USER MANUAL

PXI

HIGH DENSITY REED RELAY MODULES
(MODEL No. 40-140A / 141 / 142 / 143)

Issue 7.2 June 2012

pickering

www.pickeringtest.com

ISO 9002
Reg No. FM38792

TECHNICAL SUPPORT

For Technical Support please contact Pickering Interfaces either by phone, fax, the website or via e-mail.

WARRANTY

All products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of two years, excluding PXI chassis, 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.

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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.

Observe the Electrical Hazard Warning detailed in Section 8.

Observe the Electrostatic Sensitive Device Caution detailed in Section 8.

Worldwide Technical Support and Product Information

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CONTENTS

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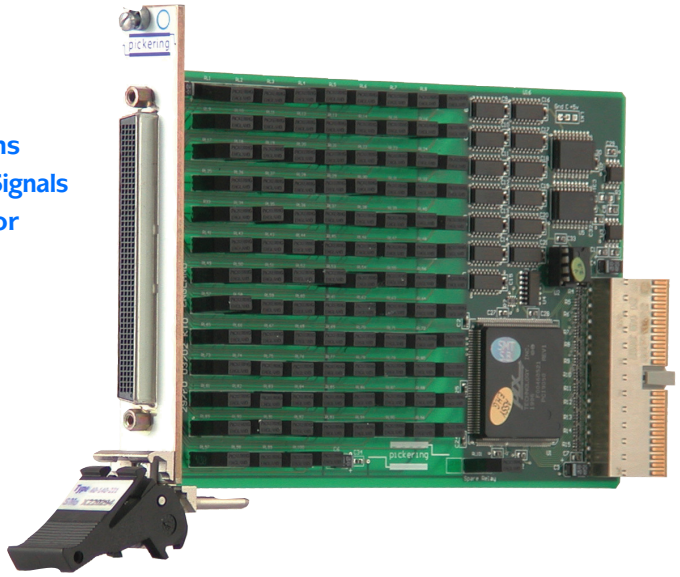
SECTION 1 - TECHNICAL SPECIFICATION

40-140A/141/142/143
High Density Reed Relay Module



- Highest Density Reed Relay Modules in PXI
- Up To 100 Reed Relays Per Module
- SPST, DPST, SPDT and Shielded Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed 250µs Typical
- Pin Compatible With Alternate 40-145 Electro-mechanical Relay Modules
- Switch up to 150Volts, 1A with 20W Max Power
- Single PCB Construction With Leaded Relays Allow Easy Maintenance
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7
- Self-Test Diagnostic Tool Available (PI-MXT)
- Supported by PXI or LXI Chassis
- 2 Year Warranty

The 40-140A/141/142/143 range of high density switching modules are available in Normally Open (SPST & DPST) and changeover (SPDT) configurations. Connections are made via a front panel 200-pin female connector.

For applications requiring improved bandwidth and crosstalk performance please look at the 40-142 shielded reed relay module.

General purpose reed relays are suitable for the construction of small switching networks, I/O port switching, for slaving up to larger switches or for operating external devices (e.g. lamps, solenoids etc.).

Range Description:

40-140A	50, 75 or 100 x SPST Reed Relays.
40-141	50 x DPST Reed Relays.
40-142	50 x Shielded SPST Reed Relays.
40-143	48 or 64 x SPDT Reed Relays.

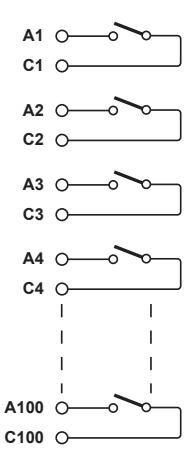
Choice of Signal Relay Types

40-140A/141/142/143 series modules are fitted with **Reed Relays** (Sputtered Ruthenium Type) which are designed solely for high-end instrumentation applications. They offer very long life to 1000 million operations, fast operate time of 0.25ms and exceptional low level switching performance. Reed Relays are hermetically sealed so ensuring consistent and stable contact resistance with long life. All of the reed relays used in our PXI modules are manufactured by our sister company Pickering Electronics (www.pickeringrelay.com).

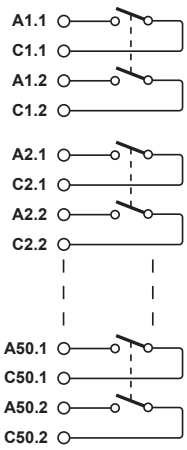
Electro-mechanical Relays (Palladium-Ruthenium, Gold covered) are used in module series 40-145/146/148. They offer good general purpose performance, switching times of 3ms and are lower cost than instrumentation grade reed relays. Overall they offer a good general purpose choice.

Pin Compatibility. 40-140A & 40-145 series modules are 100% pin compatible (except shielded types) so allowing use of either module type in your Test System.

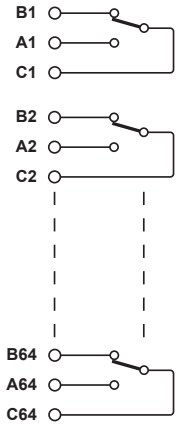
Exactly which type to select depends on your application, if in doubt please contact your nearest Pickering sales office.



40-140A-221 SPST Reed Relay Module



40-141-022 DPST Reed Relay Module



40-143-221 SPDT Reed Relay Module

High Density 200-Way Connector

Pickering Interfaces have a range of connector solutions for the 200 way connector used on the 40-14X module. These include mating connectors, pre-made cable assemblies and also cable assemblies that break out the 200-way to more manageable 50-way transition connectors. Please refer to web site for latest details or the Interconnection Solutions Catalog.

Relay Type

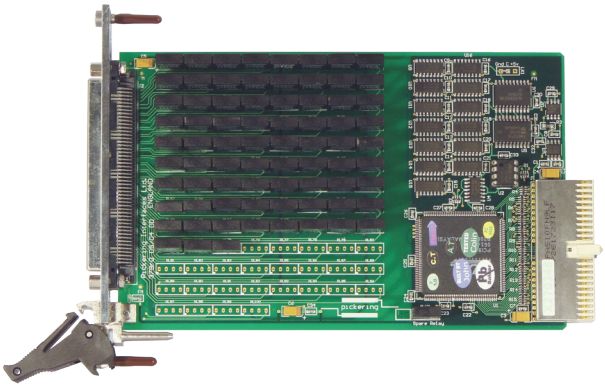
The 40-140A series are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

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

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W (3W for SPDT) 1A (0.25A for SPDT) 1A
Initial Path Resistance On: Off: Thermal Offset:	 <500mΩ (300mΩ typical) $>10^9$Ω <10μV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations



40-140A-121 Module Side View
(75 x SPST Ruthenium Reed Relays)

40-961-200
200-Way Mating Connector

40-971-200 200 Way
to 4 x 50-Way Cable
Assembly

Power Requirements

+3.3V	+5V	+12V	-12V
0	1400mA (typ 600mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 200g (40-140A-121)
240g (40-140A-221)
200g (40-141-022)
200g (40-143-221)

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 200-Way female LFH connector, for pin outs please refer to the operating manual.

Product Order Codes

50 x SPST, Ruthenium Reed Relays	**40-140A-021**
75 x SPST, Ruthenium Reed Relays	**40-140A-121**
100 x SPST, Ruthenium Reed Relays	**40-140A-221**
50 x DPST, Ruthenium Reed Relays	**40-141-022**
50 Shielded SPST Reed Relays	**40-142-021**
48 x SPDT Reed Relays	**40-143-121**
64 x SPDT Reed Relays	**40-143-221**

Mating Connectors & Cabling

For connection accessories for the 40-140 series please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Support Products

Self-Test Diagnostic Tool (PI-MXT)

Most of these modules are compatible with Pickering's 90-100 PI-MXT test tool. This enables all switch paths to be automatically tested so that faulty relays can be easily identified. The tool consists of a Windows executable program and an adapter for the specific module, a user supplied multimeter capable of 4-wire resistance measurement is also required.

The PI-MXT test adapters required for the 40-140 series are as follows:

90-100-113 supports 40-140A-021
90-100-112 supports 40-140A-121
90-100-114 supports 40-140A-221
90-100-214 supports 40-141-022
90-100-125 supports 40-143-121
90-100-126 supports 40-143-221

For further details on the PI-MXT tool, please refer to the 90-100 data sheet and user manual available from the Pickering website.

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 40-140 range are as follows:

91-100-015 kit for 40-140A-021/121/221
91-100-005 kit for 40-141-022
91-100-011 kit for 40-142-021
91-100-025 kit for 40-143-121/221

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

Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with Windows XP/Vista and Windows 7 operating systems. 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:

- **National Instruments** products (LabVIEW/LabWindows/CVI/MAX/TestStand etc.)
- **Microsoft Visual Studio** products (Visual Basic/Visual C+)
- **Agilent VEE**
- **Mathworks Matlab**
- **Geotest ATE Easy**

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 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 Switching chassis. For information on driving your switching solution in an LXI environment refer to the LXI Short Form Catalog.

Latest Details

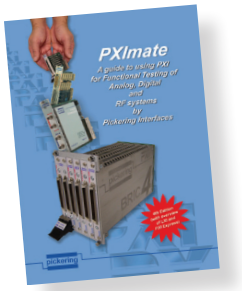
Please refer to our Web Site for Latest Product Details.

www.pickeringtest.com

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is 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.

Refer to the "**PXI Product Guide**" for descriptions of Pickering Interfaces' comprehensive range of PXI switching and instrumentation modules, including specifications and product selection guides.

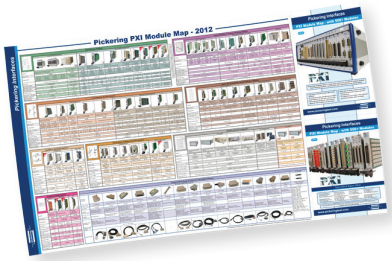
The Product Guide is available on request or can be downloaded from the Pickering website.



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 "**PXI Module Map**" - a simple fold-out selection guide to all Pickering's 500+ 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.

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The High Density Reed Relay Module is powered by a +5V input via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted 200-way LFH type connector, J2. The module comprises a PCB populated with SPST relays (40-140A), DPST relays (40-141), shielded SPST relays (40-142) or SPDT relays (40-143). The relays are energised via control signals from the relay drivers, which are addressed by PCI bridge U1, via the control logic, to output the required signal. Module configuration is determined by links and data stored in EEPROM U7. PCI Bridge U1 is configured by EEPROM U2.

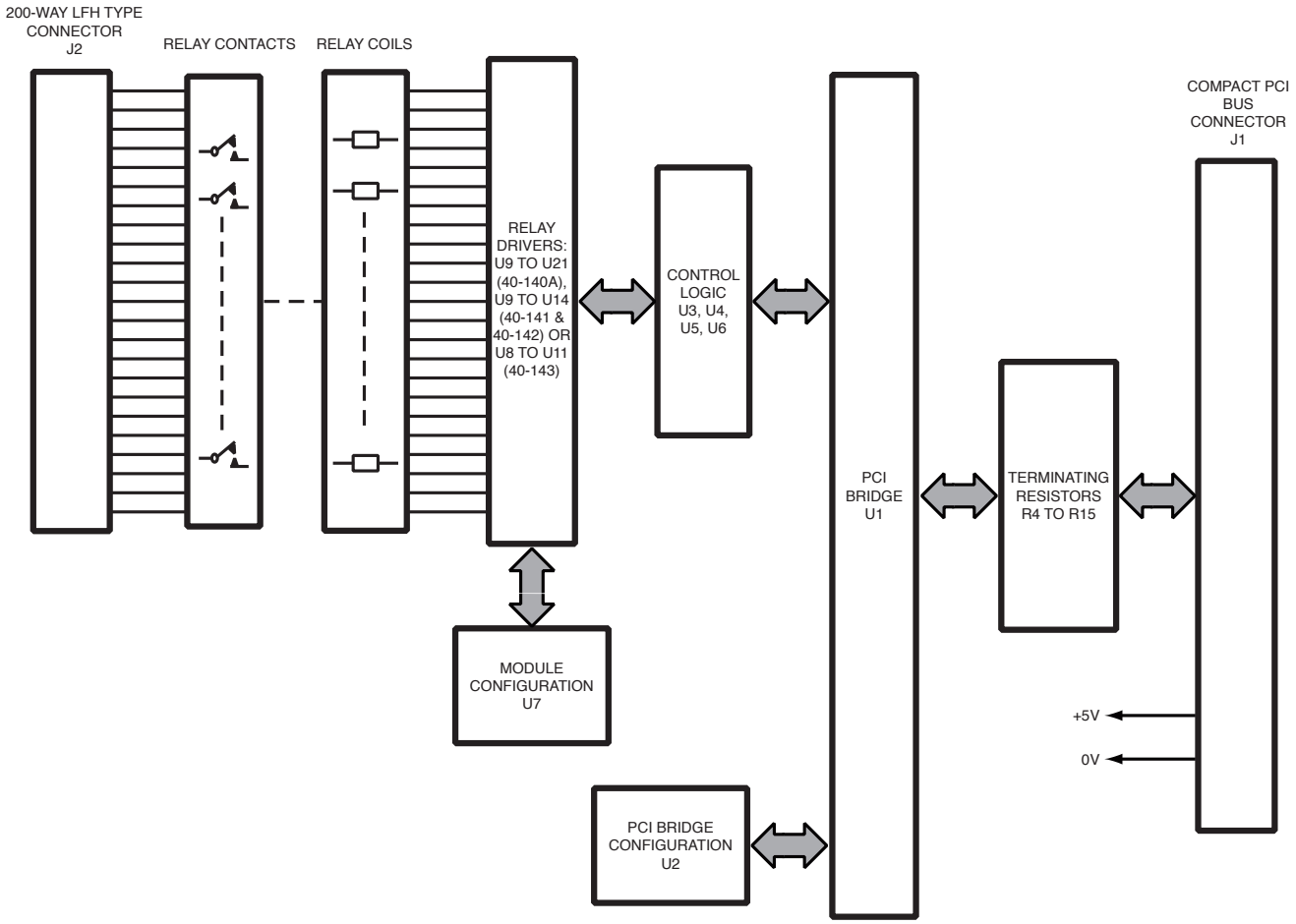

Figure 2.1 - High Density Reed Relay Module: Functional Block Diagram

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SECTION 3 - INSTALLATION

HARDWARE INSTALLATION

CAUTION

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

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

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

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

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

5. Hold the handle whilst slowly sliding the module into the card guides until the handle catches on the injector/ejector rail (refer to Figure 3.1).
6. Raise the injector/ejector handle until the module firmly seats into the backplane. The front panel of the module should be flush with the front panel of the chassis.
7. Screw the front panel of the module to the front panel mounting rail.
8. In a system employing MXI-3 to connect a desktop PC to a PXI chassis or to link multiple chassis, power-up the system as follows:
   a. For a system comprising a PC and one chassis, power up the chassis before powering up the PC.
   b. For a system comprising more than one chassis, turn ON the last chassis in the system followed by the penultimate, etc, and finally turn ON the PC or chassis containing the system controller.
9. For Pickering Interfaces modular LXI installation there is no requirement to use any particular power up sequence.

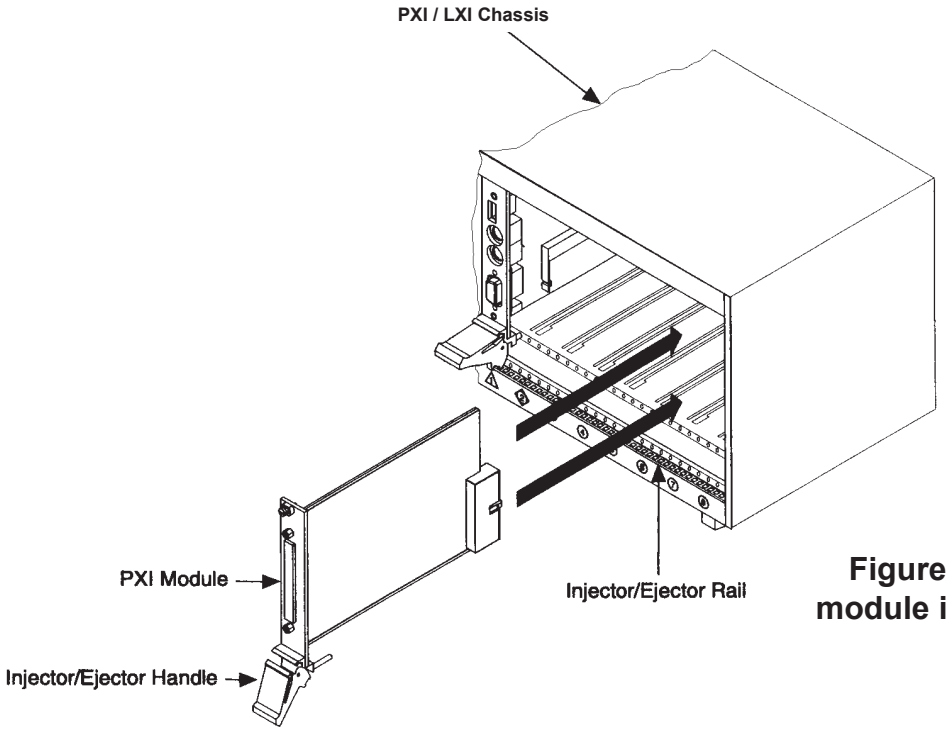


Figure 3.1 - Installing the module into a PXI / cPCI / LXI Chassis

SOFTWARE INSTALLATION

First install the appropriate Pickering PXI switch card drivers by running the installer program Setup.exe, either from the CD-ROM supplied, or by downloading the latest version from our website http://www.pickeringtest.com - the recommended method. There are different versions of the Setup program to suit different Windows versions and software environments. Setup is accompanied by a ReadMe file containing additional installation information. A single installation covers all cards in the System 40, System 45 and System 50 ranges.

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

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

SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI CARDS

Software drivers are supplied for Microsoft Windows XP/Vista/7 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/ODriver for Windows - Pilpxi

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

Register-level Programming

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

- If the functionality of the supplied drivers does not meet the application requirements
- If security considerations demand full source-code for the application
- In development environments that have alternate mechanisms for accessing 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/ODriver for Windows - Piplx

The piplx driver is based on the PXI Direct IO 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 IO 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.

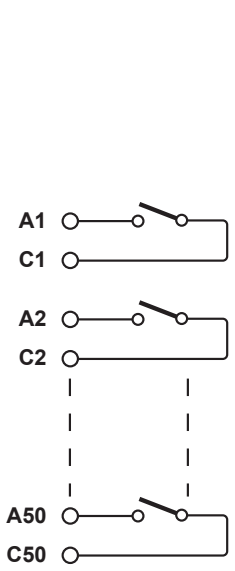
For example a simple matrix card will usually contain a single sub-unit containing the switches arranged in a 2-dimensional array. However a similar card with additional isolating relays connected to the matrix will contain additional sub-units containing those isolation relays.

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.

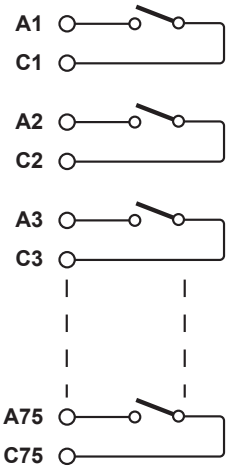
For full details of the driver functions available the programmer should refer to the documentation provided.

MODULE ARCHITECTURE 40-140A

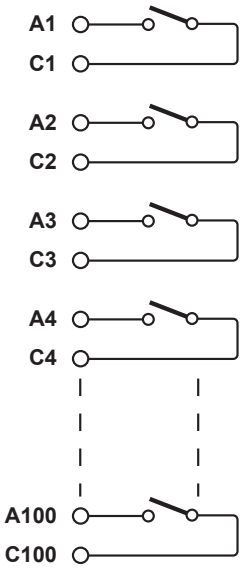
The 40-140A is an array of 50, 75 or 100 uncommitted SPST relays. In the default state, all signal paths are open, energising a particular relay creates a signal path between the C and A terminals. The relay module's switching architectures are shown in their default state in the diagram below:



40-140-021 (50 x SPST)



40-140-121 (75 x SPST)



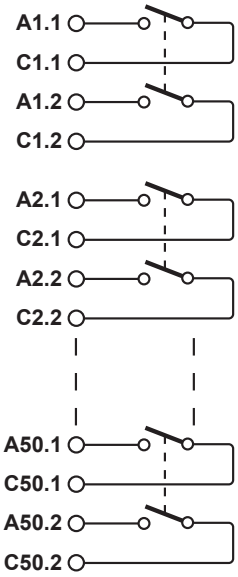
40-140-221 (100 x SPST)

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.

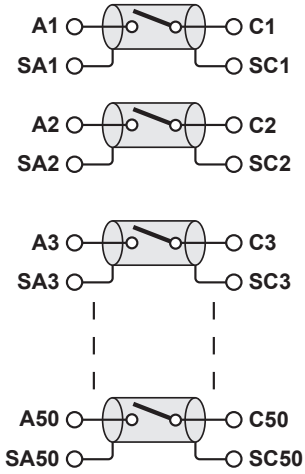
Sub-Unit	Bit	40-140A-021 Signal Path (with relay energised)	40-140A-121 Signal Path (with relay energised)	40-140A-221 Signal Path (with relay energised)
1	1	C1 to A1	C1 to A1	C1 to A1
1	2	C2 to A2	C2 to A2	C2 to A2
1	3	C3 to A3	C3 to A3	C3 to A3
1	4	C4 to A4	C4 to A4	C4 to A4
⋮	⋮	⋮	⋮	⋮
1	49	C49 to A49	C49 to A49	C49 to A49
1	50	C50 to A50	C50 to A50	C50 to A50
1	51	—	C51 to A51	C51 to A51
1	52	—	C52 to A52	C52 to A52
⋮	⋮	⋮	⋮	⋮
1	74	—	C74 to A74	C74 to A74
1	75	—	C75 to A75	C75 to A75
1	76	—	—	C76 to A76
1	77	—	—	C77 to A77
⋮	⋮	⋮	⋮	⋮
1	97	—	—	C97 to A97
1	98	—	—	C98 to A98
1	99	—	—	C99 to A99
1	100	—	—	C100 to A100

MODULE ARCHITECTURE 40-141 & 40-142

The 40-141 is an array of 50 uncommitted DPST relays and the 40-142 is an array of 50 uncommitted shielded SPST relays. In the default state, all signal paths are open. Energising a particular relay creates a signal path between the C and A terminals. In the case of the 40-141, the two poles ".1" and ".2" are closed at the same time when the relay is energised. The relay module's switching architectures are shown in their default state in the diagram below:



40-141-022 (50 x DPST)



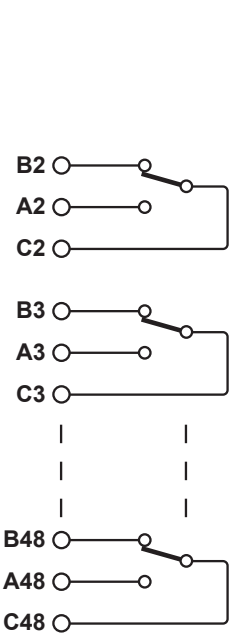
40-142-021 (50 x SPST Shielded)

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.

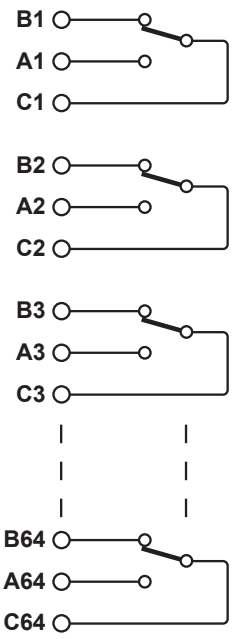
Sub-Unit	Bit	40-141-022 Signal Path (with relay energised)	40-142-021 Signal Path (with relay energised)
1	1	C1.1 to A1.1 & C1.2 to A1.2	C1 to A1
1	2	C2.1 to A2.1 & C2.2 to A2.2	C2 to A2
1	3	C3.1 to A3.1 & C3.2 to A3.2	C3 to A3
1	4	C4.1 to A4.1 & C4.2 to A4.2	C4 to A4
⋮	⋮	⋮	⋮
1	47	C47.1 to A47.1 & C47.2 to A47.2	C47 to A47
1	48	C48.1 to A48.1 & C48.2 to A48.2	C48 to A48
1	49	C49.1 to A49.1 & C49.2 to A49.2	C49 to A49
1	50	C50.1 to A50.1 & C50.2 to A50.2	C50 to A50

MODULE ARCHITECTURE 40-143

The 40-133 is an array of either 48 or 64 uncommitted changeover relays. In the default state, all signal paths are between the C terminal and the corresponding B terminal. Energising a particular relay disconnects the B terminal and creates a signal path between the C and A terminals. The relay module's switching architectures are shown in their default state in the diagram below:



40-143-121 (48 x SPDT)



40-143-221 (64 x SPDT)

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

Sub-Unit	Bit	40-143-121 Signal Path (with relay energised)	40-143-221 Signal Path (with relay energised)
1	1	C1 to A1	C1 to A1
1	2	C2 to A2	C2 to A2
1	3	C3 to A3	C3 to A3
1	4	C4 to A4	C4 to A4
1	47	C47 to A47	C47 to A47
1	48	C48 to A48	C48 to A48
1	49	—	C49 to A49
1	50	—	C50 to A50
1	61	—	C61 to A61
1	62	—	C62 to A62
1	63	—	C63 to A63
1	64	—	C64 to A64

PROGRAMMING THE MODULE

Here are examples of using the drivers with the 40-140-021 (50 x SPST) module. All other versions in the series operate in the same way but with different numbers of bits in the sub-unit.

Using PILPXI

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

OpBit

```
DWORD sub_unit = 1;
PIL_OpBit( card_num, sub_unit, 1, 1);   // Operates the A1/C1 relay
PIL_OpBit( card_num, sub_unit, 1, 0);   // Releases the A1/C1 relay
PIL_OpBit( card_num, sub_unit, 6, 1);   // Operates the A6/C6 relay
```

WriteSub

```
// Sub-unit is 50 bits wide, so 2 DWORDs are needed to hold the pattern
DWORD data[2];
data[0] = 1;            // Sets lowest bit to 1, A1/C1 relay
data[1] = 0;
PIL_WriteSub( card_num, sub_unit, data);
data[0] = 0x20;         // Sets 6th bit, A6/C6 relay
data[1] = 0;            // 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 A1/C1 relay
pipx40_setChannelState(vi, sub_unit, 1, VI_OFF);    // Releases the A1/C1 relay
pipx40_setChannelState(vi, sub_unit, 6, VI_ON);     // Operates the A6/C6 relay
```

setChannelPattern

```
// Sub-unit is 50 bits wide, so 2 ViUInt32 values are needed to hold the entire pattern
ViUInt32 data[2];
data[0] = 1;            // Sets lowest bit to 1, A1/C1 relay
data[1] = 0;
pipx40_setChannelPattern( vi, sub_unit, data);
data[0] = 0x20;         // Sets 6th bit, A6/C6 relay
data[1] = 0;            // All other relays are set to off
pipx40_setChannelPattern( vi, sub_unit, data);
```

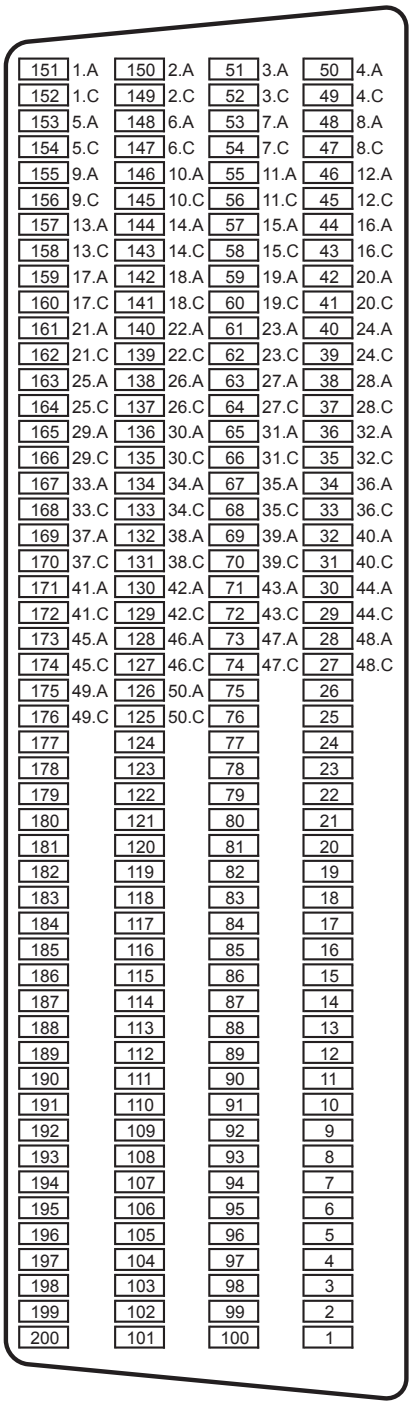
Using pi40iv

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

```
pi40iv_Connect(vi, com1, ch1);      // Operates the A1/C1 relay
pi40iv_Disconnect(vi, com1, ch1);   // Releases the A1/C1 relay
pi40iv_Connect(vi, com6, ch6);      // Operates the A6/C6 relay
```

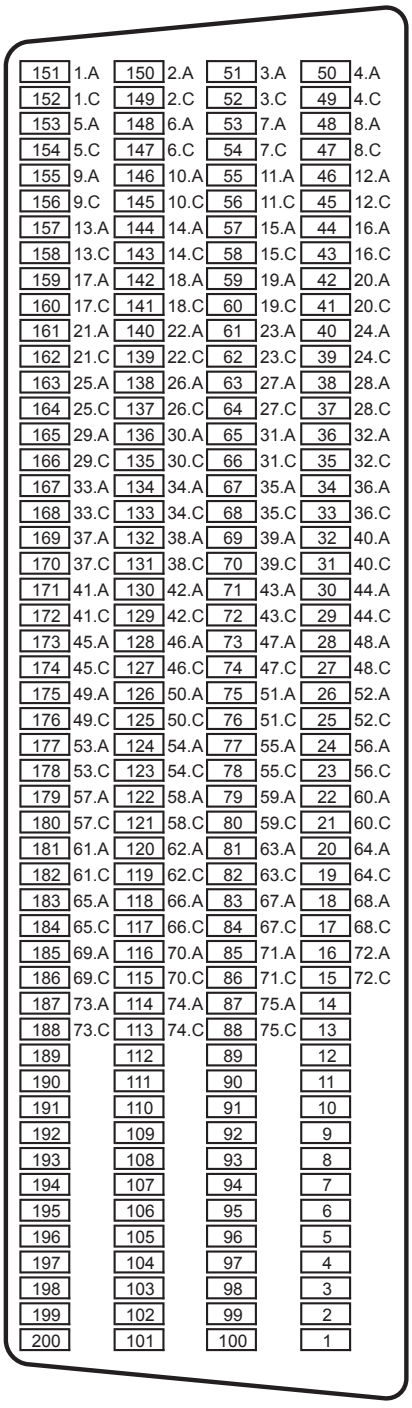
The IVI Swtch driver specification contains no bulk setting capabilities.

SECTION 5 - CONNECTOR INFORMATION



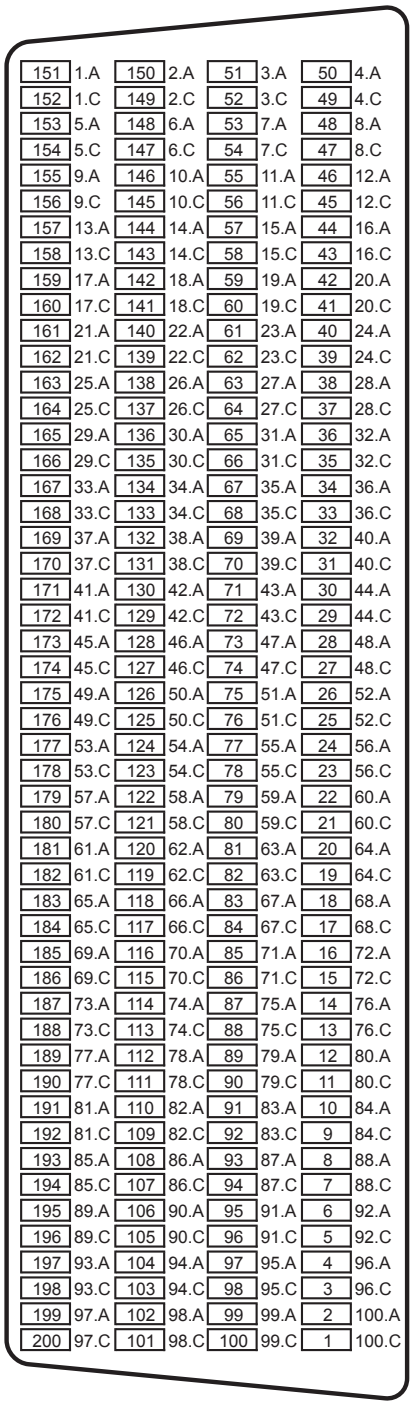
151	1.A	150	2.A	51	3.A	50	4.A
152	1.C	149	2.C	52	3.C	49	4.C
153	5.A	148	6.A	53	7.A	48	8.A
154	5.C	147	6.C	54	7.C	47	8.C
155	9.A	146	10.A	55	11.A	46	12.A
156	9.C	145	10.C	56	11.C	45	12.C
157	13.A	144	14.A	57	15.A	44	16.A
158	13.C	143	14.C	58	15.C	43	16.C
159	17.A	142	18.A	59	19.A	42	20.A
160	17.C	141	18.C	60	19.C	41	20.C
161	21.A	140	22.A	61	23.A	40	24.A
162	21.C	139	22.C	62	23.C	39	24.C
163	25.A	138	26.A	63	27.A	38	28.A
164	25.C	137	26.C	64	27.C	37	28.C
165	29.A	136	30.A	65	31.A	36	32.A
166	29.C	135	30.C	66	31.C	35	32.C
167	33.A	134	34.A	67	35.A	34	36.A
168	33.C	133	34.C	68	35.C	33	36.C
169	37.A	132	38.A	69	39.A	32	40.A
170	37.C	131	38.C	70	39.C	31	40.C
171	41.A	130	42.A	71	43.A	30	44.A
172	41.C	129	42.C	72	43.C	29	44.C
173	45.A	128	46.A	73	47.A	28	48.A
174	45.C	127	46.C	74	47.C	27	48.C
175	49.A	126	50.A	75		26	
176	49.C	125	50.C	76		25	
177		124		77		24	
178		123		78		23	
179		122		79		22	
180		121		80		21	
181		120		81		20	
182		119		82		19	
183		118		83		18	
184		117		84		17	
185		116		85		16	
186		115		86		15	
187		114		87		14	
188		113		88		13	
189		112		89		12	
190		111		90		11	
191		110		91		10	
192		109		92		9	
193		108		93		8	
194		107		94		7	
195		106		95		6	
196		105		96		5	
197		104		97		4	
198		103		98		3	
199		102		99		2	
200		101		100		1	

Figure 5.1 - Pin Outs:
PXI Module 40-140A-021
50xSPST
(200-pin LFH connector)



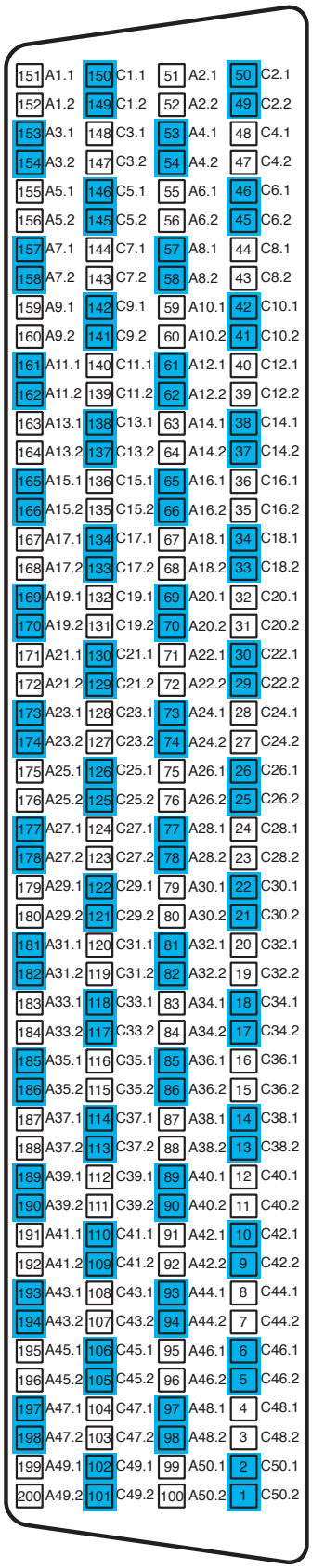
151	1.A	150	2.A	51	3.A	50	4.A
152	1.C	149	2.C	52	3.C	49	4.C
153	5.A	148	6.A	53	7.A	48	8.A
154	5.C	147	6.C	54	7.C	47	8.C
155	9.A	146	10.A	55	11.A	46	12.A
156	9.C	145	10.C	56	11.C	45	12.C
157	13.A	144	14.A	57	15.A	44	16.A
158	13.C	143	14.C	58	15.C	43	16.C
159	17.A	142	18.A	59	19.A	42	20.A
160	17.C	141	18.C	60	19.C	41	20.C
161	21.A	140	22.A	61	23.A	40	24.A
162	21.C	139	22.C	62	23.C	39	24.C
163	25.A	138	26.A	63	27.A	38	28.A
164	25.C	137	26.C	64	27.C	37	28.C
165	29.A	136	30.A	65	31.A	36	32.A
166	29.C	135	30.C	66	31.C	35	32.C
167	33.A	134	34.A	67	35.A	34	36.A
168	33.C	133	34.C	68	35.C	33	36.C
169	37.A	132	38.A	69	39.A	32	40.A
170	37.C	131	38.C	70	39.C	31	40.C
171	41.A	130	42.A	71	43.A	30	44.A
172	41.C	129	42.C	72	43.C	29	44.C
173	45.A	128	46.A	73	47.A	28	48.A
174	45.C	127	46.C	74	47.C	27	48.C
175	49.A	126	50.A	75	51.A	26	52.A
176	49.C	125	50.C	76	51.C	25	52.C
177	53.A	124	54.A	77	55.A	24	56.A
178	53.C	123	54.C	78	55.C	23	56.C
179	57.A	122	58.A	79	59.A	22	60.A
180	57.C	121	58.C	80	59.C	21	60.C
181	61.A	120	62.A	81	63.A	20	64.A
182	61.C	119	62.C	82	63.C	19	64.C
183	65.A	118	66.A	83	67.A	18	68.A
184	65.C	117	66.C	84	67.C	17	68.C
185	69.A	116	70.A	85	71.A	16	72.A
186	69.C	115	70.C	86	71.C	15	72.C
187	73.A	114	74.A	87	75.A	14	
188	73.C	113	74.C	88	75.C	13	
189		112		89		12	
190		111		90		11	
191		110		91		10	
192		109		92		9	
193		108		93		8	
194		107		94		7	
195		106		95		6	
196		105		96		5	
197		104		97		4	
198		103		98		3	
199		102		99		2	
200		101		100		1	

Figure 5.2 - Pin Outs:
PXI Module 40-140A-121
75xSPST
(200-pin LFH connector)



151	1.A	150	2.A	51	3.A	50	4.A
152	1.C	149	2.C	52	3.C	49	4.C
153	5.A	148	6.A	53	7.A	48	8.A
154	5.C	147	6.C	54	7.C	47	8.C
155	9.A	146	10.A	55	11.A	46	12.A
156	9.C	145	10.C	56	11.C	45	12.C
157	13.A	144	14.A	57	15.A	44	16.A
158	13.C	143	14.C	58	15.C	43	16.C
159	17.A	142	18.A	59	19.A	42	20.A
160	17.C	141	18.C	60	19.C	41	20.C
161	21.A	140	22.A	61	23.A	40	24.A
162	21.C	139	22.C	62	23.C	39	24.C
163	25.A	138	26.A	63	27.A	38	28.A
164	25.C	137	26.C	64	27.C	37	28.C
165	29.A	136	30.A	65	31.A	36	32.A
166	29.C	135	30.C	66	31.C	35	32.C
167	33.A	134	34.A	67	35.A	34	36.A
168	33.C	133	34.C	68	35.C	33	36.C
169	37.A	132	38.A	69	39.A	32	40.A
170	37.C	131	38.C	70	39.C	31	40.C
171	41.A	130	42.A	71	43.A	30	44.A
172	41.C	129	42.C	72	43.C	29	44.C
173	45.A	128	46.A	73	47.A	28	48.A
174	45.C	127	46.C	74	47.C	27	48.C
175	49.A	126	50.A	75	51.A	26	52.A
176	49.C	125	50.C	76	51.C	25	52.C
177	53.A	124	54.A	77	55.A	24	56.A
178	53.C	123	54.C	78	55.C	23	56.C
179	57.A	122	58.A	79	59.A	22	60.A
180	57.C	121	58.C	80	59.C	21	60.C
181	61.A	120	62.A	81	63.A	20	64.A
182	61.C	119	62.C	82	63.C	19	64.C
183	65.A	118	66.A	83	67.A	18	68.A
184	65.C	117	66.C	84	67.C	17	68.C
185	69.A	116	70.A	85	71.A	16	72.A
186	69.C	115	70.C	86	71.C	15	72.C
187	73.A	114	74.A	87	75.A	14	76.A
188	73.C	113	74.C	88	75.C	13	76.C
189	77.A	112	78.A	89	79.A	12	80.A
190	77.C	111	78.C	90	79.C	11	80.C
191	81.A	110	82.A	91	83.A	10	84.A
192	81.C	109	82.C	92	83.C	9	84.C
193	85.A	108	86.A	93	87.A	8	88.A
194	85.C	107	86.C	94	87.C	7	88.C
195	89.A	106	90.A	95	91.A	6	92.A
196	89.C	105	90.C	96	91.C	5	92.C
197	93.A	104	94.A	97	95.A	4	96.A
198	93.C	103	94.C	98	95.C	3	96.C
199	97.A	102	98.A	99	99.A	2	100.A
200	97.C	101	98.C	100	99.C	1	100.C

Figure 5.3 - Pin Outs:
PXI Module 40-140A-221
100xSPST
(200-pin LFH connector)



THE PAIRS OF CONTACTS SHOWN INDICATES A TWISTED PAIR CONNECTION INSIDE THE 200-WAY CONNECTOR FLYING LEAD

Figure 5.4 - Pin Outs: PXI Module 40-141-022 50xDPST (200-pin LFH connector)

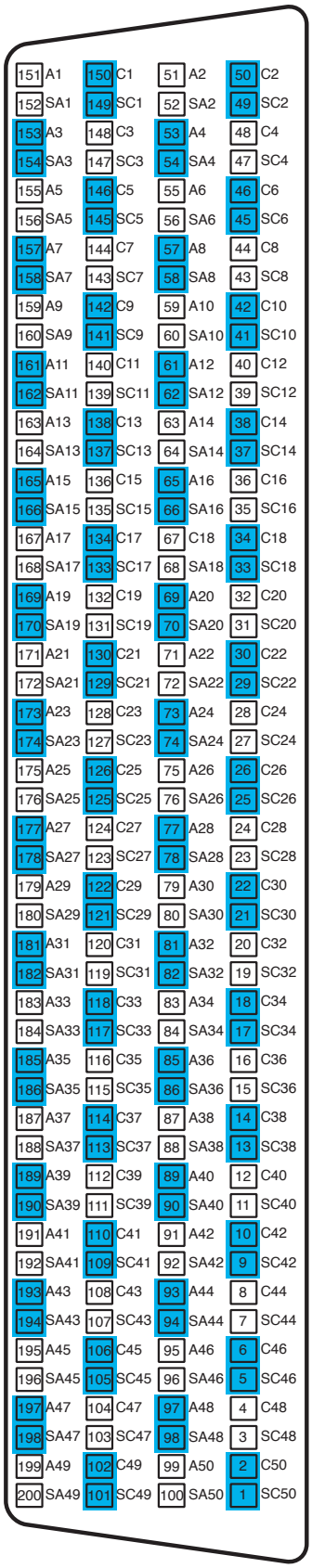
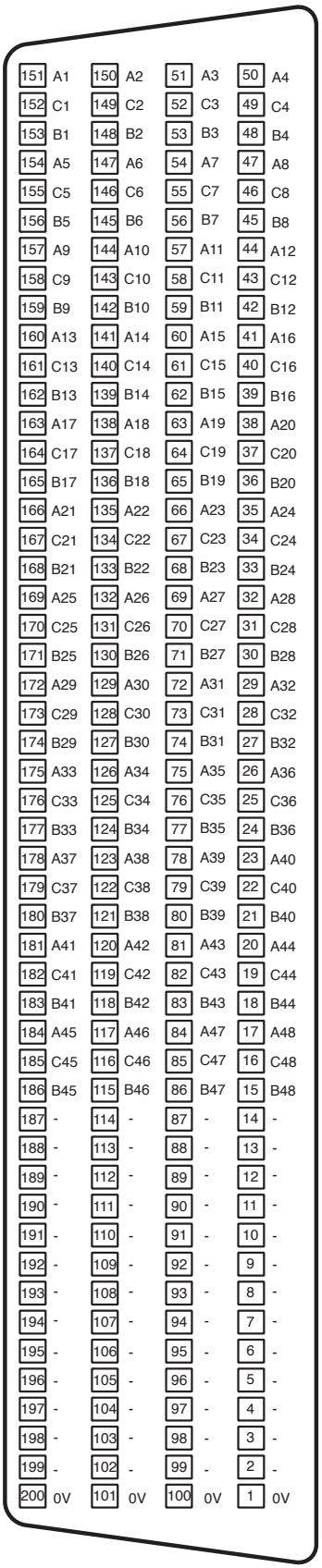
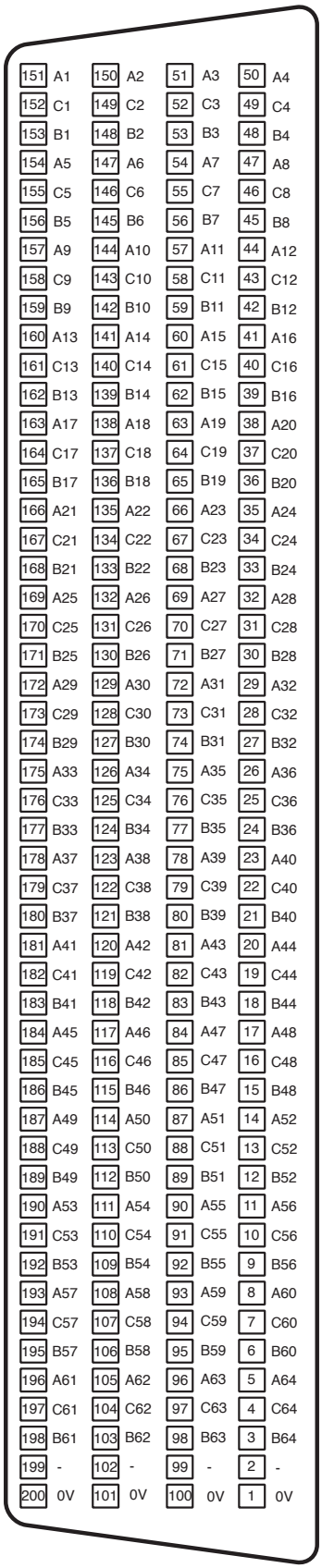


Figure 5.5 - Pin Outs: PXI Module 40-142-021 Shielded 50xSPST (200-pin LFH connector)



151	A1	150	A2	51	A3	50	A4
152	C1	149	C2	52	C3	49	C4
153	B1	148	B2	53	B3	48	B4
154	A5	147	A6	54	A7	47	A8
155	C5	146	C6	55	C7	46	C8
156	B5	145	B6	56	B7	45	B8
157	A9	144	A10	57	A11	44	A12
158	C9	143	C10	58	C11	43	C12
159	B9	142	B10	59	B11	42	B12
160	A13	141	A14	60	A15	41	A16
161	C13	140	C14	61	C15	40	C16
162	B13	139	B14	62	B15	39	B16
163	A17	138	A18	63	A19	38	A20
164	C17	137	C18	64	C19	37	C20
165	B17	136	B18	65	B19	36	B20
166	A21	135	A22	66	A23	35	A24
167	C21	134	C22	67	C23	34	C24
168	B21	133	B22	68	B23	33	B24
169	A25	132	A26	69	A27	32	A28
170	C25	131	C26	70	C27	31	C28
171	B25	130	B26	71	B27	30	B28
172	A29	129	A30	72	A31	29	A32
173	C29	128	C30	73	C31	28	C32
174	B29	127	B30	74	B31	27	B32
175	A33	126	A34	75	A35	26	A36
176	C33	125	C34	76	C35	25	C36
177	B33	124	B34	77	B35	24	B36
178	A37	123	A38	78	A39	23	A40
179	C37	122	C38	79	C39	22	C40
180	B37	121	B38	80	B39	21	B40
181	A41	120	A42	81	A43	20	A44
182	C41	119	C42	82	C43	19	C44
183	B41	118	B42	83	B43	18	B44
184	A45	117	A46	84	A47	17	A48
185	C45	116	C46	85	C47	16	C48
186	B45	115	B46	86	B47	15	B48
187	-	114	-	87	-	14	-
188	-	113	-	88	-	13	-
189	-	112	-	89	-	12	-
190	-	111	-	90	-	11	-
191	-	110	-	91	-	10	-
192	-	109	-	92	-	9	-
193	-	108	-	93	-	8	-
194	-	107	-	94	-	7	-
195	-	106	-	95	-	6	-
196	-	105	-	96	-	5	-
197	-	104	-	97	-	4	-
198	-	103	-	98	-	3	-
199	-	102	-	99	-	2	-
200	0V	101	0V	100	0V	1	0V

Figure 5.6 - Pin Outs:
PXI Module 40-143-121
48xSPDT
(200-pin LFH connector)



151	A1	150	A2	51	A3	50	A4
152	C1	149	C2	52	C3	49	C4
153	B1	148	B2	53	B3	48	B4
154	A5	147	A6	54	A7	47	A8
155	C5	146	C6	55	C7	46	C8
156	B5	145	B6	56	B7	45	B8
157	A9	144	A10	57	A11	44	A12
158	C9	143	C10	58	C11	43	C12
159	B9	142	B10	59	B11	42	B12
160	A13	141	A14	60	A15	41	A16
161	C13	140	C14	61	C15	40	C16
162	B13	139	B14	62	B15	39	B16
163	A17	138	A18	63	A19	38	A20
164	C17	137	C18	64	C19	37	C20
165	B17	136	B18	65	B19	36	B20
166	A21	135	A22	66	A23	35	A24
167	C21	134	C22	67	C23	34	C24
168	B21	133	B22	68	B23	33	B24
169	A25	132	A26	69	A27	32	A28
170	C25	131	C26	70	C27	31	C28
171	B25	130	B26	71	B27	30	B28
172	A29	129	A30	72	A31	29	A32
173	C29	128	C30	73	C31	28	C32
174	B29	127	B30	74	B31	27	B32
175	A33	126	A34	75	A35	26	A36
176	C33	125	C34	76	C35	25	C36
177	B33	124	B34	77	B35	24	B36
178	A37	123	A38	78	A39	23	A40
179	C37	122	C38	79	C39	22	C40
180	B37	121	B38	80	B39	21	B40
181	A41	120	A42	81	A43	20	A44
182	C41	119	C42	82	C43	19	C44
183	B41	118	B42	83	B43	18	B44
184	A45	117	A46	84	A47	17	A48
185	C45	116	C46	85	C47	16	C48
186	B45	115	B46	86	B47	15	B48
187	A49	114	A50	87	A51	14	A52
188	C49	113	C50	88	C51	13	C52
189	B49	112	B50	89	B51	12	B52
190	A53	111	A54	90	A55	11	A56
191	C53	110	C54	91	C55	10	C56
192	B53	109	B54	92	B55	9	B56
193	A57	108	A58	93	A59	8	A60
194	C57	107	C58	94	C59	7	C60
195	B57	106	B58	95	B59	6	B60
196	A61	105	A62	96	A63	5	A64
197	C61	104	C62	97	C63	4	C64
198	B61	103	B62	98	B63	3	B64
199	-	102	-	99	-	2	-
200	0V	101	0V	100	0V	1	0V

Figure 5.7 - Pin Outs:
PXI Module 40-143-221
64xSPDT
(200-pin LFH connector)

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SECTION 6 - TROUBLESHOOTING

INSTALLATION PROBLEMS

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

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

If your system employs MXI-3 you should check the integrity of all MXI-3 links. When the system is powered up, and during Windows start-up, you should expect to see periodic activity on the MXI-3 RX/TX (yellow) indicators, clearing to leave only the PWR/LNK (green) LEDs illuminated. The RX/TX indicators should show activity when you attempt to access a card.

DIAGNOSTIC UTILITY

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

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

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

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

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SECTION 7 - MAINTENANCE INFORMATION

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 www.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 60-102 and 60-103) 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 for each channel of the High Density Reed Relay Module and the physical relays on the circuit board. These tables can be used in the fault finding process and should be used in conjunction with the PCB layout diagrams in Figures 7.1, 7.2 and 7.3 to identify the position of faulty relays.

TABLE 7.1 - High Density SPST Reed Relay Module 40-140A Relay Numbering

Signal Path (with relay energised)	40-140A -021 Relay No.	40-140A -121 Relay No.	40-140A -221 Relay No.	Signal Path (with relay energised)	40-140A -021 Relay No.	40-140A -121 Relay No.	40-140A -221 Relay No.
C1 to A1	RL1	RL1	RL1	C51 to A51	Not Fitted	RL51	RL51
C2 to A2	RL2	RL2	RL2	C52 to A52	Not Fitted	RL52	RL52
C3 to A3	RL3	RL3	RL3	C53 to A53	Not Fitted	RL53	RL53
C4 to A4	RL4	RL4	RL4	C54 to A54	Not Fitted	RL54	RL54
C5 to A5	RL5	RL5	RL5	C55 to A55	Not Fitted	RL55	RL55
C6 to A6	RL6	RL6	RL6	C56 to A56	Not Fitted	RL56	RL56
C7 to A7	RL7	RL7	RL7	C57 to A57	Not Fitted	RL57	RL57
C8 to A8	RL8	RL8	RL8	C58 to A58	Not Fitted	RL58	RL58
C9 to A9	RL9	RL9	RL9	C59 to A59	Not Fitted	RL59	RL59
C10 to A10	RL10	RL10	RL10	C60 to A60	Not Fitted	RL60	RL60
C11 to A11	RL11	RL11	RL11	C61 to A61	Not Fitted	RL61	RL61
C12 to A12	RL12	RL12	RL12	C62 to A62	Not Fitted	RL62	RL62
C13 to A13	RL13	RL13	RL13	C63 to A63	Not Fitted	RL63	RL63
C14 to A14	RL14	RL14	RL14	C64 to A64	Not Fitted	RL64	RL64
C15 to A15	RL15	RL15	RL15	C65 to A65	Not Fitted	RL65	RL65
C16 to A16	RL16	RL16	RL16	C66 to A66	Not Fitted	RL66	RL66
C17 to A17	RL17	RL17	RL17	C67 to A67	Not Fitted	RL67	RL67
C18 to A18	RL18	RL18	RL18	C68 to A68	Not Fitted	RL68	RL68
C19 to A19	RL19	RL19	RL19	C69 to A69	Not Fitted	RL69	RL69
C20 to A20	RL20	RL20	RL20	C70 to A70	Not Fitted	RL70	RL70
C21 to A21	RL21	RL21	RL21	C71 to A71	Not Fitted	RL71	RL71
C22 to A22	RL22	RL22	RL22	C72 to A72	Not Fitted	RL72	RL72
C23 to A23	RL23	RL23	RL23	C73 to A73	Not Fitted	RL73	RL73
C24 to A24	RL24	RL24	RL24	C74 to A74	Not Fitted	RL74	RL74
C25 to A25	RL25	RL25	RL25	C75 to A75	Not Fitted	RL75	RL75
C26 to A26	RL26	RL26	RL26	C76 to A76	Not Fitted	Not Fitted	RL76
C27 to A27	RL27	RL27	RL27	C77 to A77	Not Fitted	Not Fitted	RL77
C28 to A28	RL28	RL28	RL28	C78 to A78	Not Fitted	Not Fitted	RL78
C29 to A29	RL29	RL29	RL29	C79 to A79	Not Fitted	Not Fitted	RL79
C30 to A30	RL30	RL30	RL30	C80 to A80	Not Fitted	Not Fitted	RL80
C31 to A31	RL31	RL31	RL31	C81 to A81	Not Fitted	Not Fitted	RL81
C32 to A32	RL32	RL32	RL32	C82 to A82	Not Fitted	Not Fitted	RL82
C33 to A33	RL33	RL33	RL33	C83 to A83	Not Fitted	Not Fitted	RL83
C34 to A34	RL34	RL34	RL34	C84 to A84	Not Fitted	Not Fitted	RL84
C35 to A35	RL35	RL35	RL35	C85 to A85	Not Fitted	Not Fitted	RL85
C36 to A36	RL36	RL36	RL36	C86 to A86	Not Fitted	Not Fitted	RL86
C37 to A37	RL37	RL37	RL37	C87 to A87	Not Fitted	Not Fitted	RL87
C38 to A38	RL38	RL38	RL38	C88 to A88	Not Fitted	Not Fitted	RL88
C39 to A39	RL39	RL39	RL39	C89 to A89	Not Fitted	Not Fitted	RL89
C40 to A40	RL40	RL40	RL40	C90 to A90	Not Fitted	Not Fitted	RL90
C41 to A41	RL41	RL41	RL41	C91 to A91	Not Fitted	Not Fitted	RL91
C42 to A42	RL42	RL42	RL42	C92 to A92	Not Fitted	Not Fitted	RL92
C43 to A43	RL43	RL43	RL43	C93 to A93	Not Fitted	Not Fitted	RL93
C44 to A44	RL44	RL44	RL44	C94 to A94	Not Fitted	Not Fitted	RL94
C45 to A45	RL45	RL45	RL45	C95 to A95	Not Fitted	Not Fitted	RL95
C46 to A46	RL46	RL46	RL46	C96 to A96	Not Fitted	Not Fitted	RL96
C47 to A47	RL47	RL47	RL47	C97 to A97	Not Fitted	Not Fitted	RL97
C48 to A48	RL48	RL48	RL48	C98 to A98	Not Fitted	Not Fitted	RL98
C49 to A49	RL49	RL49	RL49	C99 to A99	Not Fitted	Not Fitted	RL99
C50 to A50	RL50	RL50	RL50	C100 to A100	Not Fitted	Not Fitted	RL100

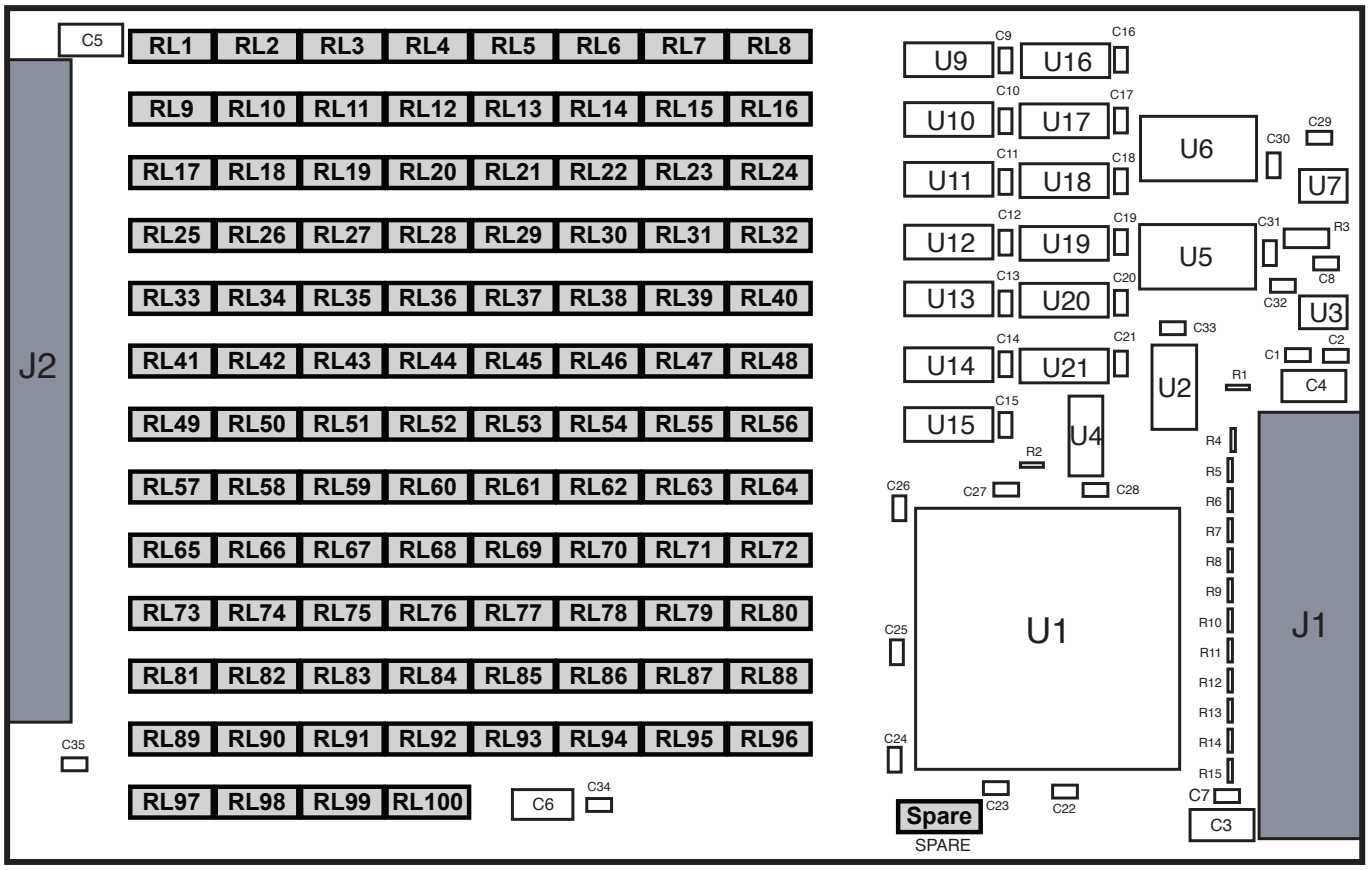

Figure 7.1 - 40-140A High Density Reed Relay Module Component Layout

TABLE 7.2 - High Density DPST Reed Relay Module 40-141 Relay Numbering

Signal Path (with relay energised)	40-141-022 Relay No.	Signal Path (with relay energised)	40-141-022 Relay No.
C1.1 to A1.1 & C1.2 to A1.2	RL1	C26.1 to A26.1 & C26.2 to A26.2	RL26
C2.1 to A2.1 & C2.2 to A2.2	RL2	C27.1 to A27.1 & C27.2 to A27.2	RL27
C3.1 to A3.1 & C3.2 to A3.2	RL3	C28.1 to A28.1 & C28.2 to A28.2	RL28
C4.1 to A4.1 & C4.2 to A4.2	RL4	C29.1 to A29.1 & C29.2 to A29.2	RL29
C5.1 to A5.1 & C5.2 to A5.2	RL5	C30.1 to A30.1 & C30.2 to A30.2	RL30
C6.1 to A6.1 & C6.2 to A6.2	RL6	C31.1 to A31.1 & C31.2 to A31.2	RL31
C7.1 to A7.1 & C7.2 to A7.2	RL7	C32.1 to A32.1 & C32.2 to A32.2	RL32
C8.1 to A8.1 & C8.2 to A8.2	RL8	C33.1 to A33.1 & C33.2 to A33.2	RL33
C9.1 to A9.1 & C9.2 to A9.2	RL9	C34.1 to A34.1 & C34.2 to A34.2	RL34
C10.1 to A10.1 & C10.2 to A10.2	RL10	C35.1 to A35.1 & C35.2 to A35.2	RL35
C11.1 to A11.1 & C11.2 to A11.2	RL11	C36.1 to A36.1 & C36.2 to A36.2	RL36
C12.1 to A12.1 & C12.2 to A12.2	RL12	C37.1 to A37.1 & C37.2 to A37.2	RL37
C13.1 to A13.1 & C13.2 to A13.2	RL13	C38.1 to A38.1 & C38.2 to A38.2	RL38
C14.1 to A14.1 & C14.2 to A14.2	RL14	C39.1 to A39.1 & C39.2 to A39.2	RL39
C15.1 to A15.1 & C15.2 to A15.2	RL15	C40.1 to A40.1 & C40.2 to A40.2	RL40
C16.1 to A16.1 & C16.2 to A16.2	RL16	C41.1 to A41.1 & C41.2 to A41.2	RL41
C17.1 to A17.1 & C17.2 to A17.2	RL17	C42.1 to A42.1 & C42.2 to A42.2	RL42
C18.1 to A18.1 & C18.2 to A18.2	RL18	C43.1 to A43.1 & C43.2 to A43.2	RL43
C19.1 to A19.1 & C19.2 to A19.2	RL19	C44.1 to A44.1 & C44.2 to A44.2	RL44
C20.1 to A20.1 & C20.2 to A20.2	RL20	C45.1 to A45.1 & C45.2 to A45.2	RL45
C21.1 to A21.1 & C21.2 to A21.2	RL21	C46.1 to A46.1 & C46.2 to A46.2	RL46
C22.1 to A22.1 & C22.2 to A22.2	RL22	C47.1 to A47.1 & C47.2 to A47.2	RL47
C23.1 to A23.1 & C23.2 to A23.2	RL23	C48.1 to A48.1 & C48.2 to A48.2	RL48
C24.1 to A24.1 & C24.2 to A24.2	RL24	C49.1 to A49.1 & C49.2 to A49.2	RL49
C25.1 to A25.1 & C25.2 to A25.2	RL25	C50.1 to A50.1 & C50.2 to A50.2	RL50

TABLE 7.3 - High Density SPST Shielded Reed Relay Module 40-142 Relay Numbering

Signal Path (with relay energised)	40-142-021 Relay No.	Signal Path (with relay energised)	40-142-021 Relay No.
C1 to A1	RL1	C26 to A26	RL26
C2 to A2	RL2	C27 to A27	RL27
C3 to A3	RL3	C28 to A28	RL28
C4 to A4	RL4	C29 to A29	RL29
C5 to A5	RL5	C30 to A30	RL30
C6 to A6	RL6	C31 to A31	RL31
C7 to A7	RL7	C32 to A32	RL32
C8 to A8	RL8	C33 to A33	RL33
C9 to A9	RL9	C34 to A34	RL34
C10 to A10	RL10	C35 to A35	RL35
C11 to A11	RL11	C36 to A36	RL36
C12 to A12	RL12	C37 to A37	RL37
C13 to A13	RL13	C38 to A38	RL38
C14 to A14	RL14	C39 to A39	RL39
C15 to A15	RL15	C40 to A40	RL40
C16 to A16	RL16	C41 to A41	RL41
C17 to A17	RL17	C42 to A42	RL42
C18 to A18	RL18	C43 to A43	RL43
C19 to A19	RL19	C44 to A44	RL44
C20 to A20	RL20	C45 to A45	RL45
C21 to A21	RL21	C46 to A46	RL46
C22 to A22	RL22	C47 to A47	RL47
C23 to A23	RL23	C48 to A48	RL48
C24 to A24	RL24	C49 to A49	RL49
C25 to A25	RL25	C50 to A50	RL50

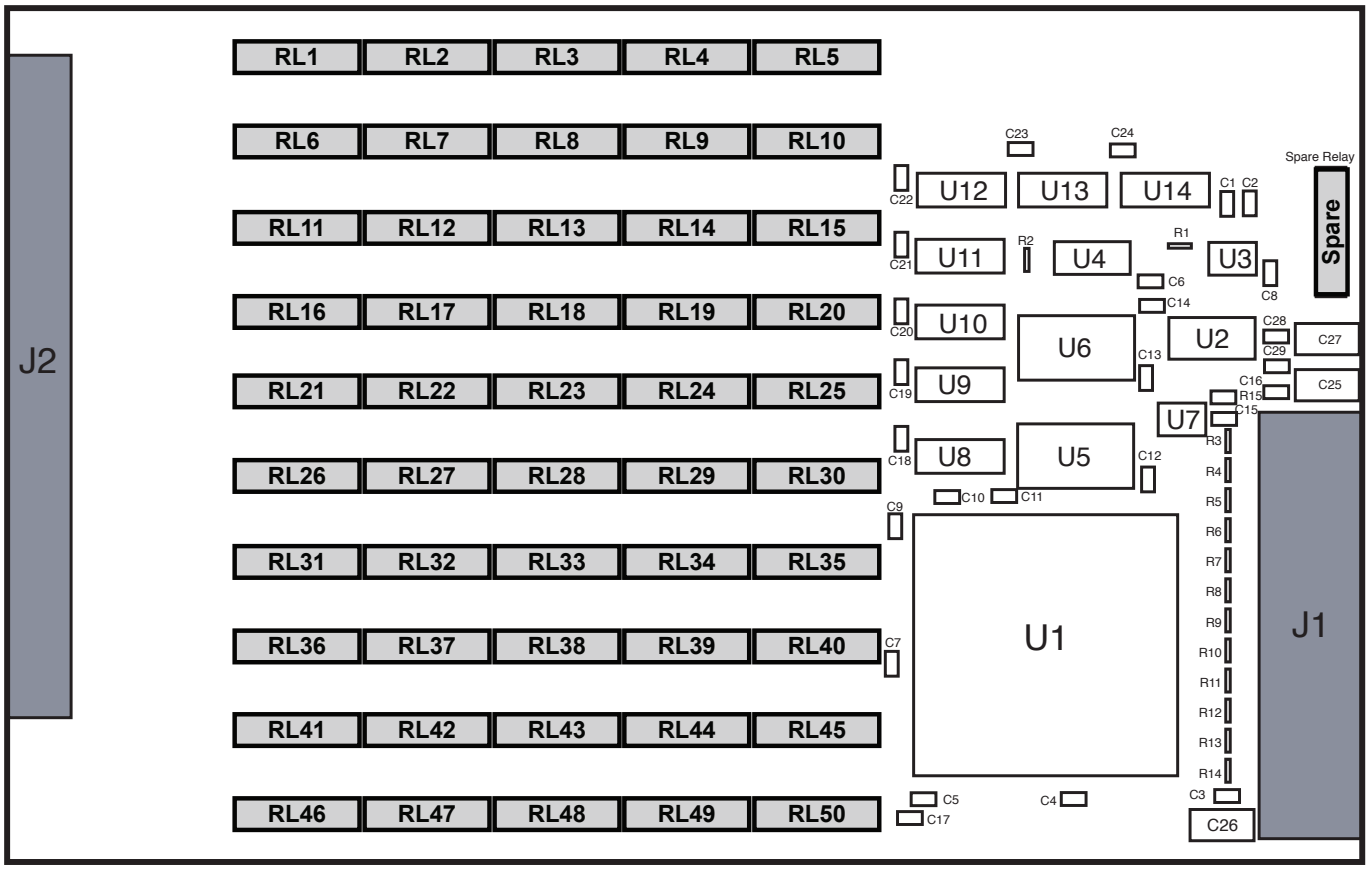

Figure 7.2 - 40-141 & 40-142 High Density Reed Relay Module Component Layout

TABLE 7.4 - High Density SPDT Reed Relay Module 40-143 Relay Numbering

Signal Path (with relay energised)	Signal Path (with relay de-energised)	40-143 -121 Relay No.	40-143 -221 Relay No.	Signal Path (with relay energised)	Signal Path (with relay de-energised)	40-143 -121 Relay No.	40-143 -221 Relay No.
C1 to A1	C1 to B1	RL1	RL1	C33 to A33	C33 to B33	RL33	RL33
C2 to A2	C2 to B2	RL2	RL2	C34 to A34	C34 to B34	RL34	RL34
C3 to A3	C3 to B3	RL3	RL3	C35 to A35	C35 to B35	RL35	RL35
C4 to A4	C4 to B4	RL4	RL4	C36 to A36	C36 to B36	RL36	RL36
C5 to A5	C5 to B5	RL5	RL5	C37 to A37	C37 to B37	RL37	RL37
C6 to A6	C6 to B6	RL6	RL6	C38 to A38	C38 to B38	RL38	RL38
C7 to A7	C7 to B7	RL7	RL7	C39 to A39	C39 to B39	RL39	RL39
C8 to A8	C8 to B8	RL8	RL8	C40 to A40	C40 to B40	RL40	RL40
C9 to A9	C9 to B9	RL9	RL9	C41 to A41	C41 to B41	RL41	RL41
C10 to A10	C10 to B10	RL10	RL10	C42 to A42	C42 to B42	RL42	RL42
C11 to A11	C11 to B11	RL11	RL11	C43 to A43	C43 to B43	RL43	RL43
C12 to A12	C12 to B12	RL12	RL12	C44 to A44	C44 to B44	RL44	RL44
C13 to A13	C13 to B13	RL13	RL13	C45 to A45	C45 to B45	RL45	RL45
C14 to A14	C14 to B14	RL14	RL14	C46 to A46	C46 to B46	RL46	RL46
C15 to A15	C15 to B15	RL15	RL15	C47 to A47	C47 to B47	RL47	RL47
C16 to A16	C16 to B16	RL16	RL16	C48 to A48	C48 to B48	RL48	RL48
C17 to A17	C17 to B17	RL17	RL17	C49 to A49	C49 to B49	Not Fitted	RL49
C18 to A18	C18 to B18	RL18	RL18	C50 to A50	C50 to B50	Not Fitted	RL50
C19 to A19	C19 to B19	RL19	RL19	C51 to A51	C51 to B51	Not Fitted	RL51
C20 to A20	C20 to B20	RL20	RL20	C52 to A52	C52 to B52	Not Fitted	RL52
C21 to A21	C21 to B21	RL21	RL21	C53 to A53	C53 to B53	Not Fitted	RL53
C22 to A22	C22 to B22	RL22	RL22	C54 to A54	C54 to B54	Not Fitted	RL54
C23 to A23	C23 to B23	RL23	RL23	C55 to A55	C55 to B55	Not Fitted	RL55
C24 to A24	C24 to B24	RL24	RL24	C56 to A56	C56 to B56	Not Fitted	RL56
C25 to A25	C25 to B25	RL25	RL25	C57 to A57	C57 to B57	Not Fitted	RL57
C26 to A26	C26 to B26	RL26	RL26	C58 to A58	C58 to B58	Not Fitted	RL58
C27 to A27	C27 to B27	RL27	RL27	C59 to A59	C59 to B59	Not Fitted	RL59
C28 to A28	C28 to B28	RL28	RL28	C60 to A60	C60 to B60	Not Fitted	RL60
C29 to A29	C29 to B29	RL29	RL29	C61 to A61	C61 to B61	Not Fitted	RL61
C30 to A30	C30 to B30	RL30	RL30	C62 to A62	C62 to B62	Not Fitted	RL62
C31 to A31	C31 to B31	RL31	RL31	C63 to A63	C63 to B63	Not Fitted	RL63
C32 to A32	C32 to B32	RL32	RL32	C64 to A64	C64 to B64	Not Fitted	RL64

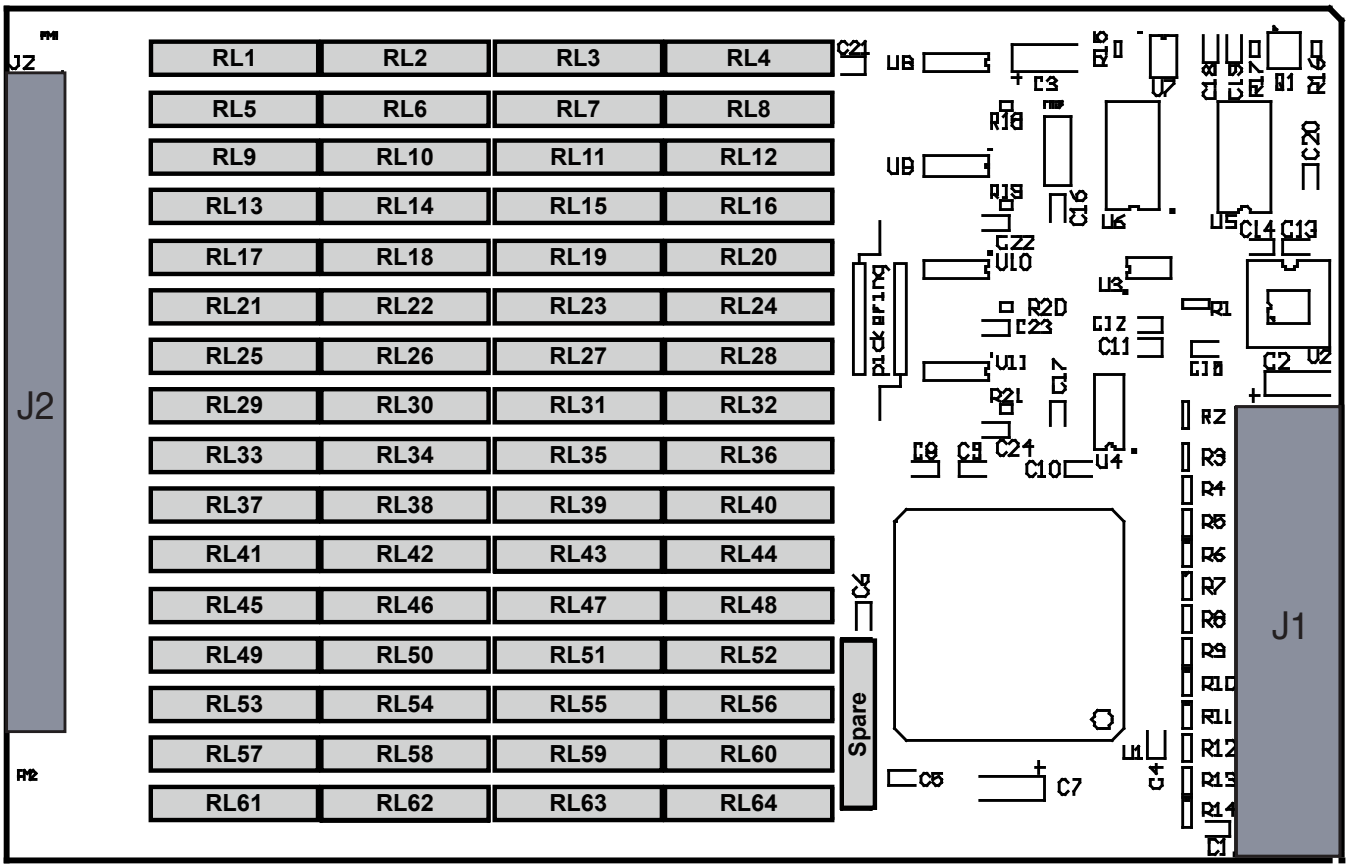

Figure 7.3 - 40-143 High Density Reed Relay Module Component Layout

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SECTION 8 - WARNINGS AND CAUTIONS

WARNING – HAZARDOUS ENVIRONMENTS

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

THIS MODULE MAY CONTAIN HAZARDOUS VOLTAGES. BEFORE REMOVING THE MODULE FROM THE RACK REMOVE ALL SUPPLIES.

CAUTION – Handling of Electrostatic-Sensitive Semiconductor Devices

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-units containing these devices:

1. Persons removing sub-units from an equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment.

2. Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer.

3. Outer clothing worn must be unable to generate static charges.

4. Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.

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APPENDIX A - OLD VERSION CONNECTOR PINOUTS

Figure A.1 provides pin outs for the High Density Reed Relay Modules in the 40-140 model range (these have now been superceded by the 40-140A modules).

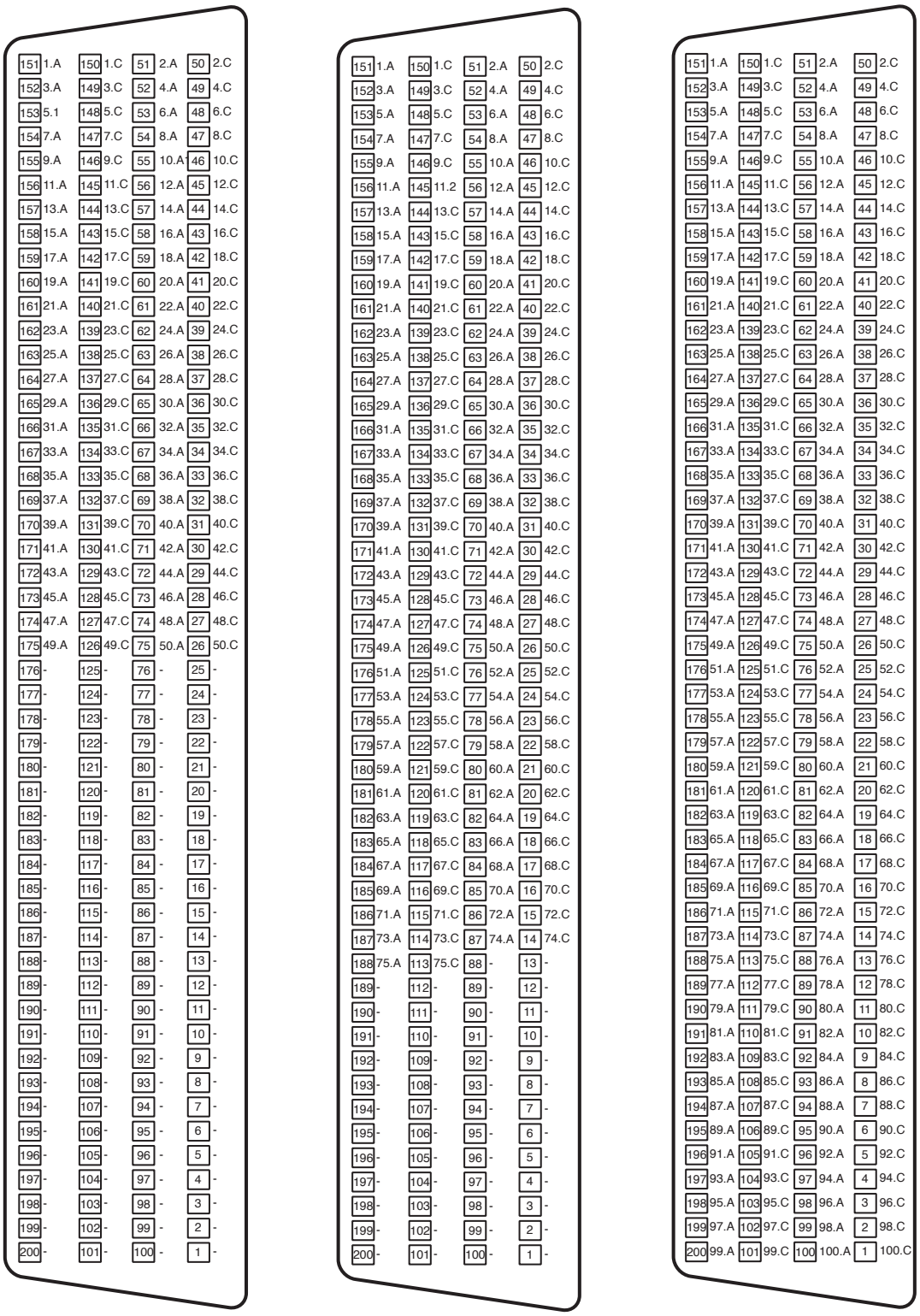

Figure A.1 - High Density Reed Relay Module 40-140: Pin Outs

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