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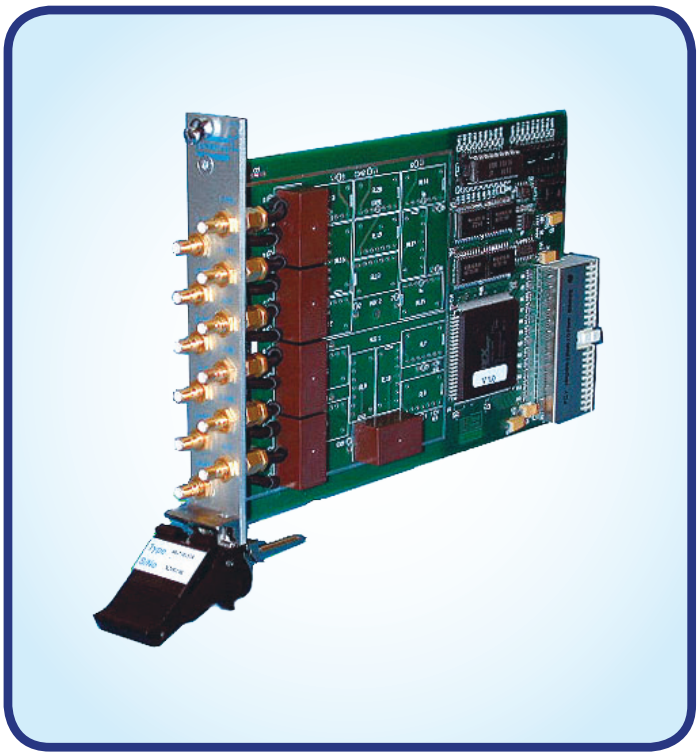
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Find the *Pickering 40-710-524* at our website: ***Click HERE***

User Manual

PXI

RF Relay Module
(Model No. 40-710)



Issue 6.2 May 2017

pickeringtest.com

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TECHNICAL SUPPORT

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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WARNINGS AND CAUTIONS

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

WARNING - DANGER OF ELECTRIC SHOCK	SYMBOL
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the PXI/LXI chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals.	

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.

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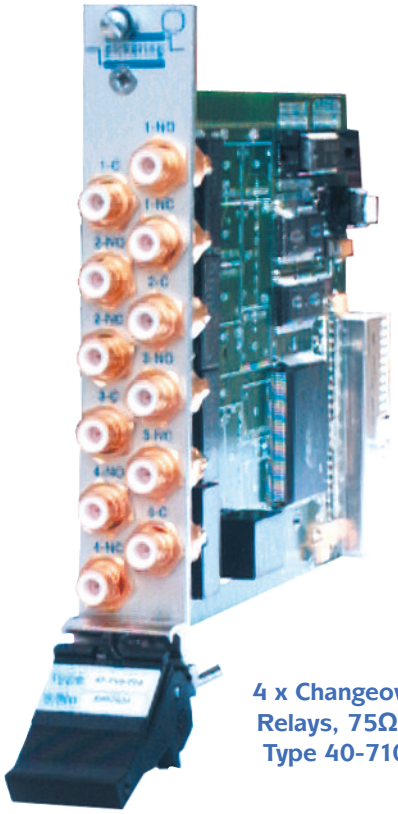
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SECTION 1 - TECHNICAL SPECIFICATION

40-710
RF Relay Module

- 4 Changeover RF Relays Per Module
- Up To 2.5GHz Bandwidth in 50Ω
- Up To 1GHz Bandwidth in 75Ω Suitable For Telecoms or Video Applications
- Tree Networks may be Constructed by Inter-Linking Individual Modules
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



4 x Changeover RF Relays, 75Ω SMZ, Type 40-710-714

Model 40-710 RF switching module has a bank of 4 individual high performance R.F. changeover switches (50Ω or 75Ω, Bi-directional) with very low insertion loss, suitable for handling signals up to 2.5GHz. Applications include aerial switching, routing high frequency signals into oscilloscopes and analysers.

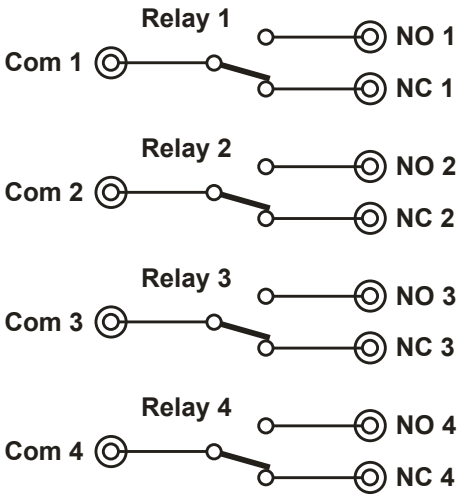
Available with a choice of connectors: SMA, SMB and Siemens 1.0/2.3 versions. In addition BNC connectors are offered with reduced bandwidth performance which requires a 2 slot width module.

The 75Ω versions are suitable for high frequency video and telecommunication signals up to 1GHz.

Relay Type

The 40-710 is fitted with high reliabillty RF Relays, these offer long life with good low level switching performance.

Spare RF Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

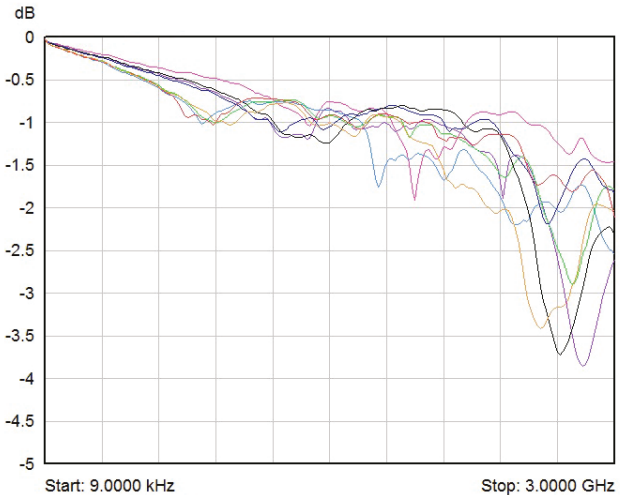


Switching Diagram for 40-710, 4 x SPDT RF Relays

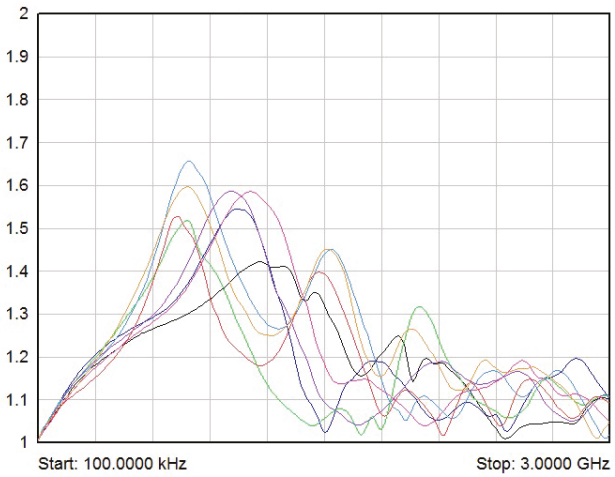


4 x Changeover RF Relays, 50Ω SMB, Type 40-710-514

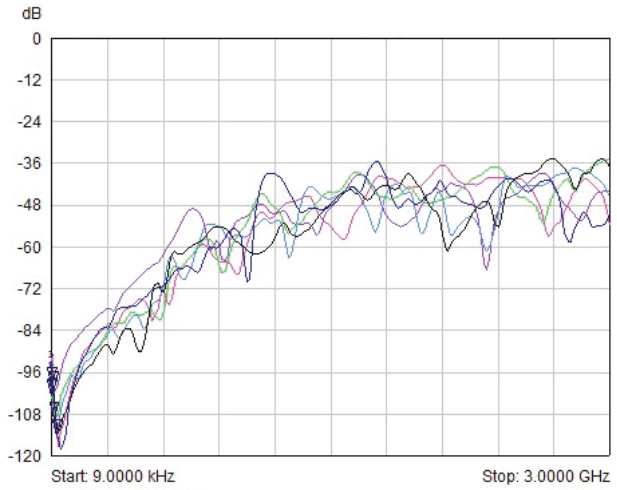
40-710-514 (50Ω SMB) Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



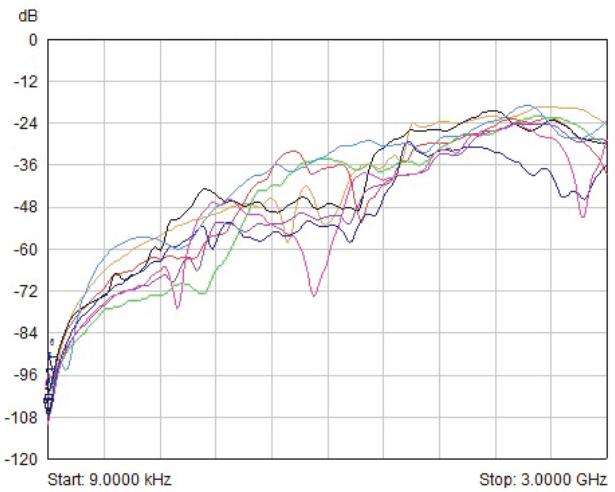
40-710-514 (50Ω SMB) typical insertion loss plots for all NO and NC inputs.



40-710-514 (50Ω SMB) typical VSWR plots for all NO and NC inputs.



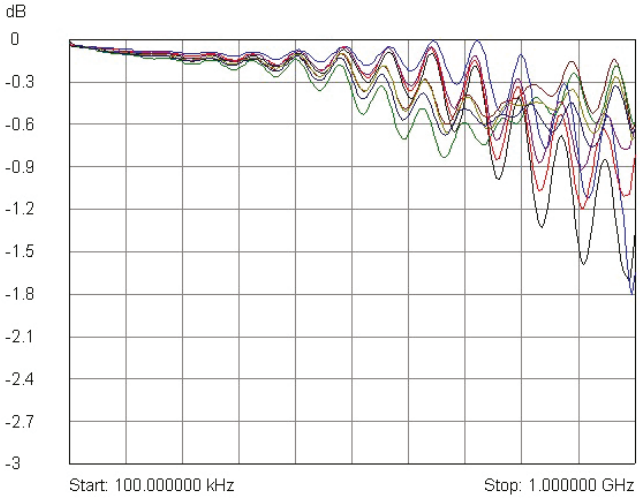
40-710-514 (50Ω SMB) typical crosstalk plots between neighbouring channels.



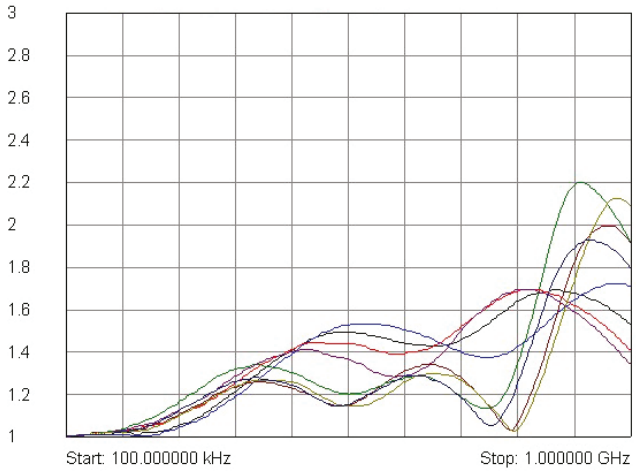
40-710-514 (50Ω SMB) typical isolation plots for all NO and NC inputs.

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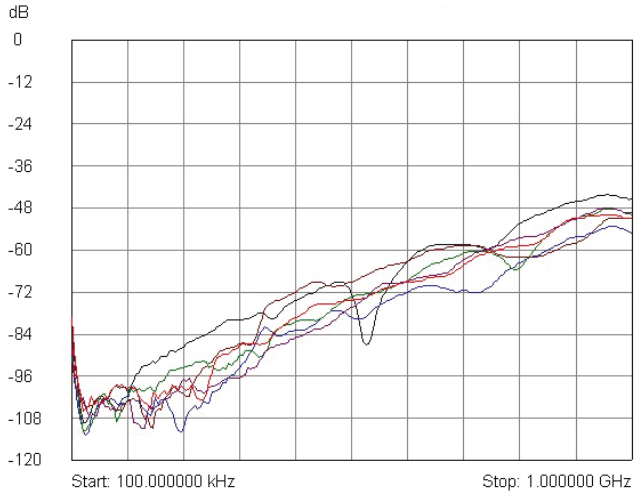
40-710-704 (75Ω BNC) Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



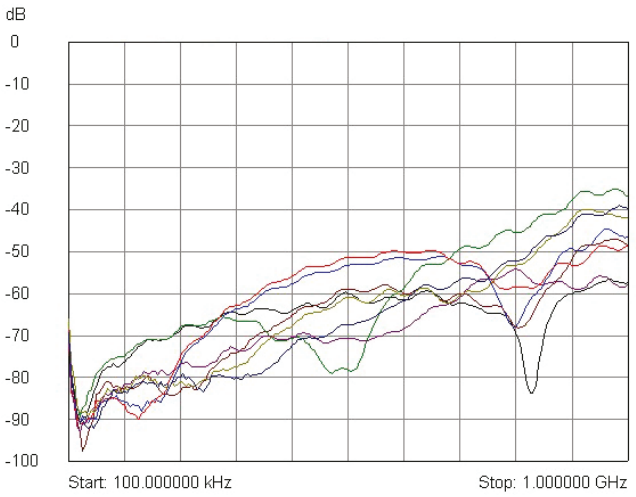
40-710-704 (75Ω BNC) typical insertion loss plots for all NO and NC inputs.



40-710-704 (75Ω BNC) typical VSWR plots for all NO and NC inputs.



40-710-704 (75Ω BNC) typical crosstalk plots between neighbouring channels.



40-710-704 (75Ω BNC) typical isolation plots for all NO and NC inputs.

General Specification - All Versions

Max Switching Power:	10W
Max Switching Voltage:	30VDC
Max Switching Current:	0.5A
Nominal Switching Capacity:	0.01A, 24VDC, 10W@1.2GHz
Initial On Path Resistance:	<200mΩ
Off Path Resistance:	$>1x10^{8}\Omega$
Thermal Offset:	<20µV
Expected Life, Mechanical:	$>1x10^{6}$ ops
Expected Life, Electrical:	$>3x10^{5}$ ops (10mA@24VDC) $>3x10^{5}$ ops (1W@2.6GHz)
Switching Time:	10ms
Rise Time:	<0.2ns (50Ω) <0.3ns (75Ω)

50Ω Specification - SMB and SMA Versions

Bandwidth:	2.5GHz
Maximum Switching Power:	10W
Isolation:	Typically >27dB (0-1GHz) Typically >17dB (1GHz-2.5GHz)
Crosstalk:	Typically <-46dB (0-1GHz) Typically <-32dB (1GHz-2.5GHz)
Insertion Loss:	Typically <1.5dB (0-1GHz) Typically <3dB (1GHz-2.5GHz)
VSWR:	<1.7:1

50Ω Specification - BNC Version

Bandwidth:	1GHz
Maximum Switching Power:	10W
Isolation:	Typically >27dB (0-1GHz)
Crosstalk:	Typically <-46dB (0-1GHz)
Insertion Loss:	Typically <3dB (0-1GHz)
VSWR:	<1.7:1

75Ω Specification - All Versions

Bandwidth:	1GHz
Maximum Switching Power:	10W
Isolation:	Typically >30dB (0-1GHz)
Crosstalk:	Typically <-40dB (0-1GHz)
Insertion Loss:	Typically <3dB (0-1GHz)
VSWR:	<2.4:1

Power Requirements

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). Except BNC version which is 2-slot width.

Module weight: 240g (40-710-734)

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 mounted coaxial connectors, type dependant upon product code.

Product Order Codes

4x Changeover Switch, 1GHz, 50Ω, BNC	**40-710-504**
4x Changeover Switch, 2.5GHz, 50Ω, SMB	**40-710-514**
4x Changeover Switch, 2.5GHz, 50Ω, SMA	**40-710-524**
4x Changeover Switch, 1GHz, 75Ω, BNC	**40-710-704**
4x Changeover Switch, 1GHz, 75Ω, SMZ/Type43	**40-710-714**
4x Changeover Switch, 1GHz, 75Ω, 1.0/2.3	**40-710-734**
4x Changeover Switch, 1GHz, 75Ω, SMB	**40-710-754**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the 40-710 range is as follows:

All 50Ω versions: 91-100-096 Relay Kit 96
All 75Ω versions: 91-100-029 Relay Kit 29

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

Mating Connectors & Cabling

For connection accessories for the 40-710 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

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Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: www.pickeringtest.com/os
The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

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

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

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.
Uses a 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

PXI & LXI Chassis Compatibility

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



Latest Details

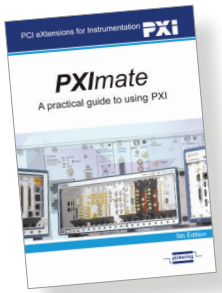
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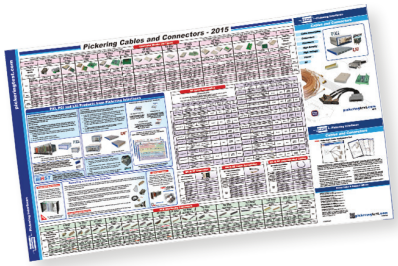
Please refer to the 200 page Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. Available in either print or as a download.
Alternatively our web site has dynamically linked connector/cabling options,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



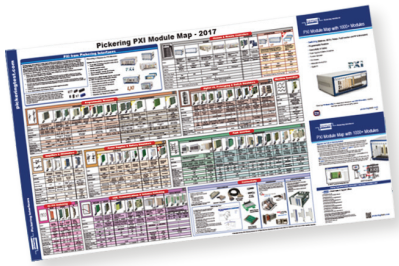
"**The Big PXI Catalog**" gives full details of Pickering's entire range of PXI switch modules, instrument modules and support products.
At over 500 pages, the Big PXI Catalog is available on request or can be downloaded from the Pickering website.



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



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



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

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The RF Switching Module is powered by +12V and +5V inputs via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted BNC, SMA, SMB, SMZ/Type 43, or Siemens 1.0/2.3 Version connectors. The module comprises a PCB populated with changeover RF relays. The relays are energised via control signals from relay driver U10. The relay driver is addressed by PCI bridge U1, via output register U8, to output the required signal. PCI Bridge U1 is configured by EEPROM U2.

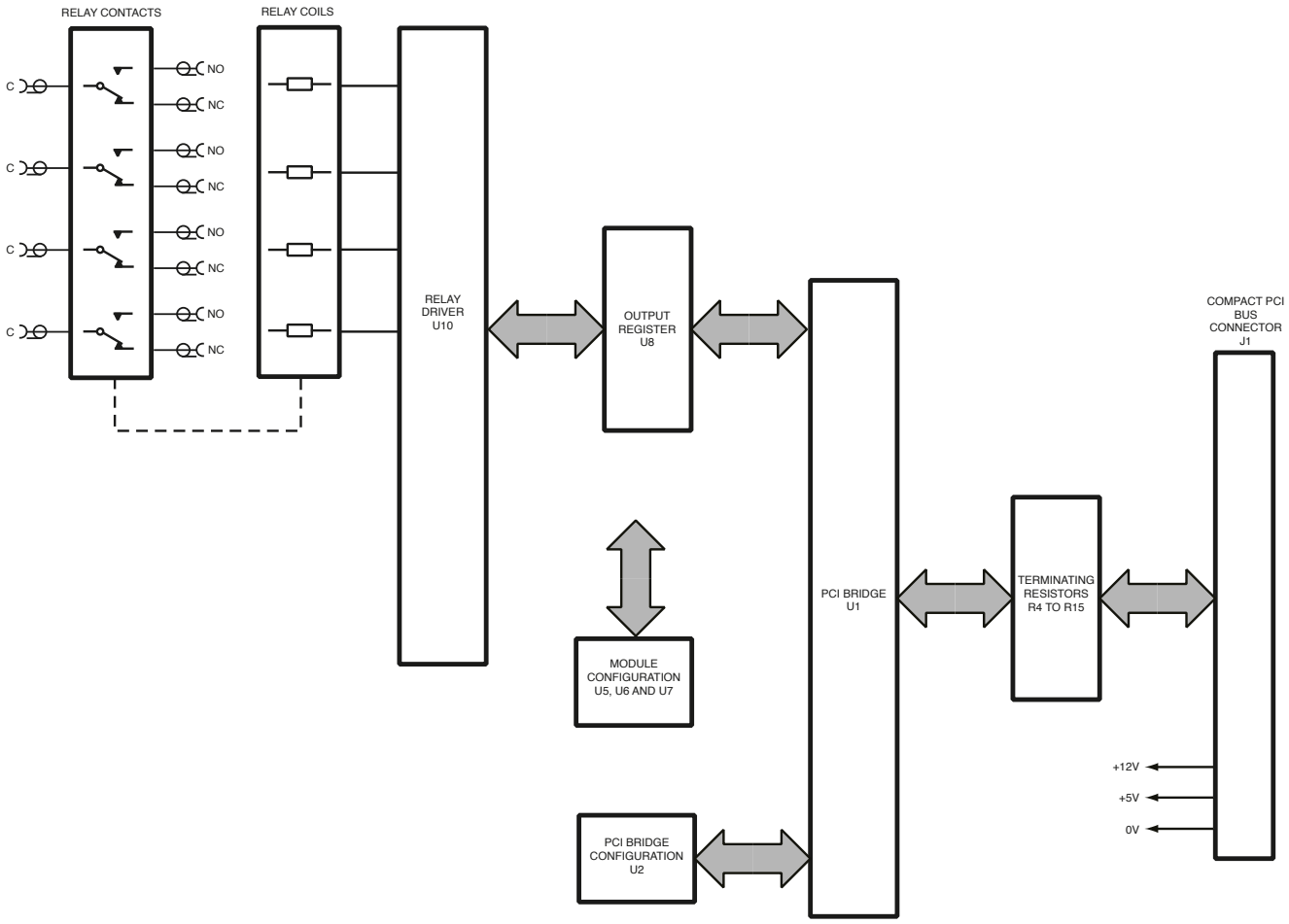


Figure 2.1 - RF Switching Module: Functional Block Diagram

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SECTION 3 - INSTALLATION

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

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

PREOPERATION CHECKS (UNPACKING)

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

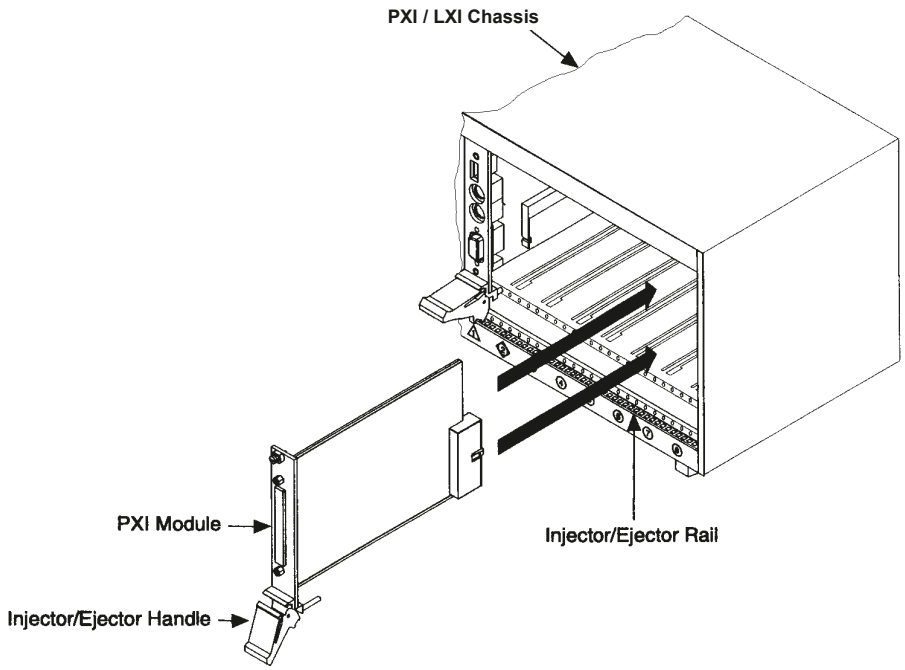


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

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HARDWARE INSTALLATION
ELECTRICAL CONNECTION (CHASSIS)

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

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

Ensure that there is adequate ventilation.

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

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

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

SOFTWARE INSTALLATION

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

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

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

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TESTING OPERATION

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



Figure 3.2 - General Soft Front Panel Icon

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

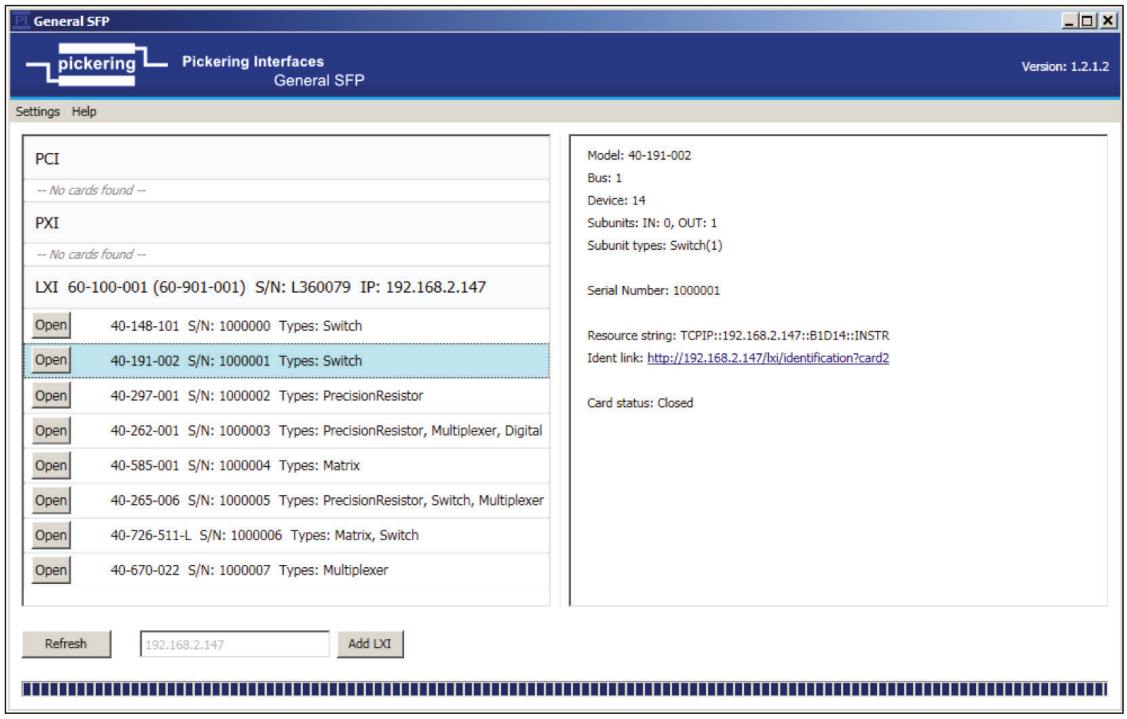


Figure 3.3 - General Soft Front Panel Selector

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

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SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI CARDS

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

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

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

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

Programming for PXI

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

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

IVI Driver for Windows - pi40iv

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

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

VISA Driver for Windows - pipx40

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

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

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

Direct I/O Driver for Windows - Pilpxi

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

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Register-level Programming

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

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

Programming for LXI

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

IVI Driver for Windows - pi40iv

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

Direct I/O Driver for Windows - Piplx

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

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

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

.NET

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

SOAP

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

SSH

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

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

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

General Pickering Card Architecture

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

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

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

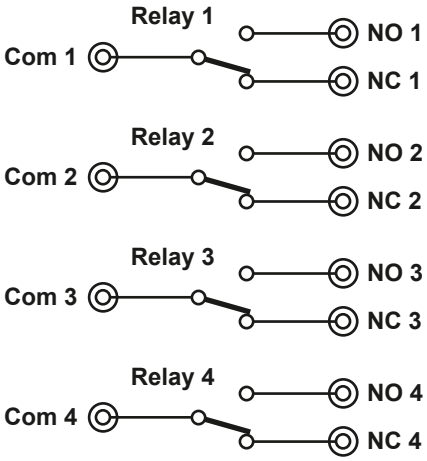
Low level drivers include functions to allow the programmer to query the card to ascertain the number of sub-units, and the size and type of each sub-unit.

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

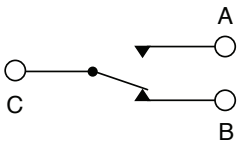
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MODULE ARCHITECTURE 40-710

The 40-710 utilises 4 SPDT relays. In the default state all relays are open circuit. Energising a particular relay creates a signal path between the C and A terminals. The relay module's switching architecture is shown in its default state in the diagram below:



Switching Diagram for 40-710
4 x SPDT Changeover Switches



SPDT Identifiers

One sub-unit is used to control all the module's relays as shown below. Enabling a particular bit closes the C to A signal path.-

Sub-Unit	Bit	40-710 Signal Path (with relay energised)
1	1	Com1 to NO1
	2	Com2 to NO2
	3	Com3 to NO3
	4	Com4 to NO4

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PROGRAMMING THE MODULE 40-710

Here are some examples of using the drivers with the 40-710 (4 x SPDT) module.

Using PILPXI

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

OpBit

```
DWORD sub_unit = 1;
PIL_OpBit( card_num, sub_unit, 1, 1);   // Operates the Ch1 relay
PIL_OpBit( card_num, sub_unit, 1, 0);   // Releases the Ch1 relay
PIL_OpBit( card_num, sub_unit, 3, 1);   // Operates the Ch3 relay
```

WriteSub

```
// Sub-unit is 4 bits wide, so 1 DWORD is needed to hold the pattern
DWORD data[1];
data[0] = 1;            // Sets lowest bit to 1, Ch1 relay
PIL_WriteSub( card_num, sub_unit, data);
data[0] = 0x4;          // Sets 3rd bit, Ch3 relay
                        // All other relays are set to off
PIL_WriteSub( card_num, sub_unit, data);
```

Using PIPX40

setChannelState

```
ViUInt32 sub_unit = 1;
pipx40_setChannelState(vi, sub_unit, 1, VI_ON);     // Operates the Ch1 relay
pipx40_setChannelState(vi, sub_unit, 1, VI_OFF);    // Releases the Ch1 relay
pipx40_setChannelState(vi, sub_unit, 3, VI_ON);     // Operates the Ch3 relay
```

setChannelPattern

```
// Sub-unit is 4 bits wide, so 1 ViUInt32 value is needed to hold the entire pattern
ViUInt32 data[1];
data[0] = 1;            // Sets lowest bit to 1, Ch1 relay
pipx40_setChannelPattern( vi, sub_unit, data);
data[0] = 0x4;          // Sets 3rd bit, Ch3 relay
                        // All other relays are set to off
pipx40_setChannelPattern( vi, sub_unit, data);
```

Using pi40iv

The IVI driver labels the channels using the normal com/nc1 or com/no1 (etc) labelling tags.

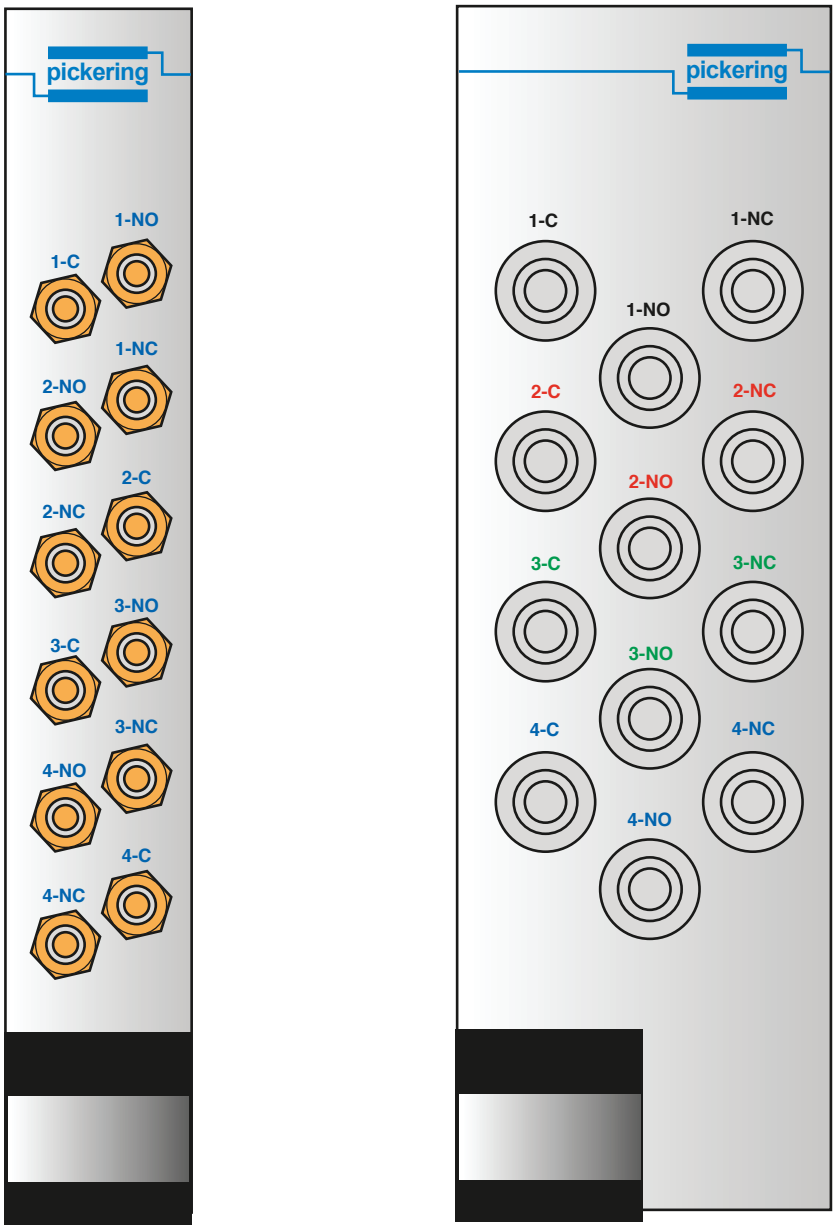
```
pi40iv_Connect(vi, com1, no1);      // Connects Ch1 to its relays NO position.
pi40iv_Disconnect(vi, com1, nc1);   // Returns the Ch1 relay to its NC position.
pi40iv_Connect(vi, com3, no3);      // Connects Ch3 to its relays NO position.
```

The IVI Switch driver specification contains no bulk setting capabilities.

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SECTION 5 - CONNECTOR INFORMATION

Figure 5.1 provides Pin Outs for the Modules in the 40-710 model range.



40-710-514/524/704/714/734//754 **40-710-504**

Figure 5.1 - Module: Pin-Outs

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SECTION 6 - TROUBLE SHOOTING

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

INSTALLATION PROBLEMS

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

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

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

DIAGNOSTIC UTILITY

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

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

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

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

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SECTION 7 - MAINTENANCE INFORMATION

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

PERIODIC MAINTENANCE

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

GENERAL CLEANING

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

SOFTWARE UPDATE

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

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

RELAY LOOK-UP TABLES

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

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Table 7.1 - RF Switching Module 40-710: Relay Numbering

40-710-504 40-710-514 40-710-524 40-710-704 40-710-714 40-710-734 40-710-754			
Sub-Unit	**Bit**	**Signal Path (with relay energised)**	**Board Relay**
1	1	Com1 to NO1	RL13
	2	Com2 to NO2	RL14
	3	Com3 to NO3	RL12
	4	Com4 to NO4	RL15

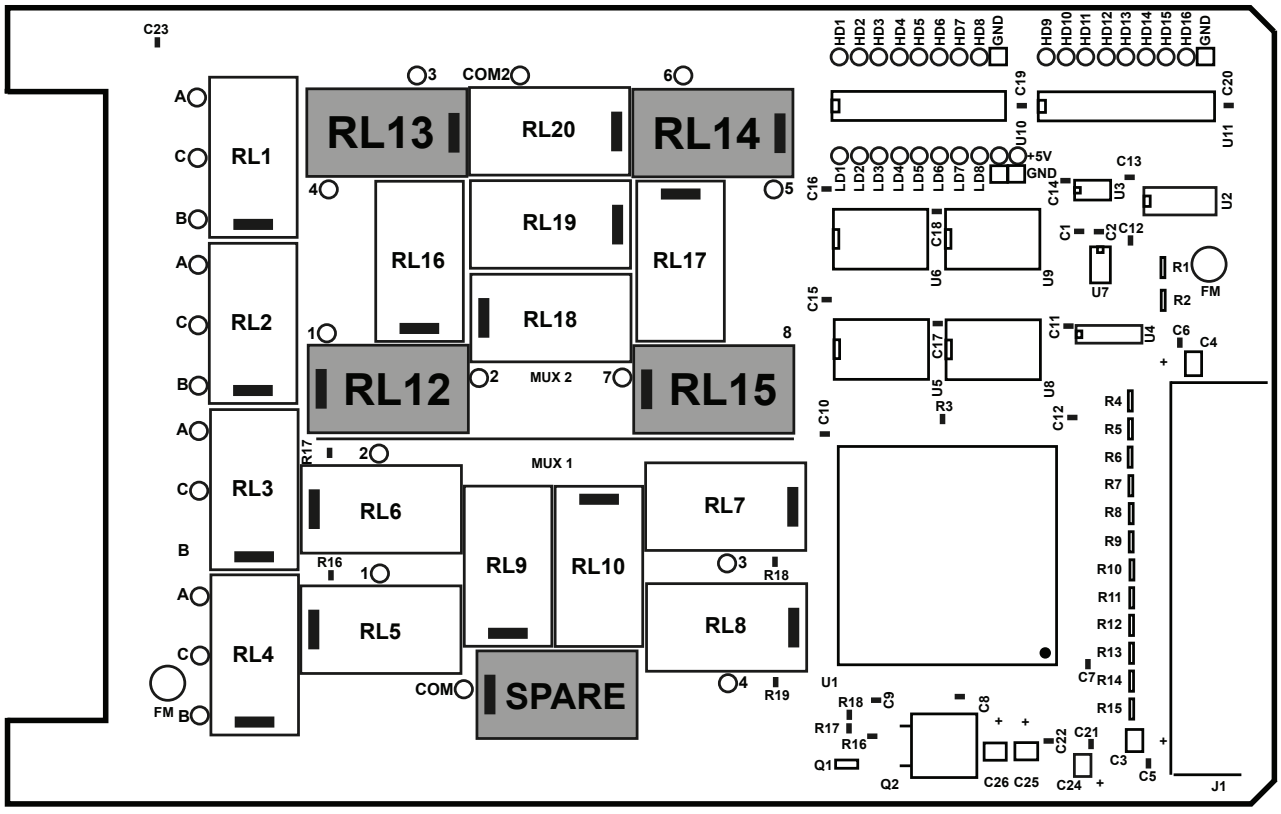


Figure 7.1 - RF Switching Module 40-710: Component Layout (Configurations as Table 7.1)

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Table 7.2 - RF Switching Module 40-710-514-H1: Relay Numbering

40-710-514-H1			
Sub-Unit	**Bit**	**Signal Path (with relay energised)**	**Board Relay**
1	1	Com1 to NO1	RL1
	2	Com2 to NO2	RL2
	3	Com3 to NO3	RL3
	4	Com4 to NO4	RL4

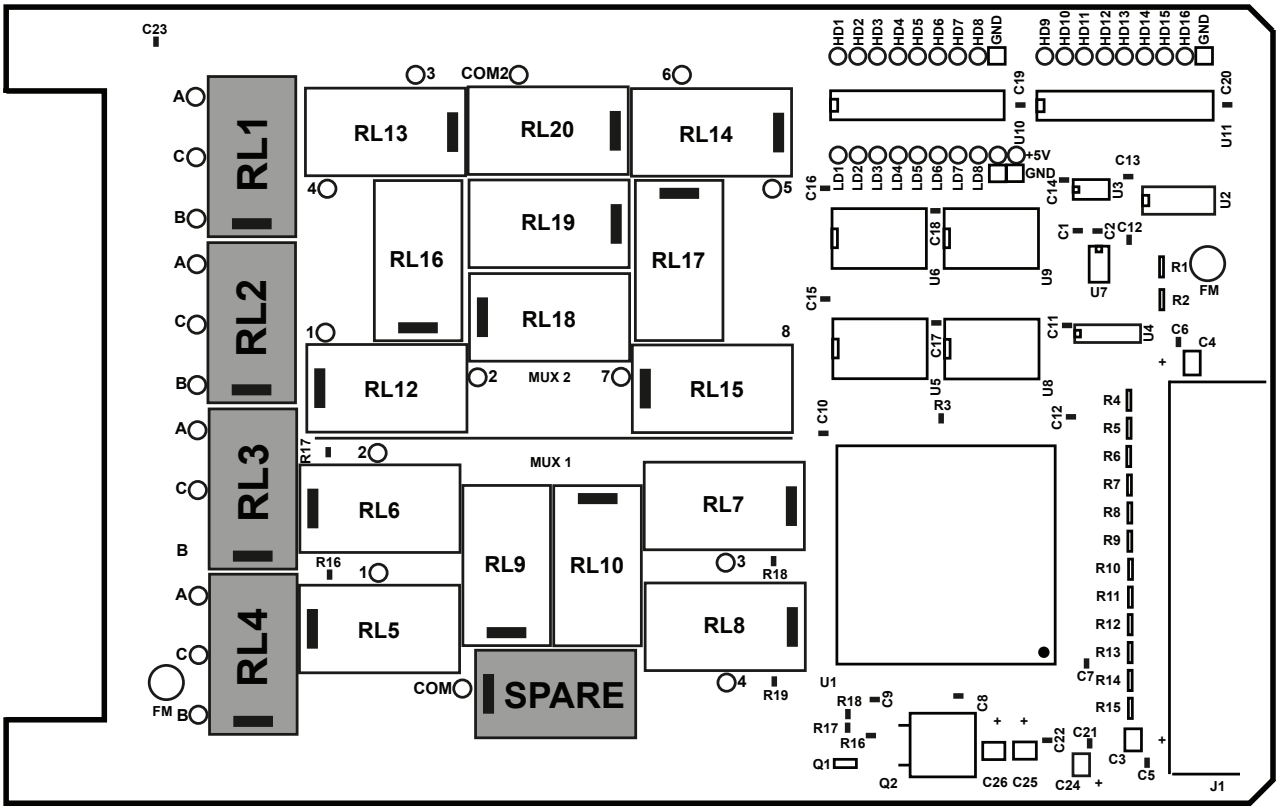
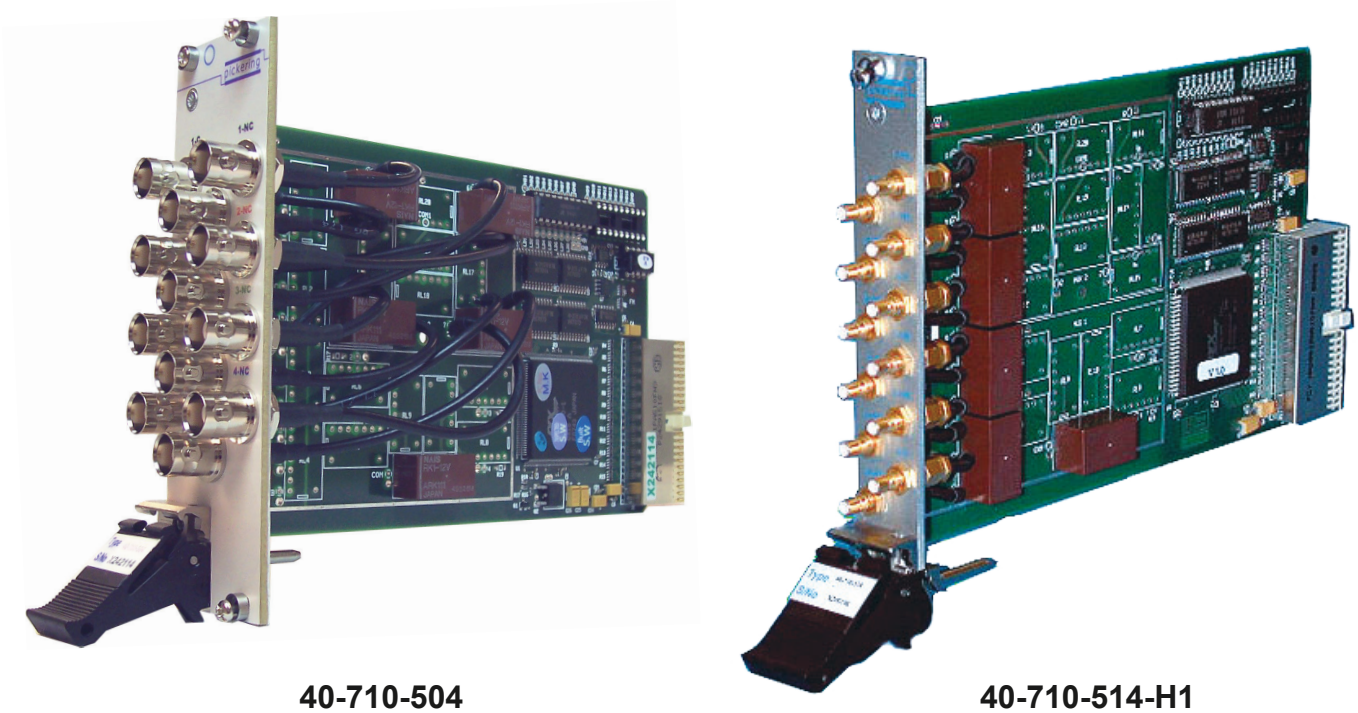


Figure 7.2 - RF Switching Module 40-710-514-H1: Component Layout

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40-710-504

40-710-514-H1

Figure 7.3 - RF Switching Modules

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