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Find the *Pickering 40-585-001* at our website: ***Click HERE***

40-584/585A/586A/587A User Manual

PXI 2 Amp 1-Pole Very High Density Matrix Modules



Issue 6.2 February 2020

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ISO 9001
Reg No. FM38792

TECHNICAL SUPPORT

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

WARRANTY

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

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

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

ENVIRONMENTAL POLICY

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

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

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PRODUCT SAFETY

LA SÉCURITÉ DES PRODUITS

SAFETY SYMBOLS

SYMBOLES DE SÉCURITÉ

The following safety symbols may be used on the product and throughout the product documentation.	Les symboles de sécurité suivants peuvent être utilisés sur le produit et dans l'ensemble de la documentation produit.

MEANING / DESCRIPTION	SYMBOL	SIGNIFICATION / DESCRIPTION
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.		MISE À LA TERRE Pour identifier les bornes destinées à être raccordées à un conducteur externe de protection contre les chocs électriques en cas de défaut d'isolement, ou pour marquer la borne de mise à la terre.
DANGEROUS VOLTAGE To indicate hazards arising from dangerous voltages.		TENSION DANGEREUSE Pour indiquer les dangers découlant des tensions dangereuses.
WARNING / CAUTION An appropriate safety instruction should be followed or caution to a potential hazard exists. Refer to the relevent instructions detailed within the product manual.		AVERTISSEMENT - ATTENTION Des consignes de sécurité appropriées doivent être suivies. En cas de danger potentiel existant, prendre des précautions. Consulter les instructions détaillées dans le manuel du produit.
HEAVY If this product is heavy reference should be made to the safety instructions for provisions of lifting and moving.		CHARGE LOURDE Si ce produit est lourd il convient de se référer aux consignes de sécurité pour les dispositions de levage et de déplacement.
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.		SENSIBILITÉ STATIQUE Pour indiquer que des appareils sensibles statiques sont présents et les précautions de manipulation doivent être suivies.

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
Minimum Switch Current 1.4

Section 2
Technical Description 2.1
Functional Description 2.1

Section 3
Installation 3.1
Pre Operation Checks 3.1
Hardware Installation 3.1
Software Installation 3.3
Testing Operation 3.4

Section 4
Programming Guide 4.1
Programming Options for PXI Modules 4.1
Programming The Very High Density Matrix 4.2
Using IVI Driver, Direct I/O Driver or VISA Driver 4.3

Section 5
Connector Information 5.1

Section 6
Troubleshooting 6.1

Section 7
Maintenance Information 7.1
Switching System Test Tools 7.2
40-584 Relay Look-Up Tables 7.3
40-585A Relay Look-Up Tables 7.6
40-586A Relay Look-Up Tables 7.9
40-587A Relay Look-Up Tables 7.12

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WARNINGS AND CAUTIONS

AVERTISSEMENTS ET PRÉCAUTIONS

WARNING HAZARDOUS ENVIRONMENTS	SYMBOL	AVERTISSEMENT ENVIRONNEMENTS DANGEREUX
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.		Ce produit n'est spécifiquement pas conçu pour un usage dans des environnements dangereux, par exemple en atmosphères explosives. Si le produit doit être utilisé dans des environnements dangereux, nous recommandons à l'utilisateur de s'assurer que des mesures de protection appropriées soient prises.

WARNING DANGER OF ELECTRIC SHOCK	SYMBOL	AVERTISSEMENT DANGER DE CHOC ELECTRIQUE
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the PXI/LXI chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals. 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.		Ce module peut contenir des tensions dangereuses. Avant de retirer le module de la baie, enlever toutes les fournitures et déconnecter les signaux d'E/S utilisateur. Les slots non utilisés dans le châssis PXI/LXI sont peuplées d'obturateurs pour empêcher l'accès aux signaux d'E/S utilisateur qui peuvent être présents. Les obturateurs sont disponibles sur commande chez Pickering dans une variété de largeur de fente. Si le produit est utilisé sans obturateur, par exemple en utilisant une carte d'extension, alors des précautions supplémentaires doivent être prises pour éviter tout contact avec les signaux exposés. Ne pas utiliser dans des circuits critiques de sécurité, se référer à nos Conditions Générales de Ventes. Ce module ne doit pas être utilisé pour la commutation des circuits principaux. Pour la commutation de tensions jusqu'à la spécification complète du module, les alimentations des circuits secondaires et l'appareil sous test doivent être complètement isolés des circuits principaux et de la terre de sécurité. Le châssis hôte doit être correctement installé et connecté à la terre ou au réseau de sécurité d'usine. Veuillez-vous reporter au manuel d'installation de votre châssis.

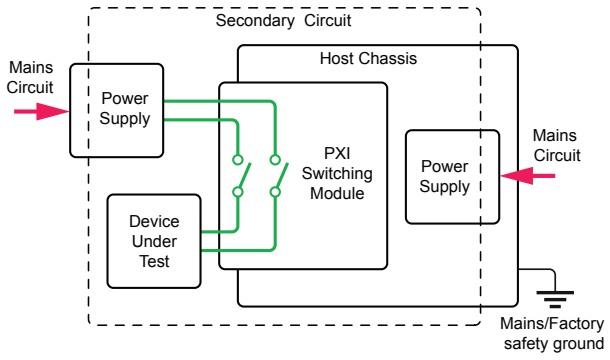


Diagram Showing Separation Between The Mains Circuit and Secondary Circuit / DUT

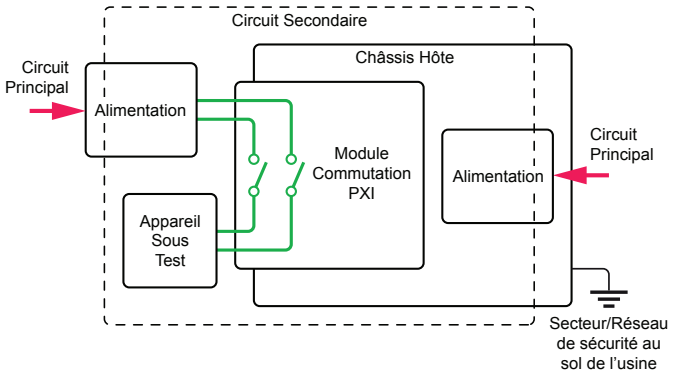


Diagramme Montrant la Séparation Entre le Circuit Principal et le Circuit Secondaire

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.	Aux fins du présent document, un circuit principal est une installation classée dans la Catégorie de Surtension Groupe II jusqu'à 300V. la séparation entre le circuit secondaire et le circuit principal est réalisée par un transformateur dans lequel les enroulements primaires sont séparés des enroulements secondaires par une isolation renforcée, une double isolation ou un blindage relié à la borne de conducteur de protection.

CAUTION - HANDLING OF ELECTROSTATIC-SENSITIVE SEMICONDUCTOR DEVICES	SYMBOL	ATTENTION - MANIPULATION DES APPAREILS SENSIBLES ELECTROSTATIQUES
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.		Certains appareils semi-conducteurs utilisés dans cet équipement sont susceptibles d'être endommager en raison de la tension statique. Respectez les précautions suivantes lorsque vous manipulez ces appareils dans leur état non terminé, ou sous-ensembles contenant ces appareils : 1. Les personnes démontant partiellement l'équipement à l'aide de ces appareils doivent être mises à la terre par bracelet antistatique et une résistance au point prévu sur l'équipement. 2. Les fers à souder utilisés pendant les opérations de réparation doivent être de type "basse tension" avec des bouts reliés à la terre et isolés à partir de la tension du réseau par un transformateur à double isolation. 3. Les vêtements externes ne doivent pas générer des charges électrostatiques. 4. Les cartes de circuits imprimés (PCB) équipées de ces appareils doivent être entreposées et transportées dans des sacs antistatiques.

CAUTION PRODUCT DOCUMENTATION	SYMBOL	ATTENTION DOCUMENTATION PRODUIT
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.		Les utilisateurs qualifiés et formés doivent veiller à ce que la documentation soit entièrement lue et comprise avant l'installation ou l'utilisation du produit.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS	CONSIGNES DE SÉCURITÉ
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.	Les travaux de nettoyage et de réparation nécessitent que l'équipement soit isolé et déconnecté de la source d'alimentation et des signaux d'E/S utilisateur (voir la section Entretien). • Les procédures de manipulation manuelle appropriées doivent être suivies en fonction du poids du module seul ou le poids combiné des modules et du châssis. • En cas de défaut avec le module ou le châssis, isoler immédiatement et débrancher l'alimentation entrant au châssis et les signaux d'E/S utilisateur. • S'assurer que le matériel est installé, utilisé et entre-tenu par du personnel formé et autorisé. • Pour les produits convenablement équipés, en cas d'urgence, appuyez sur le bouton rouge "arrêt d'urgence" situé sur l'avant de l'unité.

SECTION 1 - TECHNICAL SPECIFICATION

- HIGH DENSITY SINGLE-SLOT 3U PXI 2A MATRICES WITH 256 CROSSPOINTS
- 128x2, 64x4, 32x8 and 16x16 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical Relays
- VISA/IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by ***BIRST*** ™ and ***eBIRST*** ™ Test Tools
- 3 Year Warranty



The 40-584, 40-585A, 40-586A and 40-587A are 256 crosspoint PXI matrices with single pole switching. The matrix configurations are 128x2, 64x4, 32x8 or 16x16 using electro-mechanical relays with 2A current handling.

The modules are designed for switching medium voltage and power signals, typical applications include signal routing in ATE and data acquisition systems. The user signal connections are via a 78, 50 or 37-pin D-type or a 160-pin DIN connector that are fully supported by our wide range of cable and connector accessories.

Built-In Relay Self-Test - *BIRST*

The *BIRST* facility provides a quick and simple way of finding relay failures. No test equipment is required, simply disconnect the UUT from the module's connectors, launch the *BIRST* application and the tool will run a diagnostic test that will find all relays with faulty contacts.

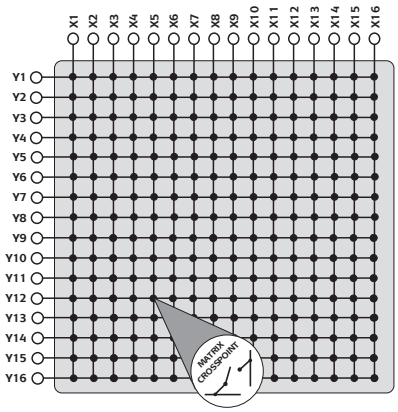
For more information go to: pickeringtest.com/birst

Supported by *eBIRST*

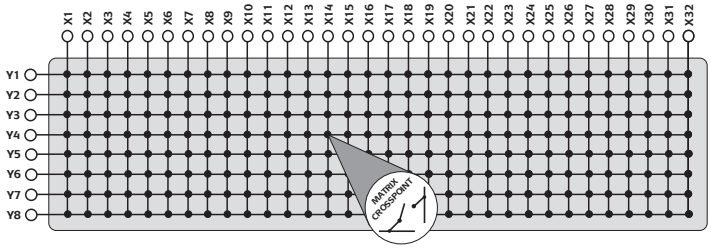
In addition to *BIRST*, these modules are also supported by our *eBIRST* test tools. These tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

For more information go to: pickeringtest.com/ebirst

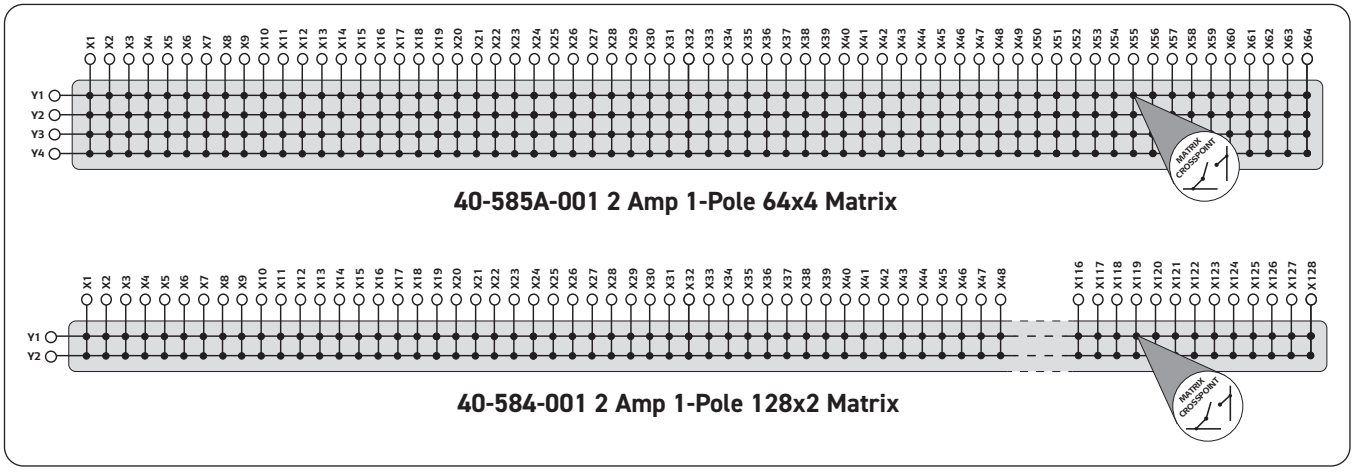
Pickering's Range of 256 Crosspoint 2 Amp PXI Matrix Modules			
Matrix Size	**Poles**	**Max Current**	**Model No.**
32x8	2	2 Amp	40-580-001
16x16			40-582-001
64x4			40-583-001
128x2	1	2 Amp	40-584-001
64x4			40-585A-001
32x8			40-586A-001
16x16			40-587A-001



40-587A-001 2 Amp 1-Pole 16x16 Matrix



40-586A-001 2 Amp 1-Pole 32x8 Matrix



Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC*
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	>10^9Ω
Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	129 (40-584) 100 (40-585A/586A/587A)
Operate Time:	<3ms
Expected Life (Operations)	
Very low power load:	>1x10^8
Low power load:	>1.5x10^7 (0.1A 20VDC)
Medium power load:	>5x10^6 (1A 30VDC)
Full power load:	>1x10^5 (2A 30VDC) >1x10^5 (0.1A 300VDC)

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

RF Specification

Bandwidth:	4MHz (40-584-001) 15MHz (40-587A-001)

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1.3A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 340g (40-568A-001).
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.

Front panel signal connectors:

- 40-584-001 - 160-pin male DIN41612
- 40-585A-001 - 78-pin male D-type
- 40-586A-001 - 50-pin male D-type
- 40-587A-001 - 37-pin male D-type

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:	5000m

Storage and Transport Conditions

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

PXI & CompactPCI Compliance

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

Uses a 33MHz 32-bit backplane interface.

Safety & CE Compliance

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

Product Order Codes

128x2 Matrix Module, 1-pole (2A, 60W)	40-584-001
64x4 Matrix Module, 1-pole (2A, 60W)	40-585A-001
32x8 Matrix Module, 1-pole (2A, 60W)	40-586A-001
16x16 Matrix Module, 1-pole (2A, 60W)	40-587A-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 reed relay types
- Mixture of reed 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	Termination
40-584-001	93-002-001	93-002-410	93-002-101
40-585A-001	93-006-001	Not Required	93-006-101
40-586A-001	93-005-001	Not Required	93-005-101
40-587A-001	93-005-001	93-005-418	93-005-101

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-584/585A/586A/587A	91-100-001

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

Mating Connectors & Cabling

For connection accessories for the 40-584/585A/586A/587A modules please refer to the 90-001D 160-pin DIN 41612, 90-006D 78-pin D-type, 90-005D 50-pin D-type and 90-007D 37-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Chassis Compatibility

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

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



Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

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

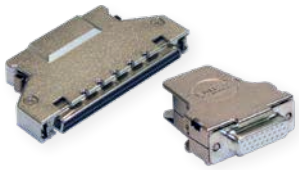


Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

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

Connectivity Solutions

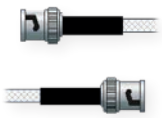
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



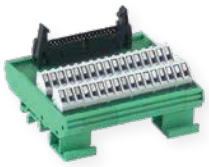
Connectors & Backshells



Multiway Cable Assemblies



RF Cable Assemblies



Connector Blocks

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



Mass Interconnect

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

Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our sister company, Pickering Electronics. 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

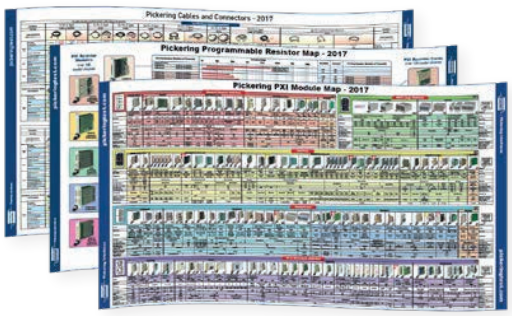
Three Year Warranty & Guaranteed Long-Term Support

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, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector 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

MINIMUM SWITCH CURRENT

Minimum switch current for models 40-584/585/586A/587A is dependent upon usage. The relay type used in these models has gold plated contacts, a metal that does not tarnish with time and is usually considered well suited for low level switching. Gold is a soft metal, so when contacts come together they tend to make good electrical contact.

Also, the relays used here are sealed to RT V (which is hermetically sealed under the IEC61810 category of protection), minimizing the threat of contact contamination with age.

Under lower level signal conditions, these models will reliably switch current below 1nA. However, under higher signal level conditions there is an increased risk of erosion (especially for DC signal switching where metal transfer is potentially a significant problem) which exposes the underlying contact material. Hence, minimum switch capacity may be impacted when switching small loads after hot switching the same path under heavy load conditions.

SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The Module is powered by the +5V and +3.3V supplies from the PXI backplane via Compact PCI connector J1. The interface to the user's equipment is via the front panel mounted 78-pin, 50-pin or 37-pin D-type, or a 160-pin DIN41612 male connector, J2.

The module comprises a mother board and a daughter board populated with 1-pole electro-mechanical relays configured as a 128x2 (40-584), a 64x4 (40-585A), a 32x8 (40-586A) or a 16x16 (40-587A) matrix. The relays are energised via control signals from relay drivers U11 to U26. Each relay driver is loaded with serial data from PCI bridge U1 to operate the required matrix crosspoint.The main PCI interface circuitry and the drivers and relays that make up one half of the matrix are built onto the mother board. The daughter board is fitted on top of the mother board and is populated with the drivers and relays that make up the other half of the matrix. Signals are sent between the two halves of the matrix via an inter-PCB connector. Module configuration is determined by data stored in Serial EPROM U3. PCI Bridge U1 is configured by Flash EPROM U2.

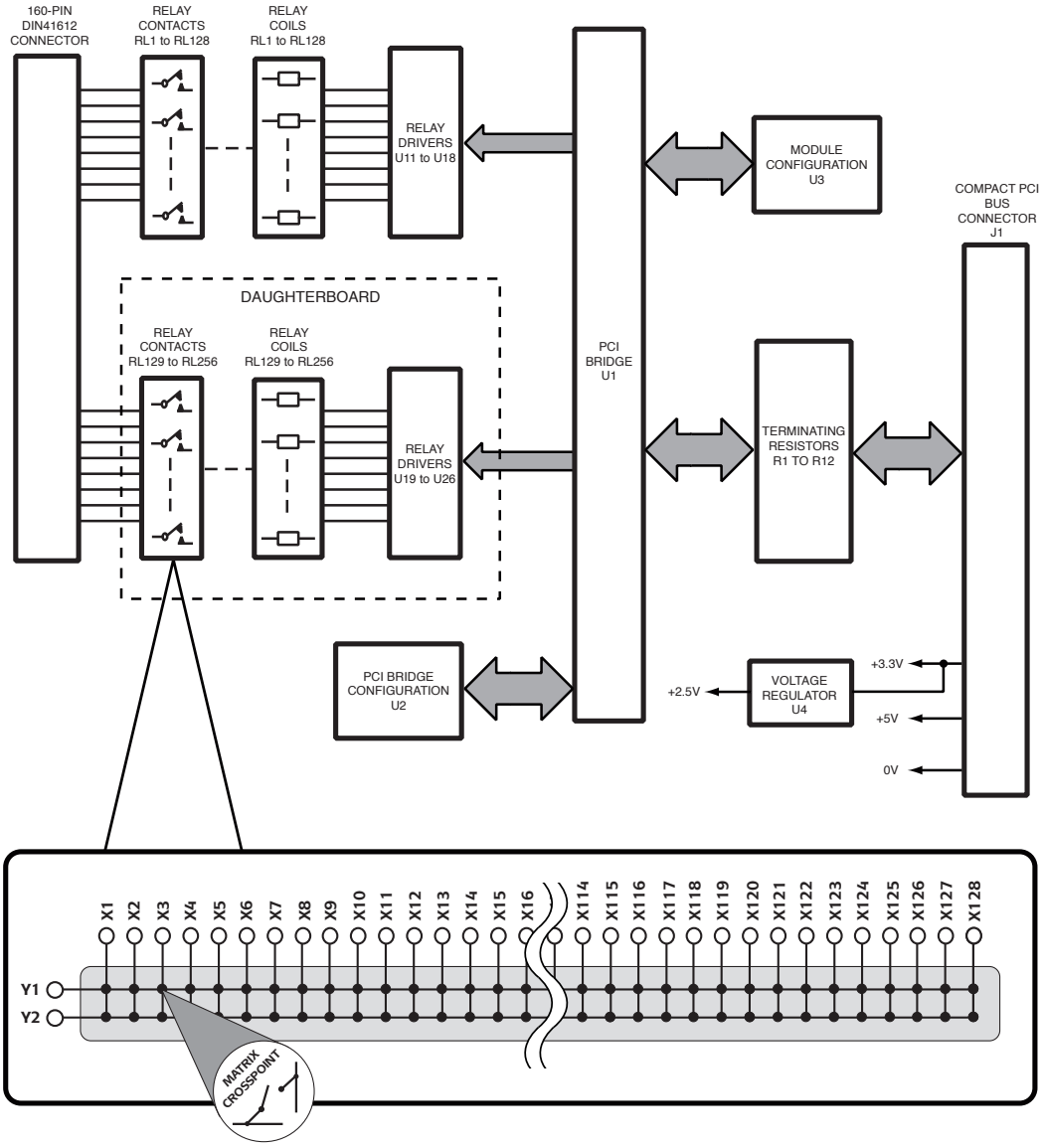


Figure 2.1 - 2 Amp 1-Pole VHD Matrix Module 40-584: Functional Block Diagram (the 40-585A, 40-586A and 40-587A are functionally the same but are configured as 64x4, 32x8 and 16x16 matrices respectively)

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SECTION 3 INSTALLATION

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.

Reportez-vous aux Avertissements et Mises en garde au début du manuel.



Les produits modulaires nécessitent une installation dans un châssis PXI/LXI approprié. Le module est conçu pour une utilisation en intérieur.

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 and chassis.

CONTRÔLES AVANT UTILISATION (DÉBALLAGE)



1. Vérifiez que le module n'est pas été endommagé pendant le transport et signalez immédiatement tout dommage à Pickering Interfaces. N'essayez pas d'installer le matériel si des dégâts sont évidents.
2. Placez le châssis contenant le module par rapport à tout autre équipement qui est censé se connecter avec. Assurez-vous que le châssis n'est pas connecté à l'alimentation électrique.
3. Assurez-vous que la zone désignée pour le châssis contenant le module est de construction plate et solide afin de résister et supporter le poids du module et le châssis.

HARDWARE INSTALLATION ELECTRICAL CONNECTION (CHASSIS)



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

INSTALLATION DU MATÉRIEL RACCORDEMENT ÉLECTRIQUE (CHASSIS)



1. Le châssis contenant le module doit être installé électriquement en conformité aux normes en vigueur par un ingénieur qualifié.
2. Le châssis contenant le module doit être mis à la terre. 

Les décharges électrostatiques peuvent endommager les composants du module. Pour éviter de tels dommages en manipulant la carte se reporter à la Page VII. 

Assurez-vous que la ventilation est adéquate.

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.

Le module doit être installé conformément à la procédure suivante:

1. Assurez-vous que le système est éteint mais qu'il reste connecté au réseau électrique afin qu'il reste relié à la terre.
2. Choisissez un emplacement approprié dans la baie.
3. Retirez la plaque d'obturation de l'emplacement choisi.
4. Assurez-vous que la poignée insertion / éjection est dans sa position vers le bas. Alignez le module avec les guides de la carte sur le haut et le bas de la fente.

   Ne pas lever la poignée insertion / éjection tout en insérant le module, sinon celui-ci ne sera pas inséré correctement.
5. Tenez la poignée tout en glissant lentement le module dans les guides de la carte jusqu'à la prise des poignées sur le rail insertion / éjection (voir la Figure 3.1).
6. Relevez la poignée insertion / éjection jusqu'à ce que le module se place fermement dans le fond de panier. Le panneau avant du module doit être aligné avec le panneau avant du châssis.
7. Fixez le panneau avant du module en utilisant les deux vis du panneau avant du rail de montage du châssis.
8. Dans un système utilisant une interface de commande à distance, pour connecter un contrôleur externe à un châssis PXI ou pour relier plusieurs châssis, faites la mise sous tension du système comme suit:
   a. Pour un système comprenant un contrôleur externe et un châssis, mettez le châssis avant d'allumer le contrôleur externe.
   b. Pour un système comprenant plus d'un châssis, allumez le dernier châssis dans le système suivi par l'avant-dernier, etc, et enfin activez le contrôleur ou le châssis externe contenant le contrôleur système.
9. Pour l'installation modulaire LXI de Pickering Interfaces, il n'est pas nécessaire d'utiliser une séquence de mise sous tension particulière.

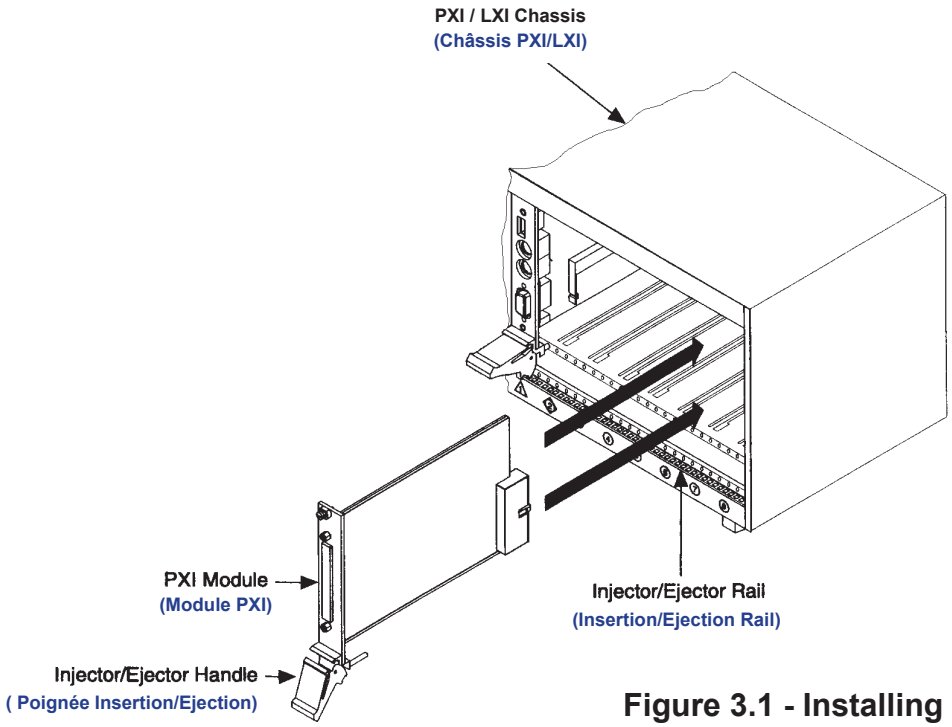


Figure 3.1 - Installing the module into a PXI/cPCI/LXI Chassis

(Figure 3.1 Installation du module dans un châssis PXI/cPCI/LXI)

SOFTWARE INSTALLATION	INSTALLATION DU LOGICIEL
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.	D'abord, installez les pilotes de la carte de commutation PXI de Pickering en exécutant le programme d'installation Setup.exe (fourni dans un fichier compressé zip), soit à partir du CD-ROM fourni, ou en téléchargeant la dernière version sur notre site **pickeringtest.com** - la méthode recommandée. Setup est accompagné d'un fichier "Lisez-moi" contenant des informations supplémentaires sur l'installation. Une seule installation pour toutes les cartes dans les gammes Système 40, Système 45 et Système 50. Une fois l'installation terminée, le pilote installé "Lisez-moi" est offert à l'affichage. Il peut également être affiché ultérieurement à l'aide d'un raccourci dans le menu Programs >> Pickering. Si vous n'êtes pas un utilisateur de LabVIEW, vous devez choisir la version "complète", et une fois qu'elle a été installée. Lancer le programme d'installation LabVIEW Runtime Engine via le raccourci dans le menu Programs >> Pickering. En l'absence de LabVIEW, le Runtime Engine est nécessaire pour supporter l'application Test Panels de Pickering.

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.

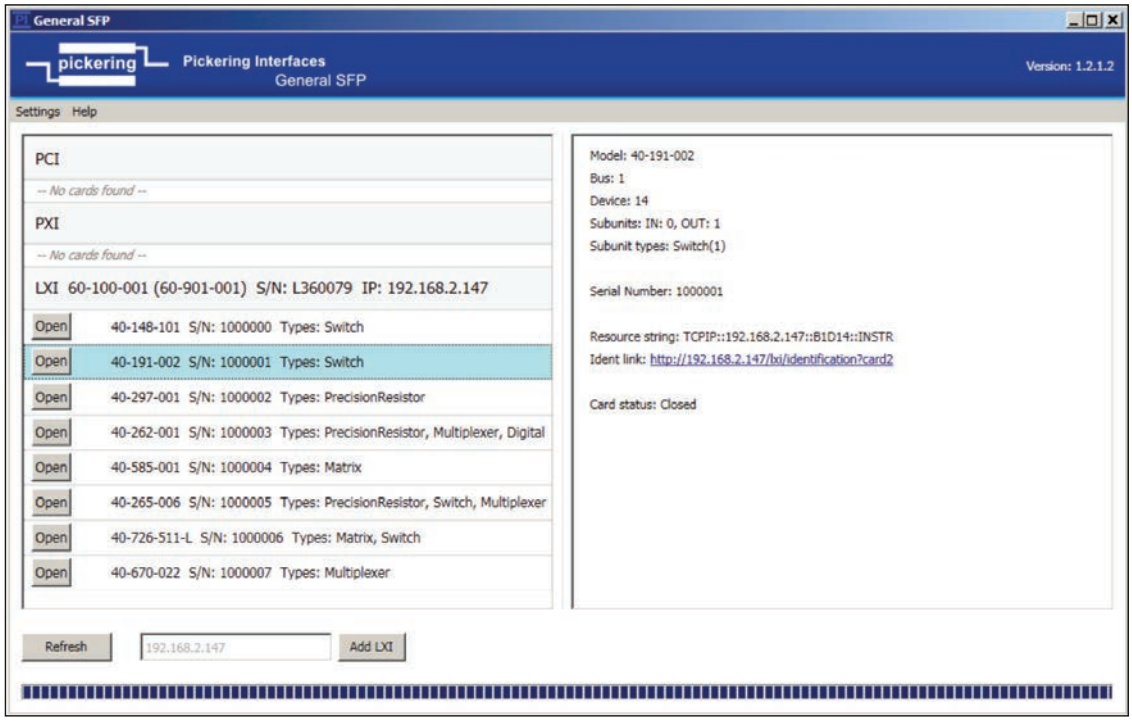


Figure 3.3 - General Soft Front Panel Selector

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

SECTION 4 - PROGRAMMING

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI MODULES

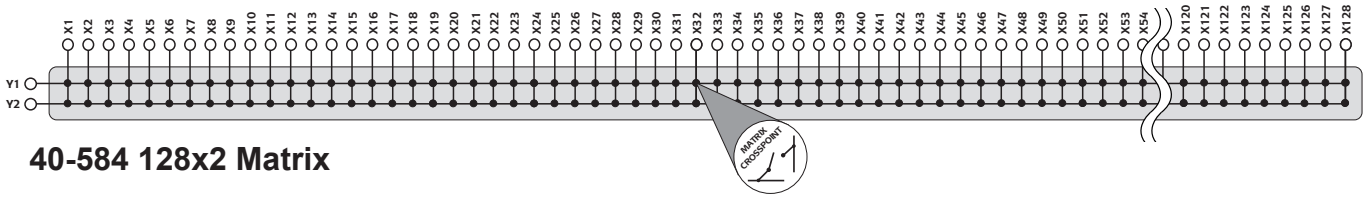
For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

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

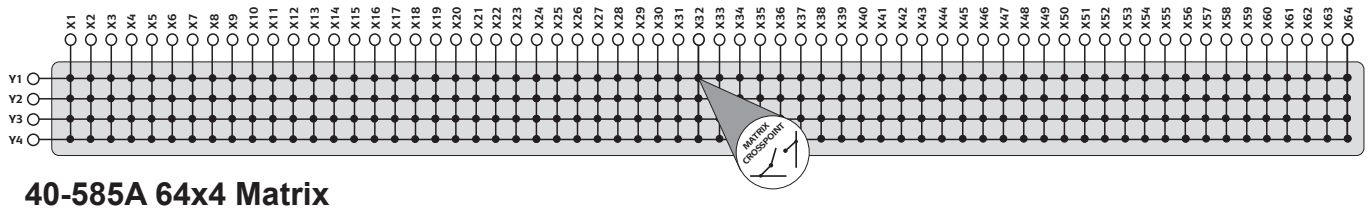
Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Software-Manual.pdf

PROGRAMMING THE VERY HIGH DENSITY MATRIX

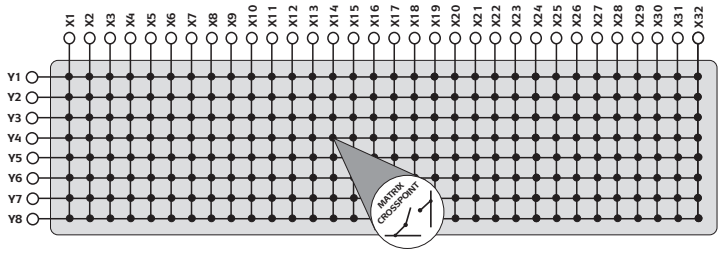
The 40-584 is a single pole switching matrix with 128 connections on the X-axis and 2 connections on the Y-axis. Connections are made by operating the relays at the crosspoints between X and Y lines allowing single X-Y connections, or X-X connections using a Y line as a path. The 40-585A, 40-586A and 40-587A are controlled in the same way but have matrix sizes of 64x4, 32x8 and 16x16 respectively. The matrix architectures are shown in the diagrams below:



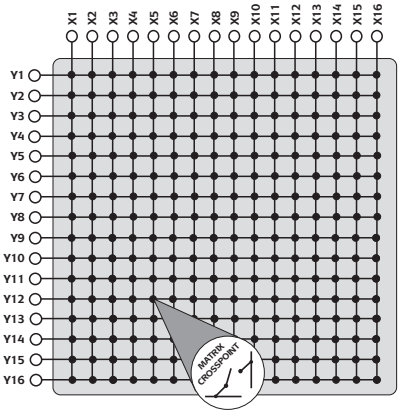
40-584 128x2 Matrix



40-585A 64x4 Matrix



40-586A 32x8 Matrix



40-587A 16x16 Matrix

In each case, 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 IO driver, and the IVI compliant driver.

USING THE IVI DRIVER, DIRECT DRIVER OR VISA DRIVER

This section provides some code fragments which show how to control the Very 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_Disconnect(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

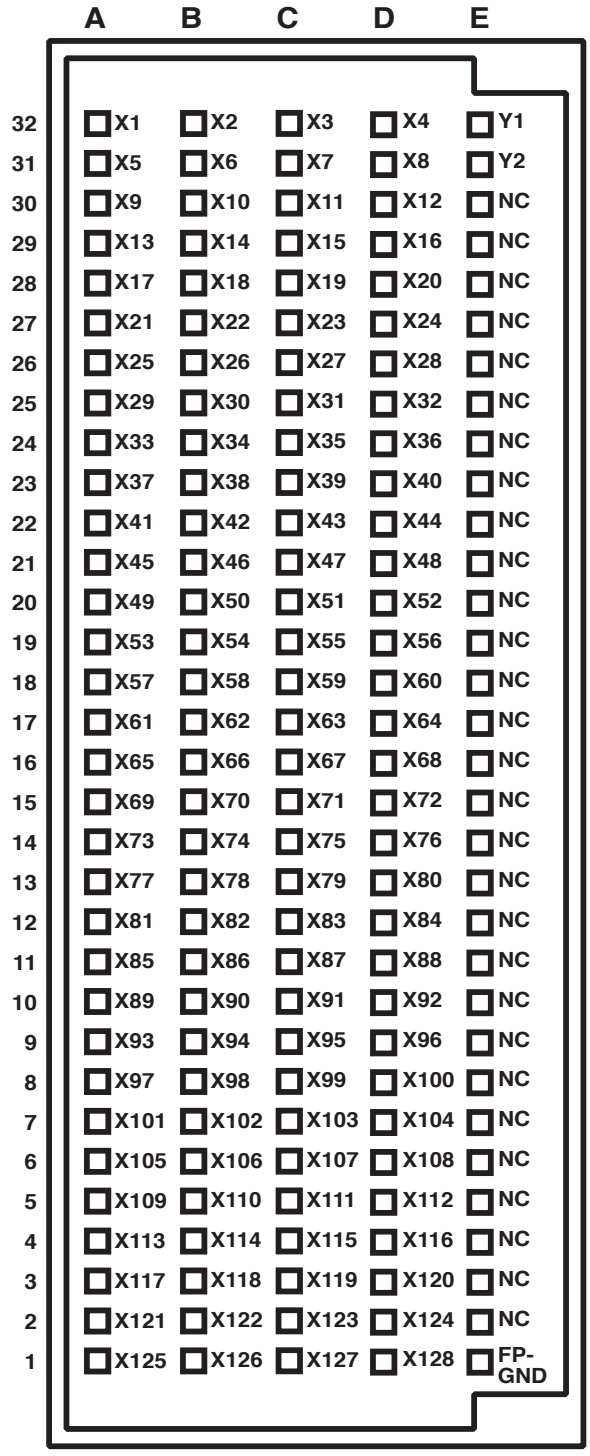


Figure 5.1 - 2 Amp 1-Pole 128x2 Matrix Module 40-584-001:
160-pin DIN41612 Male Connector Pinout
(Viewed From Front of Module)

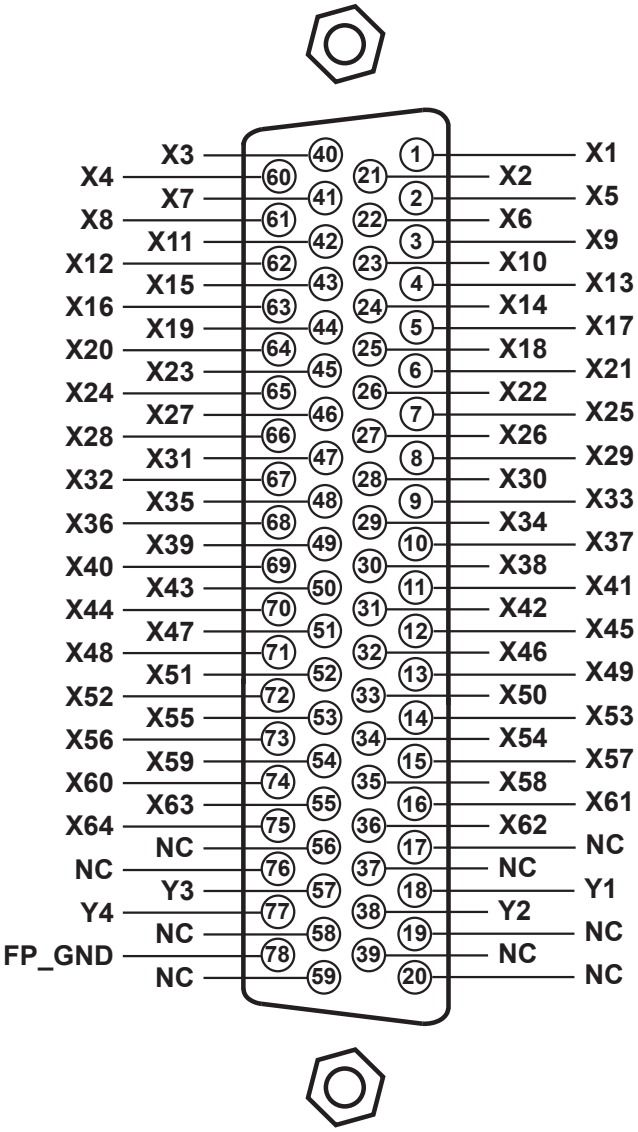


Figure 5.2 - 2 Amp 1-Pole 64x4 Matrix Module 40-585A-001:
78-pin D-type Male Connector Pinout
(Viewed From Front of Module)

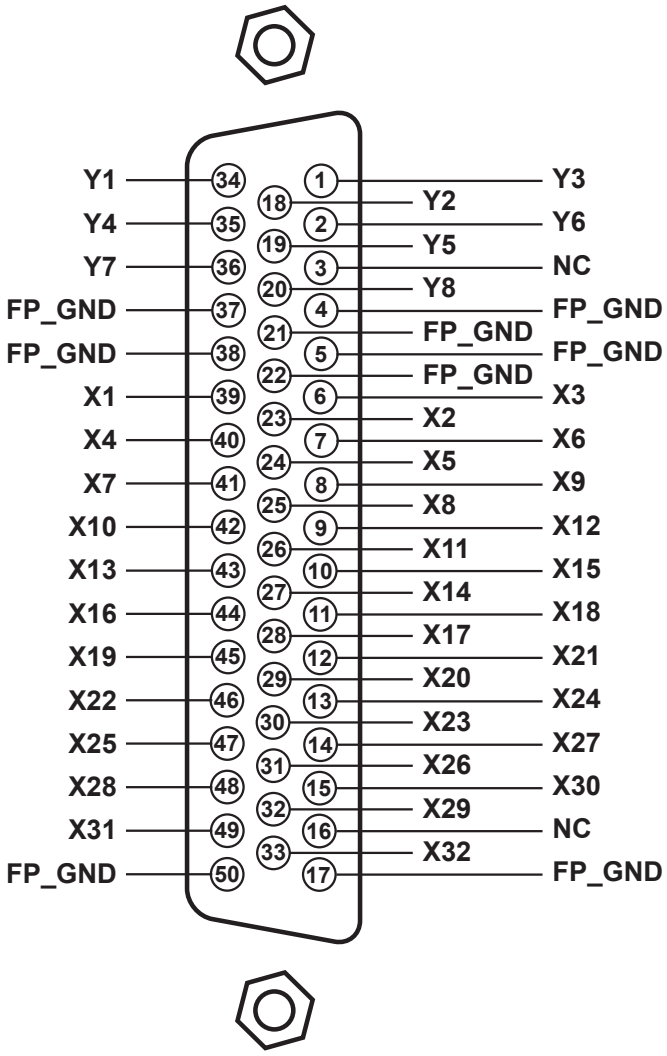


Figure 5.3 - 2 Amp 1-Pole 32x8 Matrix Module 40-586A-001:
50-pin D-type Male Connector Pinout
(Viewed From Front of Module)

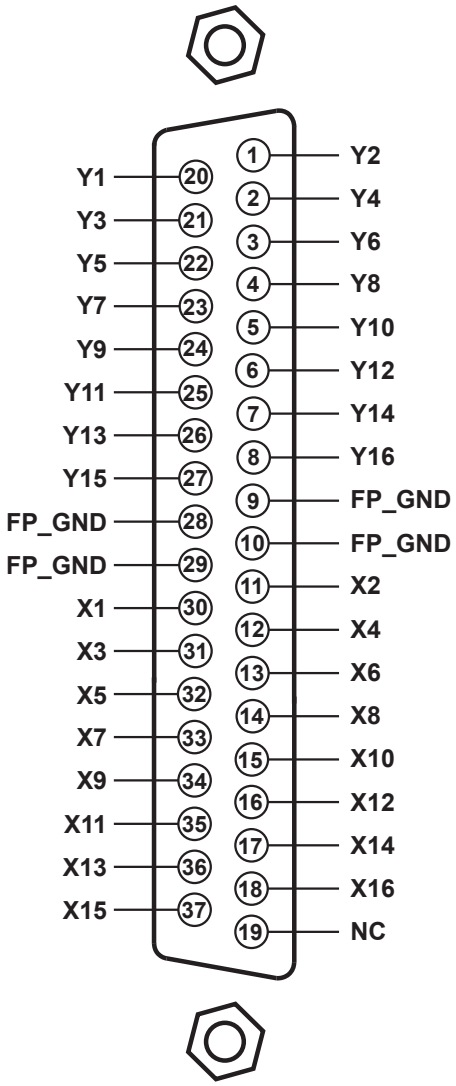


Figure 5.4 - 2 Amp 1-Pole 16x16 Matrix Module 40-587A-001:
37-pin D-type Male Connector Pinout
(Viewed From Front of Module)

SECTION 6 TROUBLE SHOOTING

SECTION 6 DÉPANNAGE

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

Reportez-vous aux Avertissements et Mises en garde au début du manuel.

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.

PROBLÈMES D'INSTALLATION

La fonctionnalité Plug & Play des cartes de commutation Pickering assure généralement une installation sans problème.

Si vous rencontrez des problèmes d'installation, vous devez d'abord vous assurer que toutes les cartes sont correctement insérées dans les slots. Les cartes mal accouplées peuvent passer inaperçues par le système d'exploitation, ou peuvent être détectées comme une carte d'un type inconnu. Elles peuvent également entraîner le blocage de l'ordinateur à divers stades du démarrage.

Si votre système utilise une interface de commande à distance, vous devez vérifier l'intégrité de tous les liens de l'interface de commande à distance. Lorsque le système est sous tension, et pendant le démarrage de Windows, vous devriez vous attendre à voir l'activité périodique sur l'interface de commande à distance RX / TX indicateur (jaune), de compensation pour ne laisser que les LED PWR/LNK (vert) allumées. Les indicateurs RX/TX doivent montrer une activité lorsque vous tentez d'accéder à une carte.

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.

UTILITAIRE DE DIAGNOSTIC

L'utilitaire de diagnostic Pickering (accessible via les programs >> Pickering >> menu Utilities PXI) génère un rapport de diagnostic de la configuration du système PCI, mettant en évidence les problèmes potentiels de configuration. Les détails spécifiques de toutes les cartes de commutation Pickering installées sont inclus. Toutes les cartes de commutation installées de Pickering doivent être répertoriées dans la section «Information Pilpxi" - si une ou plusieurs cartes manquent, il est possible de déterminer la raison en se référant au détail de la configuration PCI contenu dans le rapport, mais l'interprétation de cette information est loin d'être simple, et la meilleure solution est de contacter le support Pickering: support@pickeringtest.com, si possible, avec une copie du rapport de diagnostic.

DIAGNOSTIC UTILITY	UTILITAIRE DE DIAGNOSTIC
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.	Dans la section “Informations VISA” si VISA n’est pas installé cette absence sera signalée. Cela n’affecte pas le fonctionnement en utilisant le pilote Direct I/O, et n’est pas un problème, sauf si vous souhaitez utiliser VISA. VISA est une composante de LabWindows/CVI et LabVIEW de National Instruments, il est disponible comme un environnement autonome. Si VISA est présent et s’il est d’une version suffisamment récente, la section «Information Pipx40” devrait présenter une liste similaire pour les «Information Pilpxi”. Veuillez noter que l’utilitaire de diagnostic ne peut pas accéder aux cartes si celles-ci sont actuellement ouvertes par quelques autres applications, telles que les panneaux test ou moniteur de terminal.

SWITCHING SYSTEM TEST TOOLS	OUTILS DE TEST DE SYSTEME DE COMMUTATION
Please refer to Section 7 - Maintenance Information	Référez-vous à la Section 7 - Information sur l’entretien

SECTION 7 MAINTENANCE INFORMATION

SECTION 7 INFORMATION SUR L'ENTRETIEN

Refer to the Warnings and Cautions at the front of this manual 	**Reportez-vous aux Avertissements et Mises en garde au début du manuel.** 

PERIODIC MAINTENANCE	L'ENTRETIEN PÉRIODIQUE
This product and its corresponding chassis do not require any periodic maintenance.	Ce produit et son châssis correspondant ne nécessitent pas d'entretien périodique.

GENERAL CLEANING	NETTOYAGE GÉNÉRAL
• 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.	• Isolez l'alimentation électrique du châssis et assurez-vous qu'aucun signaux d'E/S utilisateur sont appliqués. • Nettoyez la surface des produits et des châssis uniquement avec un chiffon antistatique propre et sec.

SOFTWARE UPDATE	MISE À JOUR LOGICIELLE
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.	Pour les modules PXI opérant dans un châssis PXI, aucune mise à jour du logiciel du module n'est nécessaire. Veuillez-vous référer à notre site Web **pickeringtest.com** où des liens vers la page de téléchargement du logiciel vous fourniront la dernière version du pilote logiciel pour les différents environnements de programmation rencontrés. Pour les modules PXI qui sont pris en charge dans l'un des châssis modulaire LXI de Pickering Interfaces (comme le 60-102B et 60-103B) aucune mise à jour du logiciel du module n'est nécessaire. Si le module a été introduit après que le châssis LXI ait été fabriqué, le module peut ne pas être reconnu, dans ce cas, le firmware du châssis peut avoir besoin d'une mise à niveau. C'est un processus simple qui est décrit dans le manuel du châssis LXI modulaire.

SWITCHING SYSTEM TEST TOOLS

USING *BIRST*™ (BUILT-IN RELAY SELF TEST)

The Pickering Interfaces BIRST (Built-In Relay Self Test) Tool provides a simple means of testing selected Pickering Interfaces switching products, including this model. The tool can be used to find relay faults or to provide confirmation that a product is operating correctly, either as part of the regular system calibration or because a system fault is suspected and the switch system needs to be eliminated from the fault finding procedure.

BIRST SOFTWARE

The application program for BIRST is supplied with the support disc included when the product is shipped. Alternatively the program can be downloaded from Pickering Interfaces web site: pickeringtest.info/downloads/BIRST/

Warning: The BIRST facility requires that the UUT is disconnected from the products front panel connector(s). Failure to disconnect could result in either misleading results or damage to the BIRST hardware within the product.

Please refer to the documentation accompanying the application for detailed usage / operation details.

For further general information on BIRST click here.

USING *eBIRST*

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.

OUTILS DE TEST DE SYSTEME DE COMMUTATION

UTILISATION *BIRST*™ (AUTOTEST INTÉGRÉ DE RELAIS)

L'outil d'autotest intégré de relais BIRST™ de Pickering Interfaces fournit un moyen simple pour tester les modules de commutation de la marque, y compris ce modèle.

Il est utilisé pour identifier les relais défaillants ou confirmer qu'un module fonctionne correctement, soit dans le cadre d'une opération régulière d'étalonnage du système soit dans le cas d'une suspicion d'un défaut de fonctionnement. Dans ce dernier cas, la procédure de recherche d'erreur « Fault Finding » permet d'isoler le défaut.

LOGICIEL BIRST

Le programme BIRST™ est fourni sur le CD support livré avec le module. Le programme est également disponible en téléchargement à partir de notre site web: pickeringtest.info/downloads/BIRST/

Avertissement: L'installation de BIRST exige que l'unité sous test (UUT) soit déconnectée du panneau avant du module. Cet oubli peut avoir comme conséquences des résultats erronés ou des dommages causés aux composants BIRST présent dans le module.

Veuillez-vous référer à la documentation accompagnant l'application au chapitre 'utilisation détaillée' / 'détails des opérations'.

Pour de plus amples informations sur BIRST, cliquez ici.

L'UTILISATION DE *eBIRST*

Nous recommandons l'utilisation de ***eBIRST*** afin de contrôler le fonctionnement correct des relais et d'identifier l'emplacement de n'importe quel relais défectueux. Pour plus d'informations sur ***eBIRST*** cliquez ici.

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.

CONSULTATION TABLEAUX RELAIS

Les pages suivantes fournissent une référence croisée entre les chemins de signaux du produit et des relais physiques sur le circuit imprimé. Les tables peuvent être utilisées dans le processus de recherche de défaut et doivent être utilisées en conjonction avec les schémas de disposition de circuits imprimés correspondants pour identifier la position des relais défaillants. Utilisateurs ***eBIRST***, les outils de test de système de commutation n'ont pas besoin d'utiliser cette fonction pour localiser les relais défectueux.

40-584 RELAY LOOK-UP TABLES

The tables should be used in conjunction with the PCB layout diagrams in Figure 7.1 (Mother Board) and Figure 7.2 (Daughter Board).

40-584 RELAY CROSS REFERENCE - MOTHER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	1	RL1	33	1	RL33	1	2	RL65	33	2	RL97
2	1	RL2	34	1	RL34	2	2	RL66	34	2	RL98
3	1	RL3	35	1	RL35	3	2	RL67	35	2	RL99
4	1	RL4	36	1	RL36	4	2	RL68	36	2	RL100
5	1	RL5	37	1	RL37	5	2	RL69	37	2	RL101
6	1	RL6	38	1	RL38	6	2	RL70	38	2	RL102
7	1	RL7	39	1	RL39	7	2	RL71	39	2	RL103
8	1	RL8	40	1	RL40	8	2	RL72	40	2	RL104
9	1	RL9	41	1	RL41	9	2	RL73	41	2	RL105
10	1	RL10	42	1	RL42	10	2	RL74	42	2	RL106
11	1	RL11	43	1	RL43	11	2	RL75	43	2	RL107
12	1	RL12	44	1	RL44	12	2	RL76	44	2	RL108
13	1	RL13	45	1	RL45	13	2	RL77	45	2	RL109
14	1	RL14	46	1	RL46	14	2	RL78	46	2	RL110
15	1	RL15	47	1	RL47	15	2	RL79	47	2	RL111
16	1	RL16	48	1	RL48	16	2	RL80	48	2	RL112
17	1	RL17	49	1	RL49	17	2	RL81	49	2	RL113
18	1	RL18	50	1	RL50	18	2	RL82	50	2	RL114
19	1	RL19	51	1	RL51	19	2	RL83	51	2	RL115
20	1	RL20	52	1	RL52	20	2	RL84	52	2	RL116
21	1	RL21	53	1	RL53	21	2	RL85	53	2	RL117
22	1	RL22	54	1	RL54	22	2	RL86	54	2	RL118
23	1	RL23	55	1	RL55	23	2	RL87	55	2	RL119
24	1	RL24	56	1	RL56	24	2	RL88	56	2	RL120
25	1	RL25	57	1	RL57	25	2	RL89	57	2	RL121
26	1	RL26	58	1	RL58	26	2	RL90	58	2	RL122
27	1	RL27	59	1	RL59	27	2	RL91	59	2	RL123
28	1	RL28	60	1	RL60	28	2	RL92	60	2	RL124
29	1	RL29	61	1	RL61	29	2	RL93	61	2	RL125
30	1	RL30	62	1	RL62	30	2	RL94	62	2	RL126
31	1	RL31	63	1	RL63	31	2	RL95	63	2	RL127
32	1	RL32	64	1	RL64	32	2	RL96	64	2	RL128

40-584 RELAY CROSS REFERENCE - DAUGHTER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
65	1	RL129	97	1	RL161	65	2	RL193	97	2	RL225
66	1	RL130	98	1	RL162	66	2	RL194	98	2	RL226
67	1	RL131	99	1	RL163	67	2	RL195	99	2	RL227
68	1	RL132	100	1	RL164	68	2	RL196	100	2	RL228
69	1	RL133	101	1	RL165	69	2	RL197	101	2	RL229
70	1	RL134	102	1	RL166	70	2	RL198	102	2	RL230
71	1	RL135	103	1	RL167	71	2	RL199	103	2	RL231
72	1	RL136	104	1	RL168	72	2	RL200	104	2	RL232
73	1	RL137	105	1	RL169	73	2	RL201	105	2	RL233
74	1	RL138	106	1	RL170	74	2	RL202	106	2	RL234
75	1	RL139	107	1	RL171	75	2	RL203	107	2	RL235
76	1	RL140	108	1	RL172	76	2	RL204	108	2	RL236
77	1	RL141	109	1	RL173	77	2	RL205	109	2	RL237
78	1	RL142	110	1	RL174	78	2	RL206	110	2	RL238
79	1	RL143	111	1	RL175	79	2	RL207	111	2	RL239
80	1	RL144	112	1	RL176	80	2	RL208	112	2	RL240
81	1	RL145	113	1	RL177	81	2	RL209	113	2	RL241
82	1	RL146	114	1	RL178	82	2	RL210	114	2	RL242
83	1	RL147	115	1	RL179	83	2	RL211	115	2	RL243
84	1	RL148	116	1	RL180	84	2	RL212	116	2	RL244
85	1	RL149	117	1	RL181	85	2	RL213	117	2	RL245
86	1	RL150	118	1	RL182	86	2	RL214	118	2	RL246
87	1	RL151	119	1	RL183	87	2	RL215	119	2	RL247
88	1	RL152	120	1	RL184	88	2	RL216	120	2	RL248
89	1	RL153	121	1	RL185	89	2	RL217	121	2	RL249
90	1	RL154	122	1	RL186	90	2	RL218	122	2	RL250
91	1	RL155	123	1	RL187	91	2	RL219	123	2	RL251
92	1	RL156	124	1	RL188	92	2	RL220	124	2	RL252
93	1	RL157	125	1	RL189	93	2	RL221	125	2	RL253
94	1	RL158	126	1	RL190	94	2	RL222	126	2	RL254
95	1	RL159	127	1	RL191	95	2	RL223	127	2	RL255
96	1	RL160	128	1	RL192	96	2	RL224	128	2	RL256

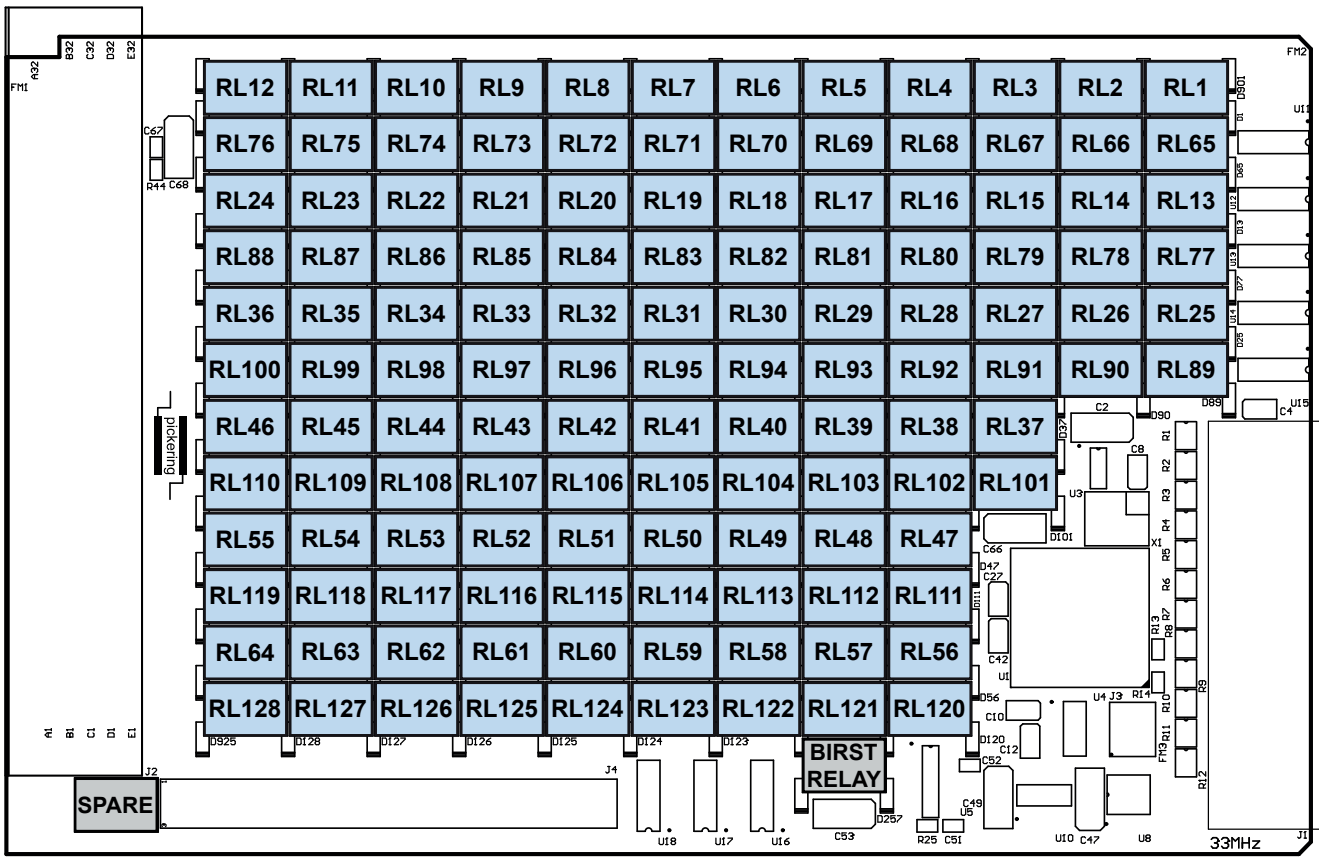


Figure 7.1 - 40-584 Component Layout - Mother Board

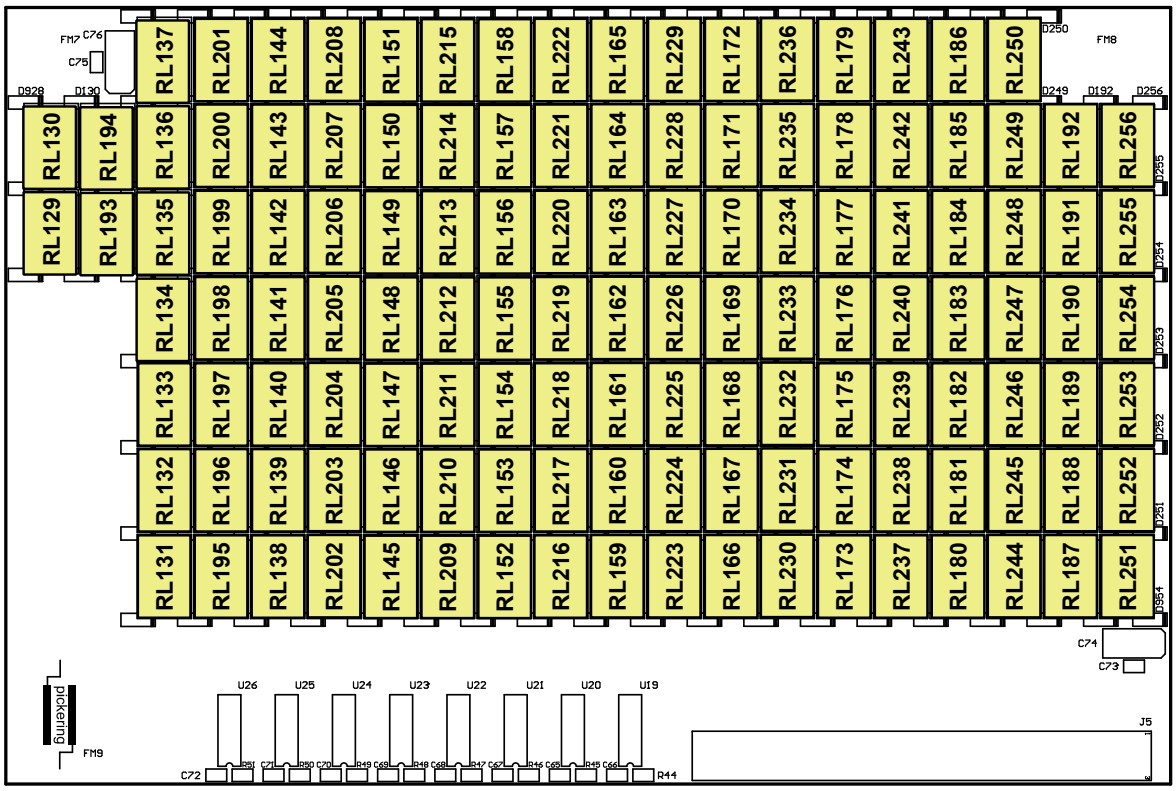


Figure 7.2 - 40-584 Component Layout - Daughter Board

40-585A RELAY LOOK-UP TABLES

The tables should be used in conjunction with the PCB layout diagrams in Figure 7.3 (Mother Board) and Figure 7.4 (Daughter Board).

40-585A RELAY CROSS REFERENCE - MOTHER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	1	RL1	1	2	RL33	1	3	RL65	1	4	RL97
2	1	RL2	2	2	RL34	2	3	RL66	2	4	RL98
3	1	RL3	3	2	RL35	3	3	RL67	3	4	RL99
4	1	RL4	4	2	RL36	4	3	RL68	4	4	RL100
5	1	RL5	5	2	RL37	5	3	RL69	5	4	RL101
6	1	RL6	6	2	RL38	6	3	RL70	6	4	RL102
7	1	RL7	7	2	RL39	7	3	RL71	7	4	RL103
8	1	RL8	8	2	RL40	8	3	RL72	8	4	RL104
9	1	RL9	9	2	RL41	9	3	RL73	9	4	RL105
10	1	RL10	10	2	RL42	10	3	RL74	10	4	RL106
11	1	RL11	11	2	RL43	11	3	RL75	11	4	RL107
12	1	RL12	12	2	RL44	12	3	RL76	12	4	RL108
13	1	RL13	13	2	RL45	13	3	RL77	13	4	RL109
14	1	RL14	14	2	RL46	14	3	RL78	14	4	RL110
15	1	RL15	15	2	RL47	15	3	RL79	15	4	RL111
16	1	RL16	16	2	RL48	16	3	RL80	16	4	RL112
17	1	RL17	17	2	RL49	17	3	RL81	17	4	RL113
18	1	RL18	18	2	RL50	18	3	RL82	18	4	RL114
19	1	RL19	19	2	RL51	19	3	RL83	19	4	RL115
20	1	RL20	20	2	RL52	20	3	RL84	20	4	RL116
21	1	RL21	21	2	RL53	21	3	RL85	21	4	RL117
22	1	RL22	22	2	RL54	22	3	RL86	22	4	RL118
23	1	RL23	23	2	RL55	23	3	RL87	23	4	RL119
24	1	RL24	24	2	RL56	24	3	RL88	24	4	RL120
25	1	RL25	25	2	RL57	25	3	RL89	25	4	RL121
26	1	RL26	26	2	RL58	26	3	RL90	26	4	RL122
27	1	RL27	27	2	RL59	27	3	RL91	27	4	RL123
28	1	RL28	28	2	RL60	28	3	RL92	28	4	RL124
29	1	RL29	29	2	RL61	29	3	RL93	29	4	RL125
30	1	RL30	30	2	RL62	30	3	RL94	30	4	RL126
31	1	RL31	31	2	RL63	31	3	RL95	31	4	RL127
32	1	RL32	32	2	RL64	32	3	RL96	32	4	RL128

40-585A RELAY CROSS REFERENCE - DAUGHTER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
33	1	RL129	33	2	RL161	33	3	RL193	33	4	RL225
34	1	RL130	34	2	RL162	34	3	RL194	34	4	RL226
35	1	RL131	35	2	RL163	35	3	RL195	35	4	RL227
36	1	RL132	36	2	RL164	36	3	RL196	36	4	RL228
37	1	RL133	37	2	RL165	37	3	RL197	37	4	RL229
38	1	RL134	38	2	RL166	38	3	RL198	38	4	RL230
39	1	RL135	39	2	RL167	39	3	RL199	39	4	RL231
40	1	RL136	40	2	RL168	40	3	RL200	40	4	RL232
41	1	RL137	41	2	RL169	41	3	RL201	41	4	RL233
42	1	RL138	42	2	RL170	42	3	RL202	42	4	RL234
43	1	RL139	43	2	RL171	43	3	RL203	43	4	RL235
44	1	RL140	44	2	RL172	44	3	RL204	44	4	RL236
45	1	RL141	45	2	RL173	45	3	RL205	45	4	RL237
46	1	RL142	46	2	RL174	46	3	RL206	46	4	RL238
47	1	RL143	47	2	RL175	47	3	RL207	47	4	RL239
48	1	RL144	48	2	RL176	48	3	RL208	48	4	RL240
49	1	RL145	49	2	RL177	49	3	RL209	49	4	RL241
50	1	RL146	50	2	RL178	50	3	RL210	50	4	RL242
51	1	RL147	51	2	RL179	51	3	RL211	51	4	RL243
52	1	RL148	52	2	RL180	52	3	RL212	52	4	RL244
53	1	RL149	53	2	RL181	53	3	RL213	53	4	RL245
54	1	RL150	54	2	RL182	54	3	RL214	54	4	RL246
55	1	RL151	55	2	RL183	55	3	RL215	55	4	RL247
56	1	RL152	56	2	RL184	56	3	RL216	56	4	RL248
57	1	RL153	57	2	RL185	57	3	RL217	57	4	RL249
58	1	RL154	58	2	RL186	58	3	RL218	58	4	RL250
59	1	RL155	59	2	RL187	59	3	RL219	59	4	RL251
60	1	RL156	60	2	RL188	60	3	RL220	60	4	RL252
61	1	RL157	61	2	RL189	61	3	RL221	61	4	RL253
62	1	RL158	62	2	RL190	62	3	RL222	62	4	RL254
63	1	RL159	63	2	RL191	63	3	RL223	63	4	RL255
64	1	RL160	64	2	RL192	64	3	RL224	64	4	RL256

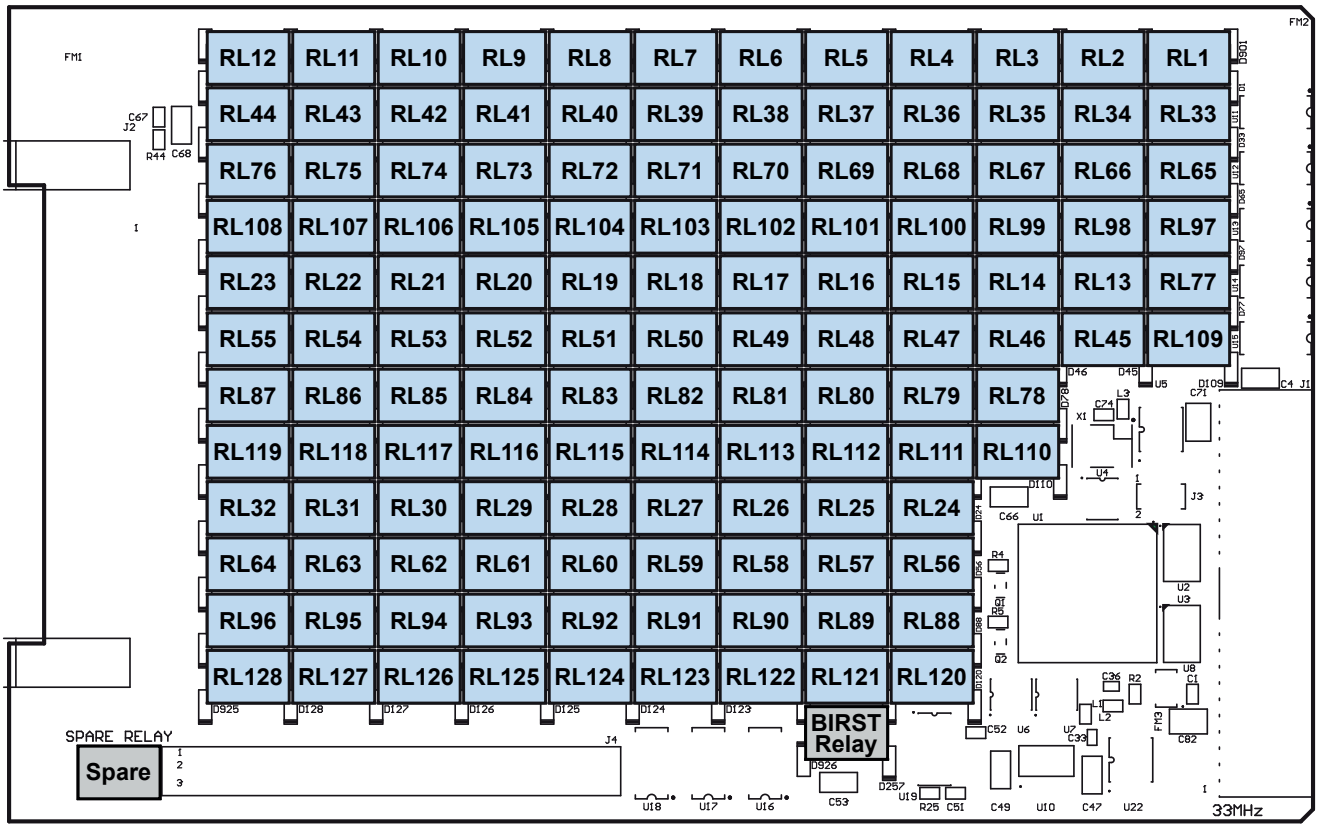


Figure 7.3 - 40-585A Component Layout - Mother Board

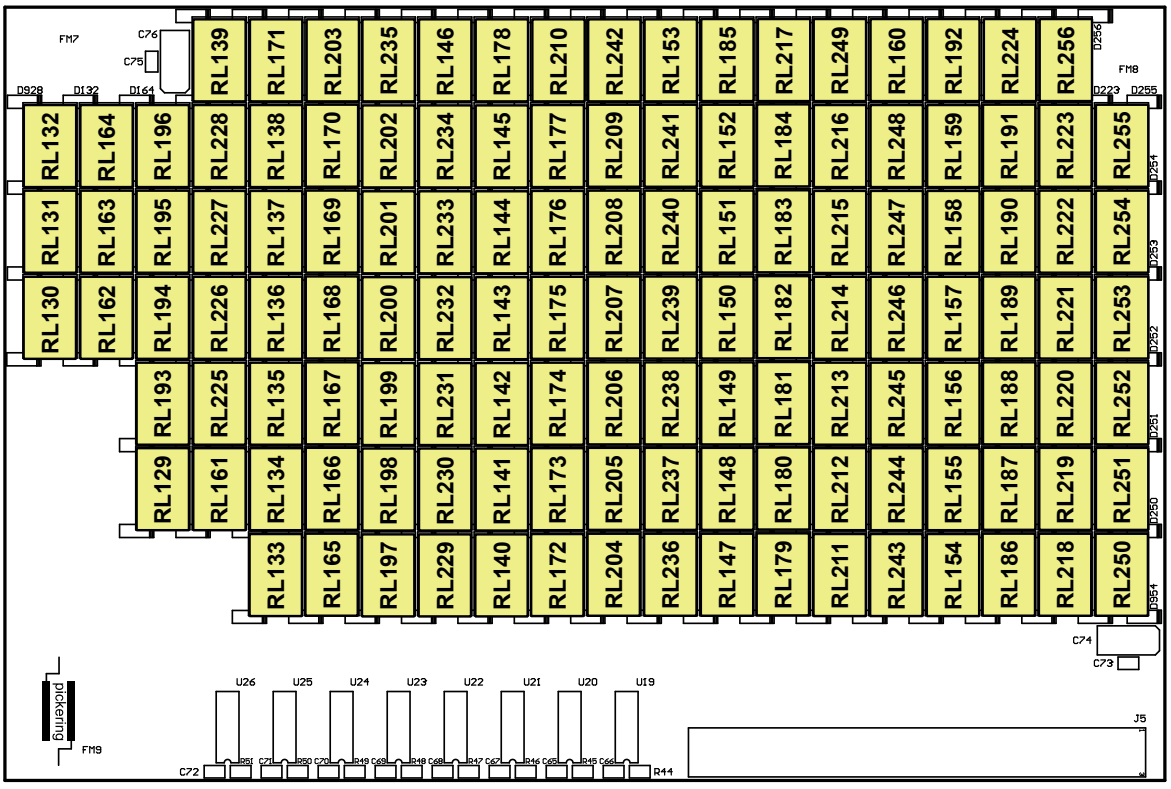


Figure 7.4 - 40-585A Component Layout - Daughter Board

40-586A RELAY LOOK-UP TABLES

The tables should be used in conjunction with the PCB layout diagrams in Figure 7.5 (Mother Board) and Figure 7.6 (Daughter Board).

40-586A RELAY CROSS REFERENCE - MOTHER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	1	RL1	1	2	RL33	1	3	RL65	1	4	RL97
2	1	RL2	2	2	RL34	2	3	RL66	2	4	RL98
3	1	RL3	3	2	RL35	3	3	RL67	3	4	RL99
4	1	RL4	4	2	RL36	4	3	RL68	4	4	RL100
5	1	RL5	5	2	RL37	5	3	RL69	5	4	RL101
6	1	RL6	6	2	RL38	6	3	RL70	6	4	RL102
7	1	RL7	7	2	RL39	7	3	RL71	7	4	RL103
8	1	RL8	8	2	RL40	8	3	RL72	8	4	RL104
9	1	RL9	9	2	RL41	9	3	RL73	9	4	RL105
10	1	RL10	10	2	RL42	10	3	RL74	10	4	RL106
11	1	RL11	11	2	RL43	11	3	RL75	11	4	RL107
12	1	RL12	12	2	RL44	12	3	RL76	12	4	RL108
13	1	RL13	13	2	RL45	13	3	RL77	13	4	RL109
14	1	RL14	14	2	RL46	14	3	RL78	14	4	RL110
15	1	RL15	15	2	RL47	15	3	RL79	15	4	RL111
16	1	RL16	16	2	RL48	16	3	RL80	16	4	RL112
17	1	RL17	17	2	RL49	17	3	RL81	17	4	RL113
18	1	RL18	18	2	RL50	18	3	RL82	18	4	RL114
19	1	RL19	19	2	RL51	19	3	RL83	19	4	RL115
20	1	RL20	20	2	RL52	20	3	RL84	20	4	RL116
21	1	RL21	21	2	RL53	21	3	RL85	21	4	RL117
22	1	RL22	22	2	RL54	22	3	RL86	22	4	RL118
23	1	RL23	23	2	RL55	23	3	RL87	23	4	RL119
24	1	RL24	24	2	RL56	24	3	RL88	24	4	RL120
25	1	RL25	25	2	RL57	25	3	RL89	25	4	RL121
26	1	RL26	26	2	RL58	26	3	RL90	26	4	RL122
27	1	RL27	27	2	RL59	27	3	RL91	27	4	RL123
28	1	RL28	28	2	RL60	28	3	RL92	28	4	RL124
29	1	RL29	29	2	RL61	29	3	RL93	29	4	RL125
30	1	RL30	30	2	RL62	30	3	RL94	30	4	RL126
31	1	RL31	31	2	RL63	31	3	RL95	31	4	RL127
32	1	RL32	32	2	RL64	32	3	RL96	32	4	RL128

40-586A RELAY CROSS REFERENCE - DAUGHTER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	5	RL129	1	6	RL161	1	7	RL193	1	8	RL225
2	5	RL130	2	6	RL162	2	7	RL194	2	8	RL226
3	5	RL131	3	6	RL163	3	7	RL195	3	8	RL227
4	5	RL132	4	6	RL164	4	7	RL196	4	8	RL228
5	5	RL133	5	6	RL165	5	7	RL197	5	8	RL229
6	5	RL134	6	6	RL166	6	7	RL198	6	8	RL230
7	5	RL135	7	6	RL167	7	7	RL199	7	8	RL231
8	5	RL136	8	6	RL168	8	7	RL200	8	8	RL232
9	5	RL137	9	6	RL169	9	7	RL201	9	8	RL233
10	5	RL138	10	6	RL170	10	7	RL202	10	8	RL234
11	5	RL139	11	6	RL171	11	7	RL203	11	8	RL235
12	5	RL140	12	6	RL172	12	7	RL204	12	8	RL236
13	5	RL141	13	6	RL173	13	7	RL205	13	8	RL237
14	5	RL142	14	6	RL174	14	7	RL206	14	8	RL238
15	5	RL143	15	6	RL175	15	7	RL207	15	8	RL239
16	5	RL144	16	6	RL176	16	7	RL208	16	8	RL240
17	5	RL145	17	6	RL177	17	7	RL209	17	8	RL241
18	5	RL146	18	6	RL178	18	7	RL210	18	8	RL242
19	5	RL147	19	6	RL179	19	7	RL211	19	8	RL243
20	5	RL148	20	6	RL180	20	7	RL212	20	8	RL244
21	5	RL149	21	6	RL181	21	7	RL213	21	8	RL245
22	5	RL150	22	6	RL182	22	7	RL214	22	8	RL246
23	5	RL151	23	6	RL183	23	7	RL215	23	8	RL247
24	5	RL152	24	6	RL184	24	7	RL216	24	8	RL248
25	5	RL153	25	6	RL185	25	7	RL217	25	8	RL249
26	5	RL154	26	6	RL186	26	7	RL218	26	8	RL250
27	5	RL155	27	6	RL187	27	7	RL219	27	8	RL251
28	5	RL156	28	6	RL188	28	7	RL220	28	8	RL252
29	5	RL157	29	6	RL189	29	7	RL221	29	8	RL253
30	5	RL158	30	6	RL190	30	7	RL222	30	8	RL254
31	5	RL159	31	6	RL191	31	7	RL223	31	8	RL255
32	5	RL160	32	6	RL192	32	7	RL224	32	8	RL256

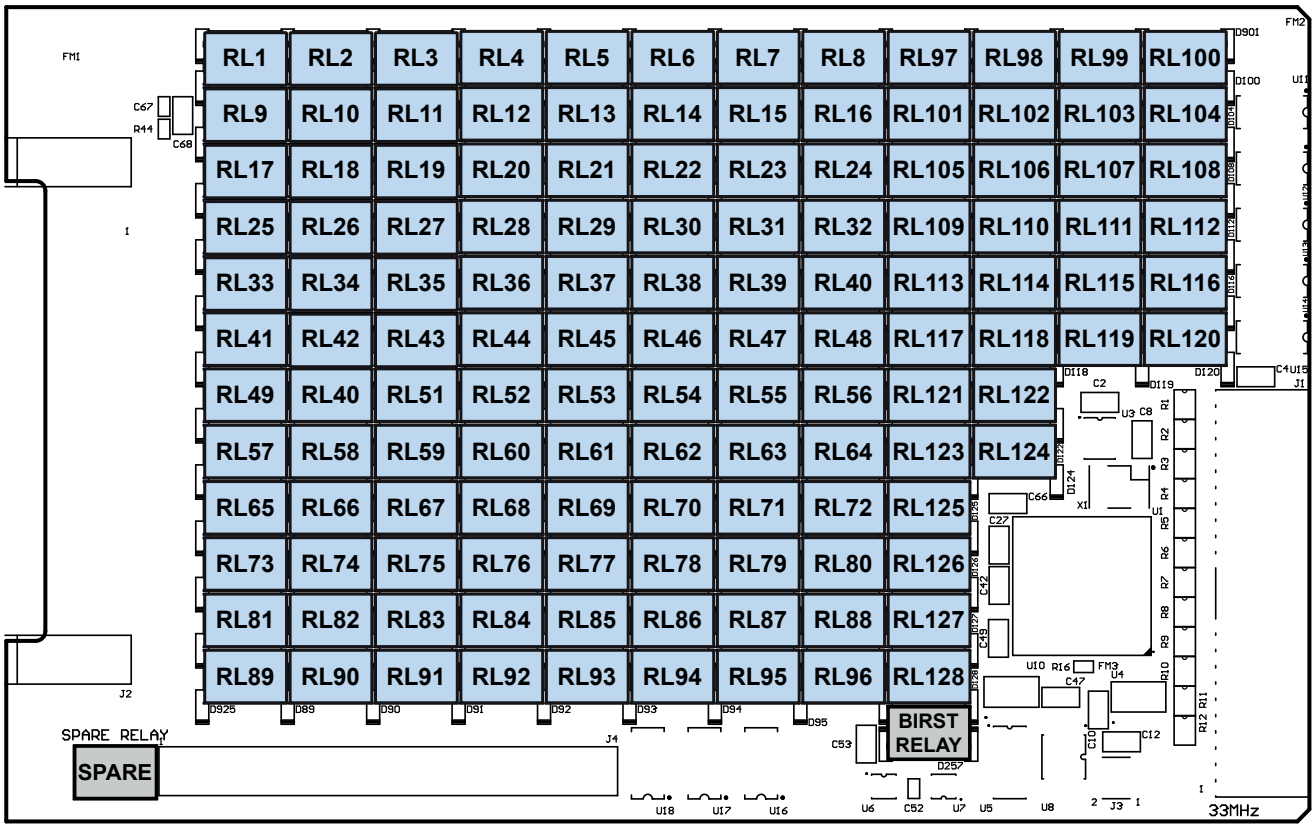


Figure 7.5 - 40-586A Component Layout - Mother Board



Figure 7.6 - 40-586A Component Layout - Daughter Board

40-587A RELAY LOOK-UP TABLES

The tables should be used in conjunction with the PCB layout diagrams in Figure 7.7 (Mother Board) and Figure 7.8 (Daughter Board).

40-587A RELAY CROSS REFERENCE - MOTHER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	1	RL1	1	3	RL33	1	5	RL65	1	7	RL97
2	1	RL2	2	3	RL34	2	5	RL66	2	7	RL98
3	1	RL3	3	3	RL35	3	5	RL67	3	7	RL99
4	1	RL4	4	3	RL36	4	5	RL68	4	7	RL100
5	1	RL5	5	3	RL37	5	5	RL69	5	7	RL101
6	1	RL6	6	3	RL38	6	5	RL70	6	7	RL102
7	1	RL7	7	3	RL39	7	5	RL71	7	7	RL103
8	1	RL8	8	3	RL40	8	5	RL72	8	7	RL104
9	1	RL9	9	3	RL41	9	5	RL73	9	7	RL105
10	1	RL10	10	3	RL42	10	5	RL74	10	7	RL106
11	1	RL11	11	3	RL43	11	5	RL75	11	7	RL107
12	1	RL12	12	3	RL44	12	5	RL76	12	7	RL108
13	1	RL13	13	3	RL45	13	5	RL77	13	7	RL109
14	1	RL14	14	3	RL46	14	5	RL78	14	7	RL110
15	1	RL15	15	3	RL47	15	5	RL79	15	7	RL111
16	1	RL16	16	3	RL48	16	5	RL80	16	7	RL112
1	2	RL17	1	4	RL49	1	6	RL81	1	8	RL113
2	2	RL18	2	4	RL50	2	6	RL82	2	8	RL114
3	2	RL19	3	4	RL51	3	6	RL83	3	8	RL115
4	2	RL20	4	4	RL52	4	6	RL84	4	8	RL116
5	2	RL21	5	4	RL53	5	6	RL85	5	8	RL117
6	2	RL22	6	4	RL54	6	6	RL86	6	8	RL118
7	2	RL23	7	4	RL55	7	6	RL87	7	8	RL119
8	2	RL24	8	4	RL56	8	6	RL88	8	8	RL120
9	2	RL25	9	4	RL57	9	6	RL89	9	8	RL121
10	2	RL26	10	4	RL58	10	6	RL90	10	8	RL122
11	2	RL27	11	4	RL59	11	6	RL91	11	8	RL123
12	2	RL28	12	4	RL60	12	6	RL92	12	8	RL124
13	2	RL29	13	4	RL61	13	6	RL93	13	8	RL125
14	2	RL30	14	4	RL62	14	6	RL94	14	8	RL126
15	2	RL31	15	4	RL63	15	6	RL95	15	8	RL127
16	2	RL32	16	4	RL64	16	6	RL96	16	8	RL128

40-587A RELAY CROSS REFERENCE - DAUGHTER BOARD

Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.	Crosspoint X	Crosspoint Y	Relay No.
1	9	RL129	1	11	RL161	1	13	RL193	1	15	RL225
2	9	RL130	2	11	RL162	2	13	RL194	2	15	RL226
3	9	RL131	3	11	RL163	3	13	RL195	3	15	RL227
4	9	RL132	4	11	RL164	4	13	RL196	4	15	RL228
5	9	RL133	5	11	RL165	5	13	RL197	5	15	RL229
6	9	RL134	6	11	RL166	6	13	RL198	6	15	RL230
7	9	RL135	7	11	RL167	7	13	RL199	7	15	RL231
8	9	RL136	8	11	RL168	8	13	RL200	8	15	RL232
9	9	RL137	9	11	RL169	9	13	RL201	9	15	RL233
10	9	RL138	10	11	RL170	10	13	RL202	10	15	RL234
11	9	RL139	11	11	RL171	11	13	RL203	11	15	RL235
12	9	RL140	12	11	RL172	12	13	RL204	12	15	RL236
13	9	RL141	13	11	RL173	13	13	RL205	13	15	RL237
14	9	RL142	14	11	RL174	14	13	RL206	14	15	RL238
15	9	RL143	15	11	RL175	15	13	RL207	15	15	RL239
16	9	RL144	16	11	RL176	16	13	RL208	16	15	RL240
1	10	RL145	1	12	RL177	1	14	RL209	1	16	RL241
2	10	RL146	2	12	RL178	2	14	RL210	2	16	RL242
3	10	RL147	3	12	RL179	3	14	RL211	3	16	RL243
4	10	RL148	4	12	RL180	4	14	RL212	4	16	RL244
5	10	RL149	5	12	RL181	5	14	RL213	5	16	RL245
6	10	RL150	6	12	RL182	6	14	RL214	6	16	RL246
7	10	RL151	7	12	RL183	7	14	RL215	7	16	RL247
8	10	RL152	8	12	RL184	8	14	RL216	8	16	RL248
9	10	RL153	9	12	RL185	9	14	RL217	9	16	RL249
10	10	RL154	10	12	RL186	10	14	RL218	10	16	RL250
11	10	RL155	11	12	RL187	11	14	RL219	11	16	RL251
12	10	RL156	12	12	RL188	12	14	RL220	12	16	RL252
13	10	RL157	13	12	RL189	13	14	RL221	13	16	RL253
14	10	RL158	14	12	RL190	14	14	RL222	14	16	RL254
15	10	RL159	15	12	RL191	15	14	RL223	15	16	RL255
16	10	RL160	16	12	RL192	16	14	RL224	16	16	RL256

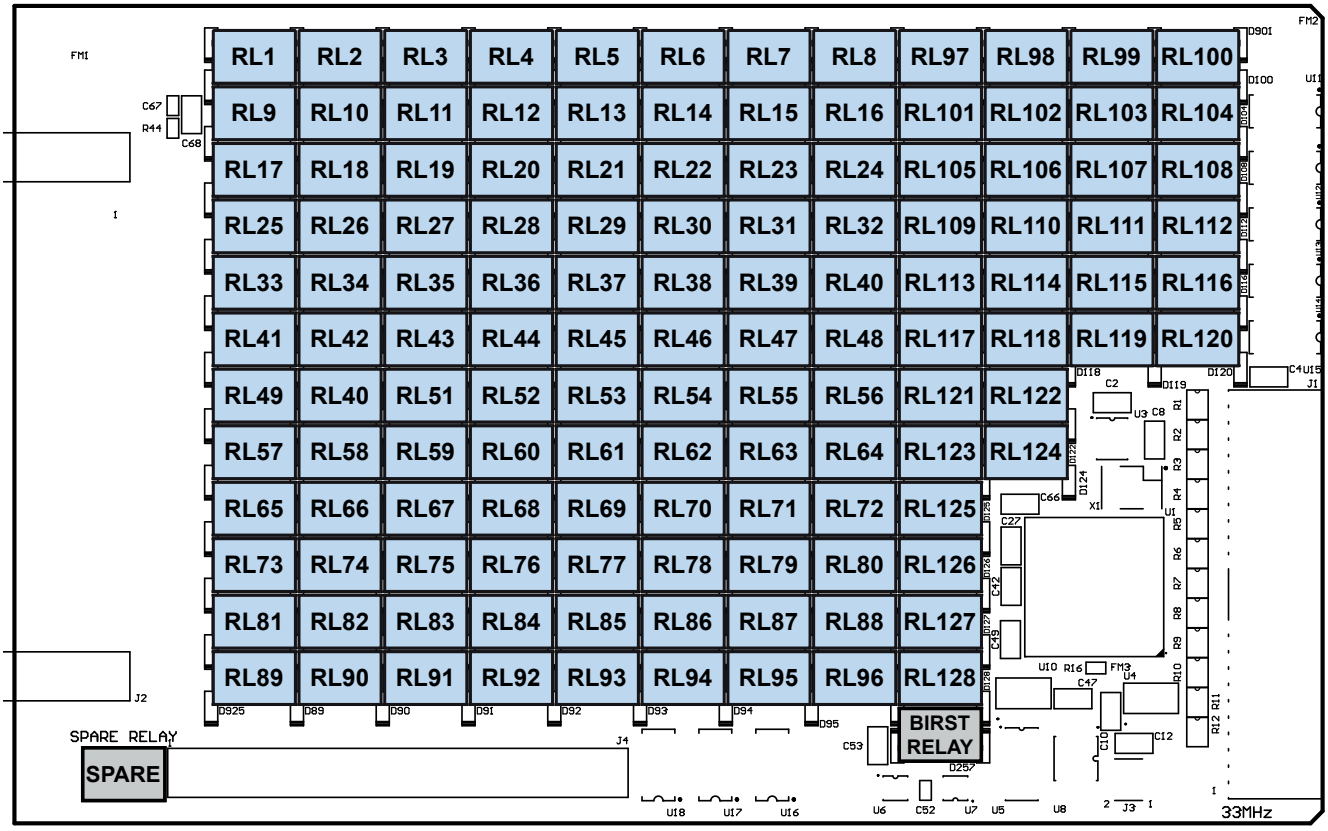


Figure 7.7 - 40-587A Component Layout - Mother Board



Figure 7.8 - 40-587A Component Layout - Daughter Board

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