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Features

The SB-293 Satellite Board expands the capabilities of the PXL-250 Tiger Controller. Depending upon the application, the SB-293 can add 8 general purpose inputs and 4 general purpose outputs, or it can add Door Switch and Request to Exit inputs and Door Lock and Alarm outputs for a second door (one reader per door) with 6 additional general purpose inputs and two additional general purpose outputs. In a networked access control system, the SB-293 increases the number of doors that can be managed from 128 to a maximum of 256. Refer to Figure 1 on pages 6 and 7 for a basic diagram of the PXL-250 access control network, including the SB-293 Satellite Board.

Standard features include:

Second Door Access Control Configuration

- two doors, one reader per door (in conjunction with a PXL-250 controller)
- two door control inputs
  - door switch status
  - request to exit
- six general purpose inputs
  - one can be user-configured for B-door Auxiliary RTE
- two Form C output relays
  - door lock
  - door alarm
- two general purpose, Form C, output relays
  - both can be user-configured for Door Held Open alarm annunciation

Additional Input/Output Configuration

- one door may use one or two readers
- eight general purpose inputs
- four general purpose, Form C, output relays

Quick Connect Wiring Connectors

- allows for quick removal of wiring connectors
- makes it easy to change/upgrade wiring following system installation

Electrical Surge/Transient Protection

- Transorbs across all inputs and outputs (except relay outputs)
- MOVs across all relay outputs
Figure 1 – A Basic PXL-250 Access Control Network with Options

SYSTEM INFORMATION

4,000 Feet Total Distance for Controller Network Communication

RS-232 Serial Communication
Direct or Via Modem

PC

RS-485 Serial Communication Controller Network

PXL-250 Tiger Controller
Door Switch and Request to Exit Inputs
General Purpose Inputs
Door Lock Output Relay (3A, Form C)
Door Alarm Output Relay (3A, Form C)

PXL-250 MASTER
Address - 1

Global Unlock or Auxiliary RTE-A Input

“B” Reader

“A” Reader

Lock, Door Switch, RTE

Door Alarm

8 General Purpose Inputs

Global Unlock or Auxiliary RTE-A Input

Door Alarm

Lock, Door Switch, RTE

“A” Reader

“B” Reader

PXL-250 SLAVE
Address - 3

SB-293 Satellite Board
May Have
8 General Purpose Inputs and 4 Output Relays

SB-293 Tiger Controller
Door Switch and Request to Exit Inputs
General Purpose Inputs
Door Lock Output Relay (3A, Form C)
Door Alarm Output Relay (3A, Form C)

4 Output Relays

RS-232 Serial Communication
Direct or Via Modem

PC

Modem

8 General Purpose Inputs

Global Unlock or Auxiliary RTE-A Input

Door Alarm

Lock, Door Switch, RTE

“A” Reader

“B” Reader

PXL-250 Tiger Controller
Door Switch and Request to Exit Inputs
General Purpose Inputs
Door Lock Output Relay (3A, Form C)
Door Alarm Output Relay (3A, Form C)

PXL-250 Master
Address - 1

Global Unlock or Auxiliary RTE-A Input

Door Alarm

Lock, Door Switch, RTE

“A” Reader

“B” Reader

PXL-250 Master
Address - 1

Global Unlock or Auxiliary RTE-A Input

Door Alarm

Lock, Door Switch, RTE

“A” Reader

“B” Reader

PXL-250 Tiger Controller
Door Switch and Request to Exit Inputs
General Purpose Inputs
Door Lock Output Relay (3A, Form C)
Door Alarm Output Relay (3A, Form C)

PXL-250 Master
Address - 1

Global Unlock or Auxiliary RTE-A Input

Door Alarm

Lock, Door Switch, RTE

“A” Reader

“B” Reader

PXL-250 Tiger Controller
Door Switch and Request to Exit Inputs
General Purpose Inputs
Door Lock Output Relay (3A, Form C)
Door Alarm Output Relay (3A, Form C)
Figure 1 – A Basic PXL-250 Access Control Network with Options
Specifications

Unit Dimensions
- PXL-250 controller PCB with an SB-293 Satellite Board
  - 7.25 inches high by 6.00 inches wide by 1.75 inches deep, including wiring connectors
  - (18.45 cm by 15.25 cm by 4.45 cm)
- PXL-250 controller PCB with an SB-293 Satellite Board and an LCD-1 Alpha/Numeric Display
  - 8.10 inches high by 6.00 inches wide by 1.75 inches deep, including wiring connectors
  - (20.60 cm by 15.25 cm by 4.45 cm)
- Enclosure
  - 9.70 inches high by 8.20 inches wide by 2.60 inches deep
  - (24.65 cm by 20.85 cm by 6.60 cm)

Operating Temperature/Humidity Range
- 0°F to 140°F (-18°C to 60°C)
- 0% to 90% Relative Humidity, non-condensing

Controller Power Requirements
- 12 VDC @ 1.5 Amp

Current Draw
- maximum current draw 500 mA for a controller with all options installed
- 120 mA max for a PXL-250 Controller
- 150 mA max for an SB-293 Satellite Board
- refer to Table 1 for Reader current draw

<table>
<thead>
<tr>
<th>Reader Type</th>
<th>MS-3000</th>
<th>MS-4000</th>
<th>MS-5000</th>
<th>MS-7000</th>
<th>MS-9000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Draw</td>
<td>50 mA</td>
<td>50 mA</td>
<td>100 mA</td>
<td>200 mA</td>
<td>200 mA</td>
</tr>
</tbody>
</table>

Table 1 – Reader Current Draw

Output Relay Contact Rating
- 1 Amp @ 24 VDC

Input Device Configuration
- Door Sense normally closed
- Request to Exit normally open
- General Purpose normally open or closed as needed by the application

Cable Requirements

Input and Output Connections
- two conductor, stranded, AWG 22 or a larger gauge

NOTE: The Lock Output relay may require a heavier gauge of wire depending upon the current demands of the lock and the length of the lock wiring run.
System Cautions

**Transient Suppression**

Voltage transients are electrical surges or spikes conducted through power, input, or output lines. Transients are generated when electric devices (such as electric locking devices) are turned on or off. Transients may affect the operation of the SB-293 satellite board. Because of this, transient suppression is required for the SB-293 satellite board. A transient suppressor is a device added to an electrical circuit that minimizes the effects of transients. Depending upon the application, a transorb or an isolation relay provides the suppression necessary to ensure proper operation of the access control system.

Under normal circumstances, a 1.5KE39C transorb must be installed across the positive and negative power lines at the electric locking device to provide the best operating conditions for the SB-293 satellite board. This transorb will prevent any transients that may be generated by an electric locking device from affecting the operation of the SB-293 satellite board. Two bipolar transorbs are provided with each SB-293 satellite board for this purpose.

In applications such as parking gates or turnstiles (or any application using a large electric motor), a transorb alone may not provide enough suppression; an isolation relay may be required. For ease of installation, Keri Systems offers an Isolation Relay Package (Keri Systems p/n IRP-1) which can provide suppression for the large transients generated by these types of devices.
**SB-293 Board Installation**

**Jumper Settings**
On the SB-293 satellite board, there is only one jumper that may require setting. JP12 configures the satellite board for either second door control or for general purpose inputs and outputs (see Figure 2, and Figure 4 on page 15).

**JP12 – Configure Satellite Board**
- Jumper across JP12 pins 1 and 2 configures the satellite board for general-purpose inputs and outputs.
- NO Jumper across JP12 configures the satellite board for second door control with additional inputs and outputs. When the satellite board is configured for second door control, the primary door must be connected to the "A" reader (TB-5 on the PXL-250 controller board) and the secondary door must be connected to the "B" reader (TB-6 on the Receiver board attached to the controller board).

**Installing the SB-293 Satellite Board**

**Board Installation**
Perform the following steps to install an SB-293 satellite board onto a PXL-250 controller.
1. Turn the controller's power off.
2. Line up the upper left-hand corner of the satellite PCB with the controller PCB.
3. Line up the stand-offs in all four corners of the satellite PCB with corresponding mounting holes in the controller PCB (see Figure 3).
4. Gently press each stand off into its mounting hole.
Wiring the Satellite Board
There are several things to keep in mind when wiring the satellite board.

DO
• Route cables in accessible areas whenever possible for ease of maintenance.
• Add transient suppression across electric devices attached to satellite board output relays.
• Use an isolation relay (Keri Systems p/n IRP-1) if connecting to a parking gate, turnstile, or any application using a large electric motor.
• For a single door application, install the door’s reader to the TB-5, "A" reader connection on the controller.
• For a two door application, install the primary door's reader to the TB-5, "A" reader connection on the controller and install the secondary door's reader to the TB-6, "B" reader connection on the receiver board.

DO NOT
• Stretch or over-tension cables.
• Route cables over sharp objects.
• Let the cables and the individual wires get tangled.
• Route cables near EMI sources. Cables can act as antennas, receiving EMI that can affect controller performance.

Understanding Inputs and Outputs
The following section provides descriptions of the Inputs and Outputs on the SB-293 Satellite Board. Possible wiring diagrams for inputs and outputs are included in the next section, Wiring Connections, which begins on page 15.

The Satellite board has eight inputs and four outputs available for configuration. If the Satellite Board is configured for two-door operation, two inputs and two outputs are dedicated to specific functions. One input is dedicated for the door status switch and one input for the Request to Exit input. One output is dedicated for the Lock Relay and one output for the Alarm Relay. Through programmable features in the Doors32™ program, the remaining two outputs can be dedicated to Door Held Open alarms for the A- and B-doors, and one input can be dedicated to an Auxiliary RTE input for the B-door. The remaining inputs and outputs may be used for general purposes. If the Satellite board is configured for general inputs and outputs, all eight inputs and all four outputs are available for general-purpose use.

Inputs
An input detects a state change generated by a device outside of the controller. The controller then responds to that state change. The input devices that generate the state change may be normally closed or normally open.

A normally closed input device continually keeps a circuit active or complete. A state change is generated when the normally closed input device is forced open, breaking the circuit. In an access control system, a door switch is a typical example of a normally closed device. While the door remains closed, the switch remains closed. When someone opens the door, the door switch is opened, breaking the circuit and generating a state change. The controller then responds to this state change and generates an output (such as sounding an alarm if the door is a secure door).

A normally open input device continually leaves a circuit open or incomplete. A state change is generated when the normally open input device is forced closed, completing the circuit. In an access control system, a request-to-exit (RTE) button is a typical example of a normally open device. In an access control installation, an RTE button is located on the secured side of the door. While there is no one there pressing the button, the switch remains open. When someone desires to exit through a secure door, they press the RTE button, closing the circuit and generating a state change.
controller then responds to this state change and generates an output (such as unlocking the door to allow egress).

**Door Status Switch Input**
The door status switch input accepts a signal from a normally closed input switch that indicates the status of the door: open or closed. While the door remains closed, the switch remains closed. When someone opens the door, the door switch is opened, breaking the circuit and generating a state change. The controller responds to this state change and generates an alarm output if the door is forced or held open too long. Refer to Figure 9 on page 18 for a typical door status switch wiring diagram.

*NOTE: If the satellite board is configured for second door control and the door status switch is not being used, install a jumper across pins 1 and 2 of TB-8 to prevent a continuous door open alarm from being received by the controller.*

*NOTE: When using a door status input, the door must also have a Request to Exit input for proper operation/annunciation of Door Forced and Door Held Open alarms.*

**Request to Exit**
The request to exit (RTE) input accepts signals from a normally open input device that indicates that a request has been made for someone to exit a secured door. Motion detectors, pressure-sensitive floor mats, or push buttons may make RTE requests. While there is no one there to activate the RTE request, the input remains open. When someone desires to exit through a secure door, they activate the RTE device, closing the circuit and generating a state change. The controller then responds to this state change and generates an output unlocking the door to allow egress. Refer to Figure 10 on page 19 for a typical RTE wiring diagram.

**General Purpose Inputs**
The general-purpose input accepts signals from either a normally closed or a normally open input device that indicates when a change in state has occurred.

For a normally closed input device, while the input device is in its normal state the general-purpose input circuit remains closed. When the input device is activated, the general-purpose input circuit is opened generating a state change. The controller may respond to this state change per programmed instructions. The general-purpose input is configured through the Doors32™ access control software.

A normally closed push-button may be used to provide a normally closed general-purpose input. While the push button is in its normal state, the normally closed circuit is complete and no input signal is generated at the controller. When a user presses the push button it opens the general-purpose input circuit and generates a state change. The controller responds to this state change per programmed instructions and may perform some action. Refer to either Figure 12 on page 20 or Figure 16 on page 23 for a typical general-purpose closed input wiring diagram.

For a normally open input device, while the input device is in its normal state, the general-purpose input circuit remains open. When the input device is activated, the general-purpose input circuit is closed generating a state change. The controller may respond to this state change per programmed instructions. The general-purpose input is configured through the Doors32™ access control software.

A normally open motion detector may be used to provide a normally open general-purpose input. If the motion detector does not detect motion, its alarm circuit remains open and no input signal is generated at the controller. When the motion detector does detect someone entering its controlled area, its alarm circuit closes, completing the general-purpose input circuit and generating a state change. The controller responds to this state change per programmed instructions and may perform some action. Refer to Figure 12 on page 20 or Figure 15 on page 23 for a typical general-purpose open input wiring diagram.
Auxiliary RTE Input
One of the general-purpose inputs can be configured as an auxiliary RTE input for the B-door. The auxiliary RTE input allows a second RTE switch to be used to unlock the B-door at a controller. Using a normally open switch as the input device, while the switch is in its normal state, the general-purpose input circuit remains open. When a person requesting egress closes the switch, the general-purpose input circuit is closed generating a state change. The controller then responds to this state change per programmed instructions and generates a command to unlock the door and allow egress. Refer to Figure 11 on page 19 for a typical auxiliary RTE input wiring diagram.

Output Relays
In many respects, a Form C output relay performs the opposite task of an input. An input detects a state change generated by a device outside of the controller. An output relay receives a signal from the controller that energizes the output relay, switching its state. This state change typically prompts an action outside of the controller. The inputs drive the signals that control the output relays.

An example of this process is when a secure door is forced open. As the door is opened, the door status switch opens. The door status switch input detects the switch's state change. The controller sends a signal instructing the alarm relay to energize. The alarm relay switches its state to activate an audio alarm notifying everyone in the immediate area that the door has been forced open. A variety of devices may be activated by an output relay such as an electric door strike, a magnetic lock, an alarm, a light, a video camera, or a modem.

A Form C relay has both normally closed and normally open circuits. When the relay is not energized, the normally closed circuit is complete and the normally open circuit is open. When the relay is energized the circuits switch roles; the normally open circuit is closed and the normally closed circuit is open. This dual nature of Form C relays (having both normally closed and normally open circuits) allows for two types of applications outside the controller. A device may be attached to the normally closed circuit so that it is always on until the relay energizes to open the circuit and turn it off. Or, a device may be attached to the normally open circuit so that it is always off until the relay energizes to turn it on.

Lock Relay
Unlocking a door is controlled by the Form C lock relay. When installing a door lock there are two things to consider: safety versus security, or should the door be “fail-safe” or “fail-secure.”

Fail-safe means that if the power should fail at a door (perhaps due to a power outage or equipment failure), the door will automatically unlock allowing entrance and egress. Power is required to keep the door locked. A fail-safe door ensures people will be able to enter and exit a secured area through that door in the case of an emergency.

A typical fail-safe application may use a magnetic lock. In this application, the controller energizes the lock relay, causing the lock relay to change its state. In its new state the normally closed circuit is opened breaking the power to the magnetic lock and allowing the door to be opened. Refer to Figure 6 on page 16 for a typical fail safe lock relay wiring diagram.

Fail-secure means that if the power should fail at a door (perhaps due to a power outage or equipment failure), the door will automatically lock and not allow entrance but will continue to allow egress. Power is required to unlock the door. A fail-secure door ensures a secured area remains secure regardless of the situation.

A typical fail-secure application may use a door strike. In this application, the controller energizes the lock relay, causing the lock relay to change its state. In its new state the normally open circuit is closed activating the release mechanism for the door strike on the door to be opened. Refer to Figure 7 on page 17 for a typical fail secure lock relay wiring diagram.
Alarm Out Relay
Activating an audio (or a silent) alarm is controlled by the alarm out relay. The controller energizes the alarm out relay, causing the alarm out relay to change its state. In its new state the normally open circuit is closed activating the alarm. Refer to Figure 8 on page 17 for a typical alarm out relay wiring diagram.

NOTE: The Doors32™ program allows the alarm out relay to be designated for annunciating both door forced and door held open alarms or for annunciating only door forced alarms (the door held open condition is then programmed for either annunciation on an output relay or for no annunciation at all).

Door Held Open Relay
A door held open alarm can be annunciated on its own output relay (distinguishing it from a door forced alarm). Programming in the Doors32™ program routes door held open alarms to the general-purpose output relays (refer to the Doors32™ Users Guide, p/n 01821-002 for configuration information). The controller energizes the alarm out relay, causing the alarm out relay to change its state. In its new state the normally open circuit is closed activating the alarm. Refer to Figure 13 on page 21 and Figure 14 on page 22 for a typical door held open alarm relay wiring diagram.

General Purpose Output Relay
A general-purpose output relay receives a signal from the controller that energizes the output relay, switching its state. This state change typically initiates or ends an action outside of the controller.

A device may be attached to the relay's normally closed circuit so that it is always on until a signal from the controller energizes the relay, opening the circuit and turning the device off. The general-purpose output relay is configured through the Doors32™ access control software.

A normally closed general-purpose output relay may be used to disable a remote sensor. The controller opens the normally closed relay circuit based on programmed instructions within the controller or from a direct command by an operator. The opened circuit cuts power to the remote sensor, temporarily disabling it. Refer to Figure 16 on page 23 or Figure 19 on page 26 for a typical general-purpose normally closed output wiring diagram.

A device may be attached to the relay's normally open circuit so that it is always off until a signal from the controller energizes the relay, closing the circuit and turning the device on. The general-purpose output relay is configured through the Doors32™ access control software.

A normally open general-purpose output relay may be used to activate a video camera. The controller closes the normally open relay circuit based on programmed instructions within the controller or from a direct command by an operator. The closed circuit provides power to the video camera, allowing an operator to remotely view the area covered by the camera. Refer to Figure 15 on page 23 or Figure 18 on page 26 for a typical general-purpose normally open output wiring diagram.
Wiring Connections

Before performing any wiring or connection operations, ensure that controller power is OFF. Serious damage to sensitive components on the controller may occur if wiring changes are made while controller power is on.

The following instructions assume that TB-10 is pointed up. With one exception (the general-purpose relay outputs), all connections to the SB-293 satellite board are made on the left side of the unit (see Figure 4). Specific information for making each wiring connection is provided in the Terminal Block Connections section listed below.

Terminal Block Connections

Follow these instructions as you make your wiring connections. Select the wire to be installed. Strip away 1/4 inch of insulation from the wire, place the wire into the appropriate slot on the terminal block, and tighten the corresponding screw on the top of the terminal block (see Figure 5 on page 16). Make a firm connection, but be careful not to over tighten the screw.

Please note that all of the terminal blocks slide off the SB-293 Satellite Board should it become necessary to disconnect any installed cables. Firmly grasp the connector and pull it away from the controller’s printed circuit board (see Figure 5 on page 16).
Two-Door Configuration

TB-7 – Lock Relay Connection
The lock relay is a Form C relay used to control the door lock. Please refer to the Lock Relay output section on page 13 for more information on Lock relay outputs and output devices.

For a typical fail-safe door lock relay installation, refer to Table 2 and Figure 6 and make the following wiring and transorb connections to attach the door lock relay.

<table>
<thead>
<tr>
<th>TB-7 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>normally-open – GPO 1</td>
</tr>
<tr>
<td>Pin 2</td>
<td>common – GPO 1</td>
</tr>
<tr>
<td>Pin 3</td>
<td>normally-closed – GPO 1</td>
</tr>
</tbody>
</table>

Table 2 – Lock Relay Output Connections

For a typical fail-secure door lock relay installation using a door strike, refer to Table 2 and Figure 7 on page 17 and make the following wiring and transorb connections to attach the door lock relay.
The Alarm Relay is a Form C relay that provides an output to trigger an audible signal (or a silent alarm) whenever the door is put into an alarm state (i.e. the door is forced open). It is also used to trigger an alarm signal whenever the door is held open too long (exceeding the Open Time set within the Doors32™ access control program). Depending upon the type of alarm being installed and your application, your alarm may require a normally closed/common connection, a normally open/common connection, or a normally closed/common/normally open connection. Every application requires the common lead connection. Please refer to the Alarm Relay output section on page 14 for more information on Alarm relay outputs and output devices.

The enhanced alarm out annunciation feature (configured in the Doors32™ software) can set this output to door forced annunciation for the B-door (door forced annunciation on the A-door is handled by the alarm out relay on the PXL-250 controller). Door held open alarm annunciation is connected to general-purpose output relays three and four (see page 21).

For a typical alarm relay installation, refer to Table 3 and Figure 8 and make the following wiring and transorb connections to attach the alarm relay.

<table>
<thead>
<tr>
<th>TB-7 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 4</td>
<td>normally-open – GPO 2</td>
</tr>
<tr>
<td>Pin 5</td>
<td>common – GPO 2</td>
</tr>
<tr>
<td>Pin 6</td>
<td>normally-closed – GPO 2</td>
</tr>
</tbody>
</table>

Table 3 – Alarm Output Relay Connections
TB-8 – Door Status Switch Connection

The Door Status switch indicates the state of the door (open or closed). If a door status switch is not being used, install a jumper between pins 1 and 2 of TB-8. The normal state of this input is a closed circuit that will be opened when an input is generated. No voltage is applied at this input; the circuit is opened and closed corresponding with the door status. Please refer to the Door Status Switch Input section on page 12 for more information on Door Status Switch inputs and input devices.

NOTE: The SB-293 Satellite Board must have been configured for two door operation for the door status switch input connections to be valid. If the SB-293 board has been configured for general-purpose inputs and outputs, refer to the Additional Inputs/Outputs Configuration section on page 24.

Refer to Table 4 and Figure 9 and make the following connections to attach a door status input.

<table>
<thead>
<tr>
<th>TB-8 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>door status switch input – GPI 1</td>
</tr>
<tr>
<td>Pin 2</td>
<td>ground/common</td>
</tr>
</tbody>
</table>

Table 4 – Door Status Switch Input Connections

![Diagram](image)

Figure 9 – Door Status Switch Input Connections

NOTE: If a ground lead from the RTE input has already been installed on TB-8, pin 2, loosen the terminal connector and insert the door status switch ground lead beside the RTE input ground lead.

TB-8 – Request to Exit Connection

Request to Exit (RTE – also known as REX) devices typically unlocks the door to allow egress from the building. The SB-293 Satellite Board may accept input from devices such as switches, motion sensors, or floor mats. The normal state of this input is an open circuit that will be closed when an input is generated. No voltage is applied at this input; the circuit is completed to indicate an RTE event. Please refer to the Request to Exit Input section on page 12 for more information on RTE inputs and input devices.

NOTE: The SB-293 Satellite Board must have been configured for two door operation for the RTE input connections to be valid. If the SB-293 board has been configured for general purpose inputs and outputs refer to the Additional Inputs/Outputs Configuration section on page 24.

Refer to Table 5 and Figure 10 on page 19 and make the following connections to attach an RTE input.

<table>
<thead>
<tr>
<th>TB-8 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>Pin 3</td>
<td>RTE signal – GPI 2</td>
</tr>
</tbody>
</table>

Table 5 – Request to Exit Input Connections
NOTE: If a ground lead from the Door Status Switch input has already been installed on TB-8, pin 2, loosen the terminal connector and insert the RTE ground lead beside the door status input ground lead.

TB-8 – Auxiliary Request to Exit Connection
The Auxiliary Request to Exit (RTE – also known as REX) allows a secondary input device to unlock the door to allow egress from the building. The SB-293 Satellite Board may accept input from devices such as switches, motion sensors, or floor mats. The normal state of this input is an open circuit that will be closed when an input is generated. No voltage is applied at this input; the circuit is completed to indicate an RTE event. Please refer to the auxiliary RTE Input section on page 13 for more information on RTE inputs and input devices.

NOTE: The SB-293 Satellite Board must have been configured for two door operation for the auxiliary RTE input connections to be valid. If the SB-293 board has been configured for general purpose inputs and outputs refer to the Additional Inputs/Outputs Configuration section on page 24.

Refer to Table 6 and Figure 11 and make the following connections to attach an auxiliary RTE input.

<table>
<thead>
<tr>
<th>TB-8 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 4</td>
<td>RTE signal – GPI 3</td>
</tr>
<tr>
<td>Pin 5</td>
<td>ground/common</td>
</tr>
</tbody>
</table>

Table 6 – Auxiliary Request to Exit Input Connections

NOTE: If a ground lead from general-purpose input 4 has already been installed on TB-8, pin 5, loosen the terminal connector and insert the auxiliary RTE ground lead beside the general-purpose input ground lead.
TB-8/TB-9 – General Purpose Input Connections

General-purpose inputs may be used in conjunction with the programmable input/output feature of the Doors32™ access control software. The normal state of these inputs can be either a closed circuit that will be opened when an input is generated or an open circuit that will be closed when an input is generated. No voltage is applied at these inputs; the circuits are either opened or closed to indicate an input event. Please refer to the General Purpose Input section on page 12 for more information on general-purpose inputs and input devices.

For examples of typical general purpose input connections, refer to Table 7 and Figure 12 and make the following connections.

<table>
<thead>
<tr>
<th>TB-8/TB-9 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>* TB-8, Pin 4</td>
<td>general purpose signal – GPI 3</td>
</tr>
<tr>
<td>* TB-8, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-8, Pin 6</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 1</td>
<td>general purpose signal – GPI 4</td>
</tr>
<tr>
<td>TB-9, Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 3</td>
<td>general purpose signal – GPI 5</td>
</tr>
<tr>
<td>TB-9, Pin 4</td>
<td>general purpose signal – GPI 6</td>
</tr>
<tr>
<td>TB-9, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 6</td>
<td>general purpose signal – GPI 8</td>
</tr>
<tr>
<td>* only applies if this input has not been configured as an auxiliary RTE input</td>
<td></td>
</tr>
</tbody>
</table>

Table 7 – General Purpose Input Connections – Two-Door Configuration

For the upper application in Figure 12, a circuit is opened to create an input event at the controller. For the lower application in Figure 12, the motion detector senses motion and closes a circuit to create an input event at the controller.

![Figure 12 – General Purpose Input Connections – Two-Door Configuration](image-url)
TB-10 – Door Held Open Alarm Relay Connection

These instructions apply if the enhanced alarm out annunciation feature (in the Doors32™ software) has configured these outputs to door held open annunciation. Otherwise skip to the TB10 – General Purpose Output Relay Connections section on page 22.

The Door Held Open Alarm Relay is a Form C relay that provides an output to trigger an audible signal (or a silent alarm) whenever the door is put into an alarm state; whenever the door is held open too long (exceeding the Open Time set within the Doors32™ access control program). General-purpose output four can be configured to be the door held open alarm for the A-door on the PXL-250 controller. General-purpose output three can be configured to be the door held open alarm for the B-door on the SB-293 satellite board. Please refer to the Door Held Open Alarm Relay output section on page 14 for more information on Alarm relay outputs and output devices.

For a typical door held open alarm relay installation for the A-door, refer to Table 8 and Figure 13 and make the following wiring and transorb connections to attach the door held open alarm relay.

For a typical door held open alarm relay installation for the B-door, refer to Table 9 on page 22 and Figure 14 on page 22 and make the following wiring and transorb connections to attach the door held open alarm relay.

<table>
<thead>
<tr>
<th>TB-10 – Pin ...</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 4</td>
<td>normally-open – GPO 4</td>
</tr>
<tr>
<td>Pin 5</td>
<td>common</td>
</tr>
<tr>
<td>Pin 6</td>
<td>normally-closed – GPO 4</td>
</tr>
</tbody>
</table>

Table 8 – Door Held Open Alarm Output Relay Connections - A-Door

Figure 13 – Door Held Open Alarm Relay Output Connections - A-Door
Table 9 – Door Held Open Alarm Output Relay Connections - B-Door

<table>
<thead>
<tr>
<th>TB-10 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>normally-open – GPO 3</td>
</tr>
<tr>
<td>Pin 2</td>
<td>common</td>
</tr>
<tr>
<td>Pin 3</td>
<td>normally-closed – GPO 3</td>
</tr>
</tbody>
</table>

Figure 14 – Door Held Open Alarm Relay Output Connections - B-Door

TB10 – General Purpose Output Relay Connections
If output relays three and four have not been configured for use for door held open annunciation (as described in the previous section) they are available for general-purpose use. General-Purpose Output Relays are Form C relays that provide an output to enable or disable a device outside the controller. This device can be attached to the relay’s normally closed circuit so that the device is always on until the relay energizes to open the circuit and turn it off. Or, this device can be attached to the relay’s normally open circuit so that the device is always off until the relay energizes to turn it on.

Depending upon the type of device being installed and your application, the device may require a normally closed/common connection, a normally open/common connection, or a normally closed/common/normally open connection. Every application requires the common lead connection. Please refer to the General-Purpose Output Relay section on page 14 for more information on General-Purpose relay outputs and output devices.

For examples of typical general-purpose relay installations, refer to Table 10, Figure 15, and Figure 16, all on page 23, and make the following wiring and transorb connections.
### Table 10 – General Purpose Output Relay Connections – Two-Door Configuration

<table>
<thead>
<tr>
<th>TB-10, Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-10, Pin 1</td>
<td>normally open – GPO 3</td>
</tr>
<tr>
<td>TB-10, Pin 2</td>
<td>common</td>
</tr>
<tr>
<td>TB-10, Pin 3</td>
<td>normally closed – GPO 3</td>
</tr>
<tr>
<td>TB-10, Pin 4</td>
<td>normally open – GPO 4</td>
</tr>
<tr>
<td>TB-10, Pin 5</td>
<td>common</td>
</tr>
<tr>
<td>TB-10, Pin 6</td>
<td>normally closed – GPO 4</td>
</tr>
</tbody>
</table>

![Figure 15 – Normally Open General Purpose Relay Output Connections – Two-Door Configuration](image1)

![Figure 16 – Normally Closed General Purpose Relay Output Connections – Two-Door Configuration](image2)
**Additional Inputs/Outputs Configuration**

**TB-8/TB-9 – General Purpose Input Connection**

General-purpose inputs may be used in conjunction with the programmable input/output feature of the Doors32™ access control software. The normal state of these inputs can be either a closed circuit that will be opened when an input is generated or an open circuit that will be closed when an input is generated. No voltage is applied at these inputs; the circuits are either opened or closed to indicate an input event. Please refer to the General Purpose Input section on page 12 for more information on general-purpose inputs and input devices.

For examples of typical general purpose input connections, refer to Table 11 and Figure 17 on page 25 and make the following connections.

<table>
<thead>
<tr>
<th>TB-8/TB-9 – Pin . . .</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-8, Pin 1</td>
<td>general purpose signal – GPI 1</td>
</tr>
<tr>
<td>TB-8, Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-8, Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-8, Pin 3</td>
<td>general purpose signal – GPI 2</td>
</tr>
<tr>
<td>TB-8, Pin 4</td>
<td>general purpose signal – GPI 3</td>
</tr>
<tr>
<td>TB-8, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-8, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-8, Pin 6</td>
<td>general purpose signal – GPI 4</td>
</tr>
<tr>
<td>TB-9, Pin 1</td>
<td>general purpose signal – GPI 5</td>
</tr>
<tr>
<td>TB-9, Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 2</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 3</td>
<td>general purpose signal – GPI 6</td>
</tr>
<tr>
<td>TB-9, Pin 4</td>
<td>general purpose signal – GPI 7</td>
</tr>
<tr>
<td>TB-9, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 5</td>
<td>ground/common</td>
</tr>
<tr>
<td>TB-9, Pin 6</td>
<td>general purpose signal – GPI 8</td>
</tr>
</tbody>
</table>

Table 11 – General Purpose Input Connections – Additional I/O Configuration

For the upper application in Figure 17 on page 25, a circuit is opened to create an input event at the controller. For the lower application in Figure 17 on page 25, the motion detector senses motion and closes a circuit to create an input event at the controller.
TB-7/TB-10 – General Purpose Output Relay Connections

General Purpose Output Relays are Form C relays that provide an output to enable or disable a device outside the controller. This device can be attached to the relay's normally closed circuit so that the device is always on until the relay energizes to open the circuit and turn it off. Or, this device can be attached to the relay's normally open circuit so that the device is always off until the relay energizes to turn it on.

Depending upon the type of device being installed and your application, the device may require a normally closed/common connection, a normally open/common connection, or a normally closed/common/normally open connection. Every application requires the common lead connection. Please refer to the General-Purpose Output Relay section on page 14 for more information on General-Purpose relay outputs and output devices.

For examples of typical general-purpose relay installations, refer to Table 12, and Figures 18 and 19 on page 26, and make the following wiring and transorb connections.

<table>
<thead>
<tr>
<th>TB-7/TB-10 – Pin...</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-7, Pin 1</td>
<td>normally open – GPO 1</td>
</tr>
<tr>
<td>TB-7, Pin 2</td>
<td>common</td>
</tr>
<tr>
<td>TB-7, Pin 3</td>
<td>normally closed – GPO 1</td>
</tr>
<tr>
<td>TB-7, Pin 4</td>
<td>normally open – GPO 2</td>
</tr>
<tr>
<td>TB-7, Pin 5</td>
<td>common</td>
</tr>
<tr>
<td>TB-7, Pin 6</td>
<td>normally closed – GPO 2</td>
</tr>
<tr>
<td>TB-10, Pin 1</td>
<td>normally open – GPO 3</td>
</tr>
<tr>
<td>TB-10, Pin 2</td>
<td>common</td>
</tr>
<tr>
<td>TB-10, Pin 3</td>
<td>normally closed – GPO 3</td>
</tr>
<tr>
<td>TB-10, Pin 4</td>
<td>normally open – GPO 4</td>
</tr>
<tr>
<td>TB-10, Pin 5</td>
<td>common</td>
</tr>
<tr>
<td>TB-10, Pin 6</td>
<td>normally closed – GPO 4</td>
</tr>
</tbody>
</table>

Table 12 – General Purpose Output Relay Connections – Additional I/O Configuration

In the following application, an event causes programming in the controller to close the normally-open line, temporarily activating a video camera.
Figure 18 – Normally Open General Purpose Relay Output Connections – General Purpose I/O Configuration

In the following application, an event causes programming in the controller to open the normally-closed line, temporarily turning off a sensor device.

Figure 19 – Normally Closed General Purpose Relay Output Connections – General Purpose I/O Configuration
System Operation

I/O Configuration
All I/O configuration functions are handled within the Doors32™ access control program. For specific information, please refer to the Doors32™ User’s Guide (p/n 01821-001) or to the on-line help information found within the Doors32™ program.

System Maintenance

To ensure the best operating conditions for your access control system, Keri Systems recommends performing the following checks periodically at each controller.

1. Verify the PXL-250 controller’s earth ground is still a quality earth ground.
2. Verify all terminal block connections continue to be secure.
Glossary

ALARM RELAY OUTPUT – a relay on the controller that changes its state upon command by the controller. Typically the alarm relay output activates an audible alarm.

AUXILIARY RTE – a second input source that informs the controller that someone has requested egress from a secure area. RTE and REX are common abbreviations. See REQUEST TO EXIT.

CONTROLLER – a central unit containing a microprocessor, a database, inputs, and outputs. The microprocessor processes information received from the inputs, compares it to information in the database, and determines if an output should be generated.

DOOR FORCED ALARM – a door that is forced open generates a door forced alarm.

DOOR HELD OPEN ALARM – a door that is held open beyond the Open Time (as programmed in the Doors32™ program) generates a held open alarm.

DOOR SWITCH – a switch that reflects the current state of the door: if the door is open, the switch is open; if the door is closed, the switch is closed.

EARTH GROUND – an electrical connection point that brings all electrically neutral lines to the earth’s surface potential (essentially zero potential). A good earth ground protects electrical devices from transients such as power surges and lightning strikes, and drains electrical interference from data, communication, and power lines that support these electrical devices.

FAIL-SAFE – fail-safe means that if the power should fail at a door, the door will automatically unlock allowing egress. A fail-safe door ensures people will be able to exit a secured area through that door in the case of an emergency.

FAIL-SECURE – fail-secure means that if the power should fail at a door, the door will automatically lock and not allow entrance, but will continue to allow egress. A fail-secure door ensures a secured area remains secure regardless of the situation.

INPUT – an electronic sensor on the controller that detects a change of state in a device outside the controller. See NORMALLY CLOSED, NORMALLY OPEN.

LOCK RELAY OUTPUT – a relay on the controller that changes its state upon command by the controller. Typically the lock relay output unlocks a secure door.

NETWORK – a series of controllers linked together via a communication cable.

NORMALLY CLOSED – an input device that continually keeps a circuit active or complete. A state change is generated when a normally closed device is opened. See INPUT.

NORMALLY OPEN – an input device that continually keeps a circuit open or incomplete. A state change is generated when a normally open device is closed. See INPUT.

OUTPUT RELAY – a device that changes its state upon receiving a signal from the controller. Typically the state change prompts an action outside of the controller such as activating or inactivating a device.
RELAY, FORM C – a device that has both normally closed and normally open circuits. When the relay is not energized, the normally closed circuit is complete and the normally open circuit is open. When the relay is energized the circuits switch roles, the normally closed circuit is open and the normally open circuit is complete. This dual nature of Form C relays allows for two types of applications outside the controller. A device may be attached to the normally closed circuit so that it is always on until the relay energizes to open the circuit and turn it off. Or, a device may be attached to the normally open circuit so that it is always off until the relay energizes to turn it on.

REQUEST TO EXIT – a signal that informs the controller that someone has requested egress from a secure area. RTE and REX are common abbreviations.

REX – see REQUEST TO EXIT.

RTE – see REQUEST TO EXIT.

SUPPRESSION – the addition of a device to an electrical circuit that minimizes or prevents transients from affecting the proper operation of that circuit.

TRANSIENTS – electrical surges or spikes conducted through power or data lines. Transients are generated as electrical devices are turned on or off.

TRANSORB – an electrical suppression device. See SUPPRESSION.
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Appendix

1. Quick Start Guide
SB-293 Satellite Board

This quick start guide is made up of a specification sheet, basic installation drawings and information, and short descriptions of key terms and concepts. For comprehensive information regarding the SB-293 Satellite Board, please refer to the Technical Reference (p/n 01838-002).

The SB-293 Satellite Board

Connecting Wires – Removing a Terminal Block

Strip away 1/4 inch of insulation and place the wire in the appropriate slot. Firmly tighten the screw on the top of the terminal block but do not overtighten.

To remove the terminal block from the printed circuit board, grasp the terminal block and gently pull it away from the printed circuit board.
**SB-293 Satellite Board**

**Specifications**

**Unit Dimensions**
- PXL-250 controller PCB with an SB-293 Satellite Board
  - 7.25 inches high by 6.00 inches wide by 1.75 inches deep, including wiring connectors
  - (18.45 cm by 15.25 cm by 4.45 cm)
- PXL-250 controller PCB with an SB-293 Satellite Board and an LCD-1 Alpha/Numeric Display
  - 8.10 inches high by 6.00 inches wide by 1.75 inches deep, including wiring connectors
  - (20.60 cm by 15.25 cm by 4.45 cm)
- Enclosure
  - 9.70 inches high by 8.20 inches wide by 2.60 inches deep
  - (24.65 cm by 20.85 cm by 6.60 cm)

**Operating Temperature/Humidity Range**
- 0°F to 140°F (-18°C to 60°C)
- 0% to 90% Relative Humidity, non-condensing

**Controller Power Requirements**
- 12 VDC @ 1.5 Amp

**Current Draw**
- maximum current draw 500 mA for a controller with all options installed
- 120 mA max for a PXL-250 Controller
- 150 mA max for an SB-293 Satellite Board
- refer to Table 1 for Reader current draw

**Reader Type**

<table>
<thead>
<tr>
<th>Reader Type</th>
<th>MS-3000</th>
<th>MS-4000</th>
<th>MS-5000</th>
<th>MS-7000</th>
<th>MS-9000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Draw</strong></td>
<td>50 mA</td>
<td>50 mA</td>
<td>100 mA</td>
<td>200 mA</td>
<td>200 mA</td>
</tr>
</tbody>
</table>

Table 1 – Reader Current Draw

**Output Relay Contact Rating**
- 1 Amp @ 24 VDC

**Input Device Configuration**
- Door Sense normally closed
- Request to Exit normally open
- Auxiliary Request to Exit normally open
- General Purpose normally open or closed as needed by the application

**Cable Requirements**

**Input and Output Connections**
- two conductor, stranded, AWG 22 or a larger gauge

**NOTE:** The Lock Output relay may require a heavier gauge of wire depending upon the current demands of the lock and the length of the lock wiring run.
**SB-293 Satellite Board**

**Jumper Settings**
JP12 - Configures the Satellite Board (see Figure 2)
- Jumper across JP12, pins 1 and 2, configures the Satellite board for general purpose inputs and outputs.
- NO jumper across JP12 configures the Satellite board for second door control with additional inputs and outputs. When the Satellite board is configured for second door control, the primary door must be connected to the "A" reader (TB-5 on the PXL-250 controller board) and the secondary door must be connected to the "B" reader (TB-6 on the Receiver board attached to the controller board).

**Board Installation**
Perform the following steps to install an SB-293 Satellite board on a PXL-250 controller (see Figure 3).
1) Turn the controller’s power off.
2) Line up the upper left-hand corner of the Satellite PCB with the controller PCB.
3) Line up the stand-offs in all four corners of the Satellite PCB with corresponding mounting holes in the controller PCB (see the Satellite/Controller Installation drawing below).
4) Align the Satellite Board to Motherboard connector pins.
5) Gently press the two boards together with each stand-off into its mounting hole and with the connector pins meshing together.

![Figure 2 – Setting JP12](image)

**Do**
- route cables in accessible areas for ease of maintenance
- add transient suppression across electric devices attached to a satellite board output
- use an isolation relay (Keri Systems p/n IRP-1) if attaching to a parking gate, a turnstile, or any application using a large electric motor
- for a single door application, install the door’s reader to the TB-5, “A” reader connection on the controller
- for a two door application, install the primary door’s reader to the TB-5, “A” reader connection on the controller and install the secondary door’s reader to the TB-6, “B” reader connection on the receiver board

**Do Not**
- stretch or over-tension cables
- route cables over sharp objects
- let cables or wires get tangled
Two Door Configuration Connections

This configuration assumes JP12 is OFF configuring the Satellite board for second door control.

Relay Outputs Table

<table>
<thead>
<tr>
<th>TB-7 / TB-10 Relay Outputs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-7 – Pin 1</td>
<td>lock output – normally open line</td>
</tr>
<tr>
<td>TB-7 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-7 – Pin 3</td>
<td>lock output – normally closed line</td>
</tr>
<tr>
<td>TB-7 – Pin 4</td>
<td>alarm output – normally open line</td>
</tr>
<tr>
<td>TB-7 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-7 – Pin 6</td>
<td>alarm output – normally closed line</td>
</tr>
<tr>
<td>TB-10 – Pin 1</td>
<td>GPO 3/DHO-B – normally open line</td>
</tr>
<tr>
<td>TB-10 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-10 – Pin 3</td>
<td>GPO 3/DHO-B – normally closed line</td>
</tr>
<tr>
<td>TB-10 – Pin 4</td>
<td>GPO 4/DHO-A – normally open line</td>
</tr>
<tr>
<td>TB-10 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-10 – Pin 6</td>
<td>GPO 4/DHO-A – normally closed line</td>
</tr>
</tbody>
</table>

Inputs Table

<table>
<thead>
<tr>
<th>TB-8 / TB-9 Inputs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-8 – Pin 1</td>
<td>door status switch input – normally closed</td>
</tr>
<tr>
<td>TB-8 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-8 – Pin 3</td>
<td>RTE input – normally open</td>
</tr>
<tr>
<td>TB-8 – Pin 4</td>
<td>GPI 3 input /AUX RTE-B input – normally open</td>
</tr>
<tr>
<td>TB-8 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-8 – Pin 6</td>
<td>GPI 4 input (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 1</td>
<td>GPI 5 input (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-9 – Pin 3</td>
<td>GPI 6 input (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 4</td>
<td>GPI 7 input (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-9 – Pin 6</td>
<td>GPI 8 input (1)</td>
</tr>
</tbody>
</table>

(1) General Purpose inputs can accept either a normally closed or normally open signal. The type of signal is dependent upon the type of input device. The Doors32™ software is then programmed to accept that input.

Door Status Switch Input

A door status switch opens and closes as the door is opened and closed.

NOTE: If a door switch is not installed, a jumper must be installed across pins 1 and 2 of TB8 to prevent a continuous door open alarm from being reported by the controller.
**SB-293 Satellite Board**

**Two-Door Configuration Connections (continued)**

**Request to Exit (RTE) Input**
In an RTE circuit a user presses a switch (completing the circuit) to inform the controller that the user wishes to exit through the door associated with that controller.

**Auxiliary Request to Exit (RTE) Input**
In an auxiliary RTE circuit a user presses a switch (completing the circuit) to inform the controller that the user wishes to exit through the door associated with that controller.

**General Purpose Inputs**
For the top application in the figure below, a circuit is opened to create an input event at the controller.

For the bottom application in the figure above, the motion detector senses motion and closes a circuit to create an input event at the controller.
**Two-Door Configuration Connections (continued)**

**Fail-Safe Door Lock Output Relay**
In a fail-safe application, if the power fails, the door is unlocked (see page 12 for more information).

**Fail-Secure Door Lock Output Relay**
In a fail-secure application, if the power fails, the door is locked (see page 12 for more information).

**Alarm Output Relay**
An alarm condition on the controller closes the normally open line, sounding an alarm.
Door Held Open Alarm Output Relays
These instructions apply if the enhanced alarm out annunciation feature in the *Doors32™* software has configured these outputs for door held open annunciation. Otherwise skip to the General-Purpose Outputs sections (normally open and normally closed) on page 8.

An alarm condition on the controller closes the normally open line, sounding an alarm. The following figure is for the A-door.

The following figure is for the B-door.
Two-Door Configuration Connections (continued)

General Purpose Outputs - Normally Open Relay Connection
In the following application, an event causes programming in the controller to close the normally-open line, temporarily turning on a video camera.

General Purpose Outputs - Normally Closed Relay Connection
In the following application, an event causes programming in the controller to open the normally-closed line, temporarily turning off a sensor device.
**SB-293 Satellite Board**

**General Purpose Inputs and Outputs Configuration Connections**
This configuration assumes JP12 is ON configuring the Satellite board for general purpose inputs and outputs.

**Relay Outputs Table**

<table>
<thead>
<tr>
<th>TB-7 / TB-10 Relay Outputs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-7 – Pin 1</td>
<td>GPO 1 – normally open line</td>
</tr>
<tr>
<td>TB-7 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-7 – Pin 3</td>
<td>GPO 1 – normally closed line</td>
</tr>
<tr>
<td>TB-7 – Pin 4</td>
<td>GPO 2 – normally open line</td>
</tr>
<tr>
<td>TB-7 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-7 – Pin 6</td>
<td>GPO 2 – normally closed line</td>
</tr>
<tr>
<td>TB-10 – Pin 1</td>
<td>GPO 3 – normally open line</td>
</tr>
<tr>
<td>TB-10 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-10 – Pin 3</td>
<td>GPO 3 – normally closed line</td>
</tr>
<tr>
<td>TB-10 – Pin 4</td>
<td>GPO 4 – normally open line</td>
</tr>
<tr>
<td>TB-10 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-10 – Pin 6</td>
<td>GPO 4 – normally closed line</td>
</tr>
</tbody>
</table>

**Inputs Table**

<table>
<thead>
<tr>
<th>TB-8 / TB-9 Inputs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB-8 – Pin 1</td>
<td>GPI 1 (1)</td>
</tr>
<tr>
<td>TB-8 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-8 – Pin 3</td>
<td>GPI 2 (1)</td>
</tr>
<tr>
<td>TB-8 – Pin 4</td>
<td>GPI 3 (1)</td>
</tr>
<tr>
<td>TB-8 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-8 – Pin 6</td>
<td>GPI 4 (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 1</td>
<td>GPI 5 (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 2</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-9 – Pin 3</td>
<td>GPI 6 (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 4</td>
<td>GPI 7 (1)</td>
</tr>
<tr>
<td>TB-9 – Pin 5</td>
<td>common/ground</td>
</tr>
<tr>
<td>TB-9 – Pin 6</td>
<td>GPI 8 (1)</td>
</tr>
</tbody>
</table>

(1) General Purpose inputs can accept either a normally closed or normally open signal. The type of signal is dependent upon the type of input device. The Doors32™ software is then programmed to accept that input.
SB-293 Satellite Board

General Purpose Inputs and Outputs Configuration Connections
(continued)

General Purpose Inputs
For the top application in the figure below, a circuit is opened to create an input event at the controller.

For the bottom application in the figure above, the motion detector senses motion and closes a circuit to create an input event at the controller.

General Purpose Outputs - Normally Open Relay Connection
In the following application, an event causes programming in the controller to close the normally-open line, temporarily turning on a video camera.
General Purpose Inputs and Outputs Configuration Connections
(continued)

General Purpose Outputs - Normally Closed Relay Connection
In the following application, an event causes programming in the controller to open the normally-closed line, temporarily turning off a sensor device.

![Diagram showing connections for a normally closed relay]

- Normally-Closed Signal to TB-10, Pin 6
- Ground/Common to TB-10, Pin 5
- Normally-Open Signal to TB-10, Pin 4
- Sensor Device

1.5KE39C Transorb for Transient Suppression
SB-293 Satellite Board

General Information on Inputs
A controller input detects a state change generated by a device outside the controller that may prompt a response from the controller. Input devices that generate a state change may be normally-closed or normally-open. This section provides a brief description of normally-closed versus normally-open inputs.

Normally-Closed
A normally-closed input device continually keeps a circuit active or complete. A state change is generated when the normally-closed input device is forced open, breaking the circuit. In an access control system, a door switch is a typical example of a normally-closed device. While the door remains closed, the switch remains closed. When someone opens the door, the door switch is opened, breaking the circuit and generating a state change. The controller then responds to the state change and generates an output (such as sounding an alarm if the door is a secure door).

Normally-Open
A normally-open input device continually leaves a circuit open, or incomplete. A state change is generated when the normally-open input device is forced closed, completing the circuit. In an access control system, a request-to-exit (RTE) button is a typical example of a normally open device. In an access control installation, an RTE button is located on the secure side of a door. While there is no one there pressing the button, the switch remains open. When someone desires to exit through a secure door, they press the RTE button, closing the circuit and generating a state change. The controller then responds to this state change and generates an output (such as unlocking the door to allow egress).

General Information on Safety versus Security with Door Locks
When installing a door lock there are two things to consider: safety versus security, or should the door be “fail-safe” or “fail-secure.”

Fail-Safe Door Lock
Fail-safe means that if the power should fail at a door (perhaps due to a power outage or equipment failure), the door will automatically unlock allowing entrance or egress. Power is required to keep the door locked. A fail-safe door ensures people will be able to enter and exit a secured area through that door in the case of an emergency. A typical fail-safe application may use a magnetic lock. In this application, the controller energizes the lock relay, causing the lock relay to change its state. In its new state the normally-closed circuit is opened breaking the power to the magnetic lock and allowing the door to be opened.

Fail-Secure Door Lock
Fail-secure means that if the power should fail at a door (perhaps due to a power outage or equipment failure), the door will automatically lock and not allow entrance, but will continue to allow egress. Power is required to unlock the door. A fail-secure door ensures a secured area remains secure regardless of the situation. A typical fail-secure application may use a door strike. In this application, the controller energizes the lock relay, causing the lock relay to change its state. In its new state the normally-open circuit is closed activating the release mechanism for the door strike on the door to be opened.