M5 Controller

Installation Manual

Document number/revision: **460130002G** (June 2009).

Intended use Use this product only for the purpose it was designed for; refer to the data sheet and user documentation. For the latest product information, contact your local supplier or visit us online at `www.gesecurity.com`.

FCC compliance 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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

You are cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Certification and compliance

2002/96/EC (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info.

Regulatory

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Preface

This is the GE *M5 Controller Installation Manual*. This document includes an overview of the product and detailed instructions explaining:

- how to mount the cabinet;
- how to install and wire the controller boards, reader boards, DI boards, DO boards; and
- how to configure the controller.

There is also information describing how to contact technical support if you have questions or concerns.

Read these instructions and all supporting documentation entirely before installing or operating this product.

A qualified service person, complying with all applicable codes, should perform all required hardware installation.

Conventions used in this document

The following conventions are used in this document:

Bold	Menu items and buttons.
Italic	Emphasis of an instruction or point; special terms.
	File names, path names, windows, panes, tabs, fields, variables, and other GUI elements.
	Titles of books and various documents.
Blue italic	(Electronic version) Hyperlinks to cross-references, related topics, and URL addresses.
`Monospace`	Text that displays on the computer screen.
	Programming or coding sequences.

Safety terms and symbols

These terms may appear in this manual:

CAUTION:	*Cautions* identify conditions or practices that may result in damage to the equipment or other property.

WARNING:	***Warnings* identify conditions or practices that could result in equipment damage or serious personal injury.**

Chapter 1 Introduction

This chapter provides an overview of your M5 Controller along with its technical specifications.

In this chapter:

Product overview

The M5 controller provides distributed processing for the interface of access control readers, keypads, alarm inputs and outputs back to a host system computer. This distributed processing allows each M5 controller to operate independent of the host system computer with the majority of access control and alarm monitoring decisions made locally at the controller. The M5 provides instant response for door control and alarm sensing in the field, while leaving the host system computer with more processing power for quickly executing daily operations such as alarm response, database updates and reporting.

The M5 has five card file slots for controller boards. All boards plug into the controller backplane making field configuration and maintenance easy and economical.

The M5 additionally incorporates “FLASH” memory technology that provides the ability to receive its operating system and application remotely from the host system over the already established communications path. This allows future firmware upgrades centrally from the host system without requiring costly service trips to each location for firmware replacement. Both the modular design and the “FLASH” memory technology of the M5 provide a simple migration path when considering future host system upgrades.

The M5 Controller consists of the following:

- Enclosure (all steel cabinet with keylock and tamper-switch-protected door)
- Power supply (user-provided)
- Battery backup power supply (user-provided)
- Power/Communications board
- PXNplus CPU board

Options include:

- Reader Processing board (select one type): 2RP, 2SRP, or 8RP
- Digital Input board: 20DI
- Digital Output board: 16DO or 16DOR

The items received in your shipment depend on the items ordered. Inspect the package and contents for visible damage. If any components are damaged or missing, do not use the unit; contact the supplier immediately. If you need to return the unit, you must ship it in the original box.

Specifications

For UL-compliant installations, refer to *UL compliance* on page 150.

Enclosure specifications

Enclosure specifications		
Physical dimensions	14 inches high x 10.5 inches wide x 6.25 inches deep 356mm high x 267mm wide x 159mm deep	
Operating environment	+35F to +122F (+2C to +50C)	
Humidity range	5% to 95% non-condensing	
Thermal air cooling	At least 6 inches (15.2 cm) of clearance is required on all four sides of the controller	
Power (Door strikes powered separately)		
Controller powered by	External 12 - 15 VDC, 6 A power supply (purchased separately) Battery backup recommended (purchased separately)	
Controller power requirements	12 to 15 VDC, 6 A Recommended power supply (300377001)	
Power dissipation	20 watts maximum	
Cabling		
Host to controller	Network: Cat5 Serial: Dedicated Belden 8723 22-AWG, 2-pair twisted shielded wire recommended • RS-232: 100 feet maximum • RS-422: 2000 feet maximum Dial-up: Short or long haul modems for distances greater than 100 feet (30.5m)	
Controller to readers	(Refer to specific reader manual for more details.)	
	5 V	Maximum cable distance 300 feet with pull-up resistors
	12 V	Cable distance • greater than 500 feet and/or current per reader greater than 150 mA: use Belden 8725 (or equivalent) 20-AWG, 4-pair twisted shielded wire • less than 500 feet: use wire within 18- to 22-AWG range
Controller to DIs or DOs	Use any cable with the desired number of individually shielded pairs	
Boards and devices		
CPU board	PXNplus (See *CPU Specifications* on page 5.)	

<table>
<tr><td rowspan="3">Reader boards</td><td colspan="2">Reader port power rating: 300 mA maximum per port with a total controller power capacity of 2.7 A</td></tr>
<tr><td>2RP or 2SRP</td><td>Number supported: four boards for maximum of eight readers
Each 2RP reader board provides:
Two reader ports
Four unsupervised DIs (two door alarm, two REX inputs)
Two reader LED outputs
Two door strike DO relays
Two auxiliary DO relays
Two alarm shunt relays
Reader technology supported: Wiegand, Strobed, F/2F and Supervised F/2F
Supports keypad only and keypad/reader technology
Output devices ratings:
Door DO (Reader LED) = 100 mA @ 12 VDC nominal
Door strike (DO) relay = 2 A @ 30 VDC or 0.50 A @ 120 VAC maximum
Aux output (DO) relay = 2 A @ 30 VDC or 0.50 A @ 120 VAC maximum
Alarm shunt relay = 2 A @ 30 VDC or 0.50 A @ 120 VAC maximum</td></tr>
<tr><td>8RP</td><td>Number supported: two boards for maximum of sixteen readers
Each 8RP reader board provides:
Eight reader ports
One digital output (reader LED) per reader port
Reader technology supported: F/2F or supervised F/2F
Supports keypad only and keypad/reader technology
Output devices ratings:
Door DO (Reader LED) = 100 mA @ 12 VDC nominal</td></tr>
<tr><td>20 DI board</td><td colspan="2">Number supported: one to four boards
Each 20 DI board provides:
Twenty supervised digital input (alarm) points (dry contacts)</td></tr>
<tr><td>16 DO</td><td colspan="2">Number supported: one to four boards
Each 16DO board provides:
Sixteen digital outputs
Output devices ratings:
Digital outputs: 100 mA @ 24 VDC nominal</td></tr>
<tr><td>16 DOR</td><td colspan="2">Number supported: one to four boards
Each 16DOR board provides:
Sixteen relay points
Output devices ratings:
Relays: 2 A @ 30 VDC or 0.5 A @ 120 VAC maximum</td></tr>
</table>

Regulatory information	
Listings	FCC Class A UL 1076 UL 294 CE See *Chapter 9 Regulatory information* for more information.

CPU Specifications

Table 1. CPU specifications

	PXNplus CPU board
Communications interfaces	
Direct Serial (RS-232, RS-422)	Supported
Direct Serial Baud Rates	2400 4800 9600 19200
Direct Serial cabling	Belden 8723, 2-pair shielded, 22-AWG
Dial-up Serial	Two options available: • Optional plug-in modem card. Can be either primary communications or fallback dial-up for network communications. • External modem.
Network	10/100 MB Ethernet, on-board Ethernet RJ-45 connection, TCP/IP
Network, Static IP	Supported
Network, DNS, DHCP	Supported
CPU specifications	
Operating system	uClinux
Processor	Xilinx
RAM	32 MB
FLASH memory	32 MB
Applications supported	
Facility Commander Wnx	FCWnx 7.0 or later
Secure Perfect	SP 6.11 or later

Table 1. CPU specifications (continued)

	PXNplus CPU board
Picture Perfect	PP 2.x or later
Application Capacities	
Facility Commander Wnx 7.x or later/Secure Perfect 6.x or later	
Badge capacity	100,000
Offline badge history capacity	8,192
Offline alarm history capacity	8,192
Picture Perfect 2.x	
Badge capacity	200,000
Offline badge history capacity	5,000*
Offline alarm history capacity	2,000*
Picture Perfect 3.x, 4.x	
Badge capacity	145,000
Offline badge history capacity	5,000*
Offline alarm history capacity	2,000*

*. This is a default allocation. The capacity can be re-allocated using the Integrated Configuration Tool.

Minimum supported board levels for the PXNplus CPU board

If the controller board contains a 4 or 5 digit numeric date code, it can be used with the PXNplus CPU board. If the controller board shows a 2-digit alpha date code, refer to the table below for the minimum level required.

Table 2. Minimum board level required for use with the PXNplus CPU board

Board	Part number	Date code[1]	
Power/Communications	110064001	IZ	September 1999
2RP	110063001	DY	April 1998
2SRP	110101501	No minimum level required	
8RP	110100501	FY	June 1998
20DI	110072003	IX	September 1997
16DO	110071001	GZ	July 1999
16DOR	110078001	No minimum level required	
Backplane	110061001	Revision 3 or greater	

1. The first letter identifies the month where A=January, B=February, and so on. The second letter identifies the year where Z=1999, Y=1998, and the sequence continues with each previous letter representing the previous year.

Chapter 2 Installation planning and mounting

This chapter provides instructions for planning your installation and mounting of your M5 Controller.

In this chapter:

Getting started roadmap

The following is a basic outline for installing and setting up your M5 system. Some steps may have been done for you depending on what you ordered. Some steps are optional, depending on the additional equipment you plan to use. These steps are noted.

CAUTION: Do not apply power to any component until the installation is complete. Damage to components may occur if power is incorrectly applied.

1. Determine the cable clamps needed and obtain them prior to starting the installation.

   During the installation, remember to:

   - label all connections/cables for ease of maintenance.
   - leave enough slack in the wiring so the cables can be “dressed.” This minimizes interference during board removal or replacement.

2. Unpack your system. See *Product overview* on page 2.
3. Mount the enclosure. See *Mounting* on page 11.
4. Mount and install the power supply. See *Installing the power supply* on page 17.
5. Mount and install the battery backup. See *Installing the battery backup* on page 19.
6. Wire up the Power/Communications board. Be sure to configure and verify the switch settings. Refer to *Chapter 3, The Power/Communications board* on page 15.
7. If using networked controllers, verify your network is up and running.
8. Install and wire up the PXNplus CPU board. Be sure to configure and verify the jumpers. If this is a nework controller, plug in the network cable. Refer to *Chapter 4, The PXNplus CPU board* on page 33.
9. Insert the reader board(s) into the enclosure and wire up the readers to the controller. Be sure to configure and verify the switch settings, jumpers, and/or resistor packs. Refer to *Chapter 5, The reader processing boards* on page 45.
10. If using digital inputs, insert the DI board into the enclosure and wire the digital inputs to the board. Be sure to configure and verify the switch settings. See *20 DI board* on page 86.
11. If using digital outputs, insert the DO board into the enclosure and wire the digital outputs to the board. Be sure to configure and verify the switch settings. See *16 DO and DOR boards* on page 90.
12. Test the wiring before you apply power. Refer to *Safety* on page 9.
13. Configure your controller. If using the PXNplus CPU board, configure the controller using the Integrated Configuration Tool. Refer to *Chapter 8, Controller firmware tools* on page 97.

Safety

Radio interference

WARNING: **This is an FCC Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.**

WARNUNG: **Dies ist ein Klasse A Produkt. In Haushalten kann es zu Interferenzen kommen. Der Benutzer ist in diesem Fall angehalten angemessene Maßnahmen auszuführen.**

Electrostatic Discharge (ESD) precaution

WARNING: **Circuit board components are vulnerable to damage by electrostatic discharge (ESD). ESD can cause immediate or subtle damage to sensitive electronic parts. An electrostatic charge can build up on the human body and then discharge when you touch a board. A discharge can be produced when walking across a carpet and touching a board, for example. Before handling any board, make sure you dissipate your body's charge by touching ground. This discharges any static electricity build-up.**

General installation rules

CAUTION: This equipment is to be installed, maintained and serviced by "authorized service persons only."

The authorized installation contractor should comply with the following rules:

- Neatly label cables at both ends.
  (For example, label should include: Controller Address Number/Device or Reader Number)
- Use individually shielded pairs of cables only. All wiring must comply with local, state, and federal electrical codes and fire codes.
- Obey all national, state, and local electrical and safety codes.
- Obtain any required permits and/or inspections. Contact the local fire marshal for assistance if necessary.
- Safety of customer personnel is the primary consideration of the installation.
- Neatly dress and tie or lace all wiring in a professional manner.
- Gather together and tape all unused conductors in multiple conductor cables.
- Shield all cabling and terminate properly.

Observing noise prevention procedures

Signal transmission

- Where practical, keep cables well separated from each other. Separate power cables from signal cables.
- Keep the break-out at the ends of signal cables as short as possible.
- Ground all shield drain wire(s) at the M5 controller using the grounding studs provided inside the cabinet enclosure.
- For communication cables between controllers, ground shield to the upstream controller only.

CAUTION: Do not ground both cable ends.

Cable routing

Keep cabling at least one foot (30.5 cm) away from any power line or other AC voltage source.

Exercise caution when locating cables and M5 components near any other equipment that may cause electrical interference (noise). Examples of electrical and electro-magnetic noise sources are:

- Fluorescent lighting and neon fixtures.
- Power distribution panels, including wiring, transformers, generators, and alternators.
- Motors that drive machinery such as air conditioners, elevators, escalators, large blowers, and machine tools. Electromagnetic equipment such as degaussers, magnetic chucks, etc. Control equipment (relays) for machinery and other switching devices that carry or switch large currents.
- Radio and television receivers and transmitters. Signal generators and intercom systems. Radar transmitting equipment.
- Arc welders, electrodischarge machinery and related equipment.
- RF induction heaters.

Cable length

- Minimize long parallel cable runs since they increase the likelihood of interference between signal cables and electrical interference sources.
- Avoid excess cable length between the M5 and the optional equipment, such as readers and digital outputs, to reduce signal degradation due to external effects.

Mounting

Be sure to read the mounting and handling guidelines below before beginning to mount the controller.

Mounting and handling guidelines

Comply with the following guidelines:

- Locate the host computer and the M5 controller in areas secure from any disruption to data communications or tampering.
- All mounting areas must be clean and clear of corrosive gases and airborne metallic particles. Avoid installing near photocopiers due to contamination from toner particles.
- The M5 must be protected from hazardous (high) voltages.
- Mount the M5 on vertical surface with at least six inches (15.2 centimeters) clearance on all four sides to support thermal air cooling.
- Locate the M5 in a place that provides dedicated AC earth ground. The M5 must be earth grounded.
- Keep interior and exterior housing of all M5 cabinets and other components free of wire remnants.
- Avoid temperatures outside range specified for M5 operating environment. Do not leave boards or other components in direct sunlight.
- To avoid mechanical damage, do not drop or stack boards.
- Do not subject printed circuit boards to electrostatic discharge.

Mounting instructions

Mount the controller cabinet using the following steps, the *Mounting Template* document part number 531009001A and *Figure 1* on page 12.

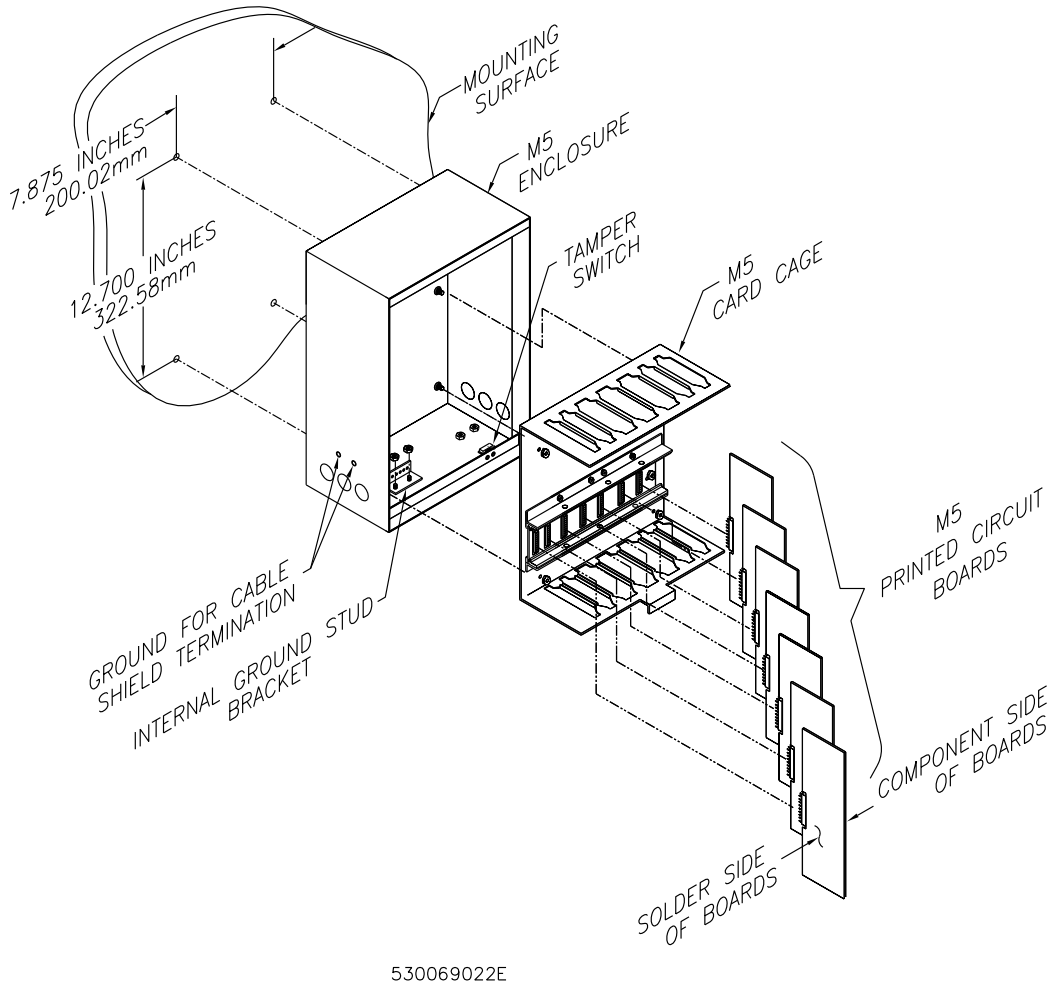
CAUTION: Do not apply power to any component during installation. Damage to components may occur if power is incorrectly applied.

1. Remove the packing material from the cabinet.
2. Unscrew four nuts to remove card cage. Use socket wrench for #10 nuts.
3. Using the template provided (531009001A), mark and drill the four mounting holes.
4. Bolt the cabinet securely to the wall using four #10 thread lag bolts or equivalent with screw heads and washers. Replace the card cage.
5. Install cable conduit to M5 cabinet knockout holes if required.

   Cabinet has knockout holes on three sides; cable is pulled through these holes. To open holes, strike knockouts from outside of cabinet.
6. Fit and tighten approved strain relief clamp in each knockout hole to be used.
7. Find the nearest earth ground (electrical box, ground bus, etc.). Run wire from the M5 cabinet ground terminal (cabinet bottom left) to earth ground point. Use wire size in accordance with local and national electrical codes.

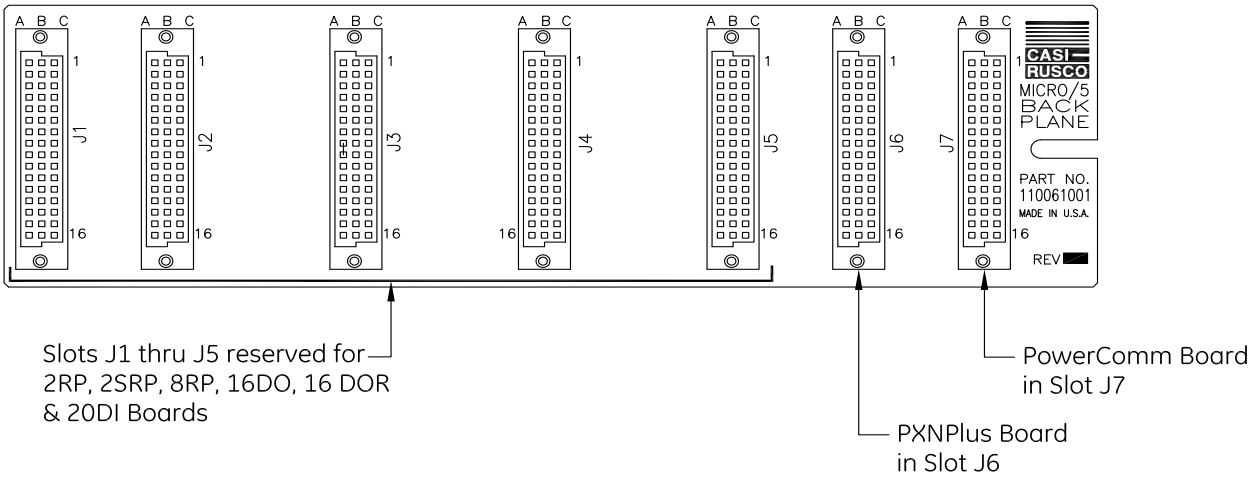
CAUTION: The M5 must be earth grounded.

Figure 1. M5 controller and components assembly drawing in standard enclosure



Note: The Power/Communications board must be positioned in slot J7 and the CPU board must be must be positioned in slot J6.

Figure 2. M5 controller slot allocations



OEM - M5 Controller

The OEM - M5 Controller is delivered without a GE enclosure for installation in another customer-specific enclosure. It is the responsibility of the installer to mount the controller in compliance with local safety codes and regulations.

Chapter 3 The Power/Communications board

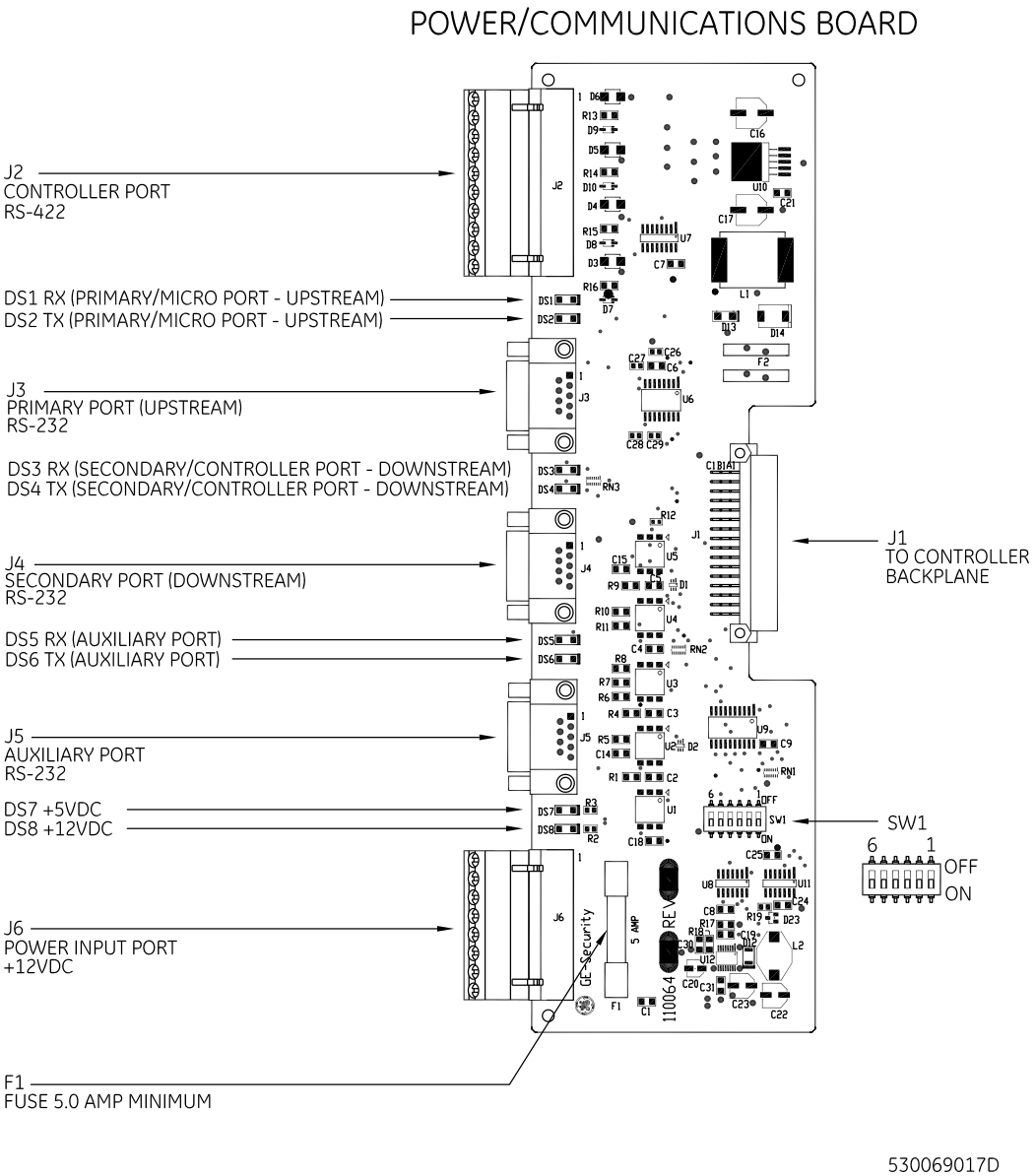
This chapter provides information about and instructions for using the Power/Communications controller board.

In this chapter:

Introduction

The Power/Communications board manages the power and controls the communications for the controller. The recommended communication method is by Ethernet.

Figure 3. Power/Communications board layout



Power setup

Installing the power supply

This section describes wiring and using a power supply.

Note: **1.** A readily accessible disconnect device shall be incorporated in the building installation wiring.
2. This equipment has been designed for connection to an IT power distribution system.

Hinweis: **1.** Ein leicht zugängliches Ausschaltgerät muss in die Installationsverkabelung des Gebäudes integriert werden.
2. Dieses Gerät wurde für den Anschluss an ein IT-Stromverteilungssystem entworfen.

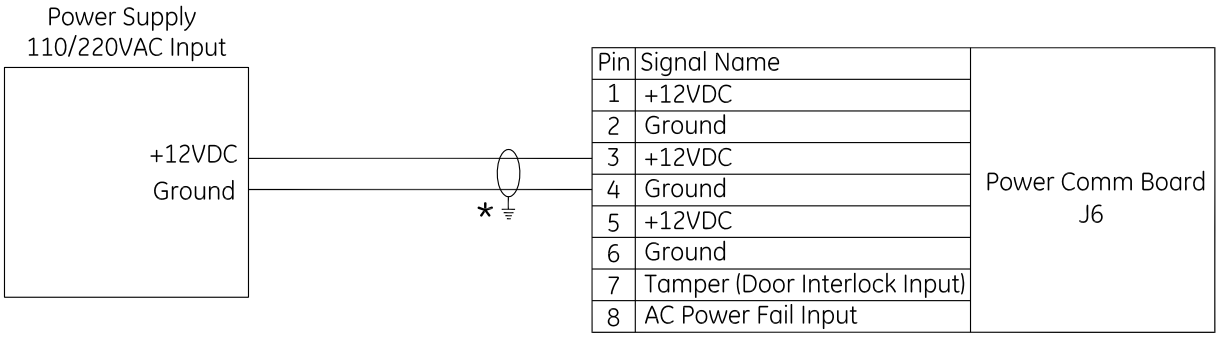
1. Mount the power supply near the M5 cabinet.
2. Run the wire through the knockout hole to the Power/Communications board J6 connector; pinouts are:
   - Pin 3 = + 12 VDC
   - Pin 4 = - Ground (12 VDC return)

CAUTION:

1. Do not ground both cable ends.

2. If the polarity is reversed, the fuse will blow to prevent damage. If the fuse blows, replace with a fuse of the same type and rating.

Figure 4. Wiring power supply



NOTE: The M5 Enclosure must be connected to earth ground to meet safety and emissions requirements (UL, FCC & CE).

* FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to external ground studs provided.

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3. Install the cabinet ground complying with the following guidelines:
   - Provide a dedicated AC ground for each controller.
   - Find the nearest earth ground, such as an electrical box or a ground bus.
   - Run a 14-18 AWG wire from the controller cabinet ground stud (located at the cabinet bottom left) to the earth ground point.

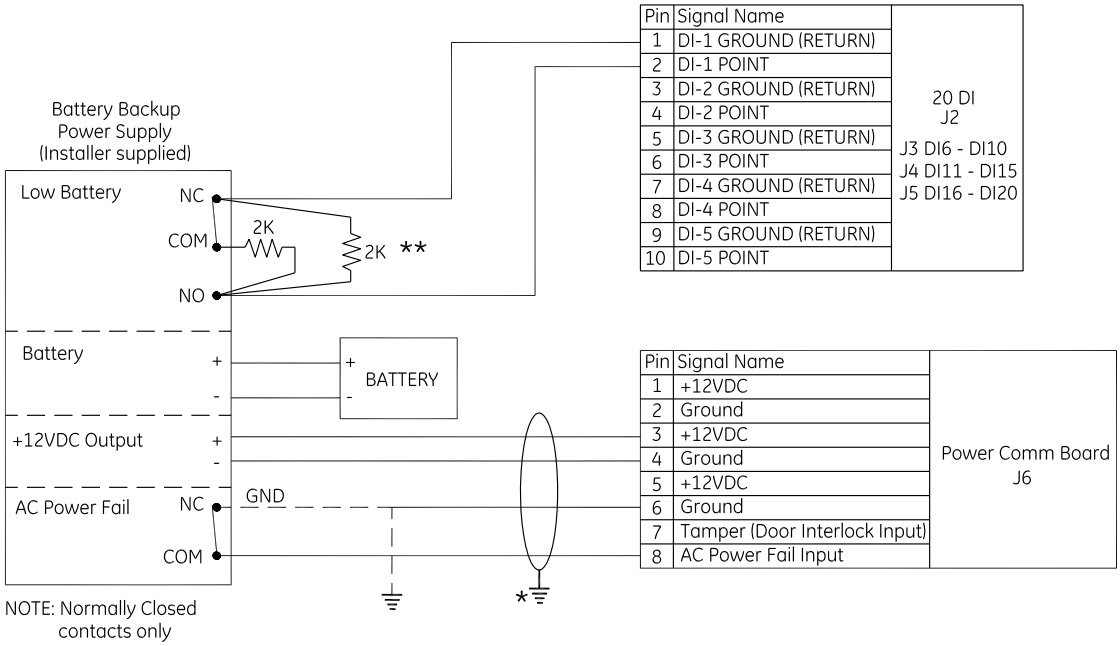
CAUTION: Controller earth grounding (AC grounding) is a critical element for proper operation. Test AC power ground to ensure proper earth grounding. Using ohmmeter, measure resistance between M5 ground stud and known good earth ground (metal water pipe or building structural steel frame). If resistance is greater than 50 ohms, it indicates poor AC ground. Good earth ground must be made before completing installation.

Installing the battery backup

The battery backup acts as a temporary power supply to M5 Controller when AC power is lost. *Figure 5* below shows a typical wiring between a battery backup power supply and a M5 Controller Power/Communications board. Refer to the manual or insert that came with your battery backup unit for specific wiring information.

CAUTION: Make sure AC input and battery backup power is disconnected prior to installing CPU, reader, DI and DO boards.

Figure 5. Wiring battery backup with built-in relay for fault output (AC power fail)



* FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to external ground studs provided.

** Install 2K resistors at power supply terminal block.

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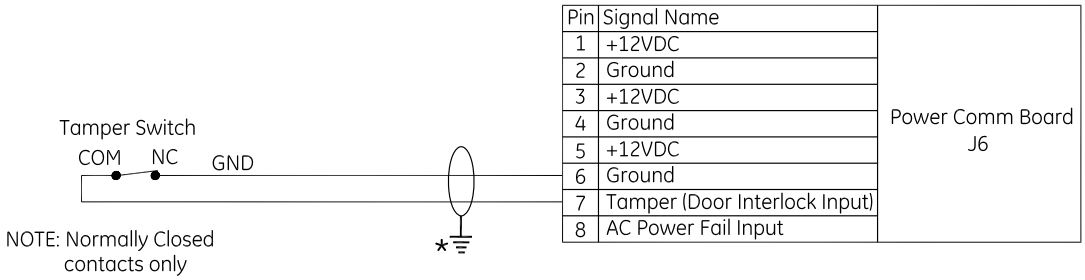
Wiring controller tamper and AC power fail inputs

1. Connect the tamper switch to the power input connector J6 between pin 6 (Gnd) and pin 7 (tamper input). Use a normally closed contact only.
2. Connect AC power fail input from a battery backup unit to connector J6 between pin 6 (Gnd) and pin 8 (AC fail). The battery backup unit must supply either normally closed dry contact or a sense line that is low (Gnd), meaning no AC power failure.

Figure 6. Wiring controller tamper and AC power fail inputs



* FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to external ground studs provided.

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Serial communications setup

The recommended communication method is by Ethernet. If using Ethernet and not using a downstream controller, this section does not apply and you can skip to the next chapter.

DIP switch settings

The Power/Communications board contains one switch block (SW1). Use SW1 to set the controller port baud rate.

Note: Set both SW1-1 and SW1-2 to ON.

Table 3. Power/Communications board - controller port baud rate

Baud rate	Controller port			
	SW1-3	SW1-4	SW1-5	SW1-6
2400	ON		ON	
4800		ON		ON
9600	ON	ON	ON	ON
19200				

= OFF

Connector pinouts

The Power/Communications board contains five connectors which are detailed in the tables below.

Table 4. J2 - Controller port (RS-422)

Connector J2		
Pin	Signal name	
1	RX+	Receive data from upstream device (controller, host, or modem)
2	RX-	
3	RX2+	Receive secondary data from downstream controller
4	RX2-	
5	RX+	Receive data from downstream controller
6	RX-	

Table 4. J2 - Controller port (RS-422)

Connector J2		
Pin	**Signal name**	
7	TX+	Transmit data to upstream device (controller, host, or modem)
8	TX-	
9	TX+	Transmit data to downstream controller
10	TX-	

Table 5. J3 - Primary port (RS-232)

Connector J3	
Pin	**Signal name**
1	CTS (jumped to pin 9)
2	(jumped to pin 7)
3	Ground
4	+5 VDC
5	Not used
6	Transmit (TX) data
7	(jumped to pin 2)
8	Received (RX) data
9	RTS (jumped to pin 1)

Table 6. J4 - Secondary port (RS-232)

Connector J4	
Pin	**Signal name**
1	CTS (jumped to pin 9)
2	(jumped to pin 7)
3	Ground
4	+5 VDC
5	Not used
6	Transmit (TX) data
7	(jumped to pin 2)
8	Receive (RX) data
9	RTS (Jumped to pin 1)

Table 7. J5 - Auxiliary port (RS-232)

Connector J5	
Pin	**Signal name**
1	CTS (jumped to pin 9)
2	(jumped to pin 7)
3	Ground
4	+5 VDC
5	Not used
6	TX - Transmit data
7	(jumped to pin 2)
8	RX - Receive data
9	RTS (jumped to pin 1)

Table 8. J6 - Power input port

Connector J6	
Pin	**Signal name**
1	+12 VDC
2	Ground
3	+12 VDC
4	Ground
5	+12 VDC
6	Ground
7	Controller cabinet tamper input
8	AC power fail input

Host computer wiring

Figure 7. Wiring host computer to first M5 Controller

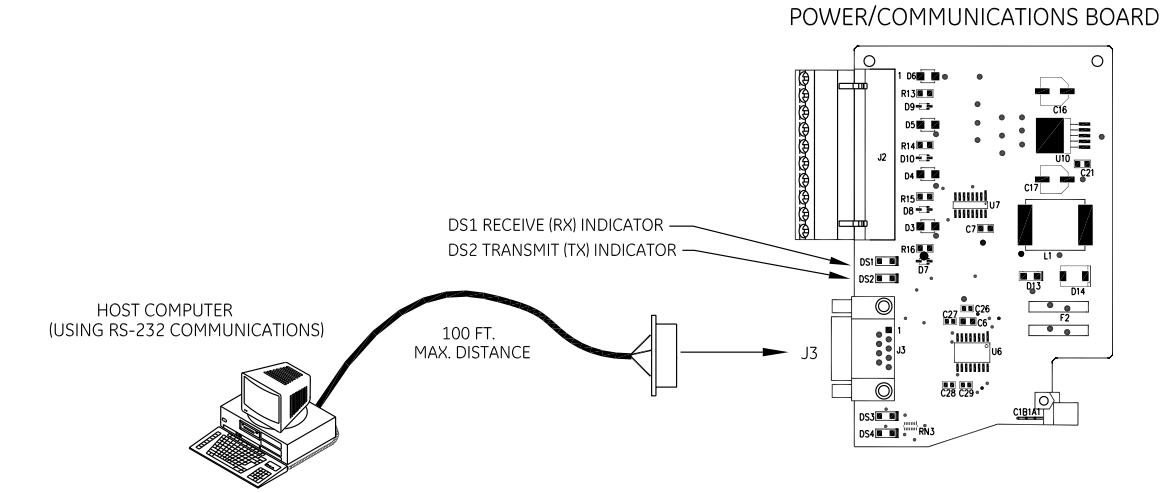

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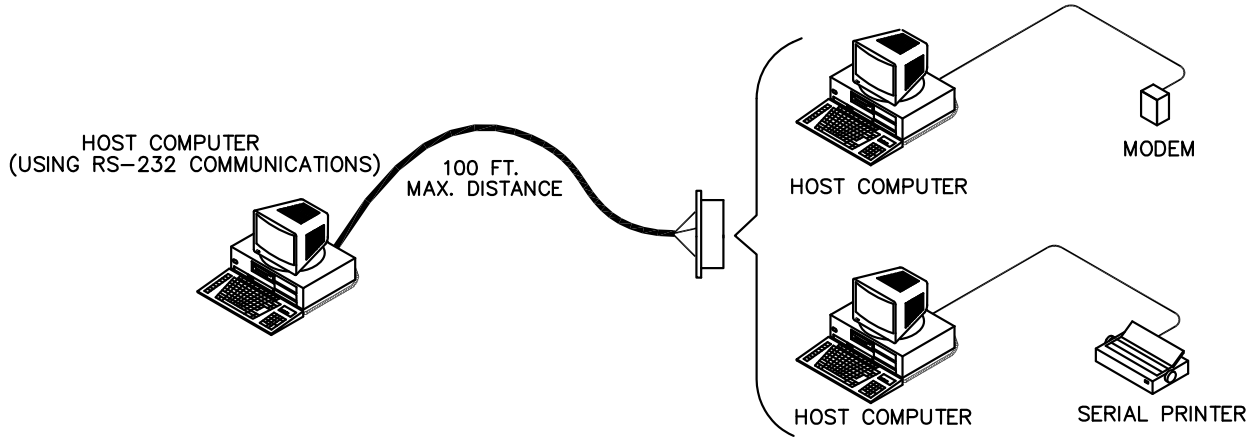
Figure 8. Wiring host computer to modem or serial printer



HOST CONNECTOR PINOUTS		SIGNAL NAME
DB25F	DB9F	
RISC/XT/PS2	AT/PENTIUM	
2	3	TX
3	2	RX
4	7	RTS
5	8	CTS
6	6	DSR
7	5	GND
8	1	DCD
20	4	DTR
22	9	RI

MODEM	SERIAL PRINTER
DB25M	DB25M
2	3
3	2
4	–
5	–
6	–
7	7
8	–
20	–
22	–
	4 5
	6 8 20

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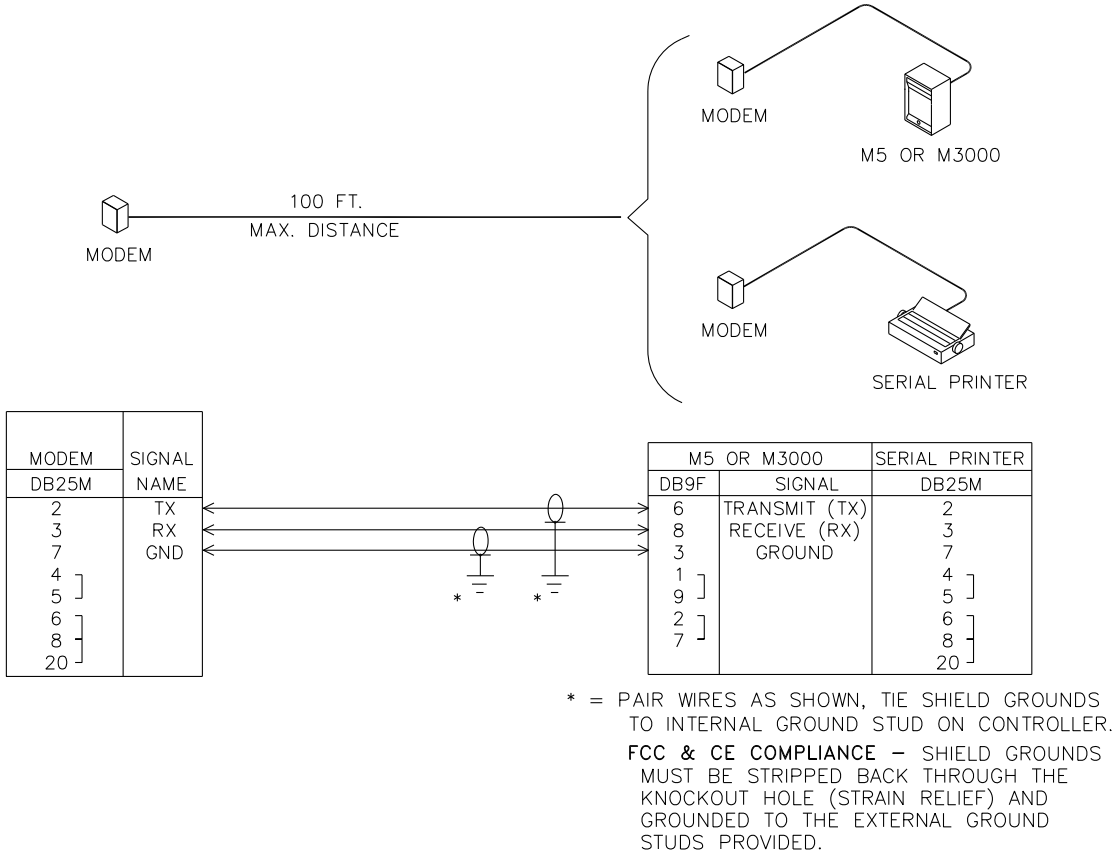
Note: If using a Digi board, use same pinouts listed in DB25F column.

Figure 9. Wiring modem to M5 Controller or serial printer



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Controller wiring

Once you have connected the first controller to the host, you can continue to connect (daisy chain) additional controllers together using the RS-232 or RS-422 port. Maximum cabling distance is 100 feet for RS-232 and 2,000 feet for RS-422. Detailed instructions on connecting controllers follow.

RS-232 connection

The Power/Communications board RS-232 ports J3 and J4 can be used to connect controllers together. Connect the host, modem, or upstream controller to port J4. Connect downstream controller to port J4.

Figure 10. Wiring upstream (toward the host) using RS-232

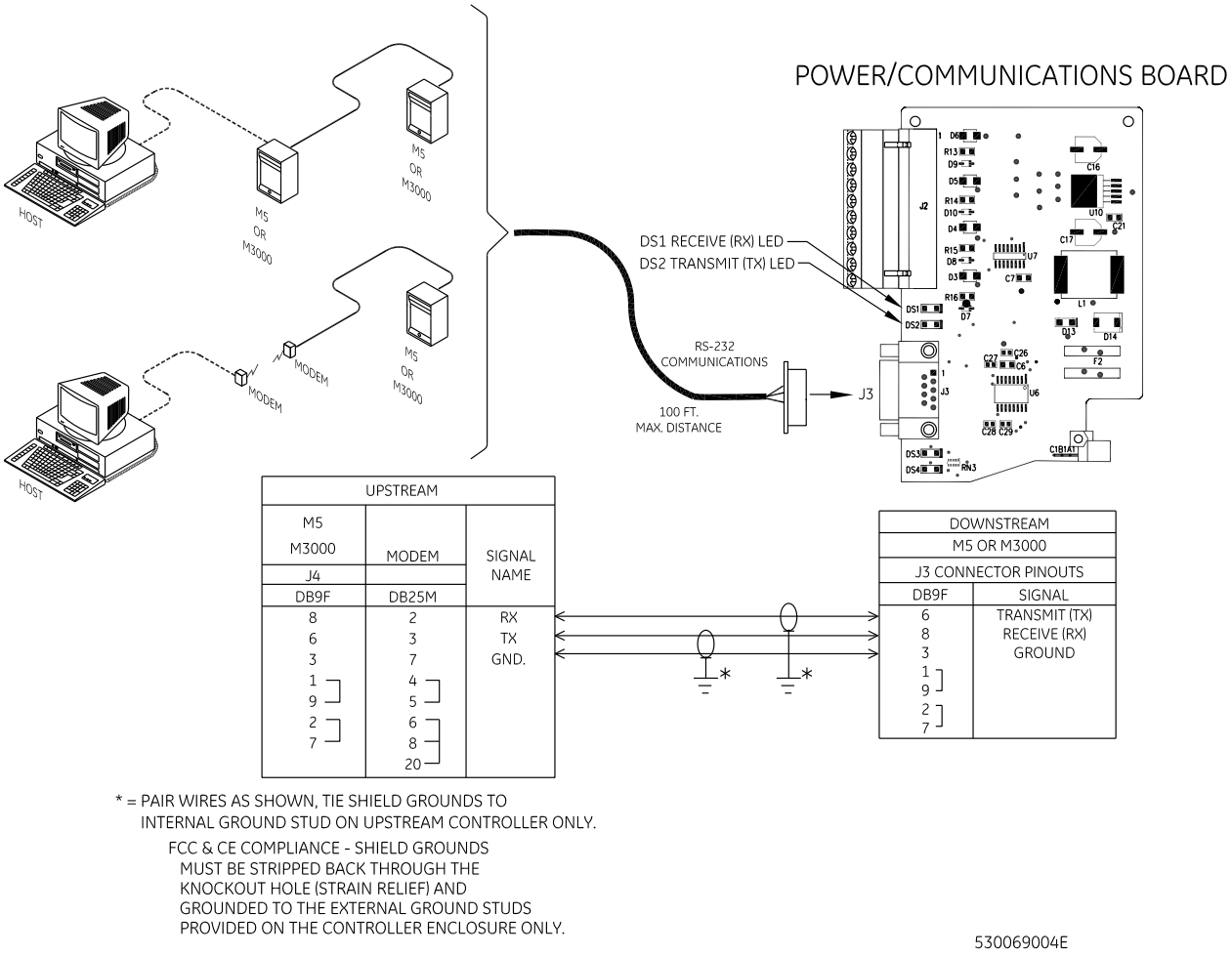
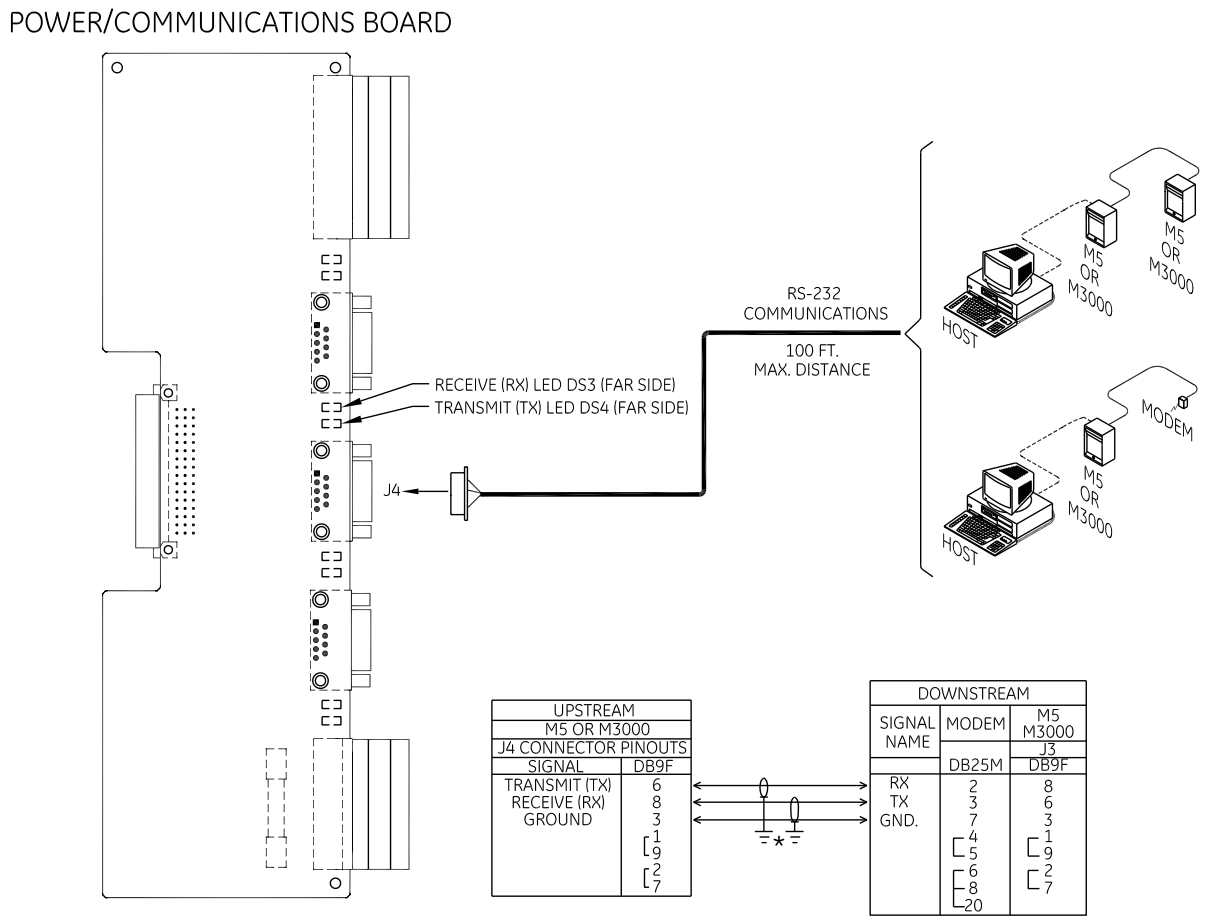


Figure 11. Wiring downstream (away from the host) using RS-232



* = PAIR WIRES AS SHOWN, TIE SHIELD GROUNDS
TO INTERNAL GROUND STUD ON THE UPSTREAM CONTROLLER ONLY.
FCC & CE COMPLIANCE - SHIELDED GROUNDS
MUST BE STRIPPED BACK THROUGH THE
KNOCKOUT HOLE (STRAIN RELIEF) AND
GROUNDED TO THE EXTERNAL GROUND
STUDS PROVIDED ON THE UPSTREAM CONTROLLER ONLY.

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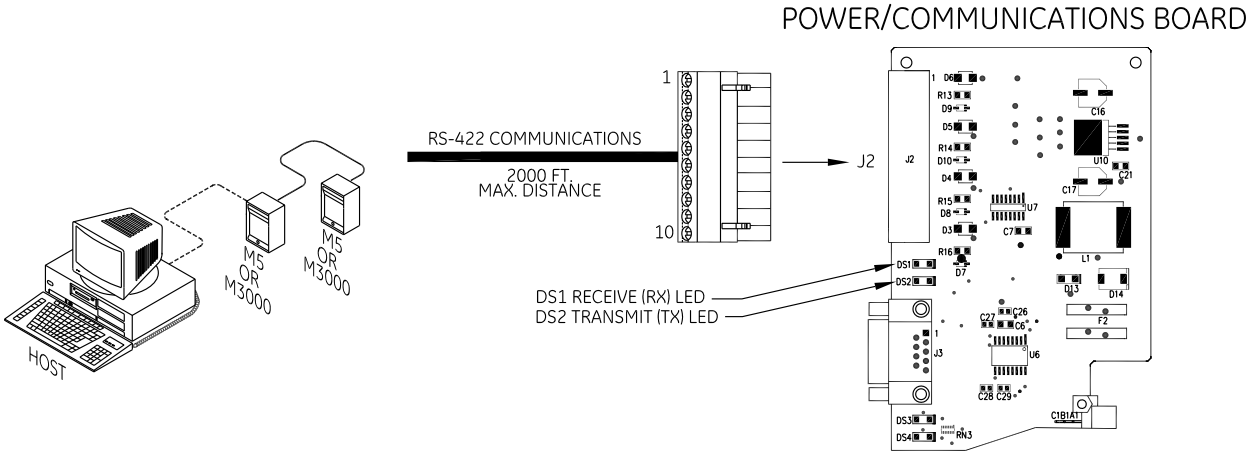
RS-422 connection

The Power/Communications board RS-422 port J2 can be used to connect controllers together.

Figure 12. Wiring upstream (toward the host) using RS-422



UPSTREAM		DOWNSTREAM	
M5 M3000	SIGNAL	M5 OR M3000	
J2	NAME	J2 CONNECTOR PINOUTS	
		J2	SIGNAL
9	TRANSMIT (+)	1	RECEIVE (+)
10	TRANSMIT (-)	2	RECEIVE (-)
5	RECEIVE (+)	7	TRANSMIT (+)
6	RECEIVE (-)	8	TRANSMIT (-)

* = PAIR WIRES AS SHOWN, TIE SHIELD GROUNDS TO INTERNAL GROUND STUD ON CONTROLLER.

FCC & CE COMPLIANCE - SHIELD GROUNDS MUST BE STRIPPED BACK THROUGH THE KNOCKOUT HOLE (STRAIN RELIEF) AND GROUNDED TO THE EXTERNAL GROUND STUDS PROVIDED ON THE CONTROLLER ONLY.

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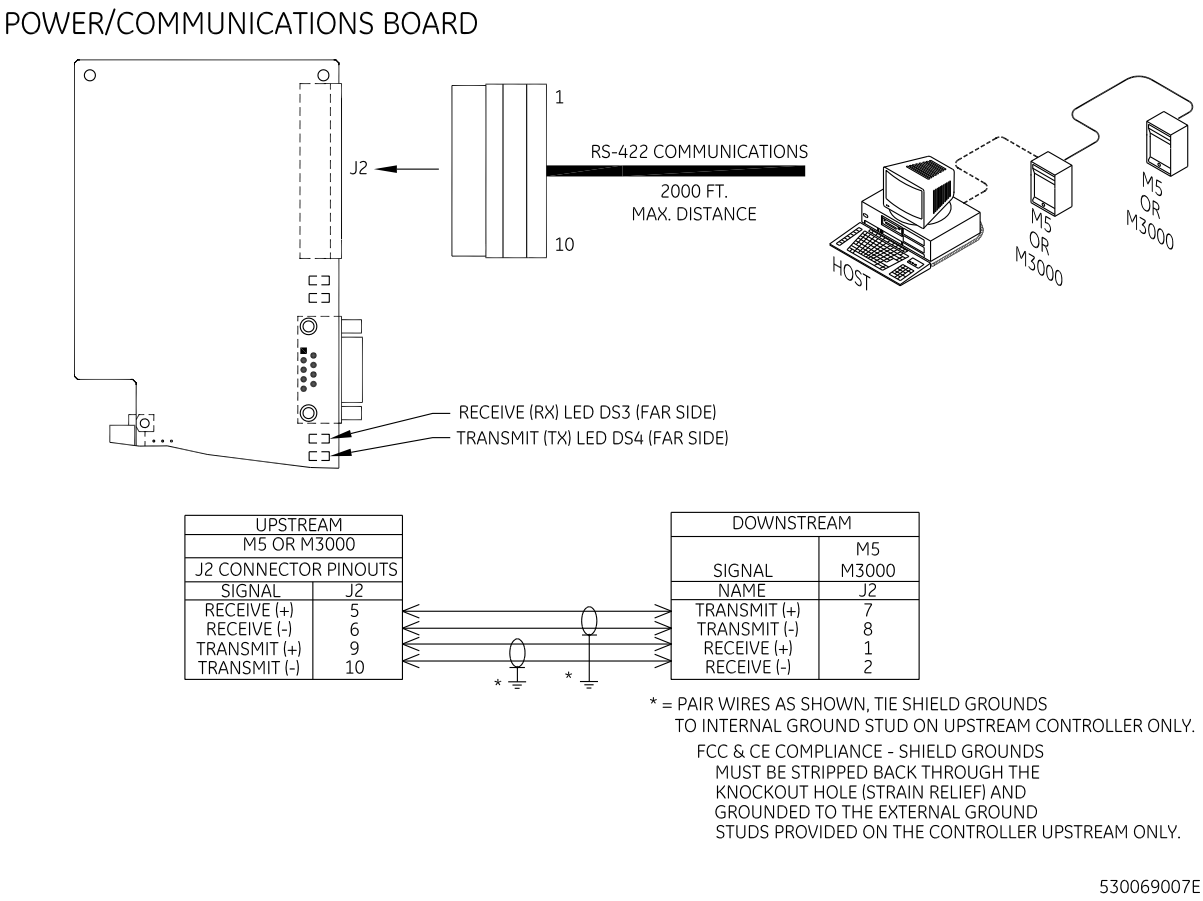
Figure 13. Wiring downstream (away from the host) using RS-422



Shield wire grounding

To ground the shield wire:

1. Connect the communications cable shield to the ground nut adjacent to the cable entrance knockout of the cabinet enclosure. For more details, see *Figure 86, Typical installation using shielded cable/drain wire - outside and inside the enclosure* on page 148.
2. **For host-to-controller connection:** ground shield wire at controller.
   For controller-to-controller connection: ground shield wire at upstream controller.

CAUTION: Do not ground both cable ends.

Wiring the Aux port

The Auxiliary port J5 is used to connect the PXNplus console or Model 351 Time Display. Refer to the appropriate section in this manual or device manual for connection information.

LED indicators on the Power/Communications board

The Power/Communications board has eight LEDs.

Table 9. LEDs on the Power/Communications board

LED number	State	Description
DS1	Flashing	Data received from upstream host/controller connected to primary/controller port (Receive RX).
DS2	Flashing	Data transmitted to upstream host/controller connected to primary/controller port (Transmit TX).
DS3	Flashing	Data received from downstream controller connected to secondary/controller port.
DS4	Flashing	Data transmitted to downstream controller connected to secondary/controller port.
DS5	Flashing	Data received from device connected to auxiliary port.
DS6	Flashing	Data transmitted to device connected to auxiliary port.
DS7	On	Indicates +5 VDC is present.
DS8	On	Indicates +12 VDC is present.

Chapter 4 The PXNplus CPU board

This chapter provides information about and instructions for using the PXNplus CPU controller board.

In this chapter:

Introduction

The PXNplus CPU board provides direct-connect, dial-up, and network capabilities in one board.

The following are some product highlights:

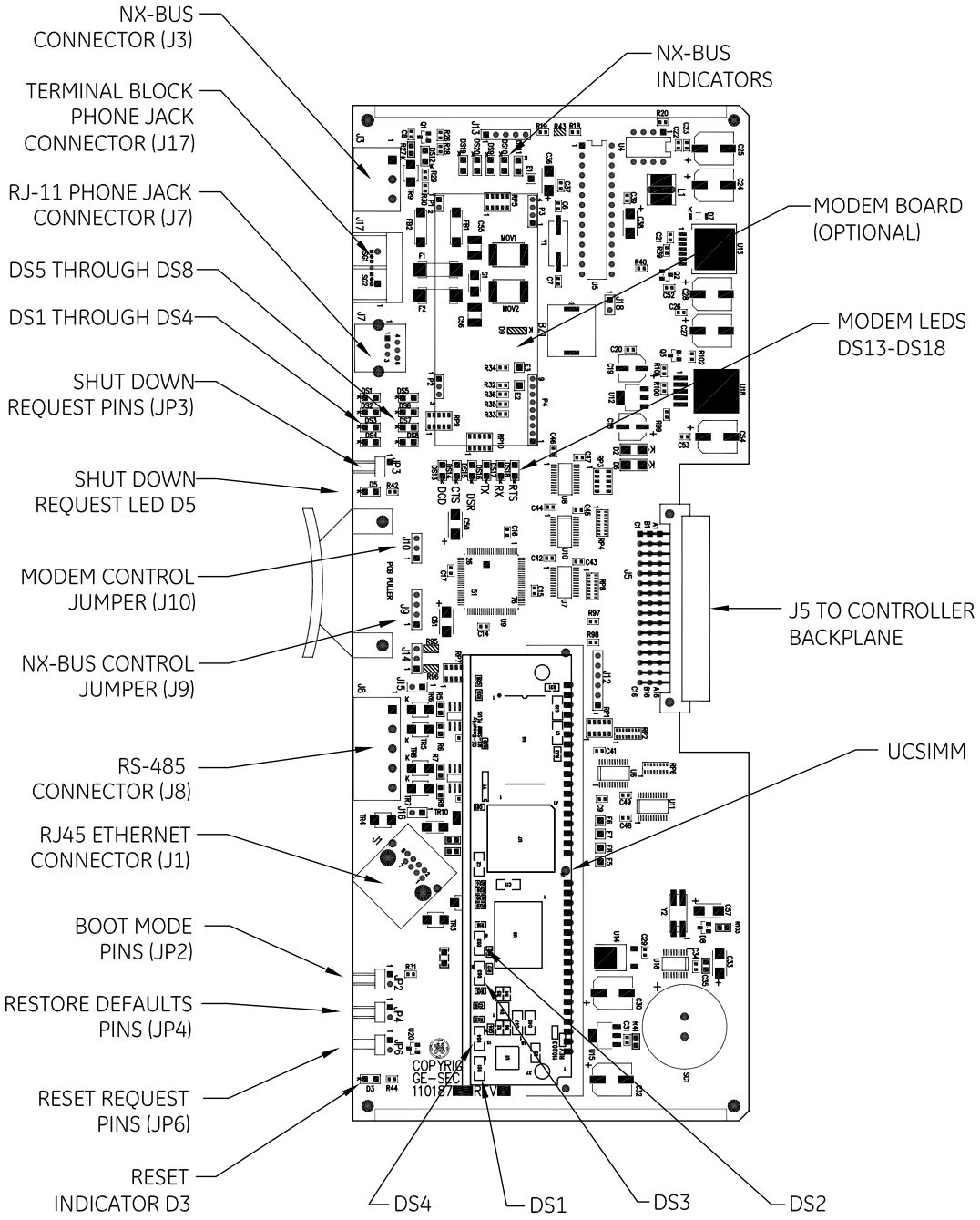
- Supports Ethernet networks.
- Supports the following network protocols: DHCP, TCP/IP, UDP, DNS, and DDNS.
- Supports an optional, integrated modem board for dial-up connection or fallback dial-up.
- Provides nonvolatile storage referred to as persistent mode of operation. This means a faster reset recovery and allows for host-less operation.
- Utilizes a 32-bit platform which provides better response times and higher capacity.
- Allows for remote diagnostics.
- Supports up to seven downstream controllers using RS-232 or RS-422 serial connection and up to 64 readers.
- Provides a browser-based configuration tool. Refer to *Chapter 8, Controller firmware tools* on page 97.
- Works with either:
  - Picture Perfect 2.0 or later
  - Secure Perfect 6.1.1 or later
  - FCWnx 7.0 or later

  Refer to the appropriate User Manual for configuration of this board within the software.
- Provides a tunable offline history buffer.

A layout of the PXNplus CPU Board is shown on the following page.

Board layout

Figure 14. PXNplus CPU board layout



Pins and jumpers

General purpose pins

Table 10. General purpose pins

Pins	Shorting these pins ...
JP2 Boot Mode	**This function is for manufacturing and catastrophic failure recovery only!** Returns the board to boot maintenance mode which allows for burning in of a new boot image.
JP3 Shutdown Request	Stops the application and puts the board into maintenance mode which allows the board to be removed. Since the PXNplus board runs an operating system just like a computer, it must be shut down correctly. Shorting JP3 shuts down the operating system/application of the board. JP3 is like using the "Shut down" feature on your computer. **To properly restart the board use both JP3 and JP6.** First, short JP3 to stop the application, then short JP6 to restart (reset) the board.
JP4 Restore Defaults	Returns the configuration to the factory defaults: • **Primary Connection Type:** Ethernet • **IP Address:** 192.168.6.6 • **Mask:** 255.255.255.0 • **Gateway:** 192.168.6.1 Short JP4 for a **minimum** of five seconds.
JP6 Hardware Reset	Reboots the CPU board without properly shutting down the application. The PXNplus board runs an operating system just like a computer. Shorting JP6 is like pressing the Off button on your computer without using the "Shut down" feature. The controller shuts down but not in a clean way. **To properly restart the board use both JP3 and JP6.** First, short JP3 to stop the application, then short JP6 to restart (reset) the board.

CAUTION: Earlier lines of GE controllers sometimes required the "wrap plug" to force the CPU into maintenance mode. DO NOT use the wrap plug on the PXNplus CPU board. To properly set the controller into maintenance mode, short JP3 (Shutdown Request) for about 5 seconds until DS7 turns on. DS2 and DS3 then alternate On.

Modem control jumper - J10

Table 11. Modem control jumper

J10	
Pins	**Function**
1 and 2[1]	Upstream direct using J3 on the Power/Communications board
2 and 3	On-board modem on the CPU board

1 This is the default setting. If the jumper is missing, the default setting is used.

Downstream configuration jumper - J9

Table 12. Downstream configuration jumper

J9	
Pins	**Function**
1 and 2[1]	RS-232 using J4 on Power/Communications board
	RS-422 using J2 on the Power/Communications board
2 and 3	Reserved - Do not use.
3 and 4	Reserved - Do not use.

1. This is the default setting. If the jumper is missing, the default setting is used.

Inserting and removing the PXNplus board

CAUTION: Earlier lines of GE controllers sometimes required the “wrap plug” to force the controller into maintenance mode. DO NOT use the wrap plug on the PXNplus CPU board. To properly set the controller into maintenance mode, short JP3 (Shutdown Request) for about 5 seconds until DS8 turns on. DS2 and DS3 then alternate On.

Inserting the PXNplus board

CAUTION: Follow standard static prevention procedures. See *Electrostatic Discharge (ESD) precaution* on page 9

1. Disconnect power and battery backup power.

   Note: When re-inserting the CPU board, the RS-485 J8 connector MUST be connected at all times to comply with CE. See *Figure 87, Location and grounding of the Power/Communications and CPU board for M5PXNplus only* on page 149.

2. Insert the CPU board into the controller.
3. Attach any necessary cables.

Removing the PXNplus board

CAUTION: Follow standard static prevention procedures. See *Electrostatic Discharge (ESD) precaution* on page 9.

1. To safely shut down the controller operating system, short JP3 for approximately 5 seconds until DS7 turns on. DS2 and DS3 then alternate On.
2. Disconnect power and battery backup power.
3. Remove any connected cables.
4. Carefully remove the CPU board from the controller.

LED indicators

LEDs on the PXNplus CPU board

The LED state depends on which state the controller is in. There are two main modes with several substates:

- **Maintenance mode:** the state of the controller before any application is running. There are two maintenance mode states:
  - **Boot mode** - indicates the bootloader is running and loading, verifying and invoking the run-time images. This is a status LED only.
  - **OS (operating system) maintenance mode** - the controller enters this mode after boot mode when it first comes up and when it is never configured before. Holding JP3 will force the controller into this mode.
- **Normal operation mode:** the state of the controller after the application is downloaded. Use the Integrated Configuration Tool to select the application. During this mode, the following additional states can occur:
  - **Controller offline:** the controller has lost communication with the host.
  - **Address received:** the controller receives a message from the host.
  - **Badge read OK:** the controller decoded a badge read and determined that it was a valid badge.
  - **Waiting for database[1]:** the controller is waiting to receive database from host.
  - **Restore defaults requested:** indicates Jumper J3 was shorted. This requests that the defaults be restored. The defaults are listed on page.
  - **Shutdown requested:** indicates Jumper J6 was shorted. This requests that the application shut down so that a hard reset can be done.
  - **eFlash image save:** indicates that the newly loaded image from the eFlash transfer is being saved into the FLASH. This is an activity indicator only.
  - **Persistence:** indicates that the controller is operating without a host. In this mode, the controller is operating standalone until communication is re-established with the host.
    Items to note:
    - Upon restoration of communications with the host, the host automatically sets badge status for Anti-passback and Time and Attendance to neutral for all badges on the controller.
    - Unknown badges cannot be learned because the controller is not online with the host. The Unknown badge transactions are mislabeled in the history upload as transaction type *Learn Timeout* instead of *Unknown Badge*.
  - **Flash write:** indicates that the controller is storing database records into the Flash file system. This is an activity indicator only.

Table 13 shows the LED state transitions. See *Chapter 10 Troubleshooting, maintenance, support* for error conditions.

See *Figure 14, PXNplus CPU board layout* on page 35 for the location of the LEDs.

Table 13. PXNplus CPU board LED normal state transitions

	DS1	DS2	DS3	DS4	DS5	DS6	DS7	DS8
During power up	ON	ON	ON	ON	ON	ON	ON	ON
Boot maintenance mode			ON					
OS (Operating system) maintenance mode		Alternates ON with DS3	Alternates ON with DS2				ON	
Normal operation mode								
Controller offline	ON							
Address received		Flashes once						
Badge read OK			Flashes once					
Waiting for database				Flashes[1]				
Restore defaults requested				ON			ON	
Shutdown requested				ON				ON
eFlash image save							Alternates ON with DS8	Alternates ON with DS7
Persistence								ON
Flash Write						Flashing		

1. For Picture Perfect systems: DS4 blinks once per second.
For Secure Perfect systems: DS4 blinks twice followed by a one-second delay before repeating.

= OFF

Modem LED indicators on the PXNplus CPU board

See *Figure 14, PXNplus CPU board layout* on page 35 for the location of the LEDs.

Table 14. Modem LEDs on the PXNplus CPU board

LED number	Name	Description
DS13	DCD - Data Carrier Detect	Modems are connected.
DS14	CTS - Clear To Send	Modem is ready to send data.
DS15	DSR - Data Set Ready	When the modem is present, this LED is always On.
DS16	TX - Transmit	Modem is sending data.
DS17	RX - Receive	Modem is receiving data.
DS18	RTS - Request To Send	Controller is ready to send data.

UCSIMMPlus board LED indicators on the PXNplus board

Table 15. UCSIMMPlus board LED indicators

	Color	Purpose
DS1	Green	ON - Link activity present.
		Flashing - Network activity detected.
		OFF - No link activity present.
DS2	Yellow	ON - 100 Mbps
		OFF - 10 Mbps
DS3	Red	ON - Full duplex
		OFF - Half duplex
DS4	Red	ON - Collision

Important information for firewall users

If your installation requires ANY controller and its corresponding host to communicate through a firewall, then the firewall must be configured to allow for connections through the following range of ports: 6767 to 7800. Currently, the following ports have been designated for use:

Table 16. For firewall users

Port	Name	Description
6767	Application (Picture Perfect)	Normal operation data port between controller and host.
6700-6709	Application (FCWnx/Secure Perfect)	Normal operation data port between controller and host.
6768	Key	Port for exchanging DES key information (Picture Perfect only).
6868	Reserved	Future use port.
7777	Reserved	Future use port.

The following is a list of products that use these ports: GE controller firmware installation tools, Picture Perfect, FCWnx/Secure Perfect, M5PXNplus, M2000PXNplus, M3000PXNplus, and DirecDoor.

Configuring upstream communications with the host

By network

1. Verify you have a working network. If you need to configure before your network is running, skip to *step 3*.
2. Connect the network cable into J1, the Ethernet connector. See *Chapter 9, Regulatory information* on page 148.
3. Use the Integrated Configuration Tool to set the board to network use. The default for this board is network so you may only need minimal set up. See *Chapter 8, Controller firmware tools* on page 97.

By network with fallback dial-up

Fallback dial-up is available only using the on-board modem.

1. Install the modem board on the PXNplus CPU board. Refer to the document *PXNplus Modem Board Installation Instructions*.
2. Verify you have a working network. If you need to configure before your network is running, skip to *step 3*.
3. Connect the network cable into J1, the Ethernet connector.
4. Use the Integrated Configuration Tool to set the board to network use with fallback dial-up. See *Chapter 8, Controller firmware tools* on page 97.

By direct-connect

1. Verify Jumper J10 is set to 1 and 2. See *Modem control jumper - J10* on page 37.
2. Use the Integrated Configuration Tool to set the board to direct-connect. See *Chapter 8, Controller firmware tools* on page 97.

By dial-up

Using on-board modem board

1. Install the modem board on the PXNplus CPU board. Refer to the document *PXNplus Modem Board Installation Instructions*.
2. Set Jumper J10 to 2 and 3. See *Modem control jumper - J10* on page 37.
3. Use the Integrated Configuration Tool to set the board to dial-up. See *Chapter 8, Controller firmware tools* on page 97.

Configuring downstream communications

The PXNplus supports up to seven downstream controllers using RS-232 through J4 of the Power/Communications board or RS-422 through J2 of the Power/Communications board.

To use direct-connect downstream communications, set J9 to pins 1 and 2.

Chapter 5 The reader processing boards

This chapter provides information about and instructions for using the reader processing boards.

In this chapter:

Introduction

The M5 Controller supports three types of reader processing boards: 2RP, 2SRP, and the 8RP. Only one type can be used at one time, for a maximum of:

- four 2RP boards (for support of up to 8 readers),
- four 2SRP boards (for support of up to 8 supervised readers), or
- two 8RP boards (for support of up to 16 readers).

2RP board

Introduction

Each 2RP reader board provides two reader ports, four unsupervised DIs (two door alarm, two REX inputs), two reader LED outputs, two door strike DO relays, two auxiliary DO relays, and two alarm shunt relays used to shunt out external alarm inputs. Please note the following:

- Each 2RP board is limited to only one type of reader technology: Wiegand, Strobed, F/2F, and Supervised F/2F. In addition, both readers connected to the board must be the same voltage.
- In Supervised F/2F mode, the exit request and door alarm contact wiring is terminated at the reader.
- Each reader, DI point, Aux DO, and Exit DI on a 2RP board is addressed differently depending on the host system you are using. Refer to the tables listed below.
- If alarm points are not available on the reader, use alarm points on the controller.

Device addressing

Picture Perfect

Table 17. 2RP device addressing - Picture Perfect

	Board 1	Board 2	Board 3	Board 4
Readers	0 and 1	0 and 1	0 and 1	0 and 1
Door DIs	0 and 1	0 and 1	0 and 1	0 and 1
Exit DIs	8 and 9	8 and 9	8 and 9	8 and 9
Door DOs	0 and 1	0 and 1	0 and 1	0 and 1
Auxiliary/shunt DOs	8 and 9	8 and 9	8 and 9	8 and 9

Facility Commander Wnx and Secure Perfect

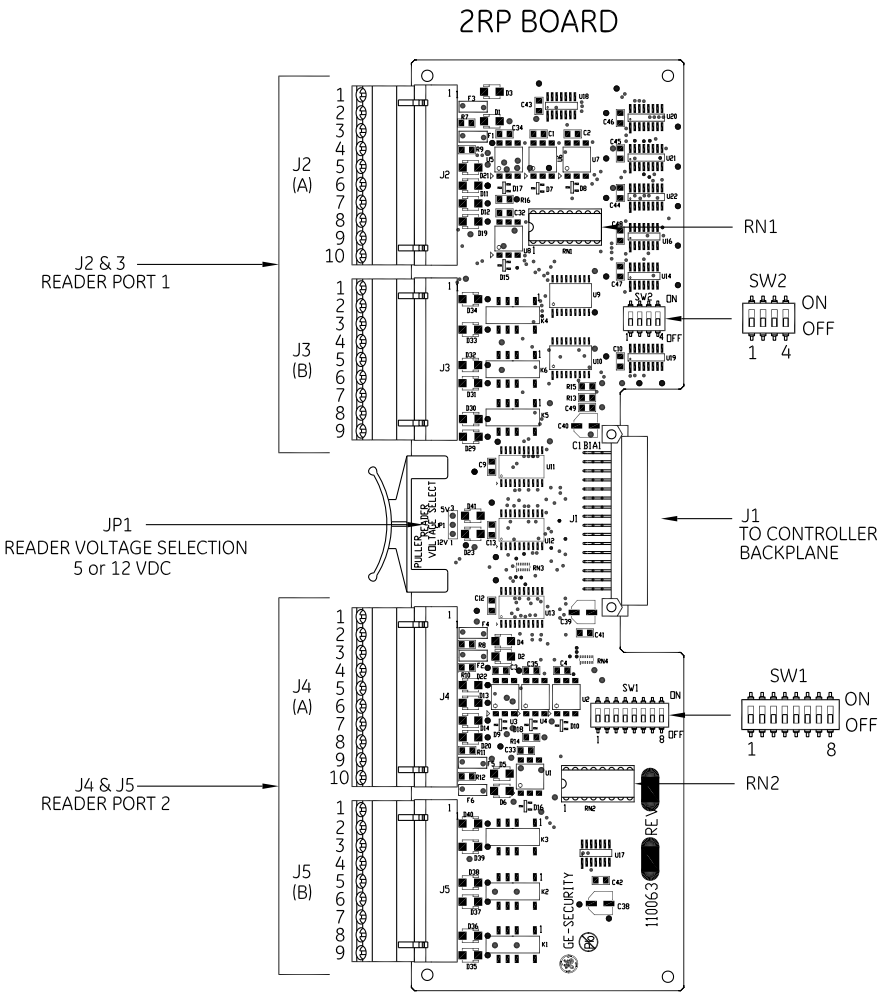
The following device addresses are created for you by the Facility Commander Wnx and Secure Perfect software. This table is provided for your reference only. The device address is in the format `mmmm-b-pp` where `mmmm` represents the controller number, `b` represents the board number, and `pp` represents the point or device number.

Table 18. 2RP device addressing - Facility Commander Wnx and Secure Perfect

	Board 1	Board 2	Board 3	Board 4
Readers/door DOs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02
Door DIs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02
Exit DIs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02
Auxiliary/shunt DOs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02

Board layout

Figure 15. 2RP reader board layout



Setting DIP switches

Set DIP switches as described in *Table 19* below before installing and wiring 2RP board.

Table 19. Reader technology and format

Reader technology and format		SW1-1	SW1-2	SW1-3	SW1-4
Not Valid					
Reserved		ON			
Reserved			ON		
Magstripe - Reversed Strobed		ON	ON		
Magstripe - Water-Mark				ON	
Magstripe - GE Supervised F/2F (default)		ON		ON	
Magstripe - Strobed			ON	ON	
Magstripe - F/2F		ON	ON	ON	
Wiegand -	3701				ON
	3702[1]				
	3201	ON			ON
	34 bit KSC				
	38 bit ADT				
	3601				
	3202		ON		ON
	4001				
	4401				
	64 bit BCD[2]				
	2802	ON	ON		ON
	2804				
	3600				
	2700			ON	ON
	2801				
	32 bit Motorola Indala				
	75 bit PIV				
	2800	ON		ON	ON
	35/37 bit Hughes				

1. Secure Perfect uses this switch setting as Custom Wiegand.
2. Only the PXNplus CPU board supports the 64 bit BCD badge format. If using the 64 bit BCD badge format, see "Wiring readers" on page 53 for special wiring instructions.

Table 19. Reader technology and format

Reader technology and format		SW1-1	SW1-2	SW1-3	SW1-4
Wiegand -	26 bit		ON	ON	ON
	34 bit CardKey				
	35 bit Hughes				
	4002				
	2500	ON	ON	ON	ON
	2804				
	3400				
	3703				

= OFF

Table 20. 2RP reader board address settings

Reader board	SW1-				SW2-			
	5	6	7	8	1	2	3	4
1	ON				ON			
2		ON				ON		
3			ON				ON	
4				ON				ON

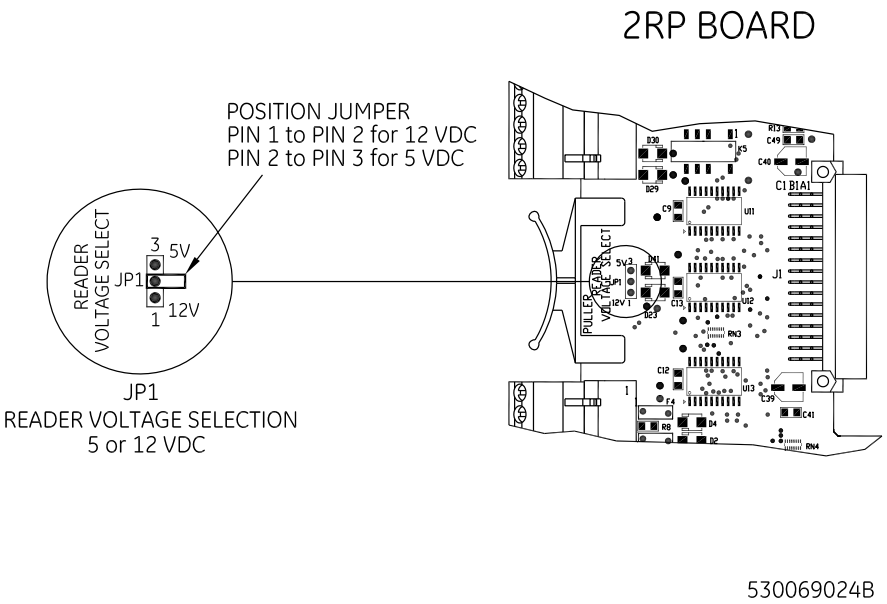
= OFF

Note: Switches SW2-5, 6, 7, and 8 are not used.

Setting reader voltage

Select the proper reader voltage by placing the jumper on JP1. See *Figure 16* below for details. Both reader ports are set to the selected voltage.

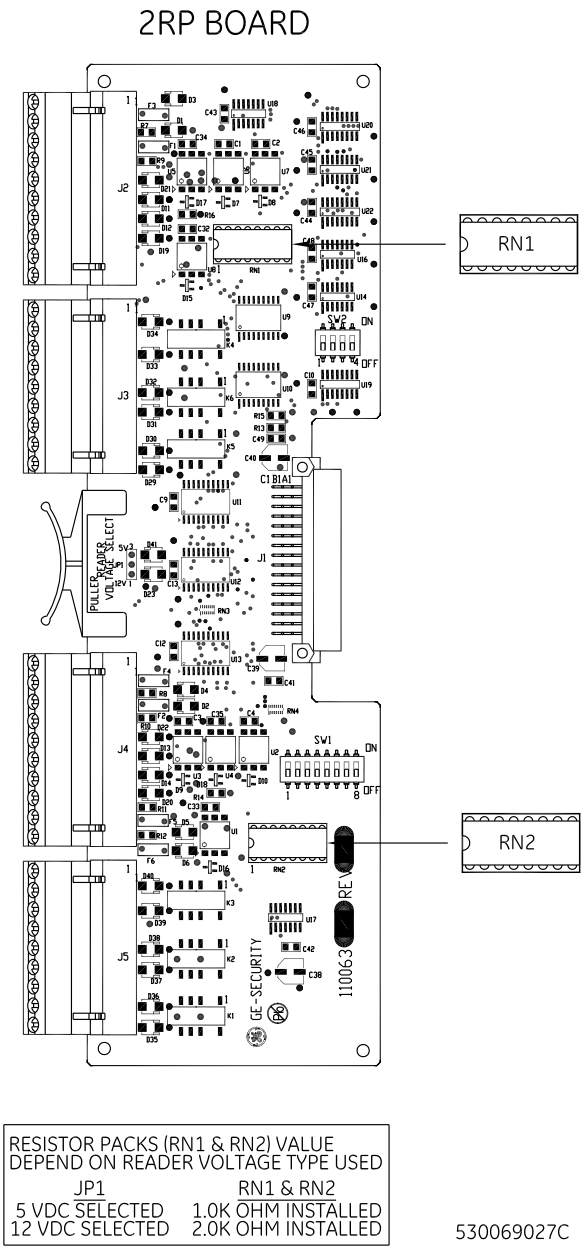
Figure 16. Setting 2RP reader voltage



Installing resistor packs

Insert the proper resistor packs in RN1 and RN2. Be sure you insert the correct resistor pack for the reader voltage selected. Both resistor packs must be the same since the voltage for both readers must be the same. See *Figure 17* below for details.

Figure 17. Installing 2RP resistor packs



Wiring readers

If wiring a 12V reader that uses 5V data lines, note the following conditions before continuing:

- Set the reader voltage (JP1) to 5V.
- Wire the Reader power lead to the Power output port (J6) on the Power/Communications board instead of to the 2RP board.

1. Mount the reader. Refer to the manual that came with your reader for specific mounting instructions.
2. Run cable from the reader to the controller. Bring each reader cable through the appropriate knockout hole in the controller enclosure. Allow some slack wire for servicing the cables and for plugging cable into an adjacent slot for troubleshooting.
3. Remove 8 inches of insulating material from the cable. Unwrap shielding and tie all shields together. Connect the shield wire to the ground stud at the bottom lower left of the controller enclosure.
4. Place the appropriate wires to the appropriate screw terminal on the 2RP reader board. Refer to the reader wiring diagrams in this section. Pairing of cables is very important.

   Important: For 12V readers using cable runs over 500 feet, you must install pull-up resistors (470 ohm, 1/2 watt) between Reader Data 0 and +12 VDC and between Reader Data 1 and +12 VDC. Some readers require pull-up resistors regardless of cable length. For 5V readers, the maximum cable distance is 300 feet with pull-up resistors. Refer to your reader manual to see if pull-up resistors are required.
5. Label each cable end with the Controller Address Number/ Device or Reader Number.

Table 21. Recommended pairing of reader wires - Typical reader cable (Use Belden 8725 twisted shielded pair or equivalent)

PIN	Signal name	Typical wire color
1	+5V DC or +12V DC Reader Power	Red
6	Reader Data 0[1]	Black
2	Ground (-)	Green
7	Reader Data 1	White
4	Door DO (Reader LED)	White/Black
8	Door DI (Alarm input)[1]	White/Red
3	Spare	White/Green
5	Exit Request DI[1]	White/Yellow

1. Reader Data 0, Door DI, and the Exit Request DI can be replaced or interchanged with Display DO and/or Clock DO when required for a nonsupervised keypad reader.

Figure 18. 2RP reader connector points

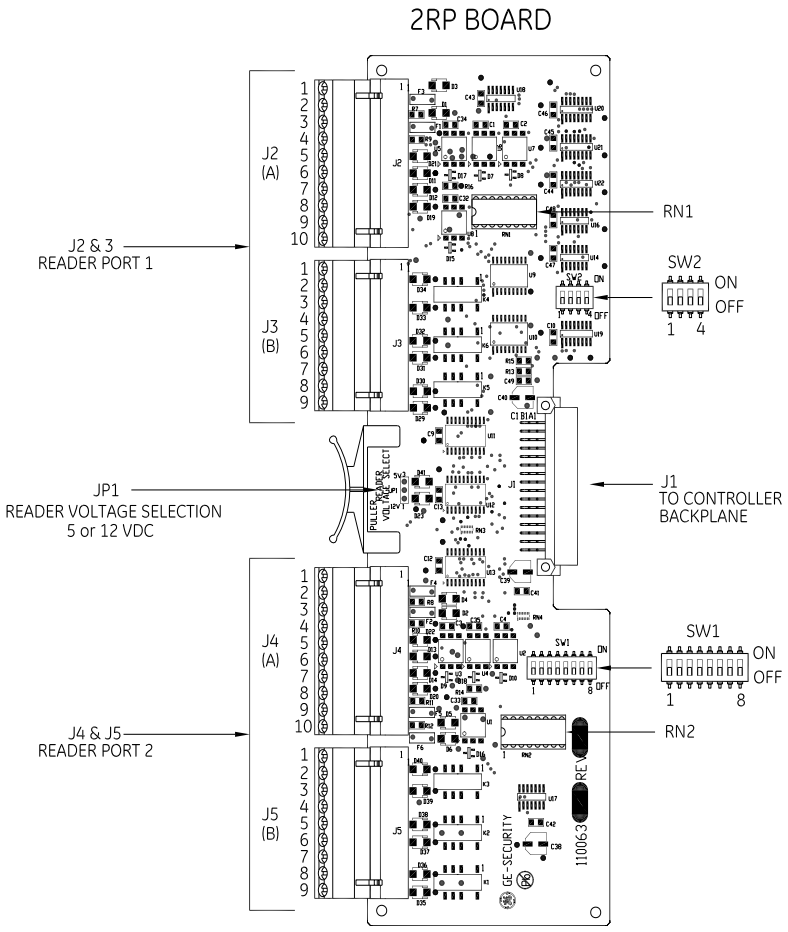
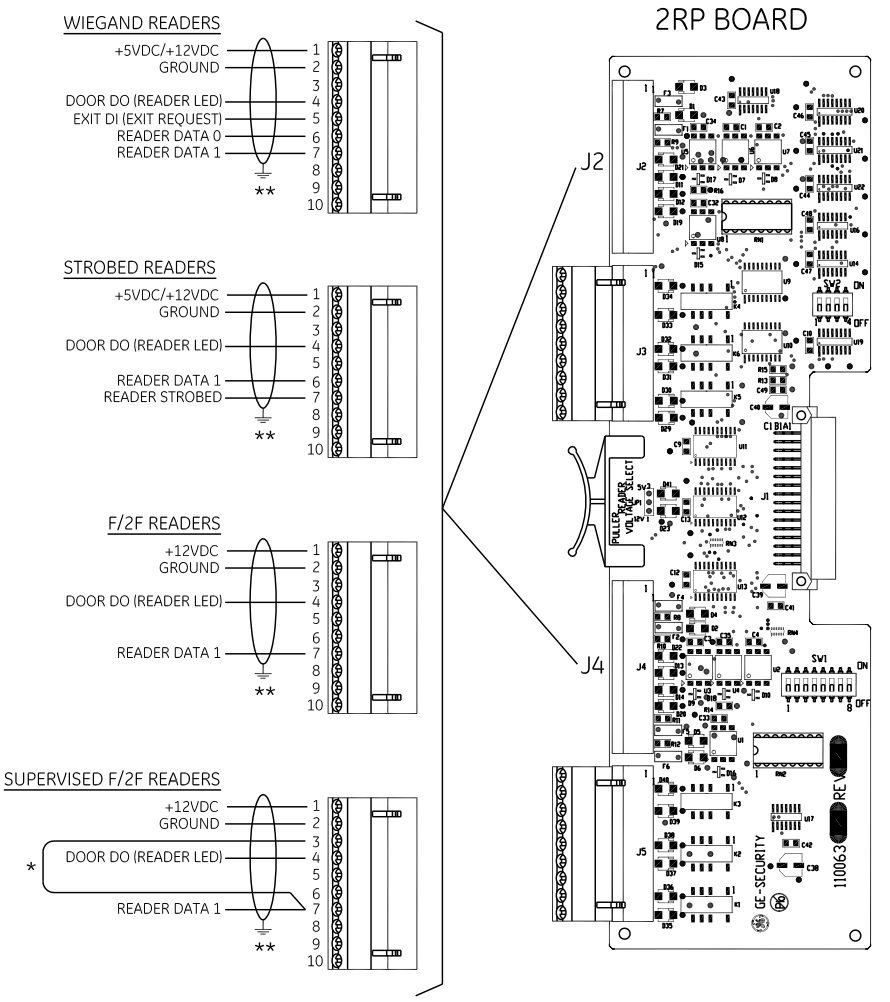


Table 22. 2RP connector pinouts

J2/J4 reader connector pinouts	
PIN	**Signal name**
1	+5 VDC/+12 VDC
2	Ground
3	Display DO
4	Door DO (Reader LED)
5	Exit DI (Exit Request)
6	Reader Data 0
7	Reader Data 1
8	Door DI (Alarm Point)
9	Not used
10	Clock DO

J3/J5 relay connector pinouts	
PIN	**Relay**
1	Door Strike Relay – Normally Closed (NC)
2	Door Strike Relay – Common (Com)
3	Door Strike Relay – Normally Open (NO)
4	Auxiliary Output Relay – Common (Com)
5	Auxiliary Output Relay – Normally Closed (NC)
6	Auxiliary Output Relay – Normally Open (NO)
7	Alarm Shunt Relay – Common (Com)
8	Alarm Shunt Relay – Normally Closed (NC)
9	Alarm Shunt Relay – Normally Open (NO)

Figure 19. Wiring 2RP to Wiegand, Strobed, F/2F, and supervised F/2F readers



* = JUMPER WIRE OR RESISTOR REQUIRED BETWEEN PIN 3 & PIN 7 FOR SUPERVISED COMMUNICATION, PULLUP RESISTORS (470 OHMS, 1/2 W) REQUIRED BETWEEN READER DATA 1 & +12VDC, REFER TO APPROPRIATE READER MANUAL.

** = PAIR WIRES AS SHOWN, THE SHIELD GROUNDS TO INTERNAL GROUND STUD ON CONTROLLER. FCC & CE COMPLIANCE - SHIELD GROUNDS MUST BE STRIPPED BACK THROUGH THE KNOCKOUT HOLE (STRAIN RELIEF) & GROUNDED TO THE EXTERNAL GROUND STUD PROVIDED.

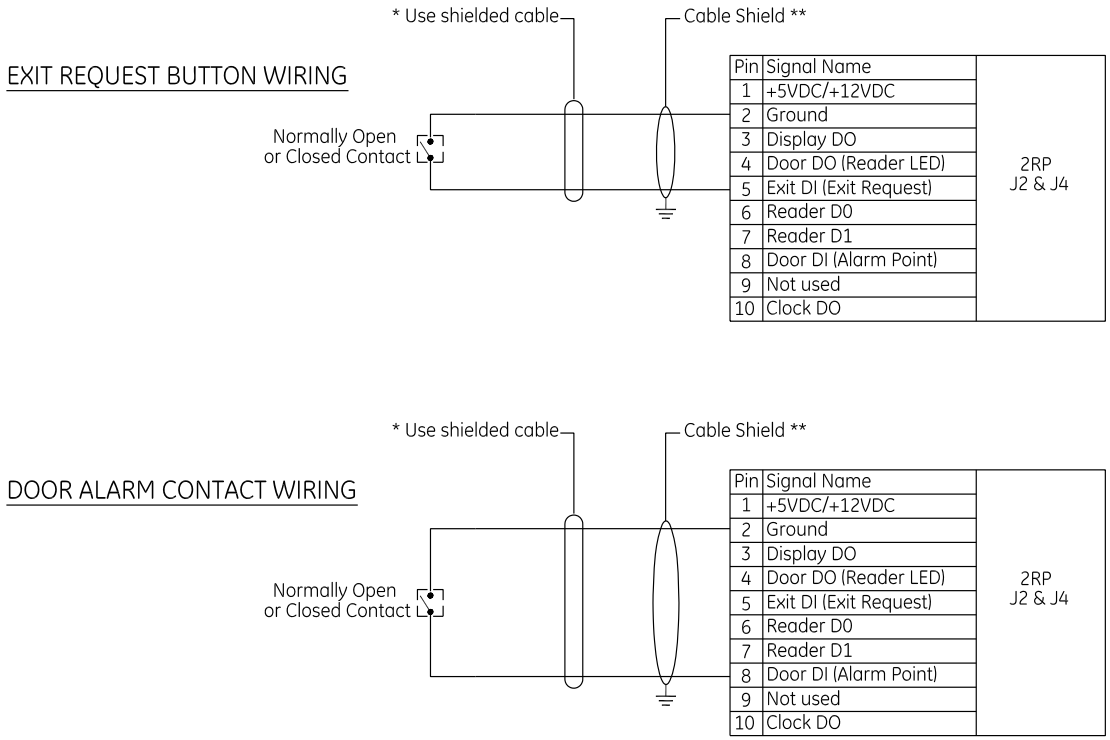
530069008F

Wiring DIs

Each reader port has two unsupervised digital inputs which are used for door status devices (door contacts and exit request input). Since these digital inputs are not supervised, they do not require end-of-line resistors.

1. Install the door contact and exit contact as required.
2. Wire the door DI between pin 2 (Gnd) and pin 8 (Door DI) and/or exit DI between pin 2 (Gnd) and pin 5 (Exit DI) to the corresponding reader port on the 2RP board. The contact can be normally open or normally closed.

Figure 20. Wiring 2RP exit request and door alarm contact



* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

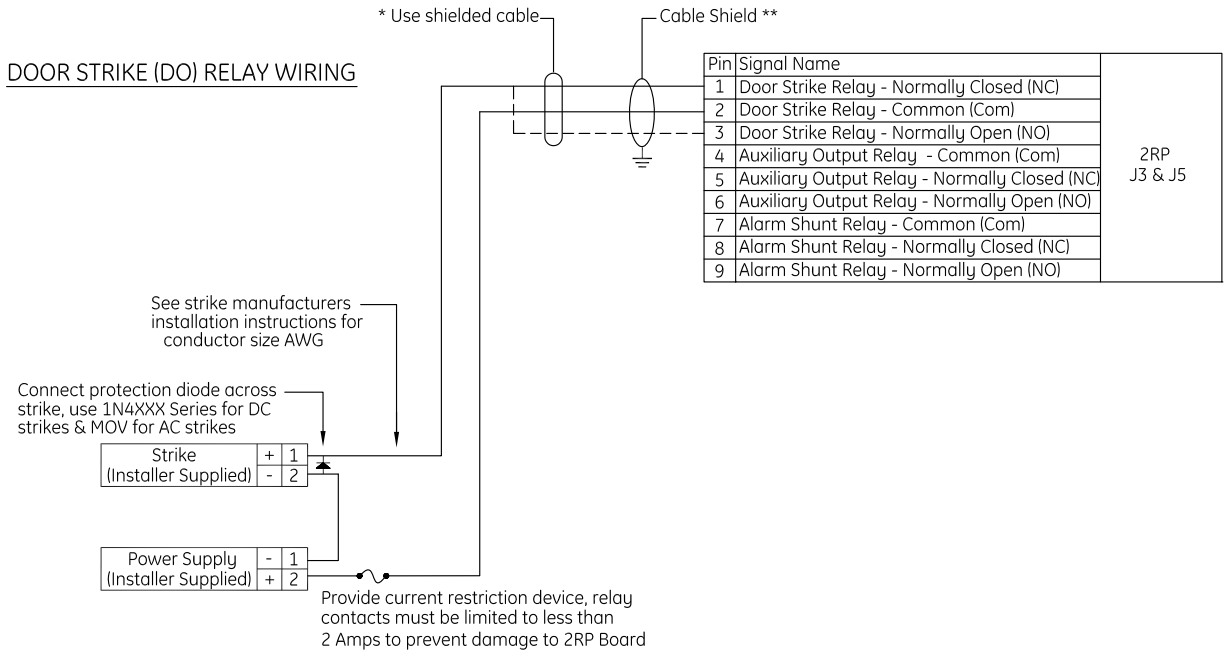
530069010C

Wiring door strike

The 2RP provides a door DO relay dedicated to each reader port.

1. Install the door strike (maximum 2 A @ 30 VDC or 0.50 A @ 120 VAC) as required.
2. Wire the door strike to the door DO (internal) relay. Normally open or normally closed dry contacts are available. See Figure 21 on page 57.
3. If required, wire the door strike to a customer supplied external relay and the 2RP Board as shown in Figure 22 on page 58.
4. Install a protection diode across the relay and the door strike. Use 1N4002, 1N4003, 1N4004 or equivalent diodes for DC door strikes and metal oxide varistors (MOV) for AC door strikes.

Figure 21. Wiring 2RP door strike - internal relay

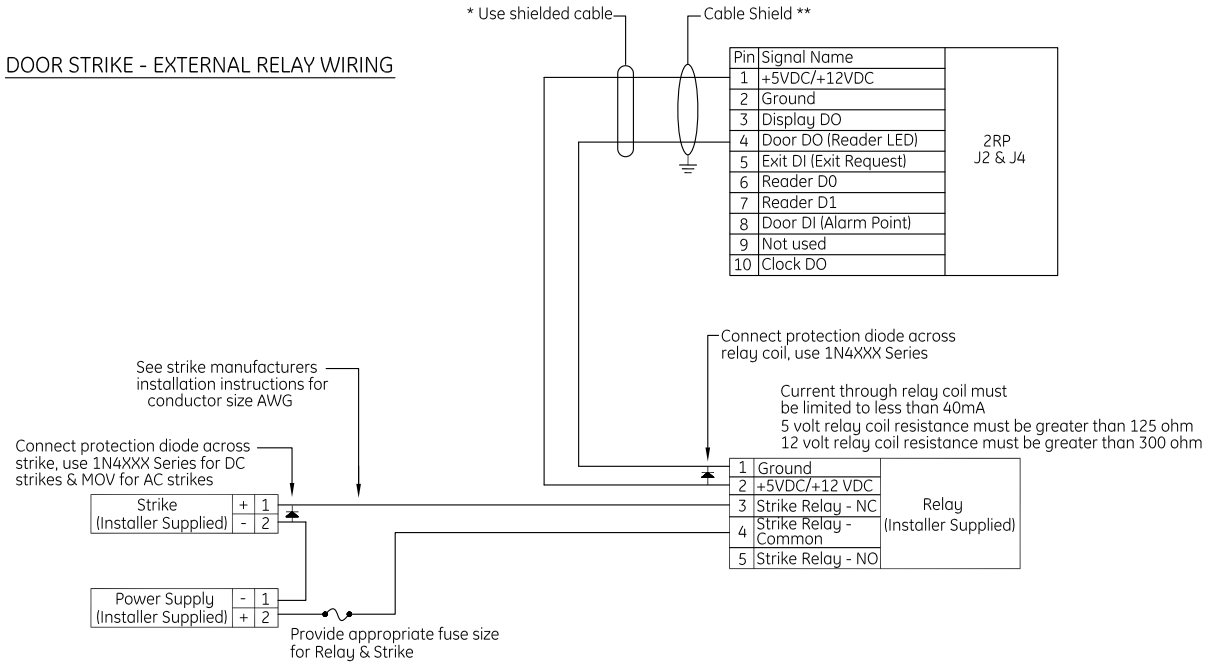


* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

530069011D

Figure 22. Wiring 2RP door strike - external relay



* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

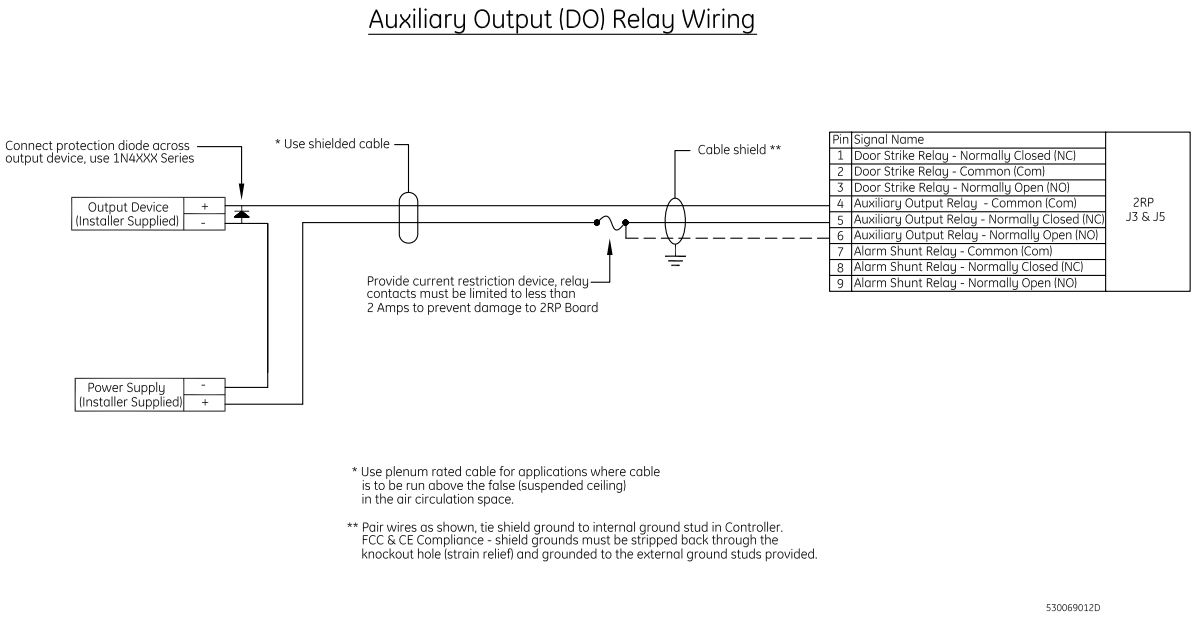
530069028D

Wiring auxiliary DO relay

One auxiliary DO relay per reader port can be defined by the user. The auxiliary DO relay is used for an auxiliary output device.

1. Install the auxiliary output (maximum 2 A @ 30 VDC or 0.50 A @ 120 VAC) as required.
2. Wire the output device to the auxiliary DO relay. The auxiliary DO relay has either a normally open or normally closed dry contact available (pin 4 = common, pin 5 = normally closed, pin 6 = normally open).

Figure 23. Wiring 2RP auxiliary DO relay

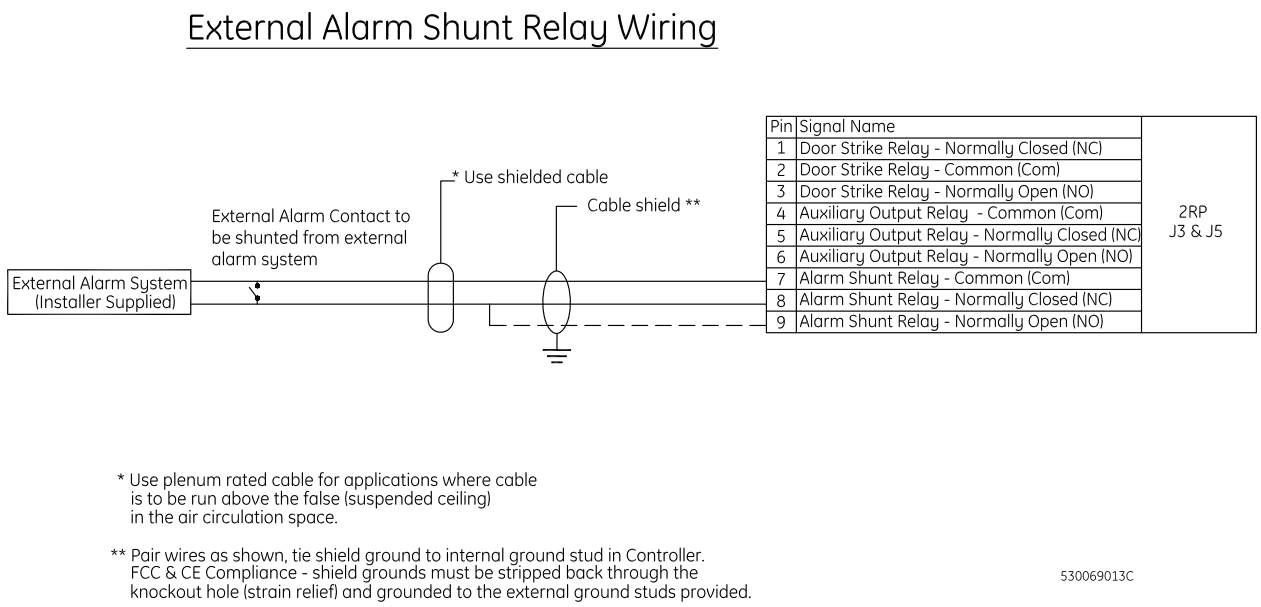


Wiring alarm shunt relay

One alarm shunt relay is available per reader port. The alarm shunt relay is used to shunt (disable) an external alarm system contact (such as burglar alarm) on a valid read or exit pushbutton request.

1. Install the alarm shunt (maximum 2 A @ 30 VDC or 0.50 A @ 120 VAC) as required.
2. Wire the external alarm system to the alarm shunt relay. The relay has either a normally open or normally closed dry contact available (pin 7 = common, pin 8 = normally closed, pin 9 = normally open).

Figure 24. Wiring 2RP external alarm shunt relay



2SRP board

Introduction

Each 2SRP reader board provides four supervised DIs (two alarm, two exit), two reader LED outputs, two door strike DO relays, two auxiliary DO relays, and two alarm shunt relays used to shunt out external alarm inputs. Please note the following:

- Each 2SRP board is limited to only one type of reader technology: Wiegand, Strobed, F/2F, and Supervised F/2F. In addition, both readers connected to the board must be the same voltage.
- The 2SRP board has built-in pull-up resistors to accommodate cable lengths over 500 feet. External pull-up resistors are not required for the 2SRP board.
- Each reader, DI point, Aux DO, and Exit DI on the 2SRP board is addressed differently depending on the host system you are using.
- If alarm points are not available on the reader, use alarm points on the controller.

Device addressing

Picture Perfect

Table 23. 2SRP device addressing - Picture Perfect

	Board 1	Board 2	Board 3	Board 4
Readers	0 and 1	0 and 1	0 and 1	0 and 1
Door DIs	0 and 1	0 and 1	0 and 1	0 and 1
Exit DIs	8 and 9	8 and 9	8 and 9	8 and 9
Door DOs	0 and 1	0 and 1	0 and 1	0 and 1
Auxiliary/shunt DOs	8 and 9	8 and 9	8 and 9	8 and 9

Facility Commander Wnx and Secure Perfect

The following device addresses are created for you by the Facility Commander Wnx and Secure Perfect software. This table is provided for your reference only. The device address is in the format `mmmm-b-pp` where `mmmm` represents the controller number, `b` represents the board number, and `pp` represents the point or device number.

Table 24. 2SRP device addressing - Facility Commander Wnx and Secure Perfect

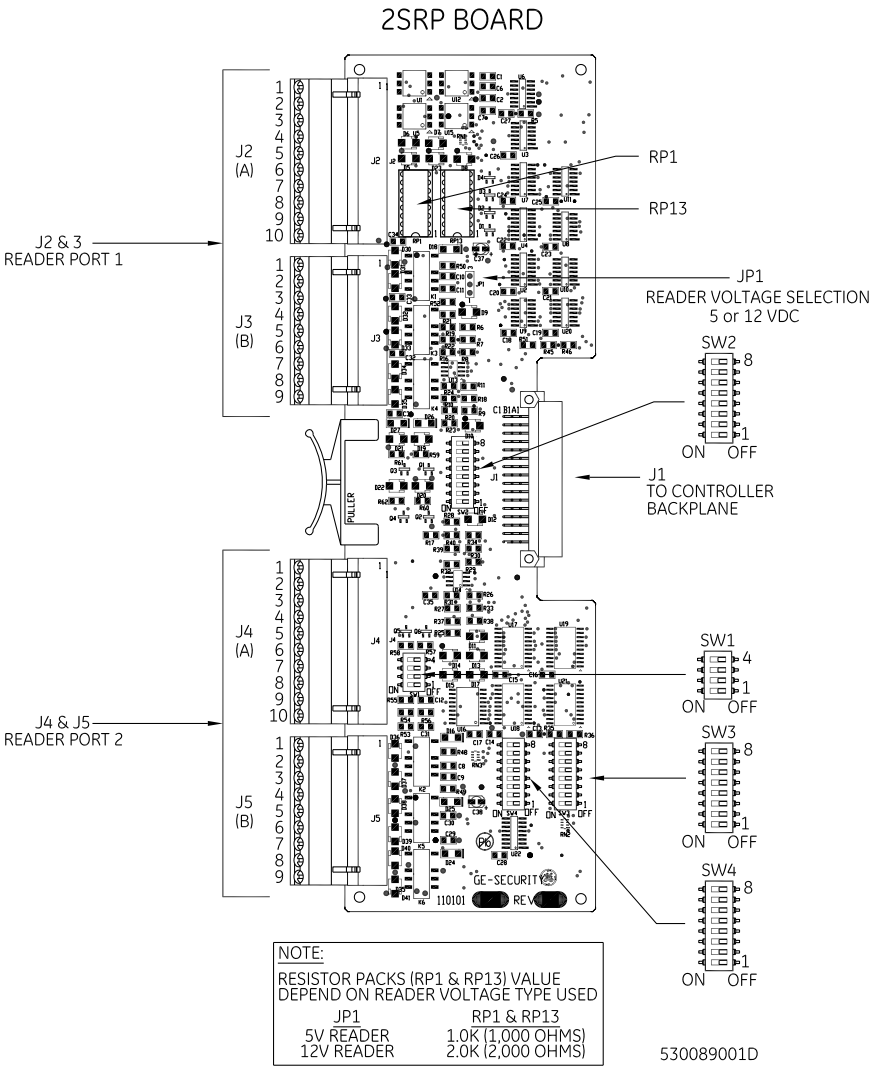
	Board 1	Board 2	Board 3	Board 4
Readers/Door DOs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02
Door DIs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02

Table 24. 2SRP device addressing - Facility Commander Wnx and Secure Perfect (continued)

	Board 1	Board 2	Board 3	Board 4
Exit DIs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02
Auxiliary/shunt DOs	*mmmm*-1-01 *mmmm*-1-02	*mmmm*-2-01 *mmmm*-2-02	*mmmm*-3-01 *mmmm*-3-02	*mmmm*-4-01 *mmmm*-4-02

Board layout

Figure 25. 2SRP supervised reader board layout



Setting the DIP switches

Set DIP switches as described in tables below before installing and wiring 2SRP board.

Table 25. Supervised DI end-of-line resistors

	SW1-				SW2-				
	1	2	3	4	1	2	3	4	5 - 8
Standard (1K, 1K)	ON	ON			ON		ON		ON
Special (6.8K, 18K)	ON		ON		ON		ON		
Time Display Readers (T&A)		ON	ON			ON		ON	ON

= OFF

.

Table 26. Reader technology and format

Reader technology and format		SW3-1	SW3-2	SW3-3	SW3-4
Not Valid					
Reserved		ON			
Reserved			ON		
Magstripe - Reversed Strobed		ON	ON		
Magstripe - Water-Mark				ON	
Magstripe - GE Supervised F/2F (default)		ON		ON	
Magstripe - Strobed			ON	ON	
Magstripe - F/2F		ON	ON	ON	
Wiegand -	3701				ON
	3702[1]				
	3201	ON			ON
	34 bit KSC				
	38 bit ADT				
	3601				
	3202		ON		ON
	4001				
	4401				
	64 bit BCD[2]				

1. Secure Perfect uses this switch setting as Custom Wiegand.
2. Only the PXNplus CPU board supports the 64 bit BCD badge format. If using the 64 bit BCD badge format, see "Wiring the readers" on page 68 for special wiring instructions.

= OFF

Table 26. Reader technology and format

Reader technology and format		SW3-1	SW3-2	SW3-3	SW3-4
Wiegand -	2802	ON	ON		ON
	2804				
	3600				
	2700			ON	ON
	2801				
	32 bit Motorola Indala				
	75 bit PIV				
	2800	ON		ON	ON
	35/37 bit Hughes				
	26 bit		ON	ON	ON
	34 bit CardKey				
	35 bit Hughes				
	4002				
	2500	ON	ON	ON	ON
	2804				
	3400				
	3703				

Table 27. Reader board (2SRP) address settings

	SW3-				SW4-			
Reader board	5	6	7	8	1	2	3	4
1	ON				ON			
2		ON				ON		
3			ON				ON	
4				ON				ON

= OFF

Note: The boards MUST be numbered consecutively. This means that the first reader board must be set to Address 1, the second reader board must be set to Address 2, and so on. If they are not, the supervised DI points will not work correctly.

Table 28. Special reader types

Reader type	SW4-5	SW4-6	SW4-7	SW4-8
Standard Readers	ON	ON	ON	ON
Special Readers (single-color LEDs)[1]		ON	ON	ON
Time Display Readers (T&A)	ON		ON	ON
HID Pin Pad Readers for Fidelity			ON	ON

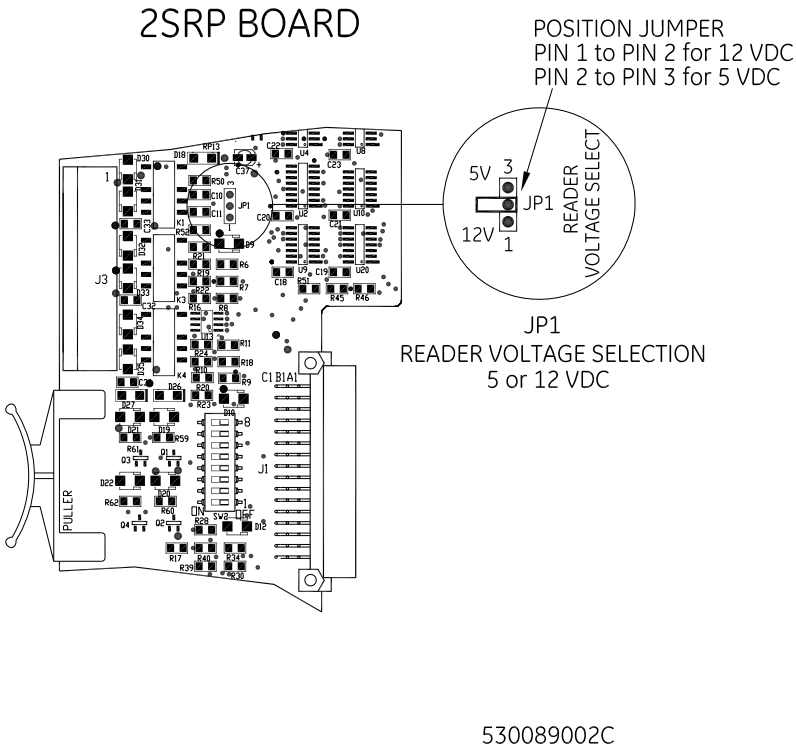
1. For special readers, see *Figure 30* on page 71.

= OFF

Setting reader voltage

Select the proper reader voltage by placing the jumper on JP1. See *Figure 26* below for details. Both reader ports are set to the selected voltage.

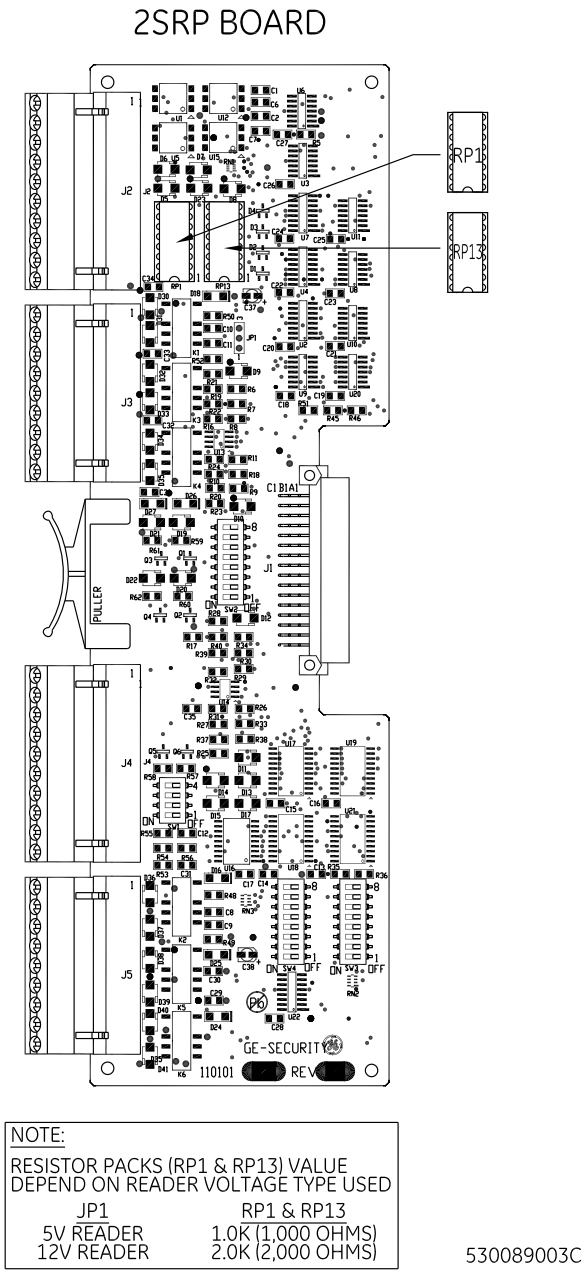
Figure 26. Setting 2SRP reader voltage



Installing resistor packs

Insert proper resistor packs in RP1 and RP13. Be sure you insert the correct resistor pack for the reader voltage selected. Both resistor packs must be the same since the voltage for both readers must be the same. See *Figure 27* below for details.

Figure 27. Installing 2SRP resistor packs



Wiring the readers

If wiring a 12V reader that uses 5V data lines, note the following conditions before continuing:

- Set the reader voltage (JP1) to 5V.
- Wire the Reader power lead to the Power output port (J6) on the Power/Communications board instead of to the 2SRP board.

1. Mount the reader. Refer to the manual that came with your reader for specific mounting instructions.
2. Run cable from the reader to the controller. Bring each reader cable through the appropriate knockout hole in the controller enclosure. Allow some slack wire for servicing the cables and for plugging cable into an adjacent slot for troubleshooting.
3. Remove eight inches of insulating material from the cable. Unwrap shielding and tie all shields together. Connect the shield wire to the ground stud at the bottom lower left of the controller enclosure.
4. Place the appropriate wires to the appropriate screw terminal on the 2SRP reader board. Refer to the reader wiring diagrams in this section. Pairing of cables is very important.

   Note: The 2SRP board has built-in pull-up resistors. Do not install any external pull-up resistors.

5. Label each cable end with the Controller Address Number/ Device or Reader Number.

Table 29. Recommended pairing of reader wires - Typical reader cable (Use Belden 8725 twisted shielded pair or equivalent)

PIN	Signal name	Typical wire color
1	+5V DC or +12V DC Reader Power	Red
6	Reader Data 0[1]	Black
2	Ground (-)	Green
7	Reader Data 1	White
4	Door DO (Reader LED)	White/Black
8	Supervised Door DI (Alarm input)[1]	White/Red
3	Spare	White/Green
9	Supervised Door DI Return[1]	White/Yellow

1. Reader Data 0, Supervised Door DI, Supervised Door DI Return, and the Supervised Exit Request DI Return can be replaced or interchanged as needed.

Figure 28. 2SRP supervised reader connector points

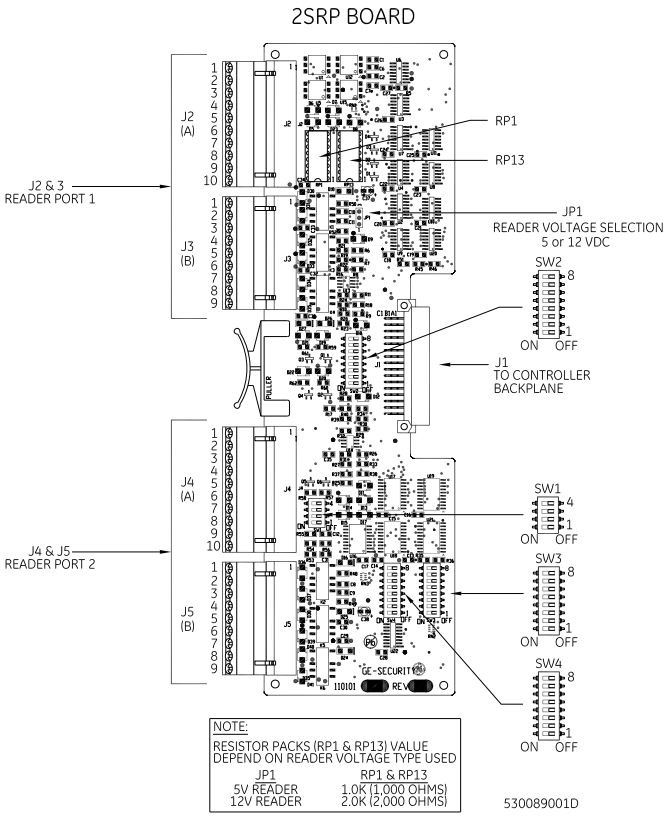


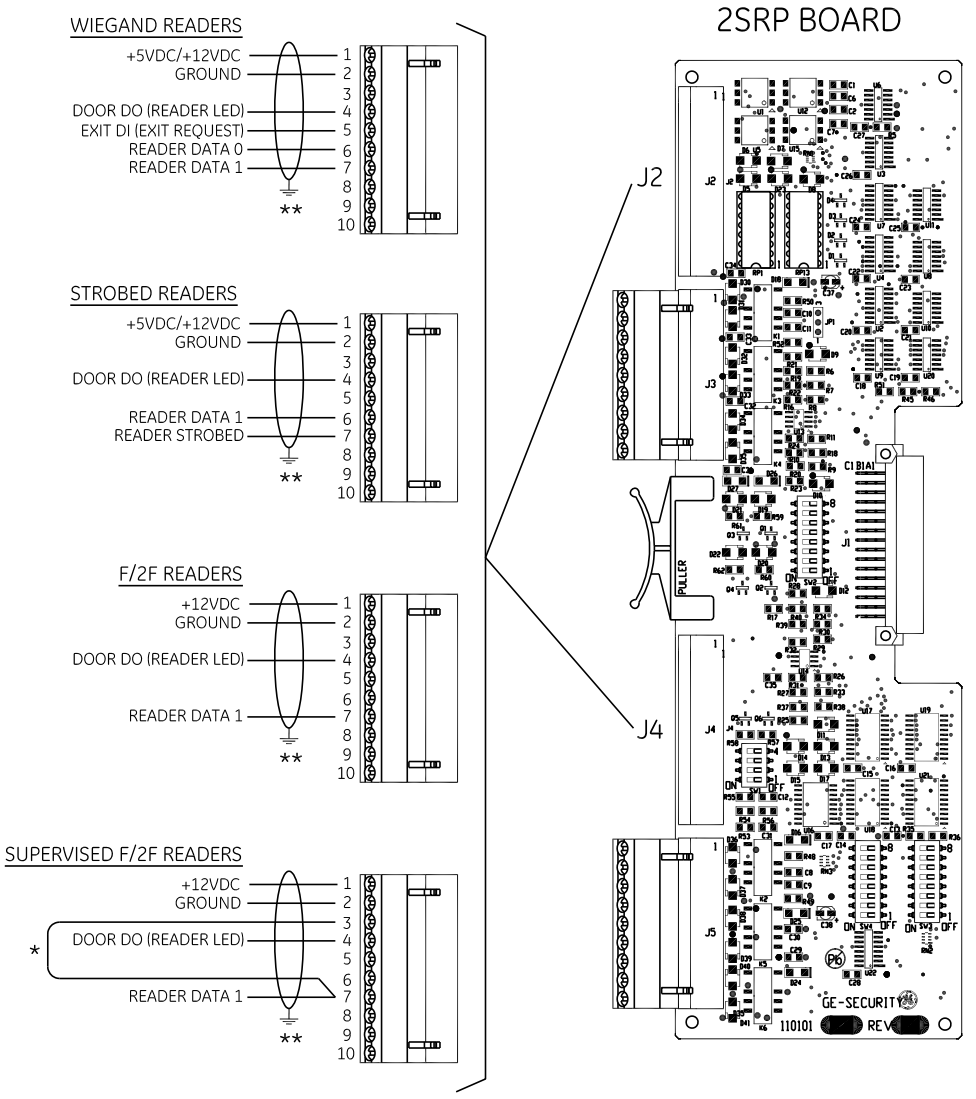
Table 30. 2SRP connector pinouts

J2/J4 reader connector pinouts	
PIN	**Signal name**
1	+5 VDC/+12 VDC
2	Ground
3	Display DO
4	Door DO (Reader LED)
5	Supervised Exit DI (Exit Request)[1]
6	Reader Data 0
7	Reader Data 1
8	Supervised Door DI (Alarm Point)[1]
9	Supervised Door DI Return[1]
10	Supervised Exit DI Return[1]

J3/J5 relay connector pinouts	
PIN	**Relay**
1	Door Strike Relay – Normally Closed (NC)
2	Door Strike Relay – Common (Com)
3	Door Strike Relay – Normally Open (NO)
4	Auxiliary Output Relay – Common (Com)
5	Auxiliary Output Relay – Normally Closed (NC)
6	Auxiliary Output Relay – Normally Open (NO)
7	Alarm Shunt Relay – Common (Com)
8	Alarm Shunt Relay – Normally Closed (NC)
9	Alarm Shunt Relay – Normally Open (NO)

1. Supervised Exit DI and supervised Door DI point must use end-of-line resistors and must be terminated at the appropriate Return point (not to ground).

Figure 29. Wiring 2SRP to Wiegand, F/2F, Strobed, and Supervised F/2F Readers



* = JUMPER WIRE OR RESISTOR REQUIRED BETWEEN PIN 3 & PIN 7 FOR SUPERVISED COMMUNICATION.

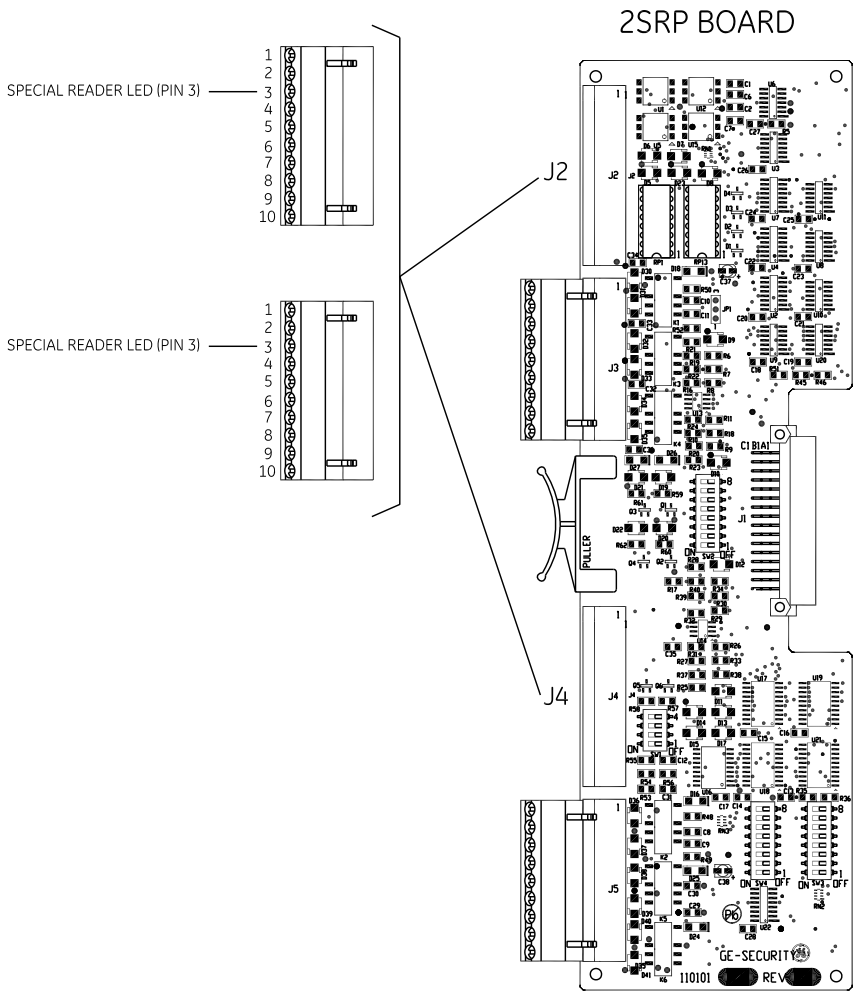
** = PAIR WIRES AS SHOWN, THE SHIELD GROUNDS TO INTERNAL GROUND STUD ON CONTROLLER. FCC & CE COMPLIANCE - SHIELD GROUNDS MUST BE STRIPPED BACK THROUGH THE KNOCKOUT HOLE (STRAIN RELIEF) & GROUNDED TO THE EXTERNAL GROUND STUD PROVIDED.

530089004E

Special readers with single color LEDs

The LED will flash fast upon a valid access condition and turn off for 3 to 4 seconds upon an invalid attempt. See *Table 28*, *Special reader types* on page 65 for switch setting information. In this configuration, the Alarm Shunt Relay is no longer available.

Figure 30. Wiring 2SRP to single color LED reader



530069035C

Wiring the DIs

Each reader port has two supervised digital inputs which are used for door status devices (door contacts and exit request input). Since these digital inputs are supervised, they require end-of-line resistors.

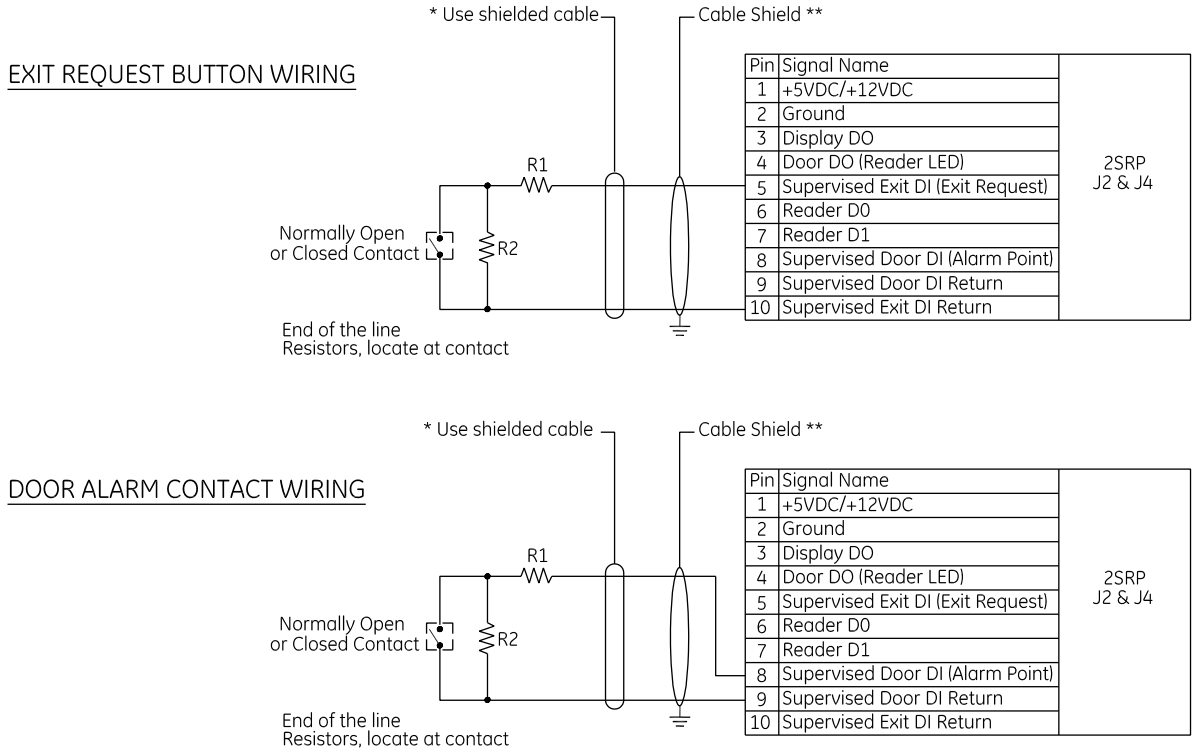
1. Follow the installation specifications for the device. Mount the device according to the manufacturer's specifications. The alarm device (door contact) should have a dry contact which can have a normally open or normally closed type switch. A normally closed contact is in its normal or resting position when it is closed. For example, the contact is closed when the door is closed. The opposite is true for a normally open contact. In this case, the contact is open when the door is closed.
2. Select the appropriate digital input for each alarm input device.
3. Ground the shields of the cable at the M5 Controller enclosure grounding studs. Insulate the shield (with tape or shrink tubing) at the DI device end to avoid electrical noise.
4. Install two end-of-line resistors. Install each resistor as close to the door status contact as possible.
5. We recommend the standard 1,000 (1K) ohm, 1/4 watt, 5% tolerance, high-quality end-of-line resistors. This board also supports 6.8K and 18K end-of-line resistors. See *Figure 31* on page 73 for the location of the resistors. See *Table 25*, *Supervised DI end-of-line resistors* on page 63 for the appropriate switch settings.
6. Wire the supervised door DI between pin 8 (Door DI) and pin 9 (Door DI Return). Wire the supervised exit DI between pin 5 (Exit DI) and pin 10 (Exit DI Return). The contact can be normally open or normally closed.

CAUTION: The supervision capability will be impaired if the resistors are NOT wired immediately adjacent to the door status contact.

---

7. Insulate resistors with tape or heat shrink tubing
8. Document how you wired the alarm input devices. Future expansion of the system and its maintenance depend upon accurate documentation.

Figure 31. Wiring 2SRP door alarm contact and exit request



	Standard	Special
R1	1K	6.8K
R2	1K	6.8K

* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

530089006C

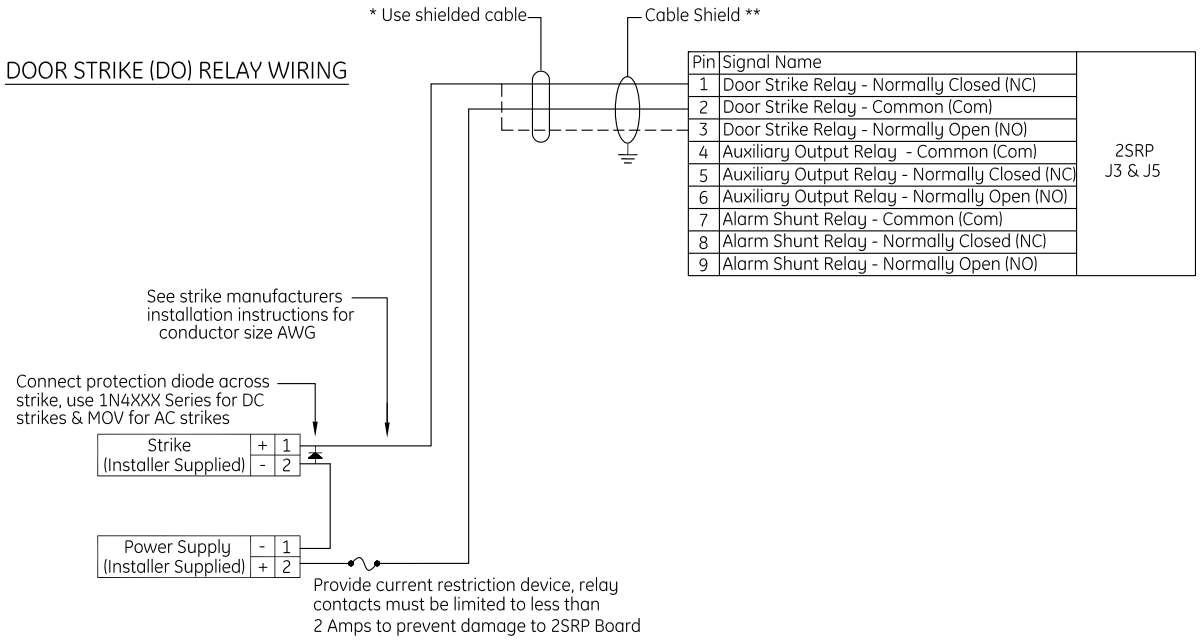
Wiring door strike

One reader LED (door DO) and one door DO relay are dedicated to each reader port. The door DO is used for the LED on the reader or an external door relay.

1. Install the door strike (2 A @ 30 VDC or 0.50 A @ 120 VAC maximum) as required.
2. Wire the door strike to the door DO (internal) relay. Normally open or normally closed dry contacts are available (pin 1 = normally closed, pin 2 = common, pin 3 = normally open). Use pin 1 (+5/+12 VDC) and pin 4 (Reader LED) for wiring the external relay. See *Figure 32* on page 74 and *Figure 33* on page 75.
3. Install a protection diode. Use 1N4002, 1N4003, or 1N4004 diodes for DC door strikes and Metal Oxide Varistors (MOV) for AC door strikes.

Note: Protection diode or MOV required at all electronic door locks.

Figure 32. Wiring 2SRP door strike - internal relay

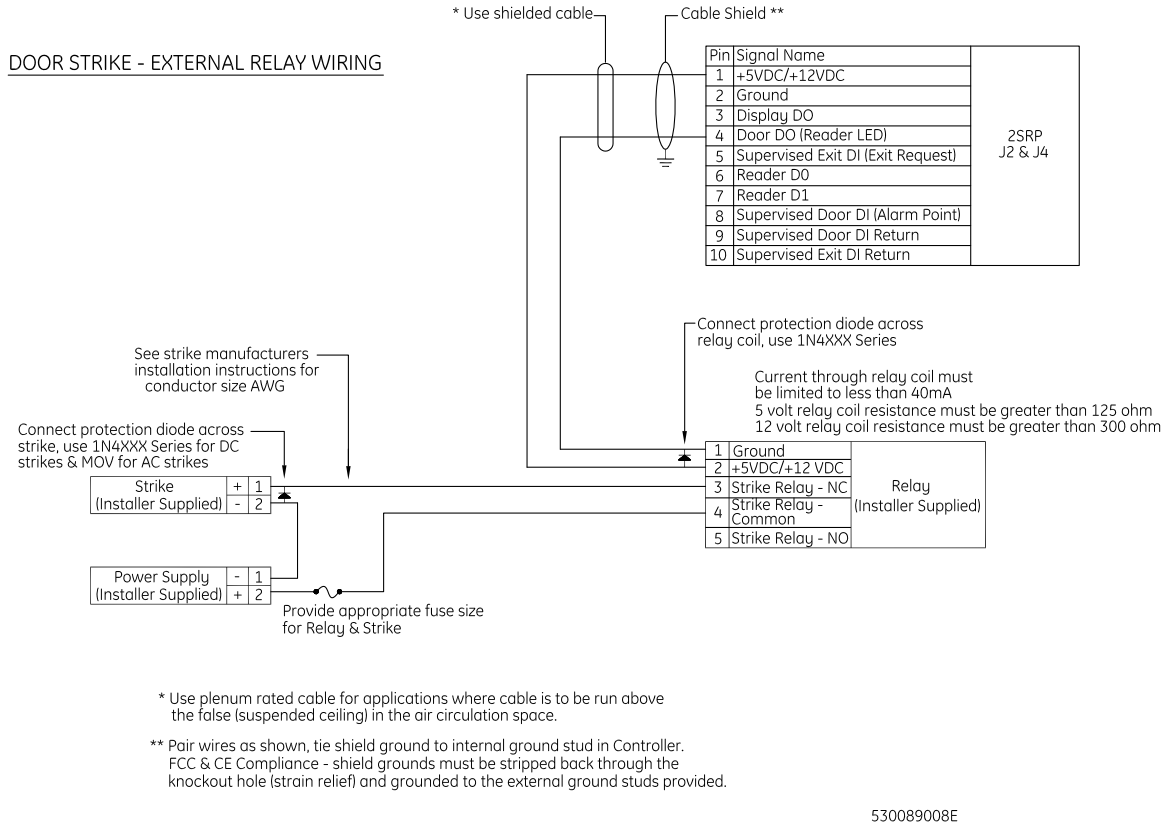


* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

530089007D

Figure 33. Wiring 2SRP door strike - external relay



* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

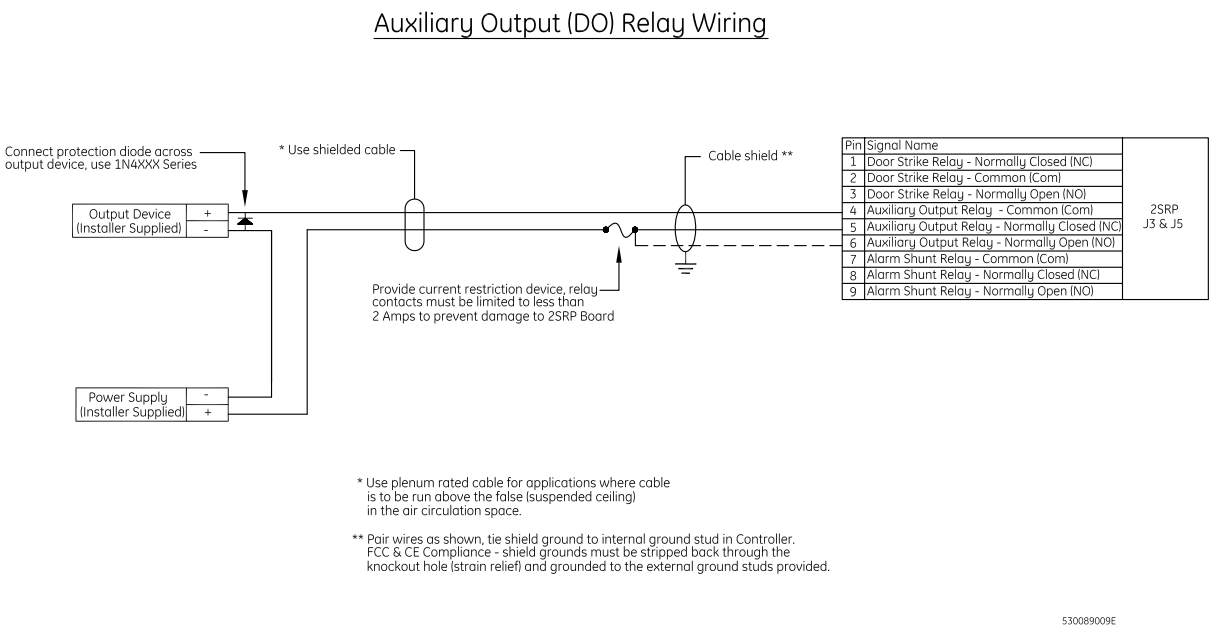
530089008E

Wiring auxiliary DO relay

One auxiliary DO relay per reader port can be defined by the user. The auxiliary DO relay is used for an auxiliary output device.

1. Install the auxiliary output device (maximum 2 A @ 30 VDC or 0.50 A @ 120 VAC) as required.
2. Wire the output device to the auxiliary DO relay. The auxiliary DO relay has either a normally open or normally closed dry contact available (pin 4 = common, pin 5 = normally closed, pin 6 = normally open).

Figure 34. Wiring 2SRP auxiliary DO relay



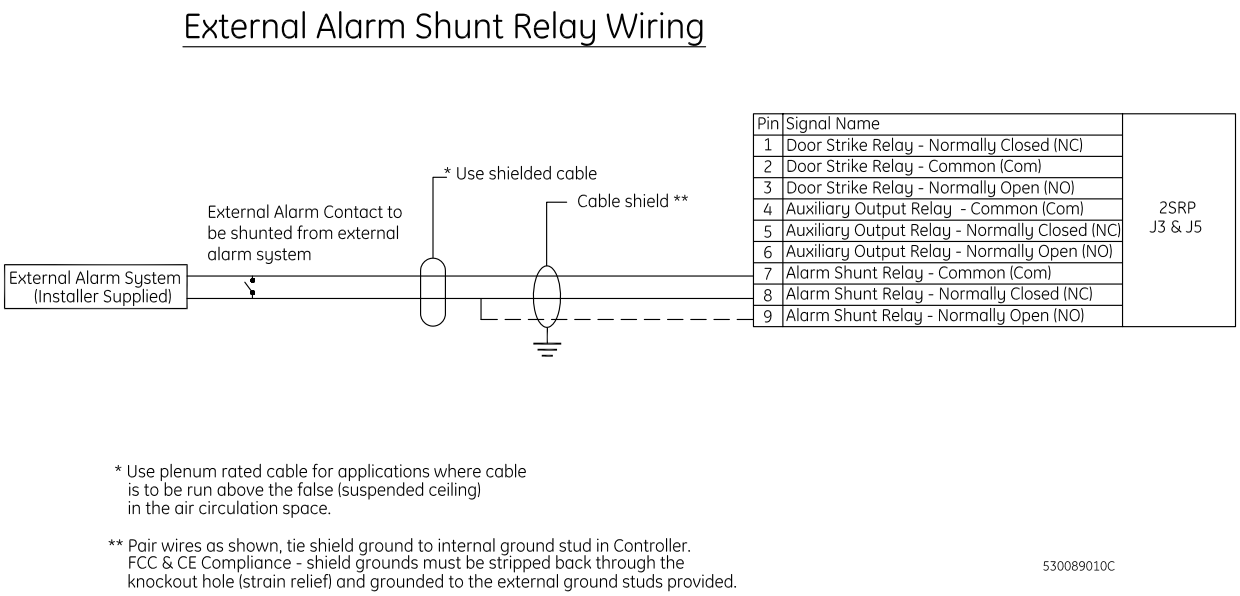
Wiring alarm shunt relay

One alarm shunt relay is available per reader port. The alarm shunt relay is used to shunt (disable) an external alarm system contact (e.g. burglar alarm) on a valid read or exit pushbutton request.

1. Install the alarm shunt (2 A @ 30 VDC or 0.50 A @ 120 VAC) as required.
2. Wire external alarm system to the alarm shunt relay. The relay has either a normally open or normally closed dry contact available (pin 7 = common, pin 8 = normally closed, pin 9 = normally open).

Note: Single color LED readers do not support alarm shunt relays.

Figure 35. Wiring 2SRP external alarm shunt relay



8RP board

Introduction

The number of 8RP boards supported by different host software systems varies. Consult the manual that came with your software for this information.

- Each 8RP board is limited to only one type of reader technology: F/2F or Supervised F/2F.
- External pull-up resistors are not required for the 8RP board.
- No DI (alarm points) or exit DIs are available on the 8RP board. Therefore, use of supervised readers is recommended since these points are available on the reader.
- If keypad readers are needed, use ONLY GE Supervised F/2F keypad readers or Wiegand Interface Units (WIU-2/WIU-4).
- Each reader, reader-based DI (input) point, and reader-based Exit DI on the 8RP board is addressed differently depending on the host system you are using.
- The 8RP board provides one digital output (reader LED) per reader port, 0.10 A @ 12 VDC maximum per output point.

Device addressing

Picture Perfect

Note: Picture Perfect uses 2RP board numbers to address readers, DIs, and DOs on the 8RP board; See *Table 31* and *Table 32* for further information. Therefore, in Picture Perfect:

- Reader ports 1 and 2 are configured as Board number 1, reader address 0 and 1;
- Reader ports 3 and 4 are configured as Board number 2, reader address 0 and 1;
- Reader ports 5 and 6 are configured as Board number 3, reader address 0 and 1;
- Reader ports 7 and 8 are configured as Board number 4, reader address 0 and 1.

Table 31. 8RP device addressing - Picture Perfect Board 1

	Board type: Board 1[1]			
	Reader 1 and 2	Reader 3 and 4	Reader 5 and 6	Reader 7 and 8
Picture Perfect board number	1	2	3	4
Readers	0 and 1	0 and 1	0 and 1	0 and 1
Door DIs	0 and 1	0 and 1	0 and 1	0 and 1
Exit DIs	8 and 9	8 and 9	8 and 9	8 and 9
Door DOs	0 and 1	0 and 1	0 and 1	0 and 1

1. The first 8 readers out of 16. See *Table 35* on page 81 for board type settings.

Table 32. 8RP device addressing - Picture Perfect Board 2

	Board type: Board 2[1]			
	Reader 9 and 10	Reader 11 and 12	Reader 13 and 14	Reader 15 and 16
Picture Perfect board number	**5**	**6**	**7**	**8**
Readers	0 and 1	0 and 1	0 and 1	0 and 1
Door DIs	0 and 1	0 and 1	0 and 1	0 and 1
Exit DIs	8 and 9	8 and 9	8 and 9	8 and 9
Door DOs	0 and 1	0 and 1	0 and 1	0 and 1

1. The second 8 readers out of 16. See *Table 35* on page 81 for board type settings.

Facility Commander Wnx and Secure Perfect

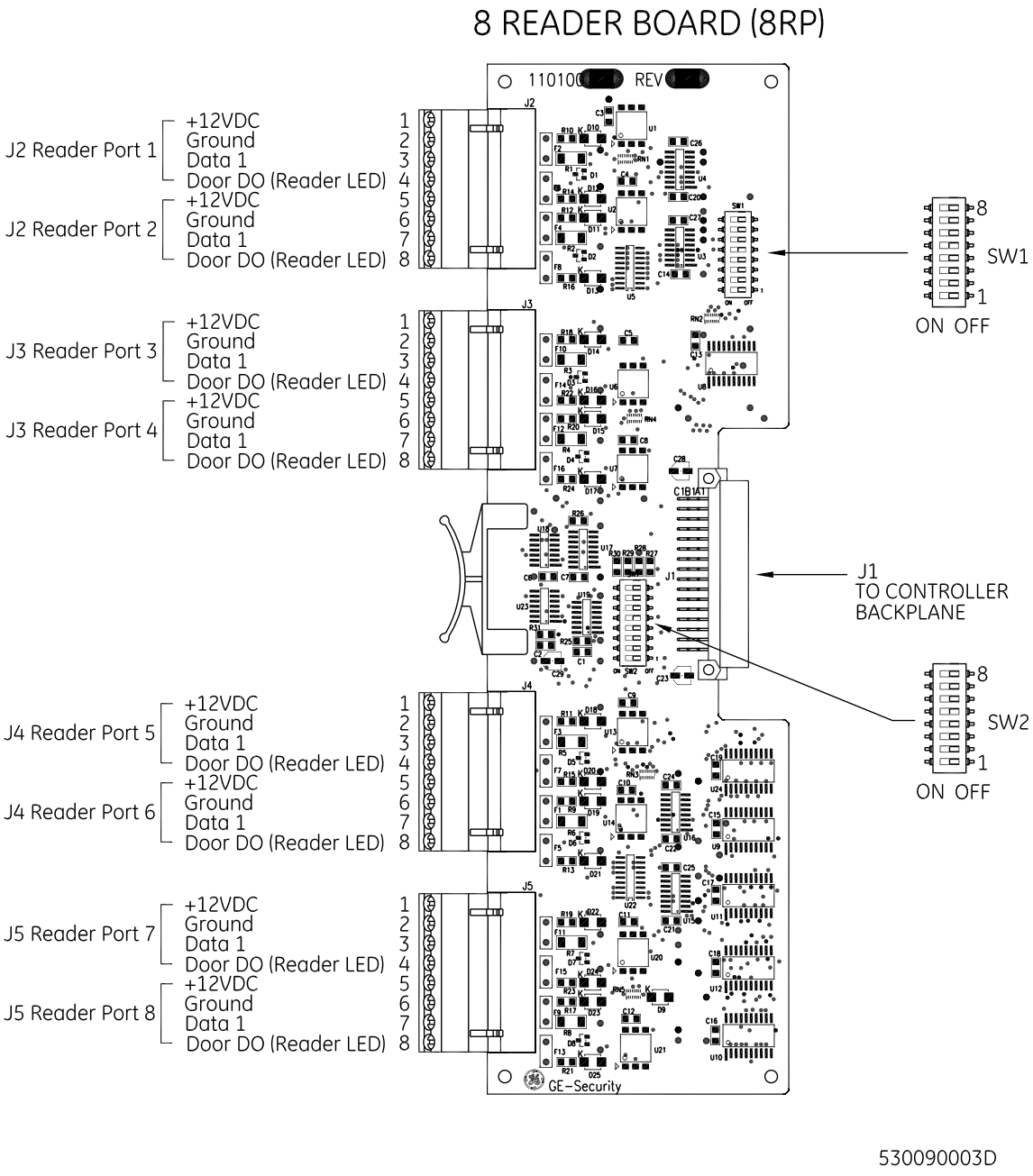
The following device addresses are created for you by the Facility Commander Wnx and Secure Perfect software. This table is provided for your reference only. The device address is in the format `mmmm-b-pp` where `mmmm` represents the controller number, `b` represents the board number, and `pp` represents the point or device number.

Table 33. 8RP device addressing - Facility Commander Wnx and Secure Perfect

	Standard/Board 1	Board 2
Readers/Door DO	*mmmm*-1-01 through *mmmm*-1-08	*mmmm*-2-01 through *mmmm*-2-08
Door DIs	*mmmm*-1-01 through *mmmm*-1-08	*mmmm*-2-01 through *mmmm*-2-08
Exit DIs	*mmmm*-1-01 through *mmmm*-1-08	*mmmm*-2-01 through *mmmm*-2-08

Board layout

Figure 36. 8RP reader board layout



Setting DIP switches

Set the DIP switches as described in the tables below before installing and wiring the 8RP board.

Table 34. Reader technology and format

Reader technology and format	SW 1-1	SW 1-2	SW 1-3	SW 1-4
Magstripe - GE Supervised F/2F	ON		ON	
Magstripe - F/2F	ON	ON	ON	

= OFF

Table 35. 8RP board address settings

Board type	SW 1-				SW 2-							
	5	6	7	8	1	2	3	4	5	6	7	8
Board 1[1]	Does not apply.			ON	ON		ON		ON		ON	
Board 2[2]				ON	ON	ON				ON		ON

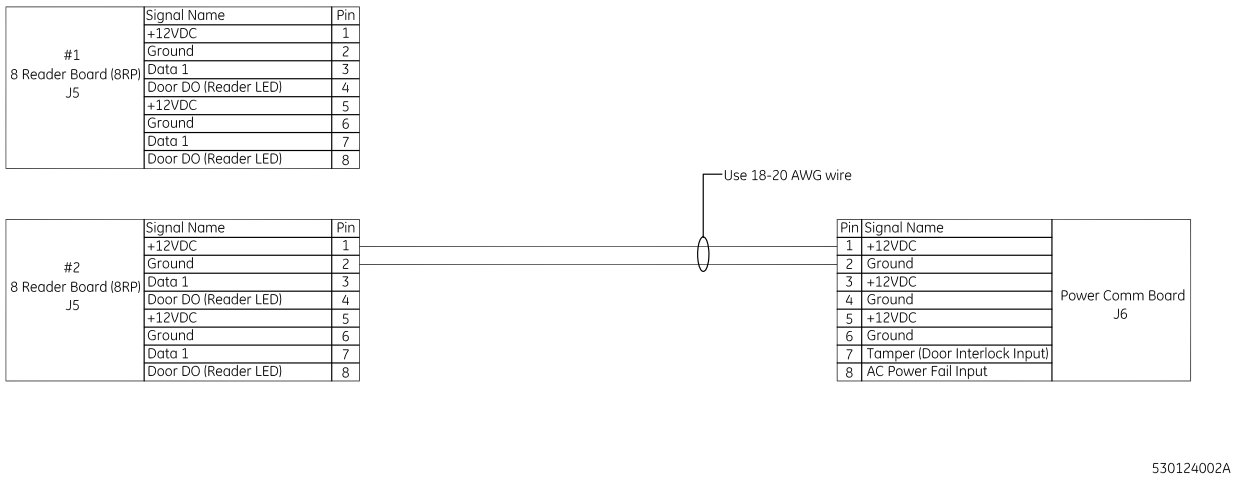
1. The first 8 readers out of 16.
2. The second 8 readers out of 16.

= OFF

Powering two 8RP boards

To ensure proper function when using two 8RP Boards in the M5 controller, the second 8RP Board should be wired directly to the Power Communication Board as shown in Figure 37.

Figure 37. Powering two 8RP boards



Wiring the readers

1. Mount the reader. Refer to the manual that came with your reader for specific mounting instructions.
2. Run cable from the reader to the controller. Bring each reader cable through the appropriate knockout hole in the controller cabinet. Allow some slack wire for servicing the cables and for plugging the cable into an adjacent slot for troubleshooting.
3. Remove eight inches of insulating material from the cable. Unwrap shielding and tie all shields together. Connect the communications cable shield to the ground nut adjacent to the cable entrance knockout of the cabinet enclosure. For more details, see *Figure 86, Typical installation using shielded cable/drain wire - outside and inside the enclosure* on page 148.
4. Place the appropriate wires to the appropriate screw terminal on the 8RP reader board. Refer to the reader wiring diagrams in this section. Pairing of cables is very important.

CAUTION: The 8RP board has built-in pull-up resistors. Do not install the external pull-up resistors supplied with the GE Proximity Readers.

5. Label each cable end with Controller Address Number/ Device or Reader Number.

   It is recommended that 20-AWG shielded cable be used for wiring reader DOs and DIs. Use plenum-rated cable for applications where cable is to be run above the false (suspended) ceiling in the air circulation space.

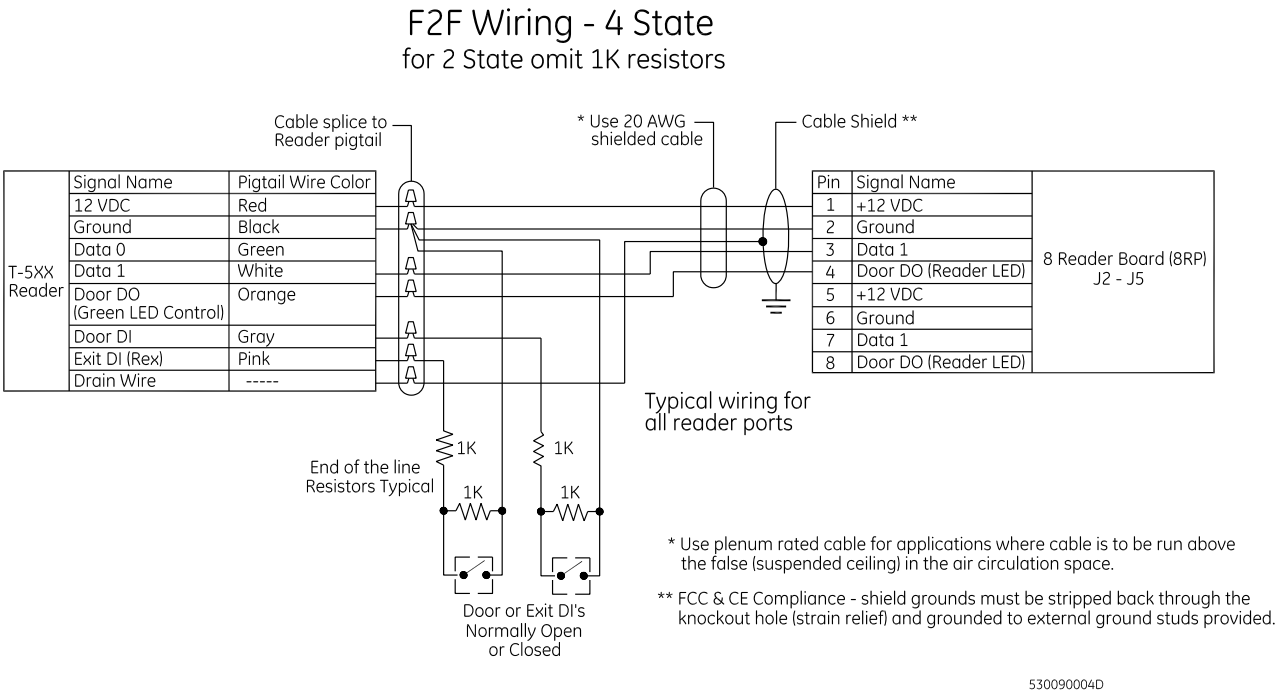
   Recommended:

   - Alpha Xtra Guard1® foil shield cable, non-plenum rated
   - Belden series security and alarm cable (commercial applications shielded), plenum-rated

Table 36. J2/J3/J4/J5 reader connector pinouts and recommended pairing

Reader port	PIN	Signal name	Typical wire color
1/3/5/7	1	+12 VDC	Red
	2	Ground	Black
	3	Reader Data 1	Green
	4	Door DO (Reader LED)	White
2/4/6/8	5	+12 VDC	Red
	6	Ground	Black
	7	Reader Data 1	Green
	8	Door DO (Reader LED)	White

Figure 38. Wiring 8RP to F/2F or Supervised F/2F Readers



Wiring door strike

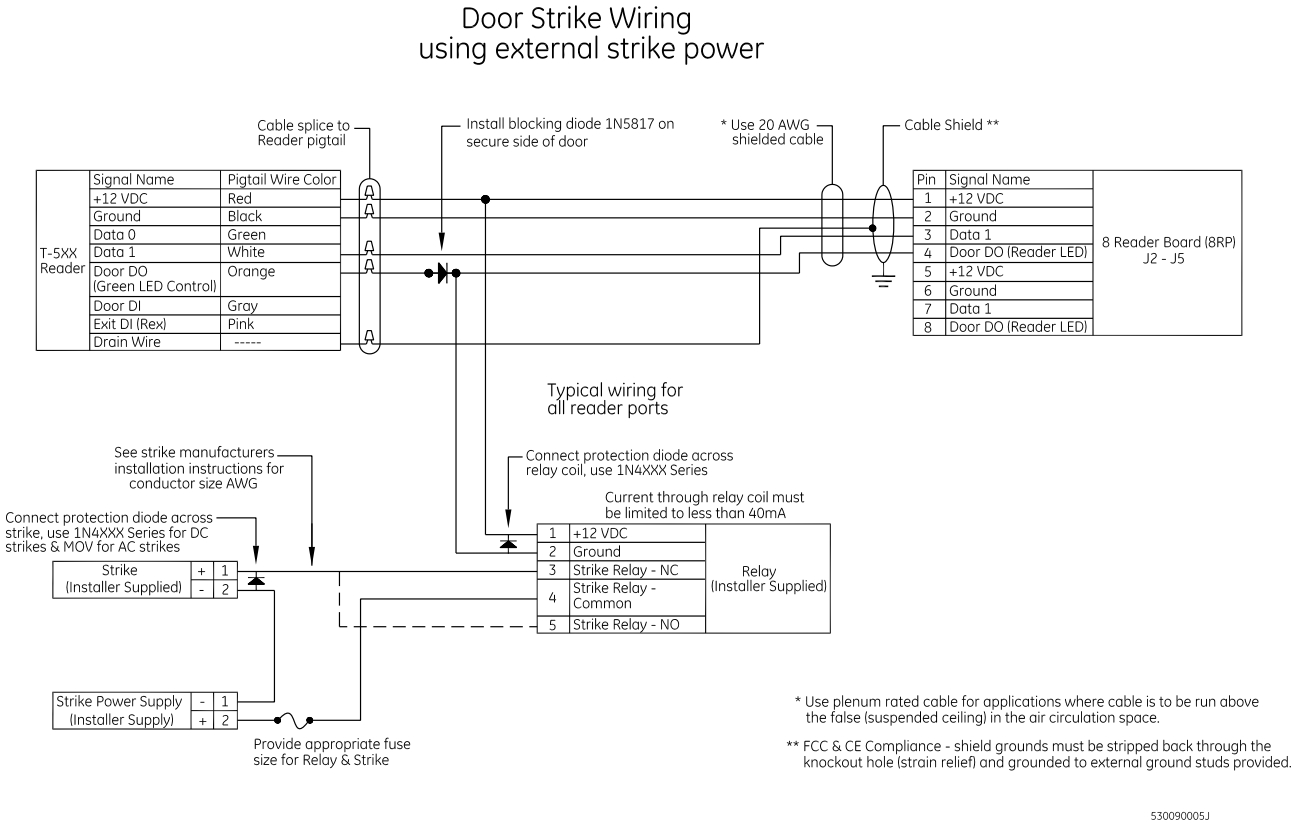
One reader LED (door DO) is dedicated to each reader. The reader LED (door DO) is used for the reader LED and/or for an external door strike relay.

1. Install the door strike as required.
2. Wire the door strike to the external door strike relay. The door strike relay is connected to +12 VDC (pin 1 and/or pin 5) and door DO (pin 4 and/or pin 8).
3. Install a **protection diode** across the relay and the door strike. Use 1N4002, 1N4003, 1N4004 or equivalent diodes for DC door strikes and Metal Oxide Varistors (MOV) for AC door strikes.

   Note: Protection diode or MOV and blocking diode required at all electronic door locks.

4. Install a **blocking diode** on the door DO (Reader LED) line between the reader and the door strike relay. Use 1N5817 (included with reader). The diode must be installed on the secure side of the door in order to be UL compliant.

Figure 39. Wiring 8RP door strike - external relay



Chapter 6 The optional DI and DO boards

This chapter provides information about and instructions for using the optional DI and DO boards.

In this chapter:

Introduction

The Micro/5 supports the 20 Digital Input board, the 16 Digital Output board, and the 16 Digital Output with Relays board. Although the Micro/5 enclosure holds up to seven boards, the specific number of DI and DO boards supported by the different host software systems varies. Reference the manual that came with your host system for further information on how many boards it supports.

20 DI board

Introduction

The 20 DI board provides 20 supervised digital input (alarm) points. Supervised DIs have end-of-line resistors on the contacts which enable the controller to detect line shorts and breaks in addition to the open and closed contact conditions. Please note the following:

- Maximum distance allowed between the Micro/5 and the alarm input device is 1,000 feet.
- Recommended cable wire is 2-conductor, 22-AWG shielded, stranded.
- Each DI point is addressed differently depending on the host system you are using.

Device addressing

Picture Perfect

From one to four boards can be configured with DI points from 16 to 35. Picture Perfect addresses DIs by board number; therefore, the DI numbers are the same for each of the possible four DI boards.

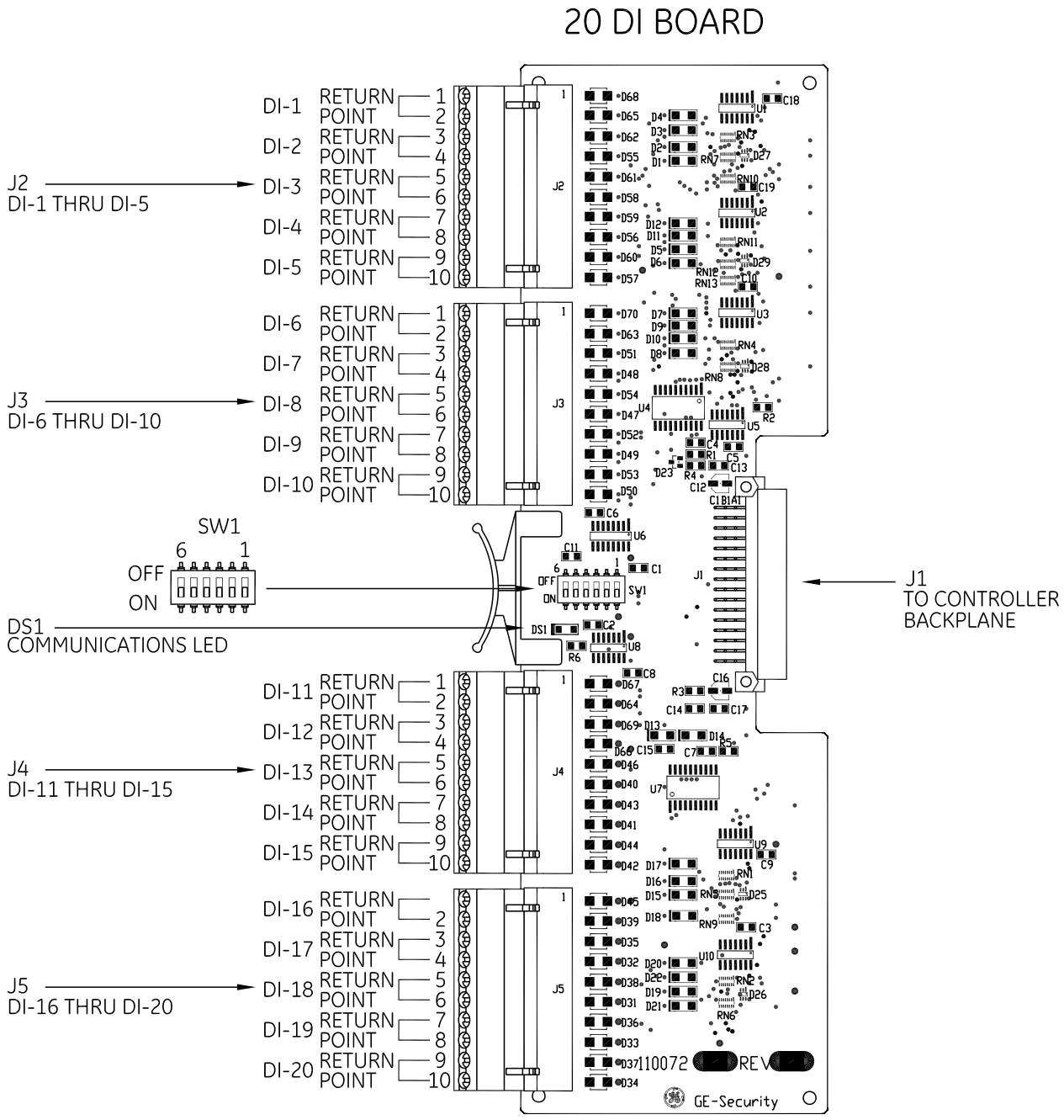
Facility Commander Wnx and Secure Perfect

From one to four boards can be configured with DI points from 1 to 20. Addressing of DI boards follows the format: **mmmm-b-pp** where **mmmm** represents the controller number to which this DI is associated, **b** represents the board number, and **pp** represents the point or device number.

For example:

0001-1-01 = DI on controller 1, DI board 1, DI 1
0001-2-01 = DI on controller 1, DI board 2, DI 1

Figure 40. 20 DI board layout



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Setting the DIP switches

Set the DIP switches on the 20 DI board before installing it and wiring the alarm input devices.

Table 37. DI board addressing

Board	SW1-1	SW1-2	SW1-3	SW1-4[1]	SW1-5	SW1-6
Board 1	ON					(1)
Board 2		ON				(1)
Board 3			ON			(1)
Board 4				ON		(1)

1. ON for M5/E, M5/2, M5/P; OFF for M5/PX, M5/PXN, M5/PXNPlus, M3000

= OFF

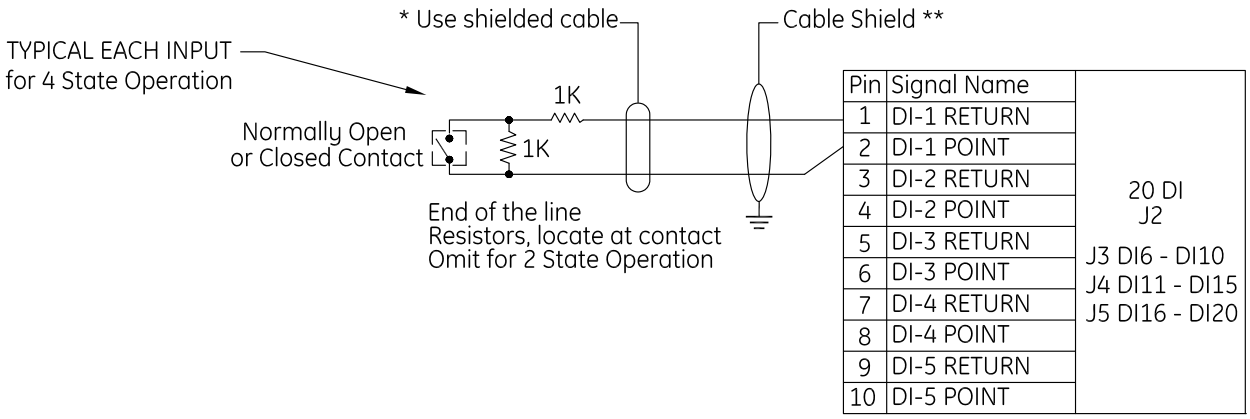
Wiring the digital input devices

1. Follow the installation specifications for the device. Mount the device according to the manufacturer's specifications. The alarm device (door contact) should have a dry contact which can have a normally open or normally closed type switch. A normally closed contact is in its normal position when it is closed. The opposite is true for a normally open contact.
2. Select the appropriate digital input for each alarm input device.
3. Ground the shields of the cable at the Micro/5 enclosure grounding studs. Float the shield (with tape or shrink tubing) at the DI device end to avoid electrical noise.
4. Install two end-of-line resistors. We recommend high quality, 1,000 (1K) ohm, 1/4 watt, 5% tolerance end-of-line resistors. Install each resistor as close to the door status contact as possible.

CAUTION: The supervision capability will be impaired if the resistors are NOT wired immediately adjacent to the door status contact.

5. Insulate resistors with tape or heat shrink tubing.
6. Document how you wired the alarm input devices. Future expansion of the system and its maintenance depend upon accurate documentation.

Figure 41. Wiring DI point



* Use plenum rated cable for applications where cable is to be run above the false (suspended ceiling) in the air circulation space.

** Pair wires as shown, tie shield ground to internal ground stud in Controller. FCC & CE Compliance - shield grounds must be stripped back through the knockout hole (strain relief) and grounded to the external ground studs provided.

530069015C

16 DO and DOR boards

Introduction

There are two different DO boards available: the 16 DO and the 16 DOR.

The 16 DO board provides 16 digital outputs rated at 100 mA @ 24 VDC maximum per output point.

The 16 DOR board has 16 relay output points rated at 2 A @ 30 VDC or 0.50 A @ 120 VAC maximum per output point. The first two relays on each J connector can be wired as normally open or normally closed. The last two relays on each J connector are factory set as normally open. Note the following:

- The maximum allowable distance between the Micro/5 16 DO/16DOR board and the output device is 1,000 feet.
- Two-conductor, 22-AWG shielded, stranded wire is recommended for the 16 DO board. Two conductor 18 to 22-AWG shielded, stranded wire is recommended for the 16 DOR board depending on the cable distance, amperage (current draw), and voltage of the output device.
- Each DO point is addressed differently depending on the host software you are using.

Device addressing

Picture Perfect

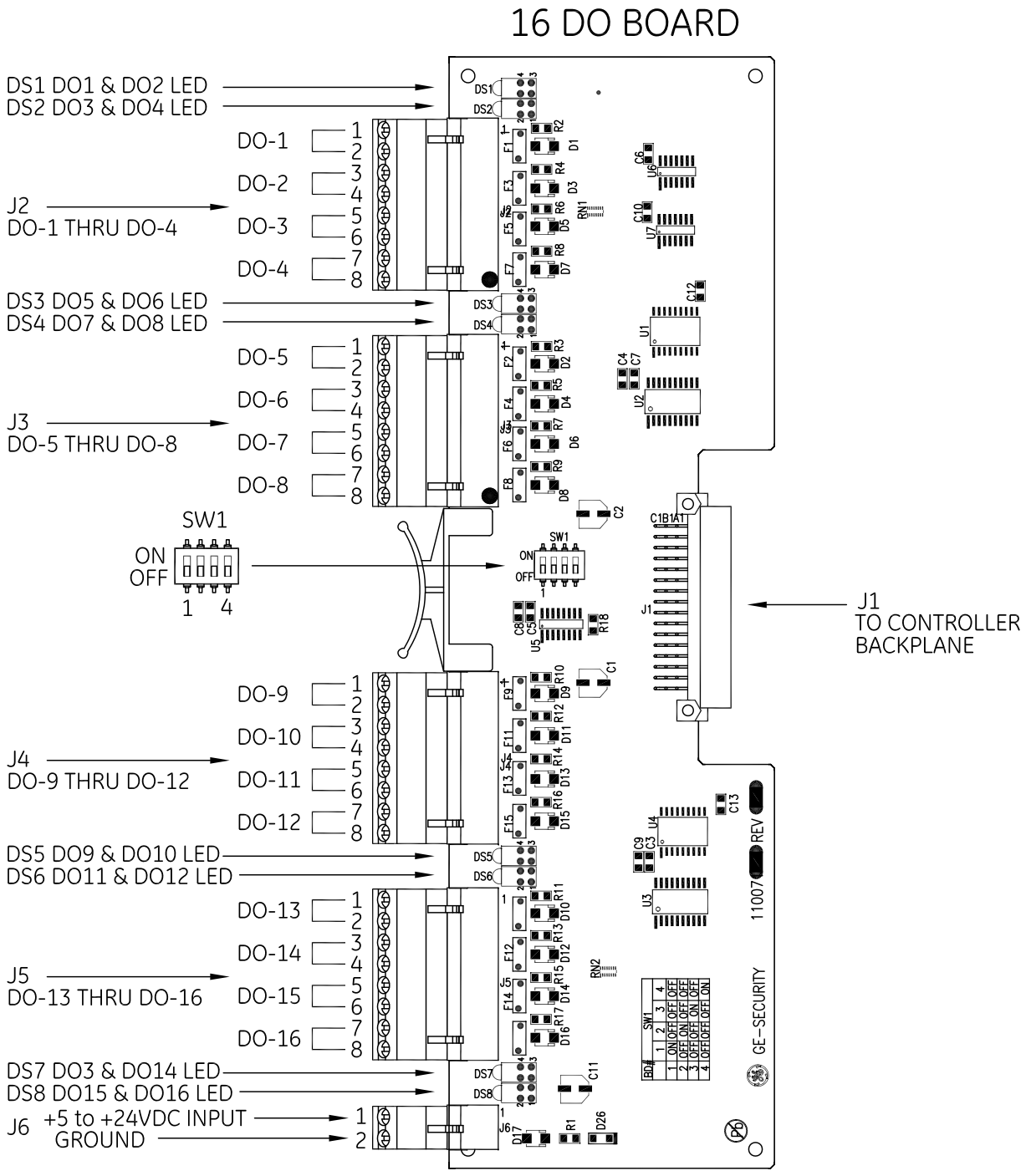
From one to four boards can be configured with DO points from 16 to 31. Picture Perfect addresses DOs by board number; therefore, the DO numbers are the same for each of the possible four DO/DOR boards.

Facility Commander Wnx and Secure Perfect

From one to four boards can be configured with DO points from 1 to 16. Addressing of DO boards follows the format: **mmmm-b-pp** where **mmmm** represents the controller number to which this DO is associated, **b** represents the board number, and **pp** represents the point or device number. For example:

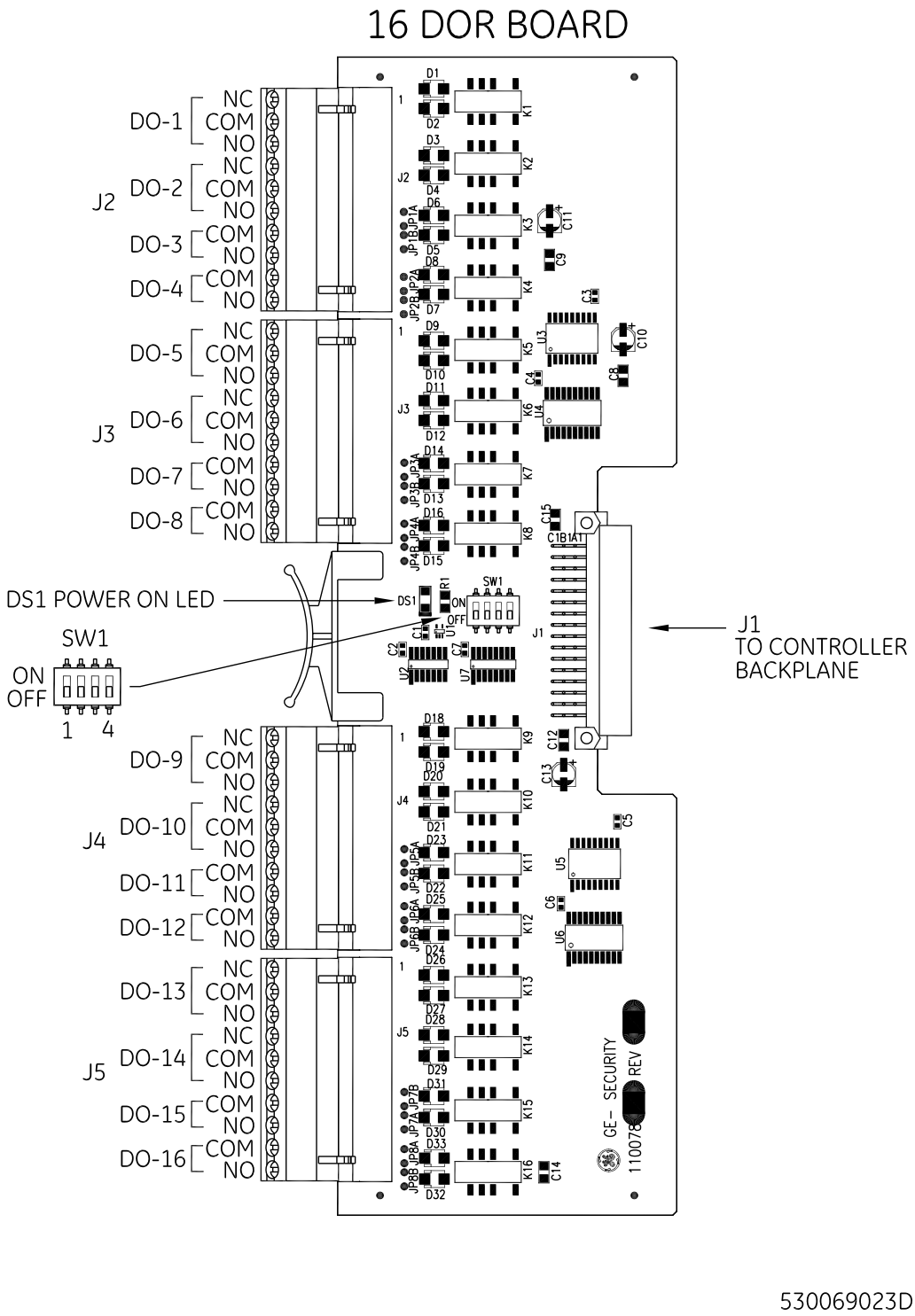
0001-1-01 = DO on controller 1, DO board 1, DO 1
0001-2-01 = DO on controller 1, DO board 2, DO 1

Figure 42. 16 DO board layout



530069018D

Figure 43. 16 DOR board layout



Setting the DIP switches

Set the DIP switches as described in the table below before installing the 16 DO/DOR board and wiring the digital output devices.

Table 38. DO/DOR board addressing

Board number	SW1-1	SW1-2	SW1-3	SW1-4
1	ON			
2		ON		
3			ON	
4				ON

= OFF

Wiring digital output devices

1. Mount the digital output device according to the manufacturer's specifications.
2. Complete the wiring. If the DO is used to energize a relay, install a diode in parallel with the relay coil to absorb transients when the relay is de-energized. A transient protection diode (user supplied) is necessary on the 16 DO board.
3. Connect a 5 to 24 VDC power supply to port J6. The voltage needed depends on the relay requirements of the DO points. Pins 1, 3, 5, and 7 on ports J2, J3, J4, and J5 get their DC voltage from pin 1 on J6.

Figure 44. Wiring output device to 16 DO board

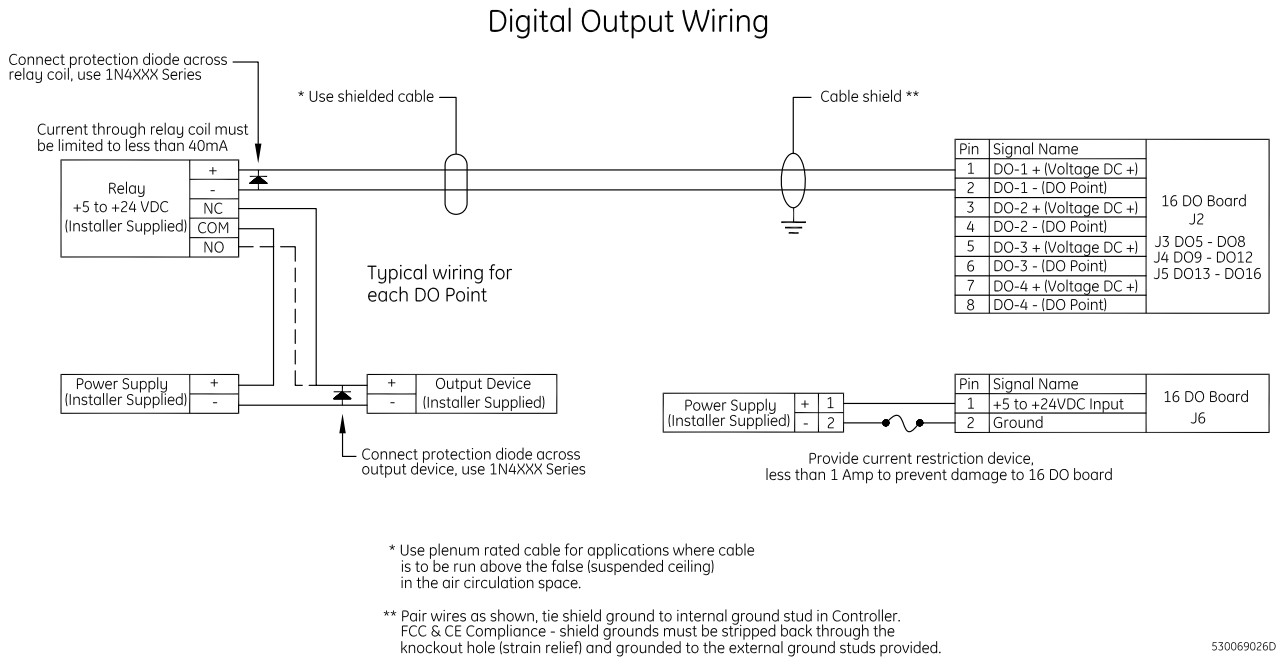
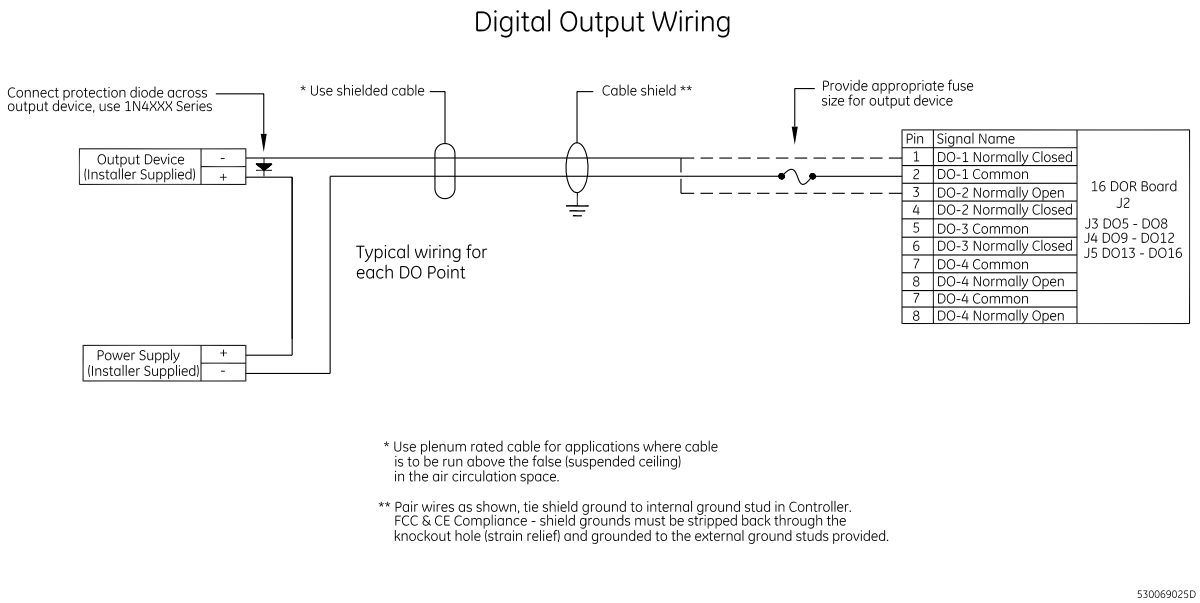


Figure 45. Wiring output device to 16 DOR board



Chapter 7 Testing before powering up

This chapter provides instructions for testing your controller before you apply power.

In this chapter:

Testing

Follow the steps below before powering up the controller.

1. Measure the AC power supplied to the power supply (110 VAC or 220 VAC, depending on the power supply installed). The power supply must have a dedicated circuit breaker. Do NOT plug into an outlet that is controlled by an on/off switch.
2. Test the reader power wiring to determine if a short circuit exists. Unplug each reader connector and measure, from the reader connector going out to the readers between pin 1 to chassis and pin 1 to pin 2, with an ohmmeter.

   Result: A measurement of less than 100 ohms indicates a short circuit. Correct this condition before powering up.
3. If a 16 DO board is installed, check for a short circuit. Unplug each connector and measure from chassis ground to all pins on the DO connector.

   Result: A measurement of less than 100 ohms indicates a short circuit. Trace out the wiring to locate the short circuit.
4. Reconnect all connectors.
5. Disconnect power input connector J6 on the Power/Communications board.
6. Use a voltmeter to measure input voltage across J6. Pin 3 = +, pin 4 = Ground.

   Result: If the meter reads -12 to -15 VDC, the wires are reversed.

   Solution: Reverse the wires on pins 3 and 4 so pin 3 is the + voltage. The meter should read +12 to +15 VDC.
7. Reconnect the J6 connector.

Once you have completed these steps, power up the M5.

Chapter 8 Controller firmware tools

This chapter provides information about and instructions for using GE controller firmware tools.

In this chapter:

Integrated Configuration Tool

The Integrated Configuration Tool is a browser-based utility used to configure the PXNplus CPU board, update the firmware, and view the application log file.

Requirements

Software requirements

One of the following:

- Microsoft Internet Explorer 6.0 or later
- Netscape 7.0 or later
- Mozilla 5.0 or later

Hardware requirements

One of the following (see *Figure 46* and *Figure 47*):

- Cat5 crossover cable for direct connection to a controller
- Standard Cat5 cable with network hub

Figure 46. Connecting directly using crossover cable

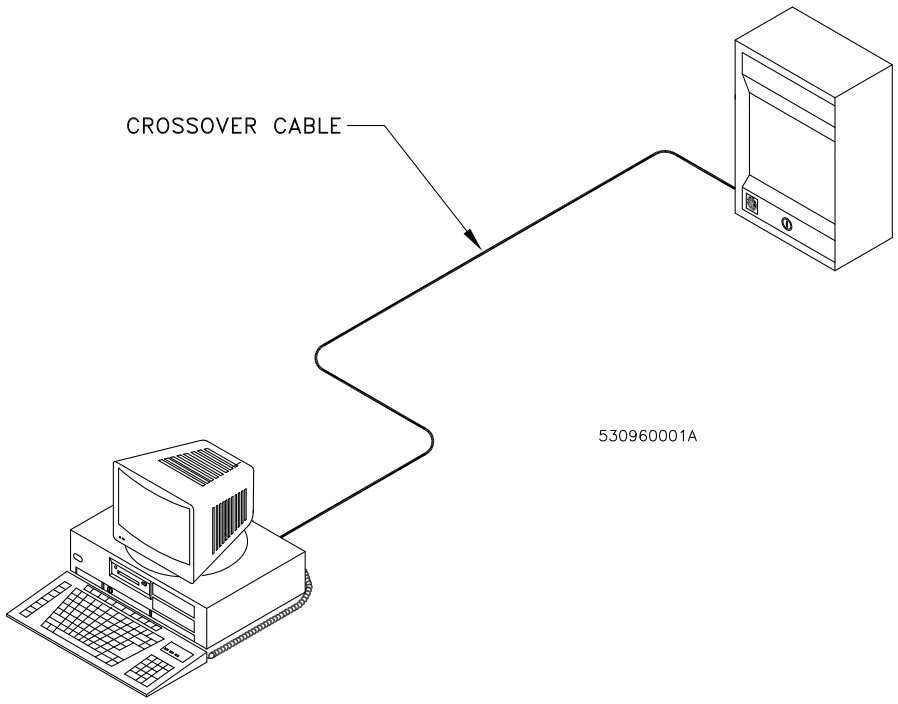
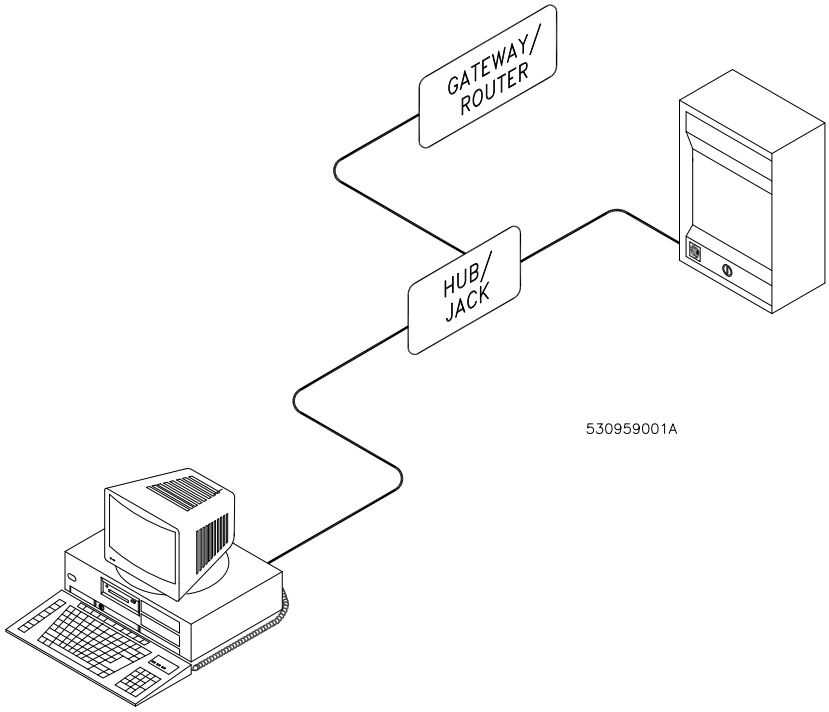


Figure 47. Connecting through network hub



Before you continue

Answer these questions before continuing:

Is there a firewall on the computer you are using to access the Integrated Configuration Tool?

If yes, you will need to disable it in order to use the Integrated Configuration Tool.

Is your network using a proxy?

If yes, you will need to disable the proxy or bypass it.

Complete the *Configuration checklist for Integrated Configuration Tool* on page 126 for each controller that you will be setting up.

Connecting and starting the tool

If this is the first time setting up this controller, you will need to follow special directions. Refer to *Initial configuration* on page 100.

Starting the tool

1. Connect the PC to the RJ45 connector on the PXNplus board using a network hub or “crossover” cable.
2. In the browser Address field, enter the IP address of the controller.

3. At the password screen, enter your username and password. The default is `install`, `install`. We recommend that you change this default.

If you need to flash the controller, see *Flash controller menu/Flash controller* on page 123.

Initial configuration

1. By default, the controller's IP address is `192.168.6.6`. To have your laptop/computer communicate with the controller, you must set your laptop/computer IP address to `192.168.6.5`, or similar valid IP address (`192.168.6.`*x* where *x* is any number between 1 and 254 except 6). The setup is different between Windows 2000 and Windows XP. Refer to the appropriate section.

   For Windows 2000:

   a. Click **Start**, **Settings**, then **Network and Dial-up Connections**.

   b. Right-click on **Local Area Connection.** If the first option in the drop-down list box is:

      - **Disable**, then the connection is enabled. Go to *step c*.
      - **Enable**, then select it to enable the connection. Return to *step a*.

   c. Select **Properties** from the drop-down list box.

   d. In the section **Components checked are used in this connection**, select **Internet Protocol TCP/IP**.

   e. Click **Properties**.

   f. If this laptop/computer is set for:

      - DHCP, then the field **Obtain an IP address automatically** is already selected. Select **Use the following IP address**.
      - Static, write down the IP address and Subnet number. You need to reset your computer back to these numbers once the controller configuration is complete.

   g. Enter the IP address `192.168.6.5`, or a similar valid IP address (`192.168.6.`*x* where *x* is any number between 1 and 254 except 6).

   h. Change the subnet mask to `255.255.255.0`.

   i. You do not need to change the gateway.

   j. Click **Ok** until all open windows are closed.

   k. Go to *step 2*.

   For Windows XP:

   a. Click **Start**, then **Control Panel**.

   b. From the **Control Panel** window, select **Network Connections**.

   c. Right-click on **Local Area Connection.** If the first option in the drop-down list box is:

      - **Disable**, then the connection is enabled. Go to *step d*.
      - **Enable**, then select it to enable the connection. Return to *step a*.

   d. Select **Properties** from the drop-down list.

   e. In the section **This connection uses the following items:**, select **Internet Protocol TCP/IP**.

f. Select **Properties**.

g. If this laptop/computer is set for:

- DHCP, then the field **Obtain an IP address automatically** is already selected. Select **Use the following IP address**.
- Static, write down the IP address and Subnet number. You need to reset your computer back to these numbers once the controller configuration is complete.

h. Enter the IP address `192.168.6.5`, or a similar valid IP address (`192.168.6.`*x* where *x* is any number between 1 and 254 except 6).

i. Change the subnet to `255.255.255.0`.

j. You do not need to change the gateway.

k. Click **Ok** until all open windows are closed.

2. Connect the Cat-5 crossover cable from the Ethernet port on your laptop or computer directly to the controller Ethernet port (no hub or switch).
3. If your controller is not yet powered up, do so now.
4. Open an Internet browser window on your laptop/computer.
5. In the browser's Address field, enter the default static IP address of the controller: `192.168.6.6`
6. The Integrated Configuration Tool starts. At the password screen, enter your username and password. The default is `install`, `install`. We recommend that you change this default.

Controller setup overview

In order to set up the controller, you must complete these screens:

- **Controller Configuration menu->Host/Connection type:** Select the software package and network. See "Controller Configuration menu -> Host/Connection type" on page .102.
- **Controller Information menu->Controller information:** Set the controller address. (Required for Picture Perfect network controllers using dial fallback and all Secure Perfect and Facility Commander Wnx controllers.) See "Controller Information menu -> Controller Information" on page .103.
- **Controller Parameters menu->Network configuration:** The setup depends on whether the IP address is static or dynamic. See "Network configuration" on page .105.
- **Controller Parameters menu->Dial configuration:** If using the optional dial fallback feature, you must complete the Dial configuration page also. See "Dial configuration" on page .106.

After completing all the screens, click Apply Changes under the Administration menu and then click Restart application for the changes to take effect. See *Table 39* on page 102 for a description of buttons used in this application.

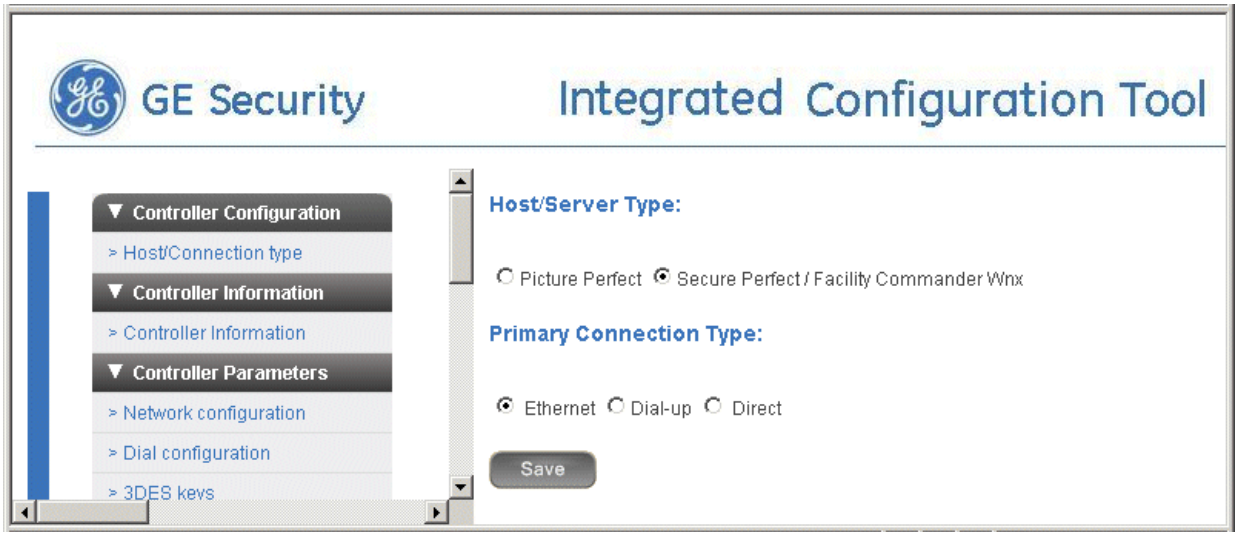
Table 39. Buttons available and when to use them

Button	Usage	Result
Save	after making changes on any page	Saves the changes to the shadow config.txt file located in the /var/tmp directory.
Apply Changes	after all the changes are complete	Saves the changes from the shadow config.txt file to the real config.txt file located in the /opt/config directory.
Restart Application	after clicking Apply Changes	The application picks up the latest changes from the config.txt file and starts again.
Restart Controller	after Apply Changes	The operating system picks up the latest changes and starts again.

Controller Configuration menu -> Host/Connection type

Use this form to select the software package and connection type.

Figure 48. Host/Connection type screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Configuration** menu, select **Host/Connection type**.
3. In the *Host/Server Type* field, select the software package you are using.
4. In the *Primary Connection Type* field, select the connection type.
5. Click **Save**.

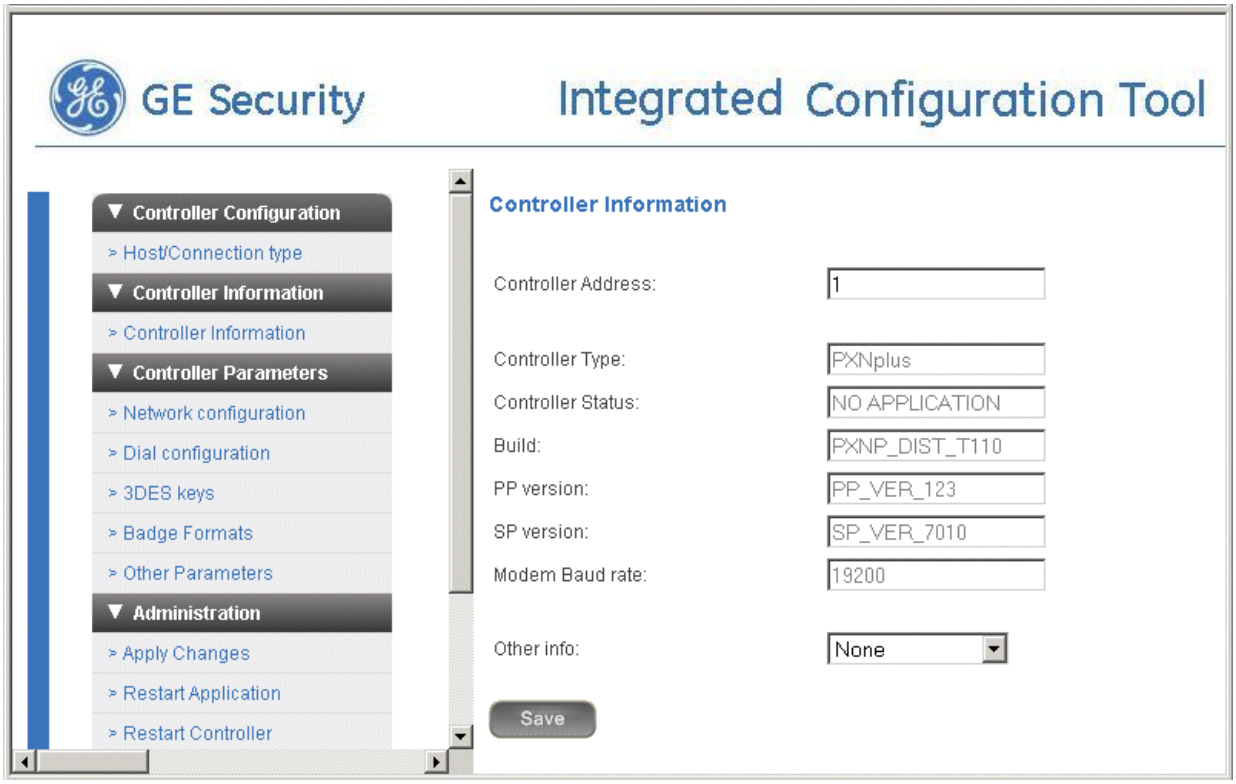
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Controller Information menu -> Controller Information

Use this form to set the controller's address. This form also provides the controller online/offline status, build and application versions, and modem baud rate.

Note: If this is a Picture Perfect network controller only (dial fallback is NOT used), you do not need to set the controller address.

Figure 49. Controller Information screen



1. From the **Controller Information** menu, select **Controller Information**.
2. To set the controller address, enter the number in the *Controller Address* field.
3. To use the status reports in the *Other Info* field, see *Using the Other Info field* below.
4. Click **Save**.
5. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Using the Other Info field

There are several status reports based on uClinux commands which are available for checking and monitoring the PXNplus board. Call GE Customer Support for assistance with these reports.

1. In the *Other Info* field, click the down arrow for a list of available reports.
2. Select the report you want. See *Table 40* below for a brief explanation of each report.

Table 40. Controller Info reports

Report	Description
Memory Usage	displays amount of memory available, both used and free
Process Status	lists which processes are running
Board Info	displays hardware related information, such as boot and board version
OS Info	displays information related to the linux operating system on the controller
Uptime	time since the last reboot
DB File Info	lists persistence-related database files
Message Info	lists data on the controller's message queues

Ping Host	pings the host from the controller (based on the current host IP or name)
	Successful ping result:
	`2 packets transmitted, 2 packets received, 0% packet loss`
	Unsuccessful ping result:
	`2 packets transmitted, 0 packets received, 100% packet loss`

Check Route	checks route information from the controller
Thread Status	lists the application firmware components and whether they are currently running
DMA Info	status of the DMA IO interface
Update history	provides a list of all updates to the firmware for selected controller
Runtime Logs	provides daily critical runtime information

Controller Parameters menu

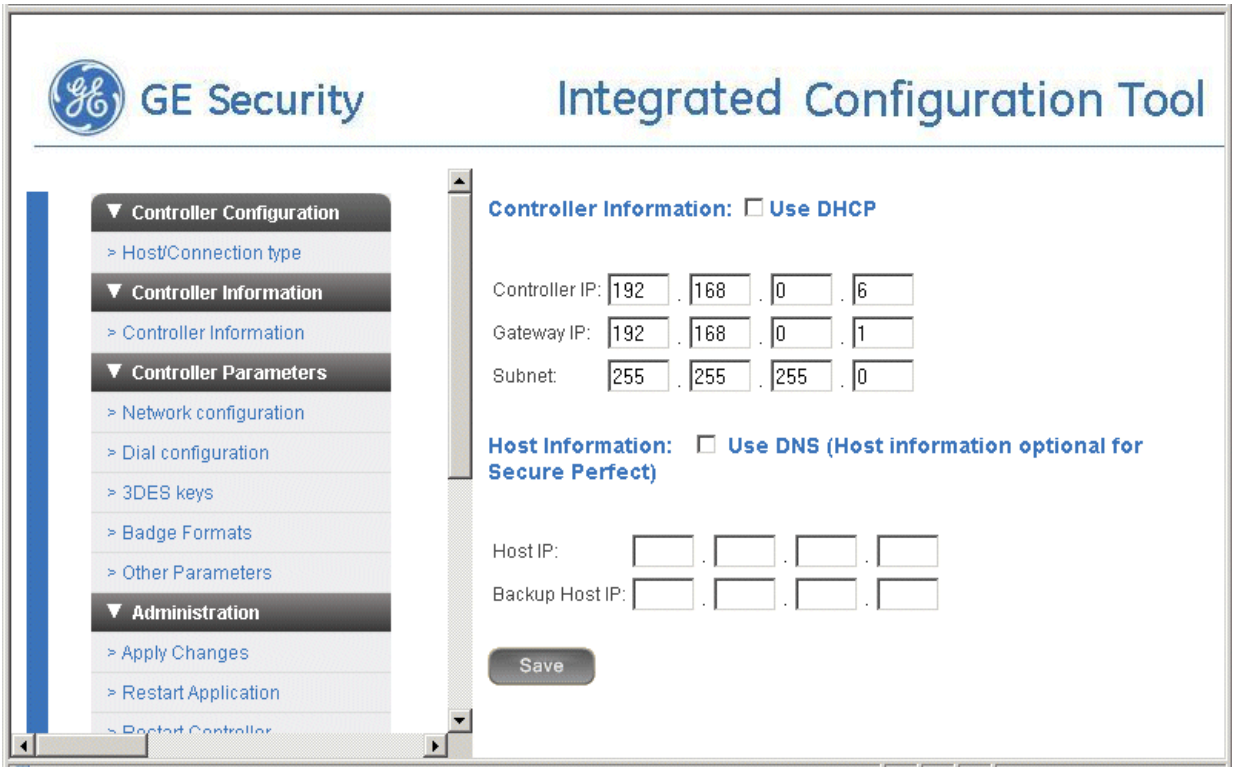
The Controller Parameters menu contains the following options:

- **Network configuration:** configure the network settings.
- **Dial configuration:** configure dial-up settings. See page 106.
- **3DES keys:** set data encryption. See page 107.
- **Badge Formats:** set Wiegand and Magnetic Stripe formats. See page 109.
- **Other Parameters:** set parameters such as setting badge history and alarm history memory allocation and changing username and password. See page 118.

Network configuration

Use this form to configure the network settings for the controller. A static or dynamic IP address can be used.

Figure 50. Controller Parameters/Network configuration screen



1. From the **Controller Parameters** menu, select **Network configuration**.
2. In the *Controller Information* area, set the controller name (DHCP) or address (Static). Refer to the appropriate section that follows.

   DHCP:

   - For a dynamic controller IP address, select *Use DHCP.*

   To name the controller, perform one of the following:

   - Enter a fully qualified, unique domain name in the *Controller name* field. For example: `controller.getest.ge.com`
   - Select the checkbox *Use MAC address* and the controller name is generated from the Controller MAC address. A MAC address (media access control address) is a unique identifier attached to most forms of networking equipment. The MAC address for your PXNplus board can be found in the *Controller MAC* field. This option disables the *Controller name* field.

   Note: Give this name or MAC address to your Network Administrator so that it can be added to the DNS database.

Static:

- If using a static controller IP address, enter the IP address of the controller given to you by your Network Administrator in the field *Controller IP.*
- If using a gateway, you may accept the gateway IP generated based on the controller IP or you may enter a gateway IP address in the *Gateway IP* field.
- If using a subnet mask, you may accept the subnet mask generated based on the controller IP or you may enter a subnet mask in the *Subnet* field.

3. If using Secure Perfect or Facility Commander Wnx, skip to *step 4*. If using Picture Perfect, you must set the host name (DNS) or address (Static). Refer to the appropriate section that follows.

   DNS:

   - For a dynamic host IP address, select the *Use DNS* checkbox and enter the host name in the *Host Name* field.

   Note: Due to the limitation on the Picture Perfect host, the DNS/DDNS server needs to be manually updated with the Picture Perfect host name and IP address.

   If you set up a static IP address in the *Controller Information* section, you also need to enter the domain for the host in the *Domain* field and the DNS IP address in the **DNS IP** field. If DHCP was selected, this is not necessary.

   - Enter the backup host name in the *Backup Host Name* field.

   Static:

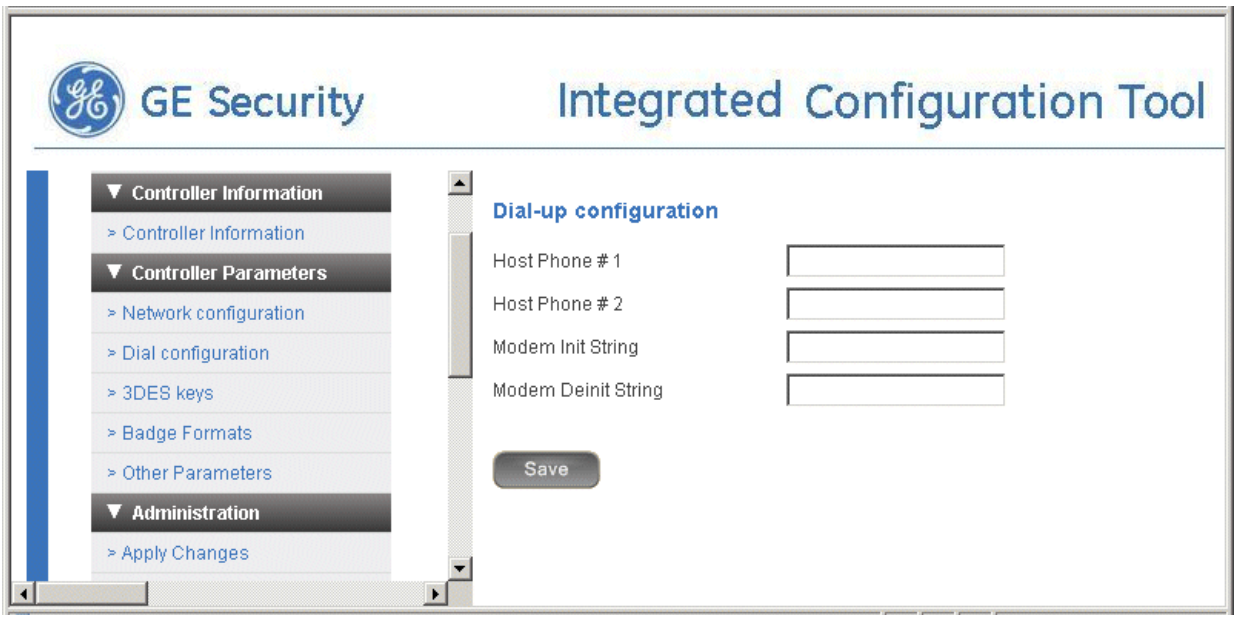
   - For a static host IP address, enter the IP address in the *Host IP* field.
   - Enter the IP address in the *Backup Host IP* field.

4. Click **Save**.
5. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Dial configuration

Use this screen to set up the dial fallback feature. Either the on-board modem or an external modem can be used.

Figure 51. Controller Parameters/Dial configuration screen



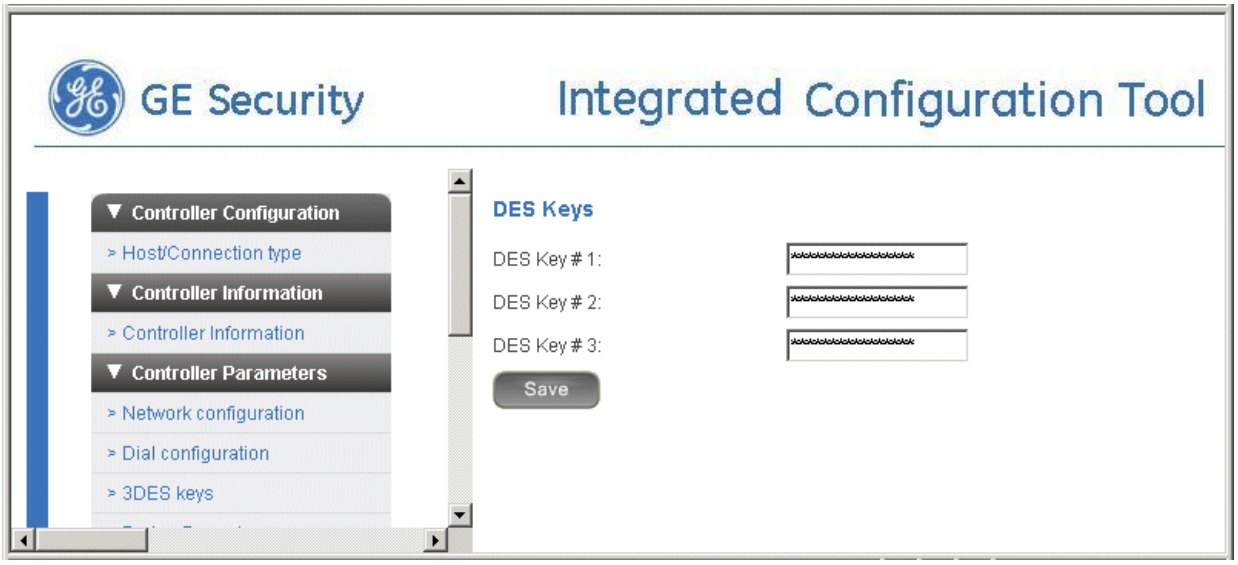
1. From the **Controller Parameters** menu, select **Dial configuration**.
2. In the *Host Phone # 1* field, enter the phone number for the host computer. Use the format: aaa-nnn-nnnn (For example, 561-555-5555)
3. If there is an additional phone number to reach the host, enter it into the field *Host Phone # 2*, otherwise, leave the field blank.
4. The fields *Modem Init String* and *Modem Deinit String* require values only if you are experiencing difficulties with the optional modem board.
5. Click **Save**.
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

3DES keys

In order to secure transmissions between the controller and the host, the data is encrypted using Triple Data Encryption Standard (3DES) encryption. Use this screen to enter keys which will create an encryption pattern for transmission.

CAUTION: The host DES keys and the controller DES keys MUST match!

Figure 52. Controller Parameters/3DES keys screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. Click **Controller Parameters**, then **3DES keys**.

   Keep the following in mind:

   - DES keys must be exactly 16 characters.
   - DES keys must be valid hexadecimal characters (0 through 9, upper or lower case letters A through F).
   - No two or more DES keys can have the same value.

CAUTION: You cannot modify only one key! All keys must be changed or you will not be able to save.

3. Click **Save**.
4. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Badge Formats

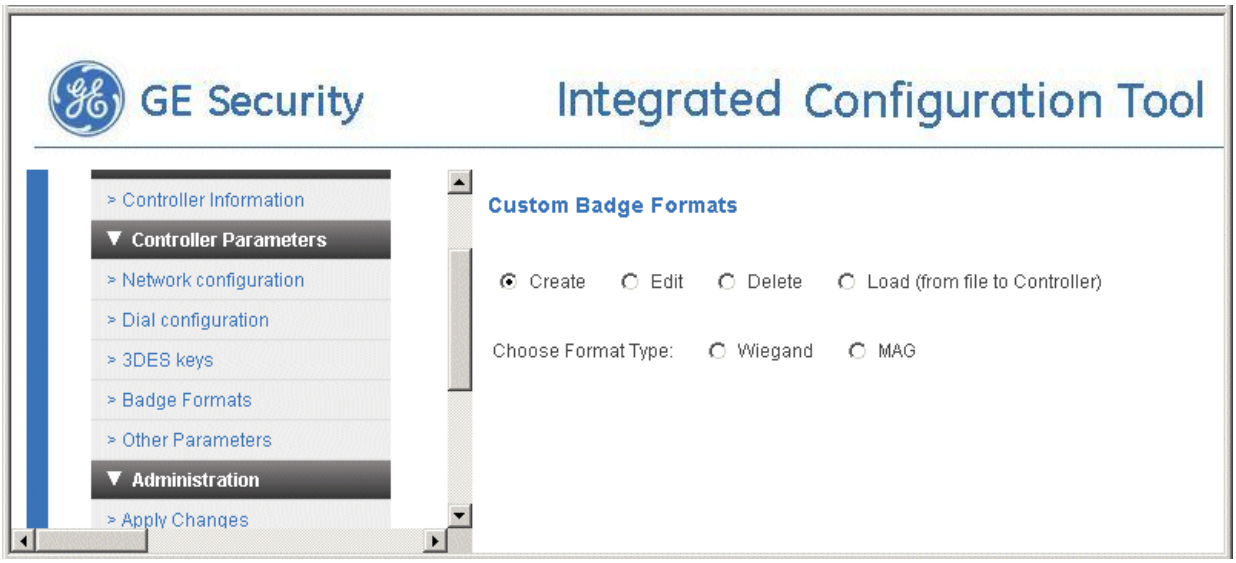
Note: The following is for Picture Perfect users only! Secure Perfect and Facility Commander Wnx users should use the Badge Format form or the Credential Format form located in the application.

You can create, edit or delete Wiegand or magnetic stripe badge formats from the controller. You should have knowledge of universal badge formats. Before attempting to create a Wiegand badge format, contact GE Technical Support for assistance.

- Create a badge format
- Load a badge format
- Edit a badge format
- Delete a badge format

Create a badge format

Figure 53. Controller Parameters/Badge Formats - Create screen

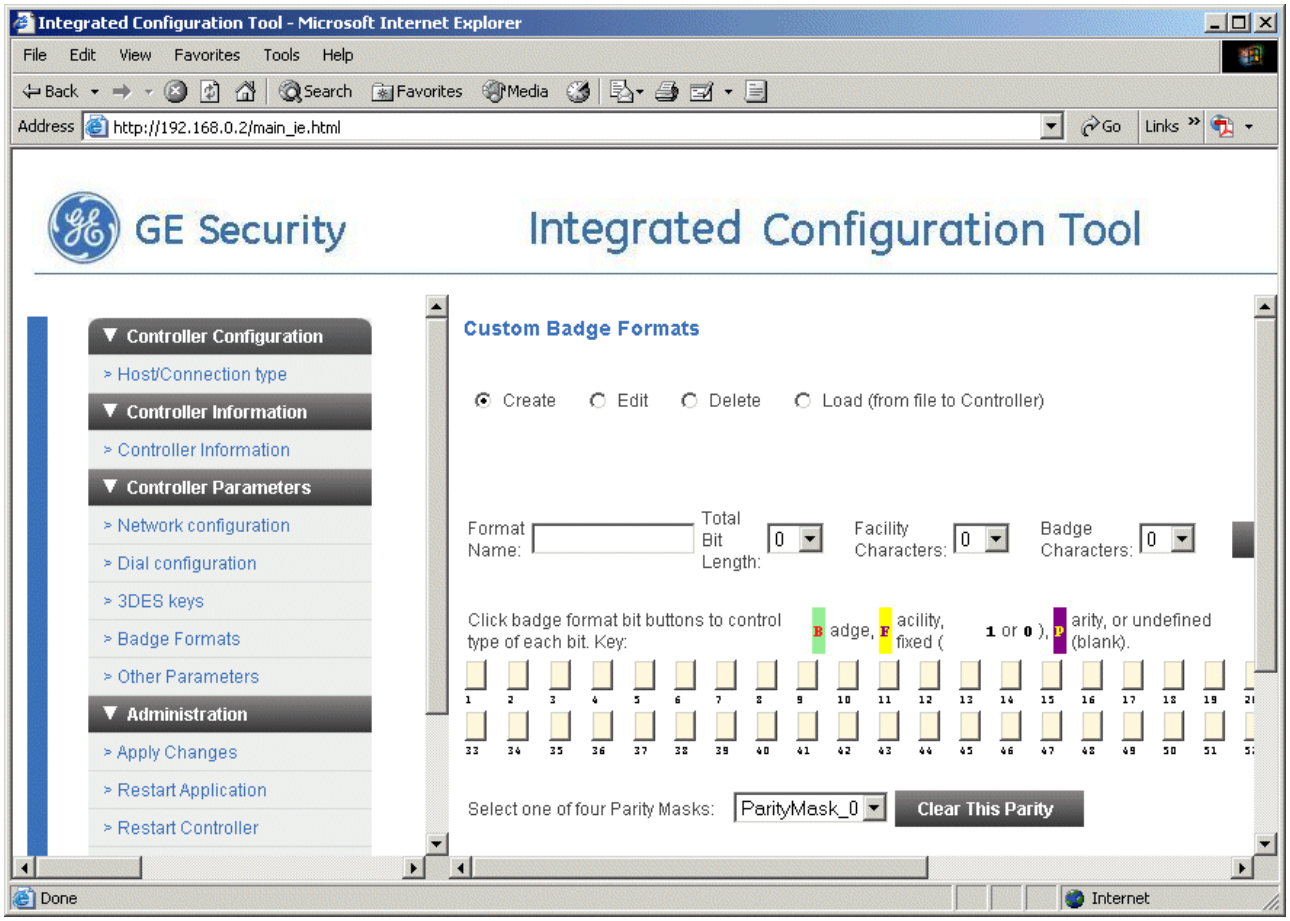


1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Badge Formats**.
3. Select *Create*.
4. In the *Choose Format Type* field, select the format type:
   - Wiegand, see *Wiegand format* on page 110.
   - MAG (for magnetic stripe), see *MAG format* on page 113.

Wiegand format

You should have knowledge of universal badge formats. Before using this screen, contact GE Technical Support for assistance. This screen allows you to name the format, specify how many total bits are in the format, how many characters are in the actual badge data used to represent facility bits, and how many characters will be used to encode the badge number.

Figure 54. Controller Parameters/Badge Formats - Create Wiegand format screen



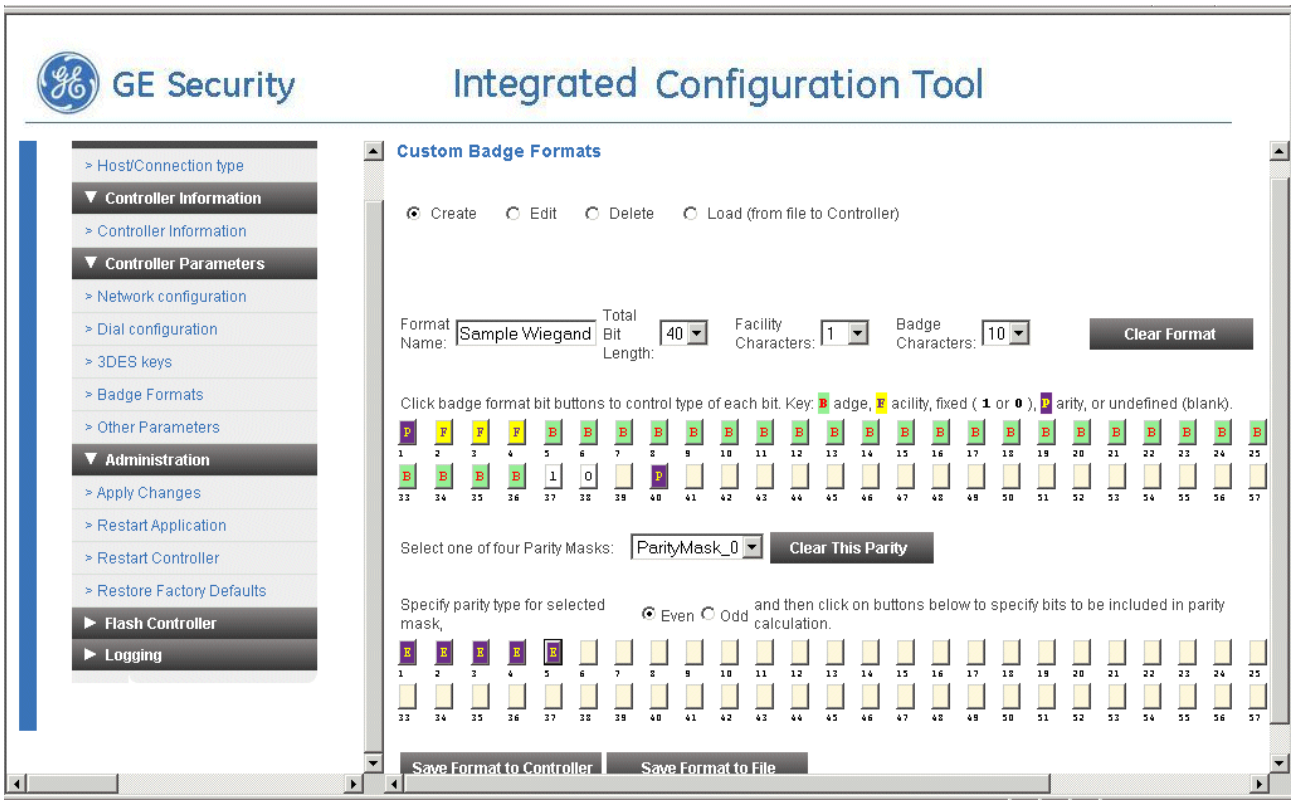
5. In the *Facility Characters* field, enter the number of characters required for the facility data.
6. In the *Badge Characters* field, enter the number of characters required for the badge data.

7. Click each button until it displays the role of that bit in the badge data. You may use one of the following:
   - B - badge
   - F - facility
   - 1 or 0 - fixed data
   - P - parity
   - - undefined (blank)

   Refer to the sample screen on *Figure 55* on page 112.
8. If you wish to select a parity mask:
   a. Use the drop-down box labeled *Select one of four Parity Masks* to select a parity mask.
   b. Select either the *Even* or the *Odd* radio button.
   c. Click on the bits that you wish to check the parity.
9. You have two Save options:
   - Click **Save Format to Controller**. If any errors are encountered, an alert dialog box pops up.
   - Click **Save Format to File**. This saves the badge format file to your local computer.
     a. A confirmation window displays. Click **Ok** to continue.
     b. A screen displays with the name of your format and the option to save it on your computer. This is actually an HTML page with your format embedded in it.
     c. Click **Save format to my computer**. A **Save** window displays.
     d. Click **Save**.

   Note: For Netscape and Mozilla users: The Save Format to File operation on these browsers is more limited in capability due to security constraints imposed by them. It is not possible to automatically bring up the Save dialog. You will have to do the following steps (as explained in the popup dialog):
   - When the mouse pointer is over the Format frame, click the right mouse button.
   - From the popup menu, select **This Frame**.
   - From the submenu, select **Save Frame As**.
   - A **Save As** dialog displays with the default file name `wiegand.html.` Replace the file name with one appropriate for your site and navigate to the directory where you want the file saved.
10. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

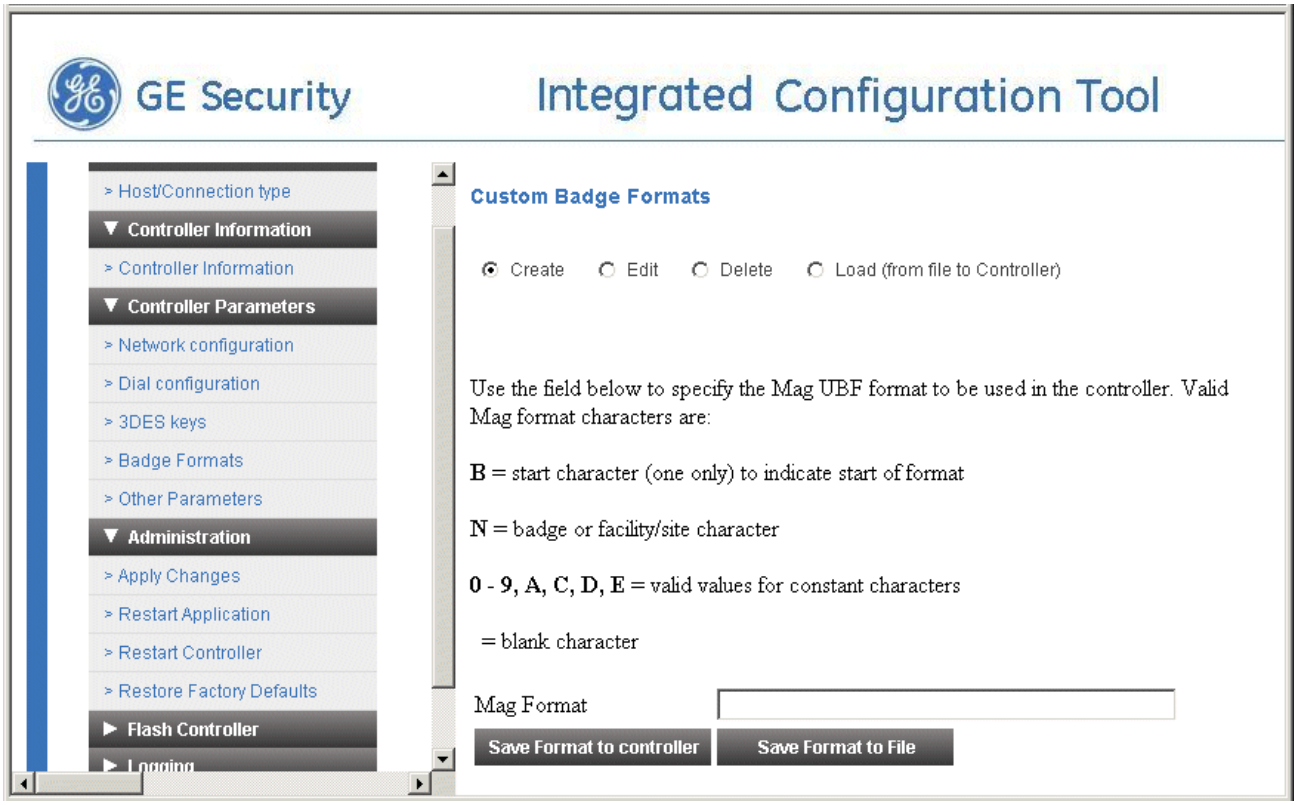
Figure 55. Controller Parameters/Badge Formats - Sample Create Wiegand format screen



MAG format

This screen allows you to name the format, specify the start character, badge and/or facility characters, constant characters, and blank characters.

Figure 56. Other Parameters/Badge Formats - Create MAG format screen



1. In the *Mag Format* field, enter the mag badge file format you want using the following format characters:

   - `B` = start character
   - `N` = badge or facility/site character
   - `0 - 9, A, C, D, E` = valid values for constant characters
   - = blank character

   For example: `BNNNNN99ACDE`

   This represents a badge number with one start character, five badge or facility/site characters, and six constant characters of “`99ACDE`”

2. You have two Save options:

   - Click **Save Format to Controller**. If any errors are encountered, an alert dialog box pops up.
   - Click **Save Format to File**. This saves the badge format file to your local computer.

     a. A confirmation window displays. Click **Ok** to continue.

b. A screen displays with the name of your format and the option to save it on your computer. This is actually an HTML page with your format embedded in it.

c. Click **Save format to my computer**. A **Save** window displays.

d. Click **Save**.

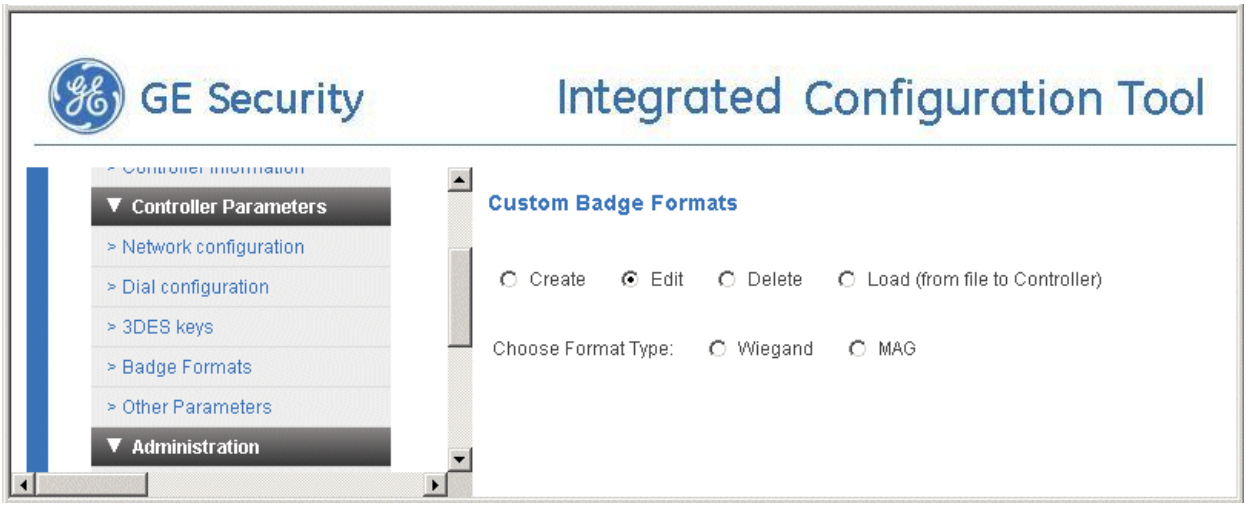
Note: For Netscape and Mozilla users: The Save Format to File operation on these browsers is more limited in capability due to security constraints imposed by them. It is not possible to automatically bring up the Save dialog. You will have to do the following steps (as explained in the popup dialog):

- When the mouse pointer is over the Format frame, click the right mouse button.
- From the popup menu, select **This Frame**.
- From the submenu, select **Save Frame As**.
- A **Save As** dialog displays with the default file name `wiegand.html`. Replace the file name with one appropriate for your site and navigate to the directory where you want the file saved.

3. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Edit a badge format

Figure 57. Controller Parameters/Badge Formats - Edit screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. Click **Controller Parameters**, then **Badge Formats**.
3. Select *Edit*.
4. In the *Choose Format Type* field, select the format type:
   - Wiegand, see *Wiegand format* on page 115.
   - MAG (for magnetic stripe), see *MAG format* on page 115.

Wiegand format

This screen allows you to edit an existing badge format or create a new badge format based on an existing format.

1. Select *Wiegand*.
2. Select the format you wish to edit.
3. The screen used to create the badge format displays populated with the values from the chosen badge format file. Make your changes. See *Wiegand format* on page 110 for an explanation of the available format characters.
4. If you do not change the format name, the existing file is overwritten.
5. Click **Save Format to Controller**.
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

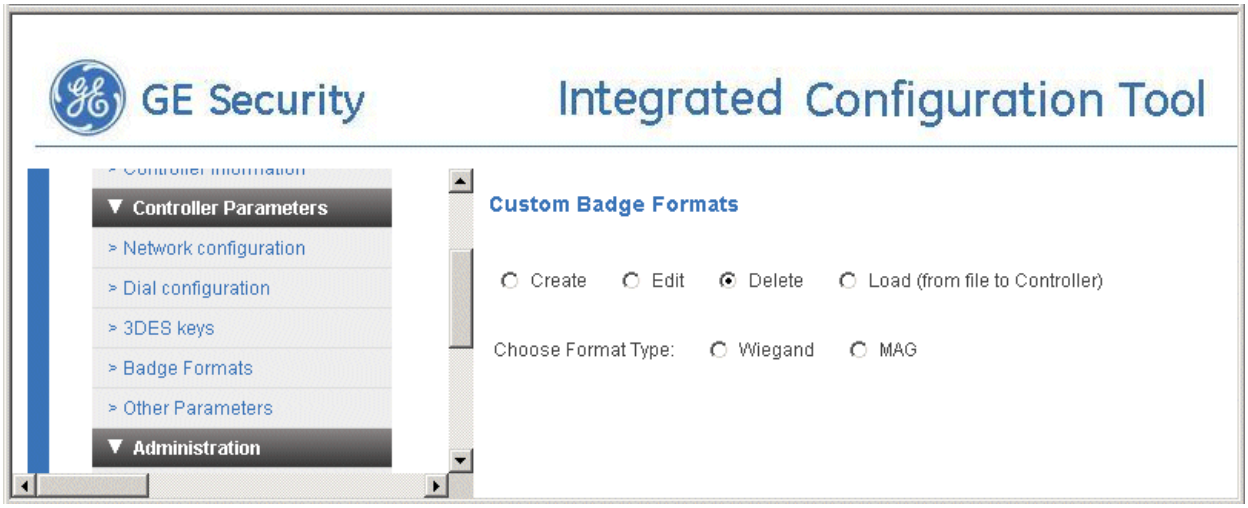
MAG format

There is only one MAG format so any changes made and saved will overwrite your existing format.

1. Select *MAG*. A new MAG format screen displays.
2. Enter the new format. See *MAG format* on page 113 for an explanation of the available format characters.
3. Click **Save Format to Controller**.
4. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Delete a badge format

Figure 58. Controller Parameters/Badge Formats - Delete screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. Click **Controller Parameters**, then **Badge Formats**.
3. Select *Delete*.
4. In the *Choose Format Type* field, select the format type:
   - Wiegand, see *Wiegand format* on page 117.
   - MAG (for magnetic stripe), see *MAG format* on page 117.

Wiegand format

1. Select *Wiegand*.
2. In the *Select Format to Delete* field, select the file name of the Wiegand format you wish to delete.
3. A confirmation window displays. Click **Ok**.
4. A window displays stating the controller has been updated.
5. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

MAG format

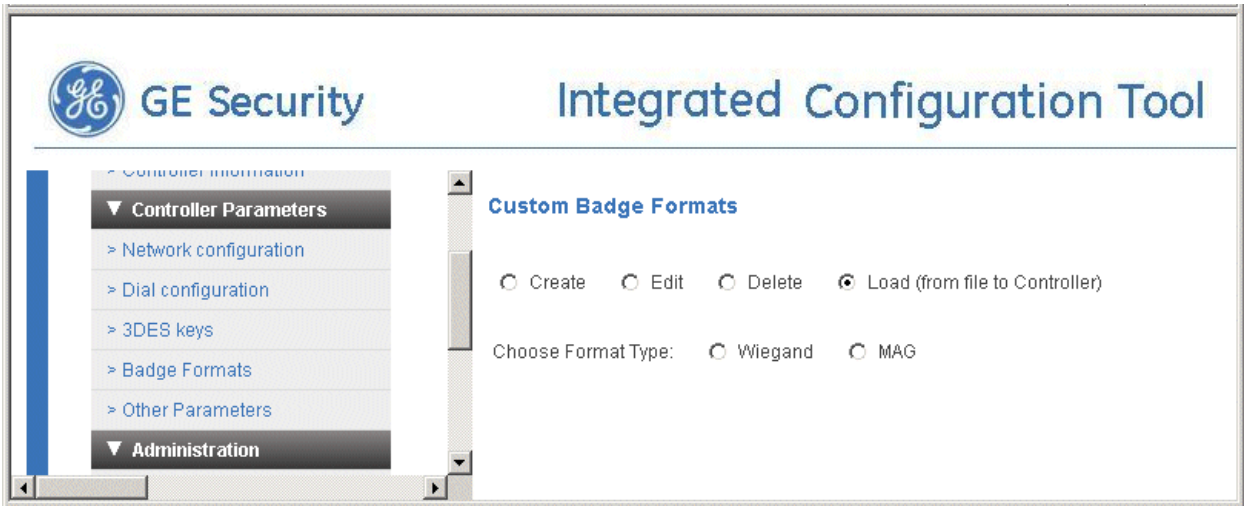
There is only one MAG format.

1. Select *MAG*. Since there is only one MAG format, it is deleted.
2. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Load a badge format

The screen allows you to search your file system for a PXNplus badge format file to send to the controller.

Figure 59. Controller Parameters/Badge Formats - Load screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Badge Formats**.
3. Select *Load (from file to Controller)*.
4. In the *Choose Format Type* field, select either *Wiegand* or *MAG*.
5. Click **Browse**. Navigate to and select the badge format file you want.
6. Click **Save**.
7. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Other Parameters

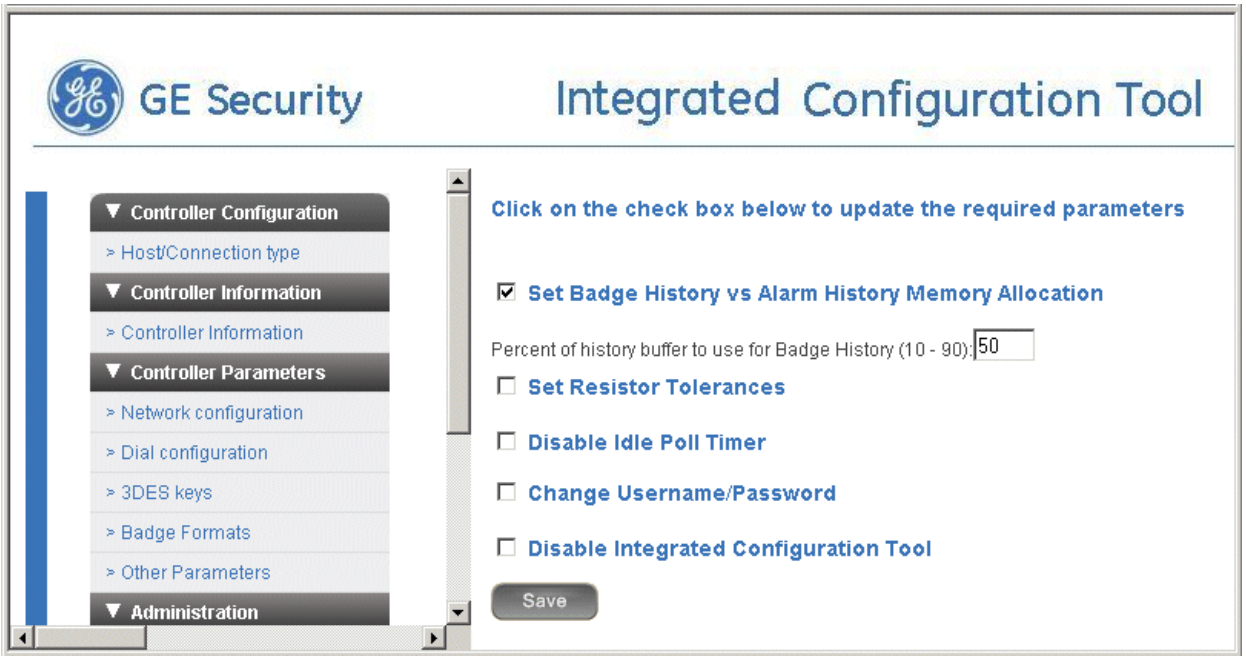
The form contains the following fields:

- **Set Badge History vs Alarm History Memory Allocation:** allocate percentage of history memory to badge history. (Picture Perfect only) See page 118.
- **Set Resistor Tolerances:** tighten the range the voltage changes before detecting a 4 state DI state change. See page 119.
- **Disable (Enable) Idle Poll Timer:** select this toggle to use or stop a timer for network activity between the controller and the host. (Picture Perfect only) See page 120.
- **Change Username/Password:** change either the username and/or the password used to log on to the Integrated Configuration Tool. See page 120.
- **Disable (Enable) Integrated Configuration Tool:** select this toggle field to block or allow access to the Integrated Configuration Tool. See page 121.

Set Badge History vs Alarm History Memory Allocation

This option is available only to Picture Perfect users.

Figure 60. Parameters/Other Parameters - Set Badge History vs Alarm History Memory Allocation screen

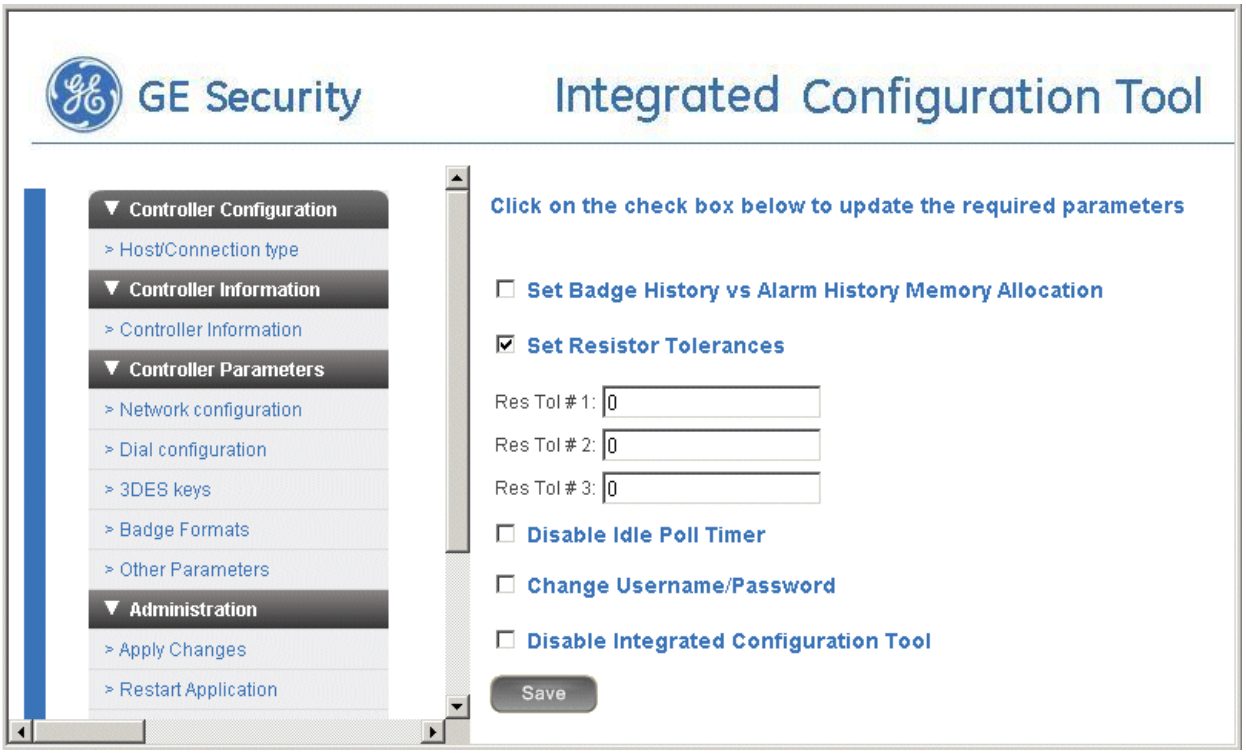


1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Other Parameters**.
3. Select *Set Badge History vs Alarm History Memory Allocation*. The field *Percent of history buffer to use for Badge History (10 - 90)* displays.

4. Enter the percentage of history you would like to use for badge history. The remaining percentage of history is used for alarm history.
5. Click **Save**.
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Set Resistor Tolerances

Figure 61. Controller Parameters/Other Parameters - Set Resistor Tolerances screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu**,** select **Other Parameters**.
3. Select *Set Resistor Tolerances*. The following fields display:
   - *Res Tol # 1:* Tightens the range the voltage changes before detecting a 4-state DI state change
   - *Res Tol # 2:* Reserved
   - *Res Tol # 3:* Reserved
4. Enter the resistor tolerance needed in the appropriate field.
5. Click **Save**.
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Disable/Enable Idle Poll Timer

This option is available only to Picture Perfect users. Use this option to disable or enable the poll timer. The poll timer guarantees that the network connection between the controller and the host is not shut down by the network administrator, firewall, or other device due to network inactivity.

Disabling the Poll Timer

1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Other Parameters**.
3. Select *Disable Idle Poll Timer.*
4. Click **Save**.
5. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

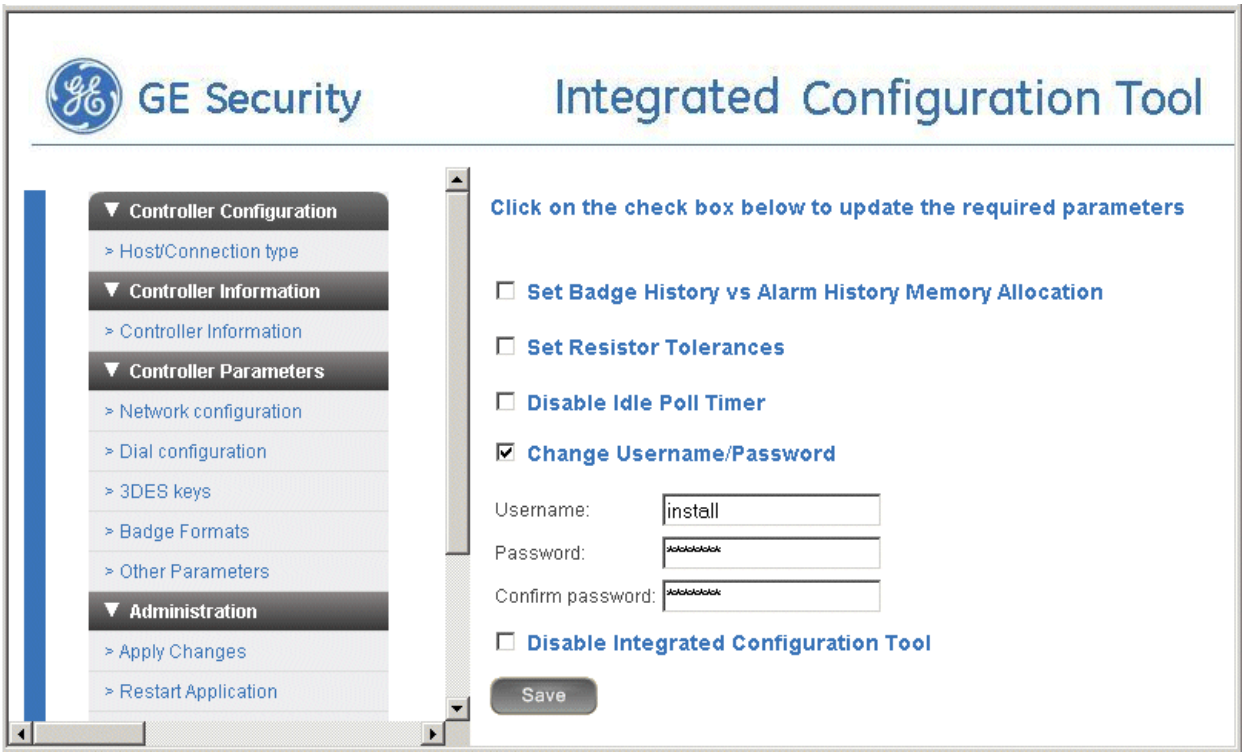
Enabling the Poll Timer

1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Other Parameters**.
3. Select *Enable Idle Poll Timer.*
4. Click **Save**.
5. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Change Username/Password

For increased security, we recommend that you change the default username and password.

Figure 62. Controller Parameters/Other Parameters - Change Username/Password screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the **Controller Parameters** menu, select **Other Parameters**.
3. Select *Change Username/Password*. The fields *Username* and *Password* and *Confirm password* display.
4. Enter a new username and password, then confirm the password.
5. Click **Save**.
6. If this completes your controller configuration, click **Apply Changes** then **Restart Application** now.

Disable or Enable Integrated Configuration Tool

Disabling the Tool

1. Successfully log on to the Integrated Configuration Tool.
2. From the **Controller Parameters** menu, select **Other Parameters**.
3. Select *Disable Integrated Configuration Tool*.
4. Selecting this option generates a dialog prompt verifying your selection. You must select **OK** on the prompt to disable the Integrated Configuration Tool.
5. To make this selection permanent, click **Save**, **Apply Changes**, then **Restart Controller**.

6. After the controller performs a successful reboot, the Integrated Configuration Tool is permanently disabled.

Enabling the Tool

There are two options to enable the Integrated Configuration Tool: temporary and permanent. The Temporary option allows access to the Tool until the controller resets. The Permanent option allows access until you manually disable the Tool again.

Before you begin, you MUST have physical access to the controller.

Temporary enabling

1. Verify that the controller has completed the power-up boot cycle by checking that DS7 is no longer in the constant ON state.
2. Jumper JP2. Verify that DS6 turns ON. Allow up to five seconds for DS6 to be turned ON. Once DS6 is ON, remove the jumper and DS6 turns OFF.
3. The Integrated Configuration Tool is now enabled until the controller reboots.

Permanent enabling

1. Complete the steps in the section *Temporary enabling* above then return to this section.
2. Successfully log on to the Integrated Configuration Tool.
3. From the **Controller Parameters** menu, select **Other Parameters**.
4. Select *Enable Integrated Configuration Tool*.
5. Selecting this option generates a dialog prompt verifying your selection. You must select **OK** on the prompt to enable the Integrated Configuration Tool.
6. To make this selection permanent, click **Save**, **Apply Changes,** then **Restart Controller**.
7. The controller performs a system reboot automatically.
8. After the controller performs a successful reboot, the Integrated Configuration Tool is permanently enabled.

Administration menu

The menu contains the following options:

- **Apply Changes:** applies new changes. See below.
- **Restart Application:** makes changes permanent. See below.
- **Restart Controller:** reboots the controller. See below.
- **Restore Factory Defaults:** restores factory defaults. See page 123.

Apply Changes

Click this menu item to apply any new changes made to the controller’s configuration.

Restart Application

Click this menu item to make the changes to the controller permanent.

Restart Controller

Click this menu item to shut down and restart the controller.

Restore Factory Defaults

The PXNplus board is shipped with the following default settings:

- **Primary Connection Type:** Ethernet
- **IP Address:** 192.168.6.6
- **Mask:** 255.255.255.0
- **Gateway:** 192.168.6.1

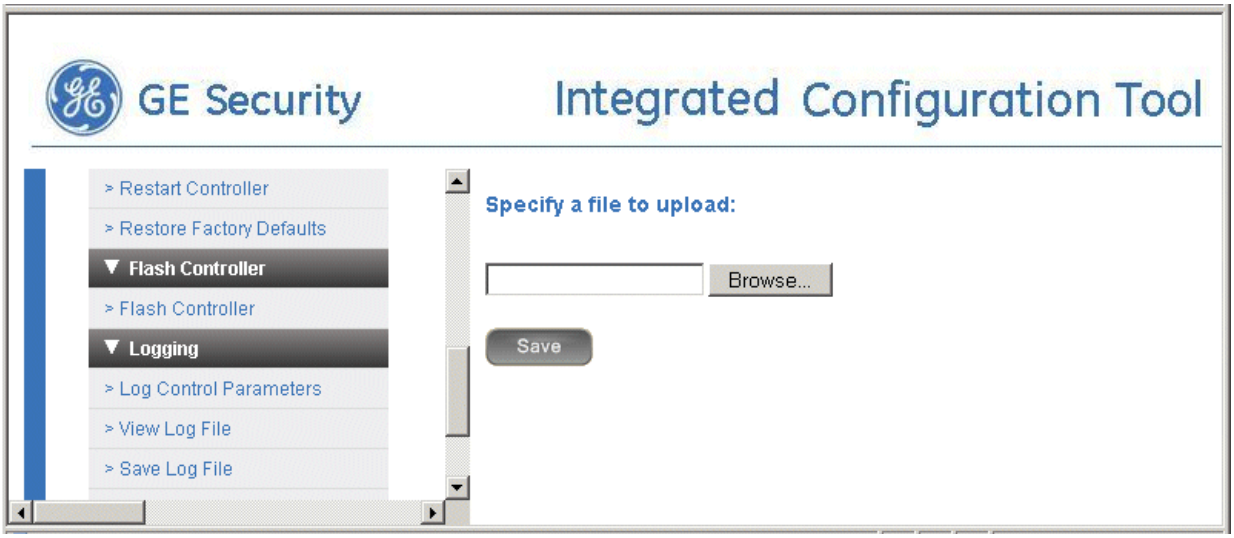
There are two methods to restore the factory default settings: through the Integrated Configuration Tool and by the contact push button on the board. The table below explains when to use each method.

Restore the factory defaults by...	Result
clicking the **Defaults** button in the Integrated Configuration Tool.	Settings are restored to factory defaults except for the network configuration.
shorting JP4 on the PXNplus CPU board until DS3 turns on (See *M5PXNplus problems* on page 160.)	All settings are restored to the factory defaults.

Flash controller menu/Flash controller

The PXNplus board uses a single flash file capable of supporting both Picture Perfect, Secure Perfect, and Facility Commander Wnx hosts. The file is in the format: `PXNPvvvv.efl`, where *vvvv* is the four digit version number of the firmware.

Figure 63. Flash Controller screen



1. If you have not already done so, log on to the Integrated Configuration Tool. See *Starting the tool* on page 99.
2. From the Flash Controller menu, select **Flash Controller**.
3. Click **Browse** and locate the new flash file.
4. Click **Save**. The controller reboots automatically.

   Note: The controller may reboot several times based on the update:
   1 time = application update only
   2 times = application and web server or kernel update
   3 times = application, web server and kernel update

5. If you wish to continue configuration changes, you will need to log back on.

Logging menu

The menu contains the following options:

- **Log Control Parameters:** select the items to track and send to the log file.
- **View Log File:** displays the log file.
- **Save Log File:** saves the log to a file.
- **Print Log File:** prints the log file.
- **Clear Log File:** clears the contents of the log file.

Log Control Parameters

The system logger provides verification of controller operation independently from the host. Other filtering can be applied to troubleshoot problems; **contact GE Security Customer Support and Engineering for assistance**.

View Log File

Click this menu item to view the log file.

Save Log File

Click this menu item to save the log file.

Print Log File

Click this menu item to print the log file.

Clear Log File

Click this menu item to clear the contents of the log file.

Configuration checklist for Integrated Configuration Tool

In order to complete controller configuration using the Integrated Configuration Tool, you will need the following information:

Secure Perfect and Facility Commander Wnx			
Communication type		**Information needed**	**Write your answer here**
Direct		Controller address:	
Dial-up		Controller address:	
		Phone number to reach host:	
		Secondary phone number to reach host:	
Ethernet	Use DHCP: NO Use DNS: NO	Controller IP:	
		Gateway:	
		Subnet:	
		Host IP: (Optional)	
	Use DHCP: YES Use DNS: YES	Controller Name or Controller MAC which is provided for you:	
		Host Name: (Optional)	
	Use DHCP: NO Use DNS: YES	Controller IP:	
		Gateway:	
		Subnet:	
		Host Name: (Optional)	
		Domain: (Optional)	
		DNS IP: (Optional)	
	Use DHCP: YES Use DNS: NO	Controller Name or Controller MAC which is provided for you:	
		Host IP: (Optional)	

Picture Perfect			
Communication type		**Information needed**	**Write your answer here**
Direct		No further configuration needed.	
Dial-up		Controller address:	
		Phone number to reach host:	
		Secondary phone number to reach host:	
Ethernet	Use DHCP: NO Use DNS: NO	Controller IP:	
		Gateway:	
		Subnet:	
		Host IP:	
		Backup Host IP (Redundant system):	
	Use DHCP: YES Use DNS: YES	Controller Name or Controller MAC which is provided for you:	
		Host Name:	
		Backup Host Name (Redundant system):	
	Use DHCP: NO Use DNS: YES	Controller IP:	
		Gateway:	
		Subnet:	
		Host Name:	
		Backup Host Name (Redundant system):	
		Domain	
		DNS IP	
	Use DHCP: YES Use DNS: NO	Controller Name or Controller MAC which is provided for you:	
		Host IP:	
		Backup Host IP (Redundant system):	

Using enhanced Flash (eFlash) within Picture Perfect, Secure Perfect, and FCWnx

Picture Perfect

The following procedures were developed using Picture Perfect 4.0, Service Pack 2. Some forms may vary depending upon the version of Picture Perfect you are using.

When the controller is powered up, you may need to flash download the Picture Perfect application code into the controller (M3000, M5, and M2000 series only). Before you begin flashing your controllers, review the following:

- If the controller is configured for **Micro Callback**, the **Callback** feature must be disabled (the **Callback** field on the Micro form must be set to **None**) in order to perform a flash download. Upon completion of the download, the feature can be enabled (the **Callback** field can be set back to **Micro**).

Flashing a controller using eFlash

This download procedure can be used with Picture Perfect version 2.0 host systems or later. The eFlash download program is installed as part of the base Picture Perfect product and can be run on stand-alone systems, network subhosts, and on the primary host of a redundant system.

On a networked system, eFlash should not be run on the network host. It can run on all subhosts simultaneously and is capable of flashing the controllers connected to each subhost.

eFlash includes the following features:

- eFlash is a new flash method which does not require the controller to be in maintenance mode while the flash code is being downloaded.
- Flashes M3000, M5PXNplus, and M2000PXNplus controllers.
- All communication is handled by the host.

eFlash can be run from either of the following:

- a Graphical User Interface (the default): see page 128
- the unix command line: see page 132

Operating eFlash in a Graphical User Interface

Before you begin, make note of the following:

- In order to prevent a Flash Timeout Failure (indicated by a red icon) when flashing a PXNplus controller, the system administrator needs to edit the `/cas/log/.eflashrc` file and enter a minimum of these values:

```
timeout = 60
flashwait = 2880
```

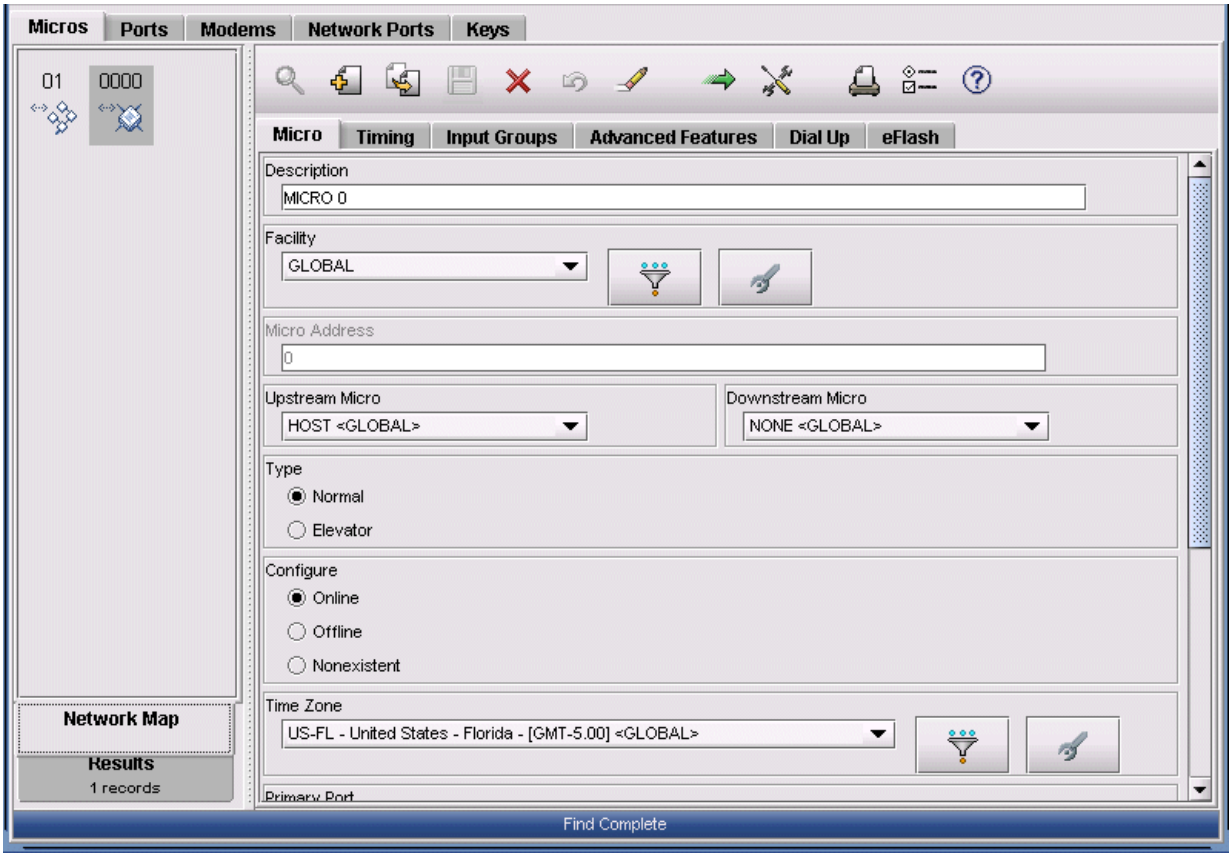
Some networks may require a higher parameter value.

- When the line of controllers has a combination of PXNplus and PX CPU boards, the whole line cannot be flashed at one time. When flashing PXNplus boards, select `PXNP7xxx.efl` as the Direct Micro File. When flashing PX boards, select m5nxxx.hex as the Direct Micro File.

To flash a controller using the eFlash GUI:

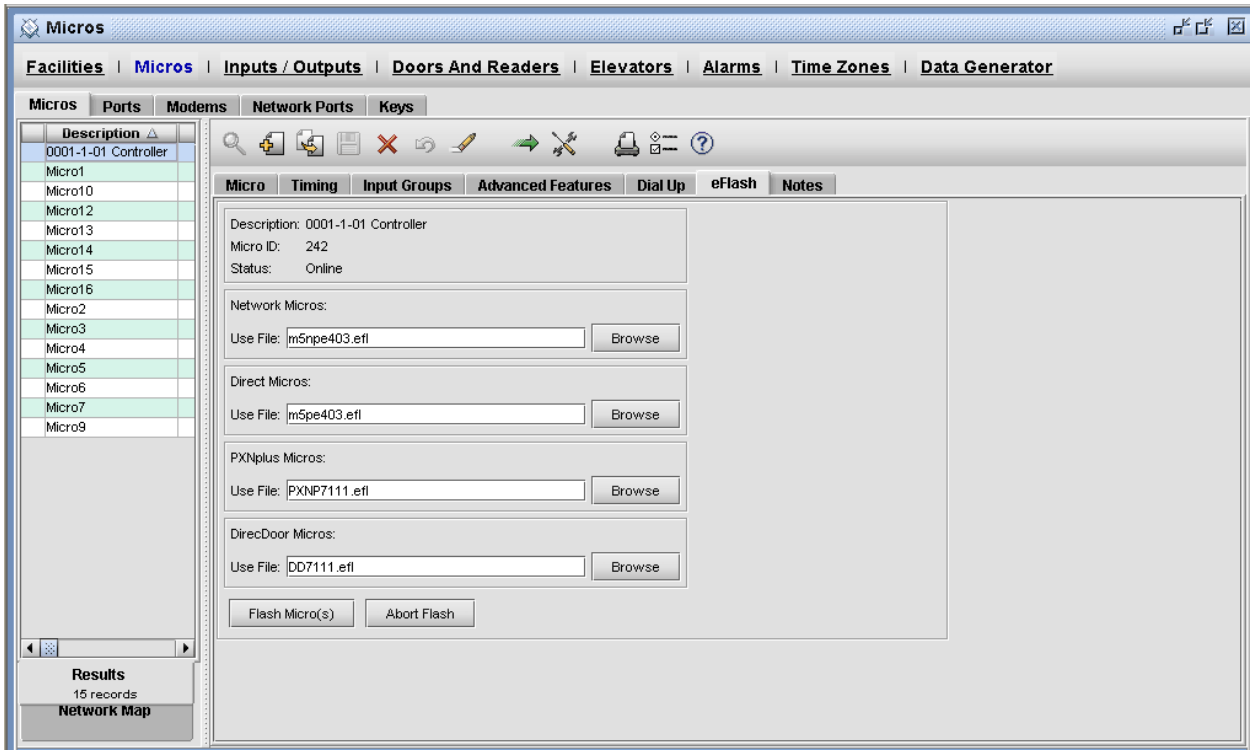
1. Log on to a Picture Perfect client PC.
2. From the **Configuration** menu, select **Micros** to display the **Micro** form.
3. Click **Find** to search for the controller you want to update.
4. Click the **Network Map** tab located at the bottom of the grid, to display a graphical layout of your controllers.

Figure 64. Picture Perfect 4.0 Network Map Tab



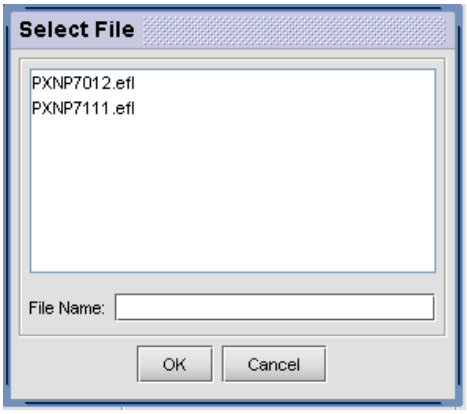
5. Click the eFlash tab to display the eFlash form.

Figure 65. Picture Perfect 4.0 eFlash Form



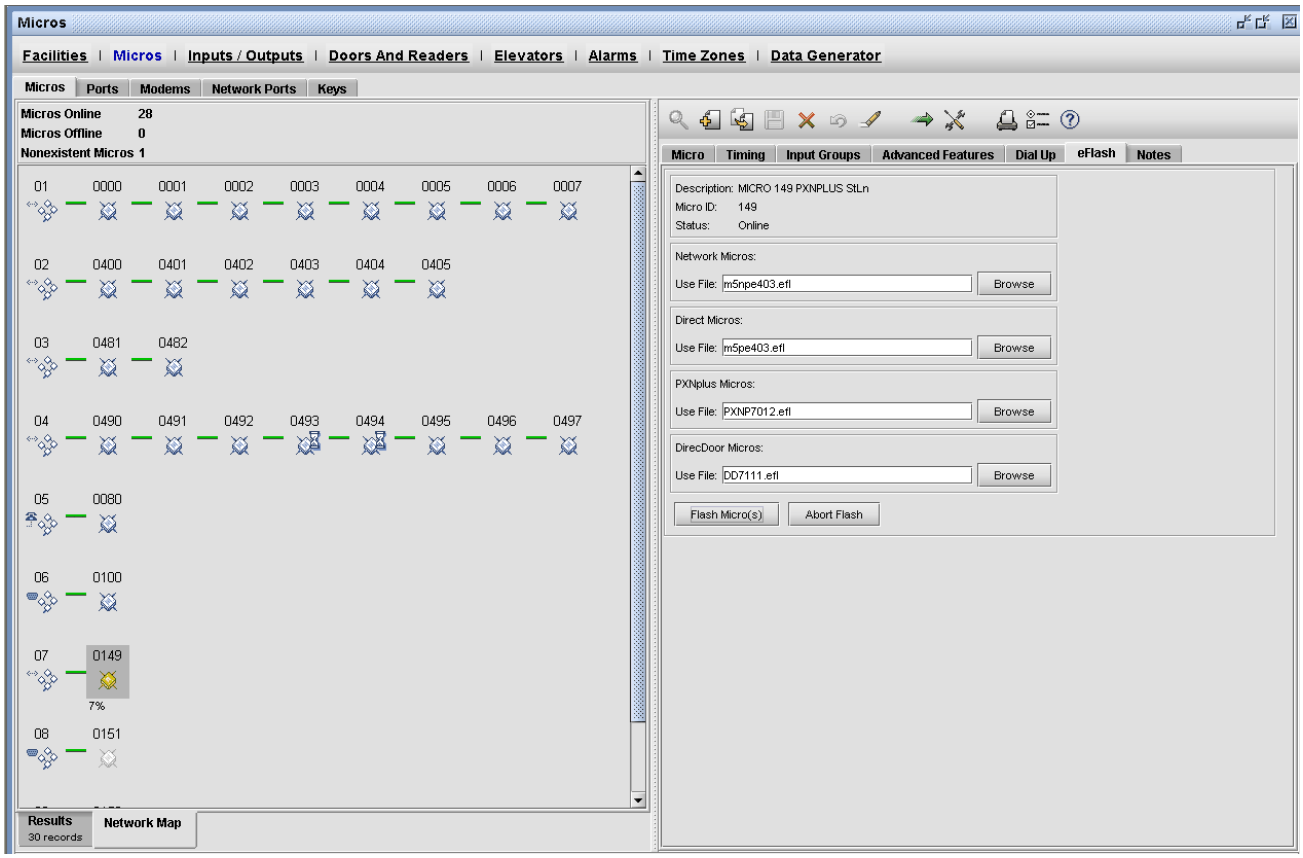
6. On the **Network Map**, click the controller that you want to flash.
7. Click **Browse** next to the selected controller, to display a list of firmware files and select the file to be used for flashing.

Figure 66. Select File



8. Click **Flash Micro** to begin the flash procedure.
   Result: The flash procedure begins and the controllers being flashed are highlighted in yellow.

Figure 67. Picture Perfect 4.0 eFlash in Progress



9. Wait until the flash is complete. You cannot flash another controller until the current selections are complete.

Note: Only one instance of eFlash can be run on a system. When eFlash begins, it creates a lock file (/tmp/.eflash.lock). If the lock file exists, indicating that the program is running, when you attempt to launch eFlash, an error message will display and the program will exit.

Operating eFlash from the command line

One or more of the arguments listed in Table 41 can be included in a command line.

Note: If an option is repeated, only the last value is used with the exception of -m and -l, which may be repeated multiple times. For example, to flash controller id 0 and controller id 2, the entry would be: eflash -m 0 -m 2.

Table 41. eFlash command line arguments

Argument	Description
c	Command line selection option
-p<directory>	Specifies the source directory to search for flash files. This replaces the default directory of /cas/flash/eflash.
-f<filename>	Specifies a flash file to use for the 5PX controller, instead of the default flash.
-n<filename>	Specifies a flash file to use for the 5PXN controller, instead of the default flash.
-x<number>	Specifies the maximum number of controllers that can be flashed at one time.
-h	Starts the HTML based online help.
-u or -?	Prints the usage message.

-m<micro selection>	Specifies the controller to be flashed. This option can be repeated multiple times.
	• To flash all active controllers in the Picture Perfect database, use:
	`eflash -m a`
	• To flash a specific controller, use:
	`eflash -m <microid>`
	where `<microid>` is the ID of any controller on the line. eFlash adds all other controllers on the line to the flash list in the correct order.
	• To flash a line of controllers, use:
	`eflash -l <microid>`
	where `<microid>` is the ID of a controller, such as 0001 that is on the line you want to flash.

To flash a controller using eFlash from the command line:

1. Log on as `root` and open a terminal window.
2. At the command prompt, enter a command using the following parameters:

   `eflash -c -m01 -p /cas/flash/eflash -f mspe170.efl`

   where `m01` is the micro id and `mspe170.efl` is the flash file.

   Result: After the flashing has completed, one of the following messages will be displayed:

   `Flashing is successful`

   or

   `Flashing is unsuccessful. See the log file<filename> for details.`

The eFlash configuration file

This is an optional file and can be found in `\root\cas\log\.eflashrc`. The purpose of the file is to allow a Picture Perfect operator to define flashing requirements for the entire system once, and then use part or all of the definition to flash or reflash controllers as needed. This file can be used for scheduling unattended flashing.

This file can contain a combination of command line arguments, processing rules, and comments.

Table 42. eFlash configuration file

Arguments	All of the following command line options can be included, either one per line or you may concatenate many options per line.controller	
	-p<directory>	Specifies the source directory to search for flash files. This replaces the default directory of /cas/flash/ eflash.
	-f<filename>	Specifies a flash file to use instead of the default flash used for direct connect type controllers (PX).
	-n<filename>	Specifies a flash file to use instead of the default flash used for network type controllers (PXN).
	-m<micro id>	Specifies the controller or controllers to be flashed.
	-m a	Specifies that all active controllers in the Picture Perfect database be flashed.
	-l<micro id>	Specifies a controller in a line of controllers, where the entire line is to be flashed.
	Note: If options are repeated, only the last value read from the file is used. The exceptions are the -m and -l options, which use all specified controllers.	
Processing Rules	Parameters that control the flashing of the controllers during the current execution of eFlash may be included. The following two parameters may be included:	
	flashwait=value(in seconds)	Sets the time that eFlash waits for the controller to actually flash the EPROM. The flash of a controller is considered a failure if the flash times out. The default is 90 seconds.
	maxflash=value(in seconds)	Sets the maximum number of controllers that can be flashed simultaneously. The actual number of controllers that is being currently flashed will always be less than this value due to restrictions on flashing multiple controllers in the same line. The default is 5. **Note**: Setting this number to a higher value can impact the response time of the system. You should keep this number low for best performance.

Table 42. eFlash configuration file (continued)

Comments	The eFlash configuration file may contain comments. A comment is a line that begins with the pound sign (#). The pound sign and all characters up through the next carriage return are ignored.

Secure Perfect

The following procedures were developed using Secure Perfect 6.1.1. Some forms may vary depending upon the version of Secure Perfect you are using.

This feature is not available for controllers not running the Secure Perfect application code. **Flash Micro** is an enhanced flash method which does not require the controller to be in maintenance mode.

The **Operations** menu, **Micro Utility** Form of the Secure Perfect application allows you to monitor communications and manage each controller in the system. You can identify the controllers using the **Search Criteria and Micro Selection**. (Refer to the *Secure Perfect User Manual* or Online Help for additional information.) The procedure to flash has been integrated so that the controller stays online and continues to process badge and alarm activity while in the process of being flashed.

For more information on:

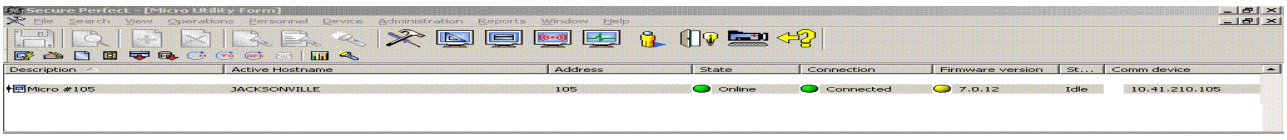
- flashing controllers, go to *Flashing controllers* on page 134.
- viewing/editing parameter information, go to *View/edit parameter information* on page 136.

Flashing controllers

To flash controllers that already have SP3.x firmware:

1. Verify that the Secure Perfect services are running (refer to the appropriate section of the *Installation Manual* for the system you purchased).
2. Log on to the Secure Perfect program. The login ID and password must belong to a member of the spadmin local user group on the Secure Perfect Server computer and the user group on any Secure Perfect client computer.)
3. Verify that the controller is online. In the Secure Perfect program, select the **Operations** menu, **Micro Utility Form**. Check the **State** column.

Figure 68. Secure Perfect Micro Utility Form



4. Select the controller or multiple controllers that you want to flash. If flashing a line of controllers, we recommend starting with the end-of-line controller, and work toward the head-of-line controller. This requires a working knowledge of your Secure Perfect system.

   Note: When flashing a line of controllers with a PXNplus controller as the head-of-line controller, only two downstream controllers can be selected at a time.

   Result: The firmware version column on the **Micro Utility Form** displays the current firmware on the controller.

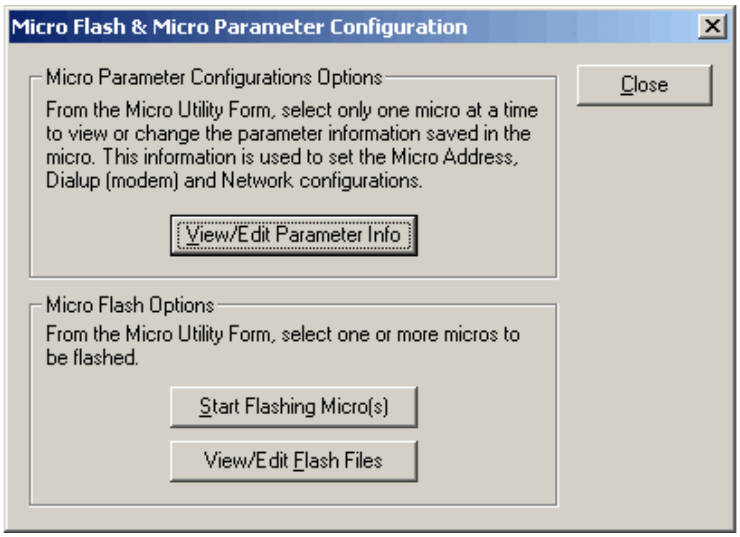
   - If the LED is green, the firmware on the controller matches the latest firmware on the Server computer.
   - If the LED is yellow, the controller firmware does not match with the latest firmware on the Server computer.

5. Click **Flash** from the **Micro Utility Form** toolbar.

Figure 69. Micro Utility Form toolbar

Result: The **Micro Flash & Micro Parameter Configuration** window displays. This window is available only if the controller is online.

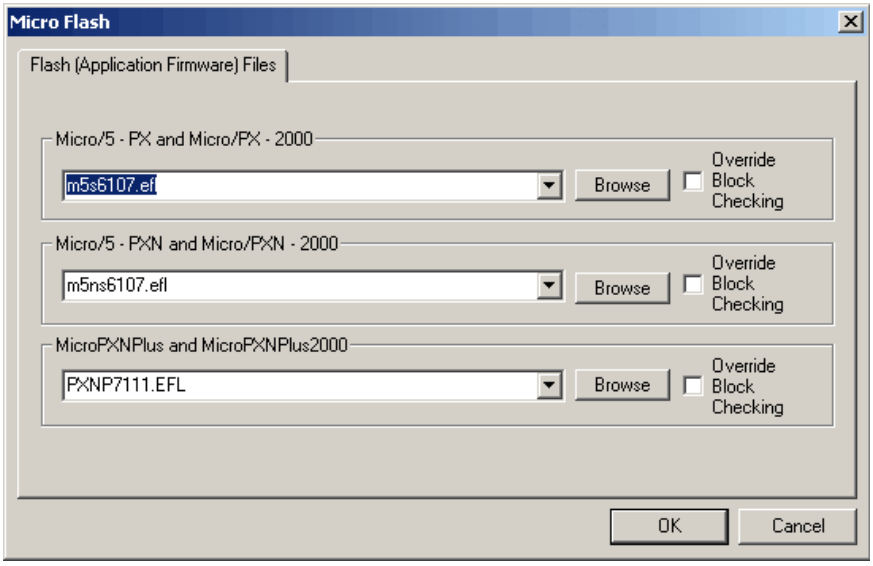
Figure 70. Micro Flash & Micro Parameter Configuration window



6. Click **Start Flashing Micro(s)** to immediately download the appropriate firmware to the controller.
   Result: A dialog box will display asking you to verify your request.

   To select a specific flash file, click **View/Edit Flash Files**. This option is primarily used by GE Customer Support personnel when it is necessary to selectively flash an older version of firmware on a controller.

Figure 71. Micro Flash window



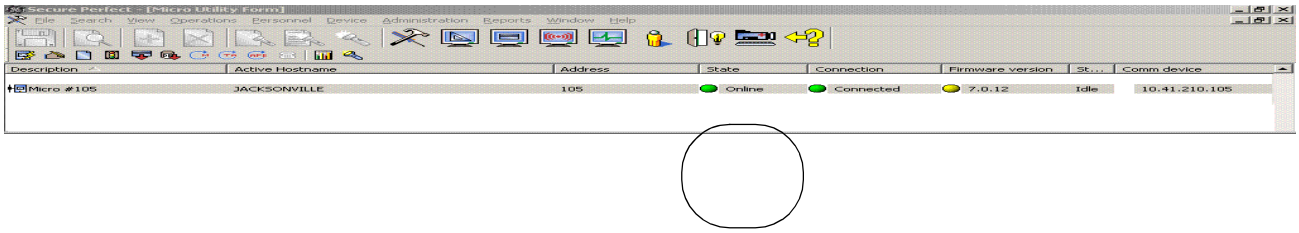
7. Click **OK** to begin the flash and reset process.
   Result: The controller firmware has been downloaded to your controller. The controller will reset after a successful flash and database download will take place.

View/edit parameter information

To view or edit the parameter information:

1. Verify that the Secure Perfect services are running (refer to the appropriate section of the *Installation Manual* for the system you purchased).
2. Log on to the Secure Perfect program. The login ID and password must belong to a member of the spadmin local user group on the Secure Perfect Server computer and the user group on any Secure Perfect client computer.)
3. Verify that the controller is online. In the Secure Perfect program, select the **Operations** menu, **Micro Utility Form**. Check the **State** column.

Figure 72. Secure Perfect Micro Utility Form

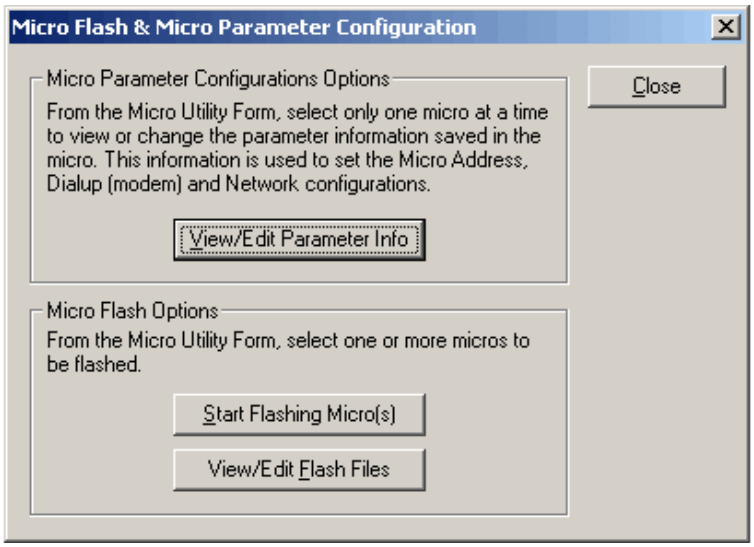


4. Select the controller you want to edit or view the parameter information.
5. Click **Flash** from the **Micro Utility Form** toolbar.

Figure 73. Micro Utility Form toolbar

Result: The **Micro Flash & Micro Parameter Configuration** window displays. This window is available only if the controller is online.

Figure 74. Micro Flash & Micro Parameter Configuration window

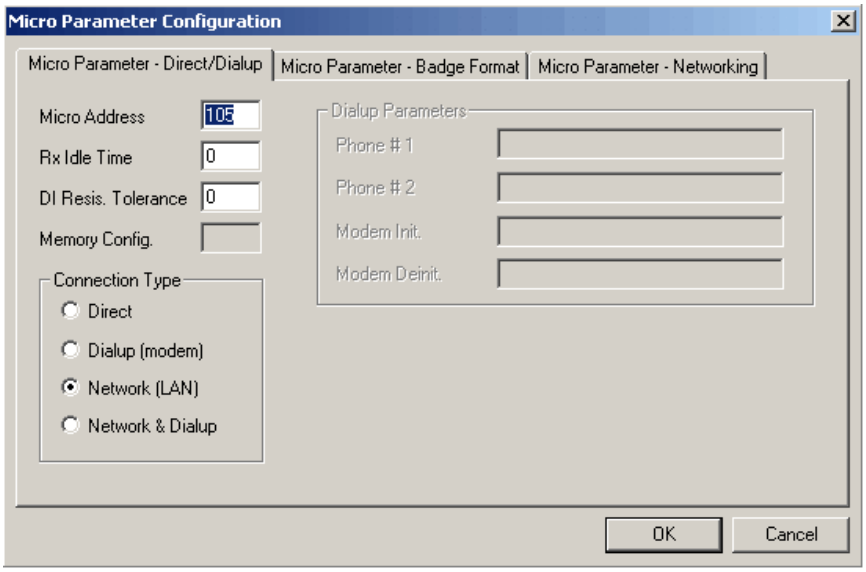


6. Click **View/Edit Parameter Info**.

   Result: The configuration for the controller is retrieved and the **Micro Parameter Configuration** window displays.

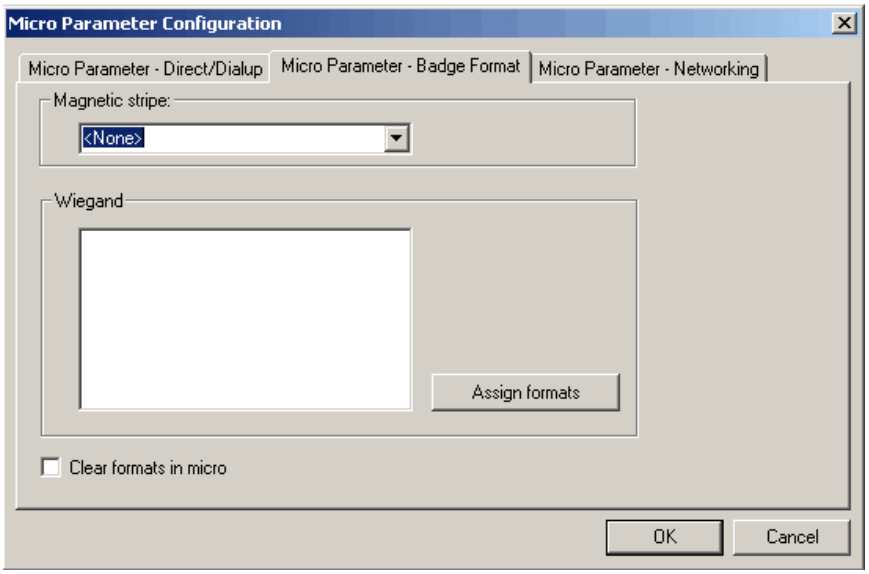
   - The **Micro Parameter - Direct/Dialup** tab allows you to change the connection type of the controller and its **Address**, **Idle Time**, and **DI res tolerance**.

Figure 75. Micro Parameter - Direct/Dialup tab



- The **Micro Parameter - Badge Format** tab allows you to select a magnetic stripe or Wiegand format.

Figure 76. Micro Parameter - Badge Format tab



- The **Micro Parameter - Networking** tab is read only. Use the Integrated Configuration Tool to update this information.

7. Make your changes and click **Ok**.

Facility Commander Wnx

The following procedures were developed using Facility Commander Wnx 7.0, Service Pack 2. Some forms may vary depending upon the version of Facility Commander Wnx you are using.

The **Monitors & Controls** menu, **Controller Monitor** form of the Facility Commander Wnx application allows you to monitor communications and manage each controller in the system. You can identify the controllers using the **Search Criteria and Controllers Selection**. (Refer to the *Facility Commander Wnx User Manual* or Online Help for additional information.) The procedure to flash has been integrated so that the controller stays online and continues to process badge and alarm activity while in the process of being flashed.

For more information on:

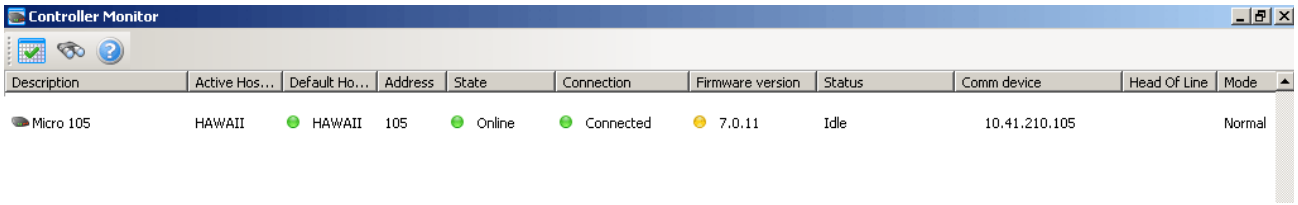
- flashing controllers, go to *Flashing controllers* on page 140.
- viewing/editing parameter information, go to *View/edit parameter information* on page 142.

Flashing controllers

To flash the controller:

1. Verify that the Facility Commander Wnx services are running (refer to the appropriate section of the *Installation Manual* for the system you purchased).
2. Log on to the Facility Commander Wnx program.
3. Verify that the controller is online. In the Facility Commander Wnx program, select the **Monitors and Controllers** menu, **Controller Monitor** form. Check the **State** column.

Figure 77. Facility Commander Utility Form



4. Select the controller or multiple controllers that you want to flash. If flashing a line of controllers, we recommend starting with the end-of-line controller, and work toward the head-of-line controller. This requires a working knowledge of your Facility Commander Wnx system.

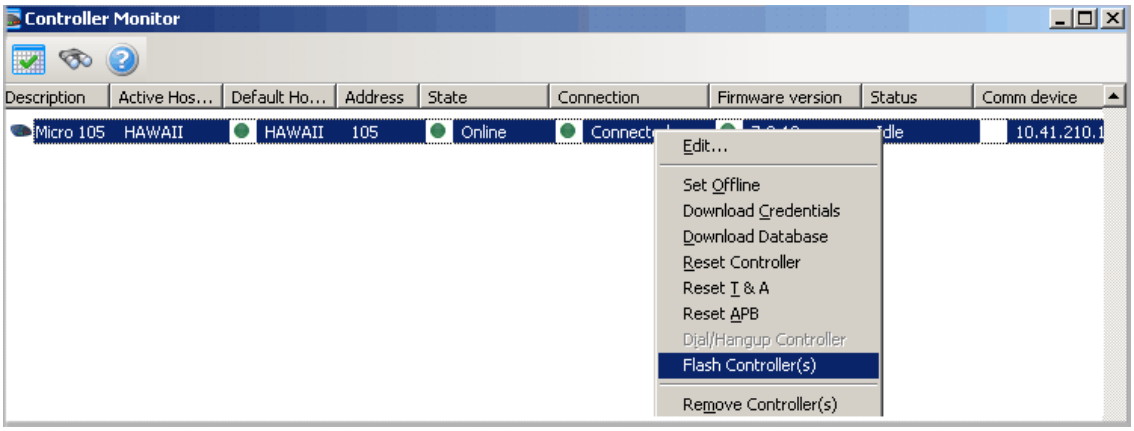
   Note: When flashing a line of controllers with a PXNplus controller as the head-of-line controller, only two downstream controllers can be selected at a time.

   Result: The firmware version column on the **Micro Utility Form** displays the current firmware on the controller.

   - If the LED is green, the firmware on the controller matches the latest firmware on the Server computer.
   - If the LED is yellow, the controller firmware does not match with the latest firmware on the Server computer.

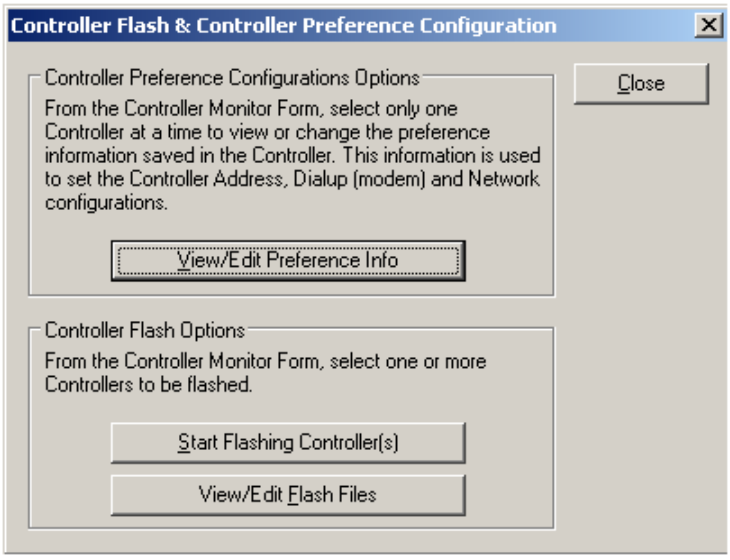
5. Right click on the controller(s) that you want to flash to obtain the **Flash Controller(s)** menu selection. Double click on **Flash Controller(s)**.

Figure 78. Flash Controller(s) menu selection



Result: The **Controller Flash & Controller Preference Configuration** window displays. This window is available only if the controller is online.

Figure 79. Controller Flash & Controller Preference Configuration window

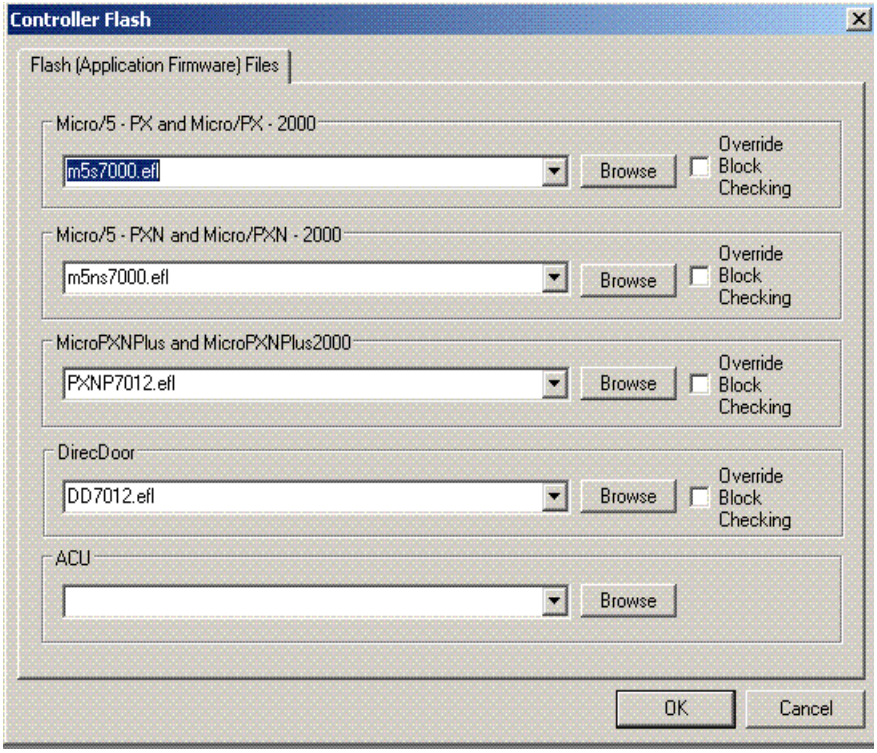


6. Click **Start Flashing Controller(s)** to immediately download the appropriate firmware to the controller.

   Result: A dialog box will display asking you to verify your request.

To select a specific flash file, click **View/Edit Flash Files**. This option is primarily used by GE Customer Support personnel when it is necessary to selectively flash an older version of firmware on a controller.

Figure 80. Controller Flash window



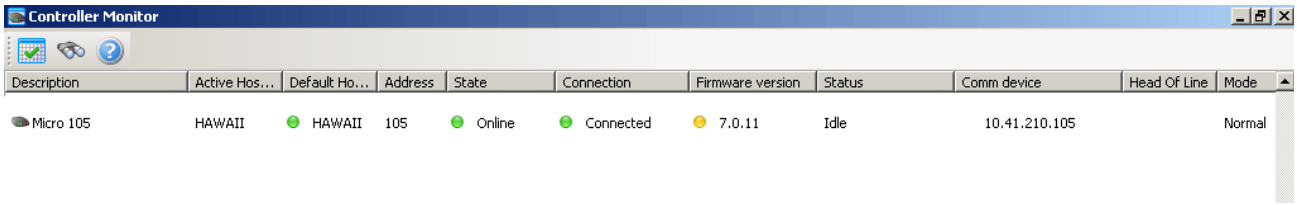
7. Click **OK** to begin the flash and reset process.
   Result: The controller firmware has been downloaded to your controller. The controller will reset after a successful flash and database download will take place.

View/edit parameter information

To view or edit the parameter information:

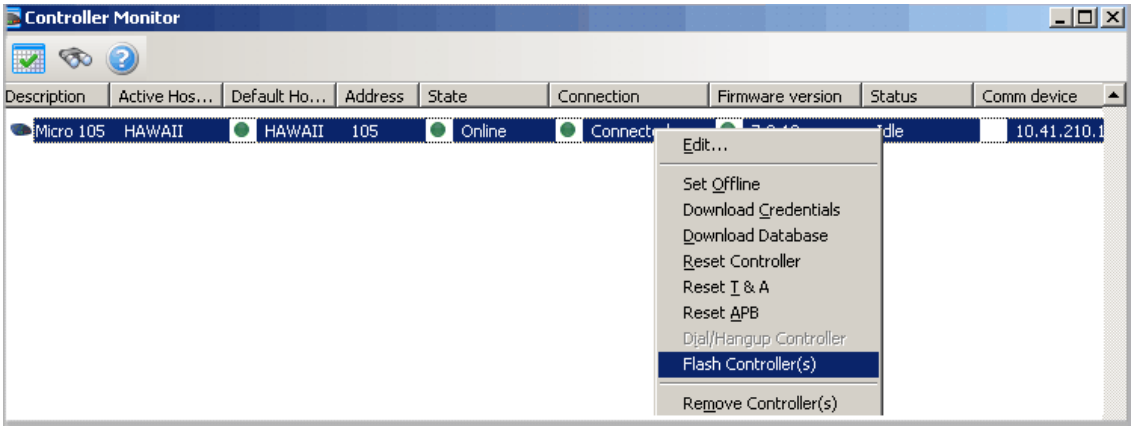
1. Verify that the Facility Commander Wnx services are running (refer to the appropriate section of the *Installation Manual* for the system you purchased).
2. Log on to the Facility Commander Wnx program.
3. Verify that the controller is online. In the Facility Commander Wnx program, select the **Monitors and Controllers** menu, **Controller Monitor** form. Check the **State** column.

Figure 81. Facility Commander Utility Form



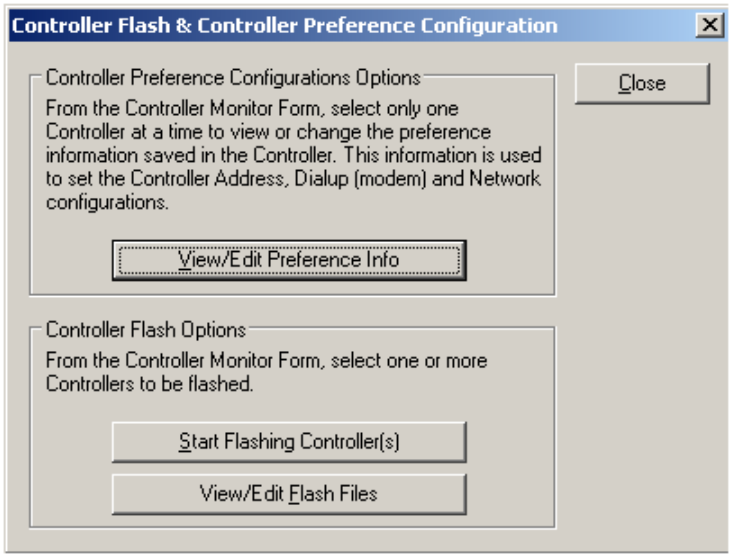
4. Select the controller you want to edit or view the parameter information.
5. Right click on the controller(s) that you want to flash to obtain the **Flash Controller(s)** menu selection. Double click on **Flash Controller(s)**.

Figure 82. Flash Controller(s) menu selection



Result: The **Controller Flash & Controller Preference Configuration** window displays. This window is available only if the controller is online.

Figure 83. Controller Flash & Controller Preference Configuration window

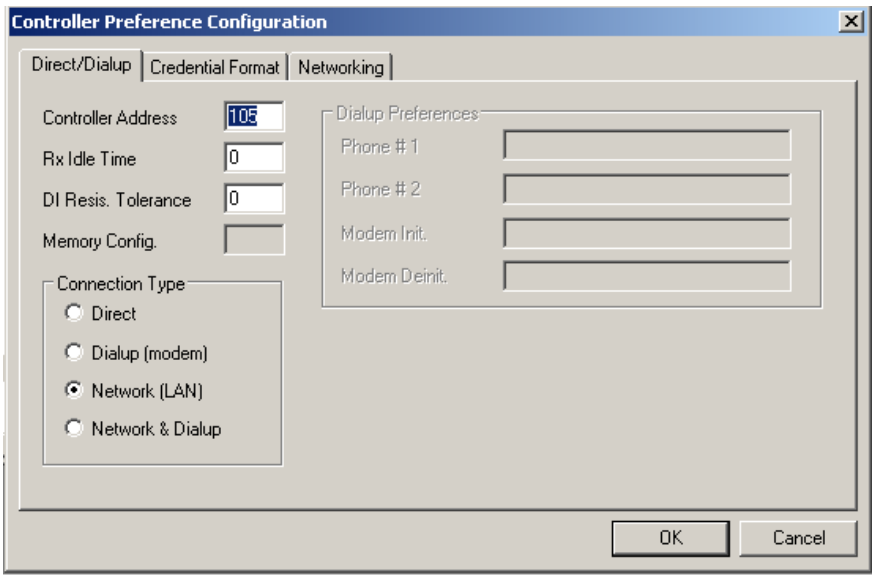


6. Click **View/Edit Preference Info**.

   Result: The configuration for the controller is retrieved and the **Controller Preference Configuration** window displays.

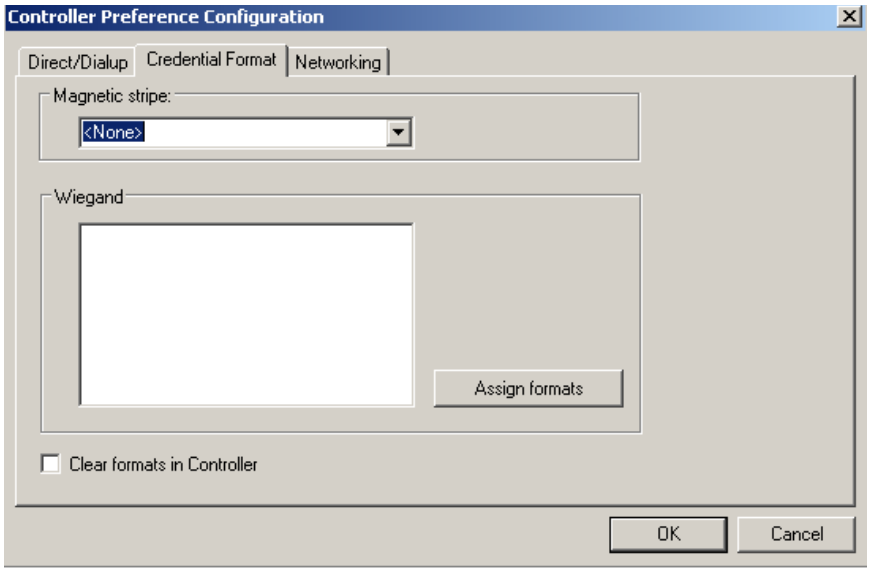
   - The **Direct/Dialup** tab allows you to change the connection type of the controller and its **Address**, **Idle Time**, and **DI res tolerance**.

Figure 84. Direct/Dialup tab



- The **Credential Format** tab allows you to select a magnetic stripe or Wiegand format.

Figure 85. Credential Format tab



- The **Networking** tab is read only. Use the Integrated Configuration Tool to update this information.

7. Make your changes and click **Ok**.

Chapter 9 Regulatory information

This chapter lists the regulatory information for CE, FCC, and UL compliance.

In this chapter:

CE (European) and FCC compliance

As of January 1, 1996, all new European Union member installations MUST be CE compliant.

To make the M5 installation CE and FCC compliant, the following conditions must be met:

- All cables connected to the M5 must be shielded with shield terminated as shown in *Figure 86*.
- The Power/Communications board must be in the far right slot of the M5 card cage and grounded with a factory-installed braided wire as shown in *Figure 87* on page 149.
- The CPU board must be in the second slot from the right of the M5 card cage and grounded with a factory-installed braided wire as shown in
- The M5 enclosure must be connected to the nearest earth ground.
- Prior to connecting the network cable to connector J1, loop the cable through the Ferrite provided and wrap cable around the Ferrite four times as shown in Figure 88.

Note: Ferrite must be installed inside of the enclosure.

Figure 86. Typical installation using shielded cable/drain wire - outside and inside the enclosure

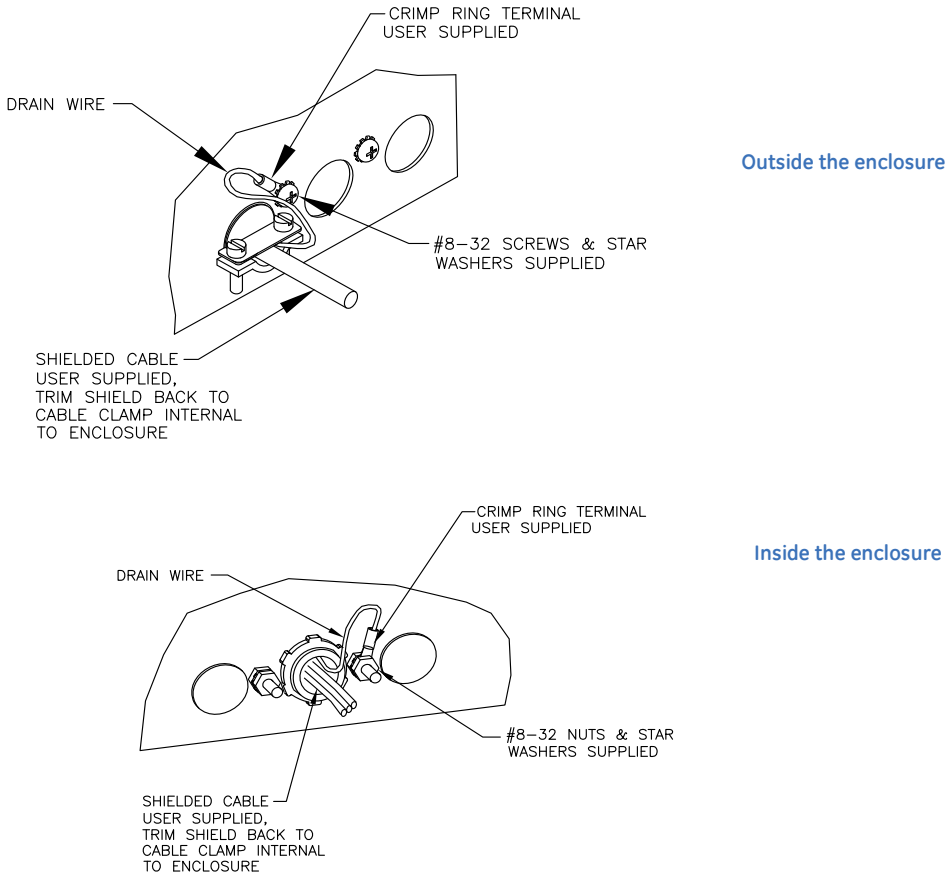


Figure 87. Location and grounding of the Power/Communications and CPU board for M5PXNplus only

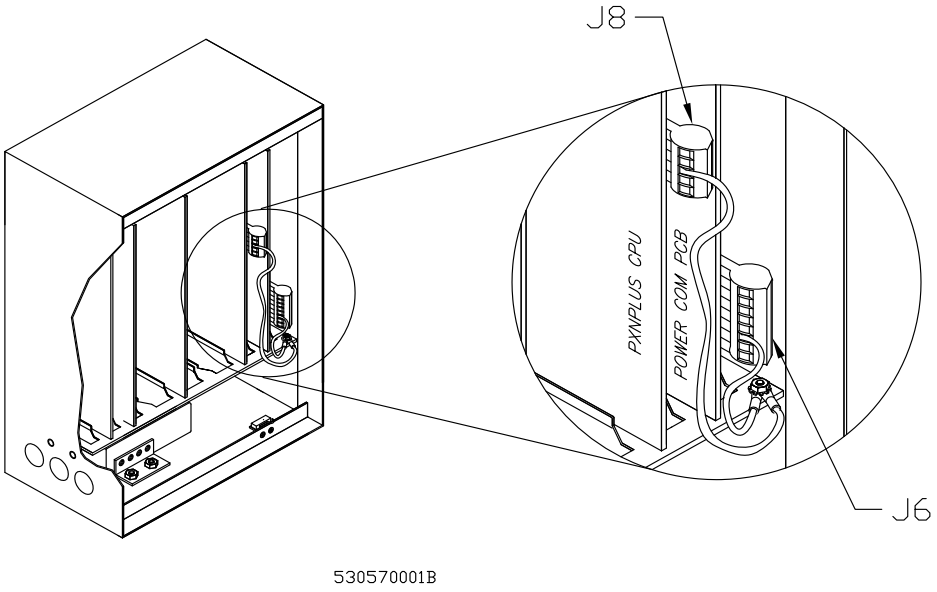
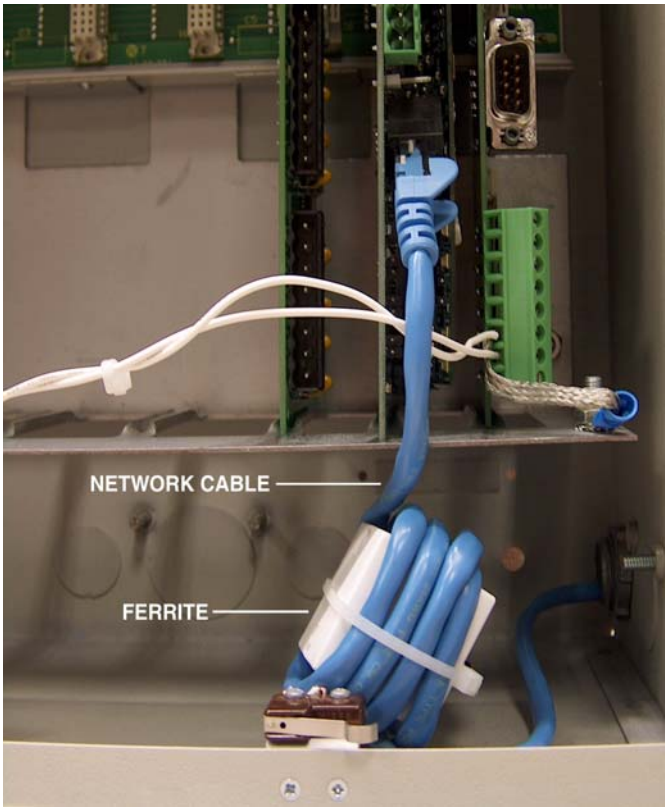


Figure 88. Installing ferrite



UL compliance

Failure to install and program the M5, Secure Perfect system, FCWnx 7.0 system, and Picture Perfect (UnixWare or Linux) system in accordance with these instructions voids the listing mark of Underwriters' Laboratories, Inc.

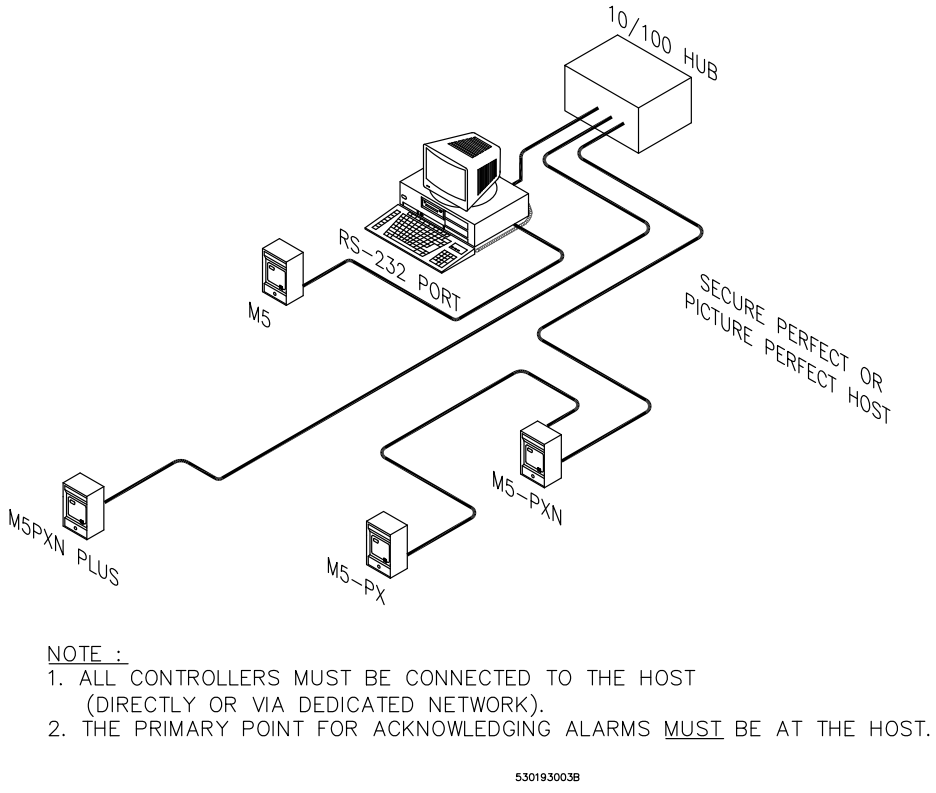
A clearly marked redundant system with the same configuration as the primary machine must be available as a backup.

The monitoring equipment must be protected by a Listed Transient Voltage Surge Suppressor with a maximum rating of 330V Listed under UL1449. The communication circuit must be protected with a Secondary Protector for Communication Circuits Listed under UL497A.

The monitoring equipment must be installed in a temperature controlled environment with 24 hours of standby power for the HVAC and computer system. In addition to the 24 hours of standby power, a minimum of 15 minutes of standby power must be available to the computer system via a UPS system. The UPS system must be Listed to UL1778 or UL1481 and must be provided with a maintenance bypass switch.

An Altronix 3 A battery backup unit model AL400UL must be used.

Figure 89. UL-Approved System Configuration



- The M5 is UL Listed as an access control unit and a proprietary burglar alarm control unit (UL1076 and UL294). It should be used with the listed GE Secure Perfect 2.0 or later, FCWnx 7.0, and Picture Perfect-UnixWare 1.5x or later system. The minimum configuration for either application consists of the M5 enclosure, Power/Communications board, and M5 CPU board. The 20 DI board must be used

for proprietary burglar alarm applications. The 2RP or 8RP board must be used for access control applications.

- M5 - Output Ratings when used with PS/C-6 - 2RP, 8RP reader boards - card reader outputs must be rated a minimum 12.7 VDC at 150 mA per output.
- The M5 must be used with the listed Altronix Corporation Model AL400UL Power Supply/Charger. Refer to the instructions provided with the power supply for installation requirements. The power supply's AC power fail contacts must be wired to the M5 as shown in *Figure 6, Wiring controller tamper and AC power fail inputs* on page 20.
- Grounding must be in accordance with Article 250 of the National Electrical Code.
- The M5 controller must only be used with the following compatible card readers: Models 100, 940, 941, 970, 971, 972, 973, 820, 825, 840, 845, 430/435, 1000/1010, and 1100/1081.
- The exit request input circuit and initiating device must be contained within the secured area. The exit device circuit must be connected to listed switches or exit devices.
- The M5 must be mounted inside the secured area.
- The door strike power must be provided from a listed burglar alarm system power supply. If the door strike circuit is arranged as fail secure (door remains locked upon loss of power), listed emergency panic hardware must be provided to allow exit from the secured area. A fail-safe configuration results in the door strike circuit unlocking in case of a power loss.
- The audible signal appliance circuit drawings in *Figure 21* on page 57, *Figure 22* on page 58, *Figure 44* on page 93, and *Figure 45* on page 94 are for supplementary use only.
- The number of separate signals on a single channel shall be limited to 1000.
- The M5 tamper switch must be wired to the Power/Communications board as shown in *Figure 6, Wiring controller tamper and AC power fail inputs* on page 20.
- Alarms on Picture Perfect, FCWnx 7.0, and Secure Perfect should be set using the following priority list with 1 being the highest priority and 7 being the lowest:

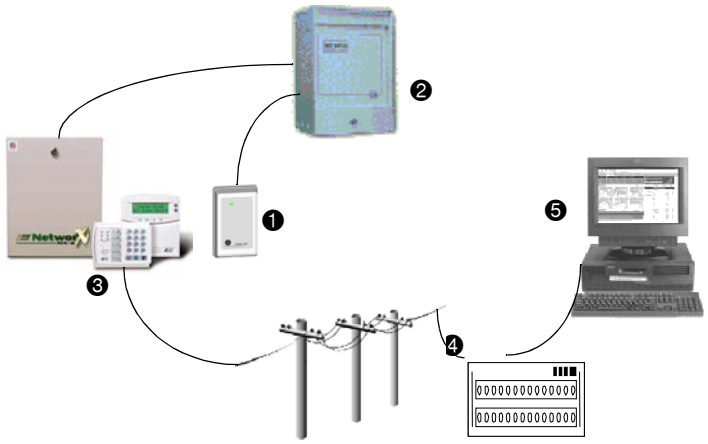
  1. Fire alarm and industrial supervision
  2. Hold-up or panic alarm
  3. Burglar alarm
  4. Watchman or guard tour
  5. Fire-alarm supervision
  6. Burglar-alarm supervision
  7. Industrial supervision

- A clearly marked redundant system with the same configuration as the primary machine should be available as a backup.
- In order for this product to be UL compliant, the Picture Perfect firmware level must be 1.7 or later when the following CPU boards are installed: 110124005, 110124006, or 110187001.

Note: 1. Removing all alarms from the Alarm Monitor should not be available to operators on UL listed systems.
2. Encryption is NOT investigated by UL.

- The M5, used in conjunction with the Model 940, Picture Perfect, and an OH Receiver, can be used as a Proprietary Burglar Alarm Unit Accessory when configured as shown in *Figure 90*.

Figure 90. Proprietary Burglar Alarm Unit Accessory configuration



❶ Model 940 Reader: See the Model 940 Proximity Reader Installation Manual for wiring the Model 940 to the M5.

❷ M5: See the M5 Installation Manual and the NX-8E Control Panel Installation and Startup Manual for wiring the M5 to the NX-8E keypad.

❸ NX-8E panel: Connect to the OH2000E Receiver using a dial-up connection.

Note: The NX-8E keypad must be installed adjacent to the Model 940 reader in order to be UL compliant.

❹ OH2000E Receiver: Connect to the Picture Perfect server, using a serial line RS-232 connection. **Note: The OH2000 E receiver must be installed adjacent to the Picture Perfect host in order to be UL compliant.**

❺ Picture Perfect Server running one or more instances of the oh_receiver interface

CE regulatory notice

Manufacturers Declaration of Conformity

For

Product Identification:

Model/type: M5PXNPLUS:M5PRMPP:M5PRMSP BOM revision level: A
:

Category (description): Controller

Brand: GE Security/CASI

Manufacturer: GE Security, CASI
Suite 100
791 Park of Commerce Blvd.
Boca Raton, Florida 33487
USA

EU Representative: GE Security B.V.
Kelvinstraat 7
6003 DH Weert
The Netherlands

Concerning	**R&TTE**		
	EMC	**Immunity**	**Safety**
A sample of the product has been tested by:	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525	PSE 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Test report reference	05F142C, 07F332C, 07F333C, 07F334C	05F142I, 07F332I, 07F333I, 07F334I	05P178
Applied standards	EN55022: 2006	EN50130-4(1996) +A1(1998)+ A2(2003)	EN60950-1:2001

Equipment class identifier (*RF products falling under the scope of R&TTE*)

☐ **Not Applicable** ☒ **None (class 1 product)** ☐ **(class 2 product)**

Means of Conformity:

We declare under our sole responsibility that this product is in conformity with Directive 93/68/EEC (Marking) and/or complies with the essential requirements and all other relevant provisions of the 1999/5/EC (R&TTE) based on test results using harmonized standards in accordance with the Directives mentioned.

Chapter 10 Troubleshooting, maintenance, support

This chapter provides information to help you troubleshoot problems and contact technical support in case you need assistance with your GE equipment.

In this chapter:

Troubleshooting

This section provides information to help you diagnose and solve various problems that may arise while configuring or using your GE product and offers technical support contacts in case you need assistance. (See *Contacting technical support* on page 165.)

Refer to the appropriate section:

- power: See *Power problems* on page 156.
- communications: See *Communications problems* on page 157.
- readers: See *Reader problems* on page 157.
- door strikes: See *Door strike problems* on page 159.
- PXNplus CPU board: See *M5PXNplus problems* on page 160.

Power problems

Problem: The M5 does not power up correctly.

Resolution: Verify that the +5V and +12V LEDs on the Power/Communications board are on. See *Figure 3, Power/Communications board layout* on page 16 If these LEDs are NOT on, do the following:

1. Use a voltmeter to check the power supply output. It should read 12 to 15 VDC. If there is no output, make sure the power supply is not on a switched outlet. Be sure the circuit breaker where the power supply is connected, is not tripped.
2. Be sure connector J6 is properly seated in the board.
3. Make sure the Power/Communications board is seated properly into the backplane and that no pins have been bent on J1, the 48-pin connector.
4. Disconnect connector J6 from the Power/Communications board. Remove the Power/Communications board and inspect the fuse. If the fuse is blown, replace it.

CAUTION: Replace the fuse with one of the same type and rating. Do not power the unit back on until you locate and correct the problem. Follow the steps below.

---

   a. Make sure that the wiring connections from the power supply to the Power/Communications board are not reversed. If these connections are OK, go to step b.

   b. Use an ohmmeter to check the resistance between pins 3 and 4. If the resistance is less than 200 ohms, there is a short from power to ground. Isolate the fault by doing the following:

      - Remove all boards from the backplane except the Power/Communications and CPU boards. Add each board while measuring the resistance on J6 pins 3 and 4. When the resistance falls below 200 ohms while a board is plugged in, isolate the board. Continue checking the remaining boards for other ground faults.
      - Remove connectors one by one on the faulty boards until the fault condition disappears (resistance goes above 200 ohms). Trace out wiring on these connectors to find and correct the problem.

Communications problems

Problem: The unit is properly powered, but it does not communicate with the host's upstream controller.

Resolution: Check the Receive RX LED DS1 and Transmit TX LED DS2 on the Power/Communications board.

If the **Receive RX LED is flashing**, do the following:

1. Look at the LEDs on the CPU board. If the LEDs indicate that the controller is in maintenance mode, the application code was not downloaded to the CPU. See the section covering LED function under the appropriate board section in *Chapter 4, The PXNplus CPU board* on page 33 to determine if the controller is in maintenance mode.
2. Check the Power/Communications switch settings for proper baud rate and local or dial-up settings. See *DIP switch settings* on page 21

If the **Receive RX LED is NOT flashing**, do the following:

1. Check the host configuration (refer to your related software installation manual).
2. Be sure that the cable on the back of the host is connected to the proper host port.
3. Check the wiring between the host and the controller. See *Serial communications setup* on page 21.

If the **Transmit TX LED is flashing**, check the wiring between the host and the controller. See *Serial communications setup* on page 21.

Reader problems

Consult your reader installation manual for potential problems which are not related to the M5.

If using the:

- 2RP board: See *Using the 2RP board* on page 157.
- 2SRP board: See *Using the 2SRP board* on page 158.
- 8RP board: See *Using the 8RP board* on page 159.

Using the 2RP board

Problem: The reader does not power up.

Resolution:

1. Be sure that JP1 on the 2RP board is set in the proper voltage selection location. See *Setting reader voltage* on page 50.

CAUTION: Do not set JP1 to 12V for a 5V reader. Permanent damage may result to the reader.

---

2. Be sure that the proper resistor packs are installed in the 2RP board. See *Installing resistor packs* on page 52.
3. Check the wiring between the 2RP board and the reader. See *2RP board* on page 46 and the reader installation manual.

4. Be sure the connector is firmly seated in the 2RP board.

Problem: The reader has power, but the Badge Read OK LED on the CPU board does not light up when a badge is presented.

Resolution:

1. Be sure the resistor packs are installed and are the correct value for the reader type being used.
2. Be sure that the switch settings on the 2RP board for address and reader technology/format are correct. See *Setting DIP switches* on page 49.
3. Check the wiring between the reader and the 2RP board. See *2RP board* on page 46 and the reader installation manual.

Using the 2SRP board

Problem: The reader does not power up.

Resolution:

1. Be sure that JP1 on the 2SRP board is set in the proper voltage selection location. See *Setting reader voltage* on page 66.

CAUTION: Do not set JP1 to 12V for a 5V reader. Permanent damage may result to the reader.

---

2. Be sure that the proper resistor packs are installed in the 2SRP board. See *Installing resistor packs* on page 67.
3. Check the wiring between the 2SRP board and the reader. See *2SRP board* on page 61 and the reader installation manual.
4. Be sure the connector is firmly seated in the 2SRP board.

Problem: The reader has power, but the Badge Read OK LED on the CPU board does not light up when a badge is presented.

Resolution:

1. Be sure the resistor packs are installed and are the correct value for the reader type being used.
2. Be sure that the switch settings on the 2SRP board for address and reader technology/format are correct. See *Setting the DIP switches* on page 63.
3. Check the wiring between the reader and the 2SRP board. See *2SRP board* on page 61 and the reader installation manual.

Using the 8RP board

Problem: The reader does not power up.

Resolution:

1. Check the wiring between the 8RP board and the reader. See *8RP board* on page 78 and the reader installation manual.
2. Be sure the connector is firmly seated in the 8RP board.

Problem: The reader has power, but the Badge Read OK LED on the CPU board does not light up when a badge is presented.

Resolution:

1. Be sure that the switch settings on the 8RP board for address and reader technology/format are correct. See *Setting DIP switches* on page 81.
2. Check the wiring between the reader and the 8RP board. See *8RP board* on page 78 and the reader installation manual.

Door strike problems

Problem: The Badge Read OK LED lights on the CPU board and the door reader LED lights on the reader, but the door strike does not operate.

Resolution:

1. Check the wiring from the door strike to the reader board. In the chapter of the appropriate reader board, see the section that covers wiring the door strike. Also refer to the door strike manufacturer's installation instructions.
2. Be sure the door strike power supply is operating properly.

M5PXNplus problems

If the problem is not caused by incorrect hardware wirings or settings, check the software settings of the M5PXNplus using the Integrated Configuration Tool.

Problem: I need to restore the factory default settings.

Resolution:

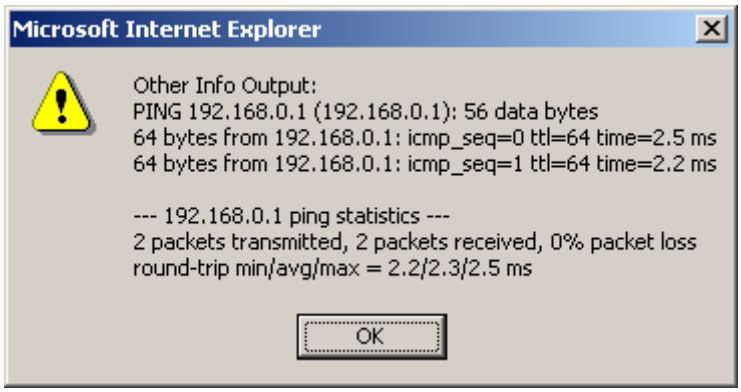
1. Short the Restore Defaults pins (JP4) until DS3 turns on.
2. The controller is now offline from the host and the factory defaults have been restored. The factory defaults are as follows:
   - **Host Server/Type:** Picture Perfect
   - **Primary Connection Type:** Ethernet
   - **IP Address:** 192.168.6.6
   - **Mask:** 255.255.255.0
   - **Gateway:** 192.168.6.1
3. If necessary, reconfigure the controller using the appropriate instructions.

Problem: The network controller does not connect.

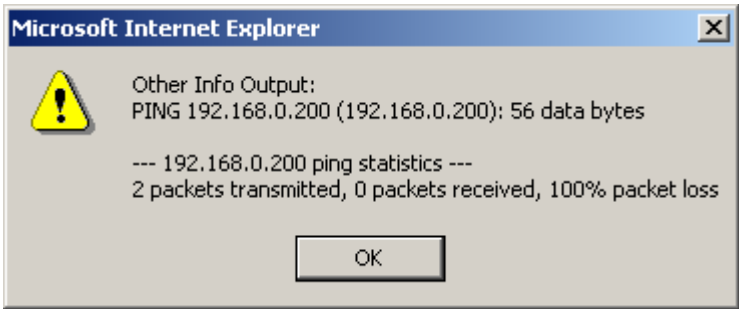
Resolution:

1. Verify your network settings:
   - host IP address (Picture Perfect systems)
   - controller IP address and controller address (Secure Perfect systems)
   - network mask
   - gateway IP
   - DHCP/DNS server
2. Check the connectivity by using the ping command. Use the Ping Host option in the Integrated Configuration Tool. See *Using the Other Info field* on page 103 for more details.
   a. In the Integrated Configuration Tool, select **Micro Info**.
   b. From the **Other Info** drop-down list, select **Ping Host**.

Successful ping example:



Unsuccessful ping example:



Problem: The dial-up controller does not connect.

Resolution:

1. Verify your settings:
   - controller address
   - modem strings
   - baud rate settings
   - cabling
2. Verify J10 jumper setting on the PXNplus CPU board:
   - external modem: 1 and 2
   - on-board modem: 2 and 3
3. Verify modem LED activity. See *Table 14, Modem LEDs on the PXNplus CPU board* on page 40.

Diagnostic LED display

Built-in diagnostics enable you to quickly determine why a controller may not be working correctly. The CPU board LEDs DS1, DS2, DS3, and DS4 are used for displaying error codes. The LED state and error code condition will vary depending on the type of CPU board:

M5PXNplus

Table 43. PXNplus CPU board LED fault conditions

	DS1	DS2	DS3	DS4	DS5	DS6	DS7	DS8	Resolution or Definition
Boot maintenance mode									
Corrupted boot					Flashing				Contact GE Customer Support.
Boot mode						Flashing			
Boot failure						Flashing	Flashing	Flashing	
Boot failure code							Flashing	Flashing	
OS (Operating System) maintenance mode									
OS maintenance		Alternates ON with DS3	Alternates ON with DS2				ON		
Operation state									
Application failure				ON	ON				Verify that the proper application (Secure Perfect or Picture Perfect) was selected in the Integrated Configuration Tool.
Monitor failure				ON		ON			The controller is configured incorrectly in the Integrated Configuration Tool.
Restore defaults requested				ON			ON		Factory default settings have been restored to the board.

Table 43. PXNplus CPU board LED fault conditions (continued)

	DS1	DS2	DS3	DS4	DS5	DS6	DS7	DS8	Resolution or Definition
Shutdown requested				ON				ON	The board has been properly shutdown and may be removed.
Watchdog failure mode					ON		ON		Indicates that an internal thread has failed. This failure is logged according to the log settings. The controller performs a complete reboot after this failure.

= OFF

Maintenance

Inserting and removing the UCSIMMPlus board on the PXNplus CPU board

CAUTION: Do NOT remove the UCSIMMPlus board unless instructed to do so by GE Customer Support.

1. To safely shut down the controller operating system, short JP3 on the PXNplus CPU board for approximately 5 seconds until DS7 turns on. DS2 and DS3 then alternate On.
2. Disconnect power and battery backup power.

CAUTION: Follow standard static prevention procedures. See *Electrostatic Discharge (ESD) precaution* on page 9.

3. Locate the clips on the right and left sides of the UCSIMMPlus board. Press both clips out.
4. Pull out the UCSIMMPlus board.
5. The board fits in with the small cutout in the right corner. Insert the board at a 45 degree angle.
6. Press down on the board until the clips engage.

Contacting technical support

For assistance installing, operating, maintaining, and troubleshooting this product, refer to this document and any other documentation provided. If you still have questions, you may contact technical support during normal business hours (Monday through Friday, excluding holidays, between 8 a.m. and 8 p.m. Eastern Time).

Table 44. Sales and support contact information

	Pre-sales	Technical support
Phone:	1 800 428 2733	1 888 GE SECURITY (437 3287)
Fax:	561 998 6160	561 998 6244
E-mail:	None	rs-bctsupport@ge.com

Note: Be ready at the equipment before calling for technical support.

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Numerics