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USER MANUAL

SINGLE 8 CHANNEL FIBRE OPTIC MULTIPLEXER MODULE (MODEL No. 40-852-018/118/218/318/418/518M)



Issue 2.0 January 2008

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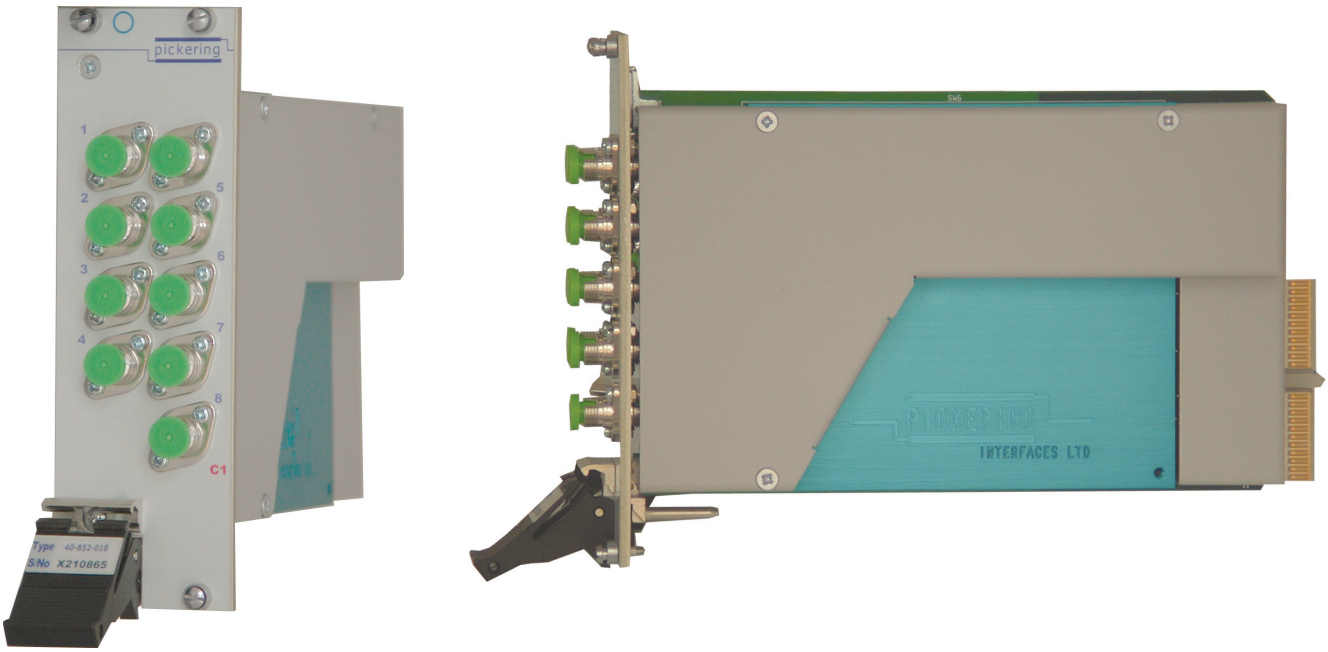
SECTION 1 - INTRODUCTION

GENERAL

The 40-852-018/118/218/318/418/518M Single 8 Channel Fibre Optic Multiplexer Module forms part of the System 40 PXI Programmable Switching system. The module operates over a 1200 to 1600nm bandwidth and supports single-mode fibre applications, connecting a single channel to one of four channels. The fibre optic multiplexer connects the optical channel by redirecting the optical signal into a selected output fibre. This is achieved using Micro-Mechanical Mirrors driven by a highly precise mechanism and activated via an electrical control signal.

The module is provided with a range of six different front panel connectors. The type of connector determines whether the module is single slot, two slot or three slot width as follows:

- FC/APC, 1200 to 1600nm Single 8 Channel Fibre MUX, 2 slot (40-852-018)
- FC/PC, 1200 to 1600nm Single 8 Channel Fibre MUX, 2 slot (40-852-118)
- SC/PC, 1200 to 1600nm Single 8 Channel Fibre MUX, 2 slot (40-852-218)
- MU (mini SC), 1200 to 1600nm Single 8 Channel Fibre MUX, 1 slot (40-852-318)
- LC, 1200 to 1600nm Single 8 Channel Fibre MUX, 1 slot (40-852-418)
- SC, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot (40-852-218-M)
- ST, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot (40-822-518-M)



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SECTION 2 - SPECIFICATION

General Specification (All Versions)

Fiber Switch Type:	**MEMS**
Internal Fiber Type:	**SM 9/125**
Wavelength:	1240 to 1640nm
Insertion loss (4 channel versions):	1dB Typ
Insertion loss (8 channel versions):	1.5dB Typ
Return loss (APC version):	60dB Min
Return loss (other versions):	55dB Min
Polarization dependent loss (PDL):	0.05dB Max
Repeatability:	±0.01dB Max
Crosstalk:	-60dB Max
Optical Input Power:	300mW Max
Thermal Stability: (-10 to 75°C insertion loss variation)	0.2dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time:	1ms
Cycle Rate:	500/sec
Module Weight:	<0.8Kg typ.

Additional Specification (MM Versions)

Fiber Switch Type:	**MEMS**
Internal Fiber Type:	**MM 62.5/125**
Wavelength:	700 to 1700nm
Insertion loss (4 channel versions):	1dB Typ
Insertion loss (8 channel versions):	1.5dB Typ
Return loss (other versions):	55dB Min
Polarization dependent loss (PDL):	0.05dB Max

Programming Information

Pickering provide kernel, VISA and IVI drivers which are compatible with Windows 2000/XP operating systems, the VISA driver is also compatible with the LabVIEW RT operating system.

These drivers may be used with a variety of programming environments and applications including :-

National Instruments products (LabVIEW/LabWindows/CVI/ Switch Executive/MAX/TestStand etc.)

Microsoft Visual Studio products (Visual Basic/Visual C+)

Agilent VEE

Mathworks Matlab

Other environments are also supported, please contact Pickering with specific enquiries.

Power Requirements

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

Width and Dimensions

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

PXI & CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.1. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.
Compatible with PCI Express Hybrid Slot.

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.

Latest Details

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

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).

Product Order Codes

8 Channel Multiplexer Versions	
FC/APC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-018**
FC/PC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-118**
SC/PC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-218**
MU (mini SC), 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 1 slot	**40-852-318**
LC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 1 slot	**40-852-418**
SC, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-218-M**
ST, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-518-M**
4 Channel Multiplexer Versions	
FC/APC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-014**
FC/PC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-114**
SC/PC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 2 slot	**40-850-214**
MU (mini SC), 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-314**
LC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-414**
SC, 700 to 1700nm, Multi-Mode Single 4 Channel Fiber MUX, 2 slot	**40-850-214-M**
ST, 700 to 1700nm, Multi-Mode Single 4 Channel Fiber MUX, 2 slot	**40-850-514-M**

Other Fiber Connector Styles

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

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to 55°C
Humidity:	Up to 95% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m

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SECTION 3 - INSTALLATION

SOFTWARE INSTALLATION

First install the appropriate Pickering PXI switch card drivers by running the installer program Setup.exe, either from the CD-ROM supplied, or by downloading the latest version from our website http://www.pickeringtest.com - the recommended method. There are different versions of the Setup program to suit different Windows versions and software environments. 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.

HARDWARE INSTALLATION

CAUTION

Electrostatic discharge can damage the components on the module. To avoid such damage in handling the board, touch the anti-static bag to a metal part of the chassis before removing the board from the bag.

Ensure that there is adequate ventilation in accordance with the PXI Specification.

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.

CAUTION

Do not raise the injector/ejector handle whilst inserting the module. The module will not insert properly unless the handle is in its downward position.

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. Screw the front panel of the module to the front panel mounting rail.
8. In a system employing MXI-3 to connect a desktop PC to a PXI chassis or to link multiple chassis, power-up the system as follows:

a. For a system comprising a PC and one chassis, power up the chassis before powering up the PC.

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 PC or chassis containing the system controller.

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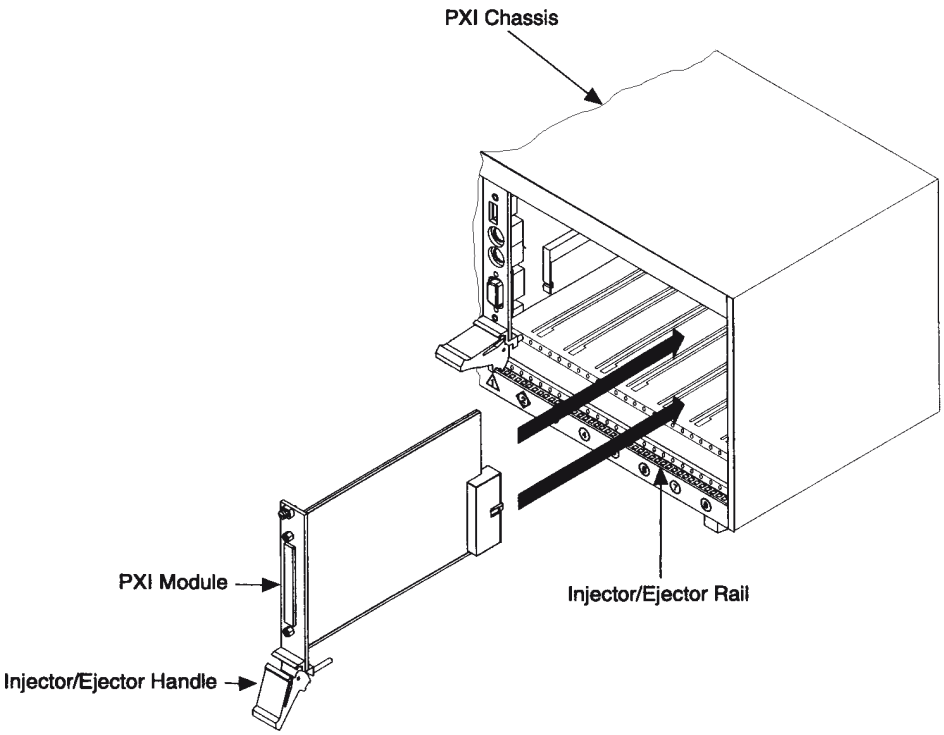


Figure 3.1 - Installing the module into a PXI/Compact PCI Chassis

TESTING OPERATION

Start the Test Panels application from the Programs>>Pickering>>PXI Utilities menu. If you are a LabVIEW user, run “Test Panels (LabVIEW VI)”; if not, run “Test Panels (EXE)”. A selector panel will appear, listing all installed Pickering PXI switch 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.

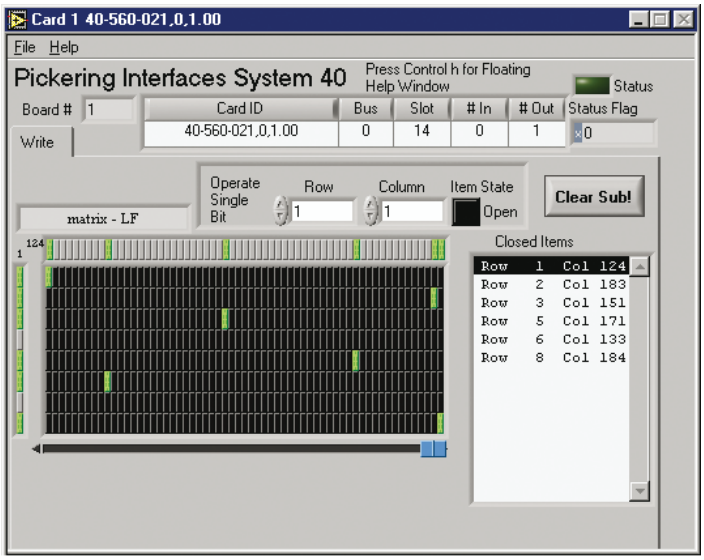


Figure 3.2 - Typical Test Panel Display

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As an alternative to the Test Panels, the simple Terminal Monitor program PILMon (again on the Programs>>Pickering>>PXI Utilities menu) allows access to all functions of Pickering switch cards through a command-line interface. In PILMon, enter “HE” for help on it’s commands.

Please note that both the Test Panels and Terminal Monitor gain exclusive access to the cards, and so only one of them can be operational at any time.

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SECTION 4 - PROGRAMMING

Programming options for Pickering Interfaces PXI Cards

Software drivers are supplied for Microsoft Windows 2000/XP operating systems, with specific support for the following development environments:

- Microsoft Visual Basic
- Microsoft Visual 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.

Three 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 Iviswtch 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 lists.

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 is 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.

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 PCIbus.
- For operating systems other than Windows LabVIEW, LabWindows/CVI and Switch Executive are trademarks of National Instruments Corporation.

Details of the above drivers is available in separate documentation.

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Card Architecture

Sub-units

Pickering PXI cards contain one or more independently addressable functional blocks, or sub-units. Sub-unit numbers begin at 1, and separate sequences are used for input and output functions. This number is used in function calls to access the appropriate block. Generally, sub-unit numbers correspond directly to the bank numbers specified in hardware documentation.

Sub-unit examples:

Model	Configuration	INPUT sub-unit #1	OUTPUT sub-unit #1	OUTPUT sub-unit #2	OUTPUT sub-unit #3
40-110-021	16 SPDT switches	None	16 SPDT switches	None	None
40-290-121	Dual Programmable resistors + 16 SPDT switches	None	Resistor #1	Resistor #2	16 SPDT switches
40-490-001	Digital I/O	16-channel inputs	32-channel outputs	None	None
40-511-021	Dual 12 x 4 matrix	None	12 x 4 matrix #1	12 x 4 matrix #2	None

Sub-unit characteristics

The numbers of input and output sub-units in a card can be obtained using functions from the libraries:

pipx40 `pipx40_getSubCounts`

pilpxi `PIL_EnumerateSubs`

pipx40 `pipx40_getSubType, pipx40_getSubInfo`

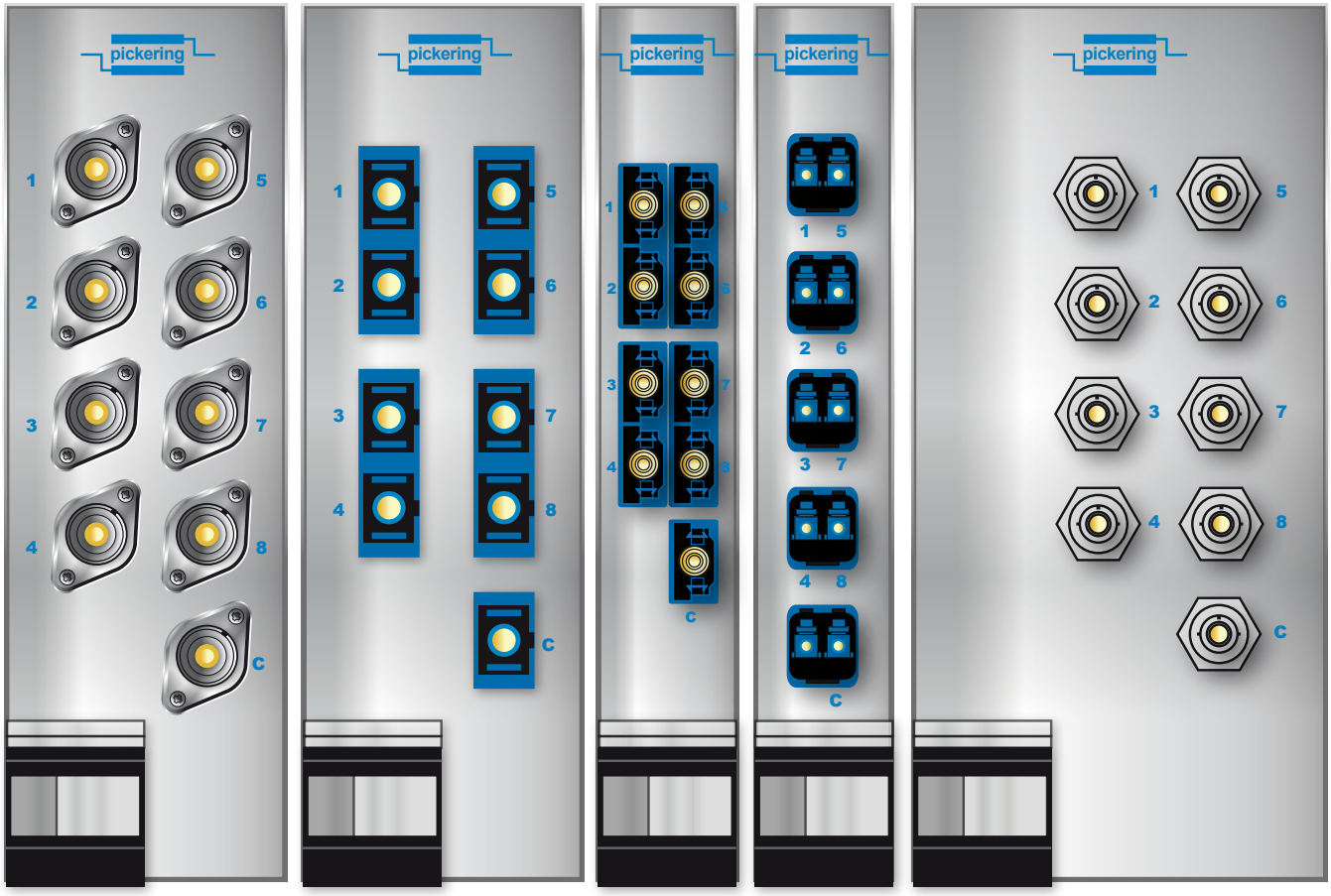
pilpxi `PIL_SubType, PIL_SubInfo`

For further detail of how to access and use Pickering drivers the user is advised to refer to the documentation provided with the installed drivers.

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SECTION 5 - CONNECTOR PIN OUTS

Figure 5.1 provides pin outs for the Fibre Optic Multiplexer Modules in the 40-852 Single Mux range.



40-852-018/118 | 40-852-218, 40-852-218-M | 40-852-318 | 40-852-418 | 40-852-518-M

Figure 5.1 - Fibre Optic Multiplexer Module 40-852-018/118/218/318/418/518M: Pin Outs

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SECTION 6 - TROUBLESHOOTING

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 MXI-3 you should check the integrity of all MXI-3 links. When the system is powered up, and during Windows start-up, you should expect to see periodic activity on the MXI-3 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 it's 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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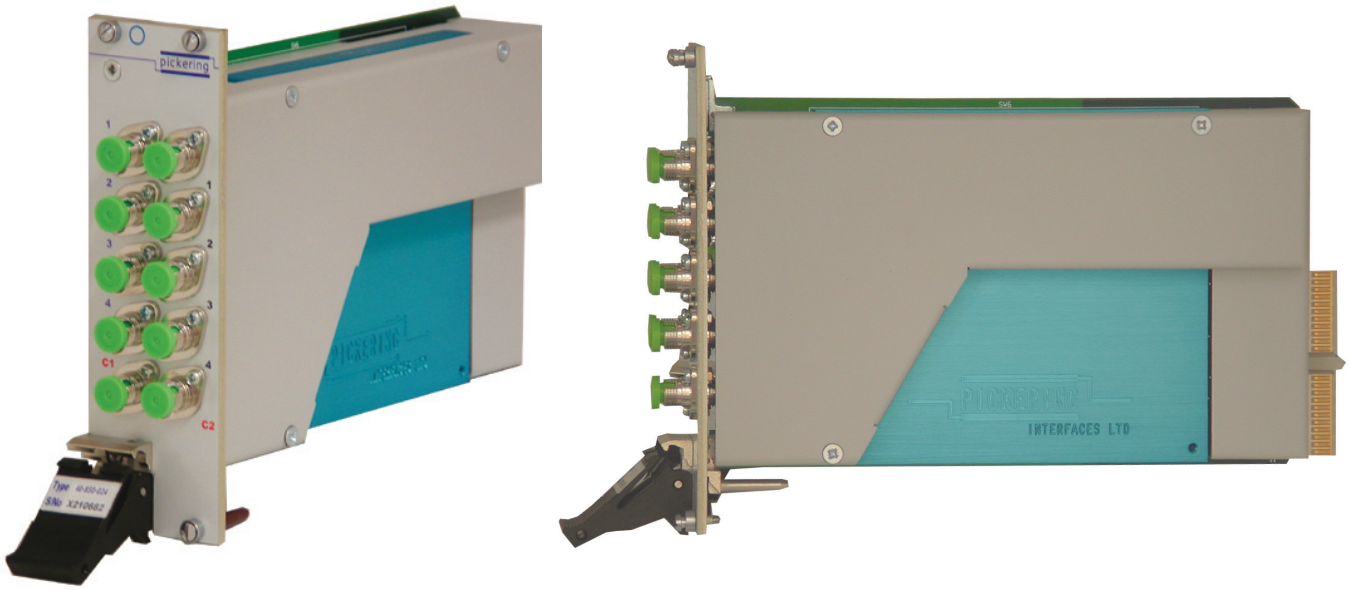
SECTION 7 - FUNCTIONAL DESCRIPTION

MECHANICAL DESCRIPTION

The Fibre Optic Multiplexer Module conforms to the 3U height (128mm) Eurocard standard. The module comprises the following:

- CPCI Ejector Handle
- Front panel mounted FC/APC, FC/PC, SC/PC, MU (mini SC), or LC connectors
- One Fibre Optic Multiplexer
- Compact PCI backplane connector
- PCI Bridge (U1)
- Control Logic

The front panel is secured to the PCB by two M2.5 x 6mm pan-head posi-drive screws.



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FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 7.1. The Fibre Optic Multiplexer Module is powered by a +5V input via Compact PCI connector J1. The module comprises a Fibre Optic multiplexer (SW6) which connects an optical channel by redirecting the optical signal received at the common input into a selected output fibre. This is achieved using Micro-Mechanical Mirrors driven by a highly precise mechanism which is activated via electrical control signals from Drivers U8 and U9. The output register is addressed by PCI bridge U1 to output the required signal. PCI Bridge U1 is configured by EEPROM U2.

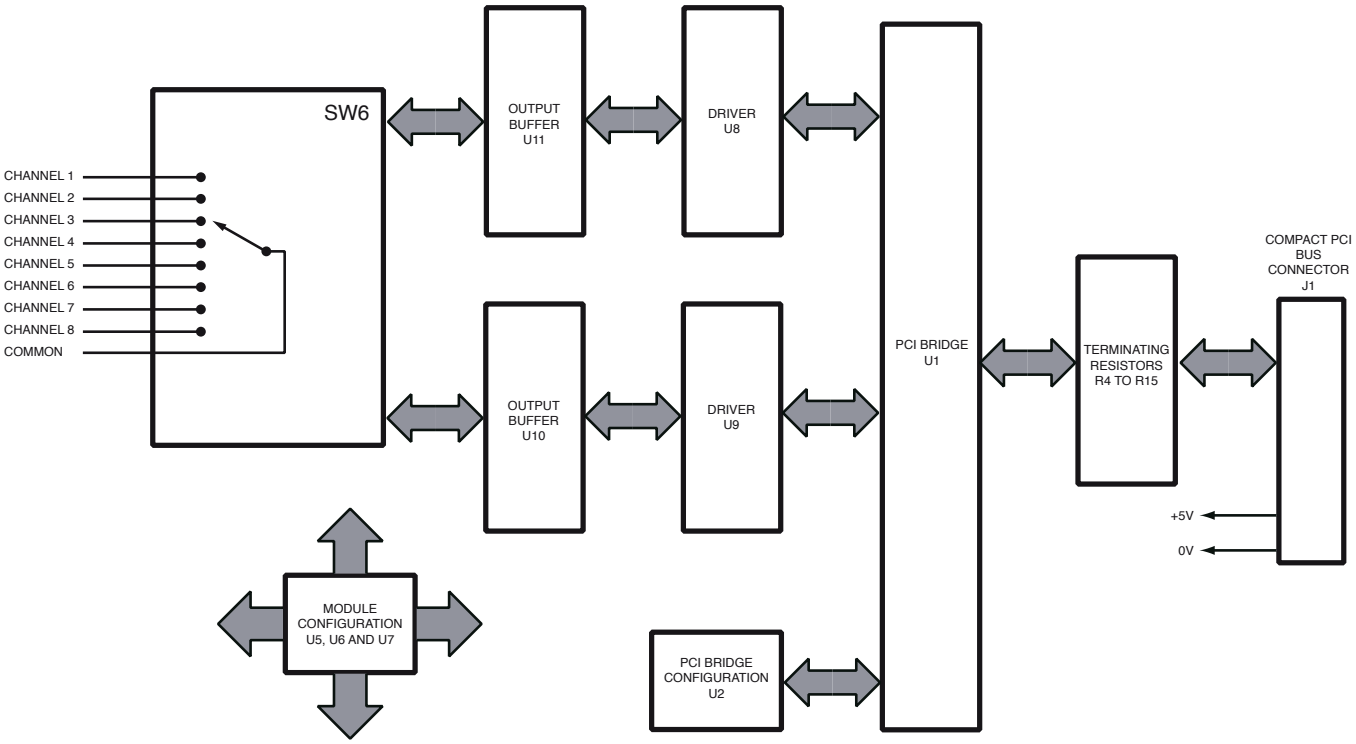


Figure 7.1 - Fibre Optic Multiplexer Module: Functional Block Diagram

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SECTION 8 - PARTS LIST

The following pages provide a parts list and a component layout diagram for the 40-852 single 8 to 1 Mux Fibre Optic Multiplexer Modules.

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Table 8.1 provides a parts list and Figure 8.1 a component layout diagram for the 40-852 single 8 to 1 Mux Fibre Optic Multiplexer Modules.

TABLE 8.1 - Fibre Optic Multiplexer Module 40-852-018/118/218/318/418/518M Parts List

PCB Location	Pickering Interfaces Part Number	Part Description	Quantity
R1, R2, R16 to R19	C/RS/079	RESISTOR N/W 4 x 10k 1206	6
R3	C/RS/085	RESISTOR 10k 0805	1
R4 to R15	C/RS/102	RESISTOR N/W 4 x 10R 1206	12
SW6	C/MS/137	8 WAY OPTICAL SWITCH	1
C1, C2, C5 to C9, C11 to C23	C/CP/034	CAPACITOR 100nF 0603	20
C3, C4	C/CP/024	CAPACITOR 10uF TANT SMD	2
J1	C/CN/355	cPCI J1 CONNECTOR	1
U1	C/IC/098	PCI9050 PQFP	1
U2	C/IC/099	93CS46 DIP	1
	C/IC/035	8 PIN DIP SKT	1
U3	C/IC/056	7705 SOP	1
U4	C/IC/087	74HCT32 SOP	1
U5	C/IC/100	74HCT273 SOP	1
U6, U10, U11	C/IC/101	74HCT244 SOP BUFFER	3
U7	C/IC/090	93C56 SOP	1
U8, U9	C/IC/108	IC Relay Driver CD74HCT4094M	2

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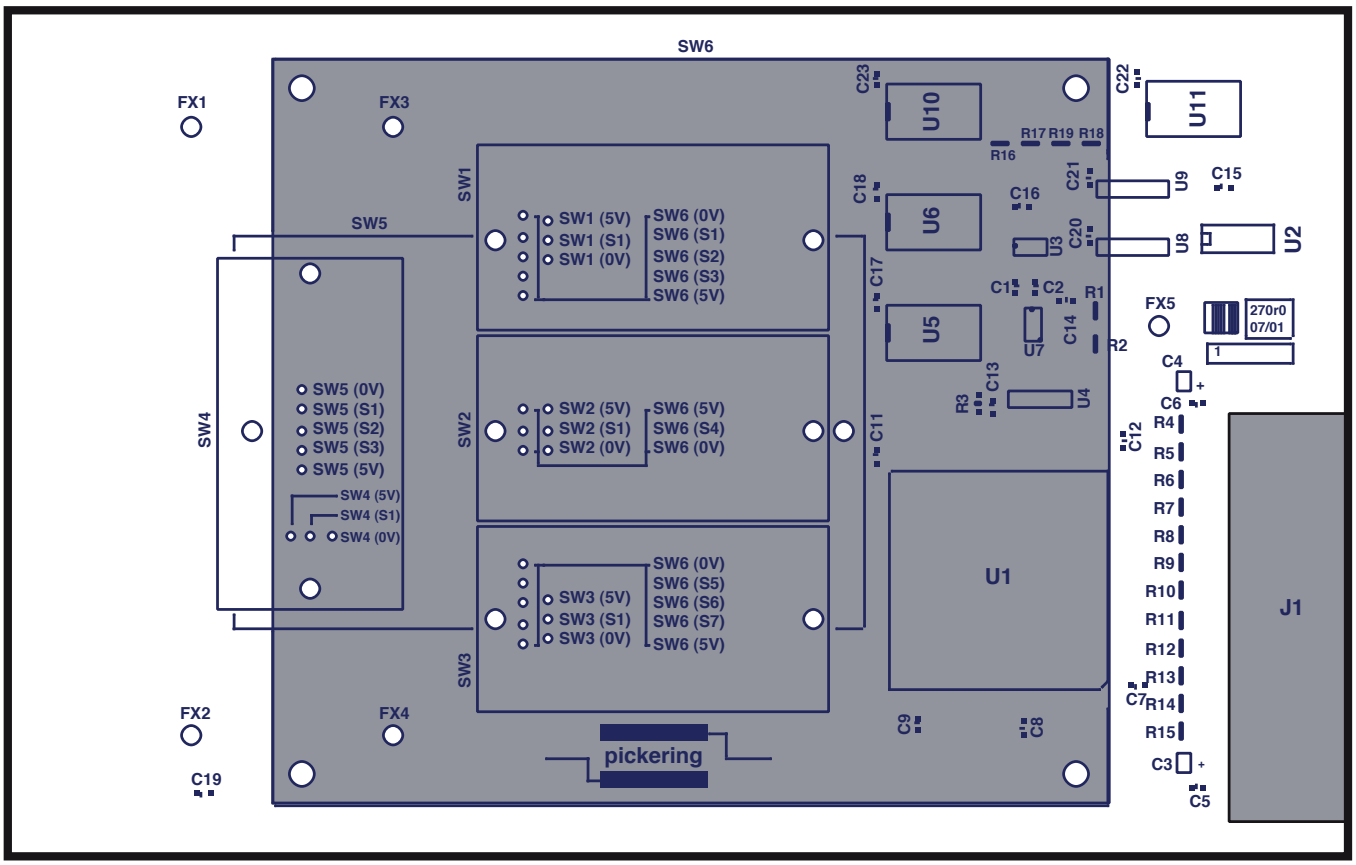


Figure 8.1 - Fibre Optic Multiplexer Module: Component Layout

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SECTION 9 - CAUTION



CAUTION
Handling of Electrostatic-Sensitive Semiconductor Devices

Certain semiconductor devices used in the equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their unterminated state, or sub-units containing these devices:

(1) Persons removing sub-units from an 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.

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