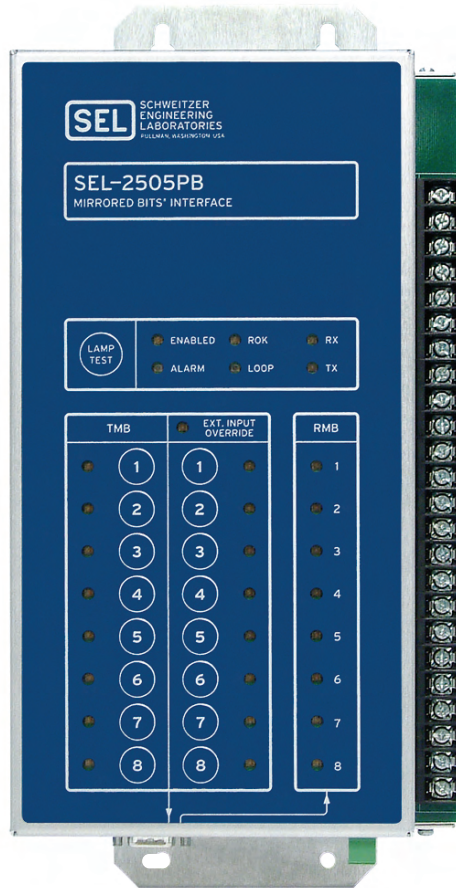




# SEL-2505PB MIRRORED BITS Interface Instruction Manual

Simulate MIRRORED BITS® Communications  
for Scheme or Logic Testing

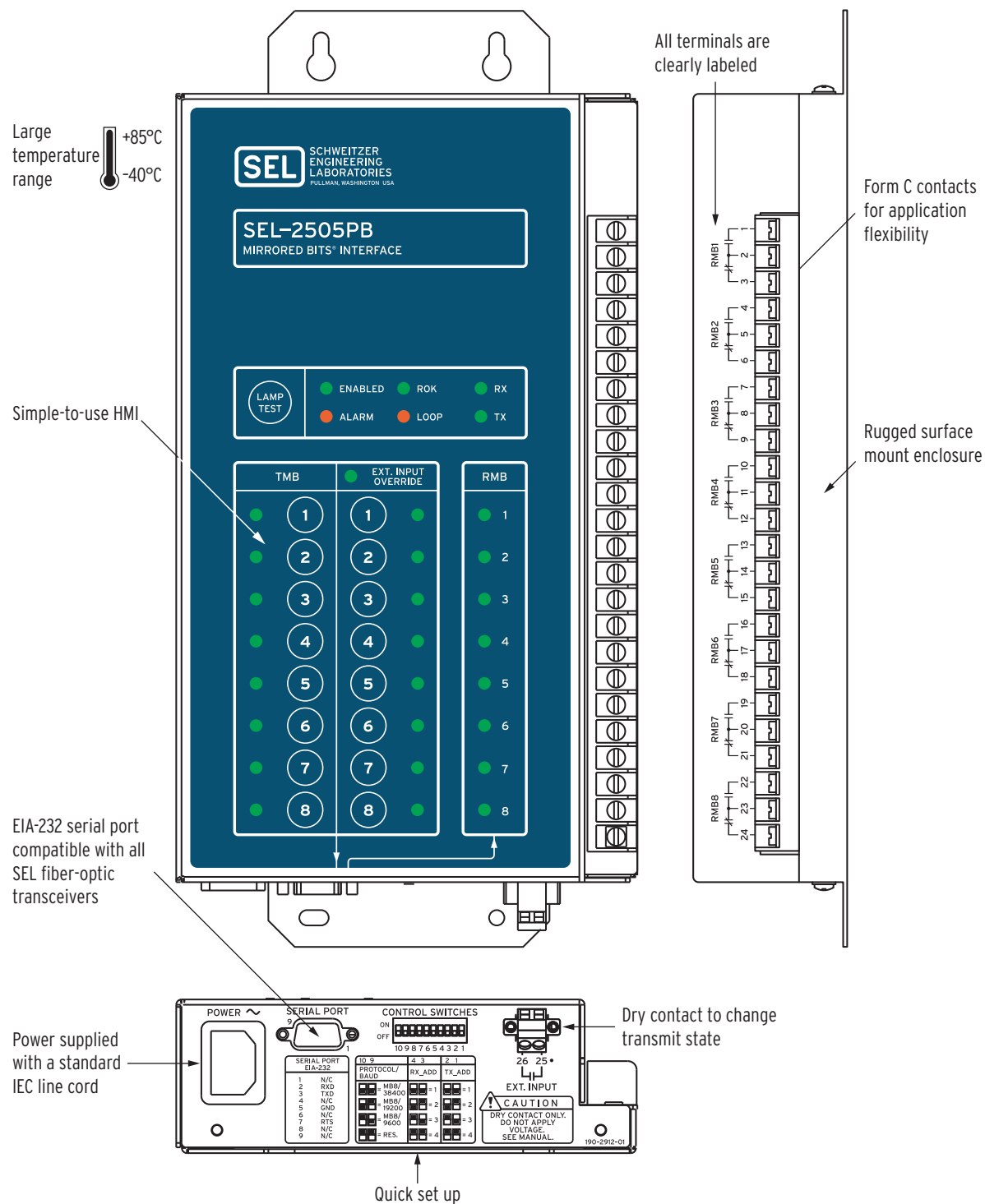


## Features, Benefits, and Applications

Use the SEL-2505PB to test relay schemes that rely on SEL MIRRORED BITS® technology as part of their decision logic. Use multiple SEL-2505PB devices to simulate inputs to a SEL-2100 Logic Processor and test complex logic schemes.

- 48 or 125 Vdc or 125 Vac power
- EIA-232 port supports all SEL fiber-optic transceivers
- MIRRORED BITS MB8 protocol
- Selectable 9600, 19200, or 38400 baud rate
- Use pushbuttons to send any combination of MIRRORED BITS or transition to an alternate combination controlled by an external input

# Product Overview

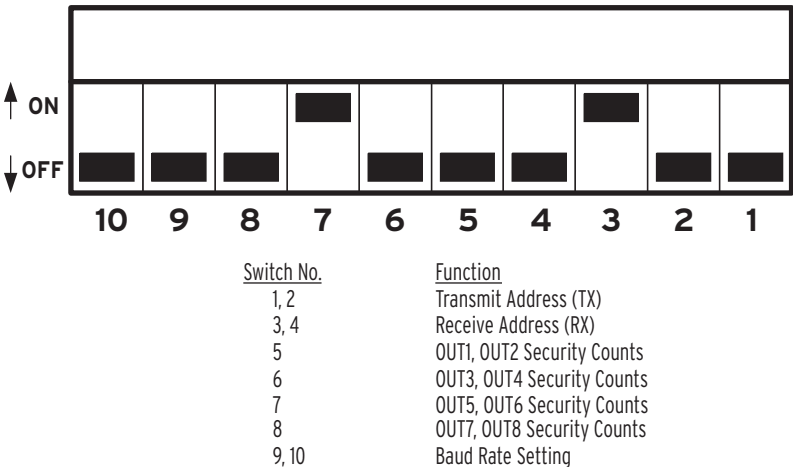


**Figure 1 SEL-2505PB Functional Overview**

# Configuring the SEL-2505PB

## Setting the Transmit and Receive Addresses

The SEL-2505PB uses a ten-position DIP switch to set the TX and RX addresses, to determine the number of received correct consecutive messages for output contact control, and to program the baud rate of the MIRRORED BITS communications (see *Figure 2*).



**Figure 2 SEL-2505PB Control Switch Position Identifications**

You must set the TX address of each local SEL-2505PB to match the receive address of the remote device. Further, the TX and RX addresses of each device should not be set to the same number. The SEL-2505PB detects a loopback condition when it receives its own transmit address in the MIRRORED BIT message. When the SEL-2505PB detects loopback, it illuminates the LOOP LED and extinguishes the ROK LED. The SEL-2505PB disables the contact outputs to prevent acting on its own message during loopback (i.e., output contacts go to their de-energized state).

## Setting Security Counts for Received Data

This setting will have minimal to no apparent effect on test results. *Table 1* lists the data security count setting possibilities. When the data security switch is set to “OFF,” the contact output follows its associated RMB logical status. When the data security switch is set to “ON,” two consecutive RMB messages of the same logical state are required to assert/deassert the associated contact output. Note that each setting switch controls an adjacent pair of contact outputs.

**Table 1 Data Security Count Settings**

Switch	Message 1	Message 2
Switch 5 (OUT1, OUT2)	OFF	ON
Switch 6 (OUT3, OUT4)	OFF	ON
Switch 7 (OUT5, OUT6)	OFF	ON
Switch 8 (OUT7, OUT8)	OFF	ON

For example, in *Figure 2*, SW7 is set to “ON.” This requires two consecutive messages to be confirmed before asserting/deasserting RMB5 and RMB6, while all other outputs require only one message.

## Setting the Baud Rate

Table 2 lists the settings for the three baud rate options (38400, 19200, or 9600).

**Table 2 Protocol/Baud Rate Settings**

Switch 10	Switch 9	
OFF	OFF	38400 baud
OFF	ON	19200 baud
ON	OFF	9600 baud
ON	ON	Reserved

## Using the Pushbuttons

The SEL-2505PB is equipped with 16 pushbuttons that are used to change the state of the transmitted MIRRORING BITS. These switches are configured in two rows of eight and are numbered 1 through 8.

### TMB Buttons

The column of eight **TMB** pushbuttons directly controls the state of the eight Transmit MIRRORING BITS (TMB). The EXT input, when active, will override the **TMB** pushbuttons. The LEDs in the TMB column always display the active transmit state of the eight MIRRORING BITS.

### EXT Input Override

The column of eight **EXT Input Override** pushbuttons sets the state the eight transmit MIRRORING BITS will take when a dry contact is closed across the EXT input terminals (25 and 26).

#### CAUTION

Only use a dry contact across this input! Application of a voltage to these terminals will damage the device!

The external input operates with a switch or relay contact wired across terminals 25 and 26. The SEL-2505PB provides a wetting voltage across these terminals. If a solid-state relay or switch that is polarity-sensitive is used, terminal 25 is the positive terminal (indicated with the • symbol).

## Connecting the SEL-2505PB to Other SEL Devices

The SEL-2505PB uses the MB8 MIRRORING BITS protocol and transmits and receives data at the baud rate set by switches 9 and 10.

The MIRRORING BITS protocol must be set to MB8; the MB protocol is incompatible with the SEL-2505PB (if your relay does not have MB8 protocol, contact SEL for a firmware upgrade).

The SPEED setting of the SEL-2505PB must be set to match the setting of the connected device.

The transmit address of the local device must match the receive address of the remote device.

The SEL-2505PB comes standard with an EIA-232 interface. This interface uses a male DB-9 pin connector with signals as shown in Table 3. To connect the SEL-2505PB to any relay with MIRRORING BITS, use an SEL C234 cable or any null modem cable.

The DB-9 connector is directly compatible with all SEL fiber-optic transceivers that are equipped with female DB-9 pin connectors.

Table 3 Serial Port Connections

1	N/C
2	RXD
3	TXD
4	N/C
5	GND
6	N/C
7	RTS
8	N/C
9	N/C

The following examples show how to connect the SEL-2505PB to operate with other devices.

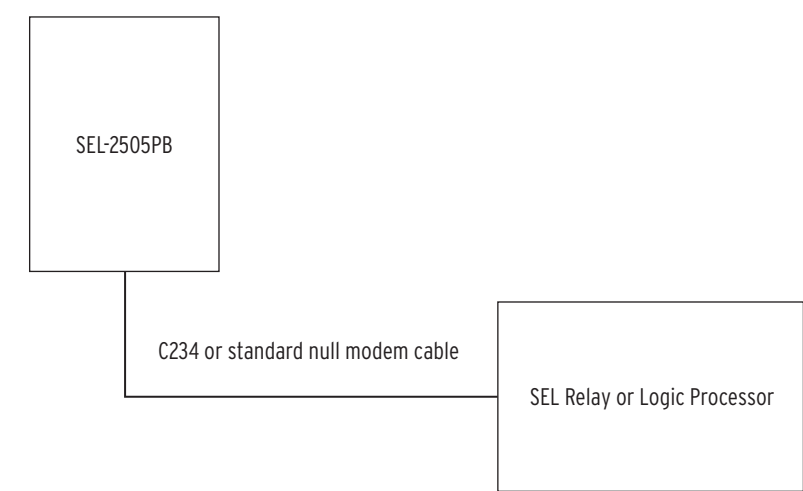


Figure 3 Connecting an SEL-2505PB to a Relay or Logic Processor

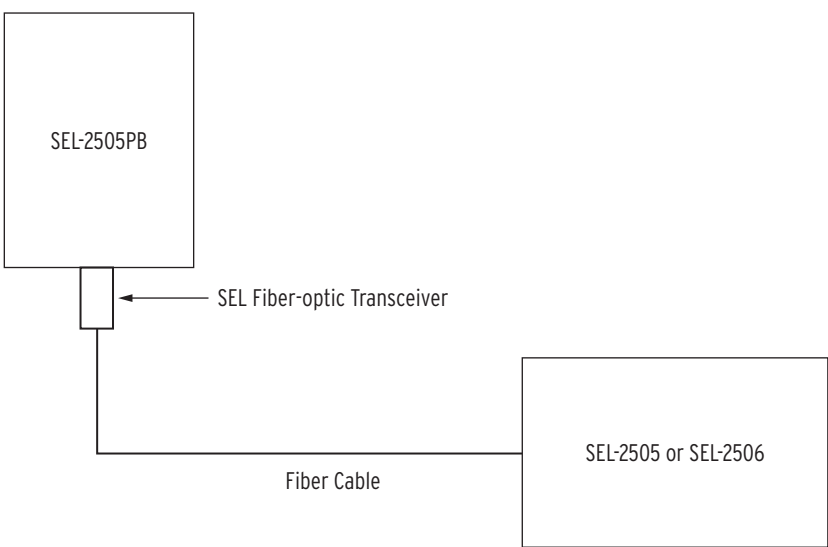


Figure 4 Connecting an SEL-2505PB to a Remote I/O Device With Fiber Cable

# Testing With the SEL-2505PB

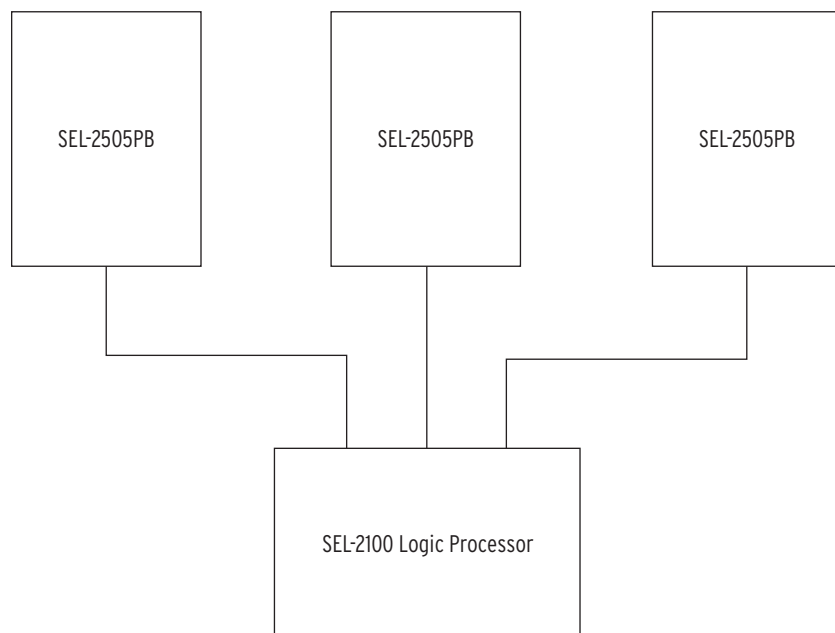
## Pilot Scheme Testing

The SEL-2505PB can be used manually or automatically to test a relay with a MIRRORRED BIT pilot scheme. Use the **TMB** pushbuttons to manually set specific MIRRORRED BITS to simulate pilot or direct transfer trip signals from a remote relay.

Use the **EXT Input Override** pushbuttons to set the state the MIRRORRED BITS will take when the EXT input is asserted. The EXT input can be driven by a test set to simulate changes to the analog conditions of a protected power-line simultaneously with changing signals from a remote relay or I/O device.

## Logic Processor Scheme Testing

Use one or many SEL-2505PB devices as shown in *Figure 5* to test the SELOGIC® programmed into a SEL-2100 Logic Processor. For example, a pre-existing condition can be set with the **TMB** pushbuttons, then an alternate or transient condition can be switched in or out using the EXT input.



**Figure 5 Using Multiple SEL-2505PB Devices to Prove SEL-2100 Programmed Logic**

# Specifications

## Alarm and Output Contacts

IEEE C37.90 Tripping Output Performance

Make:	30 A
Carry:	6 A
MOV protected:	270 Vac rms 360 Vdc continuous

## Power Supply

48/125 Vdc or 120 Vac

Range:	36–200 Vdc or 85–140 Vac (50 Hz–60 Hz)
Burden:	<5 W

## MIRRORED BITS Protocol

MB8 (only)

## Port Speed (Data Rate)

38400 baud  
19200 baud  
9600 baud

## Operating Temperature Range

–40° to +85°C (–40° to +185°F)

## Humidity

0% to 95% without condensation

## Unit Weight

1.36 kg (3 lb, 0 oz)

# Factory Assistance

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

Schweitzer Engineering Laboratories, Inc.  
2350 NE Hopkins Court  
Pullman, WA 99163-5603 USA  
Telephone: +1.509.332.1890  
Fax: +1.509.332.7990  
Internet: [www.selinc.com](http://www.selinc.com)  
Email: [info@selinc.com](mailto:info@selinc.com)

## DANGER

Contact with instrument terminals can cause electrical shock that can result in injury or death.

## WARNING

Use of this equipment in a manner other than specified in this manual can impair operator safety safeguards provided by this equipment.

## CAUTION

Equipment components are sensitive to electrostatic discharge (ESD). Undetectable permanent damage can result if you do not use proper ESD procedures. Ground yourself, your work surface, and this equipment before removing any cover from this equipment. If your facility is not equipped to work with these components, contact SEL about returning this device and related SEL equipment for service.

## CAUTION

Removal of enclosure panels exposes circuitry which may cause electrical shock which can result in injury or death.

## DANGER

Tout contact avec les bornes de l'appareil peut causer un choc électrique pouvant entraîner des blessures ou la mort.

## AVERTISSEMENT

L'utilisation de cet appareil suivant des procédures différentes de celles indiquées dans ce manuel peut désarmer les dispositifs de protection d'opérateur normalement actifs sur cet équipement.

## ATTENTION

Les composants de cet équipement sont sensibles aux décharges électrostatiques (DES). Des dommages permanents non-décelables peuvent résulter de l'absence de précautions contre les DES. Raccordez-vous correctement à la terre, ainsi que la surface de travail et l'appareil avant d'en retirer un panneau. Si vous n'êtes pas équipés pour travailler avec ce type de composants, contactez SEL afin de retourner l'appareil pour un service en usine.

## ATTENTION

Le retrait des panneaux du boîtier expose le circuit qui peut causer des chocs électriques pouvant entraîner des blessures ou la mort.

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