PTI
SECURITY
SYSTEMS

8-Channel Relay Board

Installation and Operation Manual
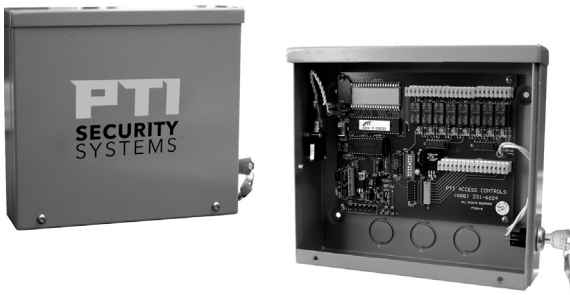
SECURITY **ACCESS** **CONTROL** **VIDEO**

www.ptisecurity.com   *800.523.9504*

8-Channel Relay Board

PTI **SECURITY** SYSTEMS

Thank you for purchasing the 8-Channel Relay Board. While every effort has been made to ensure the accuracy of the information in this document, PTI Security Systems assumes no liability for any inaccuracies contained herein. We reserve the right to change the information contained herein at any time and without notice.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio TV technician for help.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his/her own expense, will be required to take whatever measures may be required to correct the interference.

With the RS485 communication scheme, a keypad can be located as far as 4000 feet from the controller, therefore shielded twisted pair cable with ground wire is required for optimal operation. Additionally, larger gauge wire must be used the farther the device is from the controller,

Incorrect installation of electrical components can result in damage to electronics as well as personal injury.

Cross-wiring the AC power with the DC power will damage the electronics.

Cross-Wiring the Power wires with the Data wires will damage the electronics

Cross-wiring the positive and negative on the DC part of the system will damage the electronics.

Do NOT run low voltage system wires in the same conduit as high voltage wiring

The system will not operate properly if the voltage is below 12VDC. Extreme care should be taken when choosing a power supply voltage and current rating. Long distance runs may require a remote power supply to be installed in line with an RB5 relay to ensure proper operation.

Warning: The User should follow all installation, operation, and maintenance instructions. The User is strongly advised to conduct product and systems tests at least once each week. Changes in environmental conditions, electric or electronic disruptions and tampering may cause the product to not perform as expected.

Contents

Technical Specifications

Input Power:

Voltage:	12 – 18 VDC or AC
Current Consumption:	500mA Maximum

Relay Specifications:

Maximum Switching Voltage*:	30 VAC / 30VDC
Maximum Switching Current*:	1A (NO / NC)

* Resistive load

Environmental:

Ambient Temperature:	-40°C to +85°C (-40°F to 185°F)
Ambient Humidity:	0 to 85% non-condensing

Introduction

This is an installation manual for use in setting up the 8-channel relay board. This multi-use board has eight relays and eight inputs. The 8-channel relay can be used to control gates, doors, lighting zones, or an elevator in a building with up to nine stories. It can also be used as a shunt for alarms or photobeams, or as a secure interior relay.

The eight door alarm inputs can be used to control the switches for up to eight doors. Once the relay is installed it is programmed through the access control system software.

Installation

The 8-channel relay board should be installed in an interior location and secure from tampering. It can be mounted on a wall in a locking junction box, in an alarm room, security room, or elevator room, above a drop ceiling, or in another secure location.

After installation the relay board must be accessible for future maintenance. After the device location is determined, note the purpose and location of the device on the site security wiring plan.

Power and Data Communications Connections

The following procedure is used for installation as an 8-Channel relay and door alarm inputs. The power and data communications wires are connected from the RS485 line coming in from the controller (or other remote device). When power and data communications are connected, refer to the additional installation instructions for the specific function required.

1 Open the housing by removing the two stainless steel, button-head, machine screws on the front of the housing using the kex key provided with the unit. The face plate will slide down and off. The face plate can be mounted upside-down to read the label during installation.

2 Mount the back plate in the desired location using the four holes.

3 Pull the necessary wires through conduit in the housing. Each device should have the following wires.

- One of 18 AWG, 4-conductor, shielded cable coming in from the controller or from the previous AI device in line.

- One of 18 AWG, 4-conductor, shielded cable going out to the next AI device in line (if there is another AI device down the line).

- One earth ground wire

4 Strip back the outer insulation and shield foil from both of the 18 AWG, 4-conductor, shielded cables (coming from the controller or previous AI device in line and going out to the next AI device in line), being careful not to cut the bare shield wire. Strip ¼ inch of insulation off the end of each of the individual colored conductor wires.

PTI SECURITY SYSTEMS

5   Remove the terminal block **(TS1)** from the keypad circuit board by sliding them up and off. The terminal block may be somewhat difficult to remove as they are screwed on tightly. If they are tight, rock them slightly back and forth while lifting away from the board.

6   Insert both **red** wires (coming in from the controller and going out to the next AI device) into **Terminal Slot 1** on **TS1.**

7   Ensure that both wires are seated all the way inside the slot. Use a flathead precision screwdriver to tighten down the terminal screw.

8   Verify that the terminal slot has tightened down on the copper wire and not on the rubber insulation. There should be no copper wire showing outside of the terminal slot. Gently tug the wires to verify that they are tightly held inside the terminal slot.

9   Repeat this process with each of the remaining wire connections as shown in "Drawing 2: Power and Data Communications Connections" on page 6.

10 Insert both black wires into **Terminal Slot 2** of **TS1**. Ensure that both wires are seated all the way inside the slot.

11 Strip back 1/4 inch insulation from the end of the **Data +** and **Data –** wires. The common ground wire should be insulated with heat shrink or electrical tape.

12 Connect the **Data +** wire to **Pin 4** of **TS 1** by placing it in the fourth terminal block hole and tightening down with a precision standard screwdriver.

Drawing 1: 8-Channel Relay Board Installation

PTI SECURITY SYSTEMS

Drawing 2: Power and Data Communications Connections
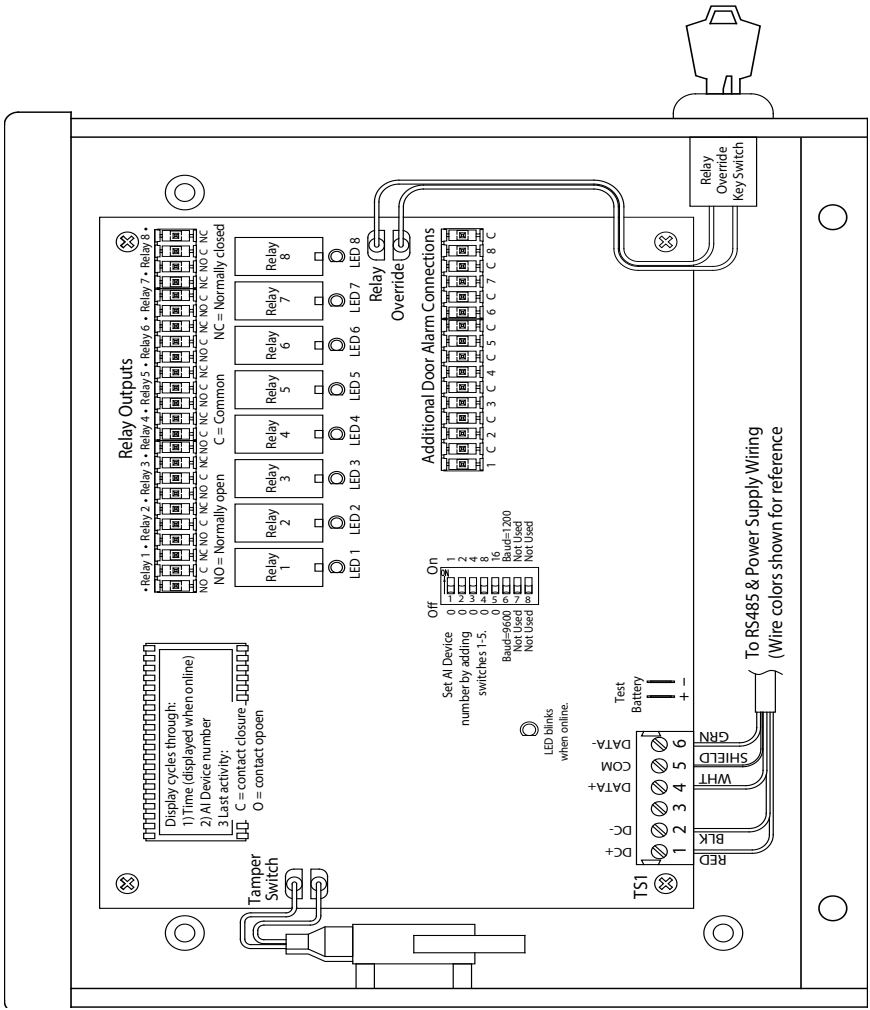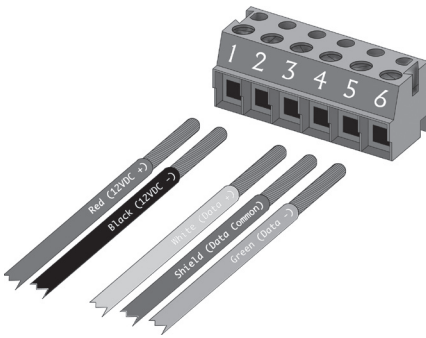
Terminal Block TS1

1. Red DC + *
2. Black DC – **
3.
4. White Data +
5. Shield **
6. Green Data -

---

* If using AC power, place the AC wires in Slots 1 and 2 PTI recommends using 12-18 VDC.
** Shield wire should be insulated with heat shrink or electrical tape.

13 Connect the **Data common ground** to **Pin 5** and **Data –** to **Pin 6** in the same way

14 Once all the wires are connected, the unit must be programmed with addresses and baud rate. Slide the dip-switches as necessary to create any address from **1 — 21**, or **23 — 31** by adding the numbers on dip-switches **1 — 5** as in the table below. **The address must be unique, with no duplication.**

Dip-switch	OFF	ON
1	0	+1
2	0	+2
3	0	+4
4	0	+8
5	0	+16

Use a small screwdriver to slide the dip-switches located in the center of the board. The dip-switches are numbered **1 — 8** starting at the top.

15 Turn on a dip-switch to activate the number. Add together the activated numbers to set any address from **1 — 21**, or **23 — 31**. Do not set the address to **0** or **22** as these are for system communications only.

16 Once the address is set and the unit is communicating, the current time and unit number will flash on the display. The last door switch activity will also show if door switches are connected.

17 **The baud rate** is set on **dip-switch 6**.

- The baud rate must be set to match the rest of the remotes on the site.

- The baud rate can be set to either 1200 or 9600 bits per second. The default is 9600. To set the rate to 1200 use a screwdriver to slide **dip-switch 6** to the right (on). In most cases, the baud rate should be set to 9,600.

Dip-Switch	Off	On
6	9,600	1,200

PTI SECURITY SYSTEMS

Installing the Relays

> **Relay boards should only be installed by qualified and licensed personnel - especially when connecting to gates, elevators, or high voltage.**

After initial installation, the device must be wired for use as an 8-channel relay. The relays can be used for alarm shunts, secure relays, elevators, or lighting zones.

- Mount the 8-Channel relay board in a secure location out of reach of the public, but accessible for maintenance - such as a security closet or office. Never install it in a locked unit.

- The 8-Channel relay board is weather-resistant, however it should be mounted in a protected interior location.

- Any device(s) connected to the 8-Channel relay board should be mounted per manufacturer's instructions.

1 The terminal strip along the top RH side of the board has eight relays. From left to right, the first three pins are Relay 1, the next three are Relay 2, etc (see "Drawing 3: Relay Outputs" on page 9 for layout).

Each relay connection consists of a **Normally Open (NO), Common Ground (cg), Normally Closed (NC)** contact. Whether the **NO** or **NC** connection is used depends on the device being connected

2 **The board relays are low voltage only and must not be used for more than 30VAC** or DC. For gate monitors, door strikes, and certain lights using more than 30V, use a contact block to handle the higher voltage.
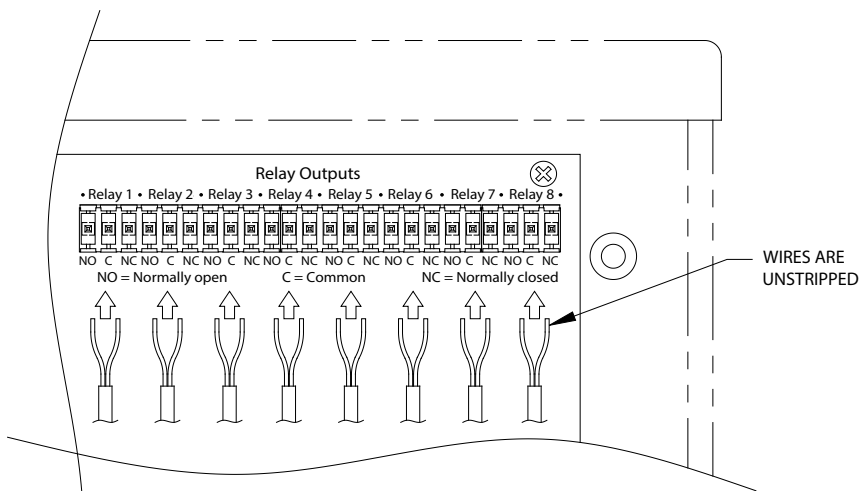
Drawing 3: Relay Outputs

> **Do not use a screwdriver, knife blade or telephone punchdown tool.**

3   Punch down the wires for each relay onto the terminal strip using a Mux Punchdown Tool (PTI part # TMUXPDTOOL). If you need to order a Mux Punchdown Tool, contact PTI Sales at 480.257.2600 or sales@ptisecurity.com

4   To punch the wires down, remove the terminal strip by gently rocking it back-and-forth while pulling up and away from the board. Place the terminal strip on a hard surface and place the wires over the correct slots.

> **Do not punch down the wires while the strip is still attached to the relay board.**
> **The board may receive damage from flexing**

PTI SECURITY SYSTEMS
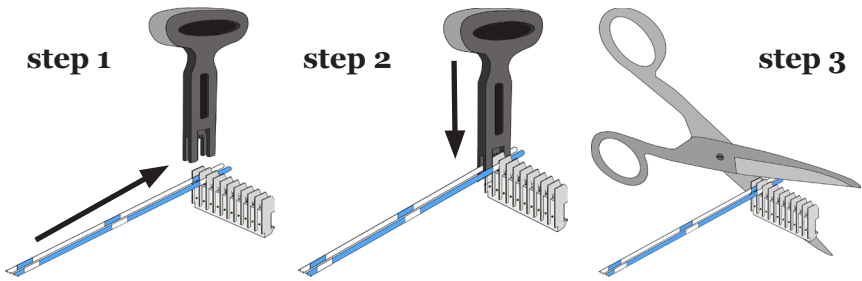
Drawing 4: Punchdown and Trim Wires

5   When all the wires are punched down, use electrician's shears or wire cutters to trim the excess wire from the back of the terminal strip. Then push the terminal strip back onto the pins in the board. "Drawing 4: Punchdown and Trim Wires" on page 10 illustrates the process.

6   After all the relays are connected to the devices they control, the relay zones must be set up in the access control system software. See the software Help Files on setting up elevators and lighting zones.

7   As each relay is activated, the LED immediatley below the relay will light up while the relay remains active. This is helpful when troubleshooting the relays.

    LED D15 is in the lower left area of the board. This relay blinks constantly when the 8-Channel relay board is communicating with the controller.

    Next to the power and data terminal block, TS1, at the bottom right area are two poles, **p6 and p7**. A 9-volt battery can be temporarily connected to these poles to test the 8-channel relay prior to connecting to the controller.

> **Do not leave the battery connected to the poles after power is connected to the system.**

> **The relay over-ride switch allows all the relays to over-ridden. Turning the keyswitch on will trigger all eight relays at the same time.**
> **This switch can be connected to a manual over-ride switch in the office, or in a Knox box for fire department access.**
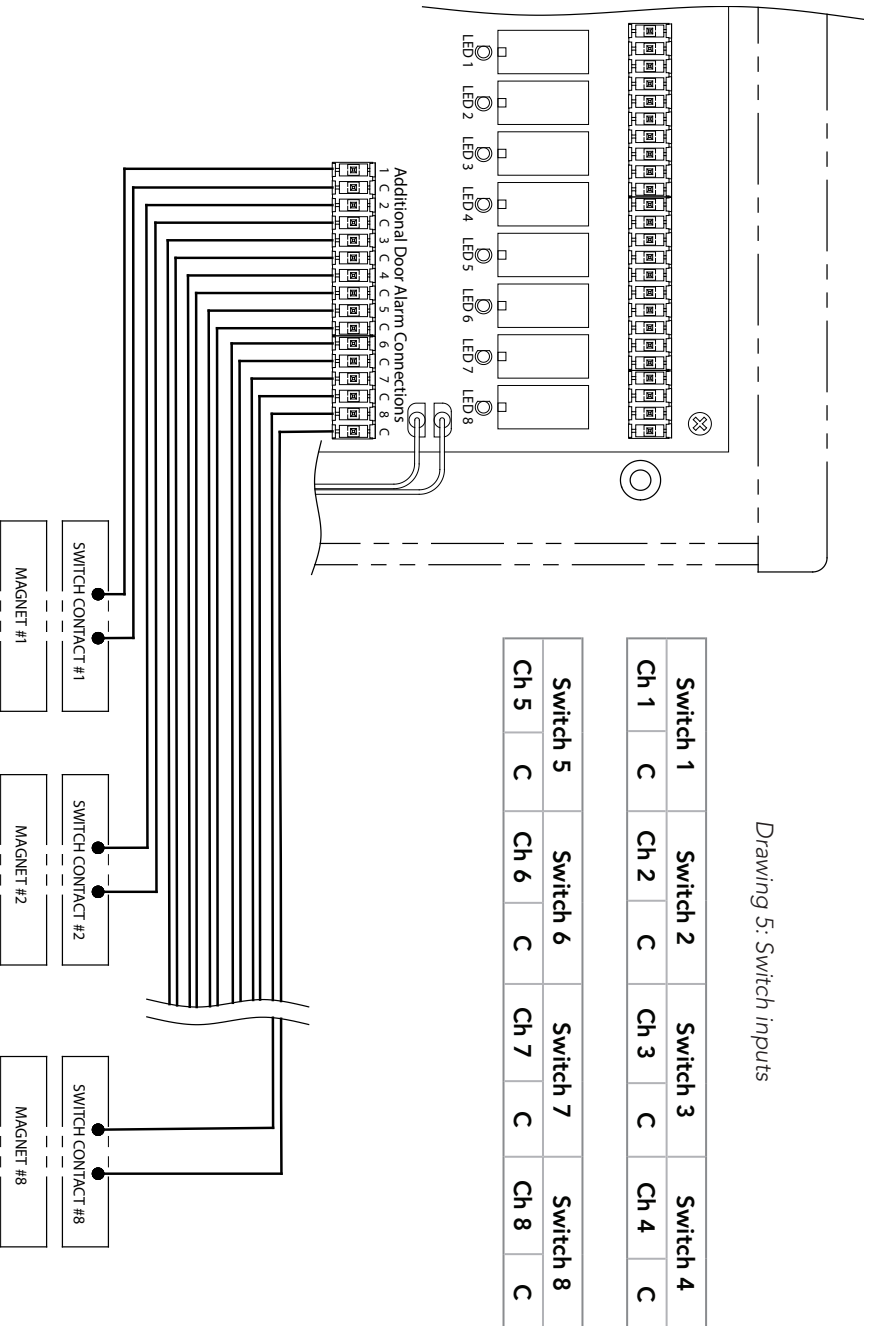
Installing Door Alarm Switches

After initial installation, the door switch contacts must be connected to enable use as a door alarm. These contacts can be used concurrently with the relays.

The door switches can be used to monitor door switches, motion sensors, photo beams or most types of alarm switch. They can also be used in conjunction with a relay for alarm shunts.

The door switch contacts cannot be used with supervised switches and do not have an RF filter. Use a regular door alarm multiplexer if these options are required.

1   The terminal strip located in the middle right of the board, below the relays, is for inputs. From left to right, the first slot is **Channel 1**, the second slot is **Common Ground**, the third slot is **Channel 2**, the fouth slot is **Common Ground**. This repeats with every other slot representing another channel. See "Drawing 5: Switch inputs" on page 12 for a diagram.

2   Use 22 or 24 AWG solid copper telephone wire for the door switch punch downs. Run this wire from the 8-channel relay board to the individual door switches and spliced with 3M UG and UY2 connectors. For splicing instructions refere to the 'Correct Splicing Techniques' documents on **www.ptisecurity.com - Knowledge base**

Additional Door Alarm Connections
1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C

LED 1 LED 2 LED 3 LED 4 LED 5 LED 6 LED 7 LED 8

MAGNET #1   SWITCH CONTACT #1

MAGNET #2   SWITCH CONTACT #2

MAGNET #8   SWITCH CONTACT #8

Drawing 5: Switch inputs

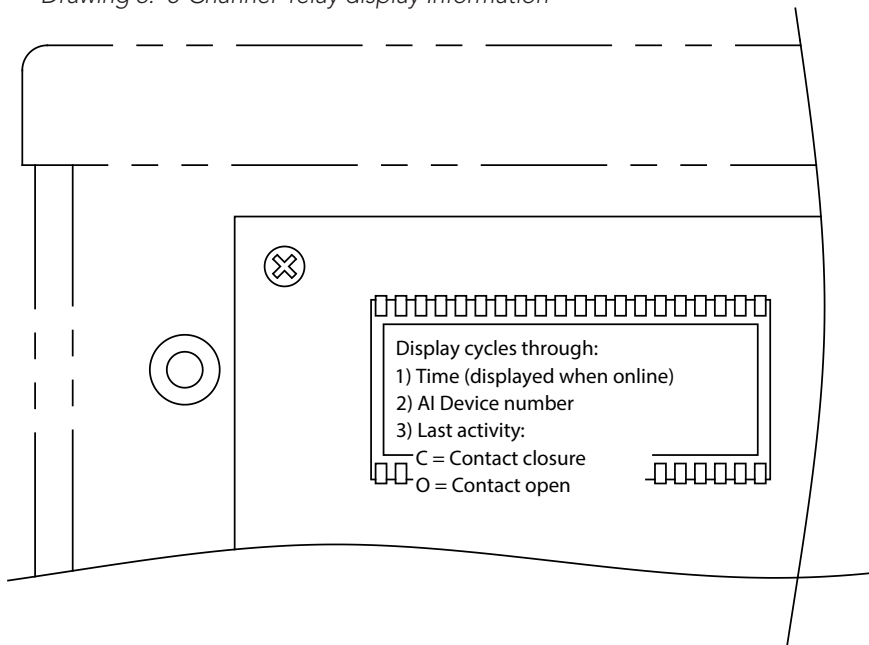| Switch 1	C	Switch 2	C	Switch 3	C	Switch 4	C
Ch 1	C	Ch 2	C	Ch 3	C	Ch 4	C
Switch 5	C	Switch 6	C	Switch 7	C	Switch 8	C
Ch 5	C	Ch 6	C	Ch 7	C	Ch 8	C

3 Punch down the door input wire using the same method as installing the relays, "Drawing 4: Punchdown and Trim Wires" on page 10. Punch down the wires for each switch using the Mux Punchdown Tool (PTI part # TMUXPDTOOL).

> **Do not use a screwdriver, knife blade, or telephone punchdown tool.**
> **Caution: Do not punch down the wires while the strip is still attached to the relay board. The board may receive damage from flexing**

4 The display in the upper left corner of the board shows the current time and remote unit number.
The display also shows the last door switch activity for any door switches attached to the board. For example, the display **O-01** shows that **Channel 1** was opened, or **C-08** to show that **Channel 8** was closed. See "Drawing 6: 8-Channel relay display Information" on page 13

Drawing 6: 8-Channel relay display Information

Display cycles through:
1) Time (displayed when online)
2) AI Device number
3) Last activity:
   C = Contact closure
   O = Contact open

PTI SECURITY SYSTEMS

5   If there are unused channels, or door alarms are not being used, they must be tied to ground. Loop a 22 or 24 AWG wire in and out of the unused channels. Punch this wire down in each channel (using the method on page 10). Loop the last end of the wire down into one of the common connections and punch it down. See "Drawing 7: Grounding Unused Channels" on page 14
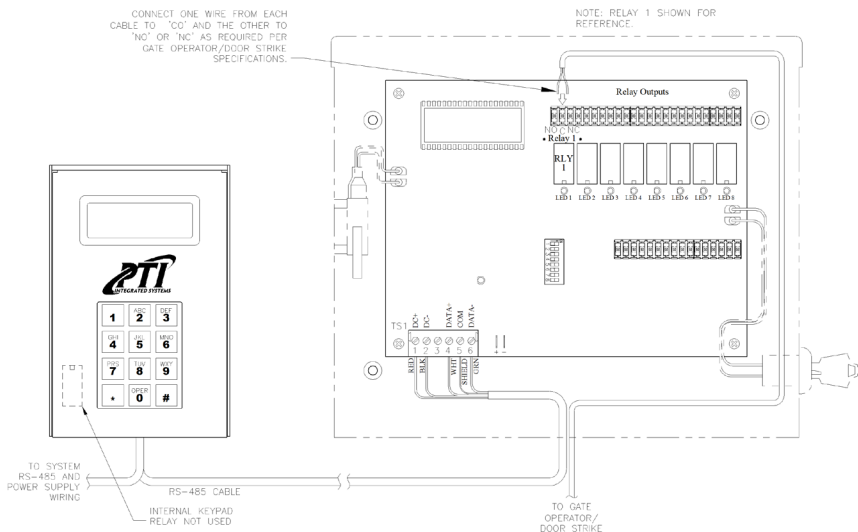
Drawing 7: Grounding Unused Channels

Additional Door Alarm Connections

PTI SECURITY SYSTEMS
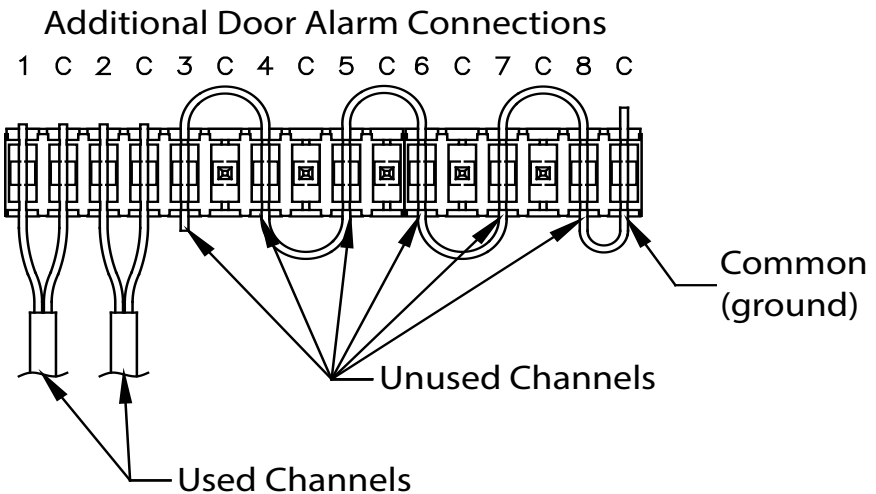
Potential Installation Wiring Diagrams

Secure Interior Relays

Secure interior relays are often used in high security installations. The keypad (or other AI device) is located outside the secure area to allow users to enter their code for access. However the access control system software is programmed to trigger the relay inside the relay board, or on the controller to actually open the secured door, see "Drawing 8: Secure Interior Relay for Keypads" on page 15.

The relay inside the keypad (or other AI device) is not used. This prevents someone from opening the keypad and placing a jumper over the relay wires to gain access.

Drawing 8: Secure Interior Relay for Keypads

Drawing 9: Alarm Shunt Connections

Relay 1

LED 1
LED 2
LED 3
LED 4
LED 5
LED 6
LED 7
LED 8

Additional Door Alarm Connections

1 C

Relay Outputs

● Relay 1 ●
NO C NC

SPLICES

NOTE: RELAY 1 & DOOR ALARM CONNECTION 1 ARE USED FOR REFERENCE
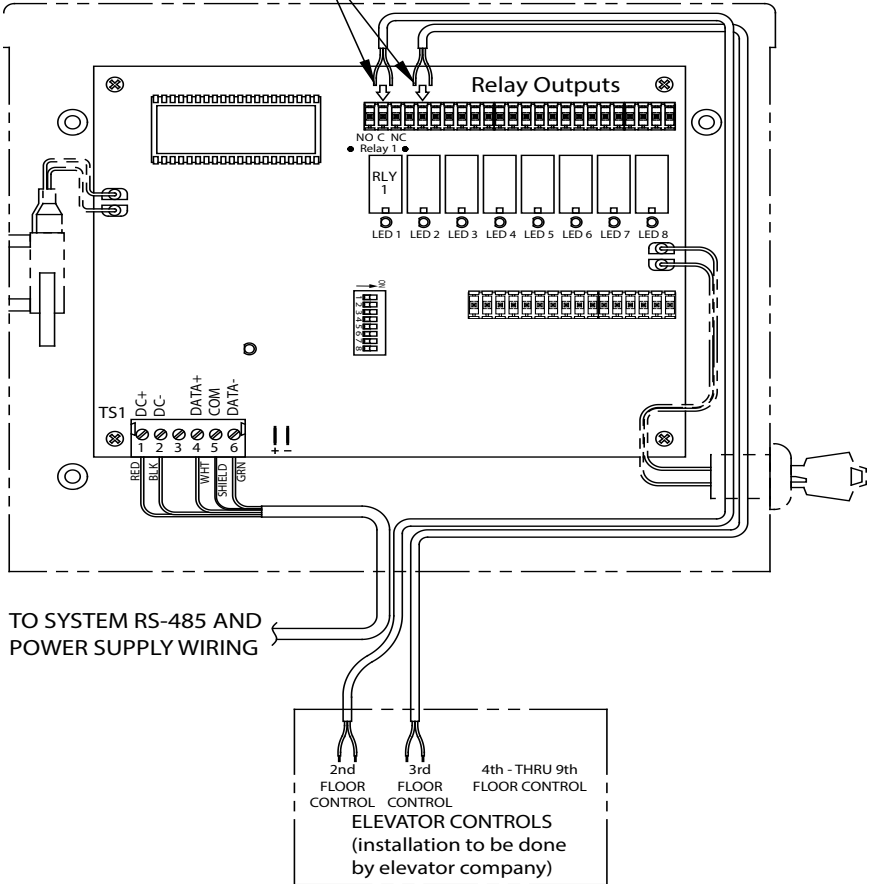
SWITCH CONTACT

MAGNET
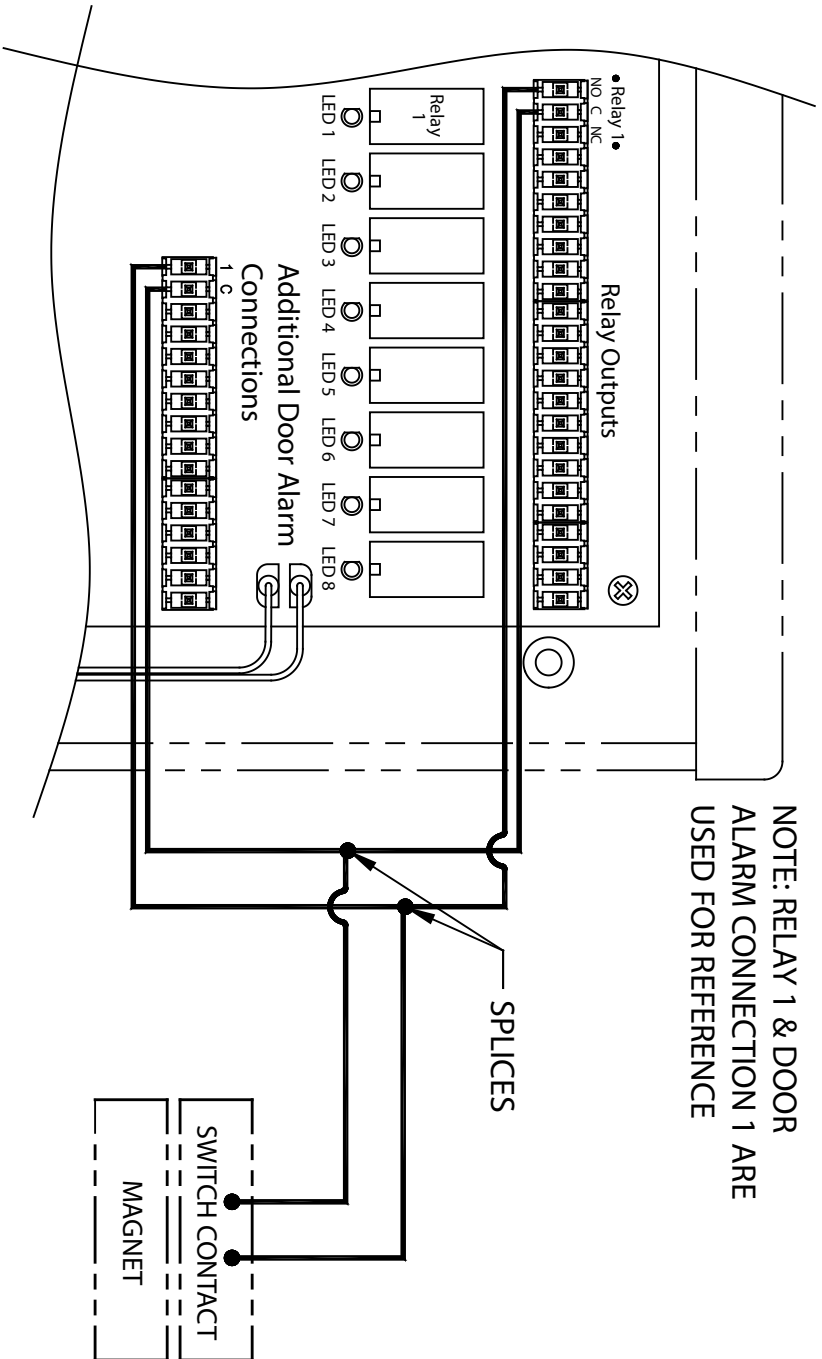
Alarm Shunts

Alarm shunts hold a relay for a certain amount of time; these are used to allow exit from a specific alarmed door or through an area covered by motion sensors, see "Drawing 9: Alarm Shunt Connections" on page 16, This allows the site manager to set a door alarm, photo beam, or motion sensor while inside the zone and still be able to exit the zone without triggering an alarm. The alarm is set after the preset relay time runs out.

Typical uses for alarm shunts are on properties with a perimeter beam, or a building with a motion sensor alarm. The alarm shunt allows a delay (for example, one minute) before activating the beam or motion sensor.

Drawing 10: Elevator Controls

CONNECT ONE WIRE FROM EACH
CABLE TO 'C' AND THE OTHER TO
'NO' OR 'NC' AS REQUIRED PER
ELEVATOR SPECIFICATIONS

NOTE: RELAYS 1 & 2 SHOWN FOR
REFERENCE. RELAYS 3 THRU 8 ARE
USED FOR FLOORS 4 THRU 9, RESPECTIVLY

Relay Outputs

NO C NC
● Relay 1 ●

RLY
1

LED 1 LED 2 LED 3 LED 4 LED 5 LED 6 LED 7 LED 8

TS1 DC+ DC- DATA+ COM DATA-
1   2   3   4   5   6
RED BLK WHT SHIELD GRN

+ -

TO SYSTEM RS-485 AND
POWER SUPPLY WIRING

2nd   3rd   4th - THRU 9th
FLOOR   FLOOR   FLOOR CONTROL
CONTROL   CONTROL
ELEVATOR CONTROLS
(installation to be done
by elevator company)

PTI **SECURITY** SYSTEMS

Elevator Controls

When elevator floor controls are connected through the 8-channel relay board, only customers with units on specific floors can gain access to that floor. The elevator buttons will not function until the user inputs a valid access code, and then only the button(s) to the floor(s) the user has permission to use will become operational. An 8-Channel relay board can control and elevator on a two to nine story building. See "Drawing 10: Elevator Controls" on page 18.
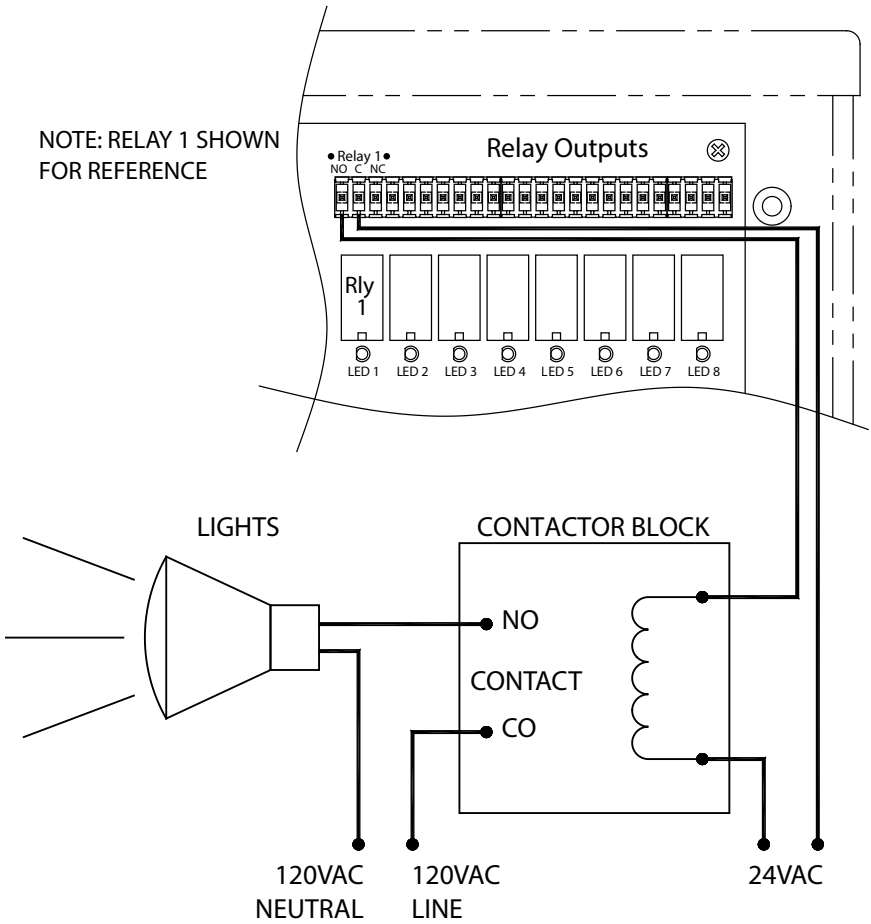
> **Caution: high voltage relay connections (over 30V) must be run through a contactor block as the voltage exceeds the relay tolerances on the 8-Channel relay board.**

Elevator controls are subject to local fire and safety regulations. It is essential that the ground floor elevator button is never controled to allow customers on any floor to return to the ground floor at any time.

In addition, stairwell access should be limited. Customers should be able to exit into a fire stairwell from any floor, but not access other floors from the stairwell.

Refer to local fire codes for specific requirements in your area. In most cases, elevator connections must be made by the elevator installer. Plan ahead to have the elevator installer present to install and test the connections. Programming for this features is covered in the software Help Files.

Drawing 11: Lighting Zone Controls

NOTE: RELAY 1 SHOWN
FOR REFERENCE

Relay 1
NO C NC

Relay Outputs

⊗

Rly
1

LED 1 LED 2 LED 3 LED 4 LED 5 LED 6 LED 7 LED 8

LIGHTS

CONTACTOR BLOCK

NO

CONTACT

CO

120VAC
NEUTRAL

120VAC
LINE

24VAC

Lighting Zones / Photo Beams

> **High voltage relay connections (over 30V) must be run through a contactor block as the voltage exceeds the relay tolerances on the 8-Channel relay board.**

Lighting zones control lights to improve power conservation on a site. Photo beams are used for access control.

Connecting hallway lights to the 8-Channel relay board via a contactor block, the lights only turn on when a customer, whose unit is in a specific hallway, logs into a keypad. After login, the lights will remain on while the customer is on-site and turn off when they logout.

Photo beams can be used in the same way, by securing a location until a customer logs in and needs access to the specific area. After login, the beam will shut off until the customer logs out.

An 8-Channel relay board can control up to eight lighting zones. Programming for this feature is covered in the software Help Files.

PTI SECURITY SYSTEMS

Warranty and Disclaimer

PTI Security Systems warrants its products and equipment to conform to its own specifications and to be free from defects in materials and workmanship, under normal use and service, for a period of one year from the date of shipment. Within the warranty period, PTI Security Systems will repair or replace, at its option, all or any part of the warranted product which fails due to materials and/or workmanship. PTI Security Systems will not be responsible for the dismantling and/or re-installation charges. To utilize this warranty, the customer must be given a Return Materials Authorization (RMA) number by PTI Security Systems. The customer must pay all shipping costs for returning the product.

This warranty does not apply in cases of improper installation, misuse, failure to follow the installation and operating instructions, alteration, abuse, accident, tampering, natural events (lightning, flooding, storms, etc.), and repair by anyone other than PTI Security Systems.

This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. PTI Security Systems will not be liable to anyone for any consequential or incidental damages for breach of this warranty or any other warranties.

This warranty will not be modified or varied. PTI Security Systems does not authorize any person to act on its behalf to modify or vary this warranty. This warranty applies to PTI Security Systems products only. All other products, accessories, or attachments used in conjunction with our equipment, including batteries, will be covered solely by their own warranty, if any. PTI Security Systems will not be liable for any direct, incidental, or consequential damage or loss whatsoever, caused by the malfunction of product due to products, accessories, or attachments of other manufacturers, including batteries, used in conjunction with our products. This warranty does not cover the replacement of batteries that are used to power PTI Security Systems products.

The customer recognizes that a properly installed and maintained security system may only reduce the risk of events such as burglary, robbery, personal injury, and fire. It does not ensure or guarantee that there will be no death, personal damage, and/or damage to property as a result. PTI Security Systems does not claim that the Product may not be compromised and/or circumvented, or that the Product will prevent any death, personal and/or bodily injury and/or damage to property resulting from burglary, robbery, fire, or otherwise, or that the Product will in all cases provide adequate warning or protection.

PTI Security Systems products should only be installed by qualified installers. The customer is responsible for verifying the qualifications of the selected installer.

PTI Security Systems shall have no liability for any death, injury, or damage, however incurred, based on a claim that PTI Security Systems Products failed to function. However, if PTI Security Systems is held liable, directly or indirectly, for any loss or damage arising under this limited warranty or otherwise, PTI Security Systems's maximum liability will not in any case exceed the purchase price of the

114A3864.C   rev. 7-2017

Product, which will be fixed as liquidated damages and not as a penalty, and will be the complete and exclusive remedy against PTI Security Systems

Warning: The User should follow all installation, operation, and maintenance instructions. The User is strongly advised to conduct Product and systems test at least once each week. Changes in environmental conditions, electric or electronic disruptions, and tampering may cause the Product to not perform as expected.

Warning: PTI Security Systems warrants its Product to the User. The User is responsible for exercising all due prudence and taking necessary precautions for the safety and protection of lives and property wherever PTI Security Systems Products are installed. PTI Security Systems does not authorize the use of its Products in applications affecting life safety.

Notice. Some PTI Security Systems products use 900Mhz wireless technology. Other devices at the site such as cordless telephones or alarm components may cause interference that will disrupt the operation of the system or may be interfered with by the system. PTI Security Systems assumes no liability for any problems caused by interference. It is the sole responsibility of the user to identify and correct such problems.

PTI
SECURITY
SYSTEMS

SECURITY **ACCESS** **CONTROL** **VIDEO**

For Technical Support, Please Visit:

tickets.ptisecurity.com