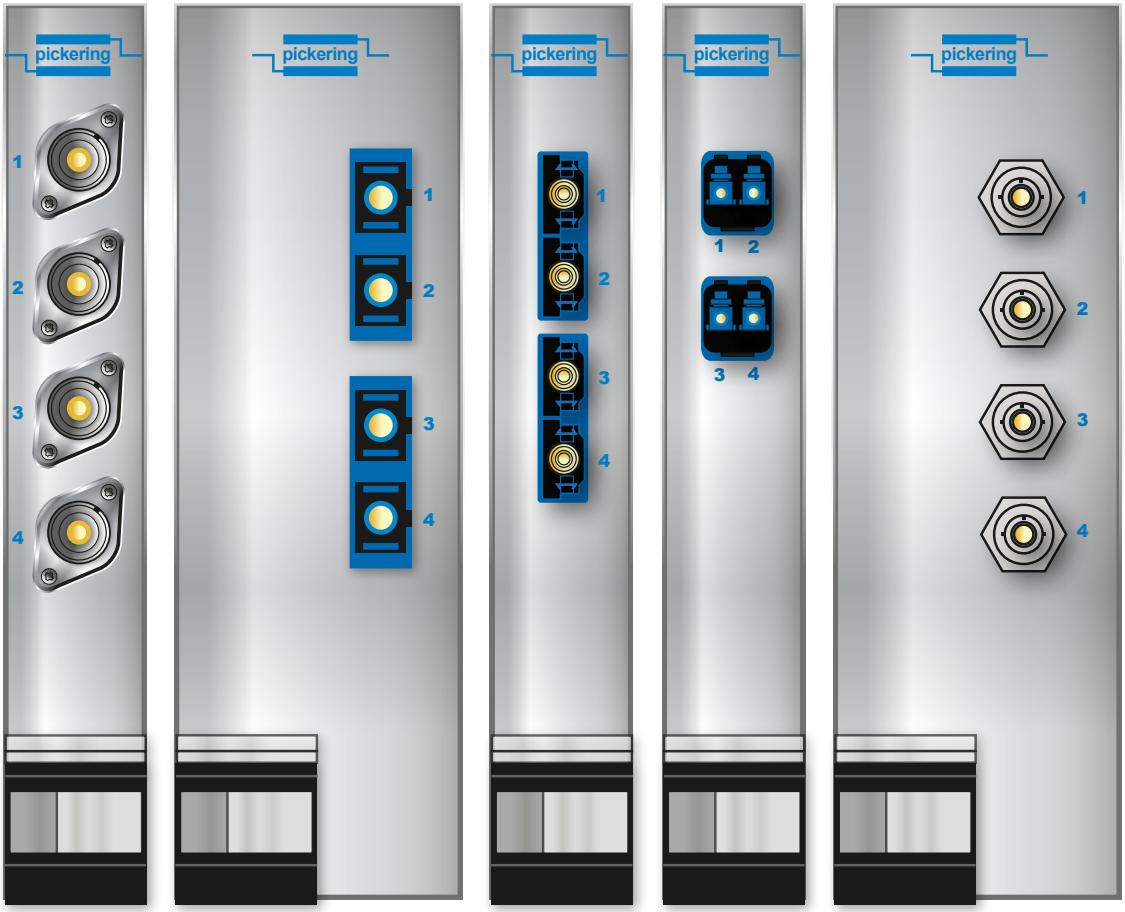
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SECTION 5 - CONNECTOR INFORMATION

Figure 5.1 provides pin-outs for the Fiber Optic Insert/Bypass Modules in the 40-860 single switch range, Figure 5.2 provides pin-outs for the Fiber Optic Insert/Bypass Modules in the 40-860 dual switch range.



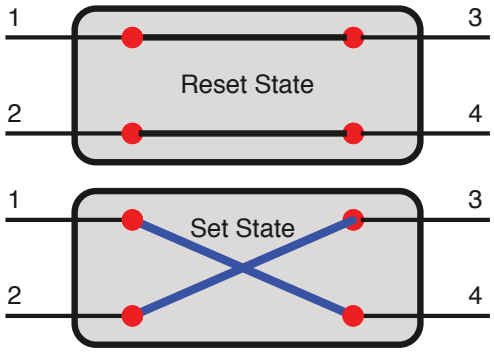
2 Channel Insert/Bypass Switch



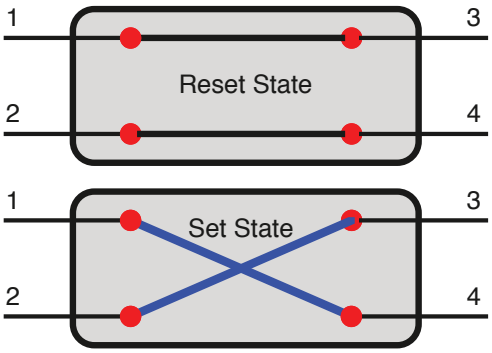
40-860-012/112 | 40-860-212, 40-860-212-M | 40-860-312 | 40-860-412 | 40-860-512-M

Figure 5.1 - Single Fiber Optic Insert/Bypass Switch Module 40-860: Connector Positions

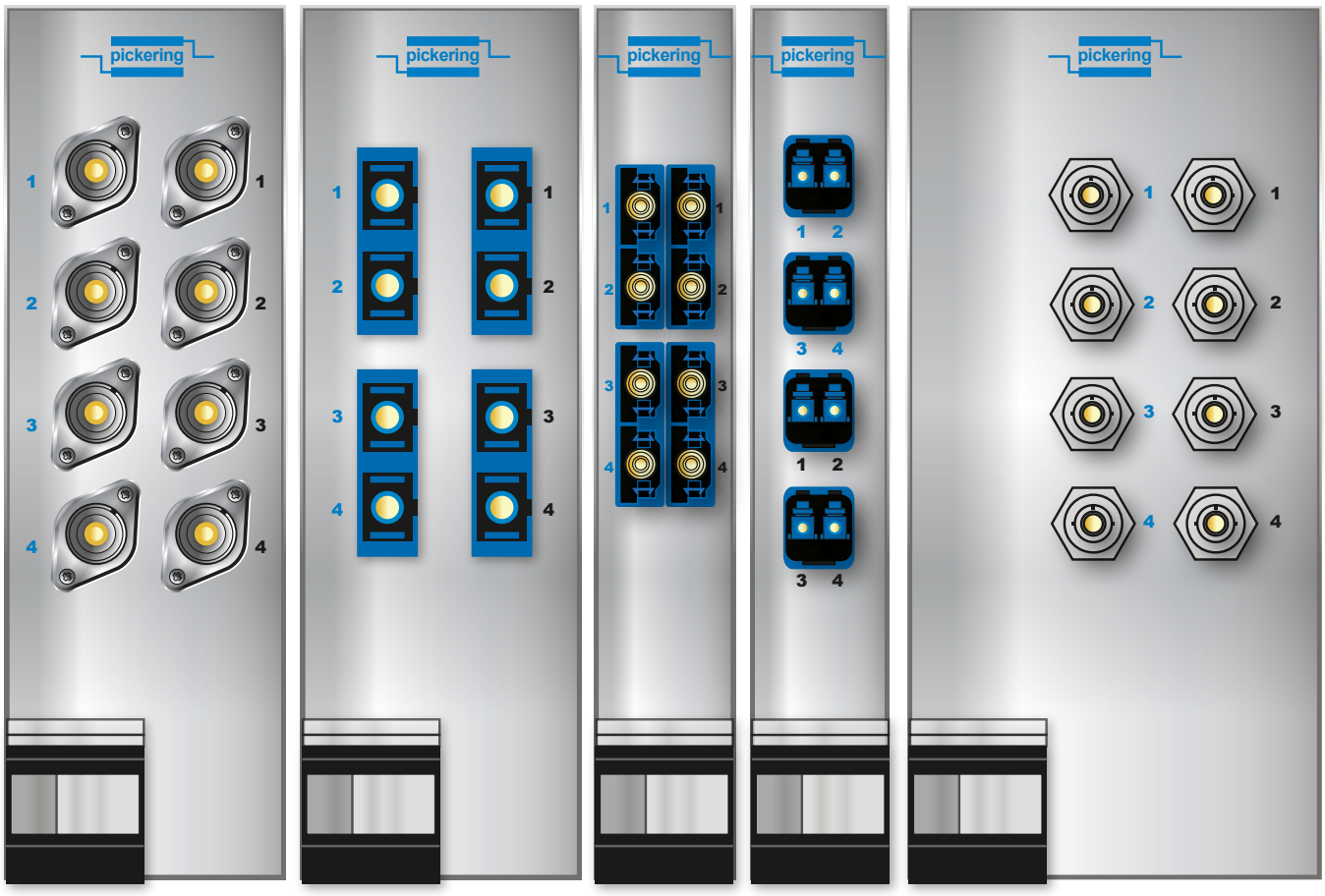
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2 Channel Insert/Bypass Switch 1



2 Channel Insert/Bypass Switch 2



40-860-022/122 | 40-860-222, 40-860-222-M | 40-860-322 | 40-860-422 | 40-860-522-M

Figure 5.2 - Dual Fiber Optic Insert/Bypass Switch Module 40-860: Connector Positions

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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.

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Table 7.1 - Fiber Optic Insert/Bypass Switch Module 40-860: Relay Numbering

Signal Path		Board Relay No. 40-860-012
Channel 1 to Channel 3 Channel 2 to Channel 4	Default	SW2
Channel 1 to Channel 4 Channel 2 to Channel 3	Energised	

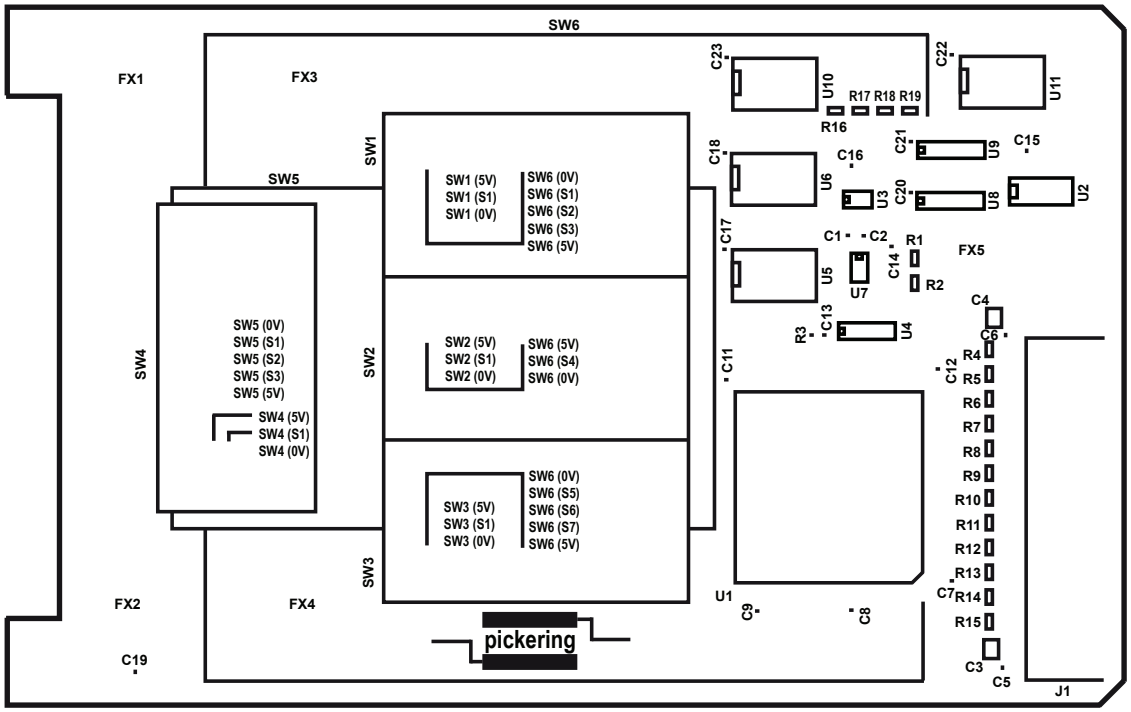


Figure 7.1 - Fiber Optic Insert/Bypass Switch Module 40-860: Component Layout

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Table 7.2 - Dual Fiber Optic Insert/Bypass Switch Module 40-860: Relay Numbering

Bank	Signal Path		Board Relay Nos. 40-860-022/122/122
1	Channel 1 to Channel 3 Channel 2 to Channel 4	Default	SW1
	Channel 1 to Channel 4 Channel 2 to Channel 3	Energised	
2	Channel 1 to Channel 3 Channel 2 to Channel 4	Default	SW3
	Channel 1 to Channel 4 Channel 2 to Channel 3	Energised	

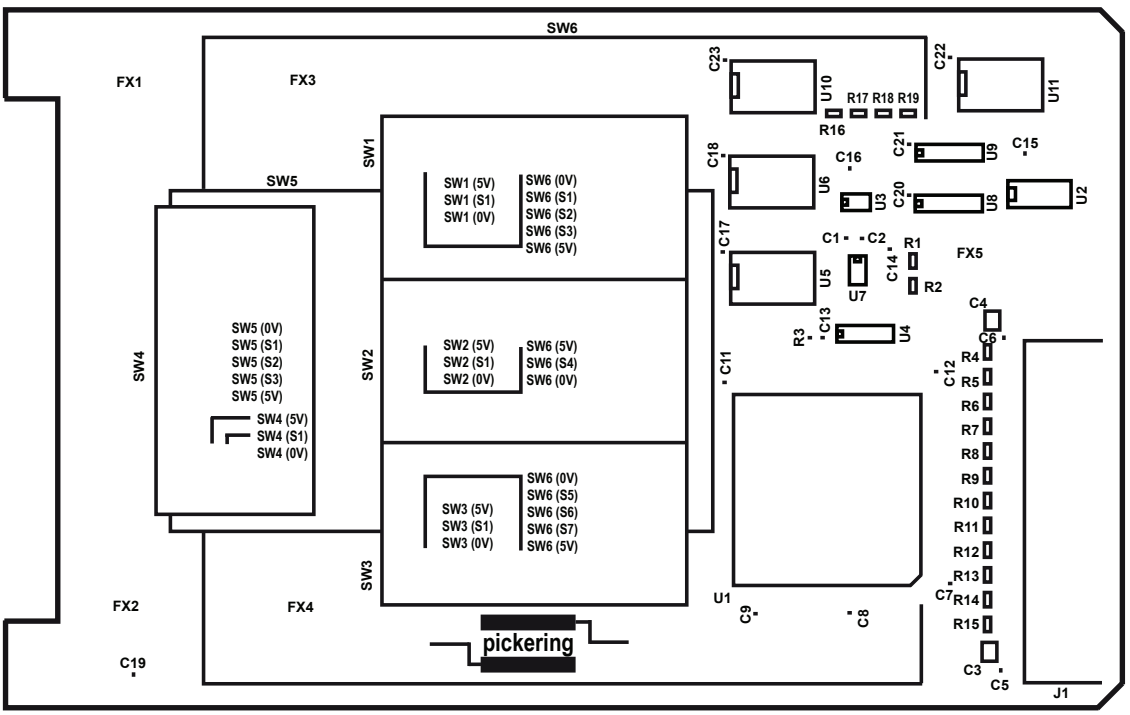


Figure 7.2 - Dual Fiber Optic Insert/Bypass Switch Module 40-860: Component Layout

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