PXI 30 A Fault Insertion Switch Modules

40-191B

- 6 Fault Insertion Channels
- Available With Optional Hardware Interlock
- 40 A Single Channel
- 30 A Continuous, All Channels
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- 2 Fault Insertion Buses
- High Inrush Current Rating
- Switch ±40 V Signals (AC or DC)
- Drivers Supplied for Windows and Linux, Plus Support for Real-time Systems
- Supported by PXI or LXI Chassis
- Supported by ***eBIRST*** ™
- 3 Year Warranty

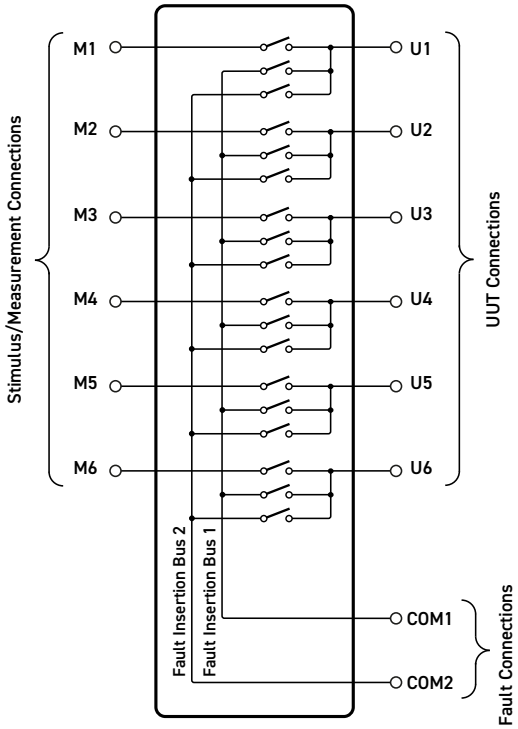
The 40-191B is a 6 Channel Fault Insertion switch for fault simulation in automotive systems. It can carrying 40 A on single channel or 30 A on all channels at the same time and provides a robust solution to high current fault insertion.

It is is able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to external signals

Through relays allow signals to the UUT to be set open-circuit. Two fault insertion buses can be used for shorting channels together or connecting to an external signal such as power, ignition or ground to simulate fault conditions.

The 40-191B uses solid state switching capable of handling inrush current of greater than 120 A and peak voltage of 40 V. With an indefinite number of switching operations the 40-191B can hot switch AC or DC with no life degradation.



40-191B 6-Channel Fault Insertion Switch Schematic Diagram

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

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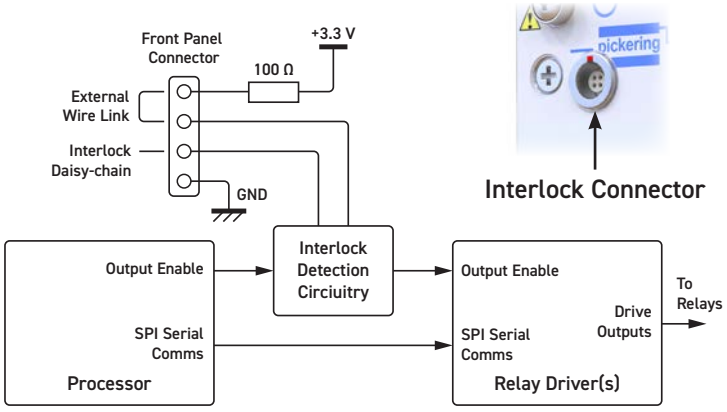
Pickering's Range of PXI Fault Insertion Switches

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	165 V	2 A
40-191B	6	2	2	40 V	30 A
40-192A	6	2	2	200 V	10 A
40-193A	7	1 or 2	1 or 2	16 V	20 A, 1 A min
40-194A	7	1 or 2	1 or 2	16 V	20 A, no min
40-195	22 or 11 pairs	—	8 or 4	150 V	1 A
40-196	10 or 5 pairs	—	10 or 5	110 V	5 A
40-197A	34 or 16	4	8	300 V	2 A
40-198	20	1 or 2	3 or 6	250 V	5 A
40-199	10	1 or 2	2	250 V	10 A
40-200	4 or 8 differential	4	8	100 V	CAN, FlexRay
40-201	4 or 8 differential	2	4	100 V	Ethernet/AFDX/ BroadR-Reach
40-202	22 or 11 pairs	—	22 or 11	150 V	1 A

Hardware Interlock

The 40-191B modules are available with an optional hardware interlock. The interlock, when activated, will return all relays to their default unpowered state (assuming the relays are fully functional) and also provide error notification via the software interface. The interlock feature can be daisy-chained between additional hardware interlock enabled modules for example to allow one signal to disable multiple cards. For further details please refer to the Hardware Interlock section within the user manual.



Interlock Signal Routing Diagram for 40-191B Versions With Hardware Interlock Option

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40 V* (DC or AC peak)†
Continuous Switch Current:	30 A continuous, all channels. 40 A continuous for single relay (other relays carrying <10 A).
Peak Current:	120 A for 200 µs
Max Total Module Current:	6 channels each carrying 30 A on thru path ‡
Max Fault Bus Current:	40 A, each bus
Initial On Path Resistance:	6 mΩ at 25 °C typical
Leakage Current (at ±40 V):	<1 µA at 25 °C and switch cold, <5 mA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	40 µs/140 µs (typical)
Operate Time:	250 µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

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

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

‡ The capacity of the module to carry 30 A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 25 A per channel for chassis meeting the minimum PXI recommendations.

Power Requirements

+3.3 V	+5 V	+12 V	-12 V
100 mA	1 A	0	0

Mechanical Characteristics

Double 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 2 front panel 8-pin male power D-Type connectors, for pin outs please refer to the operating manual.

Interlock via 4-pin female 00 series connector* (40-191B versions with hardware interlock option)

*Mating half supplied when hardware interlock option ordered, to be wired by end user.

PXI & CompactPCI Compliance

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

Uses a 33 MHz 32-bit backplane interface.

Safety & CE Compliance

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

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

Operating/Storage Conditions

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

Product Order Codes

PXI Solid State Fault Insertion Switch, 6-Channel, 30 A, Two Fault Buses:	40-191B-012
PXI Solid State Fault Insertion Switch, 6-Channel, 30 A, Two Fault Buses, Hardware Interlock:	40-191B-012-HI

Product Customization

Pickering 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	Termination
40-191B-012	93-005-001	93-005-236	93-012-103

Interlock Connectors

For module with hardware interlock option (40-191B-012-HI) spare/replacement connectors can be ordered.

Product	Description
44-961-040	Connector with internal link
44-960-040	Connector only, no internal wiring (replacing that supplied with the module)

Mating Connectors & Cabling

For a complete list of connection accessories and documentation for the 40-191B module, please refer to our 8-pin Power D-type datasheet (90-012D).

6-Channel Solid State Fault Insertion Switch Module with Optional Hardware Interlock

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 PXI Switching & Simulation Modules:

- Choose from 1000+ Pickering PXI 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. These accessories are detailed in Connector Accessories data sheets, where a complete list and documentation can be found for each accessory.

Connectors & Backshells

Multi-way Cable Assemblies

RF Cable Assemblies

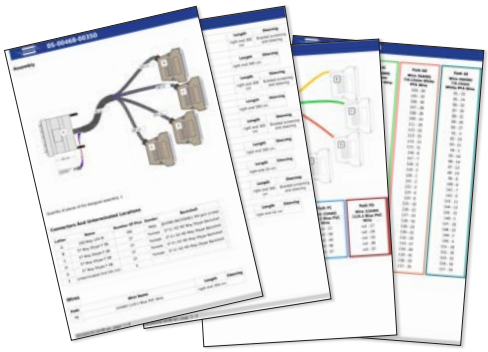
Breakouts

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.

- Fully supported on modern browsers and tablet operating systems.
- Built-in tutorials and videos allow you to get quickly up to speed.
- Store cable assemblies in the Cloud and develop over time.
- Each cable design has a downloadable PDF documentation file detailing all specifications

Start designing your custom cabling, go to pickeringtest.com/cdt



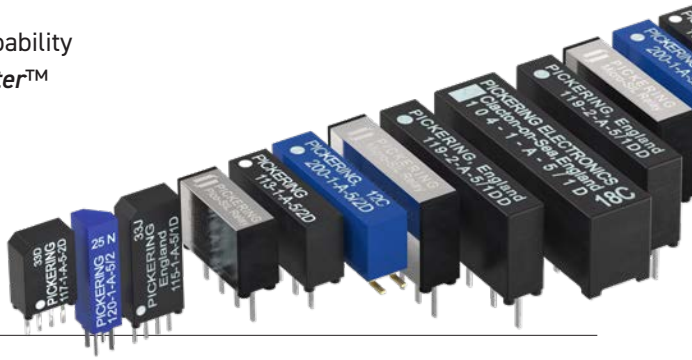
Mass Interconnect

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

Pickering Reed Relays

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

To learn more 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 more information go to pickeringtest.com/os

The VISA driver support is provided for LabVIEW Real Time Operating Systems (Pharlap and Linux-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++)
- **Programming Languages** C, C++, C#, Python
- **Keysight** VEE and OpenTAP
- **Mathworks MATLAB, Simulink**
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

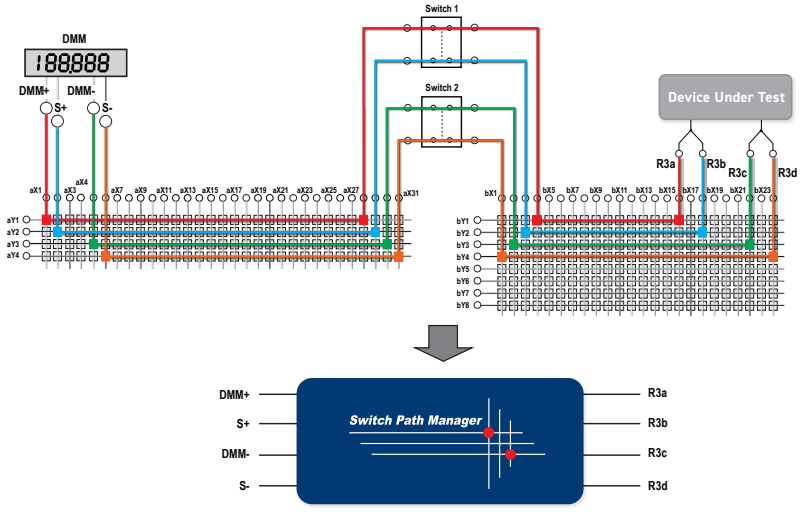
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.

To learn more about software drivers and development environments 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 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 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 three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available with various levels for 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 go to pickeringtest.com/support

Available Product Resources

We have a library of resources including success stories, product and support videos, articles and white papers as well as application-specific brochures to assist you. We have also published reference books on switching technology and the PXI and LXI standards.

To view, download or request any of our product resources go to pickeringtest.com/resources