

USER MANUAL



HIGH VOLTAGE POWER RELAY MODULE (MODEL No. 40-330)



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SECTION 1 - INTRODUCTION

GENERAL

The Pickering Interfaces 40-330 Power Relay Module consists of 24 separate SPST contacts and is suitable for applications requiring power relay switching with high density.

It features current handling up to 4A, 1000V AC peak or DC cold switching and 250V AC /110V DC hot switching. It is configured as a bank of 24 separate Single Pole Single Throw (SPST) relays. Connections are made via a front panel mounted 50 pin high voltage D-Type connector.

Typical applications will be found in Automotive, Aerospace and Power Cell Testing applications.

Power Relay Type

The 40-330 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A Spare Relay is built onto the circuit board to facilitate easy maintenance with minimum downtime.

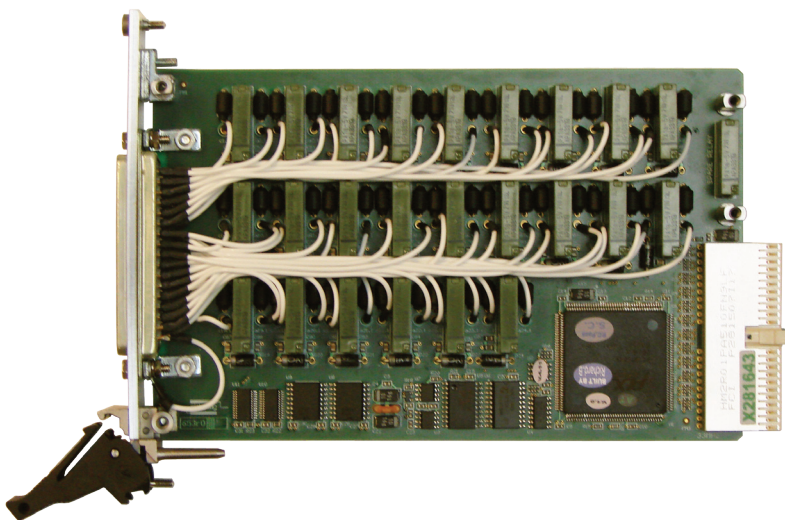


Figure 1.1 - 40-330 With Covers Removed

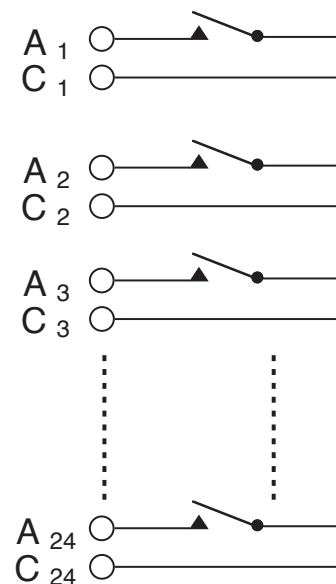


Figure 1.2 - Switching Diagram for the 40-330 - 24 SPST Contacts

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SECTION 2 - SPECIFICATION

Switching Specification

Max Cold Switch Voltage:	1000V DC/1000V AC peak
Max Hot Switch Voltage:	110V DC/250V AC
Max Switch Current:	4A
Max Carry Current:	4A
Max Power:	120W/1000VA
Max Combined Switch Path Power Dissipation:	21W
Initial On Path Resistance:	<50mΩ
Off Path Resistance:	>10 ⁹ Ω
Bandwidth:	5MHz
Operate Time:	<10ms
Expected Life (operations)	
Low power load:	>2x10 ⁷
Full power load:	>1x10 ⁵

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.75A	0	0

Width and Dimensions

Single slot 3U PXI (CompactPCI card).

Connectors

Signals via front panel 50 Way male D-type, high voltage connector.

PXI & CompactPCI Characteristics

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.

Uses 33MHz 32-bit backplane interface.

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 a LXI environment refer to the 60-100A data sheet.



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

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.

Product Order Codes

24 x SPST Power Relays	40-330-001
------------------------	-------------------

Mating Connectors & Cabling

Examples of connectors and cabling for the 40-330 are:

40-960-050-HV-F Connector, 50 way 5A D subminiature Female, High Voltage.

40-972-050-1M-HV Cableform, 50 way D subminiature Female to unterminated, 5A, 1m Length, High Voltage.

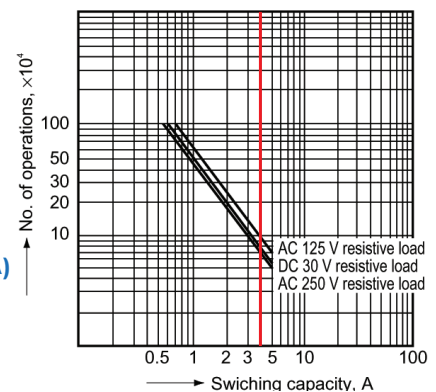
Please refer to the Pickering Interfaces "Interconnection Solutions" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options,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



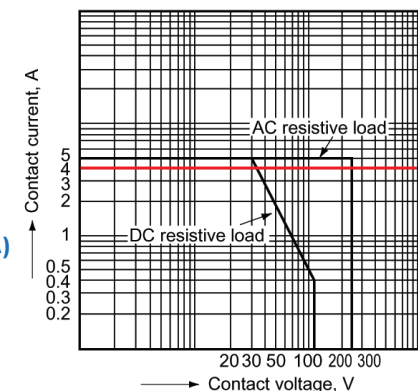
Latest Details

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

**Current/
Operating
Life Curve
(X40-330-001
is limited to 4A)**



**Current/
Voltage Curve
(X40-330-001
is limited to 4A)**



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SECTION 3 - INSTALLATION

SOFTWARE INSTALLATION

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

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

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

HARDWARE INSTALLATION

CAUTION

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

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

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

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

CAUTION

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

5. Hold the handle whilst slowly sliding the module into the card guides until the handle catches on the injector/ejector rail (refer to Figure 3.1).
6. Raise the injector/ejector handle until the module firmly seats into the backplane. The front panel of the module should be flush with the front panel of the chassis.
7. Screw the front panel of the module to the front panel mounting rail.
8. In a system employing MXI-3 to connect a desktop PC to a PXI chassis or to link multiple chassis, power-up the system as follows:
 - a. For a system comprising a PC and one chassis, power up the chassis before powering up the PC.
 - b. For a system comprising more than one chassis, turn ON the last chassis in the system followed by the penultimate, etc, and finally turn ON the PC or chassis containing the system controller.

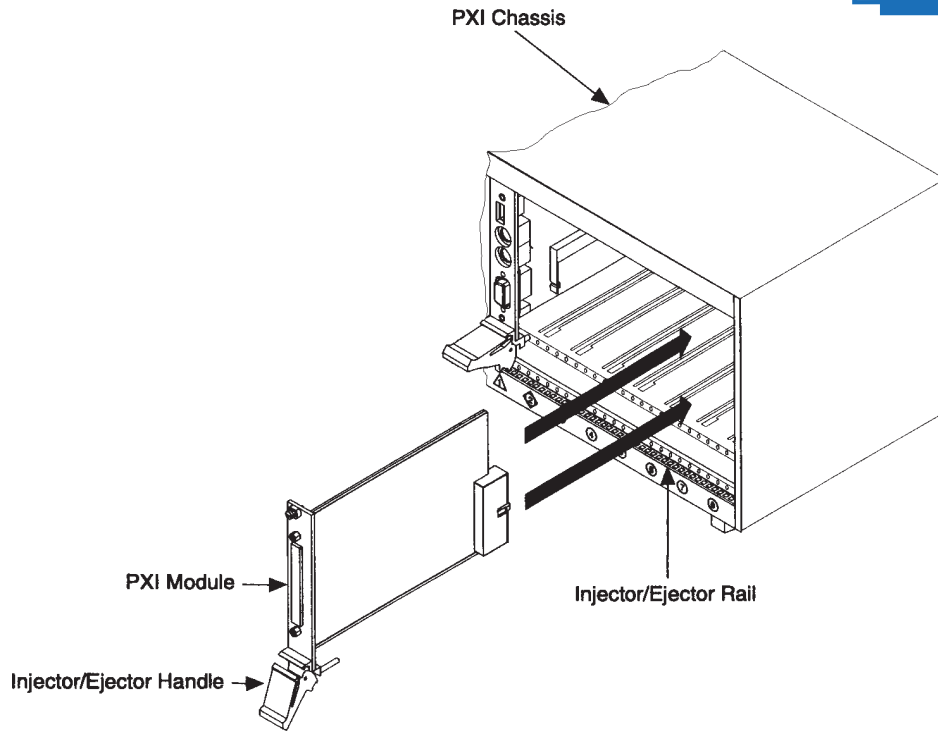


Figure 3.1 - Installing the module into a PXI/Compact PCI Chassis

TESTING OPERATION

Start the Test Panels application from the Programs>>Pickering>>PXI Utilities menu. If you are a LabVIEW user, run "Test Panels (LabVIEW VI)"; if not, run "Test Panels (EXE)". A selector panel will appear, listing all installed Pickering PXI switch cards. Click on the card you wish to control, and a graphical control panel is presented allowing operation of the card. Panels can be opened simultaneously for all the installed cards.

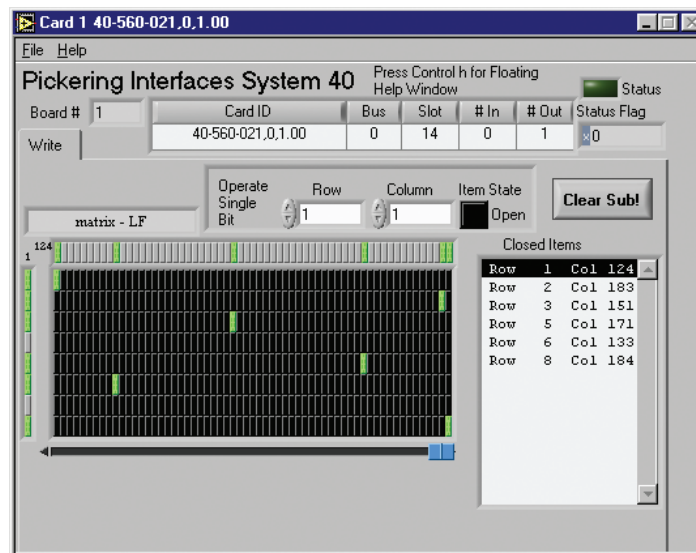


Figure 3.2 - Typical Test Panel Display

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

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

SECTION 4 - PROGRAMMING

Programming options for Pickering Interfaces PXI Cards

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

- Microsoft Visual Basic
- Microsoft Visual C++
- Borland C++
- National Instruments LabWindows/CVI
- National Instruments LabVIEW and LabVIEW RT

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

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

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

IVI Driver for Windows - pi40iv

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

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

VISA Driver for Windows - pipx40

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

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

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

Direct I/O Driver for Windows - Pilpxi

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

Register-level Programming

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

- If the functionality of the supplied drivers does not meet the application requirements.
- If security considerations demand full source-code for the application.
- In development environments that have alternate mechanisms for accessing PCibus.
- For operating systems other than Windows LabVIEW, LabWindows/CVI and Switch Executive are trademarks of National Instruments Corporation.

Details of the above drivers is available in separate documentation.

Card Architecture

Sub-units

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

Sub-unit examples:

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

Sub-unit characteristics

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

pipx40 pipx40_getSubCounts

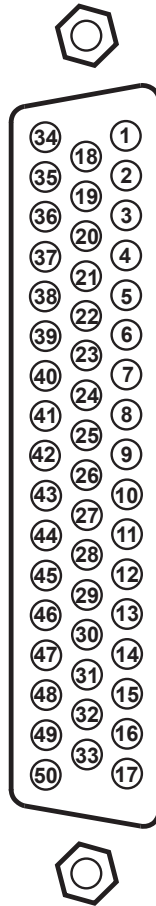
pilpxi PIL_EnumerateSubs

pipx40 pipx40_getSubType, pipx40_getSubInfo

pilpxi PIL_SubType, PIL_SubInfo

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

SECTION 5 - CONNECTOR PIN OUTS



**Figure 5.1 - 40-330-001
High Voltage Power Relay
Module Pin Out**

40-330-001 50-Way D-Type Plug					
Pin Number	Signal Name	Pin Number	Signal Name	Pin Number	Signal Name
34	A3	18	A2	1	A1
35	C3	19	C2	2	C1
36	A6	20	A5	3	A4
37	C6	21	C5	4	C4
38	A9	22	A8	5	A7
39	C9	23	C8	6	C7
40	A12	24	A11	7	A10
41	C12	25	C11	8	C10
42	A15	26	A14	9	A13
43	C15	27	C14	10	C13
44	A18	28	A17	11	A16
45	C18	29	C17	12	C16
46	A21	30	A20	13	A19
47	C21	31	C20	14	C19
48	A24	32	A23	15	A22
49	C24	33	C23	16	C22
50	FP GND			17	NC

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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.

RELAY LOOK-UP TABLE

Sub-Unit	Bit	Switch Function	Relay Number
1	1	A1 to C1	RL1
1	2	A2 to C2	RL2
1	3	A3 to C3	RL3
1	4	A4 to C4	RL4
1	5	A5 to C5	RL5
1	6	A6 to C6	RL6
1	7	A7 to C7	RL7
1	8	A8 to C8	RL8
1	9	A9 to C9	RL9
1	10	A10 to C10	RL10
1	11	A11 to C11	RL11
1	12	A12 to C12	RL12
1	13	A13 to C13	RL13
1	14	A14 to C14	RL14
1	15	A15 to C15	RL15
1	16	A16 to C16	RL16
1	17	A17 to C17	RL17
1	18	A18 to C18	RL18
1	19	A19 to C19	RL19
1	20	A20 to C20	RL20
1	21	A21 to C21	RL21
1	22	A22 to C22	RL22
1	23	A23 to C23	RL23
1	24	A24 to C24	RL24

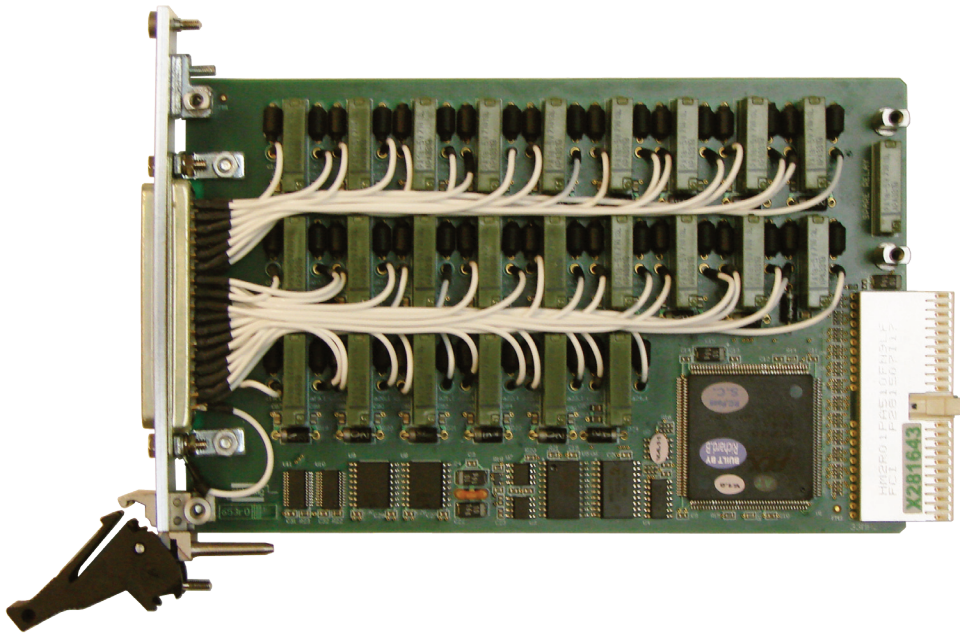
SECTION 7 - FUNCTIONAL DESCRIPTION

MECHANICAL DESCRIPTION

The High Voltage Power Relay Module conforms to the 3U height (128mm) Eurocard standard and comprises the following:

- CPCI Ejector Handle
- Front Panel mounted 50-way D Type connector
- Twenty four High Voltage electro-mechanical relays
- One spare relay
- Compact PCI backplane connector
- PCI Bridge (U1)
- Control Logic

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



FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 7.1. The High Voltage Power 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 50-way D type connector, J2. The module comprises a PCB populated with high power electro-mechanical relays arranged as 24 separate SPST contacts. The relays are energised via control signals from relay drivers U10 and U11. The relay drivers are fed with serial data from PCI bridge U1 via the control logic and digital isolators U8 and U9. Module configuration is determined by data stored in EEPROM U7, the PCI Bridge U1 is configured by EEPROM U2.

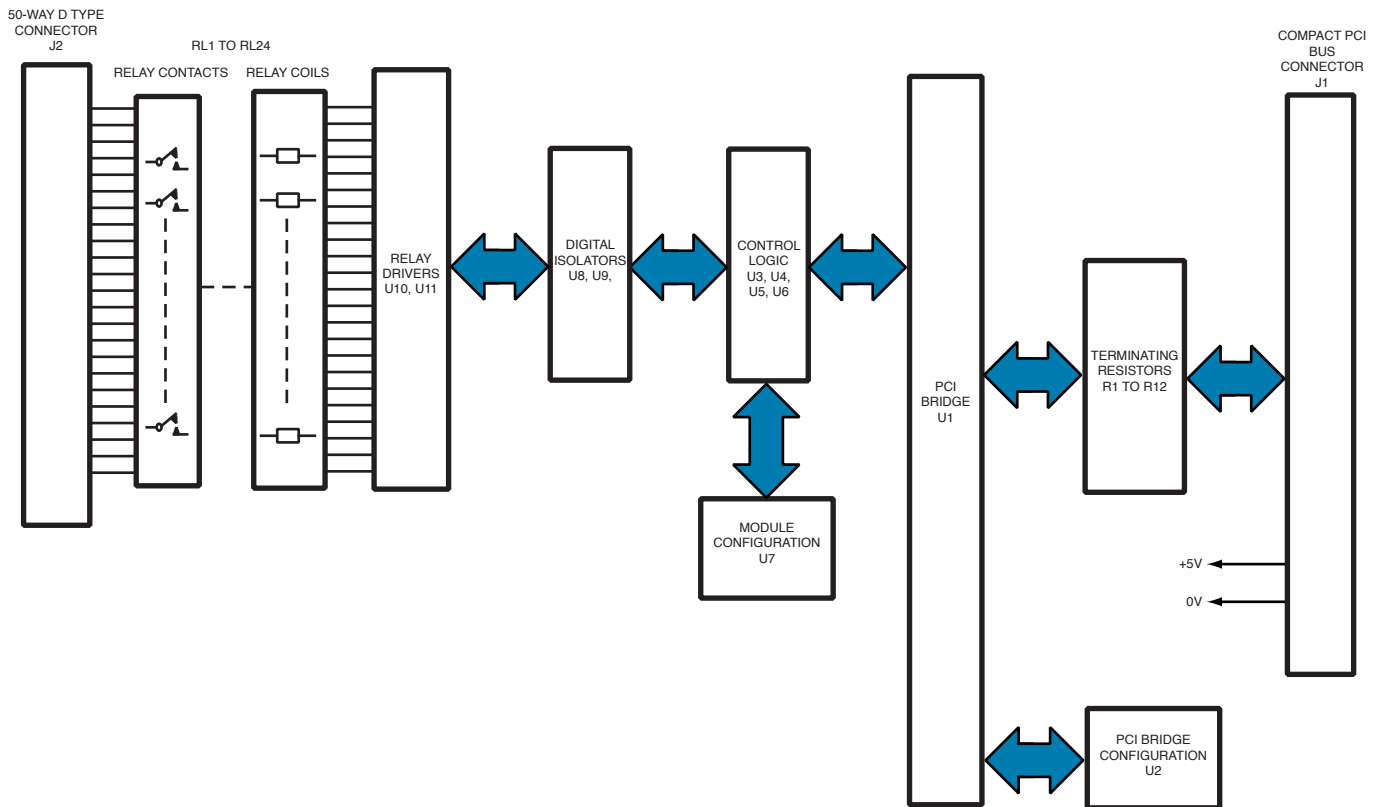
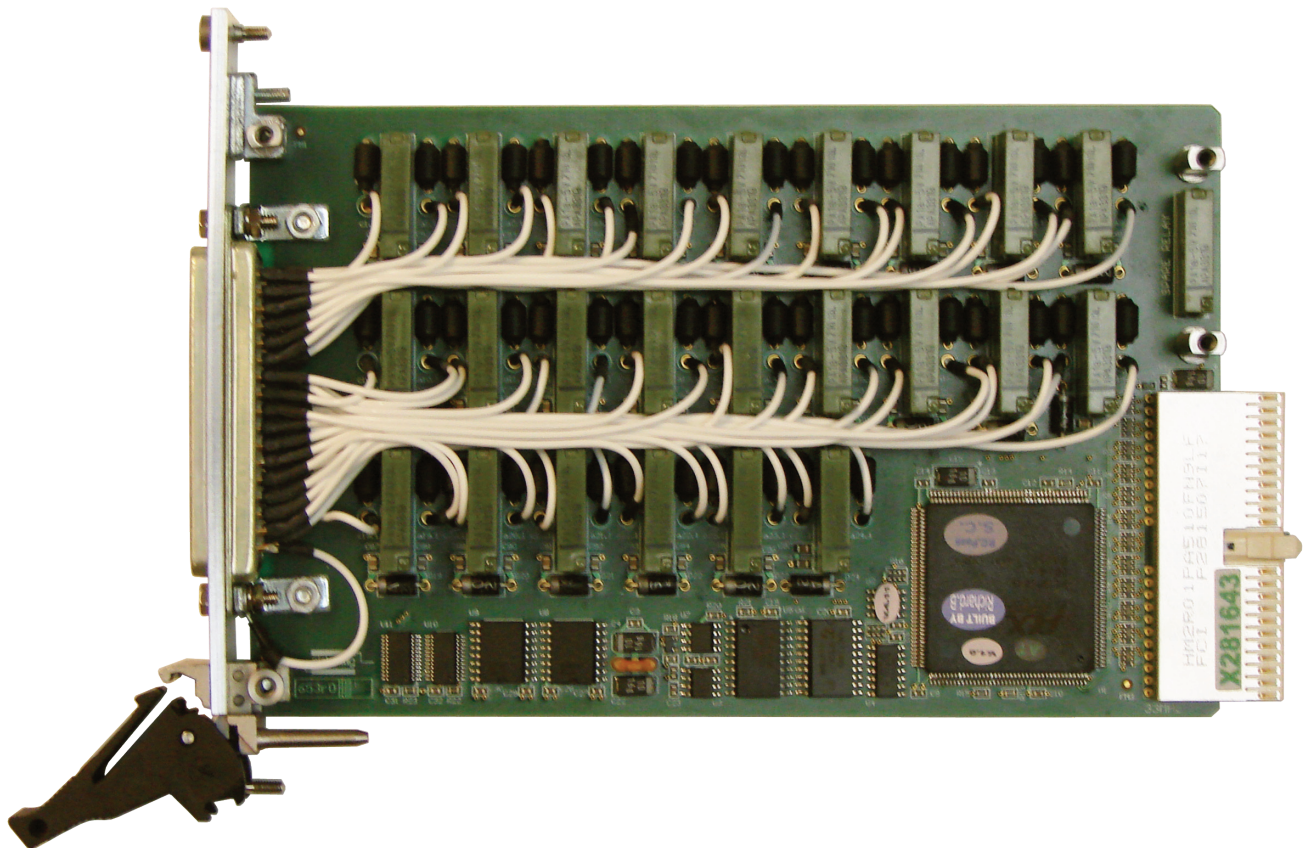


Figure 7.1 - High Voltage Power Relay Module (40-330): Functional Block Diagram

SECTION 8 - BOARD LAYOUT

The following page provide the component layout diagram for High Voltage Power Relay Module 40-330. This is for locating the positions of relays to aid in the fault finding process



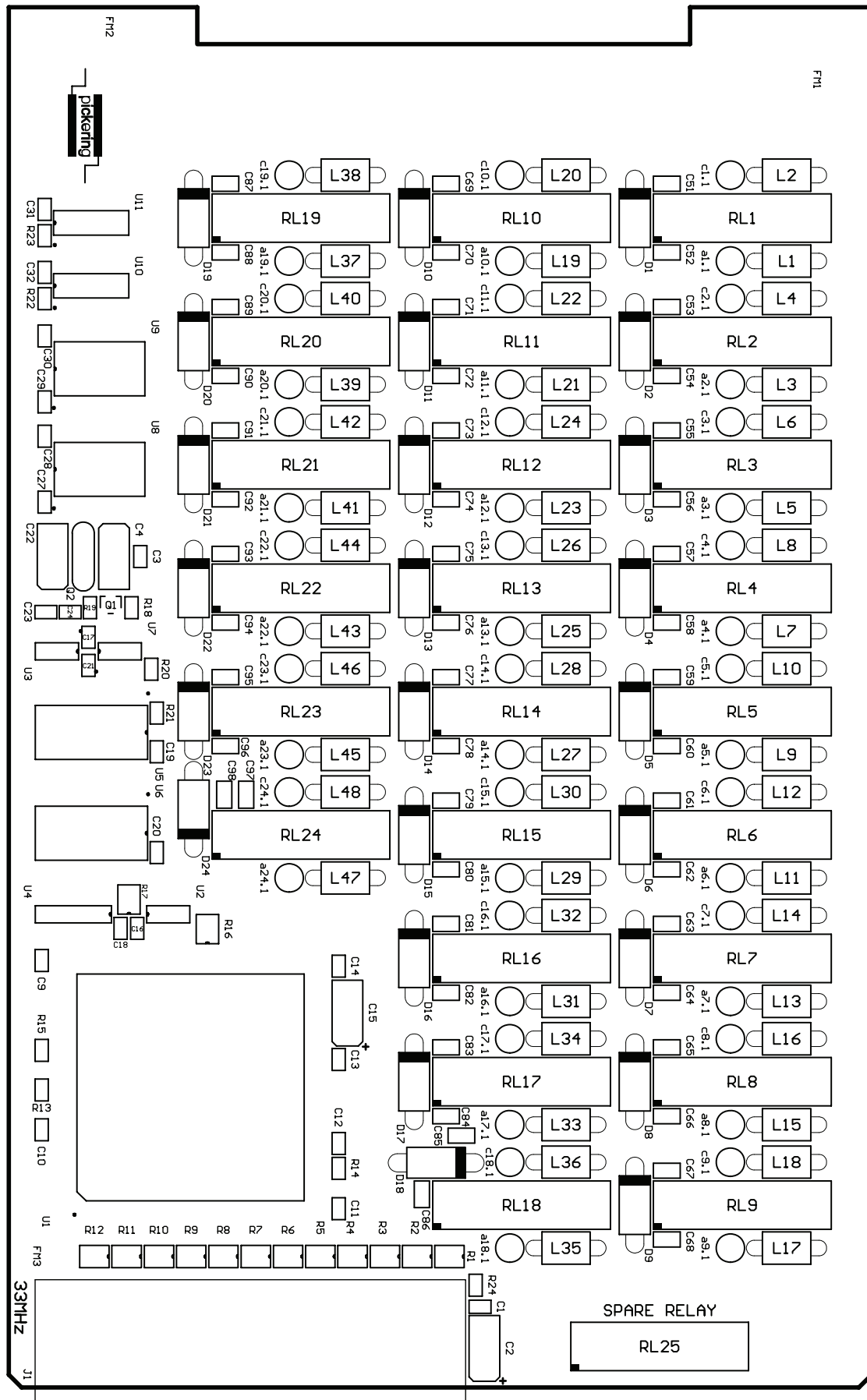


Figure 8.1 - High Voltage Power Relay Module 40-330-001: Component Layout

SECTION 9 - WARNINGS AND CAUTIONS



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

- (1) Persons removing sub-units from an equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment.
- (2) Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer.
- (3) Outer clothing worn must be unable to generate static charges.
- (4) Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.

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