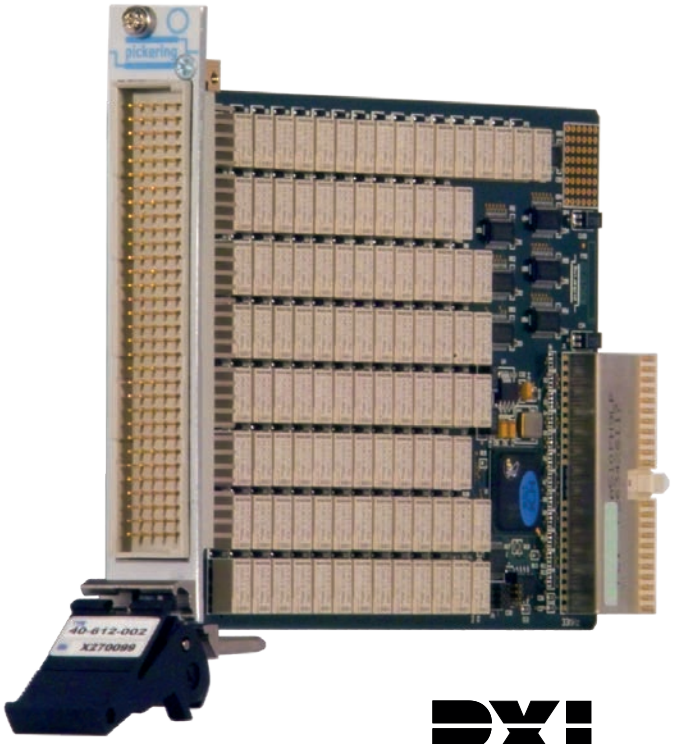
40-612 User Manual

PXI Very High Density Versatile Multiplexer Module



Issue 7.2 June 2022

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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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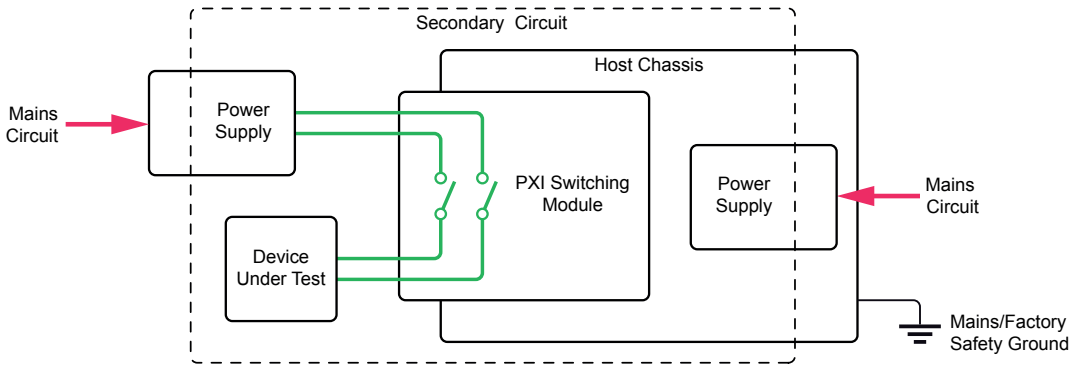
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WARNINGS AND CAUTIONS

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.	

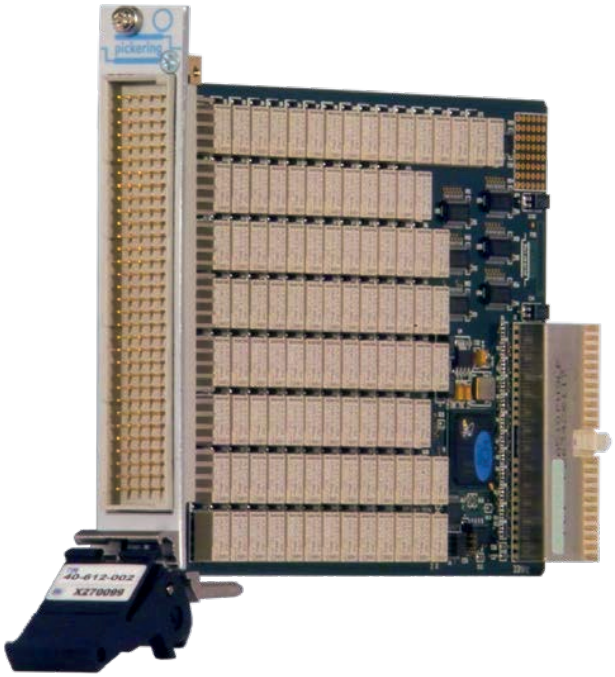
CAUTION - PRODUCT DOCUMENTATION	SYMBOL
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.	

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

- Versatile Multiplexer - For Now & The Future
- Flexible Software Configured Architecture Can be Set to Different Configurations as Needs Change
- 8-Bank 8-Channel 2-Pole Multiplexers, 1-Pole Selection, Inter-bank Connection & Isolation Switching
- Many Different Configurations up to a Single 128-Channel 1-Pole Multiplexer, Including Mixed Channel Count & Custom Configurations
- Maximum Current 2 A Hot or Cold Switching
- Switch up to 300 VDC/250 VAC and up to 60 W Max Power
- Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST* ™
- 3 Year Warranty



The 40-612 Very High Density Versatile Multiplexer module features a wide range of software selectable switching configurations. It is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. Typical applications include signal routing in ATE and data acquisition systems. The 40-612 uses high quality electro-mechanical relays, connections are made via a front panel 160-pin DIN 41612 connector.

MUX Configurations

The module can be software configured as one of a large number of different multiplexers. Relays allow the banks to be set as 1 or 2-pole and inter-bank switching allows a maximum of 128 channels (refer to schematic diagram overleaf).

Typical Configurations
8 Banks, 16 Channels, 1-Pole 8 Banks, 8 Channels, 2-Pole
4 Banks, 32 Channels, 1-Pole 4 Banks, 16 Channels, 2-Pole
2 Banks, 64 Channels, 1-Pole 2 Banks, 32 Channels, 2-Pole
1 Bank, 128 Channels, 1-Pole 1 Bank, 64 Channels, 2-Pole

Pickering's Range of Versatile Multiplexer Modules with the same switching architecture				
Model No.	**Max Voltage**	**Max Current**	**Operate Time**	**Relay Type**
40-612	300 VDC/ 250 VAC	2 A	3 ms	Electro-mechanical
40-681	±60 V	350 mA	200 µs	Solid State
40-682	±40 V	250 mA	80 µs	Solid State
40-683	±100 V	125 mA	500 µs	Solid State

The versatility of the 40-612's architecture allows all banks to be inter-linked and common connections used as extra signal inputs.

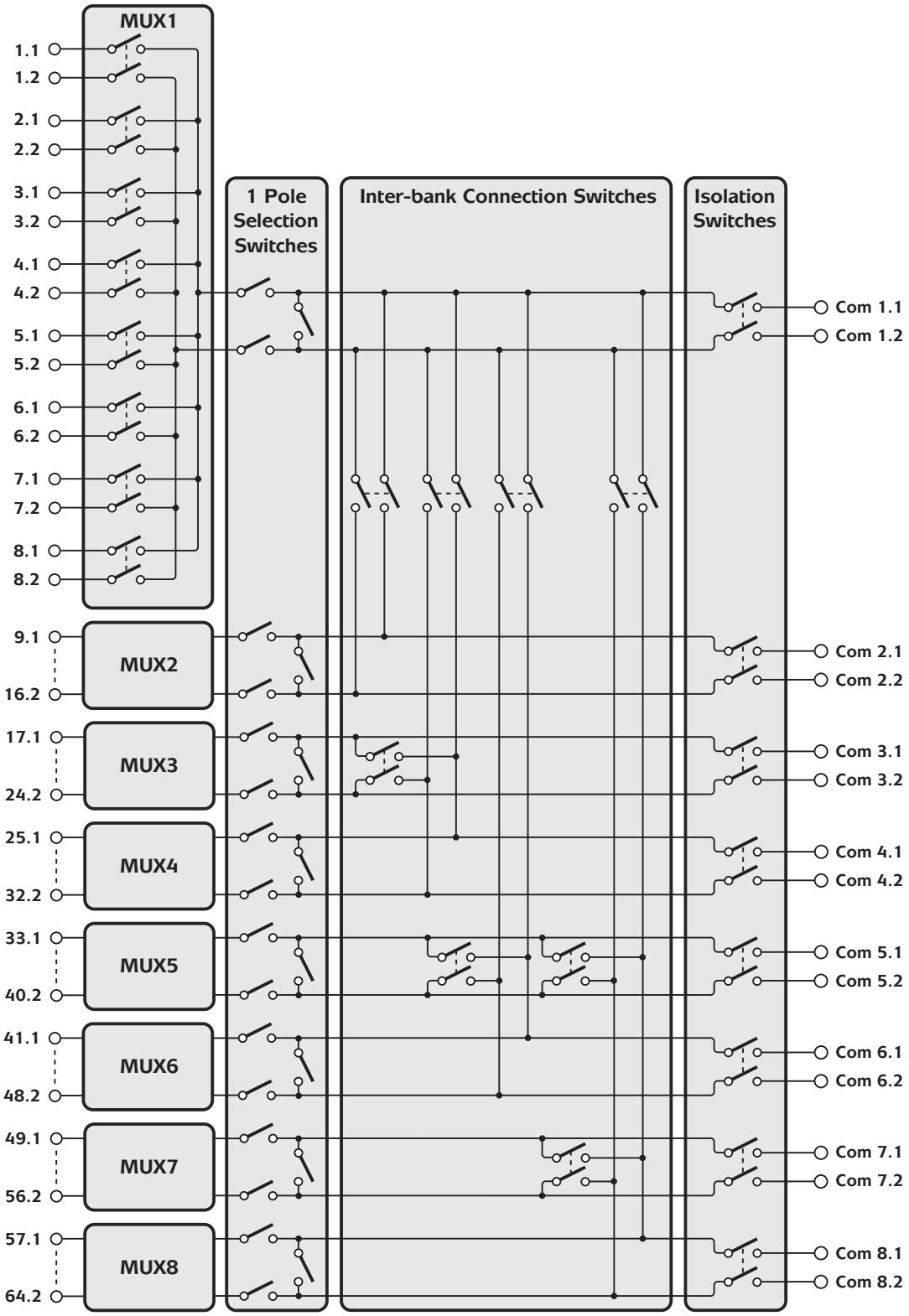
The 40-612 may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. For 2-pole configurations, multiple channels can be simultaneously selected without restriction. For 1-pole configurations the channels that can be simultaneously selected are limited because the multiplexer uses 2-pole relays.

Isolation switching connects only the currently active multiplexer bank to the analog common, keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by daisy chaining the common signals from multiple modules.

Supported by *eBIRST*

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

For more information go to: pickeringtest.com/ebirst



Switching Diagram for the 40-612-002 Very High Density 8 Bank, 8 Channel, 2 Pole Versatile Multiplexer

Relay Type

The 40-612 is fitted with electro-mechanical 2-pole relays, 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:	300 VDC/250 VAC*
Max Power:	62.5 VA, 60 W from 30 V to 220 VDC, 30 W to 300 VDC (resistive load)
Max Switch Current:	2 A
Max Continuous Carry Current:	2 A
Max Pulsed Carry Current Example (for a single switch path):	6 A for 100 ms (up to 10 % duty cycle)
Initial Path Resistance - On:	500 mΩ max, 300 mΩ typical †
Path Resistance - Off:	$>10^9$ Ω
Minimum Voltage:	100 µV
Thermal Offset:	<10 µV †
Operate Time:	6 ms typical, 3 ms for multichannel mode
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):	$>1x10^5$ (2 A 30 VDC)
	$>1x10^5$ (0.1 A 300 VDC)

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

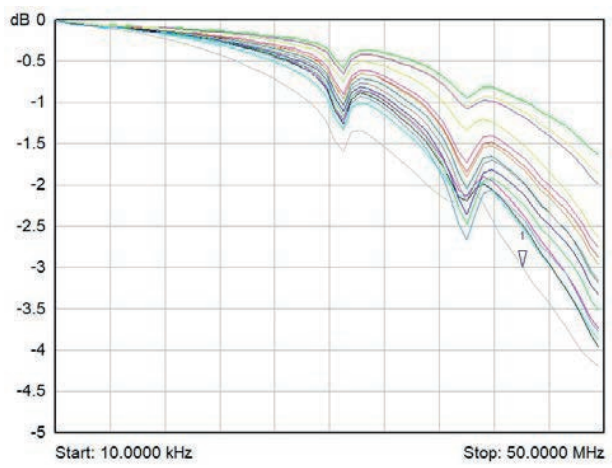
† Path resistance & thermal offset are dependent upon the signal route selected.

RF Specification

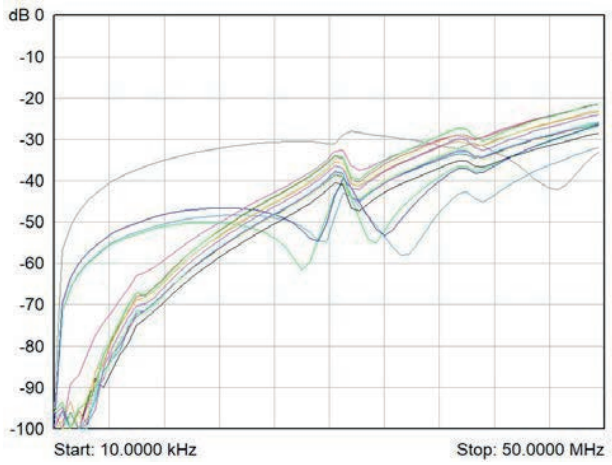
Bandwidth (typical):	-3 dB insertion loss, 50 Ω: 40 MHz 1.5:1 VSWR, 50 Ω: 20 MHz	
Isolation (typical):	10 kHz:	95 dB
	100 kHz:	85 dB
	1 MHz:	50 dB
	10 MHz:	30 dB

Power Requirements

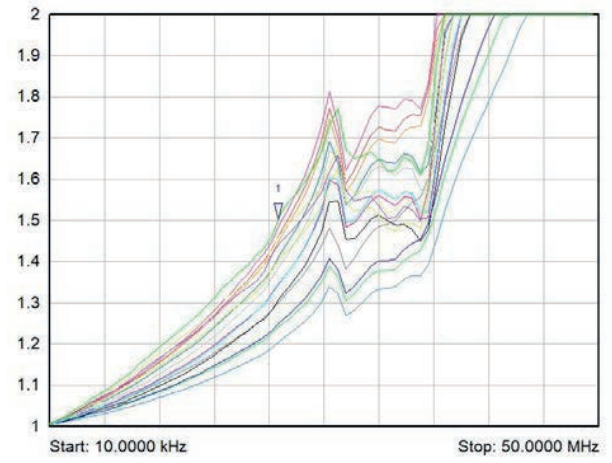
+3.3 V	+5 V	+12 V	-12 V
5 mA	2 A max (typ 280 mA)	0	0



40-612-002 Typical Insertion Loss to 50 MHz



40-612-002 Typical Isolation to 50 MHz



40-612-002 Typical VSWR to 50 MHz

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 160-pin male DIN 41612 connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

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.

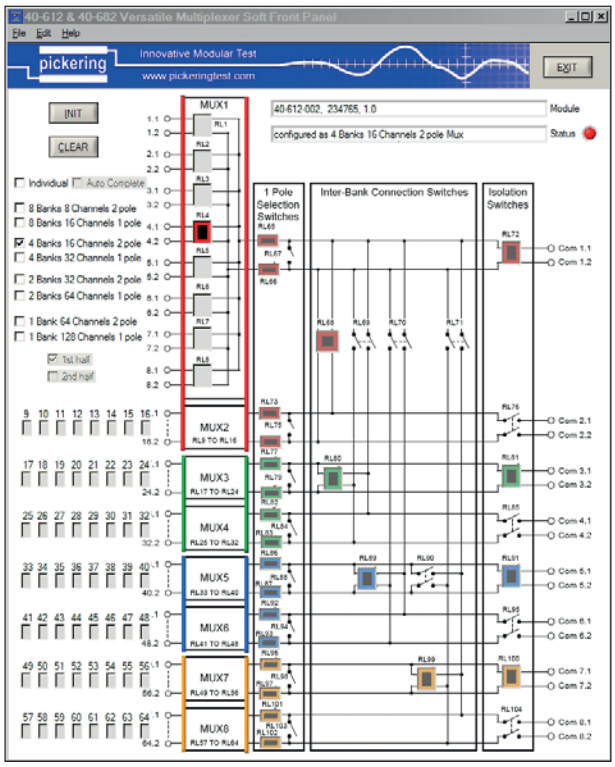
Uses a 33 MHz 32-bit backplane interface.

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.

Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-612-002, 40-681-001, 40-682-002 and 40-683-001 allows easy setting of various multiplexer configurations from 8-bank 8-channels 2-pole, up to 1-bank 128-channels 1-pole as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.



Soft Front Panel for the 40-612, 40-681, 40-682 and 40-683 Very High Density Versatile Multiplexers

Product Order Codes - Versatile Multiplexer

Channel Selection	Model Variant	Order Code
Multiple	**8-Bank, 8-Channel, 2-Pole MUX**	**40-612-002**

Note: The above module is available to select multiple channels.

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
40-612	**93-002-001**	**93-002-410**

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
40-612	**91-100-001**

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

Mating Connectors & Cabling

For connection accessories for the 40-612 module please refer to the 90-001D 160-pin DIN 41612 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

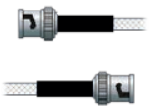
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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

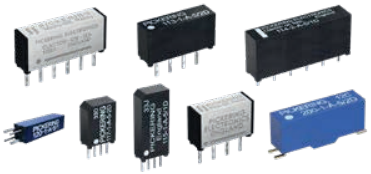


Mass Interconnect

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 Relay Division. 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 and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection 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

40-612 Functional Description

The 40-612 can be configured by the user to provide many different multiplexer configurations. This functional description provides an overview of these possibilities based on the functional diagram in Figure 2.1.

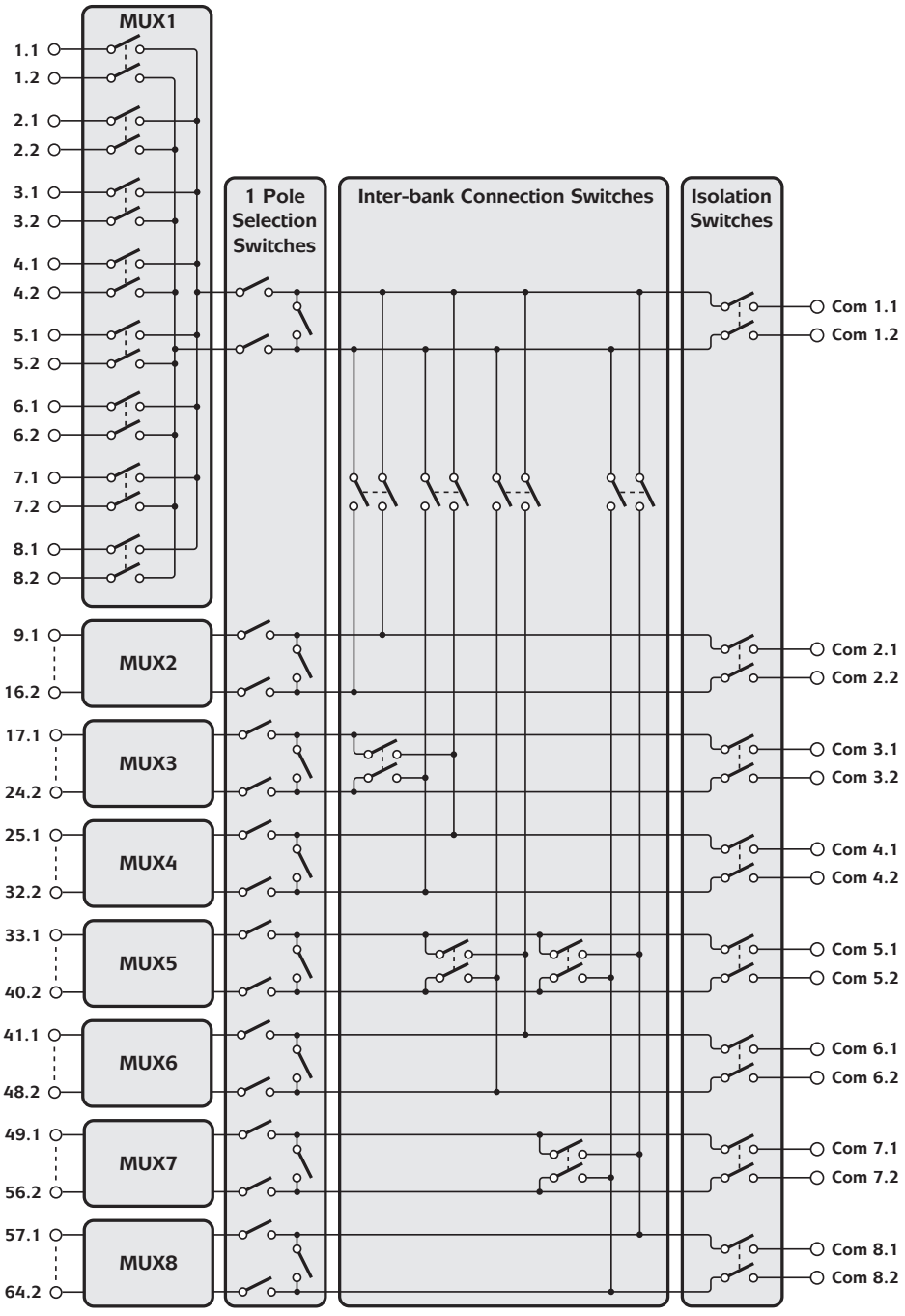


Figure 2.1 - 40-612 Module: Switching Functional Diagram

MUX1 to MUX8

Each of these MUX building blocks (MUX1 to MUX8) implements a two pole 8 way MUX. All the MUXs are identical. To simplify the descriptions this is now referred to as the output MUX.

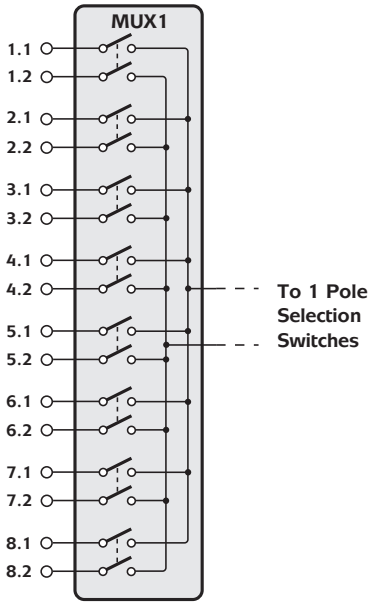


Figure 2.2 - 40-612 Module: Output MUX

1 Pole Selection Switches

Each of these switches allows the MUX to be set to be one pole or two pole, or allows the corresponding MUX output to be disconnected:

2 pole setting

Series relays are closed and shunt switch is open. The inputs to the output MUX are routed from the COM lines.

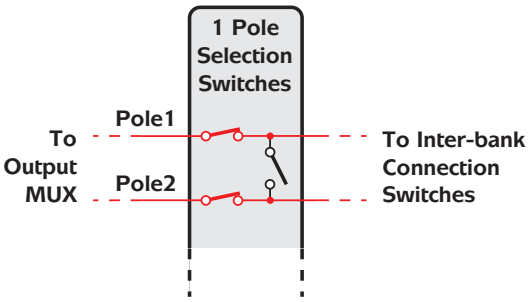


Figure 2.3 - 40-612 Module: 2-Pole Setting

1pole setting

The shunt switch is closed so that the two input connections are connected, one of the series relays is open and the other is closed so one side of the output MUX is connected but not the other side. Using the two series relays to select just one pole of the output MUX allows the MUX to perform the function of 16 way MUX

Note: The method of creating a 1-pole MUX described means that the commons of the two poles are connected together.

A 1-pole MUX can also be created where the shunt switch is only closed when the the Pole 2 switch is closed, it is open when the Pole 1 switch is closed. It can also be configured so the shunt switch is only closed when the Pole 1 series switch is closed and open when the Pole 2 switch is closed.

The difference in the two methods is that with the shunt switch closed in both situations the user can use the pole 1 or pole 2 common for connection since they are connected together. With the alternative scheme the user must determine if they connect to the pole 1 or the pole 2 common and be aware that for some settings the two poles are linked together.

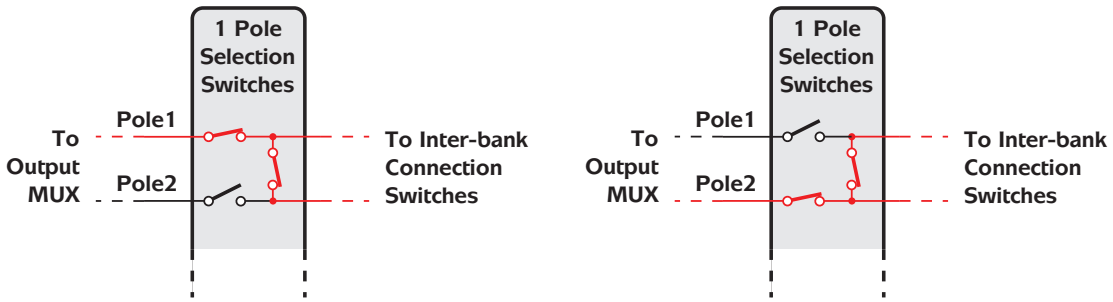


Figure 2.4 - 40-612 Module: Selecting Pole 1 or Pole 2 to Create a 1-Pole MUX

Isolation Setting

The output MUX can be disconnected by opening the series relays

Note: Disconnection can also be set by using the Isolation Switches, however if the module is being set as a wide MUX then it may on some occasions be desirable to use this control to lower the capacitive loading on the MUX by disconnecting unwanted sections>

Example: If MUX1 and MUX2 are used together to form a 32 way MUX and a connection is closed from COM1 to MUX2 then MUX1 can be disconnected using this setting.

Interbank Connection Switches

This set of switches can be used to connect MUX1 to MUX8 in various combinations to form a wider MUX. The bank switching is tiered to allow the choice of different combinations:

Interbank COM1 First Tier

COM1 can be connected to COM2, COM4, COM6 and/or COM8 directly using two pole switches. This allows MUX2, MUX4, MUX6 and/or MUX8 to be added to COM1 to provide a wider MUX

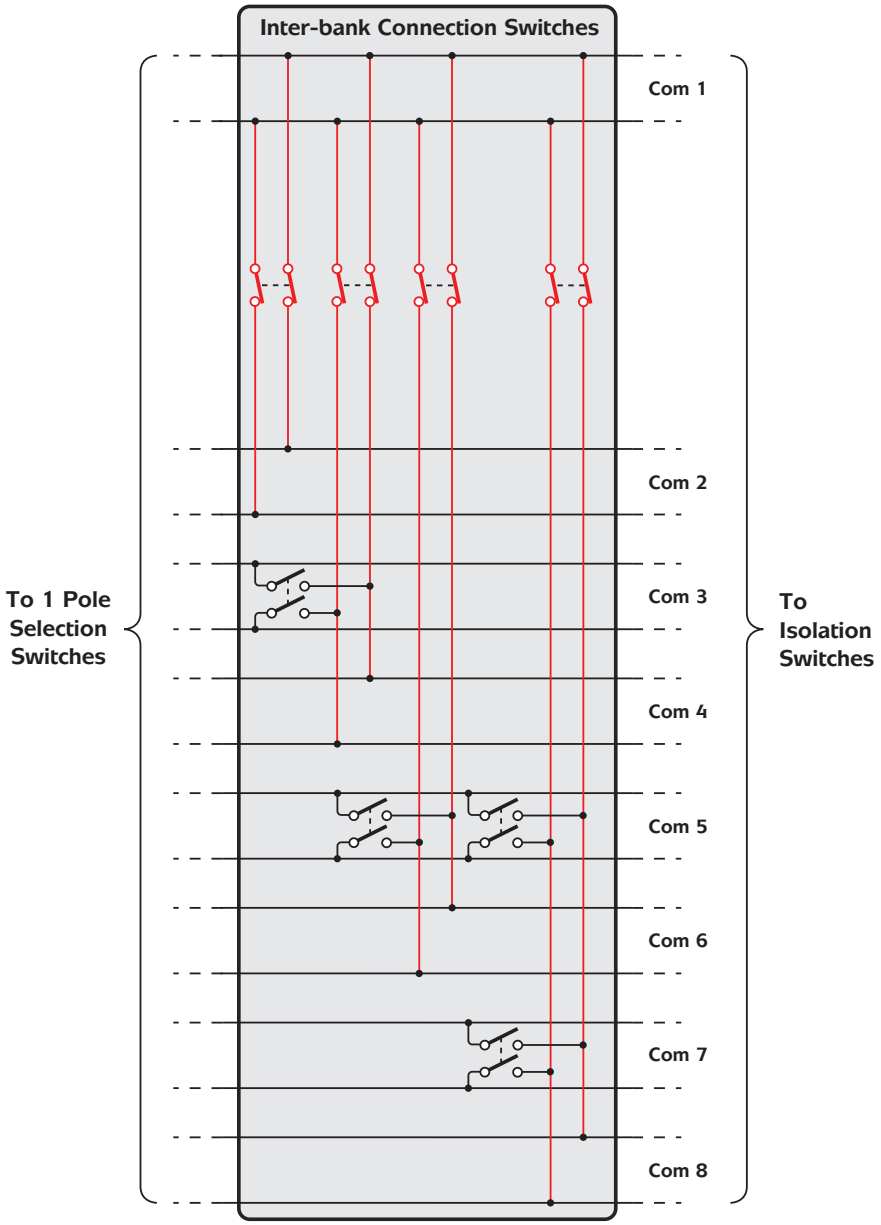


Figure 2.5 - 40-612 Module: Inter-Bank Connections - First Tier Switches

Interbank Second Tier Connections

There are then a second tier of switches that can either be used to expand the connections to COM1 listed above by connecting these COM lines to a COM line already connected to COM1 or used to simply expand the COM line they are associated with.

Example 1: COM 1 to COM 8 can all be connected together by closing the first tier relays above and then closing the second tier relays identified above.

Example 2: COM1, COM2, COM4, COM6, COM8 can be combined together as a single MUX and COM 3, COM5, Com7 used as separate MUXs by closing the first tier switches and leaving the second tier switches open.

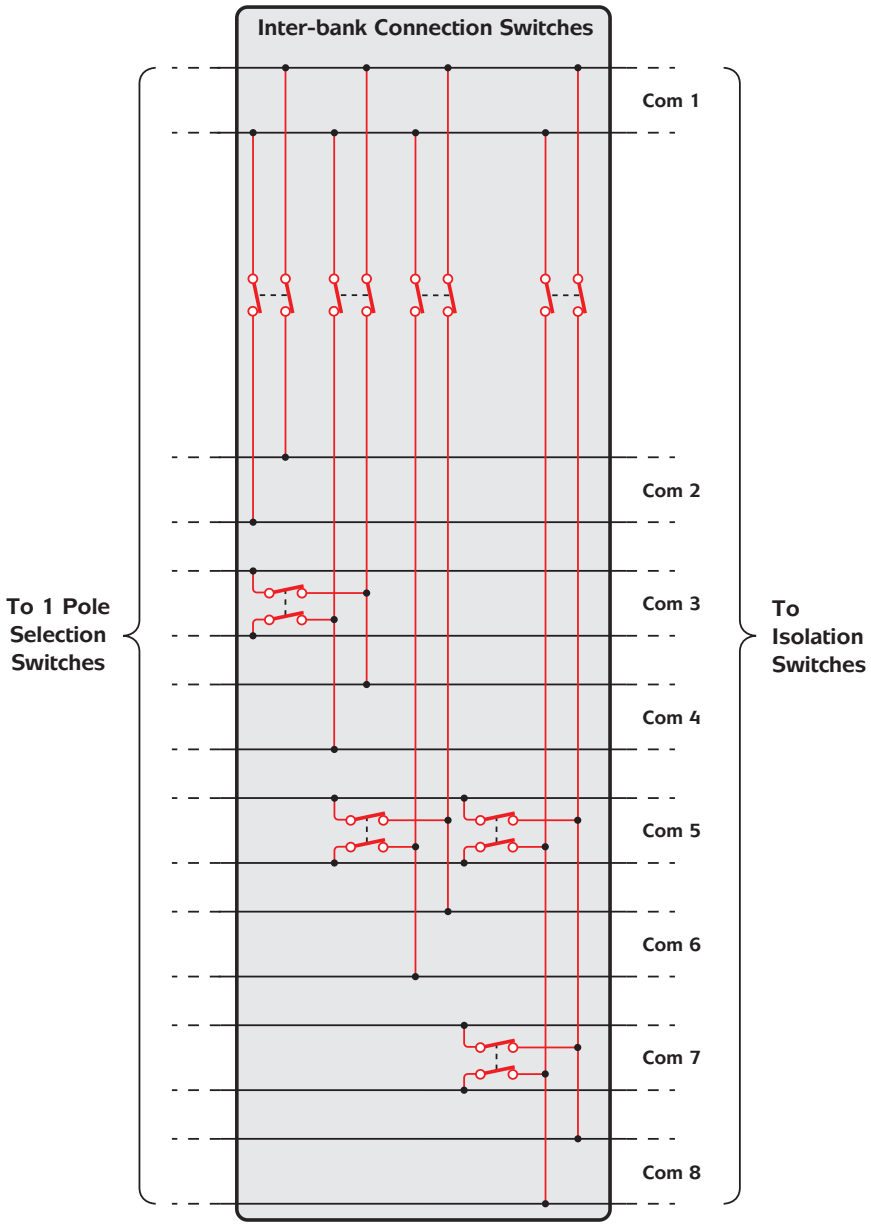


Figure 2.6 - 40-612 Module: Inter-Bank Connections - First and Second Tier Switches

Isolation Switches

The isolation switches simply disconnect the COM ports from the MUXs. This can be desirable because it removes any loading these connections might put on the test system and also ensures that if the module is used to create wider MUXs then the signals on the other COM ports can be disconnected from those being routed to the output MUX and therefore avoid an unintentional connection.

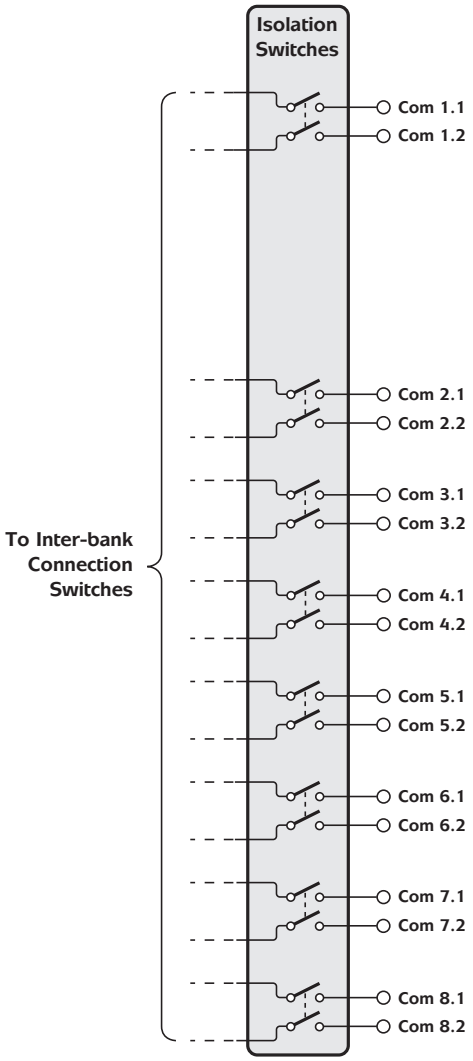


Figure 2.8 - 40-612 Module: Isolation Switches

Very Wide MUXs

It should be noted that the COM ports can be used as MUX outputs in some circumstances.

Example: If COM 1 is used as the input and all output MUXs connected to it then COM2 to COM 8 can be used as additional MUX outputs by closing the interbank and isolation switches.

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.

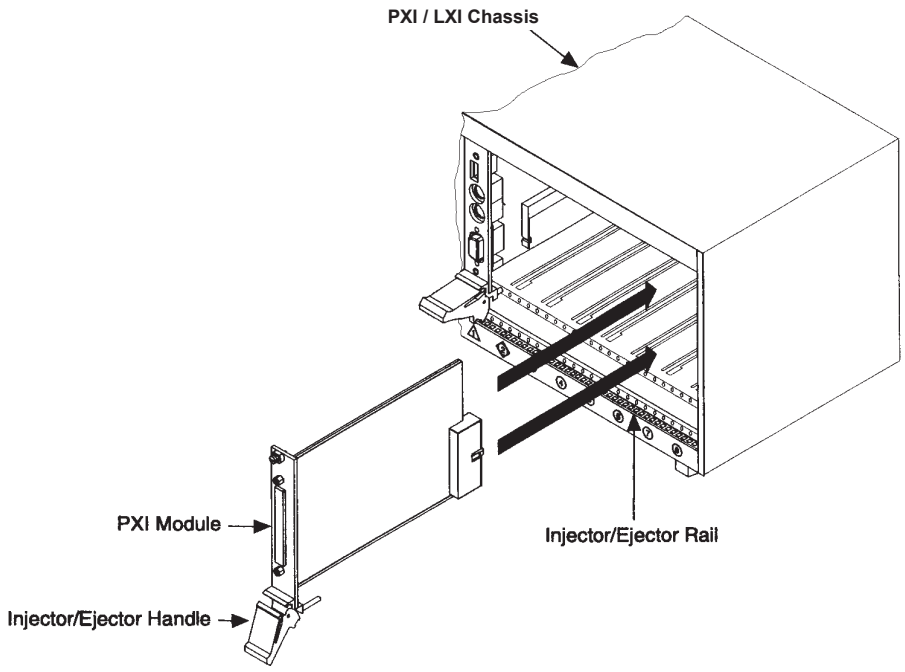


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

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.

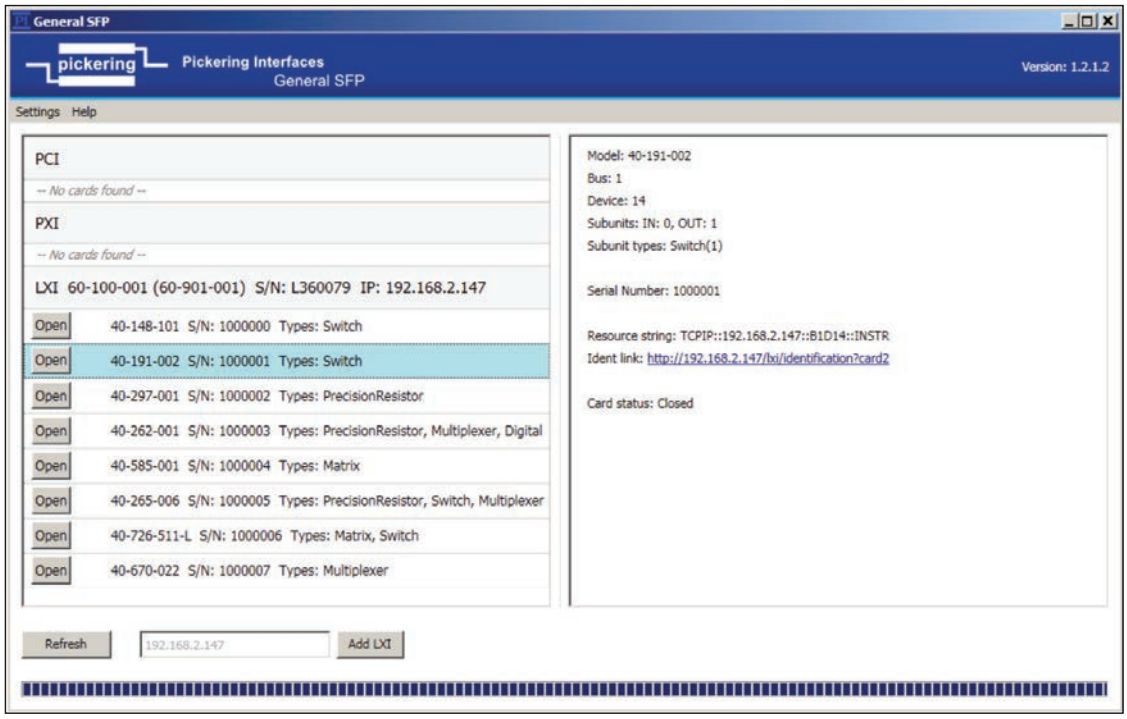


Figure 3.3 - General Soft Front Panel Selector

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

PROGRAMMING THE MODULE

Sub-unit Information

This card is a versatile MUX card and may be programmatically modified to many different configurations.

In it's basic state it performs as a 8 banks of 2-wire 8x1 MUX units, with additional switching these banks may be connected together to form MUXes of larger size, for example16x1, 24,1, 32x1 etc. It is also possible to use the 2-wires as individual inputs, changing a 2-wire 8x1 section into a 1-wire 16x1.

In terms of sub-units, discussed briefly in the preceding section, the 40-612 contains 13 sub-units as follows:

Sub-Unit	Size	Use
1 thro 8	8 bits	2-wire 8x1 MUX on each sub-unit
9	8 bits	output isolator switches
10	8 bits	pole 1 selection
11	8 bits	pole 2 selection
12	8 bits	pole shorting
13	8 bits	inter-bank linking switches

Table 4.1 describes the function of each bit in each sub-unit.

Figure 4.1 shows a schematic of the switch wiring on the card.

Card Configurations

2 wire, 8 off 8x1 MUX Use

In order to use the card as the basic 2-wire, 8 off, 8x1 MUX the switches should be set as follows:

Sub-unit 10 and 11 should both be set to hex ff to energise all the pole selection relays.
Sub-unit 12 should be set to hex 00 to leave the shorting relays un-energised
Sub-unit 13 should be set to hex 00 to leave all inter-bank linking relays un-energised

Then inputs are selected on sub-units 1 thro 8 and the appropriate output isolation selected on sub-unit 9 to route the paths to the output pins.

Building Wider MUX Units

To transform the card into a 2-wire, 4 off, 16x1 MUX, proceed as follows:

Energise RL68 to connect bank 1 to bank 2
Energise RL80 to connect bank 3 to bank 4
Energise RL89 to connect bank 5 to bank 6
Energise RL99 to connect bank 7 to bank 8

To do this, energise bits 1, 5, 6 and 7 in sub-unit 13.

Now sub-units 1 and 2 control the 16 inputs to the first 16x1 MUX, sub-units 3 and 4 the second 16x1 MUX etc.

Sub-unit 10 and 11 should both be set to hex ff to energise all the pole selection relays.

Sub-unit 12 should be set to hex 00 to leave the shorting relays un-energised

Sub-unit 9 is used to connect the MUX to the output pins, now however, due to the linking, there is a choice of 2 possible output locations, or indeed both simultaneously. Setting bit 1 will connect the 16x1 MUX to output Com1.1/2, selecting bit 2 will connect to Com2.1/2.

Use as a 1-wire MUX

Appropriate switch configuration can allow a 2-wire 8x1 MUX to operate as a 1-wire 16x1 MUX.

The 16 inputs are connected to the 8x2 wires of the MUX. Then the pole selection relays are used to select which input path is routed to the output section. The user may choose to either wire together Com1.1 and Com1.2, or energise the pole shorting relay to route both poles to both outputs, or use one output channel and alternate energisation of the shorting relay to route the required input to the output.

Both these techniques may be used in any combination resulting in a very large number of possible configurations varying from the basic 2-wire, 8 off, 8x1 MUX, to a 2-wire 1 off 64x1 MUX, to a 1-wire, 1 off 128x1 MUX, or any possible combination.
Examples using the 3 main PXI drivers available are shown on the following pages.

Direct I/O Driver pilpxi - Setting card to 2-wire, 4 off, 16x1 MUX

```
DWORD card;
DWORD data[1];

PIL_OpenSpecifiedCard(4, 15, &card);

// Configure for 2-wire, 4-off, 16x1 MUX

// First set the linking switches to link adjacent banks

// using OpBit commands to set individual bits
PIL_ClearSub(card, 13);
PIL_OpBit(card, 13, 1, 1);
PIL_OpBit(card, 13, 5, 1);
PIL_OpBit(card, 13, 6, 1);
PIL_OpBit(card, 13, 7, 1);

/* or using WriteSub command to set entire sub-unit

data = 0x71;
PIL_WriteSub(card, 13, data);

*/

// Now energise all the pole selection relays

data[0] = 0xFF;
PIL_WriteSub(card, 10, data);
PIL_WriteSub(card, 11, data);

// Then make sure the pole shorting relays are un-energised

data[0] = 0x00;
PIL_WriteSub(card, 12, data);

// Connect all the output isolation relays

data[0] = 0xFF;

PIL_WriteSub(card, 9, data);

// Select input 1 of first 16x1 MUX (1st bit on first 8x1 bank)

PIL_OpBit(card, 1, 1, 1);

// Select input 9 of first 16x1 MUX (1st bit on 2nd 8x1 bank)

PIL_OpBit(card, 2, 1, 1);

PIL_CloseSpecifiedCard(card);
```

VISA Driver pipx40 - Setting card to 2-wire, 4 off, 16x1 MUX

```
ViSession vi;
ViUInt32 data[1];

pipx40_init("PXI4::15::INSTR", 0, 0, &vi);

// Configure for 2-wire, 4-off, 16x1 MUX

// First set the linking switches to link adjacent banks

// using setChannelState commands to set individual bits
pipx40_clearSub(card, 13);
pipx40_setChannelState(vi, 13, 1, 1);
pipx40_setChannelState(vi, 13, 5, 1);
pipx40_setChannelState(vi, 13, 6, 1);
pipx40_setChannelState(vi, 13, 7, 1);

/* or using setChannelPattern command to set entire sub-unit

data = 0x71;

pipx40_setChannelPattern(vi,13, data);

*/

// Now energise all the pole selection relays

data[0] = 0xFF;
pipx40_setChannelPattern(vi,10, data);
pipx40_setChannelPattern(vi,11, data);

// Then make sure the pole shorting relays are un-energised

data[0] = 0x00;
pipx40_setChannelPattern(vi,12, data);

// Connect all the output isolation relays

data[0] = 0xFF;
pipx40_setChannelPattern(vi,9, data);

// Select input 1 of first 16x1 MUX (1st bit on first 8x1 bank)

pipx40_setChannelState(vi, 1, 1, 1);

// Select input 9 of first 16x1 MUX (1st bit on 2nd 8x1 bank)

pipx40_setChannelState(vi, 2, 1, 1);

pipx40_close(vi);
```

IVI Driver

The IVI-C driver pi40iv has been coded to cope with the versatility of this card and has a number of common configurations included in its card definition file. This relieves the user of the complexity of deciding which switches need be in what state and totally automates the process.

The following configurations are provided in the pi40iv.ini driver configuration file in your installation. Use one of these strings in the InitWithOptions function. The format of the string is 40-612-002-(pole)w(bank)/(channel)x1 as shown below:

40-612-002	
40-612-002-2w8/8x1	(8-Bank, 8-Channel, 2-Pole)
40-612-002-2w4/16x1	(4-Bank, 16-Channel, 2-Pole)
40-612-002-2w2/32x1	(2-Bank, 32-Channel, 2-Pole)
40-612-002-1w8/16x1	(8-Bank, 16-Channel, 1-Pole)
40-612-002-1w4/32x1	(4-Bank, 32-Channel, 1-Pole)
40-612-002-1w2/64x1	(2-Bank, 64-Channel, 1-Pole)
40-612-002-1w128x1	(1-Bank, 128-Channel, 1-Pole)
40-612-002-2w64x1	(1-Bank, 64-Channel, 2-Pole)

The driver will initialise the card in the desired configuration, allocate suitable channel names for that configuration and deal with all the switching complexities detailed above.

For example:

```
ViRsrc rsrc = "PXI4::15::INSTR";

ViString opt =  "Simulate=1," \
                "RangeCheck=1," \
                "QueryInstrStatus=1," \
                "Cache=1," \
                "DriverSetup=Model:40-612-002-2w4/16x1;";

pi40iv_InitWithOptions(rsrc, VI_TRUE, VI_TRUE, opt, &vi);
```

Will lead to channel names "comA" and "chA1" thro "chA16"
"comB" and "chB1" thro "chB16"
"comC" and "chC1" thro "chC16"
"comD" and "chD1" thro "chD16"

Other configurations are possible, refer to the pi40iv programming manual in your installation folder, or contact support@pickerinttest.com for details.

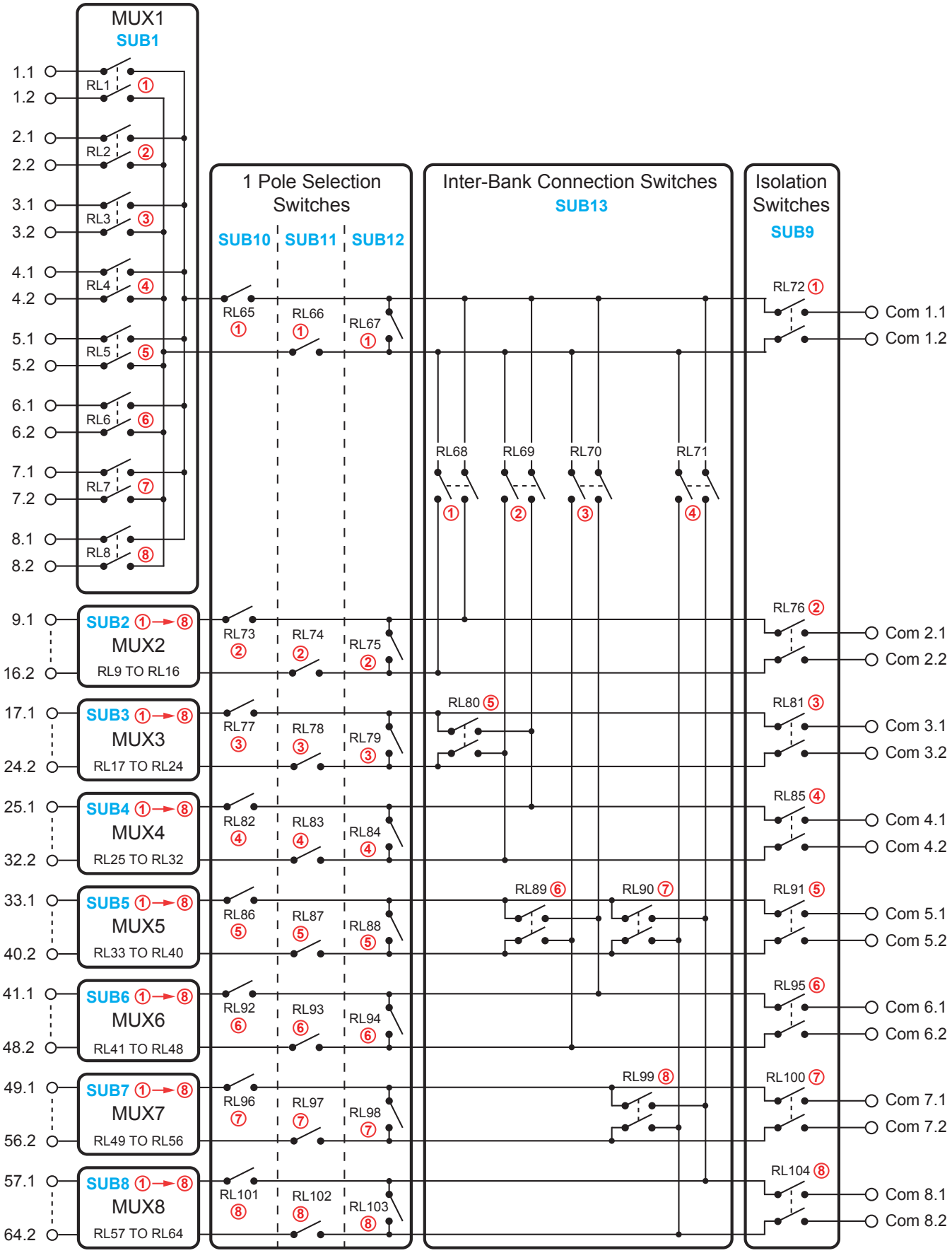


Figure 4.1 - Relay Switching Schematic, programming sub-unit numbers are in blue, bit numbers within a sub-unit are in circled in red.

Programming Look-up Tables

Table 4.1 Physical Relay To Software Sub-Unit Cross Reference

Logical Sub-Unit	Sub-unit Type	Logical Chan	Switch Function	Bank	Channel	Function	Relay (RL)
1	MUXM(8)	1	Channel	1	1	Bank 1, Channel 1	1
1	MUXM(8)	2	Channel	1	2	Bank 1, Channel 2	2
1	MUXM(8)	3	Channel	1	3	Bank 1, Channel 3	3
1	MUXM(8)	4	Channel	1	4	Bank 1, Channel 4	4
1	MUXM(8)	5	Channel	1	5	Bank 1, Channel 5	5
1	MUXM(8)	6	Channel	1	6	Bank 1, Channel 6	6
1	MUXM(8)	7	Channel	1	7	Bank 1, Channel 7	7
1	MUXM(8)	8	Channel	1	8	Bank 1, Channel 8	8
2	MUXM(8)	1	Channel	2	1	Bank 2, Channel 1	9
2	MUXM(8)	2	Channel	2	2	Bank 2, Channel 2	10
2	MUXM(8)	3	Channel	2	3	Bank 2, Channel 3	11
2	MUXM(8)	4	Channel	2	4	Bank 2, Channel 4	12
2	MUXM(8)	5	Channel	2	5	Bank 2, Channel 5	13
2	MUXM(8)	6	Channel	2	6	Bank 2, Channel 6	14
2	MUXM(8)	7	Channel	2	7	Bank 2, Channel 7	15
2	MUXM(8)	8	Channel	2	8	Bank 2, Channel 8	16
3	MUXM(8)	1	Channel	3	1	Bank 3, Channel 1	17
3	MUXM(8)	2	Channel	3	2	Bank 3, Channel 2	18
3	MUXM(8)	3	Channel	3	3	Bank 3, Channel 3	19
3	MUXM(8)	4	Channel	3	4	Bank 3, Channel 4	20
3	MUXM(8)	5	Channel	3	5	Bank 3, Channel 5	21
3	MUXM(8)	6	Channel	3	6	Bank 3, Channel 6	22
3	MUXM(8)	7	Channel	3	7	Bank 3, Channel 7	23
3	MUXM(8)	8	Channel	3	8	Bank 3, Channel 8	24
4	MUXM(8)	1	Channel	4	1	Bank 4, Channel 1	25
4	MUXM(8)	2	Channel	4	2	Bank 4, Channel 2	26
4	MUXM(8)	3	Channel	4	3	Bank 4, Channel 3	27
4	MUXM(8)	4	Channel	4	4	Bank 4, Channel 4	28
4	MUXM(8)	5	Channel	4	5	Bank 4, Channel 5	29
4	MUXM(8)	6	Channel	4	6	Bank 4, Channel 6	30
4	MUXM(8)	7	Channel	4	7	Bank 4, Channel 7	31
4	MUXM(8)	8	Channel	4	8	Bank 4, Channel 8	32

Table 4.1 Physical Relay To Software Sub-Unit Cross Reference (continued)

Logical Sub-Unit	Sub-unit Type	Logical Chan	Switch Function	Bank	Channel	Function	Relay (RL)
5	MUXM(8)	1	Channel	5	1	Bank 5, Channel 1	33
5	MUXM(8)	2	Channel	5	2	Bank 5, Channel 2	34
5	MUXM(8)	3	Channel	5	3	Bank 5, Channel 3	35
5	MUXM(8)	4	Channel	5	4	Bank 5, Channel 4	36
5	MUXM(8)	5	Channel	5	5	Bank 5, Channel 5	37
5	MUXM(8)	6	Channel	5	6	Bank 5, Channel 6	38
5	MUXM(8)	7	Channel	5	7	Bank 5, Channel 7	39
5	MUXM(8)	8	Channel	5	8	Bank 5, Channel 8	40
6	MUXM(8)	1	Channel	6	1	Bank 6, Channel 1	41
6	MUXM(8)	2	Channel	6	2	Bank 6, Channel 2	42
6	MUXM(8)	3	Channel	6	3	Bank 6, Channel 3	43
6	MUXM(8)	4	Channel	6	4	Bank 6, Channel 4	44
6	MUXM(8)	5	Channel	6	5	Bank 6, Channel 5	45
6	MUXM(8)	6	Channel	6	6	Bank 6, Channel 6	46
6	MUXM(8)	7	Channel	6	7	Bank 6, Channel 7	47
6	MUXM(8)	8	Channel	6	8	Bank 6, Channel 8	48
7	MUXM(8)	1	Channel	7	1	Bank 7, Channel 1	49
7	MUXM(8)	2	Channel	7	2	Bank 7, Channel 2	50
7	MUXM(8)	3	Channel	7	3	Bank 7, Channel 3	51
7	MUXM(8)	4	Channel	7	4	Bank 7, Channel 4	52
7	MUXM(8)	5	Channel	7	5	Bank 7, Channel 5	53
7	MUXM(8)	6	Channel	7	6	Bank 7, Channel 6	54
7	MUXM(8)	7	Channel	7	7	Bank 7, Channel 7	55
7	MUXM(8)	8	Channel	7	8	Bank 7, Channel 8	56
8	MUXM(8)	1	Channel	8	1	Bank 8, Channel 1	57
8	MUXM(8)	2	Channel	8	2	Bank 8, Channel 2	58
8	MUXM(8)	3	Channel	8	3	Bank 8, Channel 3	59
8	MUXM(8)	4	Channel	8	4	Bank 8, Channel 4	60
8	MUXM(8)	5	Channel	8	5	Bank 8, Channel 5	61
8	MUXM(8)	6	Channel	8	6	Bank 8, Channel 6	62
8	MUXM(8)	7	Channel	8	7	Bank 8, Channel 7	63
8	MUXM(8)	8	Channel	8	8	Bank 8, Channel 8	64

Table 4.1 Physical Relay To Software Sub-Unit Cross Reference (continued)

Logical Sub-Unit	Sub-unit Type	Logical Chan	Switch Function	Bank	Channel	Function	Relay (RL)
9	SWITCH(8)	1	Isolation	1	NA	Bank 1 isolation	72
9	SWITCH(8)	2	Isolation	2	NA	Bank 2 isolation	76
9	SWITCH(8)	3	Isolation	3	NA	Bank 3 isolation	81
9	SWITCH(8)	4	Isolation	4	NA	Bank 4 isolation	85
9	SWITCH(8)	5	Isolation	5	NA	Bank 5 isolation	91
9	SWITCH(8)	6	Isolation	6	NA	Bank 6 isolation	95
9	SWITCH(8)	7	Isolation	7	NA	Bank 7 isolation	100
9	SWITCH(8)	8	Isolation	8	NA	Bank 8 isolation	104
10	SWITCH(8)	1	1-Pole selection	1	NA	Bank 1 , 1/2-pole selection	65
10	SWITCH(8)	2	1-Pole selection	2	NA	Bank 2 , 1/2-pole selection	73
10	SWITCH(8)	3	1-Pole selection	3	NA	Bank 3 , 1/2-pole selection	77
10	SWITCH(8)	4	1-Pole selection	4	NA	Bank 4 , 1/2-pole selection	82
10	SWITCH(8)	5	1-Pole selection	5	NA	Bank 5 , 1/2-pole selection	86
10	SWITCH(8)	6	1-Pole selection	6	NA	Bank 6 , 1/2-pole selection	92
10	SWITCH(8)	7	1-Pole selection	7	NA	Bank 7 , 1/2-pole selection	96
10	SWITCH(8)	8	1-Pole selection	8	NA	Bank 8 , 1/2-pole selection	101
11	SWITCH(8)	1	2-Pole selection	1	NA	Bank 1 , 1/2-pole selection	66
11	SWITCH(8)	2	2-Pole selection	2	NA	Bank 2 , 1/2-pole selection	74
11	SWITCH(8)	3	2-Pole selection	3	NA	Bank 3 , 1/2-pole selection	78
11	SWITCH(8)	4	2-Pole selection	4	NA	Bank 4 , 1/2-pole selection	83
11	SWITCH(8)	5	2-Pole selection	5	NA	Bank 5 , 1/2-pole selection	87
11	SWITCH(8)	6	2-Pole selection	6	NA	Bank 6 , 1/2-pole selection	93
11	SWITCH(8)	7	2-Pole selection	7	NA	Bank 7 , 1/2-pole selection	97
11	SWITCH(8)	8	2-Pole selection	8	NA	Bank 8 , 1/2-pole selection	102
12	SWITCH(8)	1	Pole shorting	1	NA	Bank 1 , 1/2-pole selection	67
12	SWITCH(8)	2	Pole shorting	2	NA	Bank 2 , 1/2-pole selection	75
12	SWITCH(8)	3	Pole shorting	3	NA	Bank 3 , 1/2-pole selection	79
12	SWITCH(8)	4	Pole shorting	4	NA	Bank 4 , 1/2-pole selection	84
12	SWITCH(8)	5	Pole shorting	5	NA	Bank 5 , 1/2-pole selection	88
12	SWITCH(8)	6	Pole shorting	6	NA	Bank 6 , 1/2-pole selection	94
12	SWITCH(8)	7	Pole shorting	7	NA	Bank 7 , 1/2-pole selection	98
12	SWITCH(8)	8	Pole shorting	8	NA	Bank 8 , 1/2-pole selection	103

Table 4.1 Physical Relay To Software Sub-Unit Cross Reference (continued)

Logical Sub-Unit	Sub-unit Type	Logical Chan	Switch Function	Bank	Channel	Function	Relay (RL)
13	SWITCH(8)	1	Interbank Linking	1	NA	Bank 1, interbank linking	68
13	SWITCH(8)	2	Interbank Linking	1	NA	Bank 1, interbank linking	69
13	SWITCH(8)	3	Interbank Linking	1	NA	Bank 1, interbank linking	70
13	SWITCH(8)	4	Interbank Linking	1	NA	Bank 1, interbank linking	71
13	SWITCH(8)	5	Interbank Linking	3	NA	Bank 3, interbank linking	80
13	SWITCH(8)	6	Interbank Linking	5	NA	Bank 5, interbank linking	89
13	SWITCH(8)	7	Interbank Linking	5	NA	Bank 5, interbank linking	90
13	SWITCH(8)	8	Interbank Linking	7	NA	Bank 7, interbank linking	99

Note 1:- Bank references listed above relate to an 8-bank configuration, for varients the bank identifiers will change.

Table 4.2 Software Sub-Unit User Channel Set-up

8-Bank, 16-Channel, 1-pole

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	1	1	1 \ 1
3	4	1	2	1 \ 2
5	6	1	3	1 \ 3
7	8	1	4	1 \ 4
9	10	1	5	1 \ 5
11	12	1	6	1 \ 6
13	14	1	7	1 \ 7
15	16	1	8	1 \ 8
1	2	2	9	2 \ 1
3	4	2	10	2 \ 2
5	6	2	11	2 \ 3
7	8	2	12	2 \ 4
9	10	2	13	2 \ 5
11	12	2	14	2 \ 6
13	14	2	15	2 \ 7
15	16	2	16	2 \ 8
1	2	3	17	3 \ 1
3	4	3	18	3 \ 2
5	6	3	19	3 \ 3
7	8	3	20	3 \ 4
9	10	3	21	3 \ 5
11	12	3	22	3 \ 6
13	14	3	23	3 \ 7
15	16	3	24	3 \ 8
1	2	4	25	4 \ 1
3	4	4	26	4 \ 2
5	6	4	27	4 \ 3
7	8	4	28	4 \ 4
9	10	4	29	4 \ 5
11	12	4	30	4 \ 6
13	14	4	31	4 \ 7
15	16	4	32	4 \ 8

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	5	33	5 \ 1
3	4	5	34	5 \ 2
5	6	5	35	5 \ 3
7	8	5	36	5 \ 4
9	10	5	37	5 \ 5
11	12	5	38	5 \ 6
13	14	5	39	5 \ 7
15	16	5	40	5 \ 8
1	2	6	41	6 \ 1
3	4	6	42	6 \ 2
5	6	6	43	6 \ 3
7	8	6	44	6 \ 4
9	10	6	45	6 \ 5
11	12	6	46	6 \ 6
13	14	6	47	6 \ 7
15	16	6	48	6 \ 8
1	2	7	49	7 \ 1
3	4	7	50	7 \ 2
5	6	7	51	7 \ 3
7	8	7	52	7 \ 4
9	10	7	53	7 \ 5
11	12	7	54	7 \ 6
13	14	7	55	7 \ 7
15	16	7	56	7 \ 8
1	2	8	57	8 \ 1
3	4	8	58	8 \ 2
5	6	8	59	8 \ 3
7	8	8	60	8 \ 4
9	10	8	61	8 \ 5
11	12	8	62	8 \ 6
13	14	8	63	8 \ 7
15	16	8	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

8-Bank, 8-Channel, 2-pole

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	1	1	1 \ 1
2	1	2	1 \ 2
3	1	3	1 \ 3
4	1	4	1 \ 4
5	1	5	1 \ 5
6	1	6	1 \ 6
7	1	7	1 \ 7
8	1	8	1 \ 8
1	2	9	2 \ 1
2	2	10	2 \ 2
3	2	11	2 \ 3
4	2	12	2 \ 4
5	2	13	2 \ 5
6	2	14	2 \ 6
7	2	15	2 \ 7
8	2	16	2 \ 8
1	3	17	3 \ 1
2	3	18	3 \ 2
3	3	19	3 \ 3
4	3	20	3 \ 4
5	3	21	3 \ 5
6	3	22	3 \ 6
7	3	23	3 \ 7
8	3	24	3 \ 8
1	4	25	4 \ 1
2	4	26	4 \ 2
3	4	27	4 \ 3
4	4	28	4 \ 4
5	4	29	4 \ 5
6	4	30	4 \ 6
7	4	31	4 \ 7
8	4	32	4 \ 8

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	5	33	5 \ 1
2	5	34	5 \ 2
3	5	35	5 \ 3
4	5	36	5 \ 4
5	5	37	5 \ 5
6	5	38	5 \ 6
7	5	39	5 \ 7
8	5	40	5 \ 8
1	6	41	6 \ 1
2	6	42	6 \ 2
3	6	43	6 \ 3
4	6	44	6 \ 4
5	6	45	6 \ 5
6	6	46	6 \ 6
7	6	47	6 \ 7
8	6	48	6 \ 8
1	7	49	7 \ 1
2	7	50	7 \ 2
3	7	51	7 \ 3
4	7	52	7 \ 4
5	7	53	7 \ 5
6	7	54	7 \ 6
7	7	55	7 \ 7
8	7	56	7 \ 8
1	8	57	8 \ 1
2	8	58	8 \ 2
3	8	59	8 \ 3
4	8	60	8 \ 4
5	8	61	8 \ 5
6	8	62	8 \ 6
7	8	63	8 \ 7
8	8	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

4-Bank, 32-Channel, 1-pole

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	1	1	1 \ 1
3	4	1	2	1 \ 2
5	6	1	3	1 \ 3
7	8	1	4	1 \ 4
9	10	1	5	1 \ 5
11	12	1	6	1 \ 6
13	14	1	7	1 \ 7
15	16	1	8	1 \ 8
17	18	1	9	2 \ 1
19	20	1	10	2 \ 2
21	22	1	11	2 \ 3
23	24	1	12	2 \ 4
25	26	1	13	2 \ 5
27	28	1	14	2 \ 6
29	30	1	15	2 \ 7
31	32	1	16	2 \ 8
1	2	2	17	3 \ 1
3	4	2	18	3 \ 2
5	6	2	19	3 \ 3
7	8	2	20	3 \ 4
9	10	2	21	3 \ 5
11	12	2	22	3 \ 6
13	14	2	23	3 \ 7
15	16	2	24	3 \ 8
17	18	2	25	4 \ 1
19	20	2	26	4 \ 2
21	22	2	27	4 \ 3
23	24	2	28	4 \ 4
25	26	2	29	4 \ 5
27	28	2	30	4 \ 6
29	30	2	31	4 \ 7
31	32	2	32	4 \ 8

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	3	33	5 \ 1
3	4	3	34	5 \ 2
5	6	3	35	5 \ 3
7	8	3	36	5 \ 4
9	10	3	37	5 \ 5
11	12	3	38	5 \ 6
13	14	3	39	5 \ 7
15	16	3	40	5 \ 8
17	18	3	41	6 \ 1
19	20	3	42	6 \ 2
21	22	3	43	6 \ 3
23	24	3	44	6 \ 4
25	26	3	45	6 \ 5
27	28	3	46	6 \ 6
29	30	3	47	6 \ 7
31	32	3	48	6 \ 8
1	2	4	49	7 \ 1
3	4	4	50	7 \ 2
5	6	4	51	7 \ 3
7	8	4	52	7 \ 4
9	10	4	53	7 \ 5
11	12	4	54	7 \ 6
13	14	4	55	7 \ 7
15	16	4	56	7 \ 8
17	18	4	57	8 \ 1
19	20	4	58	8 \ 2
21	22	4	59	8 \ 3
23	24	4	60	8 \ 4
25	26	4	61	8 \ 5
27	28	4	62	8 \ 6
29	30	4	63	8 \ 7
31	32	4	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

4-Bank, 16-Channel, 2-pole

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	1	1	1 \ 1
2	1	2	1 \ 2
3	1	3	1 \ 3
4	1	4	1 \ 4
5	1	5	1 \ 5
6	1	6	1 \ 6
7	1	7	1 \ 7
8	1	8	1 \ 8
9	1	9	2 \ 1
10	1	10	2 \ 2
11	1	11	2 \ 3
12	1	12	2 \ 4
13	1	13	2 \ 5
14	1	14	2 \ 6
15	1	15	2 \ 7
16	1	16	2 \ 8
1	2	17	3 \ 1
2	2	18	3 \ 2
3	2	19	3 \ 3
4	2	20	3 \ 4
5	2	21	3 \ 5
6	2	22	3 \ 6
7	2	23	3 \ 7
8	2	24	3 \ 8
9	2	25	4 \ 1
10	2	26	4 \ 2
11	2	27	4 \ 3
12	2	28	4 \ 4
13	2	29	4 \ 5
14	2	30	4 \ 6
15	2	31	4 \ 7
16	2	32	4 \ 8

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	3	33	5 \ 1
2	3	34	5 \ 2
3	3	35	5 \ 3
4	3	36	5 \ 4
5	3	37	5 \ 5
6	3	38	5 \ 6
7	3	39	5 \ 7
8	3	40	5 \ 8
9	3	41	6 \ 1
10	3	42	6 \ 2
11	3	43	6 \ 3
12	3	44	6 \ 4
13	3	45	6 \ 5
14	3	46	6 \ 6
15	3	47	6 \ 7
16	3	48	6 \ 8
1	4	49	7 \ 1
2	4	50	7 \ 2
3	4	51	7 \ 3
4	4	52	7 \ 4
5	4	53	7 \ 5
6	4	54	7 \ 6
7	4	55	7 \ 7
8	4	56	7 \ 8
9	4	57	8 \ 1
10	4	58	8 \ 2
11	4	59	8 \ 3
12	4	60	8 \ 4
13	4	61	8 \ 5
14	4	62	8 \ 6
15	4	63	8 \ 7
16	4	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

2-Bank, 64-Channel, 1-pole

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	1	1	1 \ 1
3	4	1	2	1 \ 2
5	6	1	3	1 \ 3
7	8	1	4	1 \ 4
9	10	1	5	1 \ 5
11	12	1	6	1 \ 6
13	14	1	7	1 \ 7
15	16	1	8	1 \ 8
17	18	1	9	2 \ 1
19	20	1	10	2 \ 2
21	22	1	11	2 \ 3
23	24	1	12	2 \ 4
25	26	1	13	2 \ 5
27	28	1	14	2 \ 6
29	30	1	15	2 \ 7
31	32	1	16	2 \ 8
33	34	1	17	3 \ 1
35	36	1	18	3 \ 2
37	38	1	19	3 \ 3
39	40	1	20	3 \ 4
41	42	1	21	3 \ 5
43	44	1	22	3 \ 6
45	46	1	23	3 \ 7
47	48	1	24	3 \ 8
49	50	1	25	4 \ 1
51	52	1	26	4 \ 2
53	54	1	27	4 \ 3
55	56	1	28	4 \ 4
57	58	1	29	4 \ 5
59	60	1	30	4 \ 6
61	62	1	31	4 \ 7
63	64	1	32	4 \ 8

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	2	33	5 \ 1
3	4	2	34	5 \ 2
5	6	2	35	5 \ 3
7	8	2	36	5 \ 4
9	10	2	37	5 \ 5
11	12	2	38	5 \ 6
13	14	2	39	5 \ 7
15	16	2	40	5 \ 8
17	18	2	41	6 \ 1
19	20	2	42	6 \ 2
21	22	2	43	6 \ 3
23	24	2	44	6 \ 4
25	26	2	45	6 \ 5
27	28	2	46	6 \ 6
29	30	2	47	6 \ 7
31	32	2	48	6 \ 8
33	34	2	49	7 \ 1
35	36	2	50	7 \ 2
37	38	2	51	7 \ 3
39	40	2	52	7 \ 4
41	42	2	53	7 \ 5
43	44	2	54	7 \ 6
45	46	2	55	7 \ 7
47	48	2	56	7 \ 8
49	50	2	57	8 \ 1
51	52	2	58	8 \ 2
53	54	2	59	8 \ 3
55	56	2	60	8 \ 4
57	58	2	61	8 \ 5
59	60	2	62	8 \ 6
61	62	2	63	8 \ 7
63	64	2	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

2-Bank, 32-Channel, 2-pole

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	1	1	1 \ 1
2	1	2	1 \ 2
3	1	3	1 \ 3
4	1	4	1 \ 4
5	1	5	1 \ 5
6	1	6	1 \ 6
7	1	7	1 \ 7
8	1	8	1 \ 8
9	1	9	2 \ 1
10	1	10	2 \ 2
11	1	11	2 \ 3
12	1	12	2 \ 4
13	1	13	2 \ 5
14	1	14	2 \ 6
15	1	15	2 \ 7
16	1	16	2 \ 8
17	1	17	3 \ 1
18	1	18	3 \ 2
19	1	19	3 \ 3
20	1	20	3 \ 4
21	1	21	3 \ 5
22	1	22	3 \ 6
23	1	23	3 \ 7
24	1	24	3 \ 8
25	1	25	4 \ 1
26	1	26	4 \ 2
27	1	27	4 \ 3
28	1	28	4 \ 4
29	1	29	4 \ 5
30	1	30	4 \ 6
31	1	31	4 \ 7
32	1	32	4 \ 8

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	33	5 \ 1
2	2	34	5 \ 2
3	2	35	5 \ 3
4	2	36	5 \ 4
5	2	37	5 \ 5
6	2	38	5 \ 6
7	2	39	5 \ 7
8	2	40	5 \ 8
9	2	41	6 \ 1
10	2	42	6 \ 2
11	2	43	6 \ 3
12	2	44	6 \ 4
13	2	45	6 \ 5
14	2	46	6 \ 6
15	2	47	6 \ 7
16	2	48	6 \ 8
17	2	49	7 \ 1
18	2	50	7 \ 2
19	2	51	7 \ 3
20	2	52	7 \ 4
21	2	53	7 \ 5
22	2	54	7 \ 6
23	2	55	7 \ 7
24	2	56	7 \ 8
25	2	57	8 \ 1
26	2	58	8 \ 2
27	2	59	8 \ 3
28	2	60	8 \ 4
29	2	61	8 \ 5
30	2	62	8 \ 6
31	2	63	8 \ 7
32	2	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

1-Bank, 128-Channel, 1-pole

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
1	2	1	1	1 \ 1
3	4	1	2	1 \ 2
5	6	1	3	1 \ 3
7	8	1	4	1 \ 4
9	10	1	5	1 \ 5
11	12	1	6	1 \ 6
13	14	1	7	1 \ 7
15	16	1	8	1 \ 8
17	18	1	9	2 \ 1
19	20	1	10	2 \ 2
21	22	1	11	2 \ 3
23	24	1	12	2 \ 4
25	26	1	13	2 \ 5
27	28	1	14	2 \ 6
29	30	1	15	2 \ 7
31	32	1	16	2 \ 8
33	34	1	17	3 \ 1
35	36	1	18	3 \ 2
37	38	1	19	3 \ 3
39	40	1	20	3 \ 4
41	42	1	21	3 \ 5
43	44	1	22	3 \ 6
45	46	1	23	3 \ 7
47	48	1	24	3 \ 8
49	50	1	25	4 \ 1
51	52	1	26	4 \ 2
53	54	1	27	4 \ 3
55	56	1	28	4 \ 4
57	58	1	29	4 \ 5
59	60	1	30	4 \ 6
61	62	1	31	4 \ 7
63	64	1	32	4 \ 8

Channels		Bank	Relay (RL)	Sub Unit \ Logical Channel
65	66	1	33	5 \ 1
67	68	1	34	5 \ 2
69	70	1	35	5 \ 3
71	72	1	36	5 \ 4
73	74	1	37	5 \ 5
75	76	1	38	5 \ 6
77	78	1	39	5 \ 7
79	80	1	40	5 \ 8
81	82	1	41	6 \ 1
83	84	1	42	6 \ 2
85	86	1	43	6 \ 3
87	88	1	44	6 \ 4
89	90	1	45	6 \ 5
91	92	1	46	6 \ 6
93	94	1	47	6 \ 7
95	96	1	48	6 \ 8
97	98	1	49	7 \ 1
99	100	1	50	7 \ 2
101	102	1	51	7 \ 3
103	104	1	52	7 \ 4
105	106	1	53	7 \ 5
107	108	1	54	7 \ 6
109	110	1	55	7 \ 7
111	112	1	56	7 \ 8
113	114	1	57	8 \ 1
115	116	1	58	8 \ 2
117	118	1	59	8 \ 3
119	120	1	60	8 \ 4
121	122	1	61	8 \ 5
123	124	1	62	8 \ 6
125	126	1	63	8 \ 7
127	128	1	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.2 Software Sub-Unit User Channel Set-up (continued)

1-Bank, 64-Channel, 2-pole

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
1	1	1	1 \ 1
2	1	2	1 \ 2
3	1	3	1 \ 3
4	1	4	1 \ 4
5	1	5	1 \ 5
6	1	6	1 \ 6
7	1	7	1 \ 7
8	1	8	1 \ 8
9	1	9	2 \ 1
10	1	10	2 \ 2
11	1	11	2 \ 3
12	1	12	2 \ 4
13	1	13	2 \ 5
14	1	14	2 \ 6
15	1	15	2 \ 7
16	1	16	2 \ 8
17	1	17	3 \ 1
18	1	18	3 \ 2
19	1	19	3 \ 3
20	1	20	3 \ 4
21	1	21	3 \ 5
22	1	22	3 \ 6
23	1	23	3 \ 7
24	1	24	3 \ 8
25	1	25	4 \ 1
26	1	26	4 \ 2
27	1	27	4 \ 3
28	1	28	4 \ 4
29	1	29	4 \ 5
30	1	30	4 \ 6
31	1	31	4 \ 7
32	1	32	4 \ 8

Channel	Bank	Relay (RL)	Sub Unit \ Logical Channel
33	1	33	5 \ 1
34	1	34	5 \ 2
35	1	35	5 \ 3
36	1	36	5 \ 4
37	1	37	5 \ 5
38	1	38	5 \ 6
39	1	39	5 \ 7
40	1	40	5 \ 8
41	1	41	6 \ 1
42	1	42	6 \ 2
43	1	43	6 \ 3
44	1	44	6 \ 4
45	1	45	6 \ 5
46	1	46	6 \ 6
47	1	47	6 \ 7
48	1	48	6 \ 8
49	1	49	7 \ 1
50	1	50	7 \ 2
51	1	51	7 \ 3
52	1	52	7 \ 4
53	1	53	7 \ 5
54	1	54	7 \ 6
55	1	55	7 \ 7
56	1	56	7 \ 8
57	1	57	8 \ 1
58	1	58	8 \ 2
59	1	59	8 \ 3
60	1	60	8 \ 4
61	1	61	8 \ 5
62	1	62	8 \ 6
63	1	63	8 \ 7
64	1	64	8 \ 8

Note - The two individual channels from a single relay in 1-pole mode are selected by using the 1/2-pole & pole shorting relays detailed in Table 4.11.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up

8-Bank, 16-Channel, 1-pole (See Note 2)				
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**	**Comments**
1-Pole selection	1	65	10 \ 1	See Note 1
2-Pole selection	1	66	11 \ 1	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	67	12 \ 1	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	1	72	9 \ 1	
1-Pole selection	2	73	10 \ 2	See Note 1
2-Pole selection	2	74	11 \ 2	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	75	12 \ 2	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	2	76	9 \ 2	
1-Pole selection	3	77	10 \ 3	See Note 1
2-Pole selection	3	78	11 \ 3	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	3	79	12 \ 3	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	3	81	9 \ 3	
1-Pole selection	4	82	10 \ 4	See Note 1
2-Pole selection	4	83	11 \ 4	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	4	84	12 \ 4	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	4	85	9 \ 4	
1-Pole selection	5	86	10 \ 5	See Note 1
2-Pole selection	5	87	11 \ 5	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	5	88	12 \ 5	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	5	91	9 \ 5	
1-Pole selection	6	92	10 \ 6	See Note 1
2-Pole selection	6	93	11 \ 6	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	6	94	12 \ 6	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	6	95	9 \ 6	
1-Pole selection	7	96	10 \ 7	See Note 1
2-Pole selection	7	97	11 \ 7	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	7	98	12 \ 7	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	7	100	9 \ 7	
1-Pole selection	8	101	10 \ 8	See Note 1
2-Pole selection	8	102	11 \ 8	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	8	103	12 \ 8	Only requried when routing .2 signals to .1 front panel connector pin
Isolation	8	104	9 \ 8	

Note 1:- Do NOT energise the 1-pole & 2-pole selection relays at the same time as applied channel signals will be shorted together.

Note 2:- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

8-Bank, 8-Channel, 2-pole (See Note)			
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**
1-Pole selection	1	65	10 \ 1
2-Pole selection	1	66	11 \ 1
Isolation	1	72	9 \ 1
1-Pole selection	2	73	10 \ 2
2-Pole selection	2	74	11 \ 2
Isolation	2	76	9 \ 2
1-Pole selection	3	77	10 \ 3
2-Pole selection	3	78	11 \ 3
Isolation	3	81	9 \ 3
1-Pole selection	4	82	10 \ 4
2-Pole selection	4	83	11 \ 4
Isolation	4	85	9 \ 4
1-Pole selection	5	86	10 \ 5
2-Pole selection	5	87	11 \ 5
Isolation	5	91	9 \ 5
1-Pole selection	6	92	10 \ 6
2-Pole selection	6	93	11 \ 6
Isolation	6	95	9 \ 6
1-Pole selection	7	96	10 \ 7
2-Pole selection	7	97	11 \ 7
Isolation	7	100	9 \ 7
1-Pole selection	8	101	10 \ 8
2-Pole selection	8	102	11 \ 8
Isolation	8	104	9 \ 8

Note :- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

4-Bank, 32-Channel, 1-pole (See Note 2)				
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**	**Comments**
1-Pole selection	1	65	10 \ 1	See Note 1
1-Pole selection	1	73	10 \ 2	See Note 1
2-Pole selection	1	66	11 \ 1	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	74	11 \ 2	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	1	68	13 \ 1	
Isolation	1	72	9 \ 1	
Pole shorting	1	67	12 \ 1	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	75	12 \ 2	Only requried when routing .2 signals to .1 front panel connector pin
1-Pole selection	2	77	10 \ 3	See Note 1
1-Pole selection	2	82	10 \ 4	See Note 1
2-Pole selection	2	78	11 \ 3	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	2	83	11 \ 4	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	2	80	13 \ 5	
Isolation	2	81	9 \ 3	
Pole shorting	2	79	12 \ 3	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	84	12 \ 4	Only requried when routing .2 signals to .1 front panel connector pin
1-Pole selection	3	86	10 \ 5	See Note 1
1-Pole selection	3	92	10 \ 6	See Note 1
2-Pole selection	3	87	11 \ 5	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	3	93	11 \ 6	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	3	89	13 \ 5	
Isolation	3	91	9 \ 5	
Pole shorting	3	88	12 \ 5	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	3	94	12 \ 6	Only requried when routing .2 signals to .1 front panel connector pin
1-Pole selection	4	96	10 \ 7	See Note 1
1-Pole selection	4	101	10 \ 8	See Note 1
2-Pole selection	4	97	11 \ 7	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	4	102	11 \ 8	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	4	99	13 \ 8	
Isolation	4	100	9 \ 7	
Pole shorting	4	98	12 \ 7	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	4	103	12 \ 8	Only requried when routing .2 signals to .1 front panel connector pin

Note 1:- Do NOT energise the 1-pole & 2-pole selection relays at the same time as applied channel signals will be shorted together.

Note 2:- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

4-Bank, 16-Channel, 2-pole (See Note)			
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**
1-Pole selection	1	65	10 \ 1
1-Pole selection	1	73	10 \ 2
2-Pole selection	1	66	11 \ 1
2-Pole selection	1	74	11 \ 2
Interbank Linking	1	68	13 \ 1
Isolation	1	72	9 \ 1
1-Pole selection	2	77	10 \ 3
1-Pole selection	2	82	10 \ 4
2-Pole selection	2	78	11 \ 3
2-Pole selection	2	83	11 \ 4
Interbank Linking	2	80	13 \ 5
Isolation	2	81	9 \ 3
1-Pole selection	3	86	10 \ 5
1-Pole selection	3	92	10 \ 6
2-Pole selection	3	87	11 \ 5
2-Pole selection	3	93	11 \ 6
Interbank Linking	3	89	13 \ 5
Isolation	3	91	9 \ 5
1-Pole selection	4	96	10 \ 7
1-Pole selection	4	101	10 \ 8
2-Pole selection	4	97	11 \ 7
2-Pole selection	4	102	11 \ 8
Interbank Linking	4	99	13 \ 8
Isolation	4	100	9 \ 7

Note :- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

2-Bank, 64-Channel, 1-pole				
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**	**Comments**
1-Pole selection	1	65	10 \ 1	See Note 1
1-Pole selection	1	73	10 \ 2	See Note 1
1-Pole selection	1	77	10 \ 3	See Note 1
1-Pole selection	1	82	10 \ 4	See Note 1
2-Pole selection	1	66	11 \ 1	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	74	11 \ 2	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	78	11 \ 3	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	83	11 \ 4	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	67	12 \ 1	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	75	12 \ 2	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	79	12 \ 3	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	84	12 \ 4	Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	1	68	13 \ 1	
Interbank Linking	1	69	13 \ 2	
Interbank Linking	1	80	13 \ 5	
Isolation	1	72	9 \ 1	
1-Pole selection	2	86	10 \ 5	See Note 1
1-Pole selection	2	92	10 \ 6	See Note 1
1-Pole selection	2	96	10 \ 7	See Note 1
1-Pole selection	2	101	10 \ 8	See Note 1
2-Pole selection	2	87	11 \ 5	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	2	93	11 \ 6	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	2	97	11 \ 7	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	2	102	11 \ 8	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	88	12 \ 5	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	94	12 \ 6	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	98	12 \ 7	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	2	103	12 \ 8	Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	2	89	13 \ 6	
Interbank Linking	2	90	13 \ 7	
Interbank Linking	2	99	13 \ 8	
Isolation	2	91	9 \ 5	

Note 1:- Do NOT energise the 1-pole & 2-pole selection relays at the same time as applied channel signals will be shorted together.

Note 2:- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

2-Bank, 32-Channel, 2-pole (See Note)			
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**
1-Pole selection	1	65	10 \ 1
1-Pole selection	1	73	10 \ 2
1-Pole selection	1	77	10 \ 3
1-Pole selection	1	82	10 \ 4
2-Pole selection	1	66	11 \ 1
2-Pole selection	1	74	11 \ 2
2-Pole selection	1	78	11 \ 3
2-Pole selection	1	83	11 \ 4
Interbank Linking	1	68	13 \ 1
Interbank Linking	1	69	13 \ 2
Interbank Linking	1	80	13 \ 5
Isolation	1	72	9 \ 1
1-Pole selection	2	86	10 \ 5
1-Pole selection	2	92	10 \ 6
1-Pole selection	2	96	10 \ 7
1-Pole selection	2	101	10 \ 8
2-Pole selection	2	87	11 \ 5
2-Pole selection	2	93	11 \ 6
2-Pole selection	2	97	11 \ 7
2-Pole selection	2	102	11 \ 8
Interbank Linking	2	89	13 \ 6
Interbank Linking	2	90	13 \ 7
Interbank Linking	2	99	13 \ 8
Isolation	2	91	9 \ 5

Note :- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

1-Bank, 128-Channel, 1-pole				
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**	**Comments**
1-Pole selection	1	65	10 \ 1	See Note 1
1-Pole selection	1	73	10 \ 2	See Note 1
1-Pole selection	1	77	10 \ 3	See Note 1
1-Pole selection	1	82	10 \ 4	See Note 1
1-Pole selection	1	86	10 \ 5	See Note 1
1-Pole selection	1	92	10 \ 6	See Note 1
1-Pole selection	1	96	10 \ 7	See Note 1
1-Pole selection	1	101	10 \ 8	See Note 1
2-Pole selection	1	66	11 \ 1	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	74	11 \ 2	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	78	11 \ 3	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	83	11 \ 4	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	87	11 \ 5	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	93	11 \ 6	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	97	11 \ 7	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
2-Pole selection	1	102	11 \ 8	See Note 1. Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	67	12 \ 1	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	75	12 \ 2	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	79	12 \ 3	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	84	12 \ 4	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	88	12 \ 5	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	94	12 \ 6	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	98	12 \ 7	Only requried when routing .2 signals to .1 front panel connector pin
Pole shorting	1	103	12 \ 8	Only requried when routing .2 signals to .1 front panel connector pin
Interbank Linking	1	68	13 \ 1	
Interbank Linking	1	69	13 \ 2	
Interbank Linking	1	70	13 \ 3	
Interbank Linking	1	71	13 \ 4	
Interbank Linking	1	80	13 \ 5	
Interbank Linking	1	89	13 \ 6	
Interbank Linking	1	90	13 \ 7	
Interbank Linking	1	99	13 \ 8	
Isolation	1	72	9 \ 1	

Note 1:- Do NOT energise the 1-pole & 2-pole selection relays at the same time as applied channel signals will be shorted together.

Note 2:- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

Table 4.3 Software Sub-Unit Multiplexer Configuration Set-up (continued)

1-Bank, 64-Channel, 2-pole (See Note)			
Function	**Bank**	**Relay (RL)**	**Sub Unit \ Logical Channel**
1-Pole selection	1	65	10 \ 1
1-Pole selection	1	73	10 \ 2
1-Pole selection	1	77	10 \ 3
1-Pole selection	1	82	10 \ 4
1-Pole selection	1	86	10 \ 5
1-Pole selection	1	92	10 \ 6
1-Pole selection	1	96	10 \ 7
1-Pole selection	1	101	10 \ 8
2-Pole selection	1	66	11 \ 1
2-Pole selection	1	74	11 \ 2
2-Pole selection	1	78	11 \ 3
2-Pole selection	1	83	11 \ 4
2-Pole selection	1	87	11 \ 5
2-Pole selection	1	93	11 \ 6
2-Pole selection	1	97	11 \ 7
2-Pole selection	1	102	11 \ 8
Interbank Linking	1	68	13 \ 1
Interbank Linking	1	69	13 \ 2
Interbank Linking	1	70	13 \ 3
Interbank Linking	1	71	13 \ 4
Interbank Linking	1	80	13 \ 5
Interbank Linking	1	89	13 \ 6
Interbank Linking	1	90	13 \ 7
Interbank Linking	1	99	13 \ 8
Isolation	1	72	9 \ 1

Note :- The above 1-pole configurations assume that the .1 common pin(s) are being used on the front panel connector.

SOFT FRONT PANEL

The Versatile Multiplexer Soft Front Panel for the 40-612-002 and 40-682-002 allows easy setting of various configurations from 8-bank 8-channels 2-pole multiplexers, up to 1-bank 128-channels 1-pole multiplexers as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.

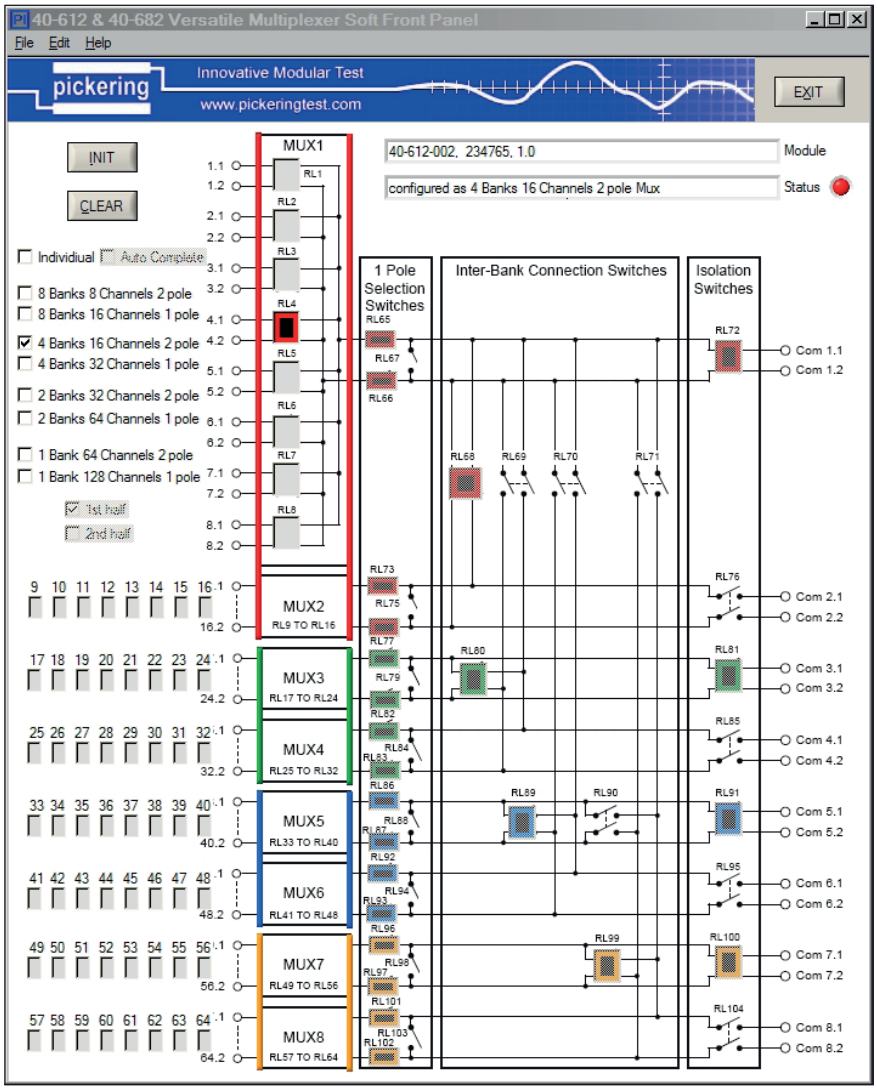
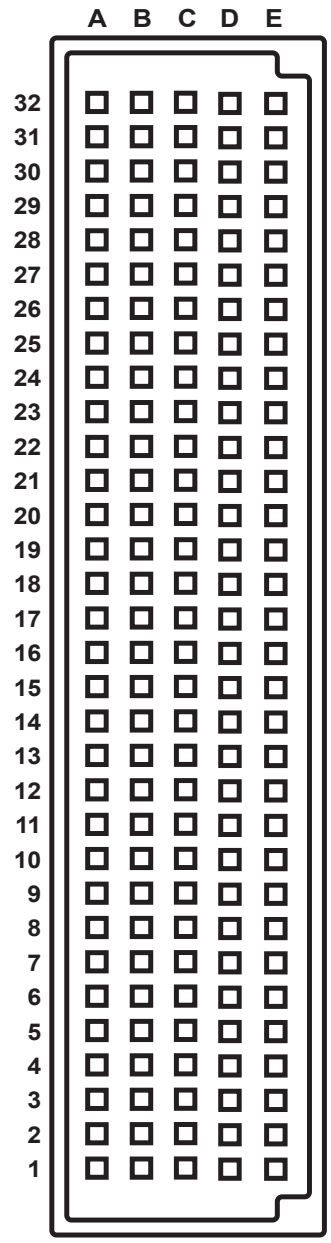


Figure 4.2 - Soft Front Panel for the 40-612 and 40-682 Very High Density Versatile Multiplexers

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SECTION 5 - CONNECTOR INFORMATION



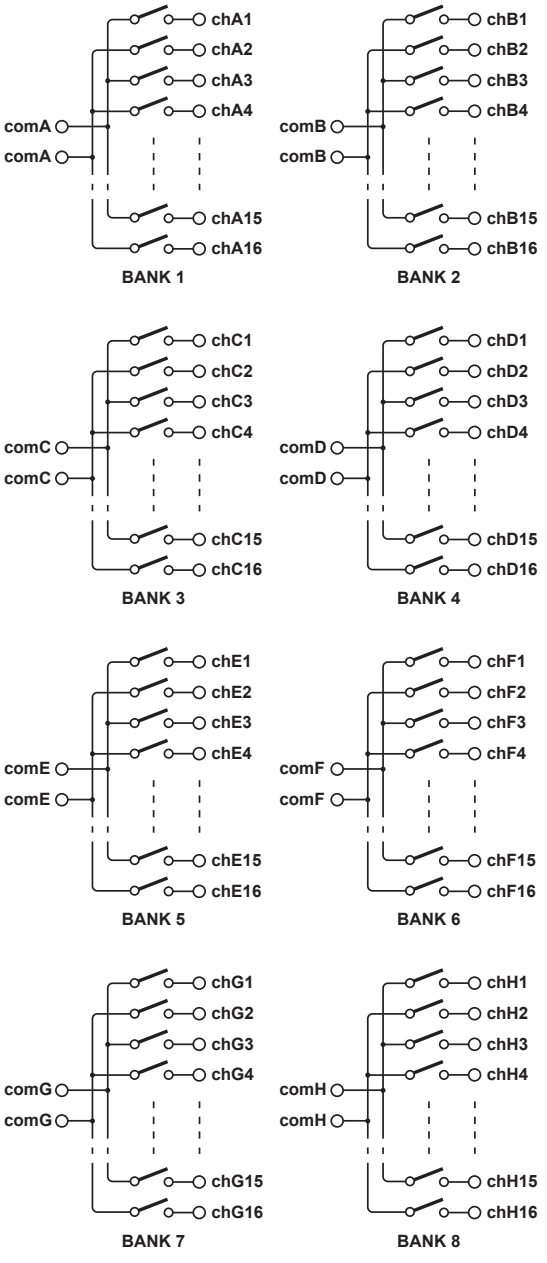
160-pin Male DIN 41612 Connector (viewed from front of module)

	40-612 - GENERAL PINOUT				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	1.1	3.1	5.1	7.1	C1.1
31	1.2	3.2	5.2	7.2	C1.2
30	2.1	4.1	6.1	8.1	NC
29	2.2	4.2	6.2	8.2	NC
28	9.1	11.1	13.1	15.1	C2.1
27	9.2	11.2	13.2	15.2	C2.2
26	10.1	12.1	14.1	16.1	NC
25	10.2	12.2	14.2	16.2	NC
24	17.1	19.1	21.1	23.1	C3.1
23	17.2	19.2	21.2	23.2	C3.2
22	18.1	20.1	22.1	24.1	NC
21	18.2	20.2	22.2	24.2	NC
20	25.1	27.1	29.1	31.1	C4.1
19	25.2	27.2	29.2	31.2	C4.2
18	26.1	28.1	30.1	32.1	NC
17	26.2	28.2	30.2	32.2	NC
16	33.1	35.1	37.1	39.1	C5.1
15	33.2	35.2	37.2	39.2	C5.2
14	34.1	36.1	38.1	40.1	NC
13	34.2	36.2	38.2	40.2	NC
12	41.1	43.1	45.1	47.1	C6.1
11	41.2	43.2	45.2	47.2	C6.2
10	42.1	44.1	46.1	48.1	NC
9	42.2	44.2	46.2	48.2	NC
8	49.1	51.1	53.1	55.1	C7.1
7	49.2	51.2	53.2	55.2	C7.2
6	50.1	52.1	54.1	56.1	NC
5	50.2	52.2	54.2	56.2	NC
4	57.1	59.1	61.1	63.1	C8.1
3	57.2	59.2	61.2	63.2	C8.2
2	58.1	60.1	62.1	64.1	NC
1	58.2	60.2	62.2	64.2	GND

Figure 5.1 - Multiplexer Module 40-612: General Pinouts

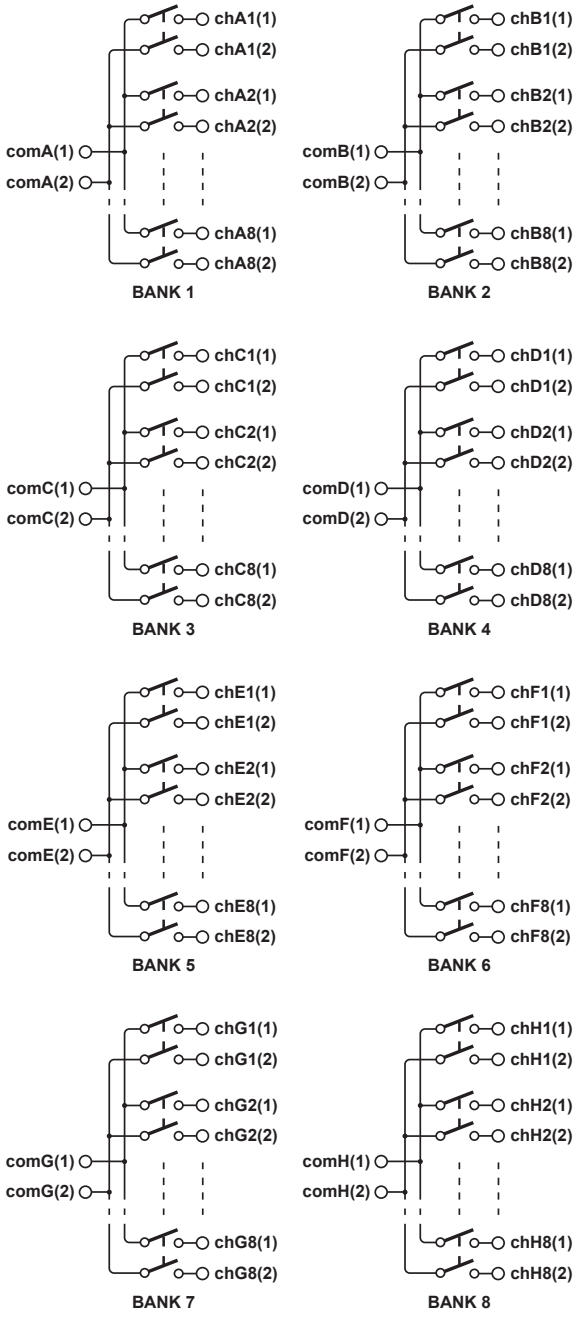
40-612 Pin Designations - IVI Modes

The 40-612 has a number of modes of operation when controlled through IVI where the MUX can be set to a specified configuration. The tables on the following pages apply to each of the IVI mode settings. For more information on the IVI modes see the IVI section in the programming chapter of this manual.



	40-612-002-1w8/16x1 8-Bank, 16-Channel, 1-Pole Pin Designations				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	chA1	chA5	chA9	chA13	comA
31	chA2	chA6	chA10	chA14	comA
30	chA3	chA7	chA11	chA15	NC
29	chA4	chA8	chA12	chA16	NC
28	chB1	chB5	chB9	chB13	comB
27	chB2	chB6	chB10	chB14	comB
26	chB3	chB7	chB11	chB15	NC
25	chB4	chB8	chB12	chB16	NC
24	chC1	chC5	chC9	chC13	comC
23	chC2	chC6	chC10	chC14	comC
22	chC3	chC7	chC11	chC15	NC
21	chC4	chC8	chC12	chC16	NC
20	chD1	chD5	chD9	chD13	comD
19	chD2	chD6	chD10	chD14	comD
18	chD3	chD7	chD11	chD15	NC
17	chD4	chD8	chD12	chD16	NC
16	chE1	chE5	chE9	chE13	comE
15	chE2	chE6	chE10	chE14	comE
14	chE3	chE7	chE11	chE15	NC
13	chE4	chE8	chE12	chE16	NC
12	chF1	chF5	chF9	chF13	comF
11	chF2	chF6	chF10	chF14	comF
10	chF3	chF7	chF11	chF15	NC
9	chF4	chF8	chF12	chF16	NC
8	chG1	chG5	chG9	chG13	comG
7	chG2	chG6	chG10	chG14	comG
6	chG3	chG7	chG11	chG15	NC
5	chG4	chG8	chG12	chG16	NC
4	chH1	chH5	chH9	chH13	comH
3	chH2	chH6	chH10	chH14	comH
2	chH3	chH7	chH11	chH15	NC
1	chH4	chH8	chH12	chH16	GND

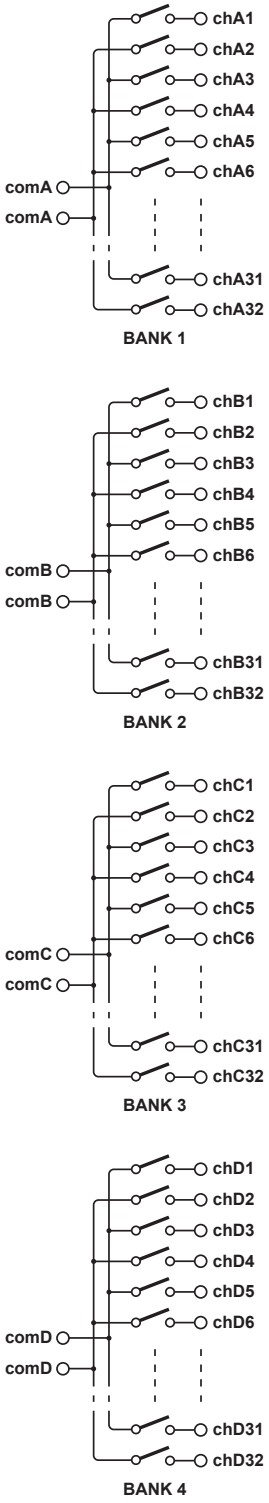
Figure 5.2 - Multiplexer Module 40-612:
IVI mode corresponding to 8-Bank, 16-Channel, 1-Pole pin designations.
The pin designations shown correspond to the IVI port.



40-612-002-2w8/8x1
8-Bank, 8-Channel, 2-Pole Pin Designations
(pole shown in brackets for wiring and is not part of IVI command)

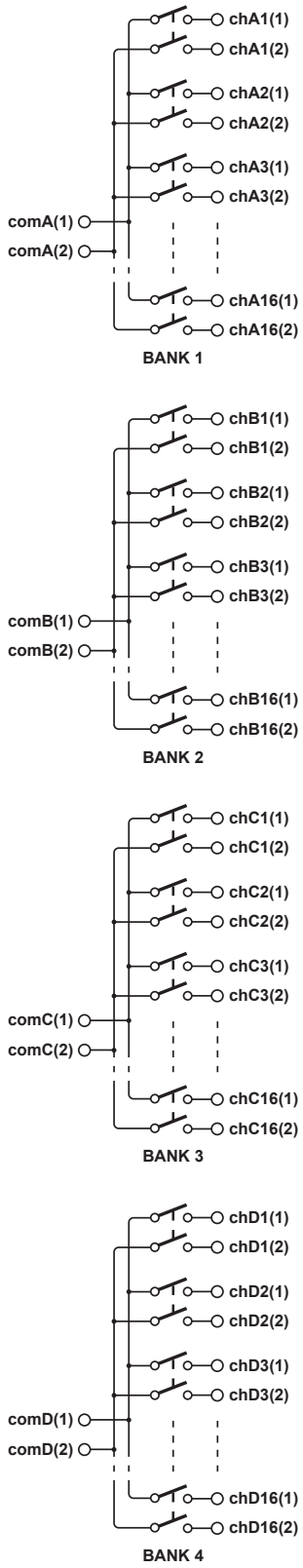
CONNECTOR ROWS	CONNECTOR COLUMNS A	B	C	D	E
32	chA1 (1)	chA3 (1)	chA5 (1)	chA7 (1)	comA (1)
31	chA1 (2)	chA3 (2)	chA5 (2)	chA7 (2)	comA (2)
30	chA2 (1)	chA4 (1)	chA6 (1)	chA8 (1)	NC
29	chA2 (2)	chA4 (2)	chA6 (2)	chA8 (2)	NC
28	chB1 (1)	chB3 (1)	chB5 (1)	chB7 (1)	comB (1)
27	chB1 (2)	chB3 (2)	chB5 (2)	chB7 (2)	comB (2)
26	chB2 (1)	chB4 (1)	chB6 (1)	chB8 (1)	NC
25	chB2 (2)	chB4 (2)	chB6 (2)	chB8 (2)	NC
24	chC1 (1)	chC3 (1)	chC5 (1)	chC7 (1)	comC (1)
23	chC1 (2)	chC3 (2)	chC5 (2)	chC7 (2)	comC (2)
22	chC2 (1)	chC4 (1)	chC6 (1)	chC8 (1)	NC
21	chC2 (2)	chC4 (2)	chC6 (2)	chC8 (2)	NC
20	chD1 (1)	chD3 (1)	chD5 (1)	chD7 (1)	comD (1)
19	chD1 (2)	chD3 (2)	chD5 (2)	chD7 (2)	comD (2)
18	chD2 (1)	chD4 (1)	chD6 (1)	chD8 (1)	NC
17	chD2 (2)	chD4 (2)	chD6 (2)	chD8 (2)	NC
16	chE1 (1)	chE3 (1)	chE5 (1)	chE7 (1)	comE (1)
15	chE1 (2)	chE3 (2)	chE5 (2)	chE7 (2)	comE (2)
14	chE2 (1)	chE4 (1)	chE6 (1)	chE8 (1)	NC
13	chE2 (2)	chE4 (2)	chE6 (2)	chE8 (2)	NC
12	chF1 (1)	chF3 (1)	chF5 (1)	chF7 (1)	comF (1)
11	chF1 (2)	chF3 (2)	chF5 (2)	chF7 (2)	comF (2)
10	chF2 (1)	chF4 (1)	chF6 (1)	chF8 (1)	NC
9	chF2 (2)	chF4 (2)	chF6 (2)	chF8 (2)	NC
8	chG1 (1)	chG3 (1)	chG5 (1)	chG7 (1)	comG (1)
7	chG1 (2)	chG3 (2)	chG5 (2)	chG7 (2)	comG (2)
6	chG2 (1)	chG4 (1)	chG6 (1)	chG8 (1)	NC
5	chG2 (2)	chG4 (2)	chG6 (2)	chG8 (2)	NC
4	chH1 (1)	chH3 (1)	chH5 (1)	chH7 (1)	comH (1)
3	chH1 (2)	chH3 (2)	chH5 (2)	chH7 (2)	comH (2)
2	chH2 (1)	chH4 (1)	chH6 (1)	chH8 (1)	NC
1	chH2 (2)	chH4 (2)	chH6 (2)	chH8 (2)	GND

Figure 5.3 - Multiplexer Module 40-612:
IVI mode corresponding to 8-Bank, 8-Channel, 2-Pole pin designations.
The pin designations shown correspond to the IVI port.



	40-612-002-1w4/32x1 4-Bank, 32-Channel, 1-Pole Pin Designations				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	chA1	chA5	chA9	chA13	comA
31	chA2	chA6	chA10	chA14	comA
30	chA3	chA7	chA11	chA15	NC
29	chA4	chA8	chA12	chA16	NC
28	chA17	chA21	chA25	chA29	NC
27	chA18	chA22	chA26	chA30	NC
26	chA19	chA23	chA27	chA31	NC
25	chA20	chA24	chA28	chA32	NC
24	chB1	chB5	chB9	chB13	comB
23	chB2	chB6	chB10	chB14	comB
22	chB3	chB7	chB11	chB15	NC
21	chB4	chB8	chB12	chB16	NC
20	chB17	chB21	chB25	chB29	NC
19	chB18	chB22	chB26	chB30	NC
18	chB19	chB23	chB27	chB31	NC
17	chB20	chB24	chB28	chB32	NC
16	chC1	chC5	chC9	chC13	comC
15	chC2	chC6	chC10	chC14	comC
14	chC3	chC7	chC11	chC15	NC
13	chC4	chC8	chC12	chC16	NC
12	chC17	chC21	chC25	chC29	NC
11	chC18	chC22	chC26	chC30	NC
10	chC19	chC23	chC27	chC31	NC
9	chC20	chC24	chC28	chC32	NC
8	chD1	chD5	chD9	chD13	comD
7	chD2	chD6	chD10	chD14	comD
6	chD3	chD7	chD11	chD15	NC
5	chD4	chD8	chD12	chD16	NC
4	chD17	chD21	chD25	chD29	NC
3	chD18	chD22	chD26	chD30	NC
2	chD19	chD23	chD27	chD31	NC
1	chD20	chD24	chD28	chD32	GND

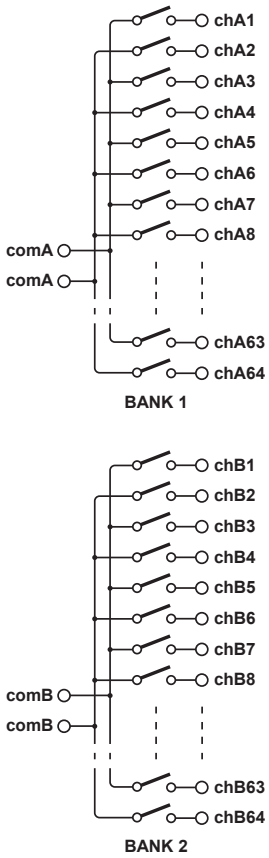
Figure 5.4 - Multiplexer Module 40-612:
IVI mode corresponding to 4-Bank, 32-Channel, 1-Pole pin designations.
The pin designations shown correspond to the IVI port.



40-612-002-2w4/16x1
4-Bank, 16-Channel, 2-Pole Pin Designations
(pole shown in brackets for wiring and is not part of IVI command)

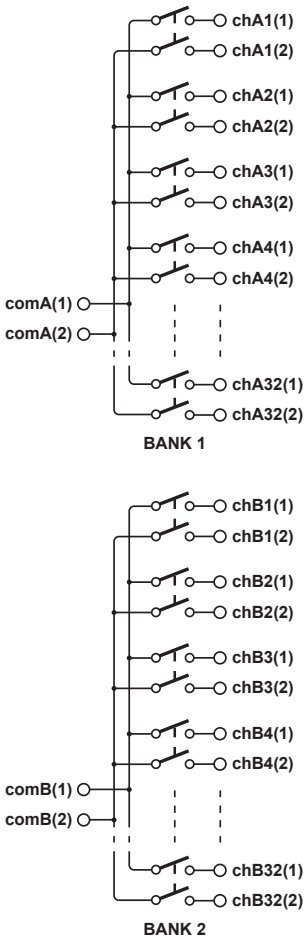
CONNECTOR ROWS	CONNECTOR COLUMNS A	B	C	D	E
32	chA1 (1)	chA3 (1)	chA5 (1)	chA7 (1)	comA (1)
31	chA1 (2)	chA3 (2)	chA5 (2)	chA7 (2)	comA (2)
30	chA2 (1)	chA4 (1)	chA6 (1)	chA8 (1)	NC
29	chA2 (2)	chA4 (2)	chA6 (2)	chA8 (2)	NC
28	chA9 (1)	chA11 (1)	chA13 (1)	chA15 (1)	NC
27	chA9 (2)	chA11 (2)	chA13 (2)	chA15 (2)	NC
26	chA10 (1)	chA12 (1)	chA14 (1)	chA16 (1)	NC
25	chA10 (2)	chA12 (2)	chA14 (2)	chA16 (2)	NC
24	chB1 (1)	chB3 (1)	chB5 (1)	chB7 (1)	comB (1)
23	chB1 (2)	chB3 (2)	chB5 (2)	chB7 (2)	comB (2)
22	chB2 (1)	chB4 (1)	chB6 (1)	chB8 (1)	NC
21	chB2 (2)	chB4 (2)	chB6 (2)	chB8 (2)	NC
20	chB9 (1)	chB11 (1)	chB13 (1)	chB15 (1)	NC
19	chB9 (2)	chB11 (2)	chB13 (2)	chB15 (2)	NC
18	chB10 (1)	chB12 (1)	chB14 (1)	chB16 (1)	NC
17	chB10 (2)	chB12 (2)	chB14 (2)	chB16 (2)	NC
16	chC1 (1)	chC3 (1)	chC5 (1)	chC7 (1)	comC (1)
15	chC1 (2)	chC3 (2)	chC5 (2)	chC7 (2)	comC (2)
14	chC2 (1)	chC4 (1)	chC6 (1)	chC8 (1)	NC
13	chC2 (2)	chC4 (2)	chC6 (2)	chC8 (2)	NC
12	chC9 (1)	chC11 (1)	chC13 (1)	chC15 (1)	NC
11	chC9 (2)	chC11 (2)	chC13 (2)	chC15 (2)	NC
10	chC10 (1)	chC12 (1)	chC14 (1)	chC16 (1)	NC
9	chC10 (2)	chC12 (2)	chC14 (2)	chC16 (2)	NC
8	chD1 (1)	chD3 (1)	chD5 (1)	chD7 (1)	comD (1)
7	chD1 (2)	chD3 (2)	chD5 (2)	chD7 (2)	comD (2)
6	chD2 (1)	chD4 (1)	chD6 (1)	chD8 (1)	NC
5	chD2 (2)	chD4 (2)	chD6 (2)	chD8 (2)	NC
4	chD9 (1)	chD11 (1)	chD13 (1)	chD15 (1)	NC
3	chD9 (2)	chD11 (2)	chD13 (2)	chD15 (2)	NC
2	chD10 (1)	chD12 (1)	chD14 (1)	chD16 (1)	NC
1	chD10 (2)	chD12 (2)	chD14 (2)	chD16 (2)	GND

Figure 5.5 - Multiplexer Module 40-612:
IVI mode corresponding to 4-Bank, 16-Channel, 2-Pole pin designations.
The pin designations shown correspond to the IVI port.



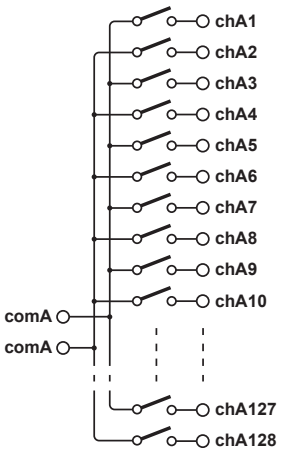
CONNECTOR ROWS	40-612-002-1w2/64x1 2-Bank, 64-Channel, 1-Pole Pin Designations				
	CONNECTOR COLUMNS				
	A	B	C	D	E
32	chA1	chA5	chA9	chA13	comA
31	chA2	chA6	chA10	chA14	comA
30	chA3	chA7	chA11	chA15	NC
29	chA4	chA8	chA12	chA16	NC
28	chA17	chA21	chA25	chA29	NC
27	chA18	chA22	chA26	chA30	NC
26	chA19	chA23	chA27	chA31	NC
25	chA20	chA24	chA28	chA32	NC
24	chA33	chA37	chA41	chA45	NC
23	chA34	chA38	chA42	chA46	NC
22	chA35	chA39	chA43	chA47	NC
21	chA36	chA40	chA44	chA48	NC
20	chA49	chA53	chA57	chA61	NC
19	chA50	chA54	chA58	chA62	NC
18	chA51	chA55	chA59	chA63	NC
17	chA52	chA56	chA60	chA64	NC
16	chB1	chB5	chB9	chB13	comB
15	chB2	chB6	chB10	chB14	comB
14	chB3	chB7	chB11	chB15	NC
13	chB4	chB8	chB12	chB16	NC
12	chB17	chB21	chB25	chB29	NC
11	chB18	chB22	chB26	chB30	NC
10	chB19	chB23	chB27	chB31	NC
9	chB20	chB24	chB28	chB32	NC
8	chB33	chB37	chB41	chB45	NC
7	chB34	chB38	chB42	chB46	NC
6	chB35	chB39	chB43	chB47	NC
5	chB36	chB40	chB44	chB48	NC
4	chB49	chB53	chB57	chB61	NC
3	chB50	chB54	chB58	chB62	NC
2	chB51	chB55	chB59	chB63	NC
1	chB52	chB56	chB60	chB64	GND

Figure 5.6 - Multiplexer Module 40-612:
IVI mode corresponding to 2-Bank, 64-Channel, 1-Pole pin designations.
The pin designations shown correspond to the IVI port.



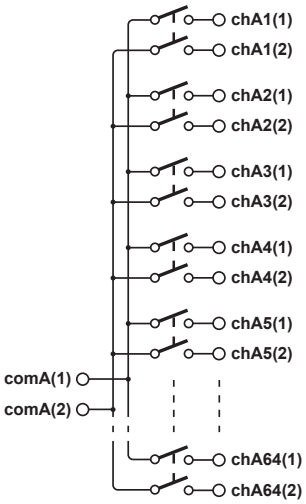
	40-612-002-2w2/32x1 2-Bank, 32-Channel, 2-Pole Pin Designations (pole shown in brackets for wiring and is not part of IVI command)				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	chA1 (1)	chA3 (1)	chA5 (1)	chA7 (1)	comA (1)
31	chA1 (2)	chA3 (2)	chA5 (2)	chA7 (2)	comA (2)
30	chA2 (1)	chA4 (1)	chA6 (1)	chA8 (1)	NC
29	chA2 (2)	chA4 (2)	chA6 (2)	chA8 (2)	NC
28	chA9 (1)	chA11 (1)	chA13 (1)	chA15 (1)	NC
27	chA9 (2)	chA11 (2)	chA13 (2)	chA15 (2)	NC
26	chA10 (1)	chA12 (1)	chA14 (1)	chA16 (1)	NC
25	chA10 (2)	chA12 (2)	chA14 (2)	chA16 (2)	NC
24	chA17 (1)	chA19 (1)	chA21 (1)	chA23 (1)	NC
23	chA17 (2)	chA19 (2)	chA21 (2)	chA23 (2)	NC
22	chA18 (1)	chA20 (1)	chA22 (1)	chA24 (1)	NC
21	chA18 (2)	chA20 (2)	chA22 (2)	chA24 (2)	NC
20	chA25 (1)	chA27 (1)	chA29 (1)	chA31 (1)	NC
19	chA25 (2)	chA27 (2)	chA29 (2)	chA31 (2)	NC
18	chA26 (1)	chA28 (1)	chA30 (1)	chA32 (1)	NC
17	chA26 (2)	chA28 (2)	chA30 (2)	chA32 (2)	NC
16	chB1 (1)	chB3 (1)	chB5 (1)	chB7 (1)	comB (1)
15	chB1 (2)	chB3 (2)	chB5 (2)	chB7 (2)	comB (2)
14	chB2 (1)	chB4 (1)	chB6 (1)	chB8 (1)	NC
13	chB2 (2)	chB4 (2)	chB6 (2)	chB8 (2)	NC
12	chB9 (1)	chB11 (1)	chB13 (1)	chB15 (1)	NC
11	chB9 (2)	chB11 (2)	chB13 (2)	chB15 (2)	NC
10	chB10 (1)	chB12 (1)	chB14 (1)	chB16 (1)	NC
9	chB10 (2)	chB12 (2)	chB14 (2)	chB16 (2)	NC
8	chB17 (1)	chB19 (1)	chB21 (1)	chB23 (1)	NC
7	chB17 (2)	chB19 (2)	chB21 (2)	chB23 (2)	NC
6	chB18 (1)	chB20 (1)	chB22 (1)	chB24 (1)	NC
5	chB18 (2)	chB20 (2)	chB22 (2)	chB24 (2)	NC
4	chB25 (1)	chB27 (1)	chB29 (1)	chB31 (1)	NC
3	chB25 (2)	chB27 (2)	chB29 (2)	chB31 (2)	NC
2	chB26 (1)	chB28 (1)	chB30 (1)	chB32 (1)	NC
1	chB26 (2)	chB28 (2)	chB30 (2)	chB32 (2)	GND

Figure 5.7 - Multiplexer Module 40-612:
IVI mode corresponding to 2-Bank, 32-Channel, 2-Pole pin designations.
The pin designations shown correspond to the IVI port.



	40-612-002-1w128x1 1-Bank, 128-Channel, 1-Pole Pin Designations				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	chA1	chA5	chA9	chA13	comA
31	chA2	chA6	chA10	chA14	comA
30	chA3	chA7	chA11	chA15	NC
29	chA4	chA8	chA12	chA16	NC
28	chA17	chA21	chA25	chA29	NC
27	chA18	chA22	chA26	chA30	NC
26	chA19	chA23	chA27	chA31	NC
25	chA20	chA24	chA28	chA32	NC
24	chA33	chA37	chA41	chA45	NC
23	chA34	chA38	chA42	chA46	NC
22	chA35	chA39	chA43	chA47	NC
21	chA36	chA40	chA44	chA48	NC
20	chA49	chA53	chA57	chA61	NC
19	chA50	chA54	chA58	chA62	NC
18	chA51	chA55	chA59	chA63	NC
17	chA52	chA56	chA60	chA64	NC
16	chA65	chA69	chA73	chA77	NC
15	chA66	chA70	chA74	chA78	NC
14	chA67	chA71	chA75	chA79	NC
13	chA68	chA72	chA76	chA80	NC
12	chA81	chA85	chA89	chA93	NC
11	chA82	chA86	chA90	chA94	NC
10	chA83	chA87	chA91	chA95	NC
9	chA84	chA88	chA92	chA96	NC
8	chA97	chA101	chA105	chA109	NC
7	chA98	chA102	chA106	chA110	NC
6	chA99	chA103	chA107	chA111	NC
5	chA100	chA104	chA108	chA112	NC
4	chA113	chA117	chA121	chA125	NC
3	chA114	chA118	chA122	chA126	NC
2	chA115	chA119	chA123	chA127	NC
1	chA116	chA120	chA124	chA128	GND

Figure 5.8 - Multiplexer Module 40-612:
IVI mode corresponding to 1-Bank, 128-Channel, 1-Pole pin designations.
The pin designations shown correspond to the IVI port.



	40-612-002-2w64x1 1-Bank, 64-Channel, 2-Pole Pin Designations (pole shown in brackets for wiring and is not part of IVI command)				
	CONNECTOR COLUMNS				
CONNECTOR ROWS	A	B	C	D	E
32	chA1 (1)	chA3 (1)	chA5 (1)	chA7 (1)	comA (1)
31	chA1 (2)	chA3 (2)	chA5 (2)	chA7 (2)	comA (2)
30	chA2 (1)	chA4 (1)	chA6 (1)	chA8 (1)	NC
29	chA2 (2)	chA4 (2)	chA6 (2)	chA8 (2)	NC
28	chA9 (1)	chA11 (1)	chA13 (1)	chA15 (1)	NC
27	chA9 (2)	chA11 (2)	chA13 (2)	chA15 (2)	NC
26	chA10 (1)	chA12 (1)	chA14 (1)	chA16 (1)	NC
25	chA10 (2)	chA12 (2)	chA14 (2)	chA16 (2)	NC
24	chA17 (1)	chA19 (1)	chA21 (1)	chA23 (1)	NC
23	chA17 (2)	chA19 (2)	chA21 (2)	chA23 (2)	NC
22	chA18 (1)	chA20 (1)	chA22 (1)	chA24 (1)	NC
21	chA18 (2)	chA20 (2)	chA22 (2)	chA24 (2)	NC
20	chA25 (1)	chA27 (1)	chA29 (1)	chA31 (1)	NC
19	chA25 (2)	chA27 (2)	chA29 (2)	chA31 (2)	NC
18	chA26 (1)	chA28 (1)	chA30 (1)	chA32 (1)	NC
17	chA26 (2)	chA28 (2)	chA30 (2)	chA32 (2)	NC
16	chA33 (1)	chA35 (1)	chA37 (1)	chA39 (1)	NC
15	chA33 (2)	chA35 (2)	chA37 (2)	chA39 (2)	NC
14	chA34 (1)	chA36 (1)	chA38 (1)	chA40 (1)	NC
13	chA34 (2)	chA36 (2)	chA38 (2)	chA40 (2)	NC
12	chA41 (1)	chA43 (1)	chA45 (1)	chA47 (1)	NC
11	chA41 (2)	chA43 (2)	chA45 (2)	chA47 (2)	NC
10	chA42 (1)	chA44 (1)	chA46 (1)	chA48 (1)	NC
9	chA42 (2)	chA44 (2)	chA46 (2)	chA48 (2)	NC
8	chA49 (1)	chA51 (1)	chA53 (1)	chA55 (1)	NC
7	chA49 (2)	chA51 (2)	chA53 (2)	chA55 (2)	NC
6	chA50 (1)	chA52 (1)	chA54 (1)	chA56 (1)	NC
5	chA50 (2)	chA52 (2)	chA54 (2)	chA56 (2)	NC
4	chA57 (1)	chA59 (1)	chA61 (1)	chA63 (1)	NC
3	chA57 (2)	chA59 (2)	chA61 (2)	chA63 (2)	NC
2	chA58 (1)	chA60 (1)	chA62 (1)	chA64 (1)	NC
1	chA58 (2)	chA60 (2)	chA62 (2)	chA64 (2)	GND

Figure 5.9 - Multiplexer Module 40-612:
IVI mode corresponding to 1-Bank, 64-Channel, 2-Pole pin designations.
The pin designations shown correspond to the IVI port.

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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.

SWITCHING SYSTEM TEST TOOLS

Please refer to Section 7 - Maintenance Information.

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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.

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 on ***eBIRST*** click here.

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.

Table 7.1 - 8-Bank, 16-Channel, 1-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	67 (c) & 66 (.2) or only 65 (.1)*	Not Applicable	72	1, 2, 3, 4, 5, 6, 7, 8
2	75 (c) & 74 (.2) or only 73 (.1)*	Not Applicable	76	9, 10, 11, 12, 13, 14, 15, 16
3	79 (c) & 78 (.2) or only 77 (.1)*	Not Applicable	81	17, 18, 19, 20, 21, 22, 23, 24
4	84 (c) & 83 (.2) or only 82 (.1)*	Not Applicable	85	25, 26, 27, 28, 29, 30, 31, 32
5	88 (c) & 87 (.2) or only 86 (.1)*	Not Applicable	91	33, 34, 35, 36, 37, 38, 39, 40
6	94 (c) & 93 (.2) or only 92 (.1)*	Not Applicable	95	41, 42, 43, 44, 45, 46, 47, 48
7	98 (c) & 97 (.2) or only 96 (.1)*	Not Applicable	100	49, 50, 51, 52, 53, 54, 55, 56
8	103 (c) & 102 (.2) or only 101 (.1)*	Not Applicable	104	57, 58, 59, 60, 61, 62, 63, 64

Table 7.2 - 8-Bank, 8-Channel, 2-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	65, 66	Not Applicable	72	1, 2, 3, 4, 5, 6, 7, 8
2	73, 74	Not Applicable	76	9, 10, 11, 12, 13, 14, 15, 16
3	77, 78	Not Applicable	81	17, 18, 19, 20, 21, 22, 23, 24
4	82, 83	Not Applicable	85	25, 26, 27, 28, 29, 30, 31, 32
5	86, 87	Not Applicable	91	33, 34, 35, 36, 37, 38, 39, 40
6	92, 93	Not Applicable	95	41, 42, 43, 44, 45, 46, 47, 48
7	96, 97	Not Applicable	100	49, 50, 51, 52, 53, 54, 55, 56
8	101, 102	Not Applicable	104	57, 58, 59, 60, 61, 62, 63, 64

Table 7.3 - 4-Bank, 32-Channel, 1-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	“67 (c) & 66 (.2) or only 65 (.1)* and 75 (c) & 74 (.2) or only 73 (.1)*”	68	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
2	“79 (c) & 78 (.2) or only 77 (.1) * and 84 (c) & 83 (.2) or only 82 (.1)*”	80	81	17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
3	“88 (c) & 87 (.2) or only 86 (.1)* and 94 (c) & 93 (.2) or only 92 (.1)*”	89	91	33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48
4	“98 (c) & 97 (.2) or only 96 (.1) * and 103 (c) & 102 (.2) or only 101 (.1)*”	99	100	49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

Table 7.4 - 4-Bank, 16-Channel, 2-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	65, 66, 73, 74	68	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
2	77, 78, 82, 83	80	81	17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
3	86, 87, 92, 93	89	91	33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48
4	96, 97, 101, 102	99	100	49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

Table 7.5 - 2-Bank, 64-Channel, 1-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	"67 (c) & 66 (.2) or only 65 (.1)* and 75 (c) & 74 (.2) or only 73 (.1)* and 79 (c) & 78 (.2) or only 77 (.1) * and 84 (c) & 83 (.2) or only 82 (.1)*"	68, 69, 80	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
2	"88 (c) & 87 (.2) or only 86 (.1)* and 94 (c) & 93 (.2) or only 92 (.1)* and 98 (c) & 97 (.2) or only 96 (.1) * and 103 (c) & 102 (.2) or only 101 (.1)*"	89, 90, 99	91	33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

Table 7.6 - 2-Bank, 32-Channel, 2-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	65, 66, 73, 74, 77, 78, 82, 83	68, 69, 80	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32
2	86, 87, 92, 93, 96, 97, 101, 102	89, 90, 99	91	33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

Table 7.7 - 1-Bank, 128-Channel, 1-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	"67 (c) & 66 (.2) or only 65 (.1)* and 75 (c) & 74 (.2) or only 73 (.1)* and 79 (c) & 78 (.2) or only 77 (.1) * and 84 (c) & 83 (.2) or only 82 (.1)* and 88 (c) & 87 (.2) or only 86 (.1)* and 94 (c) & 93 (.2) or only 92 (.1)* and 98 (c) & 97 (.2) or only 96 (.1) * and 103 (c) & 102 (.2) or only 101 (.1)*"	68, 69, 70, 71, 80, 89, 90, 99	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

Table 7.8 - 1-Bank, 64-Channel, 2-pole Relay Look-Up Table

Bank	Relays Operated			
	1/2-pole	Interbank	Isolation	Channel Selection
1	"65, 66, 73, 74, 77, 78, 82, 83, 86, 87, 92, 93, 96, 97, 101, 102"	68, 69, 70, 71, 80, 89, 90, 99	72	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64

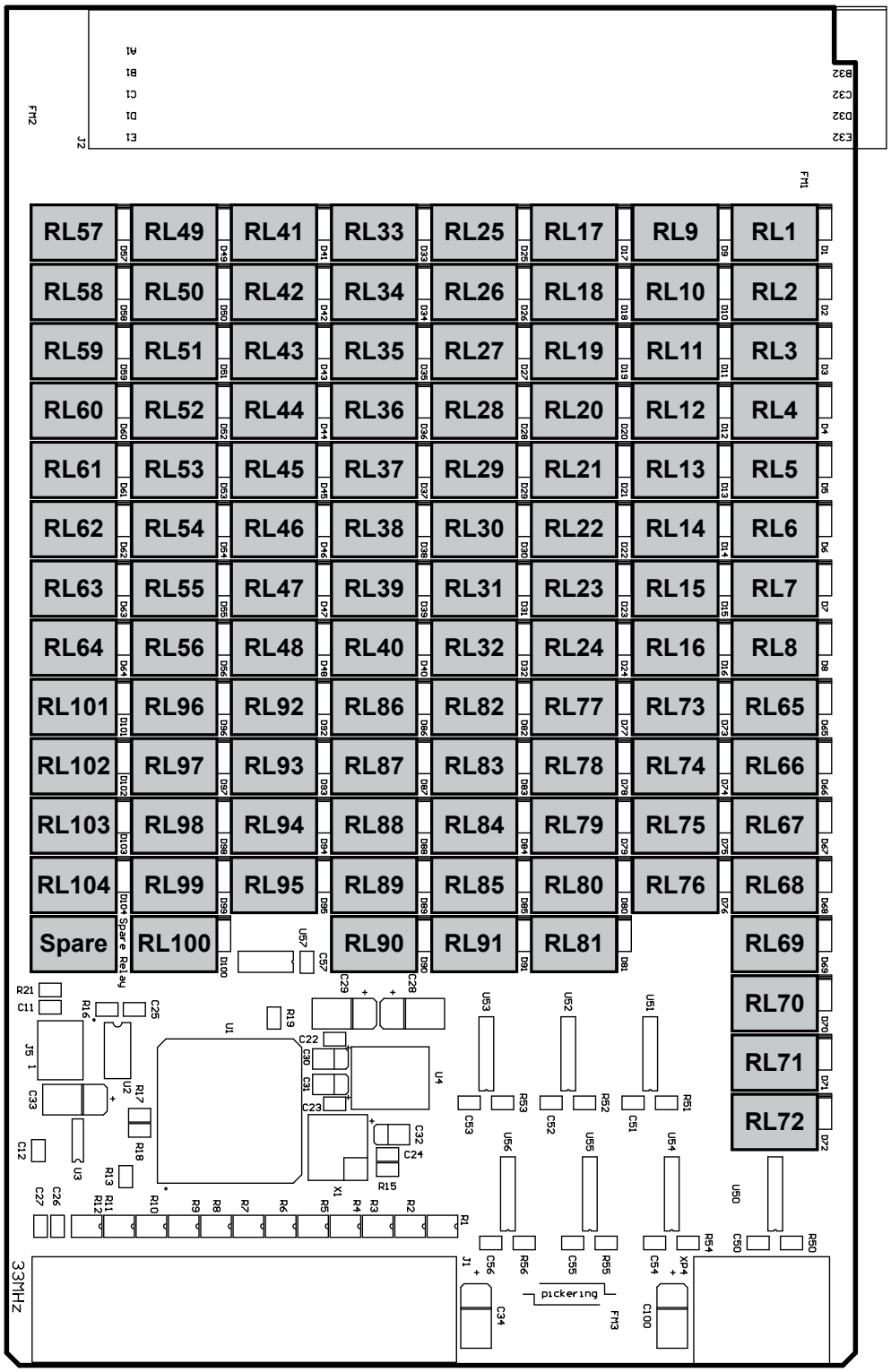


Figure 7.1 - Very High Density Versatile Multiplexer Module 40-612: Component Layout