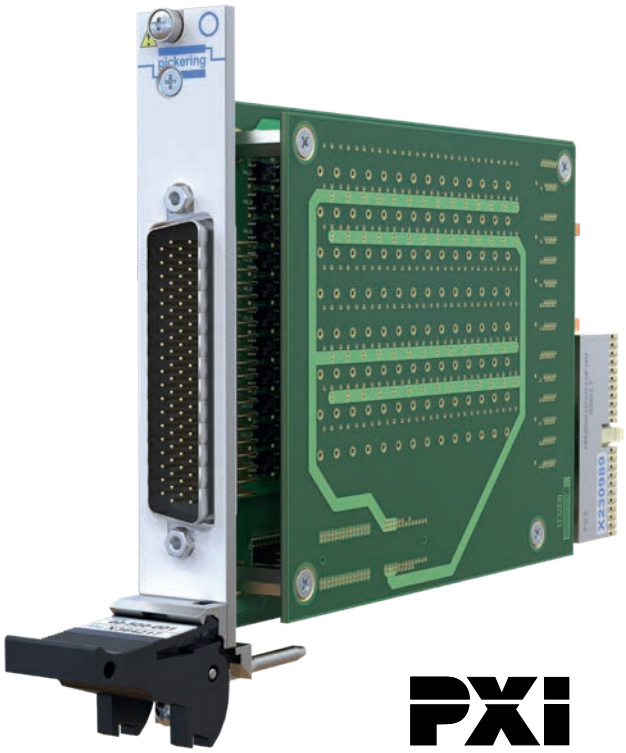
40-500 User Manual

PXI Solid State Very High Density Matrix Module



Issue 4.4 November 2021

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ISO 9001
Reg No. FM38792

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

WARRANTY

All products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years, excluding programmable power supplies, from the date of delivery to the original purchaser. Any product found to be defective within this period will, at the discretion of Pickering Interfaces be repaired or replaced.

Products serviced and repaired outside of the warranty period are warranted for ninety days.

Extended warranty and service are available. Please contact Pickering Interfaces by phone, the website or via e-mail.

ENVIRONMENTAL POLICY

Pickering Interfaces operates under an environmental management system similar to ISO 14001.

Pickering Interfaces strives to fulfil all relevant environmental laws and regulations and reduce wastes and releases to the environment. Pickering Interfaces aims to design and operate products in a way that protects the environment and the health and safety of its employees, customers and the public. Pickering Interfaces endeavours to develop and manufacture products that can be produced, distributed, used and recycled, or disposed of, in a safe and environmentally friendly manner.

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PRODUCT SAFETY

SAFETY SYMBOLS

The following safety symbols may be used on the product and throughout the product documentation.

MEANING / DESCRIPTION	SYMBOL
PROTECTIVE EARTH (GROUND) To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.	
DANGEROUS VOLTAGE To indicate hazards arising from dangerous voltages.	
WARNING / CAUTION An appropriate safety instruction should be followed or caution to a potential hazard exists. Refer to the relevant instructions detailed within the product manual.	
HEAVY If this product is heavy reference should be made to the safety instructions for provisions of lifting and moving.	
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.	

CONTENTS

Copyright Statement II

Technical Support and Warranty III

Product Safety IV

Contents (this page) V

Warnings and Cautions VII

Section 1
Technical Specification 1.1

Section 2
Technical Description 2.1
- Functional Description 2.1

Section 3
Installation 3.1
- Pre Operation Checks 3.1
- Hardware Installation 3.2
- Software Installation 3.2
- Testing Operation 3.3

Section 4
Programming Guide 4.1
- Programming Options For Pickering PXI Modules 4.1
- Module Architecture 4.2
- Programming The Module 4.3

Section 5
Connector Information 5.1

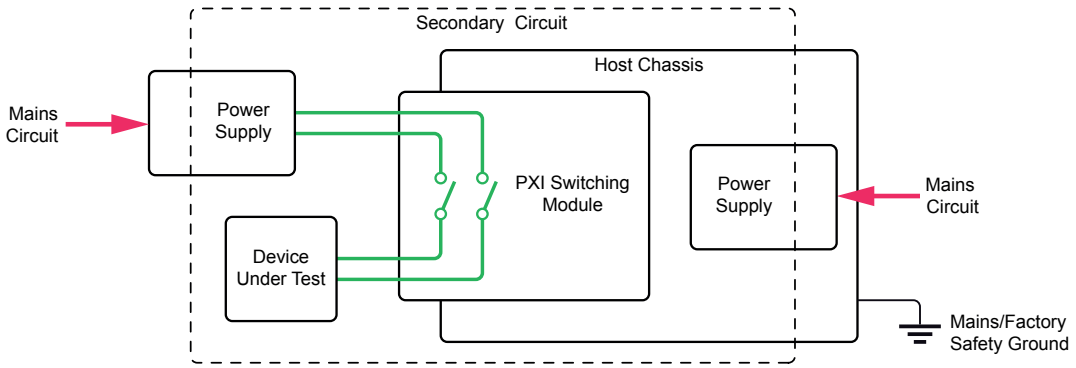
Section 6
Trouble Shooting 6.1

Section 7
Maintenance Information 7.1
- Switching System Test Tools 7.1
- Relay Lookup Tables 7.1

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WARNINGS AND CAUTIONS

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

WARNING - DANGER OF ELECTRIC SHOCK	SYMBOL
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the host chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals. Not to be used in safety critical circuits, refer to the Pickering Interfaces' terms & conditions of sale. This module must not be used for the switching of Mains Circuits. For the switching of voltages up to the module's full specification, Secondary Circuit power supplies and the Device Under Test must be fully isolated from the Mains Circuit and the safety earth. The host chassis must be correctly installed and be connected to mains or factory safety ground, please refer to your chassis installation manual.  **Diagram Showing Separation Between The Mains Circuit and Secondary Circuit / DUT** For the purposes of this document, a Mains Circuit is an installation classified as Overvoltage Category II up to 300V. Separation between the Secondary Circuit and Mains Circuit is achieved by a transformer in which the primary windings are separated from the secondary windings by reinforced insulation, double insulation, or a screen connected to the protective conductor terminal.	

CAUTION - HANDLING OF ELECTROSTATIC-SENSITIVE DEVICES	SYMBOL
Certain semiconductor devices used in this equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their unterminated state, or sub-assemblies containing these devices: 1. Persons removing sub-assemblies from equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment. 2. Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer. 3. Outer clothing worn must be unable to generate static charges. 4. Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.	

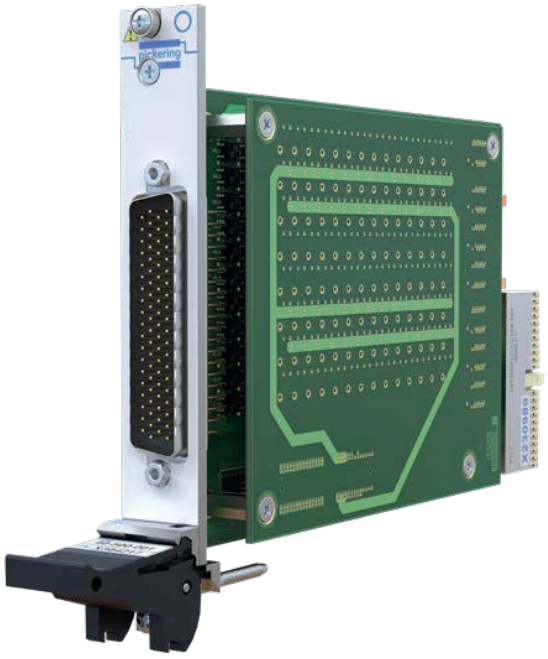
CAUTION - PRODUCT DOCUMENTATION	SYMBOL
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.	

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS
All cleaning and servicing requires the equipment to be isolated and disconnected from the power source and user I/O signals (refer to the Maintenance Section). • Appropriate manual handling procedures should be followed as dictated by the weight of the individual module or the combined weight of the modules & chassis. • Should a fault occur with the module or chassis, immediately isolate and disconnect the incoming power to the chassis and the user I/O signals. • Ensure the equipment is installed, operated and maintained by trained and authorised personnel. • For suitably equipped products in the event of an emergency press the red “emergency stop” button situated on the front of the unit.

SECTION 1 - TECHNICAL SPECIFICATION

- Solid State 1-Pole Matrix
- High Density 64x4 Configuration
- 0.5 A Hot or Cold Switching
- 1.5 A Crosspoint Inrush Current
- ±60 V Rating
- 3 A Y Bus Rating
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by *eBIRST* ™
- 3 Year Warranty



The 40-500 is a very high density matrix using solid state switching. It is configured as a 64x4 1-pole matrix and occupies a single PXI slot.

It is ideal for applications requiring fast operation and a long service life with frequent switch operations at high currents and voltages. Since the design is based on solid state relays the matrix has no wear out mechanism.

The crosspoints can switch up to 0.5 A and can sustain an inrush current of 1.5 A for 100 ms, allowing the matrix to be used with capacitive loads. Each Y-bus signal can carry 3 A, allowing multiple crosspoints with the same Y connection to carrying their maximum current. The module can hot switch up to 60 V at the full rated current and is suitable for AC or DC operation.

Applications for the 40-500 include routing signals for data acquisition systems or for the slave switching of high current relays. The 40-500 can be used for low current low voltage applications where cost, speed, zero contact bounce and the ability to withstand frequent operation is essential.

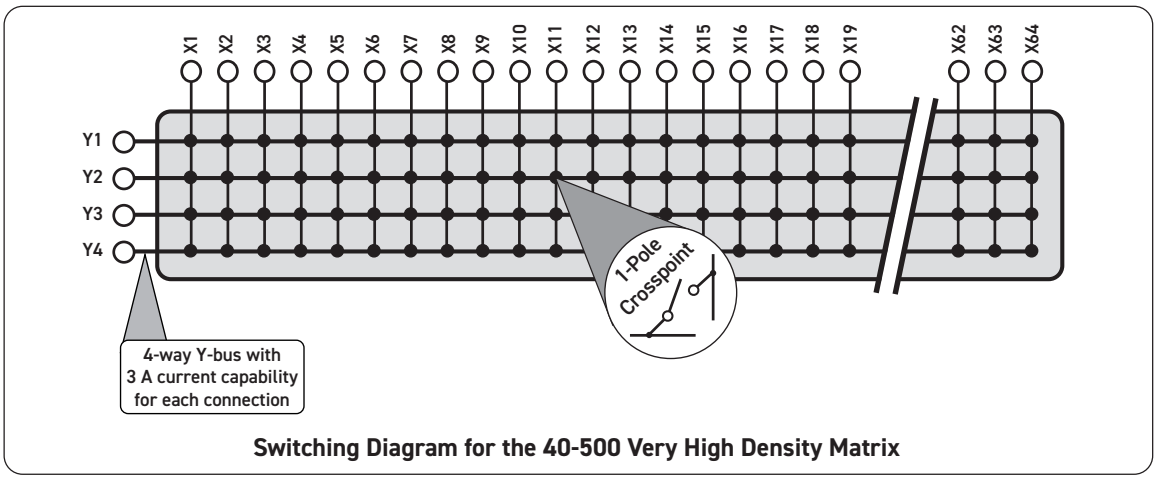
Supported by *eBIRST*

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

For more information go to: pickeringtest.com/ebirst

Pickering's Range of High Density Solid State Matrices			
Model No.	**Matrix Size**	**Current Rating**	**Voltage Rating**
40-500	64x4	500 mA	60 V
40-501	64x4	150 mA	100 V

Pickering Interfaces offers PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.



Switching Diagram for the 40-500 Very High Density Matrix

Switching Specification

Switch Type:	Solid State Switch
Max Switch Voltage:	±60 V* (AC peak or DC)†
Max Crosspoint Current:	0.5 A continuous 1.5 A for 100 ms
Max Y Bus Current:	3 A continuous for each bus
Initial On Path Resistance:	0.9 Ω (Y to X)
Switch Leakage Capacitance:	2.5 nF (single Y to X)
Leakage Current (off state):	<4 µA at 60 V
Turn On Time:	<400 µs
Turn Off Time:	<200 µs
Matrix Bandwidth:	2 MHz typical (one crosspoint)

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

† Differential voltage between channels must not exceed rated voltage, additional caution should be used when applying AC voltages as multiple asynchronous supplies can create high differential voltages between channels.

Power Requirements

+3.3 V	+5 V	+12 V	-12 V
0	0.9 A typical (64 closures)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 78-pin male D-type connector, for pin outs please refer to the operating manual.

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

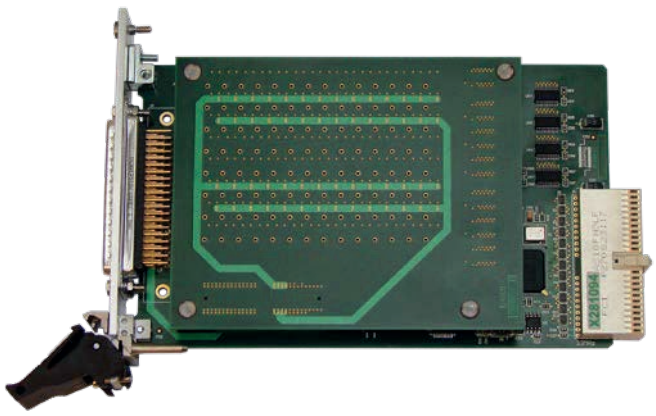
PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33 MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.



Side View of the 40-500 Matrix Module

Product Order Codes

Solid State Very High Density Matrix	**40-500-001**

Product Customization

Pickering PXI modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

Customization can include:

- Alternative relay types
- Mixture of relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

Support Products

eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below. For more information go to: pickeringtest.com/ebirst

Product	Test Tool	Adaptor
40-500	**93-006-001**	**Not Required**

Mating Connectors & Cabling

For connection accessories for the 40-500 module please refer to the 90-006D 78-pin D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Examples of connectors and cabling for the 40-500 are:

40-960-078	78-pin D-type solder connector
40-970-078-1m-FF	Cableform, 78-pin D-type Female to Female, 3 A, 1m Length
40-965-078-F	Connector Block, Shielded, 78-pin D-type Module Mounted, Female

Chassis Compatibility

This PXI module must be used in a suitable chassis. It is compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis

Chassis Selection Guide



Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

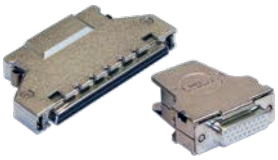


Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system

Connectivity Solutions

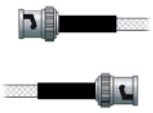
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



Connectors & Backshells



Multiway Cable Assemblies



RF Cable Assemblies



Connector Blocks

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications. Visit: pickeringtest.com/cdt to start your design.



Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our Relay Division. These instrument grade reed relays feature ***SoftCenter™*** technology, ensuring long service life and repeatable contact performance. To learn more, please go to: pickeringrelay.com



Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

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

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.
To learn more about software drivers and development environments, please go to: pickeringtest.com/software

Signal Routing Software



Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development. To learn more, please go to: pickeringtest.com/spm

Diagnostic Relay Test Tools



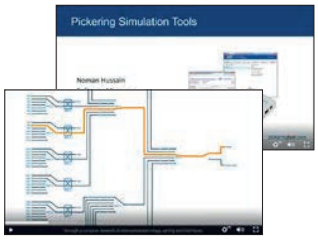
eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.
To learn more, please go to: pickeringtest.com/ebirst

Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection solutions you need. We have also published handy reference books on Switching Technology and for the PXI and LXI standards.









To view, download or request any of our product resources, please visit: pickeringtest.com/resources

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The Solid State Matrix Module is powered by +5V and +3.3V supplies via Compact PCI connector J1. An additional +2.5V supply is provided by regulator U4. FPGA U1 provides the interface to the Compact PCI bus and is configured by the Flash PROM U3. Output signals from the FPGA control relay drivers U50-58 on the Mother board and U60-66 on the Daughter board via level translation devices U59 and U60. The relay drivers control solid state relays RL1-144 on the Mother board and RL146-257 on the Daughter board which are interconnected to form a 64x4 matrix. User access to the matrix is via the 78-pin D-type plug U2 mounted on the module's front panel.

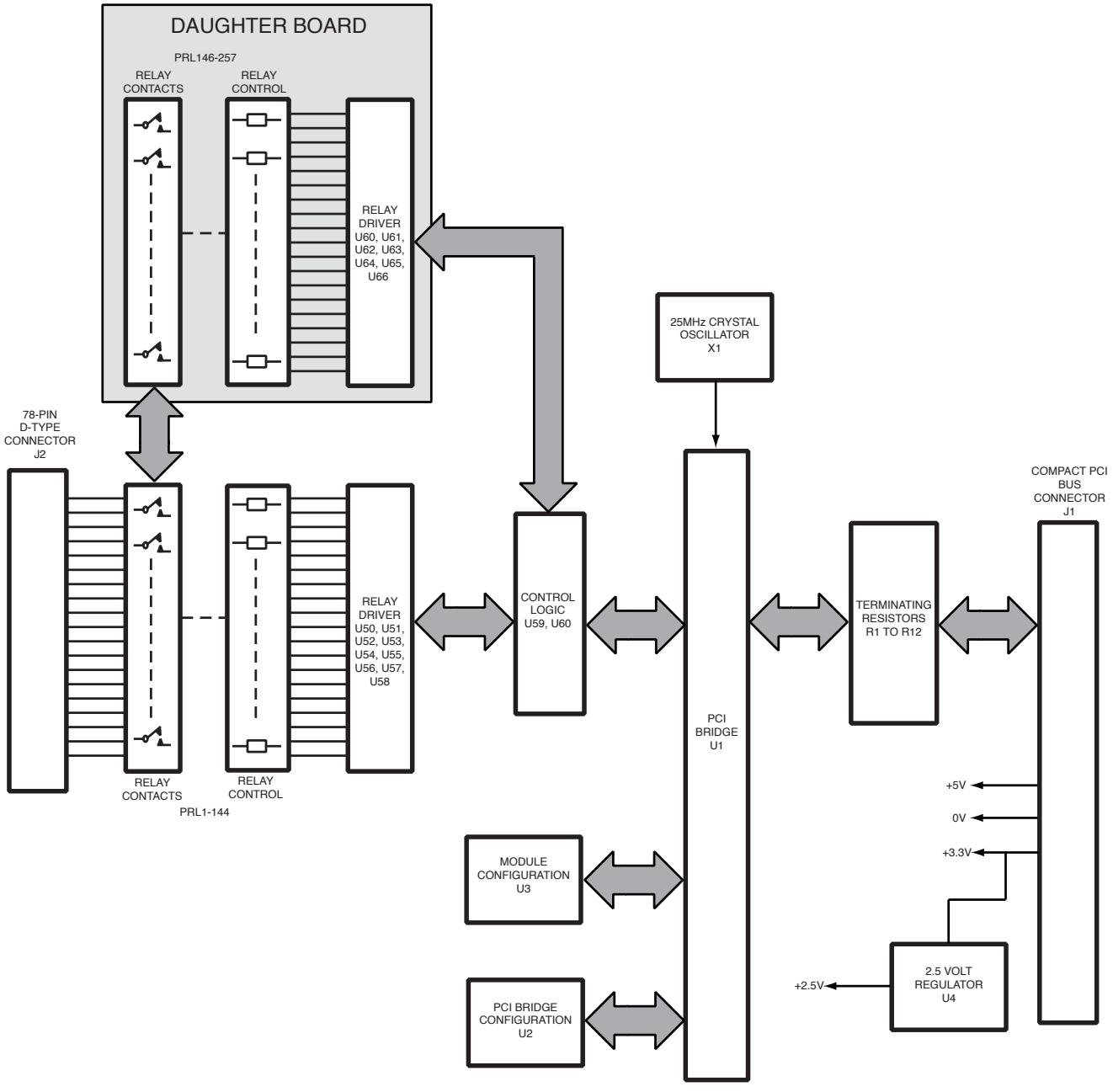


Figure 7.1 - Solid State Matrix Module 40-500: Functional Block Diagram

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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.

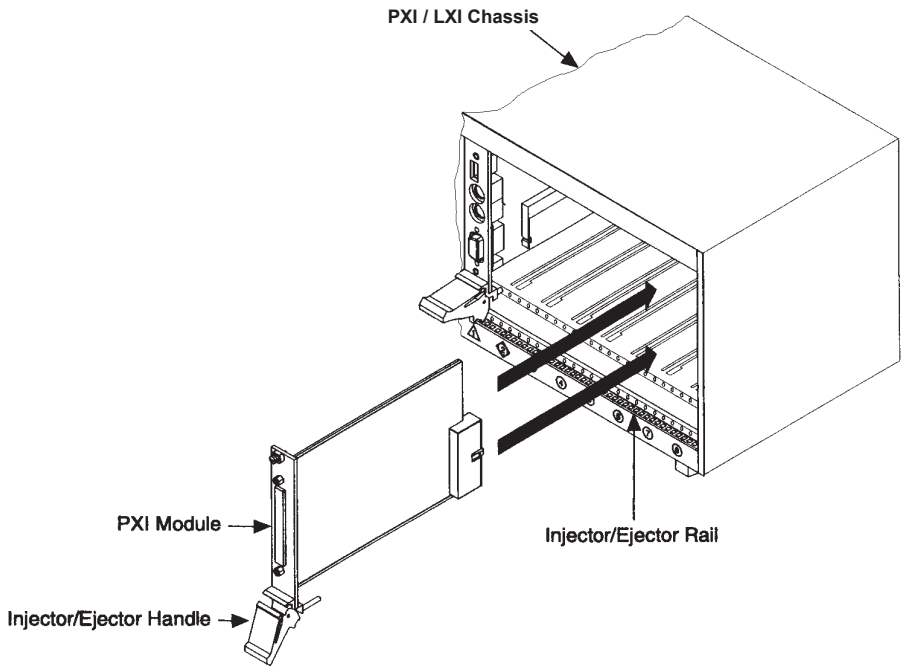


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

HARDWARE INSTALLATION
ELECTRICAL CONNECTION (CHASSIS)

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

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

Ensure that there is adequate ventilation.

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

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

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

SOFTWARE INSTALLATION

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

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

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

TESTING OPERATION

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



Figure 3.2 - General Soft Front Panel Icon

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

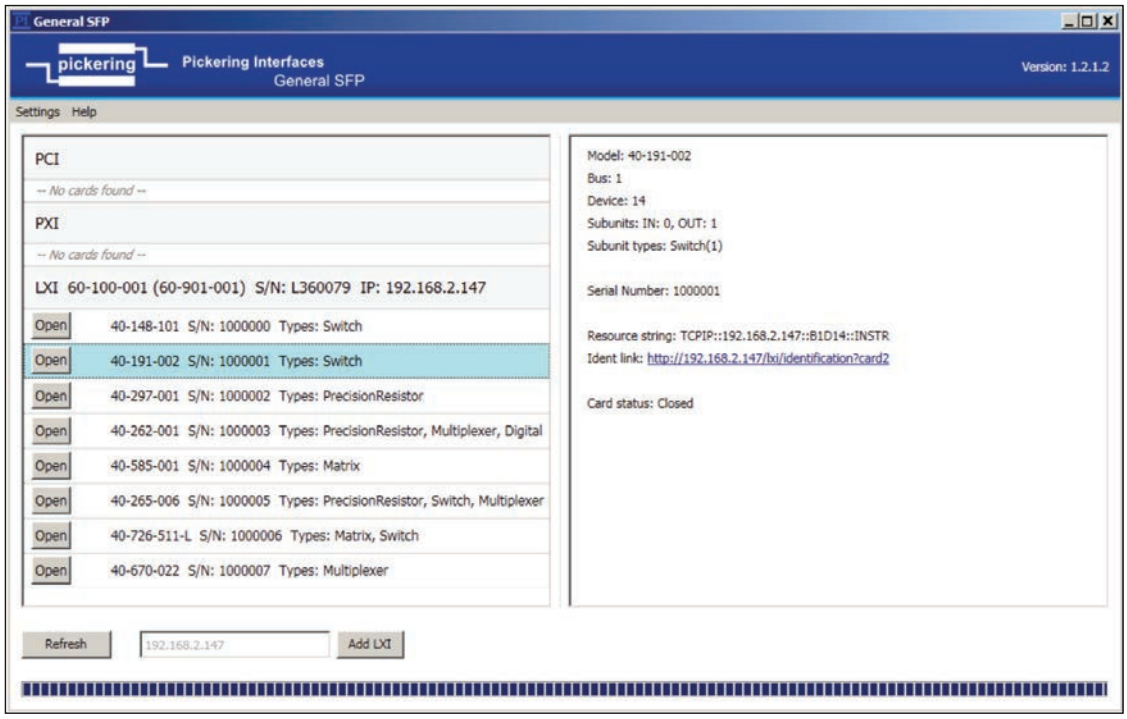


Figure 3.3 - General Soft Front Panel Selector

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

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SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI MODULES

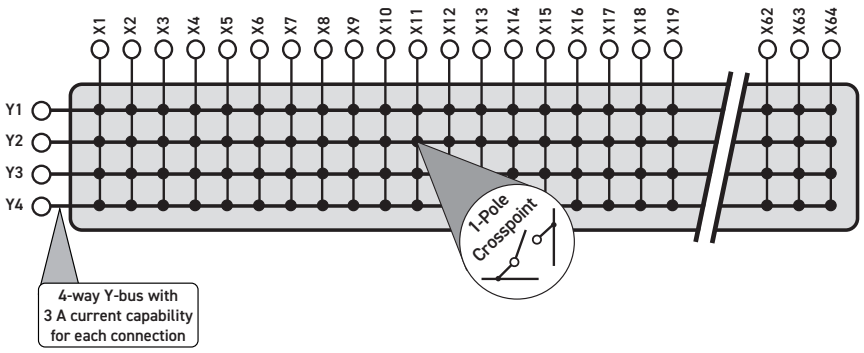
For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

This is available as a download from:
https://www.pickeringtest.com/support/software-drivers-and-downloads

Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Software-Manual.pdf

MODULE ARCHITECTURE

The 40-500 is a single pole switching matrix with 64 connections on the X-axis and 4 connections on the Y-axis. Connections are made by operating the relays at the crosspoints between X and Y lines allowing single X-Y connections, or X-X connections using a Y line as a path. The matrix architecture is shown in the diagram below:



40-500 64x4 Matrix

The entire matrix is treated as a single programming sub-unit designated as Sub-Unit 1. The following page gives some simple examples using the provided drivers: the IVI driver, the Direct I/O driver, and the IVI compliant driver.

PROGRAMMING THE MODULE

Using The IVI Driver, Direct I/O Driver or VISA Driver

This section provides some code fragments which show how to control the High Density Matrix using the IVI Driver, Direct I/O Driver or the VISA Driver.

Once the drivers are installed the manual “Sys40Prg.pdf” and driver help files which fully describes these functions can be found in the Pickering folder(s) or the Pickering entries on your Start Menu.

The card must be opened before use and closed after using the following function calls:

Direct I/O Driver - Open with `PIL_OpenCards` or `PIL_OpenSpecifiedCard` and close with `PIL_CloseCards` or `PIL_CloseSpecifiedCards` respectively.

VISA Driver - Open with `pipx40_init`, and close with, `pipx40_close`.

Setting a Matrix Crosspoint:

Using the IVI driver:

```
pi40iv_Connect(vi, x1, y2); //set crosspoint x1, y2 to on
pi40iv_Disonnect(vi, x1, y2); //set crosspoint x1, y2 to off
```

Using the Pickering Direct I/O Driver:

```
DWORD SubUnit = 1;
PIL_ClearSub(CardNo, SubUnit);    //clear all crosspoints to off state
PIL_OpCrosspoint(CardNo, SubUnit, 2, 1, 1); //set crosspoint x1, y2 to on
PIL_OpCrosspoint(CardNo, SubUnit, 2, 1, 0); //set crosspoint x1, y2 to off
```

Using the VISA driver:

```
ViUInt32 SubUnit = 1;
pipx40_clearSub(vi, SubUnit); //clear all crosspoints off state
pipx40_setCrosspointState (vi, SubUnit, 2, 1, VI_ON); //set crosspoint x1, y2 on
pipx40_setCrosspointState (vi, SubUnit, 2, 1, VI_OFF); //set crosspoint x1, y2 off
```

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SECTION 5 - CONNECTOR INFORMATION

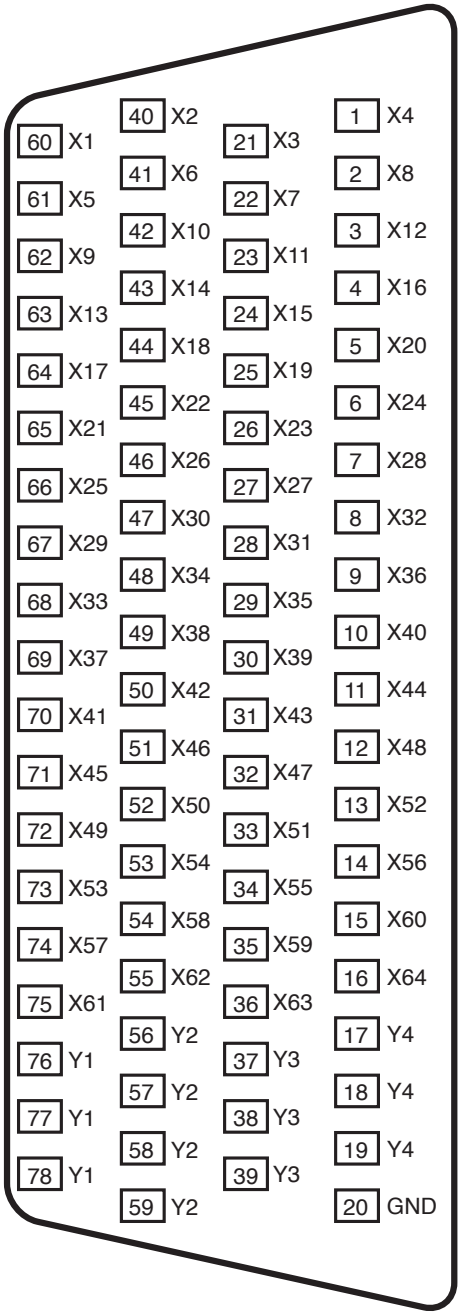


Figure 5.1 - Pinouts: Solid State Matrix Module 40-500
(78-pin male D-type connector viewed from front of module)

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SECTION 6 - TROUBLE SHOOTING

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

INSTALLATION PROBLEMS

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

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

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

DIAGNOSTIC UTILITY

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

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

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

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

SWITCHING SYSTEM TEST TOOLS

Please refer to Section 7 - Maintenance Information.

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SECTION 7 - MAINTENANCE INFORMATION

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

PERIODIC MAINTENANCE

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

GENERAL CLEANING

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

SOFTWARE UPDATE

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

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

SWITCHING SYSTEM TEST TOOLS

We recommend the use of ***eBIRST*** to provide a check of the correct operation of relays and to identify the location of any faulty relay. For more information on ***eBIRST*** click here.

RELAY LOOK-UP TABLES

The following pages provide a cross reference between the signal paths of the product and the physical relays on the PCB. The tables can be used in the fault finding process and should be used in conjunction with the corresponding PCB layout diagrams to identify the position of faulty relays. Users of ***eBIRST*** switching system test tools do not need to use this information to locate faulty relays.

40-500 64x4 MATRIX RELAY CROSS REFERENCE

Cross-point X	Cross-point Y	Relay No.
1	1	RL1
	2	RL2
	3	RL3
	4	RL4
2	1	RL5
	2	RL6
	3	RL7
	4	RL8
3	1	RL9
	2	RL10
	3	RL11
	4	RL12
4	1	RL13
	2	RL14
	3	RL15
	4	RL16
5	1	RL17
	2	RL18
	3	RL19
	4	RL20
6	1	RL21
	2	RL22
	3	RL23
	4	RL24
7	1	RL25
	2	RL26
	3	RL27
	4	RL28
8	1	RL29
	2	RL30
	3	RL31
	4	RL32
9	1	RL33
	2	RL34
	3	RL35
	4	RL36
10	1	RL37
	2	RL38
	3	RL39
	4	RL40
11	1	RL41
	2	RL42
	3	RL43
	4	RL44
12	1	RL45
	2	RL46
	3	RL47
	4	RL48
13	1	RL49
	2	RL50
	3	RL51
	4	RL52
14	1	RL53
	2	RL54
	3	RL55
	4	RL56
15	1	RL57
	2	RL58
	3	RL59
	4	RL60
16	1	RL61
	2	RL62
	3	RL63
	4	RL64
17	1	RL65
	2	RL66
	3	RL67
	4	RL68
18	1	RL69
	2	RL70
	3	RL71
	4	RL72
19	1	RL73
	2	RL74
	3	RL75
	4	RL76
20	1	RL77
	2	RL78
	3	RL79
	4	RL80
21	1	RL81
	2	RL82
	3	RL83
	4	RL84
22	1	RL85
	2	RL86
	3	RL87
	4	RL88
23	1	RL89
	2	RL90
	3	RL91
	4	RL92
24	1	RL93
	2	RL94
	3	RL95
	4	RL96
25	1	RL97
	2	RL98
	3	RL99
	4	RL100
26	1	RL101
	2	RL102
	3	RL103
	4	RL104
27	1	RL105
	2	RL106
	3	RL107
	4	RL108
28	1	RL109
	2	RL110
	3	RL111
	4	RL112
29	1	RL113
	2	RL114
	3	RL115
	4	RL116
30	1	RL117
	2	RL118
	3	RL119
	4	RL120
31	1	RL121
	2	RL122
	3	RL123
	4	RL124
32	1	RL125
	2	RL126
	3	RL127
	4	RL128
33	1	RL129
	2	RL130
	3	RL131
	4	RL132
34	1	RL133
	2	RL134
	3	RL135
	4	RL136
35	1	RL137
	2	RL138
	3	RL139
	4	RL140
36	1	RL141
	2	RL142
	3	RL143
	4	RL144
37	1	RL146
	2	RL147
	3	RL148
	4	RL149
38	1	RL150
	2	RL151
	3	RL152
	4	RL153
39	1	RL154
	2	RL155
	3	RL156
	4	RL157
40	1	RL158
	2	RL159
	3	RL160
	4	RL161
41	1	RL162
	2	RL163
	3	RL164
	4	RL165
42	1	RL166
	2	RL167
	3	RL168
	4	RL169
43	1	RL170
	2	RL171
	3	RL172
	4	RL173
44	1	RL174
	2	RL175
	3	RL176
	4	RL177
45	1	RL178
	2	RL179
	3	RL180
	4	RL181
46	1	RL182
	2	RL183
	3	RL184
	4	RL185
47	1	RL186
	2	RL187
	3	RL188
	4	RL189
48	1	RL190
	2	RL191
	3	RL192
	4	RL193
49	1	RL194
	2	RL195
	3	RL196
	4	RL197
50	1	RL198
	2	RL199
	3	RL200
	4	RL201
51	1	RL202
	2	RL203
	3	RL204
	4	RL205
52	1	RL206
	2	RL207
	3	RL208
	4	RL209
53	1	RL210
	2	RL211
	3	RL212
	4	RL213
54	1	RL214
	2	RL215
	3	RL216
	4	RL217
55	1	RL218
	2	RL219
	3	RL220
	4	RL221
56	1	RL222
	2	RL223
	3	RL224
	4	RL225
57	1	RL226
	2	RL227
	3	RL228
	4	RL229
58	1	RL230
	2	RL231
	3	RL232
	4	RL233
59	1	RL234
	2	RL235
	3	RL236
	4	RL237
60	1	RL238
	2	RL239
	3	RL240
	4	RL241
61	1	RL242
	2	RL243
	3	RL244
	4	RL245
62	1	RL246
	2	RL247
	3	RL248
	4	RL249
63	1	RL250
	2	RL251
	3	RL252
	4	RL253
64	1	RL254
	2	RL255
	3	RL256
	4	RL257

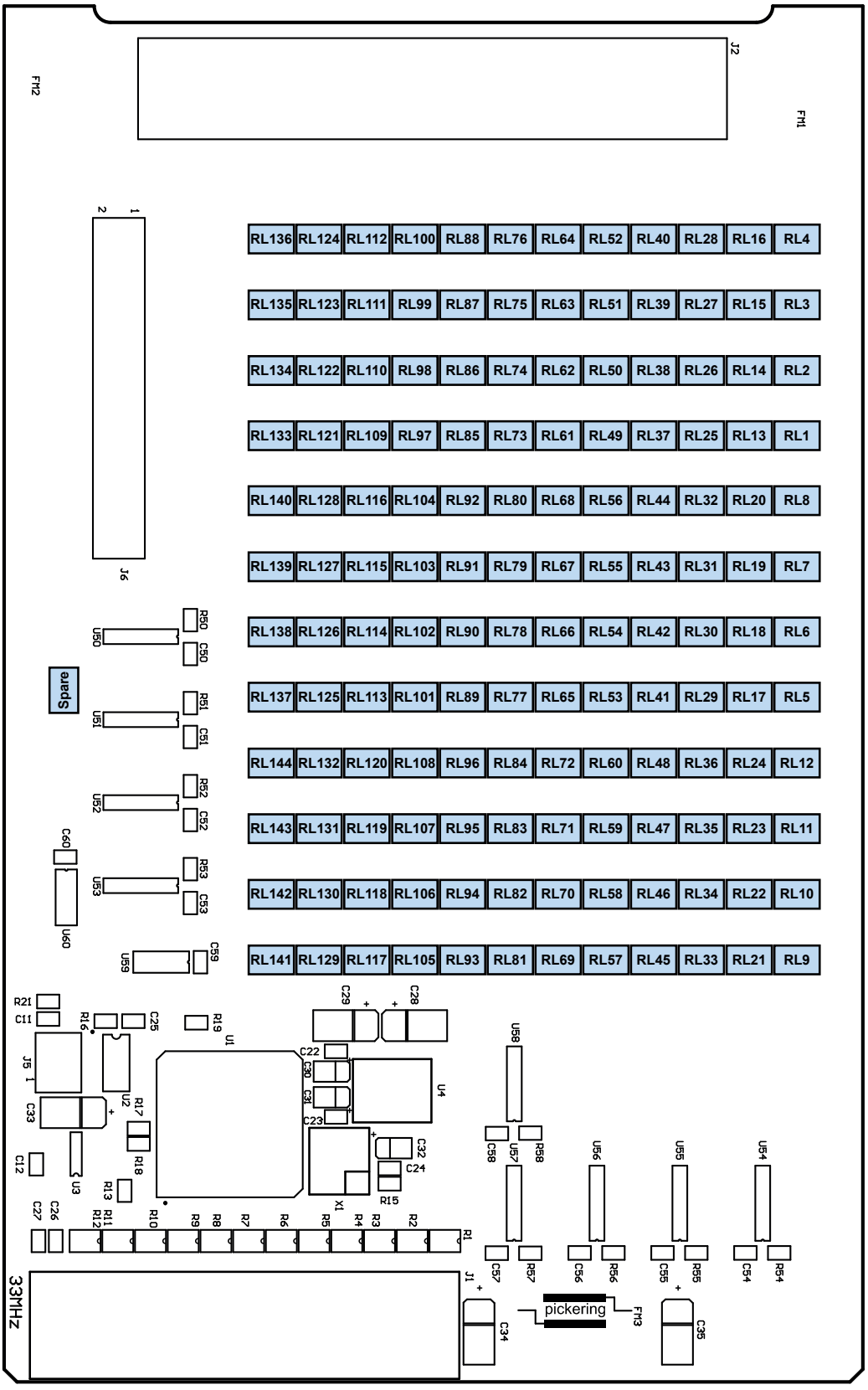


Figure 7.1 - 40-500 Motherboard Component Layout

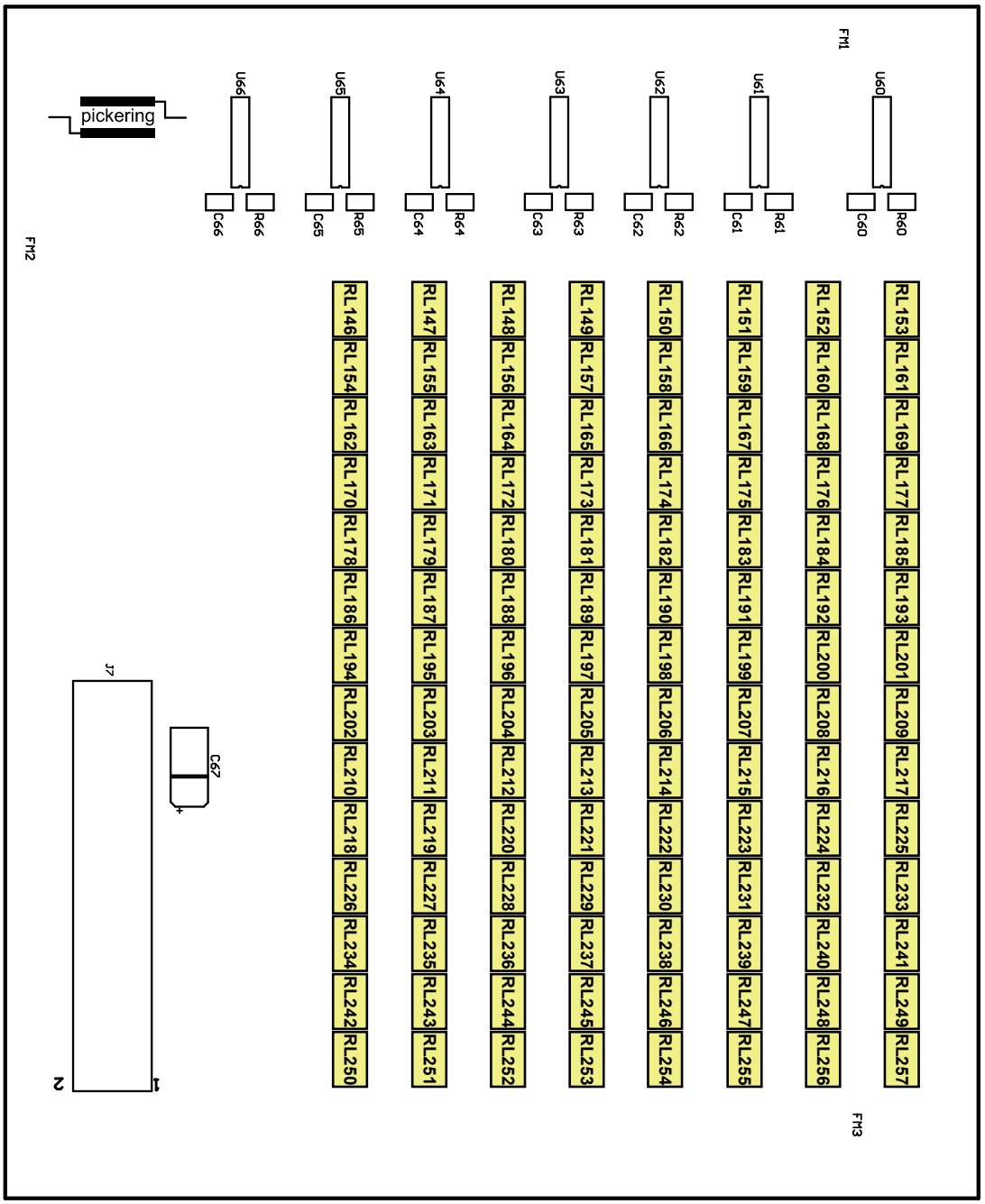


Figure 7.2 - 40-500 Daughterboard Component Layout