- **Fault Insertion on 4 or 8 Channels of 2 Wire Connections**
- **Suited for Ethernet Fault Insertion**
- **Compatible With 1Gb Ethernet, AFDX & BroadR-Reach**
- **Controlled Transmission Line Impedance**
- **Simple Insertion of Shorted Pair, Open and Battery/Ground Connection**
- **VISA, IVI & Kernel Drivers Supplied for Windows**
- **Supported by PXI or LXI Chassis**
- **Supported by *eBIRST*™**
- **3 Year Warranty**

The 40-201 is designed to simulate common faults on high speed two wire communication interfaces such as Ethernet.

It supports 4 or 8 channels of two wire serial connections and can be used for simulating faults on Ethernet, AFDX, BroadR-Reach, 100BaseT and 1000BaseT interfaces. Any wire can be set as open circuit and shorts can be applied across wire pairs or to the adjacent pair. Fault connections can be made to one of four external signals via two fault buses, typically simulating connections to supply voltage or ground.

Each channel can support up to 0.3A and is rated to 100V between wire pairs. The wire pairs have controlled transmission line impedance suited to most differential pair signalling systems, including 100BaseT, 1000BaseT, AFDX, BroadR-Reach and other automotive Ethernet systems.

The fault buses are capable of carrying 2A allowing multiple channels to be connected to the same fault condition. Additionally, each fault bus has a changeover relay to allow the user to select alternative external fault conditions.
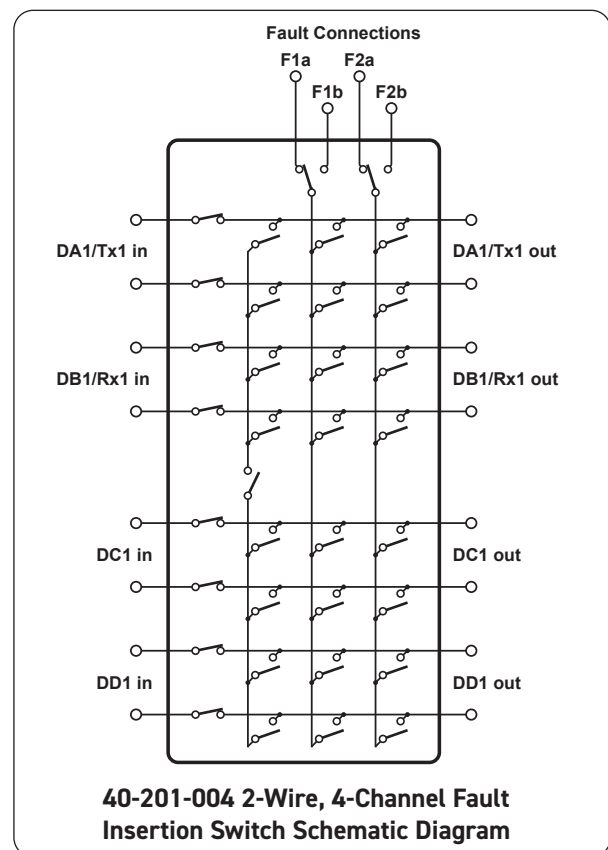
Differential Bus Switching

We also offer the 40-736 and 40-737 multiplexers which are suitable for switching Ethernet, USB and other serial communications signals.

Supported by *eBIRST*

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

For more information go to: pickeringtest.com/ebirst

Pickering's Range of PXI Fault Insertion Switches					
Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current or Bus Type
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191A	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A
40-200	4 or 8 differential	4	8	100V	CAN, FlexRay
40-201	4 or 8 differential	2	4	100V	Ethernet/AFDX /BroadR-Reach
40-202	22 or 11 pairs	—	22 or 11	150V	1A

40-201-004 2-Wire, 4-Channel Fault Insertion Switch Schematic Diagram

Relay Type

The 40-201 is fitted with high quality EMR relays designed for telecommunications use with a long service life.

Data Path Specification

Configuration:	4 or 8 pairs of two wire connections designed for use on high speed differential serial interfaces including Ethernet 1000BaseT, AFDX and BroadR-Reach.
Faults Simulated:	Open on either wire or both, short between wires or to adjacent wire pair, short to one of four fault connections via two fault buses.
Differential Line Impedance:	100Ω
Voltage Rating:	100V*
Current Rating:	0.3A
Max Hot Switch Power:	30W
Path Resistance:	<2Ω data input to output
Typical Bandwidth:	>400MHz differential
Operate Time:	4ms (typical)†

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

† Including Mode A restricted usage feature overhead - see user manual for further information.

Fault Bus Specification

Configuration:	Two fault buses each with a changeover relay for selecting one of two fault conditions.
Voltage Rating:	100V*
Current Rating:	2A
Max Hot Switch Power:	60W

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

Power Requirements

+3.3V	+5V	+12V	-12V
150mA	700mA	0	0

Mechanical Characteristics

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

Connectors

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

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

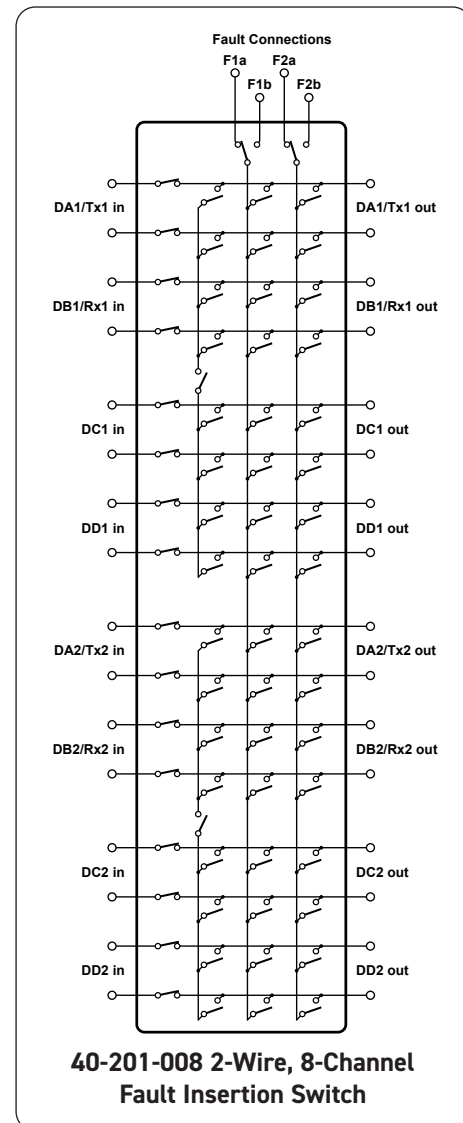| Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

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.

40-201-008 2-Wire, 8-Channel Fault Insertion Switch

Product Order Codes

4-Channel Ethernet/AFDX/ BroadR-Reach Fault Insertion Switch:	**40-201-004**
8-Channel Ethernet/AFDX/ BroadR-Reach Fault Insertion Switch:	**40-201-008**

Accessories:

Interface Board for Gigabit Ethernet, 78-pin D-type to 4xRJ45 & 9-pin D-type fault connector:	**40-965-910**
Interface Board for 100-BaseT, 78-pin D-type to 8xRJ45 & 9-pin D-type fault connector:	**40-965-911**

Product Customization

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

Customization can include:

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

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

Support Products

eBIRST Switching System Test Tool

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

Product	Test Tool	Adaptor
All Types	**93-006-001**	**Not Required**

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
All Types	**91-100-001**

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

Mating Connectors & Cabling

For general purpose (non-differential) connection accessories for the 40-201 module please refer to the 90-006D 78-pin D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Note: To use the 40-201 up to its full operating frequency, cables with twisted pairs must be used.

Interface Boards

40-965-910 Gigabit Ethernet Interface Board

40-965-911 100-BaseT Ethernet Interface Board

Pickering Interfaces is able to design and supply interface boards, such as the 40-965-910 and 40-965-911, that adapt the 78-pin D-Type connector to other connector types, including RJ45. For further information contact your local Pickering Interfaces sales representative with your requirements.

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
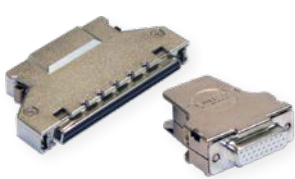- Integrated module timing and synchronization

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
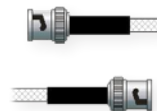- Independence from Windows operating system

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
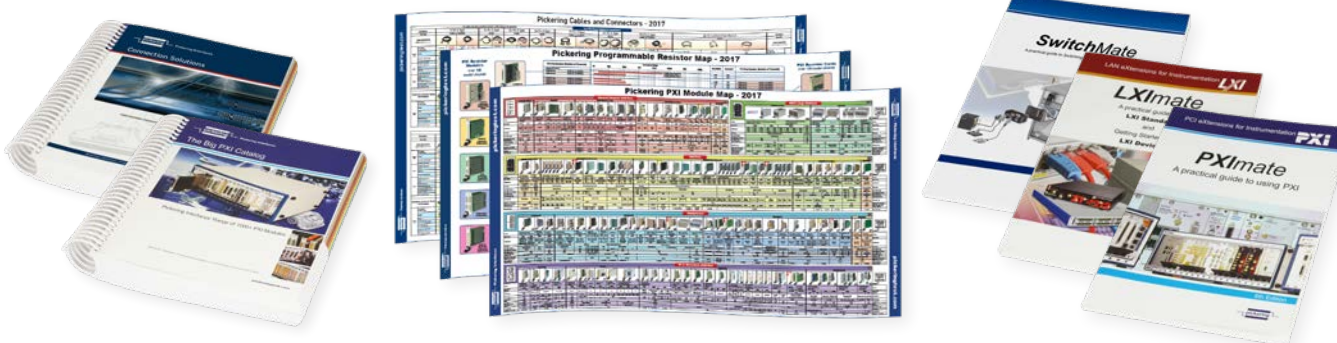
Three Year Warranty & Guaranteed Long-Term Support

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

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