65-217 User Manual

LXI Modular 2 A Matrix



pickeringtest.com

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FM38792

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

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Product Safety

Safety Symbols

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

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

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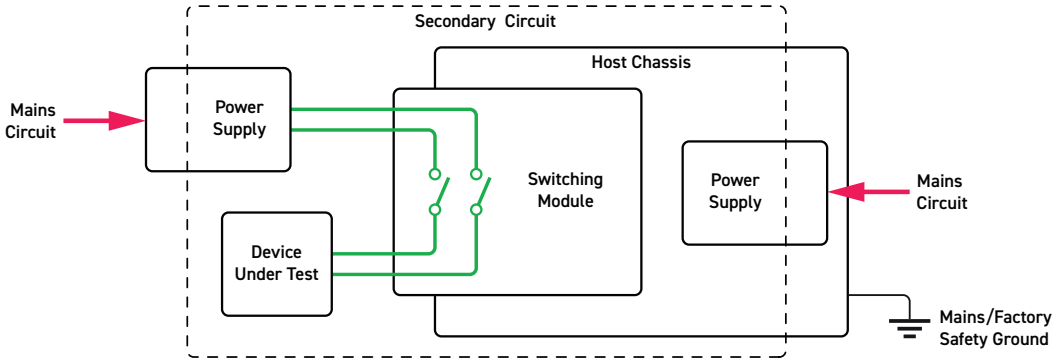
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Warnings & Cautions

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 unit may contain hazardous voltages. Before removing the unit from the rack remove all supplies and disconnect user I/O signals. If the unit has removable modules, unused slots in the chassis must be populated with blanking panels to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering. 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 unit must not be used for the switching of Mains Circuits. For the switching of voltages up to the unit'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 chassis must be correctly installed and be connected to mains or factory safety ground, please refer to the installation section of this 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: • 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. • 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. • Outer clothing worn must be unable to generate static charges. • 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

- Scalable Matrix Design With 8 Y Axis Connections
- Designed for Enhanced Unterminated Crosstalk
- User Configurable for X Dimensions by Plug-in addition, up to 384x8
- Two Analog Buses
- Maximum Switch Current of 2 A
- Switch up to 300 VDC/250 VAC and up to 60 W Max Power
- Built-In Scan List Sequence Stores With Triggering Capability
- Relay Cycle Counting Included
- Supported by *BIRST* ™ & *eBIRST* ™ Test Tools
- Fully Compliant to 1.5 LXI Standard
- 3 Year Warranty



The 65-217 is a modular matrix platform that provides a large matrix solution with 2A current carrying capacity on all Y paths.

Matrices are created by populating a 65-200 chassis with plug-in modules that provide access to the X and Y axis or X axis only on front panel D-type connectors. The chassis is capable of supporting matrices with a Y axis size of 8 and X axis sizes up to 384 in increments of 64. Users can specify as many or as few plug-in modules as they require and can field upgrade the chassis to extend the matrix.

The chassis supports up to 6 plug-in modules. These can be with or without direct Y bus access and are loaded into the chassis via the front panel, greatly improving flexibility and ease of maintenance. Plug-in modules with Y access include switched Y loop-thru connections for further matrix expansion between chassis.

Analog Buses

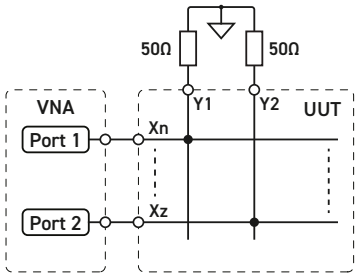
Each plug-in provides a single 64x8 sub matrix with the ability to connect its Y axis to one of two analog buses. This provides a high degree of flexibility in configuring the matrix. They can be used to maximize the bandwidth of the matrix by disconnecting unused stub matrices from the used bus, or can be used to divide the 65-217 into two independent matrices.

Cooling for the 65-200 is provided by rear fans and front air intakes ensuring no wasted space when the chassis is rack mounted. The cooling system is adaptive, ensuring the acoustic noise is minimized when used in quiet laboratory environments and low load conditions.

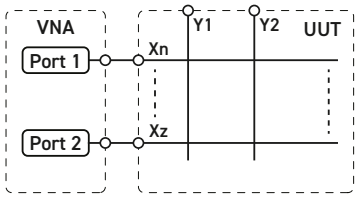
Crosstalk Measurement

Standard crosstalk measurements carried out on all Pickering modules use an aggressor switched path with the selected channel driven (VNA Port1) and termination at the common, and a selected victim channel which is monitored (Port2).

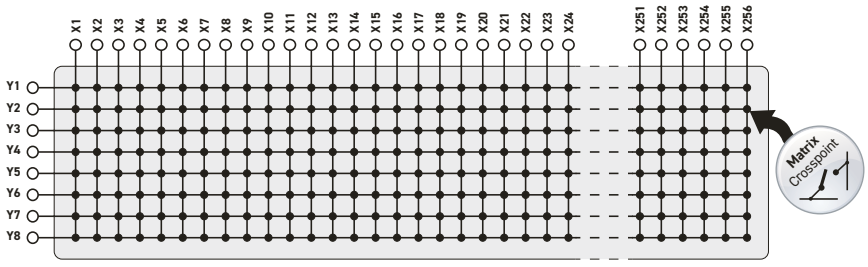
Depending on the application, some users may be more interested in an unterminated measurement which yields very different results. This module is designed to provide an enhanced crosstalk performance, for unterminated applications.



Example Terminated Test Layout (switched)



Example Unterminated Test Layout (unswitched)



Simplified Diagram For 65-217 Configured as a 256x8 Matrix (using 4 plug-ins)

Relay Cycle Counting

To aid with module "health" monitoring, the 65-217 is provided with a relay cycle counting cycle feature. The number of operations per contact are stored on the module and can be used to determine if a relay is approaching EOL. This information could allow system connections to be revised so that signals applied to heavily used contacts are swapped with lightly used contacts to prolong the working life of the relay(s).

Configuring the Matrix

To select the parts that you need to create a matrix simply:

- Specify a 65-200-002 Modular Matrix Chassis.
- Add Matrix Plug-in Modules with direct Y access as required.
- Add Matrix Plug-in Modules without direct Y access as required.

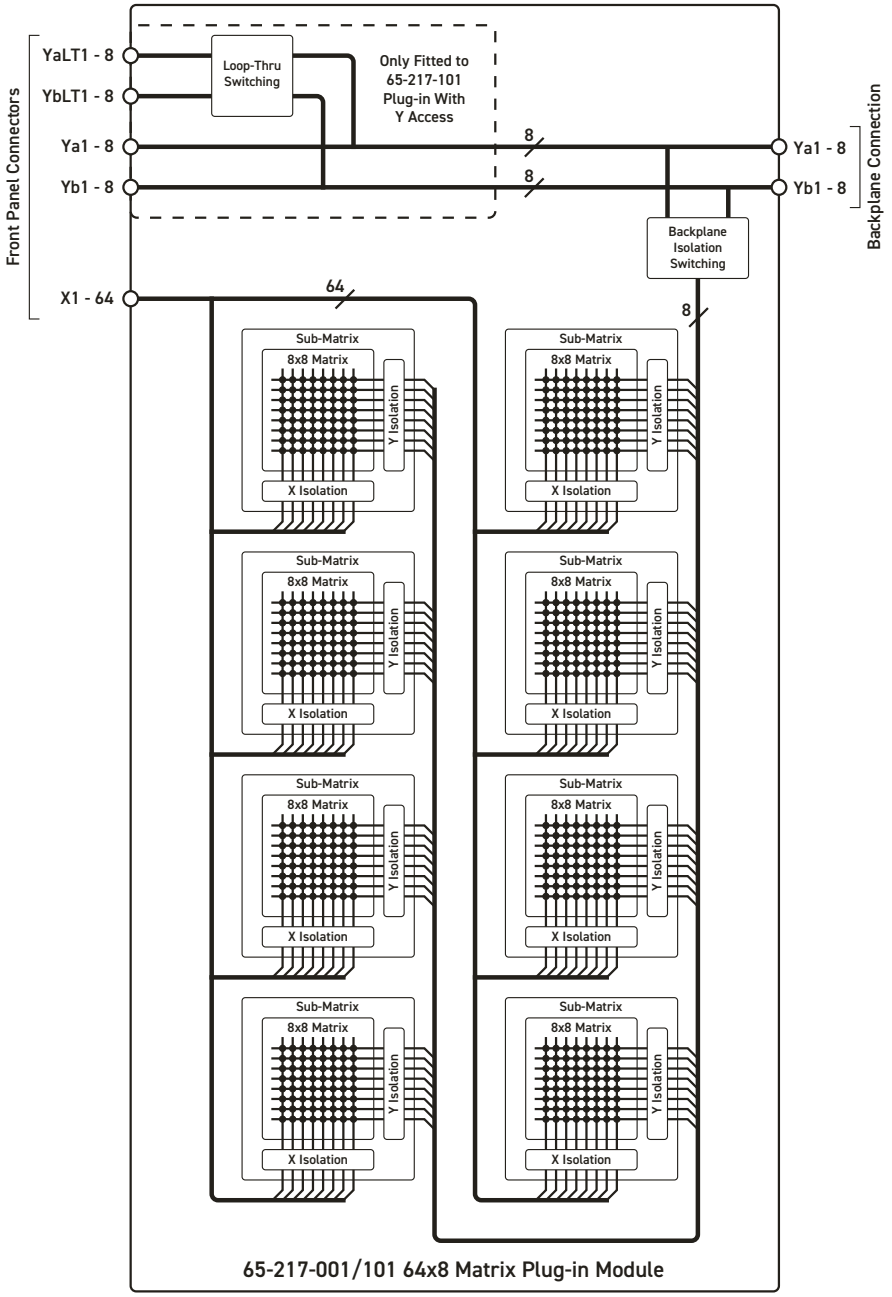
Built-In Relay Self-Test - *BIRST*

BIRST provides a quick and simple way of finding relay failures within the module. No test equipment is required, simply disconnect the UUT from the module, launch the application and it will run a diagnostic test that will find all relays with faulty contacts. For more information go to: pickeringtest.com/birst

Supported by *eBIRST*

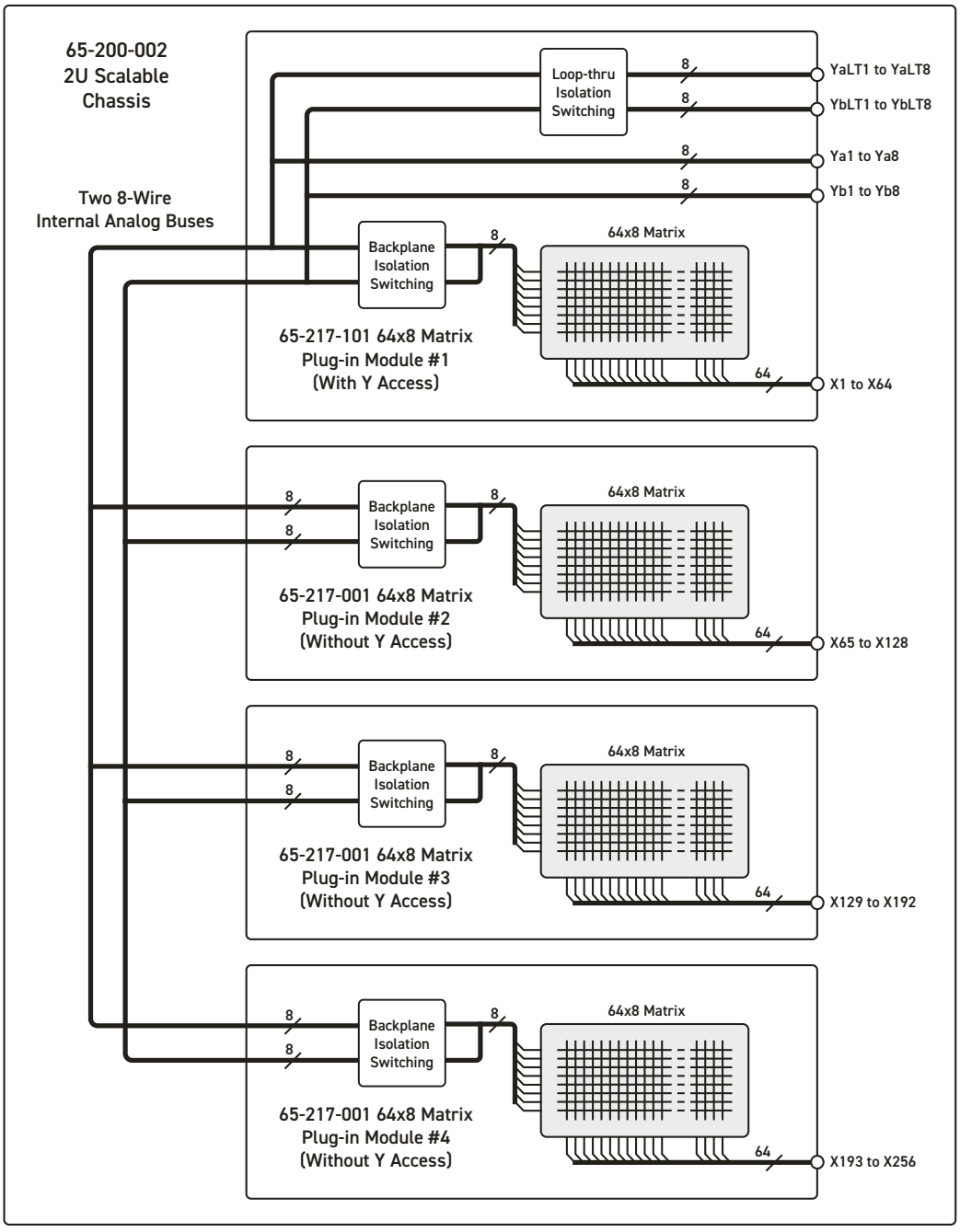
This module is also supported by *eBIRST*. These tools simplify fault-finding by quickly testing the system and graphically identifying the faulty relay. For more information go to: pickeringtest.com/ebirst

Plug-in Module Architecture



Switching Diagram for 65-217 64x8 Plugin Module

Example Configuration



65-217 Configured as a 256x8 matrix with 2 analog buses using:

- 65-200-002 2 U Modular Matrix Chassis
- 1 off 65-217-101 Plug-in Module with Y access
- 3 off 65-217-001 Plug-in Modules without Y access

Sequencing Service and Triggering

The Sequencing service provides the user with the ability to set a series of pre-determined sequences on an LXI instrument. These sequences can be triggered by software or one of the sixteen software configurable open collector triggers.

As the operations are grouped together, it will minimize the number of control transactions required to achieve a composite change of target switch state, condensing multiple operations in a single sub unit into a single operation, thus reducing the overall system switch settling time.

For example, if a user wants to operate X1-Y1, X4-Y1, X2-Y2, in the first sequence, only one operation, and so delay, will be used.

Additionally, as the switch state sequences are stored within the LXI controller itself, the burden on the Host CPU and Ethernet traffic is greatly reduced, and so the overall system latency is also reduced.

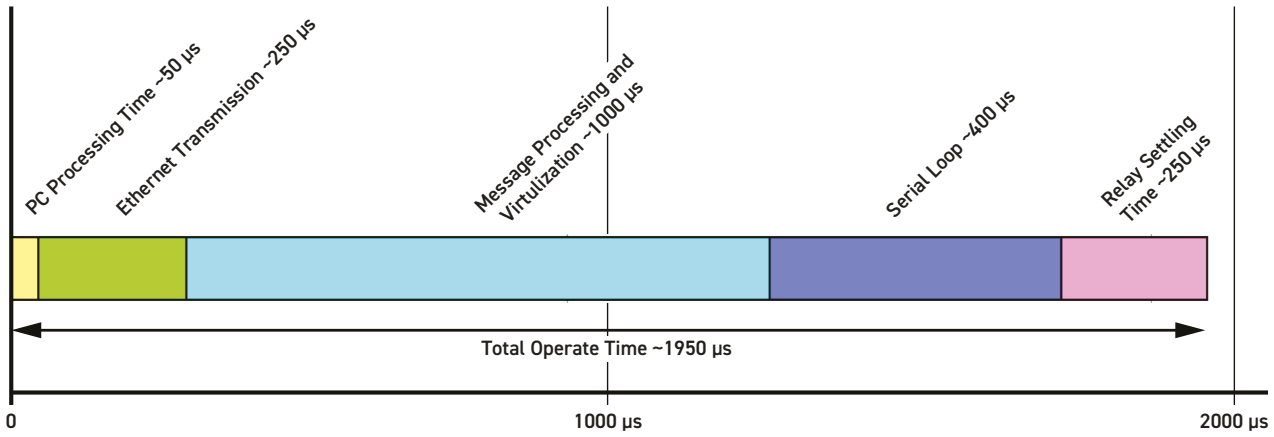
This unit features a software reset line which provides the ability for a user supplied reset to be applied to the unit, triggering a software reset of the relays, returning all relays in the unit to their default state. There is also a software fault line available that will be triggered if there is any error detected within the unit. Please note that while these reset and fault lines use dedicated physical connections to the unit, they are software control lines and as such should not be used for safety interlocks etc.

Speed of Operation

Speed of Operation can be important when defining systems for test applications, therefore it can be beneficial to understand all the necessary overhead delays associated with a switch operation.

If we consider a single relay / block relay operation, it can be considered to be a combination of five discrete operations: PC Processing, Ethernet Latency, LXI Processing / Virtualisation, Serial Loop Transmission and Relay Settling.

A representation of these processes can be seen in the diagram below.



Example Speed of Operation Diagram For Reed Relay Based Solution
Note: These are estimated figures, PC processing and Ethernet transmission times may vary depending upon the overall system setup and load.

Section 1 - Technical Specification

Matrix Switching Specification

General:	Provides 64 concurrent X to Y or 8 X to X connections
Maximum Size:	384x8 (6 plug-in modules hosted in 65-200-002 chassis)
Maximum Switch Current:	2 A
Maximum Switch Voltage:	300 VDC/250 AC*
Maximum Power:	60 W/62.5 VA
Relay Type:	Electro-mechanical (Au clad AgNi type)
Plugin Setting Time:	4 ms (per relay operation)†
Initial Path Resistance:	< 1.4 Ω (X to Y)
Thermal Offset:	< 6 µV
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2 W):	>$1.5x10^7$ (0.1 A, 20 VDC)
Medium power load (30 W):	>$5x10^6$ (1 A, 30 VDC)
Full power load (60 W):	>$1x10^5$ (2 A, 30 VDC)

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

† A single path through the matrix may require multiple relay operations.

Mechanical Specification

Chassis Dimensions:	2U rack mountable full width, depth 500 mm
Number of Plug-ins Supported:	6 (any combination of modules with or without Y access)
X Plug-in Connector:	78-pin male D-type
Y Plug-in Connector:	50-pin male D-type
Plug-in Weight:	1510 g
Trigger Connector:	25-pin male micro D-type
Chassis Cooling:	Front air intakes through plugin module holes, temperature controlled speed adjustable fans

RF Specification - Unterminated

Crosstalk (typical):	10 kHz:	-80 dB
	100 kHz:	-80 dB
	1 MHz:	-60 dB
	5 MHz:	-35 dB
	10 MHz:	-25 dB

RF Specification - Terminated

Bandwidth (-3 dB):	5 MHz (typical)	
Crosstalk (typical):	10 kHz:	-65 dB
	100 kHz:	-60 dB
	1 MHz:	-45 dB
	10 MHz:	-25 dB
Isolation (typical):	10 kHz:	80 dB
	100 kHz:	80 dB
	1 MHz:	80 dB
	10 MHz:	25 dB
VSWR (1.5:1):	1 MHz (typical)	

Section 1 - Technical Specification

LAN Interface

1000Base-T Ethernet Interface with a standard RJ-45 connector mounted on the rear panel. Compliant to LXI Standard 1.5

Triggering

- 16x Software Configurable Bidirectional Open Collector Triggers
- 1x Dedicated Software Reset Line
- 1x Dedicated Software Fault Line
- 1x Dedicated Interlock Line

Scan List Sequencing

Capable of storing 5000 predefined test sequences, loaded from the host Controller to the LXI unit at process initialization, with the ability to be triggered through software or from any of the sixteen software configurable triggers.

For more information on the Pickering Sequence Manager, please go to: pickering-sequence-manager

Power Source

Universal AC mains supply, 90-120/200-240 V 50-60 Hz.

Power Inlet:	Male IEC connector
Power Rating:	100 VA maximum
Fuse Rating:	(F) 5 A 250 V

Operating/Storage Conditions

Operating Temperature:	0 °C to +55 °C
Humidity:	Up to 90 % non-condensing
Altitude:	5000 m
Storage/Transport Temperature:	-20 °C to +75 °C
Humidity:	Up to 90 % non-condensing
Altitude:	15000 m

Safety & CE Compliance

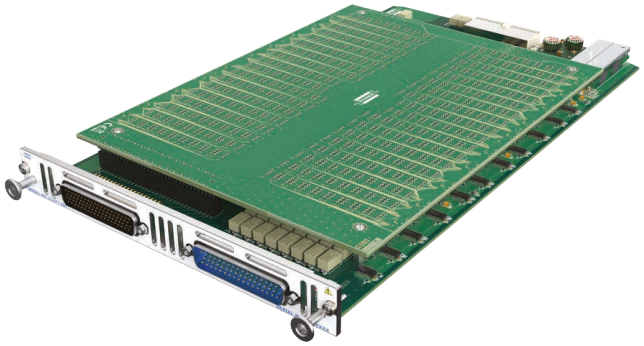
All products are fully CE compliant and meet applicable EU directives:

Low-voltage safety EN61010-1:2010,
EMC Immunity EN61326-1:2013,
Emissions EN55011:2009+A1:2010.

Product Order Codes

Specify which modules are required to build the matrix, Pickering Interfaces will supply the chassis with the modules installed if ordered at the same time. Plug-in modules can be ordered for chassis already supplied.

Chassis	
2U Modular Matrix Chassis, 6-Slot	65-200-002
Plug-in Modules	
64x8, 1-Pole Matrix With Y Access	65-217-101
64x8, 1-Pole Matrix Without Y Access	65-217-001



65-217-101 Plug-in Module
64x8 Matrix with Y-bus access

Product Customization

Pickering LXI units 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. This product requires master slave testing and two test tools are required together with the master slave cable: **93-970-301**. For more information go to: pickeringtest.com/ebirst

Product	Test Tool	Adaptor	Termination
65-217-x01	93-006-001	Not Required	93-006-101
	93-005-001	Not Required	93-005-101



To use eBIRST the test tool is fitted to the user connectors of the 65-217 plug-in module. The supplied software is executed to perform a full diagnostic test of signal paths through the matrix. This will highlight failed or problem relays on a graphical interface.

Spare Relay Kits

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

Product	Relay Kit
65-217-x01	91-100-001

For further assistance, please contact the Pickering sales office.



Also available from Pickering are the 60-102B and 60-103B LXI Modular Chassis. These are 7 and 18 slot chassis capable of hosting any of our range of PXI switching and programmable resistor modules under LXI control via a Gigabit Ethernet interface

Section 2 - Technical Description

Functional Description

The 65-217 is a modular switching system which is designed to provide a high density flexible matrix solution by the addition of plugin modules. The component parts are as follows:

- The modular 65-200 scalable chassis is the basis of the system and consists of a backplane, power supply and controller card housed in a 2U rack mountable chassis. The backplane is capable of hosting up to 6 plugin modules and distributes power, contol signals and matrix Y connections between the plugins. The controller card is based on an embedded processor and provides contol and management of the matrix via an LXI compliant LAN interface. For more information on the modular chassis, please refer to the 65-200 user manual.
- The 65-217-101 is a single 64x8 matrix plugin module with 2 separate 8-wire analog buses the design of which has been optimised for low crosstalk. The analog buses are routed from the backplane to the front panel and are connected to the Y-bus of the matrix via isolation relays. User access to the matrix X-bus is via a 78-pin D-type connector on the front panel. The user Y connection to the analog buses is via a front panel 50-pin D-type connector. The Y connector also has two sets of loop-thru connections, these are connected to the two analog buses via isolation relays and can be used for matrix expansion. The 64x8 matrix is constructed from eight 8x8 sub-matrices. Each 8x8 matrix has its own bank of X and Y isolation relays which are switched automatically by the driver software. . A switching diagram for the plug-in module is shown in Figure 2-1.
- The 65-217-001 is the same as the 65-217-101 but has no front panel access to the analog buses. See Figure 2-2.

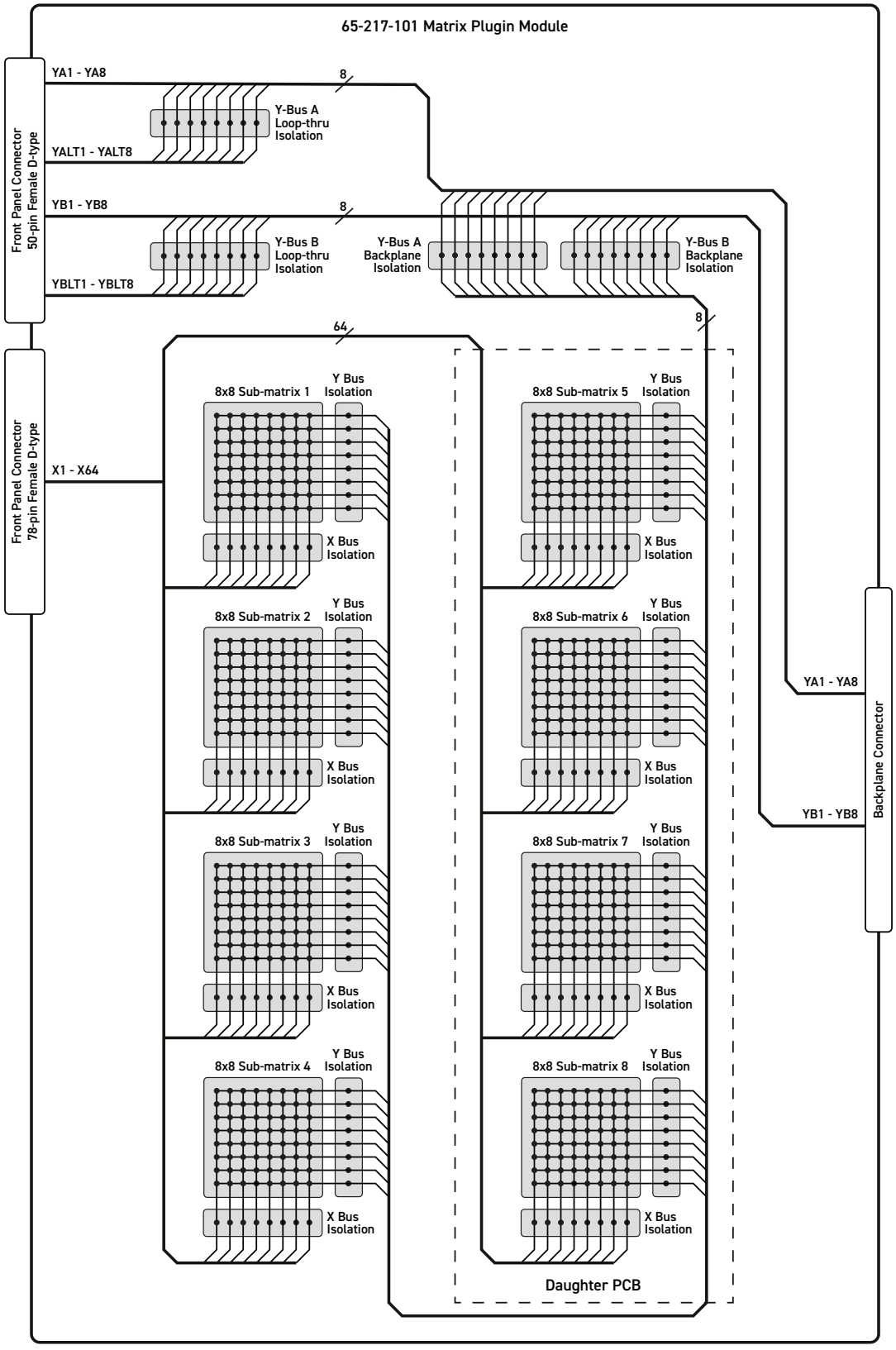


Figure 2-1. 65-217-101 64x8 Matrix Plugin Module With Direct Y Access and 2 Analog Buses

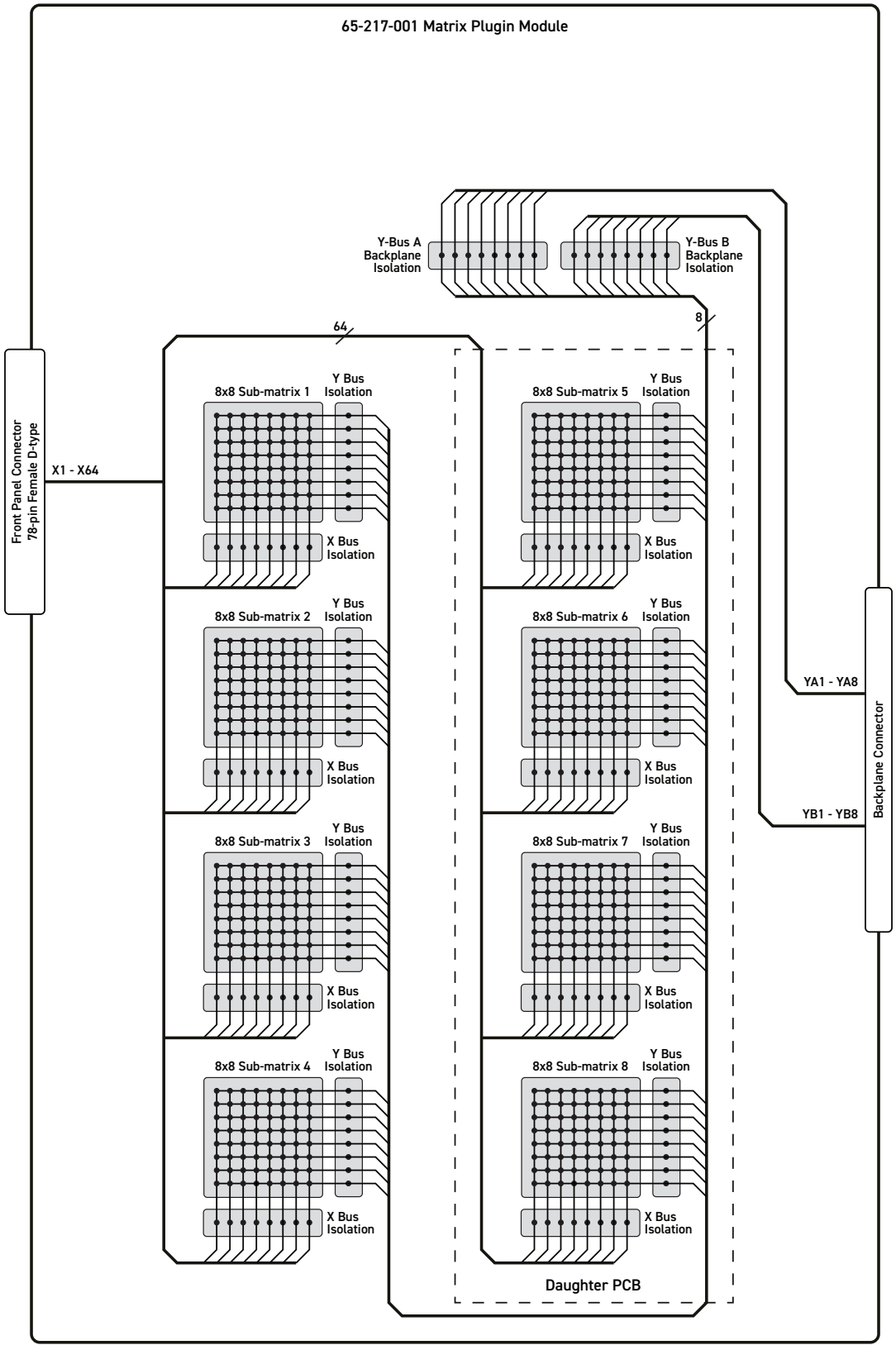


Figure 2-2. 65-217-101 64x8 Matrix Plugin Module Without Direct Y Access and 2 Analog Buses

Section 3 - Installation

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

The module is designed for indoor use only.

Pre-operation 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. Ensure that the designated area for the product is of flat and solid construction to support its weight.

Installing the Unit

For a full description for installing the scalable chassis and instructions for fitting and configuring the plug-in modules, please refer to the 65-200 user manual.

This can be downloaded via the web page:
https://www.pickeringtest.com/product/65-200-002-lxi-2u-modular-chassis-6-slot

Section 4 - Programming

Programming Options for Pickering Interfaces LXI Units

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:
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

Relay Cycle Counting Feature Details

For information related to the relay cycle counting feature present on this product, please refer to the Relay Cycle Counting User Guide.

This is available as a download from:
pickeringtest.com/portal/web/256/content/private/manuals/Relay-Cycle-Counting-User-Guide.pdf

Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Relay-Cycle-Counting-User-Guide.pdf

Programming the 65-217

Construction

The 65-200 chassis can be populated with up to six 65-217 matrix plug-in modules. Each module contains a single 64x8 matrix and can be with or without front panel access to the 2 internal Y buses. The Y buses can be used to route signals beween the plugin modues and six plugin modules can be used as a 384x8 matrix.

Although constructed from eight 8x8 sub-matrice, the 64x8 matrix on the plug-in module is controlled using a single programming sub-unit. When a crosspoint is enabled, the corresponding X and Y isolation switches of the sub-matrix are set automatically. To complete a signal path between an X port and a Y port or to a crosspoint on a different matrix, the corresponding Y isolation switch has to be enabled for one of the 2 analog buses. Similarly, if a Y signal is required to be routed to the loop-thru connections, the corresponding isolation switch has to be enabled.

Each 65-217 plugin module contains

- 1 matrix subunit of size 64x8
- 1 switch sub-unit of size 8 (for the Y-Bus Isolation for Analog Bus A)
- 1 switch sub-unit of size 8 (for the Y-Bus Isolation for Analog Bus B)
- 1 switch sub-unit of size 8 (for the Y-Bus Isolation for Analog Bus A Loop-thru)
- 1 switch sub-unit of size 8 (for the Y-Bus Isolation for Analog Bus B Loop-thru)

and the chassis can be populated with up to 6 off 65-217 plugin modules.

User has an option to

a. control all 6 plugins individually or

b. program the chassis to combine all 6 plugins into one module and control it.

In order to control

a. the whole chassis with multiple 65-217 plugins refer to *"Programming the Unit - Card Handle 1"*

b. individual 65-217 plugins in the chassis refer to *"Programming the Unit - Card Handle 2-7"*

Please Note - only one operation mode can be used at a time i.e. either control using *"Card Handle 1"* or *"Card Handle 2-7"*

Programming the Unit - Card Handle 1

A 65-200 chassis with multiple 65-217 plugins can be controlled as a single matrix module.
In order to achieve this type of control, configuration of LXI chassis using Instrument control webpage is needed.
After the chassis configuration, customer can use *"Card Handle 1"* in API functions to control the combined matrix module which *"Card Handle 1"* will be divided into. This is summarised in Table 4-1 below and Figure 4-2.

- 1 sub-unit for the matrix

As each plugin is added to the chassis the size of the matrix will increase in step in 64 and maximum size will be 348x8.

- 1 sub-unit for the Y-Bus Isolation for Analog Bus A
- 1 sub-unit for the Y-Bus Isolation for Analog Bus B
- 1 sub-unit for the Y-Bus Isolation for Analog Bus A Loop-thru
- 1 sub-unit for the Y-Bus Isolation for Analog Bus B Loop-thru

As each plugin is added to the chassis the size of the above mentioned isolation subunits will increase in steps of 8 and maximum size will 48.

Table 4-1. 65-217 Programming Sub-Unit Allocation - Card Handle 1

Card Handle	Chassis Slot No.	Bus	Device	Sub-Unit Type				
				Sub-Unit 1 Matrix	Sub-Unit 2 Y-Bus A Isolation	Sub-Unit 3 Y-Bus B Isolation	Sub-Unit 4 Y-Bus A Loop-Thru Isolation	Sub-Unit 5 Y-Bus B Loop-Thru Isolation
1	1	3	0	MATRIX(64x8)	SWITCH(8)	SWITCH(8)	SWITCH(8)	SWITCH(8)
	2	3	0	MATRIX(128x8)	SWITCH(16)	SWITCH(16)	SWITCH(16)	SWITCH(16)
	3	3	0	MATRIX(192x8)	SWITCH(24)	SWITCH(24)	SWITCH(24)	SWITCH(24)
	4	3	0	MATRIX(256x8)	SWITCH(32)	SWITCH(32)	SWITCH(32)	SWITCH(32)
	5	3	0	MATRIX(320x8)	SWITCH(40)	SWITCH(40)	SWITCH(40)	SWITCH(40)
	6	3	0	MATRIX(384x8)	SWITCH(48)	SWITCH(48)	SWITCH(48)	SWITCH(48)

Please Note:

1. While loading multiple 65-217 plugins in the 65-200 chassis, it's recommended to load the plugins in consecutive chassis slots starting from slot 1.
2. If the 65-200 chassis is populated with a mixture of 65-217 plugins with Y access (65-217-101) and without Y access (65-217-001), then it's recommended to have the plugins with Y access (65-217-101) populated from slot 1 followed by plugins without Y access (65-217-001).
3. If all the 65-217 plugins in the chassis have Y Bus Access (65-217-101), then customer application may need to standardize on which plugin's Y access front panel connector should be used for cabling.
4. LXI chassis programmed with LXI firmware version 6.5.2 supports up to 3 65-217-101 plugins (loaded in consecutive 65-200 chassis slots starting from slot 1).

Programming the Unit - Card Handle 2-7

The 65-217 can be programmed/controlled as a single 64x8 matrix for each plugin module fitted to the chassis, where each is divided into separate sub-units - one for the matrix and four for the isolation switches. This is summarised in Table 4-2 below and in Figure 4.4.

Table 4-2. 65-217 64x8 Matrix Plug-in Module - Programming Sub-Unit Allocation

Matrix	Function	Sub-unit	Sub-unit Type
single 64x8 matrix with Y-bus isolation	Matrix Crosspoints X1/Y1 to X64/Y8	1	MAT(64x8)
	Y-Bus Isolation for Analog Bus A	2	SW(8x1)
	Y-Bus Isolation for Analog Bus B	3	SW(8x1)
	Y-Bus Isolation for Analog Bus A Loop-thru	4	SW(8x1)
	Y-Bus Isolation for Analog Bus B Loop-thru	5	SW(8x1)

The 65-217 can be programmed individually based on the "Card Handle" for each plugin module. This is summarised in Table 4-3 below.

Table 4-3. 65-217 Programming Sub-Unit Allocation - Card Handle 2-7

Card Handle	Chassis Slot No.	Bus	Device	Sub-Unit Type				
				Sub-Unit 1 Matrix	Sub-Unit 2 Y-Bus A Isolation	Sub-Unit 3 Y-Bus B Isolation	Sub-Unit 4 Y-Bus A Loop-Thru Isolation	Sub-Unit 5 Y-Bus B Loop-Thru Isolation
2	1	3	1	MATRIX(64x8)	SWITCH(8)	SWITCH(8)	SWITCH(8)	SWITCH(8)
3	2	3	2	MATRIX(128x8)	SWITCH(16)	SWITCH(16)	SWITCH(16)	SWITCH(16)
4	3	3	3	MATRIX(192x8)	SWITCH(24)	SWITCH(24)	SWITCH(24)	SWITCH(24)
5	4	3	4	MATRIX(256x8)	SWITCH(32)	SWITCH(32)	SWITCH(32)	SWITCH(32)
6	5	3	5	MATRIX(320x8)	SWITCH(40)	SWITCH(40)	SWITCH(40)	SWITCH(40)
7	6	3	6	MATRIX(384x8)	SWITCH(48)	SWITCH(48)	SWITCH(48)	SWITCH(48)

Using the Matrix

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, or Y-Y connections using an X line as a path. Whenever a signal path is enabled requiring a user connection to the Y bus, the corresponding Y isolation switch has to be enabled on one of the 20 analog buses. Similarly, analog bus connections have to be made to route a Y connection between the 256x4 sub-matrices that make up the overall matrix.

Page 4.8 gives a very simple example using the provided drivers.

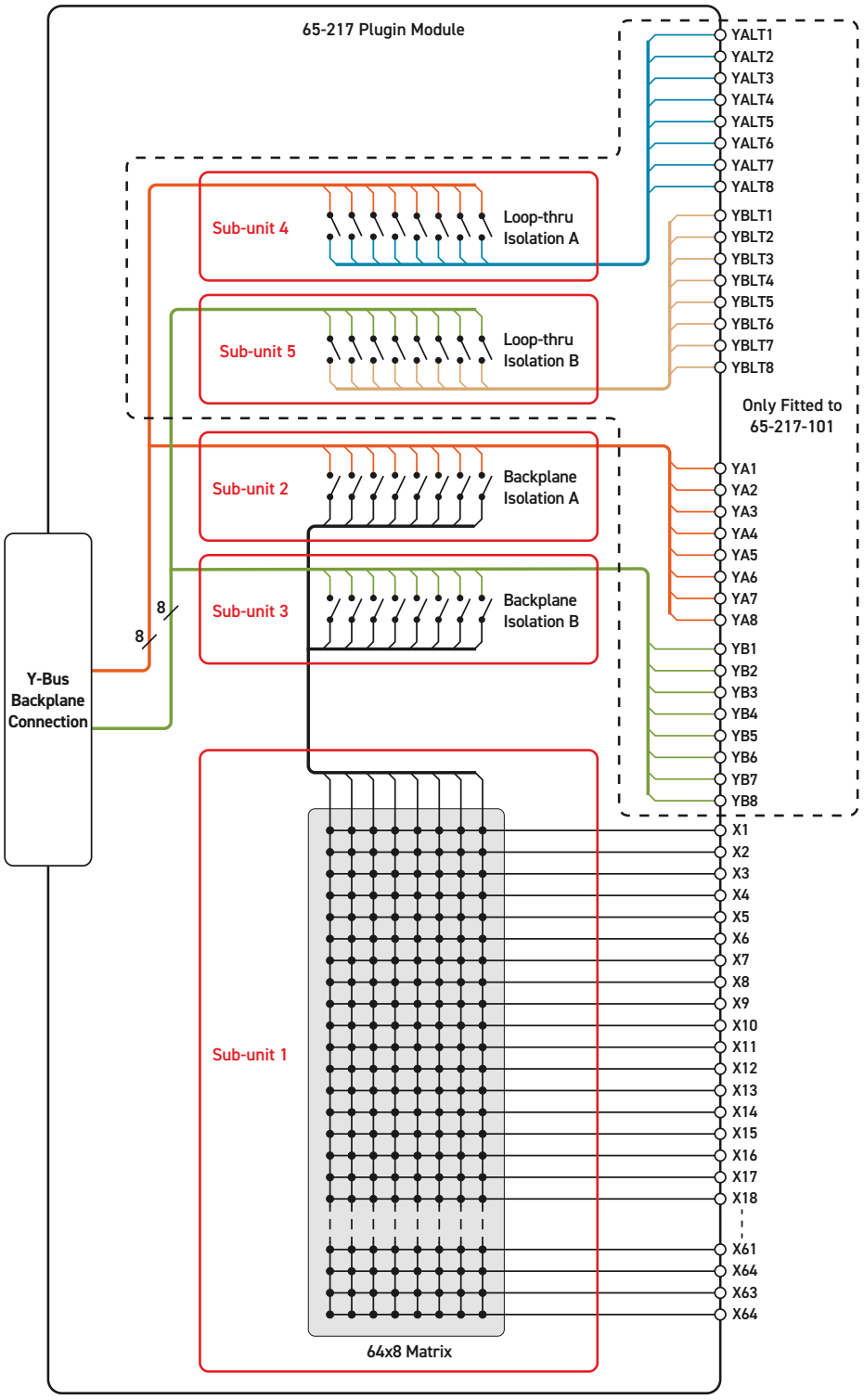


Figure 4-1. Sub-unit Allocation - 65-217-101/001 64x8 Matrix Plug-in Module

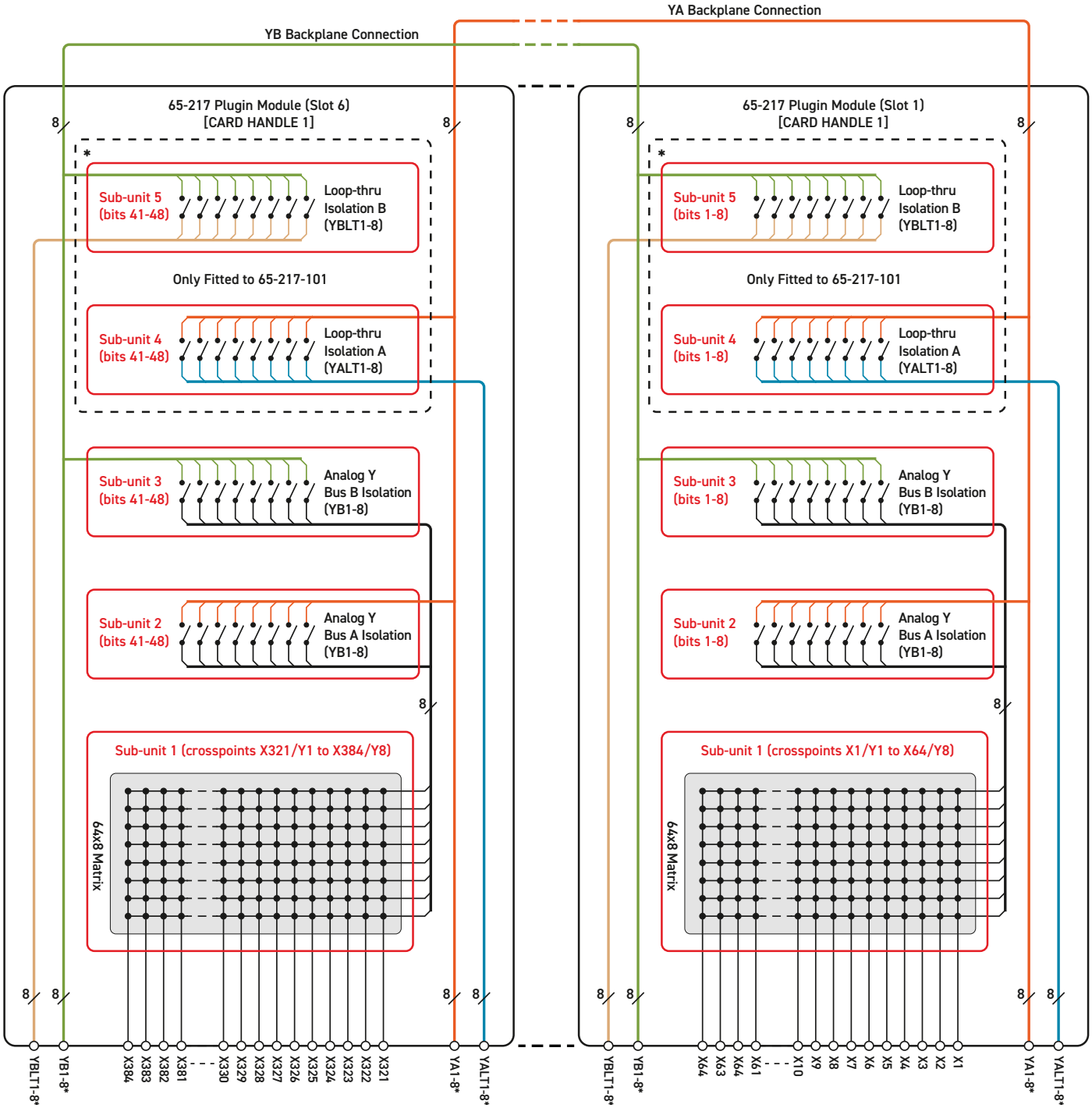


Figure 4-2. Sub-unit Allocation for 65-217 Matrix when programming the unit in "Card Handle 1" approach is used
***Loop-thru Isolation relays and front panel YA, YB, YALT and YBLT connections are only fitted to 65-217-101 plug-in module**

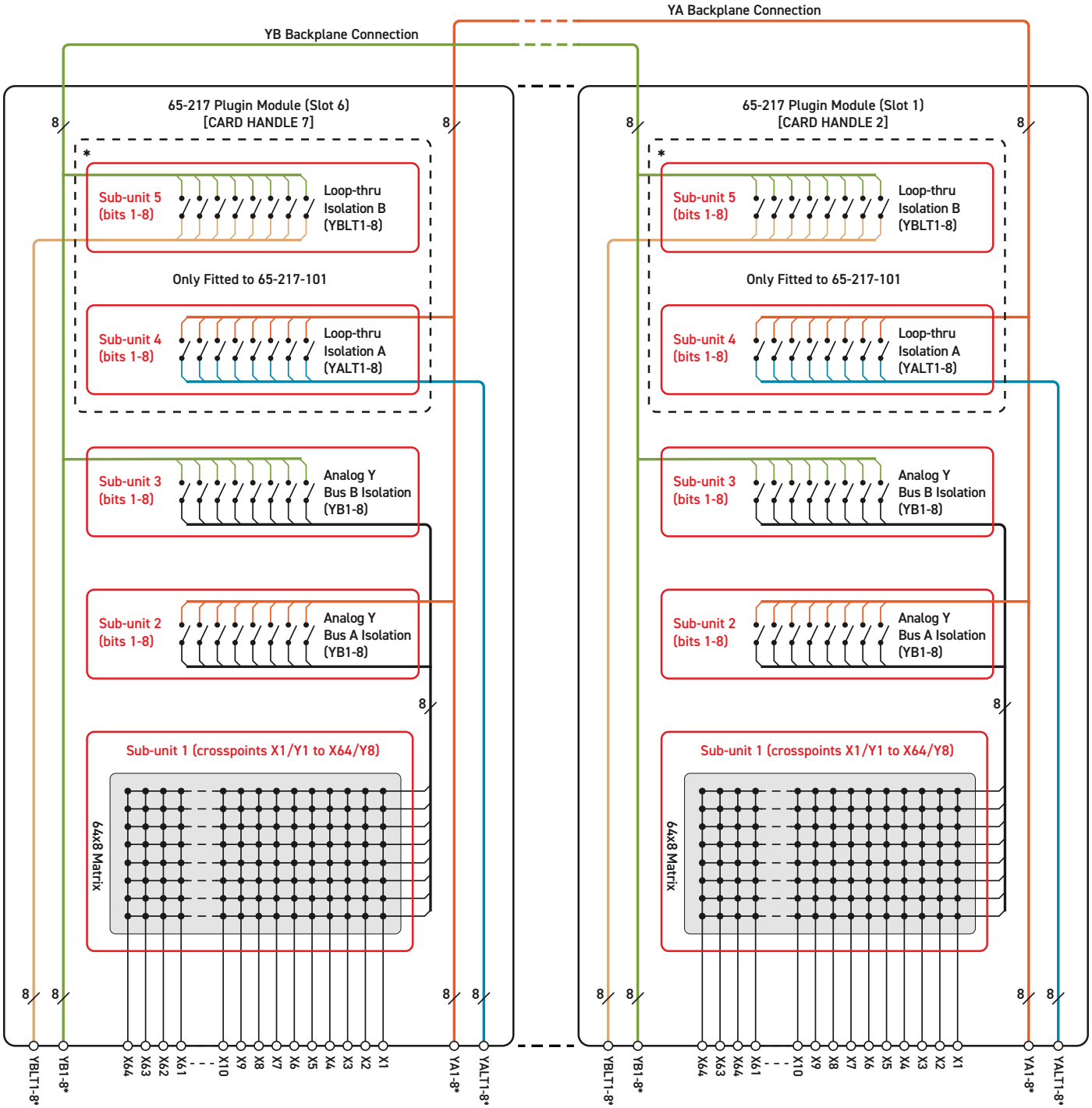


Figure 4-3. Sub-unit Allocation for 65-217 Matrix when programming the unit in "Card Handle 2-7" approach is used
***Loop-thru Isolation relays and front panel YA, YB, YALT and YBLT connections are only fitted to 65-217-101 plug-in module**

Example – Making X1->Y1 connection

(Error checking has been removed to simplify the code)

Establish a session on the LXI device and open the internal switch card:

```
SESSION session;
DWORD err, cardnum;
err = PICMLX_Connect(0, “192.168.1.100”, 1024, 2000, &session);
cardnum = PIPLX_OpenCards(session);
```

Make a connection X1->Y1 on the first Y (YA) switch bank:

```
DWORD matsub = 1;
DWORD isosub = 2;
err = PIPLX_OpCrosspoint(session, cardnum, matsub, 1, 1, 1); // connect crosspoint X1, Y1
err = PIPLX_OpBit(session, cardnum, isosub, 1, 1); // connect isolation relay YA1
```

Make a connection X1-Y1 on the second Y (YB) switch bank

```
DWORD isosub = 3;
err = PIPLX_OpBit(session, cardnum, isosub, 1, 1); // connect isolation relay YB1
```

Make a connection X1-Y1 on the first Y (YALT) switch bank

```
DWORD isosub = 4;
err = PIPLX_OpBit(session, cardnum, isosub, 1, 1); // connect isolation relay YALT1
```

Make a connection X1-Y1 on the first Y (YBLT) switch bank

```
DWORD isosub = 5;
err = PIPLX_OpBit(session, cardnum, isosub, 1, 1); // connect isolation relay YBLT1
```

Please refer to documentation for the driver API for detail of these calls and their parameters.

Using the IVI Driver, pi40iv

Using the pi40iv driver, the `pi40iv_InitWithOptions` function should be used to establish a session on the matrix card.

Switch closures on the matrix are made using the `pi40iv_Connect` function and released using the `pi40iv_Disconnect` function.

The following code snippet demonstrates the minimum steps required to operate a switch on a Pickering LXI unit.

Firstly a device session is opened on the card located at bus 0, device 20 inside the LXI unit located at 192.168.1.100.

Then a switch closure of the crosspoint on the first matrix at (x,y) location (12,4) is made then released.

Finally the session is closed.

Please refer to the IVI channel names for the whole unit on the following page.

```
ViSession vi;
ViStatus err;

ViRsrc rsrc_name = "TCPIP::192.168.1.100::0.20::INSTR";
ViString options = "Simulate=1,RangeCheck=1,QueryInstrStatus=0, \
                                Cache=1,DriverSetup=Model:65-217-101;";

err = pi40iv_InitWithOptions(rscr_name, VI_TRUE, VI_TRUE, options, &vi);


if (err == VI_SUCCESS)
{
       pi40iv_Connect(vi, "xA12", "yA4");      // connect crosspoint X12, Y4
       pi40iv_Connect(vi, "comB4", "chB4");    // connect Y4 signal to YA4 on front panel
                                               // and backplane
       .
       .
       .
       pi40iv_Disconnect(vi, "comB4", "chB4"); // disconnect Y4 signal from YA4 on front panel
                                               // and backplane
       pi40iv_Disconnect(vi, "xA12", "yA4");   // disconnect crosspoint X12, Y4}

pi40iv_Close(vi);
```

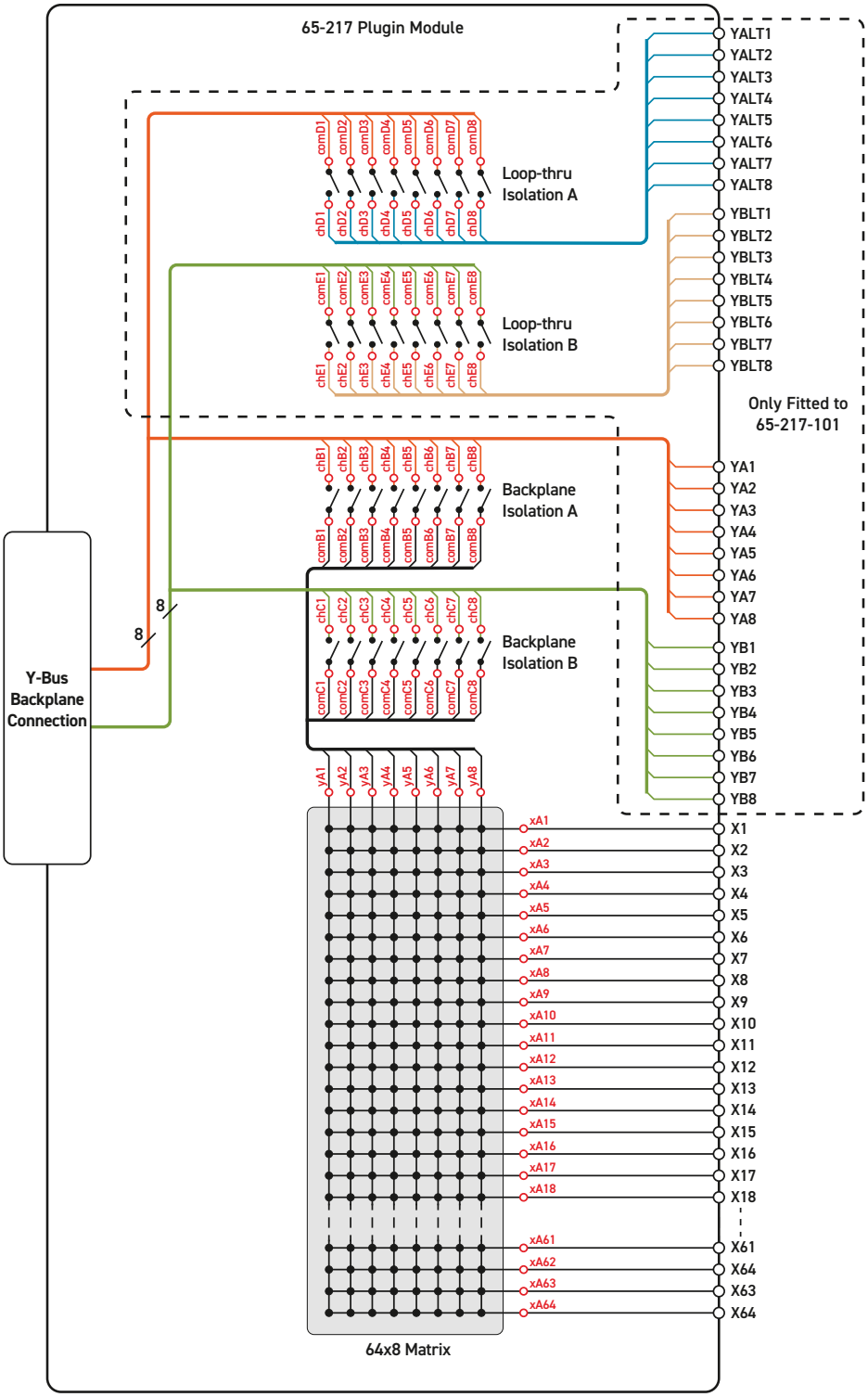


Figure 4-4. Channel Names for IVI Driver - 65-217-101/001 64x8 Matrix Plug-in Module

IVI Channel Names

The IVI channel names for the switching elements of the 60-217 are shown below. This is also summarised in Figure 4-4.

Sub-unit 1, Matrix, Crosspoints for Matrix A:

```
"xA1" -> "xA64"
"yA1" -> "yA8"
```

Sub-unit 2, Switch, Backplane Isolation Switches A:

```
"comB1" -> "comB8"
"chB1" -> "chB8"
```

Sub-unit 3, Switch, Backplane Isolation Switches B:

```
"comC1" -> "comC8"
"chC1" -> "chC8"
```

Sub-unit 4, Switch, Loop-thru Isolation Switches A:

```
"comD1" -> "comD8"
"chD1" -> "chD8"
```

Sub-unit 5, Switch, Loop-thru Isolation Switches B:

```
"comE1" -> "comE8"
"chE1" -> "chE8"
```

SSH (Secure SHell) Interface

Refer to the section "Command Line Control of Pickering LXI Instruments" in the 65-200 Scalable Chassis user manual for details of how to open this interface and general information on the command set available.

Command Line Control of Pickering LXI Instruments

For a description of command line control of a Pickering LXI device, please refer to the 65-200 Scalable Chassis user manual.

The 65-200 Scalable Chassis user manual can be downloaded via the web page:
https://www.pickeringtest.com/product/65-200-002-lxi-2u-modular-chassis-6-slot

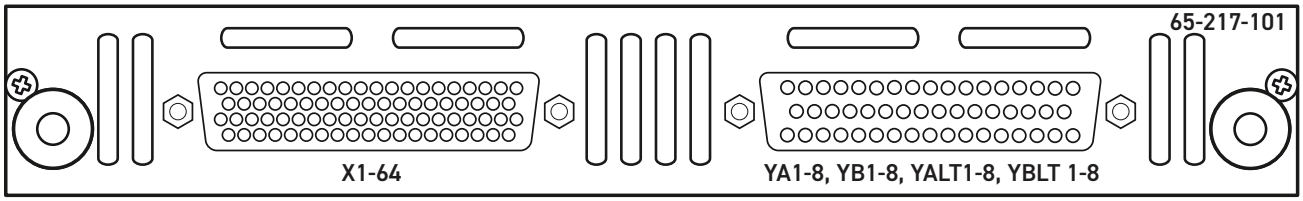


Figure 5-1. 65-217-101 Plugin Module With Y-Access, Connector Positions

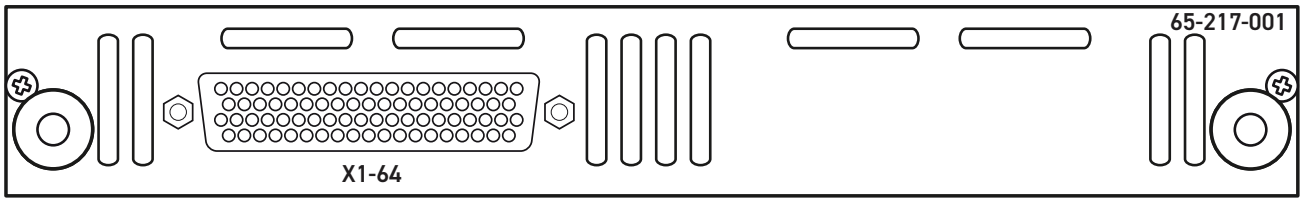


Figure 5-2. 65-217-001 Plugin Module Without Y-Access, Connector Positions

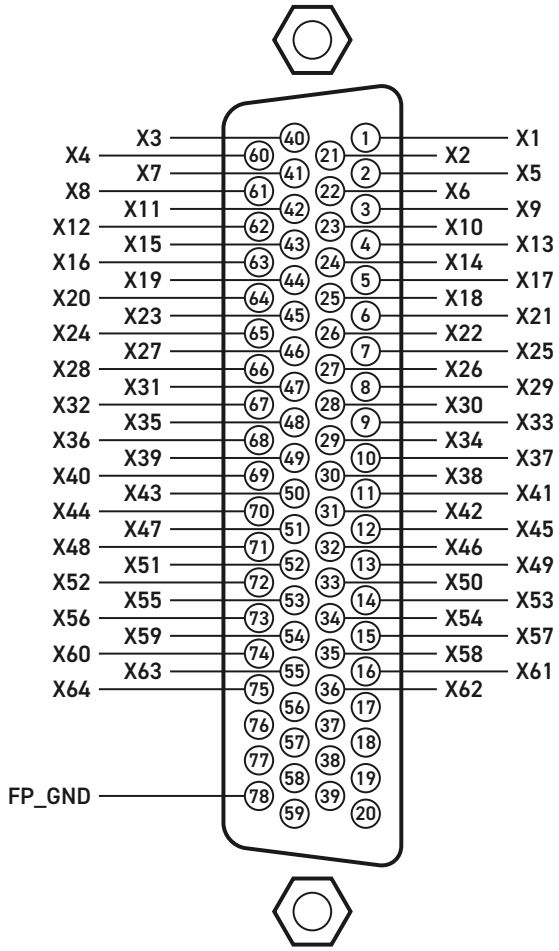


Figure 5-3. 65-217-101/001 Plugin Module, X Connector Pin-out
(78-pin D-type connector viewed from front of module)

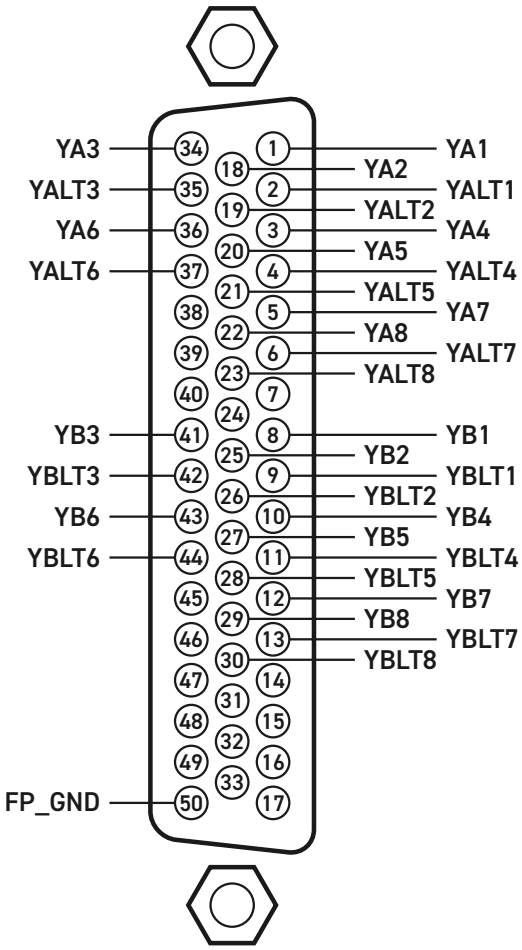


Figure 5-3. 65-217-101 Plugin Module, Y Connector Pin-out
(50-pin D-type connector viewed from front of module)

Section 6 - Sequence Service & Triggering

Sequence Service & Triggering

For a description of the Sequencing Service and Triggering function as well information on the DIO/Trigger port, please refer to the 65-200 Scalable Chassis user manual.

The 65-200 Scalable Chassis user manual can be downloaded via the web page:
https://www.pickeringtest.com/product/65-200-002-lxi-2u-modular-chassis-6-slot

Section 7 - Troubleshooting

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 cables are properly connected

Troubleshooting Guide

For a troubleshooting guide for the LXI interface and LAN connectivity of the unit, please refer to the 65-200 Scalable Chassis user manual.

The 65-200 Scalable Chassis user manual can be downloaded via the web page:
https://www.pickeringtest.com/product/65-200-002-lxi-2u-modular-chassis-6-slot

Section 8 - 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

No software updates are required for LXI products in normal operation. 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.

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 positions of the faulty relays.

Relay Look-up Tables

The following pages provide a cross reference between the signal paths of the Modular Matrix and the physical relays on the mother and daughter boards. The tables can be used in the fault finding process and should be used in conjunction with the corresponding PCB layout diagrams to indentify the position of faulty relays.

See Figures 8.1 and 8.2 for the locations of the sub-matrices on the mother and daughter boards as well as the locations of the crosspoint and isolation relays.

The relay look-up tables for the daughterboards fitted to the 65-217 Plugin Module are summarized below:

Table 8.1 - Backplane and Loop-thru Isolation (on motherboard) - Relay Cross Reference (Y1 TO Y8)

Table 8.2 - 8x8 Sub-matrix 1 (on motherboard) - Relay Cross Reference (Crosspoints X1/Y1 to X8/Y8)

Table 8.3 - 8x8 Sub-matrix 2 (on motherboard) - Relay Cross Reference (Crosspoints X9/Y1 to X16/Y8)

Table 8.4 - 8x8 Sub-matrix 3 (on motherboard) - Relay Cross Reference (Crosspoints X17/Y1 to X24/Y8)

Table 8.5 - 8x8 Sub-matrix 4 (on motherboard) - Relay Cross Reference (Crosspoints X25/Y1 to X32/Y8)

Table 8.6 - 8x8 Sub-matrix 5 (on daughterboard) - Relay Cross Reference (Crosspoints X33/Y1 to X40/Y8)

Table 8.7 - 8x8 Sub-matrix 6 (on daughterboard) - Relay Cross Reference (Crosspoints X41/Y1 to X48/Y8)

Table 8.8 - 8x8 Sub-matrix 7 (on daughterboard) - Relay Cross Reference (Crosspoints X49/Y1 to X56/Y8)

Table 8.9 - 8x8 Sub-matrix 8 (on daughterboard) - Relay Cross Reference (Crosspoints X57/Y1 to X64/Y8)

Table 8.1 - Backplane and Loop-thru Isolation (on motherboard) - Relay Cross Reference (Y1 to Y8)

Backplane YA Isolation	Relay No.	Backplane YB Isolation	Relay No.	Loop-thru YA Isolation	Relay No.	Loop-thru YB Isolation	Relay No.
Y1	321	Y1	329	Y1	337	Y1	345
Y2	322	Y2	330	Y2	338	Y2	346
Y3	323	Y3	331	Y3	339	Y3	347
Y4	324	Y4	332	Y4	340	Y4	348
Y5	325	Y5	333	Y5	341	Y5	349
Y6	326	Y6	334	Y6	342	Y6	350
Y7	327	Y7	335	Y7	343	Y7	351
Y8	328	Y8	336	Y8	344	Y8	352

Table 8.2 - 8x8 Sub-matrix 1 (on motherboard) - Relay Cross Reference (Crosspoints X1/Y1 to X8/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X1	Y1	1	X1	Y3	17	X1	Y5	33	X1	Y7	49	X1	257	Y1	289
X2	Y1	2	X2	Y3	18	X2	Y5	34	X2	Y7	50	X2	258	Y2	290
X3	Y1	3	X3	Y3	19	X3	Y5	35	X3	Y7	51	X3	259	Y3	291
X4	Y1	4	X4	Y3	20	X4	Y5	36	X4	Y7	52	X4	260	Y4	292
X5	Y1	5	X5	Y3	21	X5	Y5	37	X5	Y7	53	X5	261	Y5	293
X6	Y1	6	X6	Y3	22	X6	Y5	38	X6	Y7	54	X6	262	Y6	294
X7	Y1	7	X7	Y3	23	X7	Y5	39	X7	Y7	55	X7	263	Y7	295
X8	Y1	8	X8	Y3	24	X8	Y5	40	X8	Y7	56	X8	264	Y8	296
X1	Y2	9	X1	Y4	25	X1	Y6	41	X1	Y8	57				
X2	Y2	10	X2	Y4	26	X2	Y6	42	X2	Y8	58				
X3	Y2	11	X3	Y4	27	X3	Y6	43	X3	Y8	59				
X4	Y2	12	X4	Y4	28	X4	Y6	44	X4	Y8	60				
X5	Y2	13	X5	Y4	29	X5	Y6	45	X5	Y8	61				
X6	Y2	14	X6	Y4	30	X6	Y6	46	X6	Y8	62				
X7	Y2	15	X7	Y4	31	X7	Y6	47	X7	Y8	63				
X8	Y2	16	X8	Y4	32	X8	Y6	48	X8	Y8	64				

Table 8.3 - 8x8 Sub-matrix 2 (on motherboard) - Relay Cross Reference (Crosspoints X9/Y1 to X16/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X9	Y1	65	X9	Y3	81	X9	Y5	97	X9	Y7	113	X9	265	Y1	297
X10	Y1	66	X10	Y3	82	X10	Y5	98	X10	Y7	114	X10	266	Y2	298
X11	Y1	67	X11	Y3	83	X11	Y5	99	X11	Y7	115	X11	267	Y3	299
X12	Y1	68	X12	Y3	84	X12	Y5	100	X12	Y7	116	X12	268	Y4	300
X13	Y1	69	X13	Y3	85	X13	Y5	101	X13	Y7	117	X13	269	Y5	301
X14	Y1	70	X14	Y3	86	X14	Y5	102	X14	Y7	118	X14	270	Y6	302
X15	Y1	71	X15	Y3	87	X15	Y5	103	X15	Y7	119	X15	271	Y7	303
X16	Y1	72	X16	Y3	88	X16	Y5	104	X16	Y7	120	X16	272	Y8	304
X9	Y2	73	X9	Y4	89	X9	Y6	105	X9	Y8	121				
X10	Y2	74	X10	Y4	90	X10	Y6	106	X10	Y8	122				
X11	Y2	75	X11	Y4	91	X11	Y6	107	X11	Y8	123				
X12	Y2	76	X12	Y4	92	X12	Y6	108	X12	Y8	124				
X13	Y2	77	X13	Y4	93	X13	Y6	109	X13	Y8	125				
X14	Y2	78	X14	Y4	94	X14	Y6	110	X14	Y8	126				
X15	Y2	79	X15	Y4	95	X15	Y6	111	X15	Y8	127				
X16	Y2	80	X16	Y4	96	X16	Y6	112	X16	Y8	128				

Table 8.4 - 8x8 Sub-matrix 3 (on motherboard) - Relay Cross Reference (Crosspoints X17/Y1 to X24/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X17	Y1	129	X17	Y3	145	X17	Y5	161	X17	Y7	177	X17	273	Y1	305
X18	Y1	130	X18	Y3	146	X18	Y5	162	X18	Y7	178	X18	274	Y2	306
X19	Y1	131	X19	Y3	147	X19	Y5	163	X19	Y7	179	X19	275	Y3	307
X20	Y1	132	X20	Y3	148	X20	Y5	164	X20	Y7	180	X20	276	Y4	308
X21	Y1	133	X21	Y3	149	X21	Y5	165	X21	Y7	181	X21	277	Y5	309
X22	Y1	134	X22	Y3	150	X22	Y5	166	X22	Y7	182	X22	278	Y6	310
X23	Y1	135	X23	Y3	151	X23	Y5	167	X23	Y7	183	X23	279	Y7	311
X24	Y1	136	X24	Y3	152	X24	Y5	168	X24	Y7	184	X24	280	Y8	312
X17	Y2	137	X17	Y4	153	X17	Y6	169	X17	Y8	185				
X18	Y2	138	X18	Y4	154	X18	Y6	170	X18	Y8	186				
X19	Y2	139	X19	Y4	155	X19	Y6	171	X19	Y8	187				
X20	Y2	140	X20	Y4	156	X20	Y6	172	X20	Y8	188				
X21	Y2	141	X21	Y4	157	X21	Y6	173	X21	Y8	189				
X22	Y2	142	X22	Y4	158	X22	Y6	174	X22	Y8	190				
X23	Y2	143	X23	Y4	159	X23	Y6	175	X23	Y8	191				
X24	Y2	144	X24	Y4	160	X24	Y6	176	X24	Y8	192				

Table 8.5 - 8x8 Sub-matrix 4 (on motherboard) - Relay Cross Reference (Crosspoints X25/Y1 to X32/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X25	Y1	193	X25	Y3	209	X25	Y5	225	X25	Y7	241	X25	281	Y1	313
X26	Y1	194	X26	Y3	210	X26	Y5	226	X26	Y7	242	X26	282	Y2	314
X27	Y1	195	X27	Y3	211	X27	Y5	227	X27	Y7	243	X27	283	Y3	315
X28	Y1	196	X28	Y3	212	X28	Y5	228	X28	Y7	244	X28	284	Y4	316
X29	Y1	197	X29	Y3	213	X29	Y5	229	X29	Y7	245	X29	285	Y5	317
X30	Y1	198	X30	Y3	214	X30	Y5	230	X30	Y7	246	X30	286	Y6	318
X31	Y1	199	X31	Y3	215	X31	Y5	231	X31	Y7	247	X31	287	Y7	319
X32	Y1	200	X32	Y3	216	X32	Y5	232	X32	Y7	248	X32	288	Y8	320
X25	Y2	201	X25	Y4	217	X25	Y6	233	X25	Y8	249				
X26	Y2	202	X26	Y4	218	X26	Y6	234	X26	Y8	250				
X27	Y2	203	X27	Y4	219	X27	Y6	235	X27	Y8	251				
X28	Y2	204	X28	Y4	220	X28	Y6	236	X28	Y8	252				
X29	Y2	205	X29	Y4	221	X29	Y6	237	X29	Y8	253				
X30	Y2	206	X30	Y4	222	X30	Y6	238	X30	Y8	254				
X31	Y2	207	X31	Y4	223	X31	Y6	239	X31	Y8	255				
X32	Y2	208	X32	Y4	224	X32	Y6	240	X32	Y8	256				

Table 8.6 - 8x8 Sub-matrix 5 (on daughterboard) - Relay Cross Reference (Crosspoints X33/Y1 to X40/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X33	Y1	1	X33	Y3	17	X33	Y5	33	X33	Y7	49	X33	257	Y1	289
X34	Y1	2	X34	Y3	18	X34	Y5	34	X34	Y7	50	X34	258	Y2	290
X35	Y1	3	X35	Y3	19	X35	Y5	35	X35	Y7	51	X35	259	Y3	291
X36	Y1	4	X36	Y3	20	X36	Y5	36	X36	Y7	52	X36	260	Y4	292
X37	Y1	5	X37	Y3	21	X37	Y5	37	X37	Y7	53	X37	261	Y5	293
X38	Y1	6	X38	Y3	22	X38	Y5	38	X38	Y7	54	X38	262	Y6	294
X39	Y1	7	X39	Y3	23	X39	Y5	39	X39	Y7	55	X39	263	Y7	295
X40	Y1	8	X40	Y3	24	X40	Y5	40	X40	Y7	56	X40	264	Y8	296
X33	Y2	9	X33	Y4	25	X33	Y6	41	X33	Y8	57				
X34	Y2	10	X34	Y4	26	X34	Y6	42	X34	Y8	58				
X35	Y2	11	X35	Y4	27	X35	Y6	43	X35	Y8	59				
X36	Y2	12	X36	Y4	28	X36	Y6	44	X36	Y8	60				
X37	Y2	13	X37	Y4	29	X37	Y6	45	X37	Y8	61				
X38	Y2	14	X38	Y4	30	X38	Y6	46	X38	Y8	62				
X39	Y2	15	X39	Y4	31	X39	Y6	47	X39	Y8	63				
X40	Y2	16	X40	Y4	32	X40	Y6	48	X40	Y8	64				

Table 8.7 - 8x8 Sub-matrix 6 (on daughterboard) - Relay Cross Reference (Crosspoints X41/Y1 to X48/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X41	Y1	65	X41	Y3	81	X41	Y5	97	X41	Y7	113	X41	265	Y1	297
X42	Y1	66	X42	Y3	82	X42	Y5	98	X42	Y7	114	X42	266	Y2	298
X43	Y1	67	X43	Y3	83	X43	Y5	99	X43	Y7	115	X43	267	Y3	299
X44	Y1	68	X44	Y3	84	X44	Y5	100	X44	Y7	116	X44	268	Y4	300
X45	Y1	69	X45	Y3	85	X45	Y5	101	X45	Y7	117	X45	269	Y5	301
X46	Y1	70	X46	Y3	86	X46	Y5	102	X46	Y7	118	X46	270	Y6	302
X47	Y1	71	X47	Y3	87	X47	Y5	103	X47	Y7	119	X47	271	Y7	303
X48	Y1	72	X48	Y3	88	X48	Y5	104	X48	Y7	120	X48	272	Y8	304
X41	Y2	73	X41	Y4	89	X41	Y6	105	X41	Y8	121				
X42	Y2	74	X42	Y4	90	X42	Y6	106	X42	Y8	122				
X43	Y2	75	X43	Y4	91	X43	Y6	107	X43	Y8	123				
X44	Y2	76	X44	Y4	92	X44	Y6	108	X44	Y8	124				
X45	Y2	77	X45	Y4	93	X45	Y6	109	X45	Y8	125				
X46	Y2	78	X46	Y4	94	X46	Y6	110	X46	Y8	126				
X47	Y2	79	X47	Y4	95	X47	Y6	111	X47	Y8	127				
X48	Y2	80	X48	Y4	96	X48	Y6	112	X48	Y8	128				

Table 8.8 - 8x8 Sub-matrix 7 (on daughterboard) - Relay Cross Reference (Crosspoints X49/Y1 to X56/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X49	Y1	129	X49	Y3	145	X49	Y5	161	X49	Y7	177	X49	273	Y1	305
X50	Y1	130	X50	Y3	146	X50	Y5	162	X50	Y7	178	X50	274	Y2	306
X51	Y1	131	X51	Y3	147	X51	Y5	163	X51	Y7	179	X51	275	Y3	307
X52	Y1	132	X52	Y3	148	X52	Y5	164	X52	Y7	180	X52	276	Y4	308
X53	Y1	133	X53	Y3	149	X53	Y5	165	X53	Y7	181	X53	277	Y5	309
X54	Y1	134	X54	Y3	150	X54	Y5	166	X54	Y7	182	X54	278	Y6	310
X55	Y1	135	X55	Y3	151	X55	Y5	167	X55	Y7	183	X55	279	Y7	311
X56	Y1	136	X56	Y3	152	X56	Y5	168	X56	Y7	184	X56	280	Y8	312
X49	Y2	137	X49	Y4	153	X49	Y6	169	X49	Y8	185				
X50	Y2	138	X50	Y4	154	X50	Y6	170	X50	Y8	186				
X51	Y2	139	X51	Y4	155	X51	Y6	171	X51	Y8	187				
X52	Y2	140	X52	Y4	156	X52	Y6	172	X52	Y8	188				
X53	Y2	141	X53	Y4	157	X53	Y6	173	X53	Y8	189				
X54	Y2	142	X54	Y4	158	X54	Y6	174	X54	Y8	190				
X55	Y2	143	X55	Y4	159	X55	Y6	175	X55	Y8	191				
X56	Y2	144	X56	Y4	160	X56	Y6	176	X56	Y8	192				

Table 8.9 - 8x8 Sub-matrix 8 (on daughterboard) - Relay Cross Reference (Crosspoints X57/Y1 to X64/Y8)

Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Crosspoint		Relay No.	Isolation	Relay No.	Isolation	Relay No.
X57	Y1	193	X57	Y3	209	X57	Y5	225	X57	Y7	241	X57	281	Y1	313
X58	Y1	194	X58	Y3	210	X58	Y5	226	X58	Y7	242	X58	282	Y2	314
X59	Y1	195	X59	Y3	211	X59	Y5	227	X59	Y7	243	X59	283	Y3	315
X60	Y1	196	X60	Y3	212	X60	Y5	228	X60	Y7	244	X60	284	Y4	316
X61	Y1	197	X61	Y3	213	X61	Y5	229	X61	Y7	245	X61	285	Y5	317
X62	Y1	198	X62	Y3	214	X62	Y5	230	X62	Y7	246	X62	286	Y6	318
X63	Y1	199	X63	Y3	215	X63	Y5	231	X63	Y7	247	X63	287	Y7	319
X64	Y1	200	X64	Y3	216	X64	Y5	232	X64	Y7	248	X64	288	Y8	320
X57	Y2	201	X57	Y4	217	X57	Y6	233	X57	Y8	249				
X58	Y2	202	X58	Y4	218	X58	Y6	234	X58	Y8	250				
X59	Y2	203	X59	Y4	219	X59	Y6	235	X59	Y8	251				
X60	Y2	204	X60	Y4	220	X60	Y6	236	X60	Y8	252				
X61	Y2	205	X61	Y4	221	X61	Y6	237	X61	Y8	253				
X62	Y2	206	X62	Y4	222	X62	Y6	238	X62	Y8	254				
X63	Y2	207	X63	Y4	223	X63	Y6	239	X63	Y8	255				
X64	Y2	208	X64	Y4	224	X64	Y6	240	X64	Y8	256				

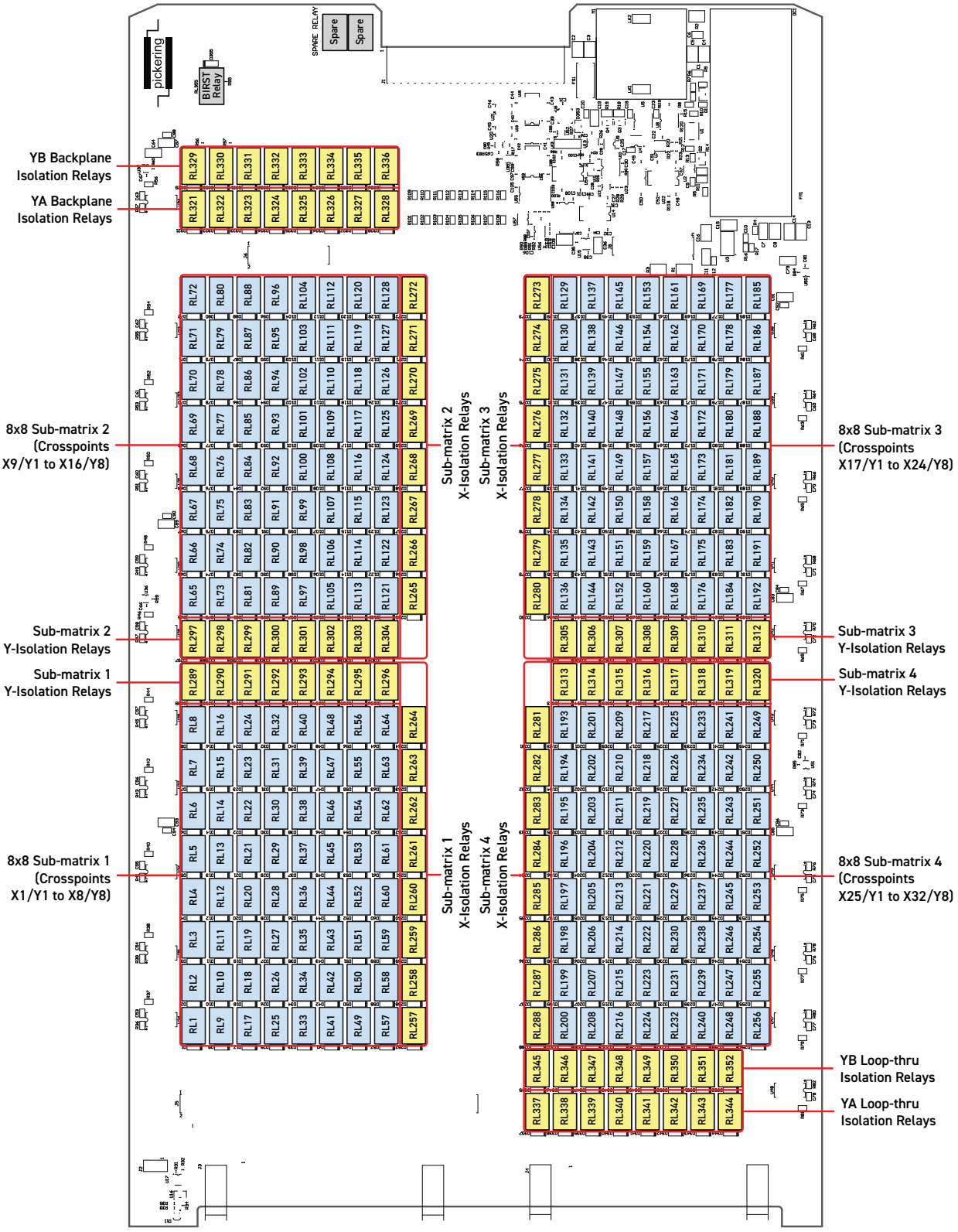


Figure 8.1 - 65-217 Matrix Plugin Module: Motherboard Relay Locations

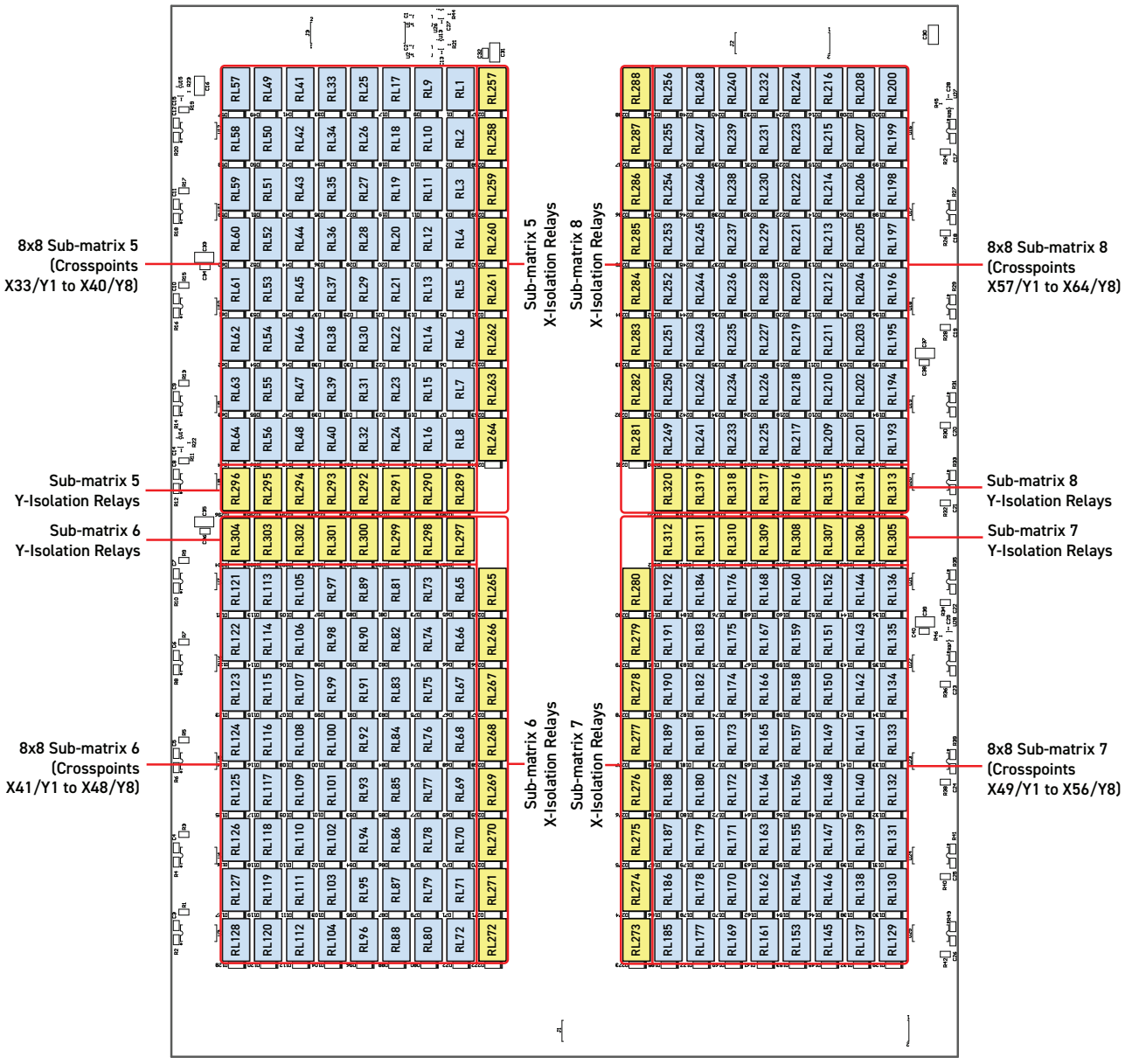


Figure 8.1 - 65-217 Matrix Plugin Module: Daughterboard Relay Locations

Diagnostics

External Loop-Back Connectors

The 60-217 is fitted with the ability to perform self diagnosis of its switching matrix using the BIRST application. This diagnostic tool requires the user to remove all front panel cabling from the unit and fit loop-back connectors to enable the routing of internally generated test signals. For more information on BIRST, see www.pickeringtest.com/birst

To allow the diagnostic test to run, a minimum of three loop-back connectors are required - one for the 78-pin D-type X-bus connector and two for the 50-pin D-type Y-bus/YLT connector. The plug-in moduled is supplied with these three loop-back connectors as outlined below:

- 78-pin loop-back, part number 65-217-BAT1 (fitted to the X1-X64 connector during testing - for X loop-back).
- 50-pin loop-back, part number 64-217-BAT2 (fitted to the Y1-8/YLT1-8 connector during testing - for Y loop-back).
- 50-pin loop-back, part number 64-217-BAT3 (fitted to the Y1-8/YLT1-8 connector during testing - for YLT loop-back).

When executing the diagnostic application, the test will halt at the appropriate stage and the user will be prompted to remove a particular loop-back and re-fit to the next connector.

To simplify the test procedure, loop-backs can be fitted to all front panel connectors. To do this, extra loop-back connectors can be ordered from Pickering Interfaces or the user can construct their own using 78 and 50-pin D-type sockets and referring to the following wiring information:

65-217-BAT1 X-bus 78-pin Loop-Back Pin to Pin Connections
The following pins are connected:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75

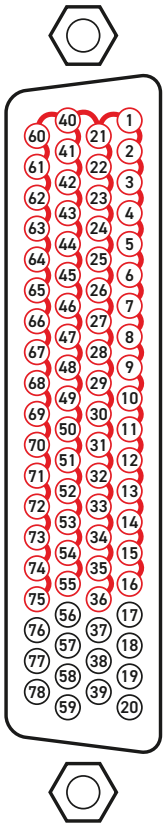


Figure 8-3. X Loop-Back Connector Wiring (female 78-pin D-type viewed from solder side)

65-217-BAT2 Y-bus 50-pin Loop-Back Pin to Pin Connections
The following pins are connected:
1, 3, 5, 8, 10, 12, 18, 20, 22, 25, 27, 29, 34, 36, 41, 43

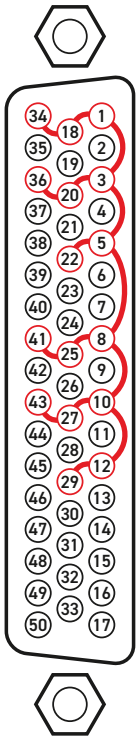


Figure 8-4. Y Loop-Back Connector Wiring (female 50-pin D-type viewed from solder side)

65-217-BAT3 YLT-bus 50-pin Loop-Back Pin to Pin Connections
The following pins are connected:
2, 4, 6, 9, 11, 13, 19, 21, 23, 26, 28, 30, 35, 37, 42, 44

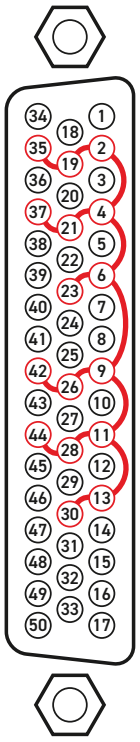


Figure 8-5. YLT Loop-Back Connector Wiring (female 50-pin D-type viewed from solder side)

Appendix A

Product Lifecycle Status

Product Number:	65-217
Introduced:	2026
Product Change Notification (If applicable):	Not applicable
Status:	Active
Compatibility, forward:	Not applicable, latest version
Compatibility, backward:	Not applicable, original version
Last Time Buy Date:	Not applicable
Form, fit, function to previous version:	Not applicable, original version
Details of update from previous version:	Not applicable, original version