



GE Security

Model 940+ Proximity Reader Installation Guide

***GE Security, Inc.
791 Park of Commerce Boulevard
Suite 100
Boca Raton, Florida 33487
(561) 998-6100***

Part Number: 460595001A
July 2004

This publication may contain examples of data reports used in daily business operations. Examples include fictitious names of individuals and companies for illustration only; any similarity to names and addresses of actual business enterprises and persons is entirely coincidental.

This document is distributed on an *as is* basis, without warranty either expressed or implied. Successful implementation depends solely upon the customer's ability to integrate each product into the total inventory of "in-house" products. While each offering has been reviewed for its compatibility and maintainability, no assurance of successful installation can be given.

The customer accepts full maintenance responsibility. (A full scope of software and hardware maintenance contracts are available to the customer.)

© 2004 GE Security, Inc.
All Rights Reserved
Printed in the USA

Proximity Perfect and ProxLite are trademarks of GE Security, Inc.

Contents

Safety	1
Radio Interference	1
Electrostatic Discharge (ESD) Precaution	1
Product Features	1
System Requirements	2
Technical Specifications	2
Parts List	3
Installation Overview	3
Mounting the Reader Backplate	4
Connecting the Reader	7
Pinouts	8
FCC Compliance	9
Wiring Diagrams	11
Configuring the Reader	18
Supervised F/2F	18
Unsupervised F/2F or Wiegand 4001/4002	18
Testing the Reader	19
Indicators	20
Reader Configuration Card Setup Instructions	20
Supervised or Unsupervised Communication	21
F/2F or Wiegand 40-bit (4001/4002) Communication	21

Figures

Figure 1:	Model 940+ Reader - Gang Box Mounting	5
Figure 2:	Model 940+ Reader - Direct Wall Mounting	6
Figure 3:	Model 940+ Reader	7
Figure 4:	Typical Installation (Internal to the micro) Using Shielded Cable/Drain Wire.....	9
Figure 5:	Typical Installation (External to the micro) Using Shielded Cable/Drain Wire.....	9
Figure 6:	Supervised, 4-State, F/2F Wiring Diagram	12
Figure 7:	Unsupervised F/2F Wiring Diagram	14
Figure 8:	Wiegand Wiring Diagram	16

Safety

Radio Interference



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.

Electrostatic Discharge (ESD) Precaution



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.

Product Features

The CASI Model 940+ Proximity Perfect™ reader combines the convenience of contactless proximity technology with flexibility of operation.

The CASI Model 940+ Reader offers:

- State-of-the-art architecture.
- The ability to read all ISO ProxLite™, ProxLite, and Entrée badges and key tags.
- Supervised F/2F communications with 4-state Door/REX supervision.
- Unsupervised F/2F communications.
- 40-bit Wiegand (4001 and 4002) format output.
- Reader-to-micro cable lengths up to 3,000 feet (914.4 meters).
- Weather-resistant housing for outdoor use.
- 12 VDC operation.
- A clear, logical user interface with tri-color LED and beeper.
- Rugged molded ABS construction with backplate.
- Cover removal and off-the-wall tamper detection.
- UL approved for indoor use (pending).

System Requirements

Microcontrollers	<ul style="list-style-type: none"> • Micro/5-PX with 8RP, 2RP • Micro/5-PXN with 8RP, 2RP • Micro/PX-2000 • Micro/PXN-2000
Badge and Keytag Formats	<ul style="list-style-type: none"> • CASI ProxLite • Entrée • ISO ProxLite

Technical Specifications



Shielded cable should be used for all installations.

Operating Temperature Range	-31° F (-35° C) to +150° F (+66° C)
Relative Humidity	5% to 95% (non-condensing)
Physical Dimensions HxWxD	4.75" (121 mm) x 2.9" (74 mm) x 0.90" (23 mm)
Index of Protection	IP51
Input Voltage Range	10 to 15 VDC (measured at the reader)
Power Consumption	85 mA @ 12 VDC
Cable Specifications	Belden 8725 or equivalent, 20 AWG shielded pairs
Maximum Cabling Distance ^a	<ul style="list-style-type: none"> • F/2F: 3,000 ft (914.4 m) @ 12 VDC with 20 AWG shielded cable • Wiegand: 500 ft (152.4 m) @ 12 VDC with 20 AWG shielded cable
Read Range	ProxLite: up to 6 inches ISO ProxLite: up to 5 inches ProxLite Keytag: up to 3 inches
Operating Modes	Supervised F/2F Unsupervised F/2F ^b Wiegand 40-bit ^b (4001 or 4002)
Agency Approvals	FCC Class A UL 294 (pending)

a. The maximum cabling distance of 3,000 ft (914.4 meters) is influenced by a number of factors including wire gauge and reader power requirements.

b. Operating the reader in this mode, requires a programming card for setup. Refer to “Configuring the Reader” on page 18 for more information.

Parts List

- Model 940+ Reader
- Optional installation wrench

Refer to the GE Security price list for part numbers and ordering information.

Installation Overview

The following is the general sequence of steps to follow when installing the 940+ reader. Each step is explained in further detail in the sections that follow.

Recommended installation sequence:

1. Mount the reader backplate.
Refer to “Mounting the Reader Backplate” on page 4.
2. Connect the reader.
Refer to “Connecting the Reader” on page 7.
3. Configure the reader.
Refer to “Configuring the Reader” on page 18.
4. Test the reader.
Refer to “Testing the Reader” on page 19.

Mounting the Reader Backplate

The reader comes with a backplate suitable for mounting directly onto standard U.S. electrical gang boxes. The reader may also be mounted directly onto a hollow wall.

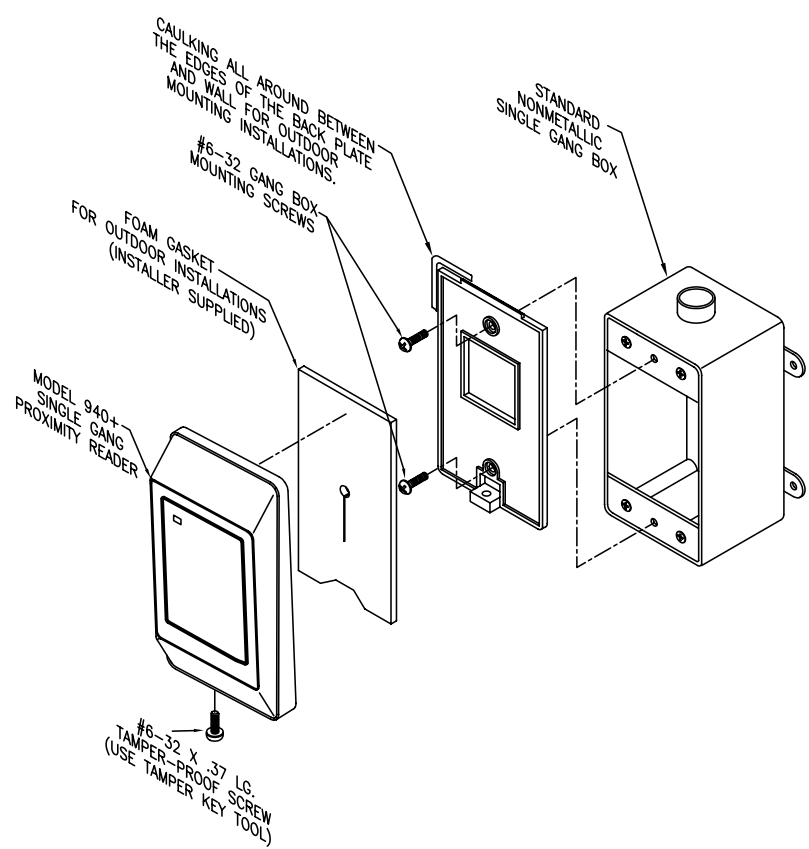
For Gang Box mounting instructions, see Figure 1.

For Direct Wall mounting instructions, see Figure 2.

Important:

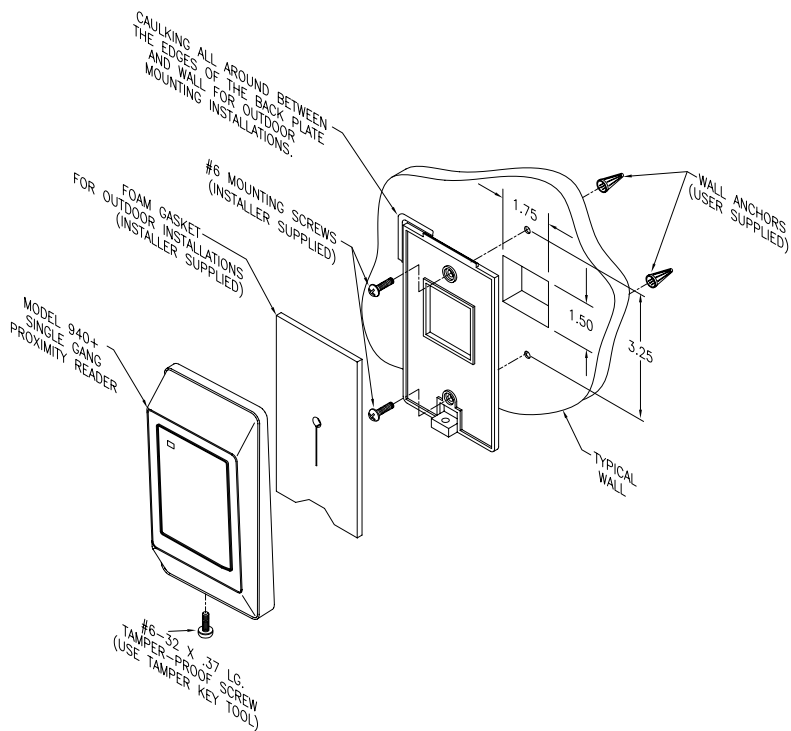
- Readers should not be mounted within three feet of a computer terminal. Some terminals radiate electrical noise that may reduce the effective maximum read range.
- An installer-supplied gasket should be used to form a weather-resistant seal between the mounting surface and the inside of the reader for outdoor installations. The gasket should be located on the inside surface of the reader's plastic backplate. For outdoor installations, where the reader is mounted in direct exposure to weather, a bead of silicone caulking should be applied between the reader and the wall to prevent water from entering the back of the reader.

FIGURE 1: Model 940+ Reader - Gang Box Mounting



530065001G

FIGURE 2: Model 940+ Reader - Direct Wall Mounting



530065002F

Connecting the Reader

The Model 940+ Reader is supplied with a convenient 11-pin connector as shown in Figure 3 below.

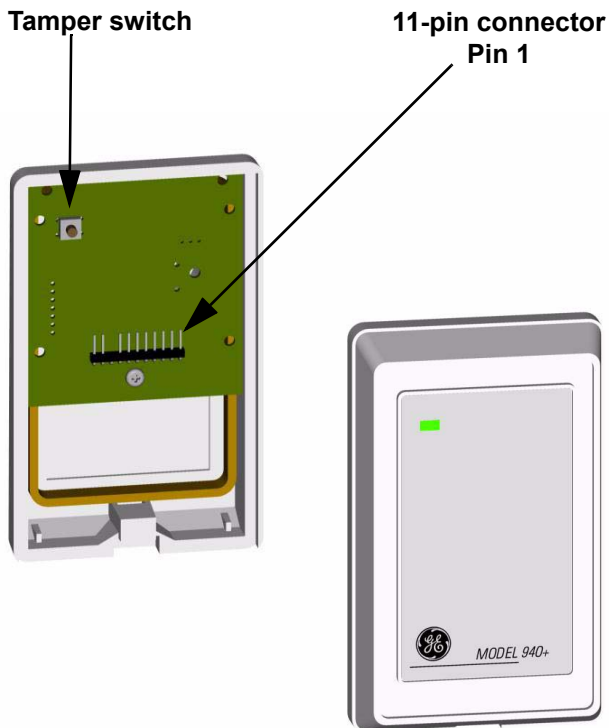
Refer to the following sections for more information on connecting the reader:

- “Pinouts” on page 8
- “FCC Compliance” on page 9
- “Wiring Diagrams” on page 11



It is important to ensure all connections are made prior to applying power.

FIGURE 3: Model 940+ Reader



Pinouts

The table below shows the pinouts for connecting the reader to the microcontroller. Connector J2, pin 1 is to the right as you view the connector from behind the reader. See Figure 3, “Model 940+ Reader,” on page 7.

TABLE 1: Pinouts

Connector J2 Pin #	Signal
1	+12 VDC
2	GND (Ground)
3	Red LED Control
4	Door DO/Green LED Control
5	Yellow LED Control
6	Wiegand Data 0
7	F/2F Data 1 or Wiegand Data 1
8	Beeper Control
9	Key (No Connection)
10	Door DI (Door Contact Switch)
11	REX DI (Exit Request Button)

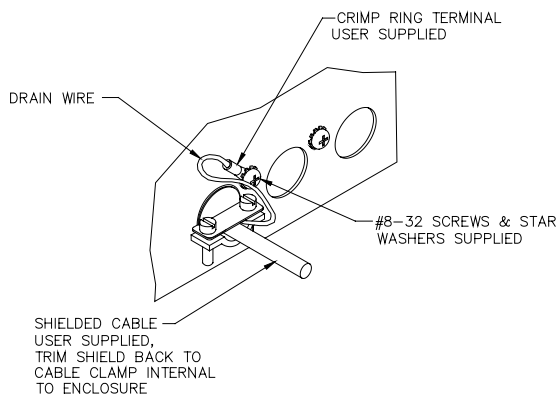
FCC Compliance

To make the Model 940+ Reader installation FCC compliant, the cable connecting the reader to the micro must have its shield grounded at the micro, according to one of the methods specified in the figures below.

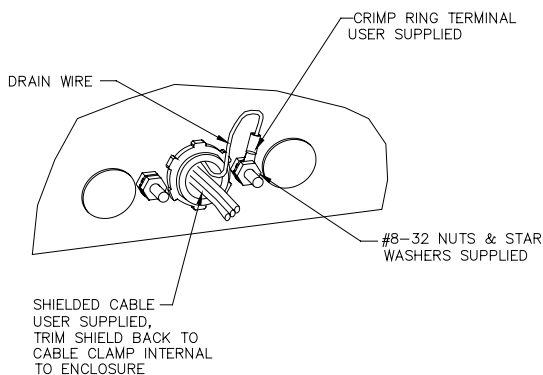


Do not make shielded connections at the reader.

**FIGURE 4: Typical Installation (Internal to the Micro)
Using Shielded Cable/Drain Wire**



**FIGURE 5: Typical Installation (External to the Micro)
Using Shielded Cable/Drain Wire**



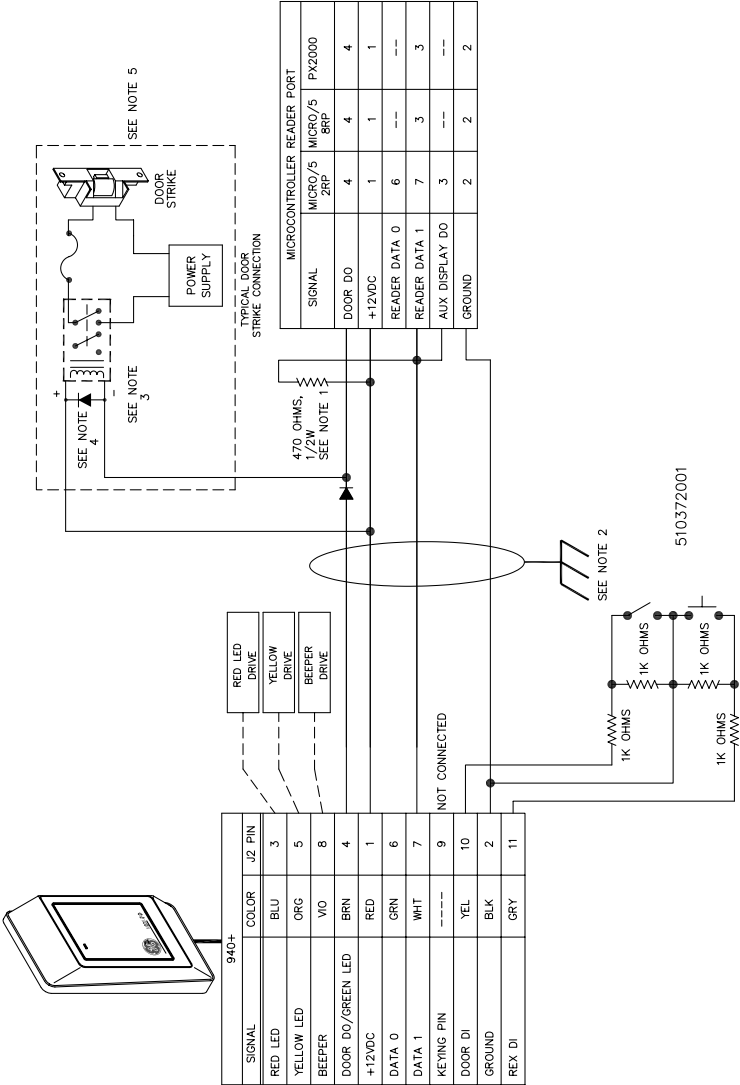
This page intentionally left blank

Wiring Diagrams

See the following wiring diagrams for details on connecting the reader to the microcontroller:

- “Supervised, 4-State, F/2F Wiring Diagram” on page 12.
- “Unsupervised F/2F Wiring Diagram” on page 14.
- “Wiegand Wiring Diagram” on page 16.

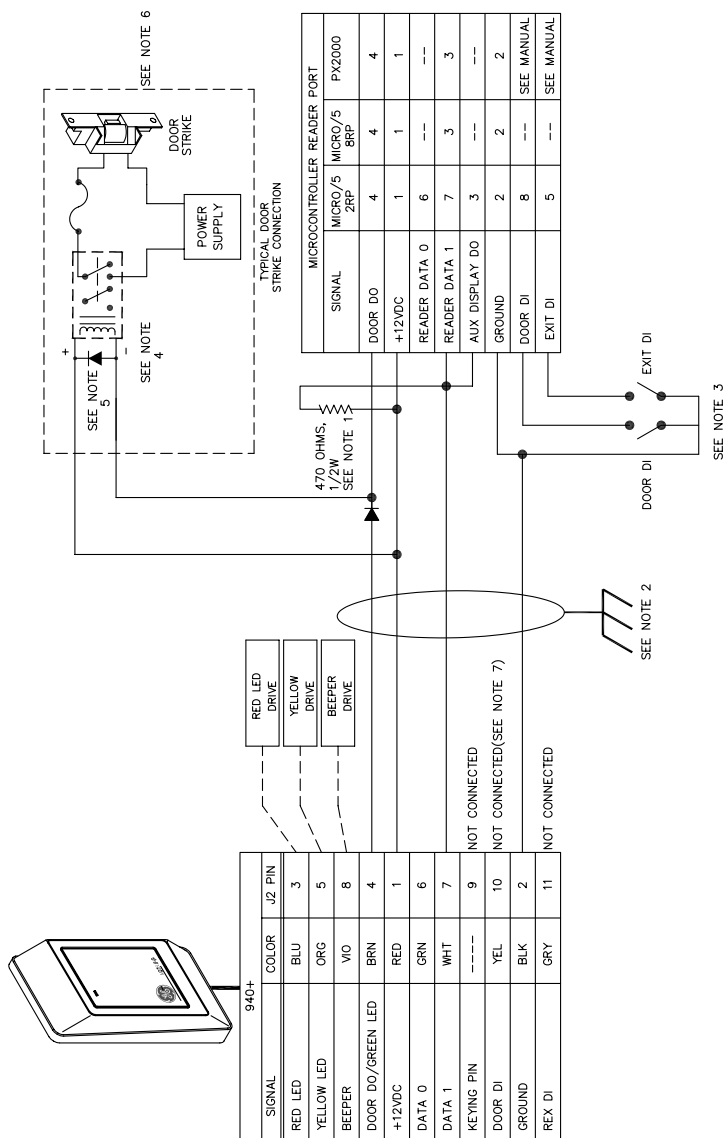
FIGURE 6: Supervised, 4-State, F/2F Wiring Diagram



NOTES:

1. A 470 ohm, 1/2W, pull-up resistor may be required between +12 VDC and READER DATA 1. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate micro manual for installation requirements.
2. Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader.
3. Blocking diodes must be 1N4148 or equivalent, located on the secured side of the door.
4. Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
5. Fuse, power supply, door strike, diodes, and relay are provided by the installer.

FIGURE 7: Unsupervised F/2F Wiring Diagram

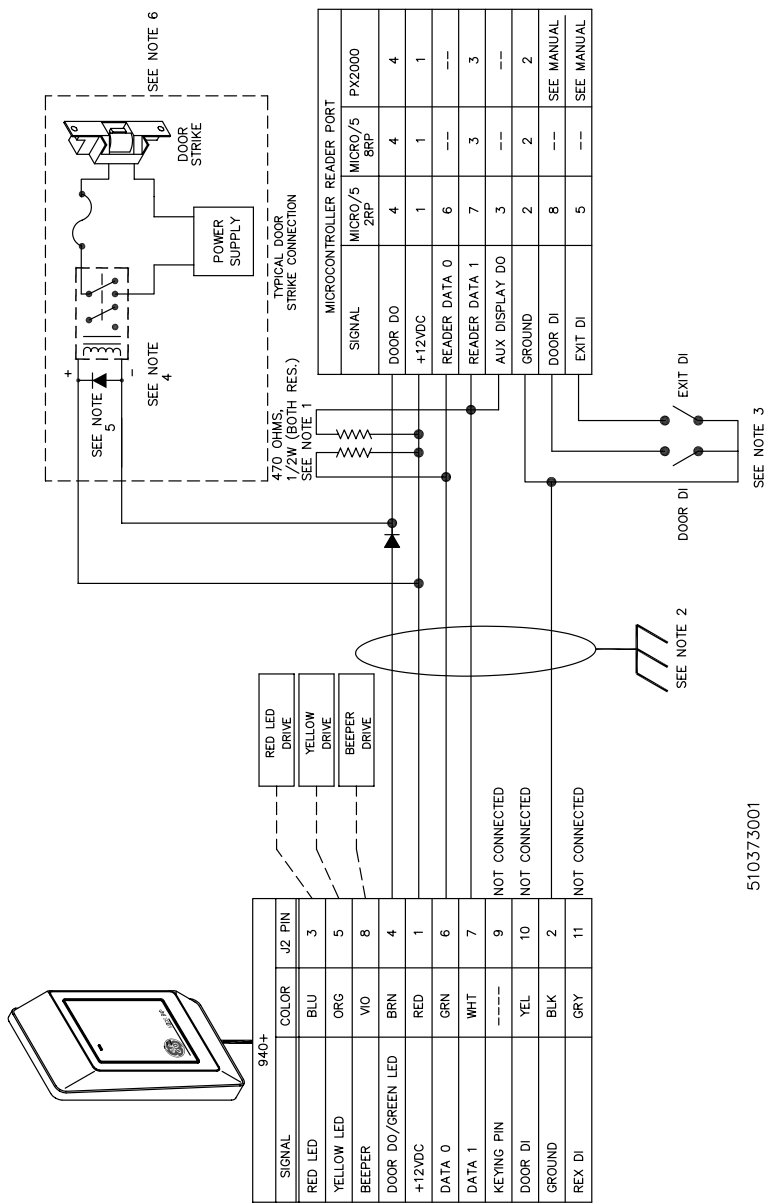


510371001

NOTES:

1. A 470 ohm, 1/2W, pull-up resistor may be required between +12 VDC and READER DATA 1. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate micro manual for installation requirements.
2. Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader.
3. Refer to the appropriate microcontroller manual for specific wiring details.
4. Blocking diodes must be 1N4148 or equivalent, located on the secured side of the door.
5. Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
6. Fuse, power supply, door strike, diodes, and relay are provided by the installer.
7. If the door contact switch is not used, connect reader pin 10 directly to ground.

FIGURE 8: Wiegand Wiring Diagram



NOTES:

1. Two 470 ohm, 1/2W, pull-up resistors may be required between +12 VDC and READER DATA 1 and DATA 0. The pull-up resistor should be installed at the microcontroller's terminal block. Refer to the appropriate micro manual for installation requirements.
2. Shielded cable is required. Connect all shields together at the micro or panel end using 14-AWG wire. Do not make shield connections at the reader. Do not pair Wiegand DATA 1 and DATA 0.
3. Refer to the appropriate microcontroller manual for specific wiring details.
4. Blocking diodes must be 1N4148 or equivalent, located on the secured side of the door.
5. Protection diodes must be 1N4002, 1N4003, or 1N4004 for the door strike assembly.
6. Fuse, power supply, door strike, diodes, and relay are provided by the installer.

Configuring the Reader

Supervised F/2F

For supervised F/2F operation, no further configuration is required.

Unsupervised F/2F or Wiegand 4001/4002

For unsupervised F/2F or Wiegand 40-bit format output, you must configure the reader using the Reader Configuration Card Kit. Refer to the section, “Reader Configuration Card Setup Instructions” on page 20, for detailed instructions. The kit can be ordered at no cost from the GE Security price list.

Testing the Reader

Follow the steps below to verify that the reader is working correctly.



It is important to ensure all connections are made prior to applying power.

1. Check the following:
 - Proper cabling and electrical connections exist between the reader and the microcontroller.
 - The microcontroller is properly configured and the proper version of firmware is installed.
 - The reader is properly mounted.
2. Close the tamper switch by joining the reader and backplate so that the tamper alarm is not activated or by ensuring the reader is securely mounted.
3. Apply power to the reader and verify that the power-on self test completes as described in the section “Indicators” on page 20.
4. Verify that the reader is not beeping and that the red LED is not flashing. If either of these two conditions exist, refer to the section “Indicators” on page 20.
5. Verify proper reader operation as follows:
 - A. Select a known good test badge. Be sure that the badge is properly enrolled in the host system.
 - B. Ensure that the door is closed and latched. This is the first step to verify that the reader strike relay is wired properly.
 - C. Present a card to the reader. Observe that the reader behaves as described in the section “Indicators” on page 20.
 - D. Observe that the green LED turns on, indicating a valid access has been granted by the host.
 - E. Open the door. This verifies that the reader strike relay operates properly.

Indicators

A tri-color LED (red, yellow, and green), and a beeper are incorporated into the reader and operate as indicated in the following table:


CONDITION	STANDARD INDICATORS
Power-on Self Test	Red LED flashes, Yellow LED flashes, Green LED flashes
Reader Ready	Yellow LED on continuously
Badge Read	Yellow LED flashes briefly, 1 short beep
Valid Access	Green LED on until door strike is deactivated
Loss of Communication (Supervised)	Red LED flashes slowly, 3 short beeps every 30 seconds
Tamper (Supervised mode)	Red LED flashes quickly, 3 short beeps every 30 seconds
Alarm State	Red LED may be turned on and off and the beeper may be sounded by the microcontroller, to indicate an alarm state. Consult the appropriate Access Control manual for details on this operation.

Reader Configuration Card Setup Instructions

When used with the Model 940+ Proximity Reader, the three Reader Configuration Cards included in your kit can be used to:

- Select supervised/unsupervised F/2F communications .. Card 1
- Select/deselect Wiegand 4001 output mode..... Card 2
- Select/deselect Wiegand 4002 output mode..... Card 3

By default, the reader is configured at the factory for supervised F/2F communication. To change to unsupervised F/2F or Wiegand 4001/4002 output, refer to the instructions below.

 **Before you begin, remove the reader from the backplate and place the reader in tamper mode.**

Supervised or Unsupervised Communication

To change Supervised communication to Unsupervised communication:

1. Select Card #1, labeled **Supervised/Unsupervised F/2F**.
2. Present the card to the reader.

Result: The red LED will flash twice and the beeper will emit two short beeps.

In addition, a single tamper message is sent to the micro to alert system operators of a potentially malicious act. This message will only be observed when a reader that is properly configured and wired for supervised mode is re-configured with a reader configuration card to operate in non-supervised mode.

To change Unsupervised communication to Supervised communication:

1. Select Card #1, labeled **Supervised/Unsupervised F/2F**.
2. Present the card to the reader.

Result: The yellow LED will flash three times and the beeper will emit three short beeps.

F/2F or Wiegand 40-bit (4001/4002) Communication

To enable F/2F data output:

1. Select Card #2, labeled **Wiegand 4001 Output**, or Card #3, labeled **Wiegand 4002 Output**.
2. Present the card to the reader.

Result: The red LED will flash twice and the beeper will emit two short beeps.

To enable Wiegand 4001/4002 data output:

1. Select Card #2, labeled **Wiegand 4001 Output**, or Card #3, labeled **Wiegand 4002 Output**.
2. Present the card to the reader.

Result: The yellow LED will flash three times and the beeper will emit three short beeps.

NOTES