System 2000 Hardware Manual

Corby Industries, Inc.

PREFACE

This document is a complete hardware reference manual for the Corby System 2000 Access Control unit which is manufactured, designed, or distributed by Corby Industries, Inc., USA. **It is assumed that the user of this manual is expert in the installation of high security devices and has professional knowledge in electronics and security related installations.**

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CORBY INDUSTRIES, INC.

Corby has been supplying security professionals with quality security products since 1972 when we first introduced the concept of a digital key to the security industry. Up to that time, everyone used a round metal key which is now almost extinct thanks to the hundreds of thousands of "Corby Keys" installed everywhere around the world.

For over 27 years we have been a major supplier to alarm dealers and locksmiths around the world. Users of Corby products include the FBI, Secret Service, and Department of Defense. Corby has hundreds of authorized distributor locations in the USA and 17 foreign countries.

At Corby, our customer is the most important person in our business. We constantly strive to serve our customers with quality and service which is second to none. At Corby, we always try to be the best!

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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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

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CHAPTER 1

SYSTEM OVERVIEW

Introduction

System 2000 consists of flexible, two-door access control panels that can be expanded into a large 248 door System. Panels are connected to a Network Interface Controller (NIC) and personal computer (PC) to provide a reliable and powerful Access Control System. Panels communicate to NIC and the PC on multiple RS485 channels to insure data transfer. Once programmed, each panel contains all user and door control data necessary to provide fast and easy access without delays or reliance on the PC.

The NIC provides a link between the System 2000 panels and the PC. It administers the network of panels to provide a high reliability buffer and communications interface. The NIC contains a very high speed microprocessor which controls data flow to four RS485 channels. Each channel can control up to 31 System panels and 62 doors.

Programming

Programming is accomplished using a personal computer with either Microsoft Windows® 95, 98, 2000 or NT software.

Function and Use

Users can pass through an entry point secured by a Keypad, Reader, or combination of both by entering a correct code into the Keypad or presenting a valid Card or Data Chip to the reader. The panel then decides if the user is allowed access to this door at the current time and date, either grants or denies access and logs the transaction in the event buffer of the panel and the PC's database.

A door can be programmed for public access to automatically lock and unlock according to the programmed time schedules set up by the System Administrator.

Calendar

System 2000 has a built-in clock and calendar that automatically adjusts for daylight savings time and leap year. Also, there are hundreds of holidays which allow the System to selectively engage alternate holiday schedules for users and doors.

Outputs / Inputs

Each System panel is equipped with two of the following outputs/inputs: Main Relays, Auxiliary Relays, Voltage Outputs, Door Ajar / Forced Entry Inputs, Request-To-Exit Inputs, Zone Inputs and one Emergency Drop Input.

Network Interface Controller (NIC)

The NIC contains four RS485 channels for communications to the networked System 2000 panels. The standard NIC has Channel #1 active. The 248 door upgrade must be purchased to maximize the amount of doors to 248. Each channel can support a maximum of 31 System 2000 panels (p/n 2025) at a maximum of 4000 feet.

It is recommended that the total number of System panels are distributed between all four available channels. This will minimize the number of System panels “lost” due to a channel’s failure to communicate (ie. cut wire, lightning strike). The transmission of data between the NIC and the panels is maximized by using all the available channels, as apposed to using one channel.

RS232 Communications

The Network Interface Controller (NIC) has a RS232 serial communications port for connection to a personal computer. This connection supports a 115k baud data rate to provide fast and accurate data transfers between the PC and System panels.

Main Relays

Each System 2000 panel has two independently controlled SPDT "C" form heavy duty relays with contacts rated five amps at 30 volts DC. They are fully programmable and may be activated by Keypads, Cards, Request-To-Exit switches, time schedules, and/or using the "Manual Override Outputs Option" from the PC. These relays can be programmed for a momentary time of 1 - 65,535 seconds (18.2 hours) or latching (on/off).

These "dry" relay contacts may be used to activate door strikes, electromagnetic door holders, alarm system controls, or to control any momentary or on/off device including energy management devices, lights, and air conditioning systems. Each time a relay is activated/deactivated, an event is created, stored in memory, and, with the addition of a printer, printed with event data including time & date. Because they are "C" form, they may be wired "fail-safe" or "fail-secure". In addition to the “C” form contacts, main relays also have an “A” form contact rated five amps at 30 volts DC which also can be used to control door strikes or shunt existing alarm contacts.

Auxiliary Relays

Each System 2000 panel has two SPDT auxiliary relays rated five amps at 30 volts DC. These relays can be triggered from any System event, time schedules or codes. These relays can be programmed for a momentary time of 1 - 65,535 seconds (18.2 hours) or latching (on/off).

Voltage Outputs

Each System 2000 panel has two voltage outputs which are capable of switching to negative (-) up to 50 ma. These outputs can be triggered from various System events, time schedules or codes. These outputs can be programmed for a momentary time of 1 - 65,535 seconds (18.2 hours) or latching (on/off).

Door Ajar / Forced Entry Inputs / Time Cancel

The System 2000 can monitor a " normally closed" or "closed circuit" door contact to report a Door Ajar / Forced Entry condition. Each System has one input for each of the two doors. A Door Ajar condition is created when a door is held or propped open for more than five seconds after a valid code or Card entry. A Forced Entry condition is created when a door is opened without being preceded by a valid code or Card entry. In either condition any of the System's Auxiliary outputs can be triggered.

Request-To-Exit Inputs

With the addition of a Normally Open "button" or Passive Infrared device connected to these inputs, the main relays can be activated to release the door locks, log the event and trigger any Auxiliary output.

Zone Inputs

The System can monitor a "normally closed" or "closed circuit" switch or alarm contact mounted on a door to report a Zone Condition. Each System has one input for each of the two doors. When the door is opened or closed, an event is generated, which can be used to activate any of the System's Auxiliary outputs.

Emergency Drop Input

This input can be used to open the normally closed contacts on both main relays. When (+)12VDC is applied to this input, the main relay's normally closed contact will open - disconnecting power to the magnetic locks on both doors and generating an event. This feature is not applicable to door strikes wired to the normally open contact of the relay.

Reset

A reset button (SW1) is located in the upper right hand corner of the System 2000 circuit board. The NIC also has a reset button (S1) located in the upper right hand corner of the circuit board. These buttons, when pressed, will initiate a "soft boot" of the system which will reset the main microprocessor and test the memory. If memory is corrupted, the System will clear memory. The system may continue to operate with corrupted memory to some degree however, memory will need to be cleared and reprogrammed. This feature allows the clearing and reprogramming to be preformed at a more convenient time. If memory is not corrupted, a system reset event will be generated with no other consequences.

System 2000 LED Indicators

The System contains 19 LEDS on the circuit board which identify various system functions. The ACTIVITY LED & AC POWER LED are visible through transparent windows in the front panel of the cabinet. A blinking ACTIVITY LED indicates a normal, functioning system. A steady AC POWER LED indicates that 16.5 volts is present to supply main power to the unit. The other LEDS, except DROP RELAY LED, go "on" to indicate relays and outputs that are active, RS232 status, RS485 status and the presence of auxiliary voltages for +5, +6, +12 volts DC. BATT RELAY LED, which is normally "on", goes out to indicate the external standby battery is supplying power to the system

Circuit board LED markings are: RELAY 1 (Main Relay 1); RELAY 2, (Main Relay 2); AUX1, (Auxiliary Relay 1); AUX2, (Auxiliary Relay 2); VO1, (Voltage Output 1); RXD, (RS232 Receive Data); TXD, (RS232 Transmit Data); CTS, (RS232 Clear To Send), DCD, (RS232 Carrier Detect); RS485 RXD & TXD (Data Activity); DROP RELAY LED indicates that the emergency Drop Input is active. BATT RELAY LED, when off, indicates that the external standby battery is operating the system.

NIC LED Indicators

The Network Interface Controller (NIC) contains 18 LEDS on the circuit board which identify various system functions. A blinking ACTIVITY LED indicates a normal, functioning system. A steady AC POWER LED indicates that 16.5 volts is present to supply main power to the unit, and the +5, and +12 volt LEDs show the power supplies proper operation. The other LEDS indicate the battery fuse, RS232 and RS485 status.

Time Keeping

The System contains an active time keeping clock chip that is activated at time of manufacture. This clock is accurate to +/- 60 seconds per year and is used to time stamp system events and record time-in-service for warranty purposes. Powered by an on-board lithium battery, this clock chip will keep time for 50 years.

Electronic Serial Number Chip

Each System 2000 panel has a unique Electronic Serial Number (ESN) contained in a chip that cannot be altered. The Unit ID Number and manufacture date are programmed into a one-time programmable memory device which cannot be changed. This information may be displayed in Option #13 and is used for warranty service.

RS485 Networking

The System 2000 and NIC use a standard high-speed RS485 communication bus to communicate with each other. This bus uses a twisted pair of shielded wires which can be up to 4000 feet in length. This RS485 bus allows up to 31 System's to connect to one of four RS485 channels on the Network Interface Controller (NIC). A total of 124 System's can be connected to a NIC, 31 per channel.

CHAPTER 2
QUICKSTART

Bench Test System 2000

- Connect the PC running System 2000 to the Network Interface Controller (NIC) and a System 2000 panel. Refer to Figure 34.
- Power up the System 2000 Panel. Connect supplied transformer to Terminals #2 and #3. Then connect supplied battery to H1, see Figure 32. The AC LED should be on solid and the ACTIVITY LED should be flashing. The +5V, +6V, +12V, and CTS LEDs should be on solid. See Figure 4 for LED locations.
- Power up the NIC Board. Connect supplied transformer to Terminals #2 and #3. Then connect supplied battery to H1, see Figure 32. The AC LED should be on solid and the ACTIVITY LED should be flashing. The +5V, +12V, and CTS LEDs should be on solid. See Figure 30 for LED locations.
- The System 2000 Panel and NIC will go through their initialization. The NIC will momentarily flash the RS232 TD and RTS LEDs and all four RS485 TD LEDs. The LCD will display “Memory Corrupt” and “Clear Memory?”. The system will clear memory and power up events will be displayed on the LCD.
- Start the System 2000 Windows application.
- Set up a single panel and NIC as found in the *Quick Start* section of the *Getting Started* Instruction Sheet.
- Test RTE - Momentarily connect a jumper across Terminals #22 and #27. The Door relay should activate and the LCD should display an RTE event.
- Test Forced Entry -Momentarily connect a jumper across Terminals #22 and #26 of Terminal block “A”. A Door Closed event should be displayed on the LCD. Then a Forced Entry event should be displayed on the LCD.
- Test Zone Input -Momentarily connect a jumper across Terminals #22 and #37. A Zone ON event should be displayed on the LCD. Then a Zone OFF event should be displayed on the LCD.

Activate Premium Options

U If premium options have been purchased, each option must be activated before they can be tested. Each premium option has its own unique Upgrade Key.

Locate instruction sheet with a list of the premium options purchased. If any options were purchased after the unit shipped from the factory, you must call Corby for the Upgrade Keys to unlock any or all features.

U Activating a premium option:

Enter program mode - Press X 12345# on the program keypad. The main menu should come up.
Enter Option #13 Install Options - Press 13#. The Enter Option prompt will display on the LCD.
Enter the option number of the premium option you want to activate 1-9 then press #. The Enter Key prompt will display on the LCD.
Enter the upgrade key for this premium option then press #. The Option Installed prompt should display on the LCD. Press # to return to the main menu.
If a Key Error prompt is displayed an incorrect upgrade key was entered. Press # to return to the main menu.
Redo the procedure to reenter the correct upgrade key.
Redo the procedure to activate additional premium options.

U The RTE, Forced Entry, and Zone Input test should be repeated for all doors installed on the system.

U ***After installing the expansion memory (RAM), all existing system data will be erased.***

Keypad Test

U Connect the keypad using a short cable. Connect up both ports for a two door System. Figure 9 shows the connections for a keypad.

U The door lock(s) could also be connected at this point. Figures 20-21 show the connections for door locks.

U Enter a test code:

Under the View Menu, open Panels.
Click on the New Panel button in the lower left of the screen. This will open the Panels Properties dialog box.
Be sure there is a U in the Active Box..
Enter the Electronic Serial Number (ESN) in the Serial Number space.
Click on the Input Configuration tab at the top of Panel Properties.
Door 1 Input Device - Select Keypad Only. If using Door 2, select Keypad Only for this door.
Click OK.
Repeat these steps for each system panel.

Under the View Menu, open Interfaces.
Click on the New button in the lower left of the screen. This will open the Interface Properties dialog box.
Be sure there is a U in the Active Box..
Select the Communications Port the NIC is connected to.
Click on the Panel Assignment tab. Select all the panels listed on the right side of the dialog box.
Click the Add button for Channel 1.
Click OK.

Under the View Menu, open Door Groups.
Click on the New Group button in the lower left of the screen.
Select Door 1 on the right side and click the Add button.
If there is multiple doors, repeat this step for each door.
Click OK.

Under the View Menu, open Users.
Click on the New User button in the lower left of the screen.
Select New Door Group under Door Group.
Enter the Keypad Code 12480.
Click OK.

The software will download the new information to the system panels.

U Enter the test code - Press X 12480# on the door keypad. The door relay should activate for 5 seconds and the Valid User 00101 event should be displayed . If there are two doors enter the code on both doors.

Card Reader Test

U Connect the reader using a short cable. Connect up both ports for a two door System. Figures 10- 19 show the connections for the readers.

U The door lock(s) could also be connected at this point. Figures 20-21 show the connections for door locks.

U Enter a test code:

Under the View Menu, open Panels.
Click on the New Panel button in the lower left of the screen. This will open the Panels Properties dialog box.
Be sure there is a U in the Active Box..
Enter the Electronic Serial Number (ESN) in the Serial Number space.
Click on the Input Configuration tab at the top of Panel Properties.
Select the Card type you will be using:
26-bit Wiegand, Credit Card, Data Chip, Mag-Stripe, Bar Code, Wiegand or Proximity.
Door 1 Input Device - Select Card Only. If using Door 2, select Card Only for this door.
Click OK.
Repeat these steps for each system panel.

Under the View Menu, open Interfaces.
Click on the New button in the lower left of the screen. This will open the Interface Properties dialog box.
Be sure there is a U in the Active Box..
Select the Communications Port the NIC is connected to.
Click on the Panel Assignment tab. Select all the panels listed on the right side of the dialog box.
Click the Add button for Channel 1.
Click OK.

Under the View Menu, open Door Groups.
Click on the New Group button in the lower left of the screen.
Select Door 1 on the right side and click the Add button.
If there is multiple doors, repeat this step for each door.
Click OK.

Under the View Menu, open Users.
Click on the New User button in the lower left of the screen.
Select New Door Group under Door Group.
Enter the Card or Data Chip Code.
Remember, if using 30 bit Wiegand or Proximity cards, the Facility Codes must precede the five digit card number.
Click OK.

The software will download the new information to the system panels.

U Swipe the test card or touch the test Data Chip. The door relay should activate for 5 seconds and the Valid User 00101 event should be displayed. If there are two doors swipe the test card or touch the test Data Chip on both doors.

If There is a Problem

If there is a problem with the board powering up, take the voltage measurements found in Figure 5 and Figure 31. If there is a problem with the programing, refer to the Application Help Screens.

If Everything tests OK

If the System 2000 is OK then you need to decide when and where you are going to program the System.

The System has a lithium battery for backing up user memory. The System can have its external power removed and retain its programming.

The lithium battery comes from the factory disconnected. Before you start programing, install the jumper that is on pin 1 of H4 across pins 1 and 2. Once the lithium battery is connected to the System, disconnecting it from ac power and standby battery should be kept to a minimum. Depending on the configuration of the memory, the lithium battery should keep the Systems memory backed up for over a month but it can not be recharged so unnecessary discharging could cause a problem later in the life of the System.

Quick Installation

- U Remove all power from the NIC and System 2000 panels. AC and Standby battery.
- U Run the wire. You'll need cables for the Reader or Keypad and Door Ajar switch, two conductors for the door lock and another separate two conductor wire for the RS485 communications line. Don't forget a pair for the AC power transformer, and one for the door lock power supply.
- U Mount the Keypad, Card Reader or Data Chip Reader. Keypads should be mounted at eye level. Be sure if you are mounting a Keypad or Reader outside, that it is a weatherproof model.
- U Mount the door lock and FOLLOW THE DIRECTIONS that come with it! Make sure to install a diode across the coil for noise and spike suppression on DC powered door locks.
- U Install the Request To Exit button and Door Ajar/Time Cancel switch. Don't run the Request To Exit wires out to the Keypad or Reader. Drop them off inside the protected area.
- U Make your connections to the NIC and System 2000 panels and apply power.

CHAPTER 3

VERSIONS & ACCESSORIES

Versions

The System 2000 network is configured using the following components:

2000 Network Interface Controller (NIC) - Controls 124 System panels (p/n 2025) for a total of 248 doors. Includes Windows® software, heavy-duty steel Cabinet, 16.5 VAC Transformer, 12 V 4AH stand-by battery.

2025 Supports 2 Doors, Two door control panel. Includes heavy-duty steel Cabinet, 48 English Character LCD, 16.5 VAC Transformer, 12 V 4AH stand-by battery.

Accessory

2001 248 Door Upgrade for System 2000 NIC.

2027 Data Chip Wand to RS232 adapter.

Expanded Warranties

Requires the Electronic Serial Number (ESN). Full coverage no exclusions. Covers lightning, fire, water damage, plus advance replacement via next day service. If purchasing an expanded warranty, one is required for each System panel and the Network Interface Controller (NIC).

2011 1 Year expanded warranty.

2012 2 Year expanded warranty.

2013 3 Year expanded warranty.

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CHAPTER 4

OPTIONAL EQUIPMENT

Data Chip to PC Adapter

To assist you while entering Data Chips we highly recommend you purchase a Data Chip to PC Adapter (p/n 2027). This adapter plugs into the serial port (COMM port) of your computer and allows you to batch load Data Chips into a special utility provided with the System 2000 software.

Line Extender Module

The Corby Line Extender Module (LEM - p/n 4056) improves performance and extends the distance of a Wiegand, Bar-code or Mag-stripe Card Reader an additional 500 ft. from the System.

The best place to install the LEM is at the midway point of the cable between the reader and the System. Multiple LEMs can be connected at 500 ft. intervals to increase the reader distance.

When connecting more than one LEM to a single reader, wire size must increase to compensate for the voltage drop which occurs with long wire runs. Wiegand readers require 4.75 - 5.25 VDC. Proximity readers require 12-14 VDC. Mag-stripe and bar-code readers are particularly sensitive to low voltage created by long wire runs and you must compensate for the extra voltage drop by running heavier wire or doubling up on conductors.

The LEM is not waterproof and must be mounted in a dry secure area. Avoid placing the LEM outdoors. If mounting an LEM outdoors is absolutely necessary, a sealed weatherproof box or enclosure must be used.

Door Locks

Door Strikes and Magnetic Locks must be Direct Current (DC) type, can be 12V or 24V and need their own power supply. AC strikes are not recommended because they generate electrical noise and Electro-magnetic interference (EMI) that is difficult to eliminate. We recommend magnetic locks (Mag-Locks) because they almost never wear out, and rarely need service. External power supplies are required for all door lock devices. A two conductor 16 or 18 gauge wire is suggested for door lock wire. It is OK to use shielded wire but it is not required. **Install a diode across the coil of the DC door lock (at the lock) to prevent noise spikes.**

Be sure there is a door which can be accessed in case of an emergency. If all doors are secured with a electric door lock and the power and backup battery fail, you may find yourself locked in/out of the building.

Printer

An optional printer can provide a hard copy of events. Data is sent to the printer from the PC using a standard parallel printer cable.

Corby carries an 80 column, dot-matrix, parallel printer that uses standard plain perforated tractor feed paper. The printer is UL listed and requires 110/120VAC @ 60HZ, .7AMP. It requires a three prong grounding outlet and comes with a five ft. cord.

Corby Printer: 4006 - Parallel Printer

Surge Protection Device

Corby Surge Protectors are UL listed as a "surge protector" (not a simple cube protection device). It is designed to reduce the effects of power surges and lightning strikes. Of course, no protection is available to eliminate a direct lightning strike, but this device may minimize the problem.

This Corby Surge Protector has two protected outlets and both have voltage surge protection and EMI/RMI noise filtering built into them. The surge protector protects both the hot and the neutral AC inputs. This surge unit helps prevent "glitch" errors and reduces the possibility of electronic component failure due to high voltage spikes.

Surge Protector:
- 4238 - Surge Protector for four plug-in transformers
- 4239 - Surge Protector for RS232 (use for PC)
- 4240 - Surge Protector for 2 plug-in devices

Personal Computer

The Network Interface Controller (NIC) has a built in, 115K baud serial port that is used for the Personal Computer (PC). If connected, a printer can provide a hard copy of events. The PC can be used for local or remote programming.

The personal computer requires the following requirements:

- Pentium class processor
- Microsoft Windows 95 or higher
- 16MB RAM minimum
- 30 MB hard drive space
- CD ROM Drive
- 1 free Comm port
- 1 parallel port
- 1 Mouse

CHAPTER 5

SYSTEM 2000 PANEL INSTALLATION

PLAN THE JOB
UNDERSTAND THE EQUIPMENT
READ THE MANUAL

This short section is included in this manual to aid you in analyzing the job requirements to ensure that the System will perform to specifications and that the job will be completed successfully.

Mounting the System 2000 panel Cabinet

The cabinet must be mounted in a dry secure area. It contains all the electronic circuits which control the Keypad, Card Reader, Data Chip and locking mechanism. *It is not waterproof*.

Corby supplies an actual size paper mounting template. Position the template in place and mark the exact center of all four mounting screws. Installation is easier if you pre-drill the screw holes. Using #8 pan-head screws, install the top two screws and tighten to within 1/16 in. (about the thickness of a penny). Hang the system panel on the top two screws and slide it down so the screws align in the cabinet slots. Install the bottom two screws and tighten securely. Do not attempt to adjust or tighten the top two screws. The cabinet contains ¾" and 1¾" knockout holes for installation of interconnect wires.

Earth Ground

This is **very important** because the system must be protected from voltage transients, static, and lightning discharges for proper operation and long life. The ground connection should be made to a proper ground as defined by the National Electrical Code. Refer to the *Shield and Grounding Layout*. (Figure 6).

CAUTION: The section of shield which is exposed, after stripping the cable, must be insulated to protect it from shorting out any components of the circuit board. Use a piece of heat shrink tubing, a piece of cable jacket or electrical tape.

This is extremely important when cables enter the cabinet under the circuit board.

The connection from the stripped end of the cable to earth ground (Terminal #1) should be as short as possible. The longer the drain wire the less effective the shield.

Refer to *Wiring the Shield to Earth Ground* (Figure 7).

Voltage transients must be kept out of the System for proper, successful, and continued operation. This can only be done by diverting these high-voltage transients to a good earth ground.

DO NOT OPERATE THIS SYSTEM WITHOUT A GOOD EARTH GROUND

Run at least a 14 ga. wire from a suitable earth ground to Terminal #1 of the System. A suitable ground could be a cold water pipe or building ground. The ground you use must be bonded to the main electrical ground as defined by the National Electrical Code. Proper bonding is required for safety reasons and to prevent flashover in an electrical storm. If you are not sure you have a good ground, measure the difference in ohms between electrical ground and your earth ground. If it exceeds five ohms, one of the two grounds is not a good earth ground and will need to be corrected. Ground wire runs should be as straight and direct as possible avoiding sharp bends.

When there is more than one System 2000 panel cabinet located together, you need to establish a "unified ground point" for termination of your ground. This unified ground point then becomes the point to which all Terminal #1 connections are made. Never daisy chain a ground from one System to another. Remember that a voltage transient from electrical noise or lightning will always find the path of least resistance to ground. This path must be kept as short as possible to direct the transient away from the System.

Failure to properly install and use an earth ground defeats all safety, lightning, static and electrical noise protection. Loss of programmed memory and erratic operation may also occur.

FAILURE TO CONNECT AN EARTH GROUND WILL VOID ALL LIGHTNING AND TRANSIENT PROTECTION BUILT INTO THE SYSTEM.

Transformer and Battery

Transformer

The main power source for System 2000 panel is a UL listed transformer. Primary 120V, 60hz, .48A / Secondary 16.5VAC, 40 VA. If the 16.5VAC output terminals are shorted, the internal fuse will open and the transformer will be useless. It should be noted that the fuse is impossible to repair. Attempting to repair it is dangerous and also voids the UL Listing! The transformer measures 2.75" x 2.625" x 3.875" (69.8 mm x 66.6 mm x 98.4 mm). It may not be used to power any other devices, other than the System. Refer to Figure 8.

CAUTION: This transformer has an internal fuse which cannot be repaired or replaced.

External Standby Battery

If AC power is lost, the System will operate normally by automatically switching to the standby lead-acid battery. The System charges this battery at a voltage of 13.8 volts. Operating time under battery standby conditions will vary depending upon system activity and the type of Card Readers or Keypads used.

Typical battery operation times are listed below and assume normal system activity and usage. These are only estimates, other factors that will effect battery operation time depend on battery condition, number of LEDS , type of readers, programmed relay time etc.

	4 amp/hr battery	6 amp/hr battery
1 or 2 Data Chip Readers	14 hrs.	20 hrs.
1 or 2 Keypads	14 hrs.	20 hrs.
1 Bar Code Reader	10 hrs.	15 hrs.
2 Bar Code Readers	08 hrs.	12 hrs.
1 Mag-Stripe reader	12 hrs.	19 hrs.
2 Mag-Stripe Readers	11 hrs.	18 hrs.
1 Proximity Reader	08 hrs.	13 hrs.
2 Proximity Readers	06 hrs.	10 hrs.
1 Wiegand Reader	13 hrs.	20 hrs.
2 Wiegand Readers	12 hrs.	18 hrs.

To install the battery, locate the supplied wire harness. It consists of a nylon plug attached to a pair of six inch red and black wires, each with a .187 inch spade terminal for connection to the battery. Observe polarity and connect the RED to Positive (+) and the BLACK to Negative (-). Plug the nylon plug into socket H1 located in the lower left hand corner of the circuit board. The battery may be connected after the AC power is connected. Allow 24 hours for the battery to reach full charge. Refer to Figure 8.

External Back-up Power

If you are using an external 12 volt back-up power supply that has its own back-up battery and charging circuit, and do not wish to use the supplied 4 amp hr. back-up battery, follow the instructions below. This modification will disconnect the charging circuit of the System 2000 panel.

- Remove power from the System 2000 panel
- Cut Diode D7 on the System circuit board
  The diode is located approximately 2" above Terminal #4 and just to the left of capacitor C2
- Cut the lead ends off the battery connector
- Connect the ends of the connector to your external power supply
- Apply power to the System 2000 panel

Battery Replacement

Modern maintenance-free sealed lead acid rechargeable batteries have an approximate life of three to five years, or 1000 charge/discharge cycles. When replacement is necessary, the battery must be replaced with a lead acid type of the same capacity (i.e. = 12 volts, 4 or 6 amp/hrs.). The connecting wires require .187 inch quick disconnect tabs. The recommended battery measures 3.5 in. x 2.75 in. x 4.0 in. and is manufactured by YUASA Battery Co., LTD., Part No. NP4-12. Installing a battery with less capacity will degrade the standby performance times and likewise installing a battery with more capacity will increase standby time.

CAUTION! Do not use dry cell or ni-cad type batteries. They may explode if connected to this System.

Testing The Battery

After the battery has been charged for at least 24 hours, the voltage measured across the battery terminals with the charging circuit still connected should be 13.5 to 13.8 volts. A digital voltmeter is required for this measurement.

To test the quality of the battery, disconnect the battery from the System and attach a 33 ohm, 10 watt resistor to the battery terminals with jumper leads or test clips. Measure the battery voltage with a voltmeter. If after 60 seconds, the voltage falls below 12.0 volts, the battery should be replaced. CAUTION! The 33 ohm resistor will get hot if the battery has a full charge!

Internal Lithium Battery

A coin shaped battery (BT1) is located in the upper right hand corner of the circuit board. This battery is used to run the system clock and backup the memory (RAM). As shipped, the battery *is* connected to the clock but it *is not* connected to the memory. To install this jumper, the battery may be placed "in circuit" to provide memory backup by installing a jumper on pins 1&2 of the three pin header H4 which is located just above the TP1 and SCKT 6, in the upper right hand corner of the circuit board. This battery will retain memory for approximately 30 days.

Wiring Surge Protection

The wire between the transformer and the System 2000 panel should be two conductor, stranded or solid, low voltage wire of at least 18 AWG. Using a one nanosecond surge protection device installed at the 120VAC outlet, the wire between the 16.5VAC transformer and the System must be at least ten feet long. The reason is: high voltage transients travel about one foot per nanosecond. A one nanosecond device will require at least one nanosecond for it to "start" clamping the surge and in one nanosecond, the destructive voltage has already traveled one foot towards the System. A ten foot long connection will provide a safe margin. The idea is to have the clamping action in place before the high voltage gets into the equipment.

Wire

We recommend eight conductor, non-twisted pair with shield, 22 AWG because it's common and generally available. Plenum cable is available from Corby also. Do not use four pairs of twisted type cable.

Typical wire specifications for Keypads, Card Readers, and Data Chips* is an eight conductor, 22 AWG stranded multiconductor with overall foil shield and non twisted pair; .032 in. (.81mm) PVC jacket, insulation thickness .010 in. (.25mm), mutual capacitance per ft. 25-30 pf/ft. 300v, 80 degrees (C), UL style No. 2464, CSA type SR-PVC. This wire must be multiconductor and not twisted pair. It should be noted that all multiconductor wire has some overall twist, which is OK to use. The use of any other wire is experimental and not supported by Corby. Any unused conductors may not be connected to ground or doubled up with active wires. In some applications where not all features are used a cable with less conductors can be used.

Door Locks and Transformer connections require a two-conductor, 18 gauge wire (most popular is jacketed multiconductor or twisted pair is also acceptable).

**** Data Chip wire length can be extended by using a twisted pair for the data and negative wires of the reader only. This optional method is the exception to the non-twisted rule. See the wiring diagram for Data Chip readers for more information.***

WARNING! Class II wiring practices must prevail as defined by the National Electrical Code. Wiring that carries AC voltage may not be run in the same conduit or next to DC wiring of the System 2000 panel. Depending on voltages and the actual type cable used, System operation may be a problem in areas with high electrical noise. It is best to not run wires on or near fluorescent light fixtures.

Keypads

Overview

Keypads are designed to be flush or surface mounted on a wall about 60 inches above the floor level. They have factory installed LEDS to provide the end user with visual feedback of the door/relay status. If the Keypad is an outdoor version and will be mounted in a humid location, protect the wire terminals from corrosion by applying a light coat of silicone grease or other protective caulk to the terminals. They may be installed in standard electrical back boxes or on surface boxes using standard electrical hardware. Use the supplied mounting template, nylon or lead plugs, and screws.

Keyboard data is BCD encoded and multiplexed making code duplication virtually impossible by shorting or crossing data lines. Tamper-proofing schemes are not necessary. Custom back boxes are available from Corby.

Status LEDS

Keypads have LEDS to indicate door operation. Most have a red and green LED. The System activates the green LED when the door opens and the red LED when the door closes, ie. in a flip/flop fashion. It may be desirable to operate only one LED since an illuminated red LED may attract attention in an outdoor application.

All LEDS have built-in resistors and will operate at 12VDC @ 18ma. The yellow lead is negative and the red lead is positive.

Back To Back Keypads

It is also possible to install two Keypads back to back at the same door by wiring both Keypads in parallel and connecting both of them (with only one home run) to the same System 2000 panel. This type of installation will open the door anytime a valid code is used at either of the Keypads but will only show the port used as a single port. This specific type of installation does not support Anti-Passback or in/out reports and requires the use of a code to open the door from any direction.

Anti-Passback with Digital Keypads

The Anti-Passback feature requires two Keypads to be used at each door (one inside the protected area and one outside). The outside Keypad is connected to Port 1 and the inside Keypad to Port 2. Users must first enter using Keypad #1 before they can exit using Keypad #2.

Keypad Tamper Methods

If the Keypad will be mounted outside in a public area subject to vandalism, or if it could be removed from the original installation site by unauthorized personnel, it is recommended that a backbox with tamper switch(s) or tamper screws be used in conjunction with an alarm circuit to secure the installation. Use a Corby Model 11, 12 or 14 backbox.

Note: Keypads were not investigated by UL during the testing of this product.

Keypad Styles

Choose one of seven Corby Keypads.

Indoor Keypads:
4010 - flush mount, with one green LED.
4014 - surface mount hidden view, with one green and one red LED.
4063 - flush mount heavy duty, for high usage with one green and red LED.

Outdoor Keypads:
4012 - flush mount, aluminum housing, green and red LED and a night light.
4062 - heavy duty, mounted in a lock box w/ a gooseneck, green and red LED.
4064 - surface mount, heavy duty, mounted in a lock box, green and red LED.
4066 - flush mount, heavy duty for high usage, green and red LED.

Keypad Wire Runs

Keypads may be 1000 feet from the System 2000 panel. Wire must be multiconductor (not twisted pairs) and MUST be 8 conductor shielded. (Refer to Figure 9).

Keypad Ground

All System Keypads have an earth ground screw terminal for attaching the foil shield drain wire of the multiconductor cable. Do not connect this drain wire to the metal Keypad plate. Connecting a separate earth ground at both ends of the multiconductor keyboard cable is undesirable. The foil shields should only be connected to Terminal #1 of the System, which must be connected to an earth ground. (Refer to Figure 9).

CAUTION: The section of shield which is exposed, after stripping the cable, must be insulated to protect it from shorting out any components of the circuit board. Use a piece of heat shrink tubing, a piece of cable jacket or electrical tape. (Refer to Figure 7). This is extremely important when cables enter the cabinet under the circuit board.

The connection from the stripped end of the cable to earth ground (Terminal #1) should be as short as possible. The longer the drain wire the less effective the shield.

Keypad Connections

Connections from the wiring harness to the System 2000 panel terminal strip:
Yellow to #18 Green to #19 White to #20 Blue to #21 Black to #22

Your Color:	Terminal #:
_____	#18
_____	#19
_____	#20
_____	#21
_____	#22
_____	#1

LED Connections:

Green LED	Red to #29	Yellow to #30.
Red LED	Red to #29	Yellow to #31.

Readers

Overview

Readers are designed to be flush mounted or surface mounted on a wall depending on the type used. They have factory installed LEDS to provide the end user with visual feedback of the door/relay status. Mount the Reader in a vertical or horizontal position. If the Reader is an outdoor version and will be mounted in a humid location, protect the wire terminals from corrosion by applying a light coat of silicone grease or other protective caulk to the terminals.

They may be installed in standard electrical back boxes (some Proximity or Data Chip models) or surface mounted using standard electrical hardware. Bar Code, Magnetic Stripe and Wiegand Card Readers normally supplied for the System are swipe-style, and are designed to be surface mounted. Swipe means there is an open slot in the unit where the Card is passed through in a rapid fashion. It is "swiped" through the reader slot. An insert reader is available for the Wiegand readers. Use the supplied mounting template, nylon or lead plugs, and screws if mounting the Reader directly to the wall.

The standard Proximity reader is a surface mount reader with a read range of 5-8". This reader is made to be surface mounted, or hidden behind drywall. Switchplate Readers are indoor and designed to be mounted on a standard wall box. Mullion readers are slim line and are designed to be mounted in a door frame.

Reader data is encoded making code duplication virtually impossible by shorting any of the data lines.

Status LEDS

Readers have a dual color LED that is normally red indicating that the reader is not active. When a valid Card is used, the red LED changes its color to green for the duration of the door release time. It then changes back to red when the "door open time" has elapsed or is canceled by a System "door closed" sense switch. When an invalid card is used, the LED will blink four times to indicate that the card used was not authorized at that port. If there is a wiring problem or parity error, the LED will blink twice.

Back To Back Readers

It is possible to install two readers back to back at the same door and connect both of them to one Port. It will open the door any time a valid Card/Data Chip is used at either of the readers but the printer will only show the Port used as a single Port. Of course, all other System data including the user ID and location will be recorded and/or displayed.

To mount Bar Code, Data Chip, Magnetic Stripe or Wiegand Readers on both sides of the door, connect the five wires together. These Readers will report as one. If you wish the Readers to report as a separate entry, two Ports must be used - each wired directly to the system.

Back to back mounting of Proximity Readers is possible if done properly. Standard size readers cannot be mounted directly back to back unless they are offset at least eight inches so that one is well outside the shadow of the other.

Grounding Readers

The foil shield of the cable running to all Readers should only be connected to Terminal #1 of the System, which must be an earth ground.

Bar Code Readers have an earth ground wire on the supplied cable. Attach this to the foil shield drain wire of the multiconductor cable. (Refer to Figure 10).

Data Chip Readers mounted on a metal plate (4302-4305), Magnetic Stripe and Wiegand Readers do not need to be grounded at the reader.

Proximity readers require the Shield to be attached to the Black wire at the Reader location through a .01 UF capacitor. (Refer to Figure 15).

CAUTION: The section of shield which is exposed, after stripping the cable, must be insulated to protect it from shorting out any components of the circuit board. Use a piece of heat shrink tubing, a piece of cable jacket or electrical tape. (Refer to Figure 7). This is extremely important when cables enter the cabinet under the circuit board.

The connection from the stripped end of the cable to earth ground (Terminal #1) should be as short as possible. The longer the drain wire the less effective the shield.

Anti-Passback with Readers

The Anti-Passback feature requires two Readers to be used at each door (one inside the protected area and one outside). The outside Reader is connected to port one and the inside Reader to port two. Users must first enter using Reader #1 before they can exit using Reader #2.

Readers and Keypads on the same Port

A "Card Reader and Keypad" or a "Data Chip Reader and Keypad" can be wired to the same Port or Door. This door can be programmed as a *"or"* Port or an *"and"* Port.

If the System 2000 panel is programmed for *Card or Keypad* the Reader can be used to operate the door lock *or* the Keypad can be used.

If the System 2000 panel is programmed for *Card and Keypad* the card or data chip must be used at the reader *and* that same card or data chips PIN number must be entered on the Keypad to operate the door lock.

Bar Code Readers

Overview

Corby Bar Code Readers will only work with Bar Code Cards that use CODE 39 symbology. The reader will process the first ten digits as the user code. The first five digits must be 00000. The second set of digits (five) is the user code which can be 00000 to 99999. Corby cards 4151 are programmed with the above specifications.

This is an infrared reader. It is possible to read Cards that have an opaque polyester film covering the Bar Code. This film is used to protect the Bar Code from damage and prevents duplication through copying. Corby Cards Model 4151 have this protective film. Cards must be printed using a carbon based ink.

This weatherproof reader is configured to produce a magnetic card type Clock & Data output in ABA track II format.

Bar Code Reader Styles

Corby Bar Code Readers are available in an indoor/outdoor swipe, surface mount version (black). The reader is equipped with a wire harness for all connections.

Bar Code Cards

The reader will process the first ten digits as the user code.

Corby 4151 Card Format: The first five digits must be 00000. The second set of digits (five) is the user code which can be 00000 to 99999.

Card Format: (00000ccccc)
00000.....Leading Zeros
ccccc..... .User Code

It is also possible to read Code 39 Bar Code cards with any 16 digit code. This allows the use of existing cards.

Bar Code Reader Wire Runs

These Readers require a minimum of five wires with shield. Bar Code Readers are limited to 500 feet from the System 2000 panel. If distances greater than 500 feet are necessary a Line Extender Module (Corby P/N 4056) must be installed. Wire must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDS and RTE switches may use the extra wires. Refer to Figure 10.

Bar Code Reader & LED Connections

All wire connections are made from the wiring harness to the System 2000 panel terminal strip.

So you can keep track of your color codes used in this installation, write in the color match below:

Harness Color:	Your Color:	Terminal #:
Yellow	_____	#22
Black	_____	#22
Green	_____	#23
Purple	_____	#24
Red	_____	#28
Brown	_____	#30
Shield	_____	#1

Data Chip Readers

Overview

Data Chips contain an internal electronic memory chip which is bonded inside a stainless canister. When both the top and side of the chip canister make contact with the reader, the Data Chip is powered and a communication path is established. The chip's information is then read and transmitted to the Access Control System. The shape of the Data Chip and reader allows the chip to be read at virtually any alignment.

Data Chip Reader Styles

The basic and slim-line readers are compact enough to fit on a narrow aluminum door frame. Their low profiles easily blend with existing architecture. Corby stocks a number of reader mounting plate styles to suite your application. Single gang and slim-line mullion versions are available with either one or two LEDS. The single gang unit measures 2.75" wide by 4.5" in length. The mullion unit measures 1.375" wide by 3.125" in length. The basic reader is also available without a plate. This unit measures .83" in diameter, .40" surface depth, with an overall depth of .88". The reader has no electronics and can be located up to 500 feet from the System 2000 panel.

Data Chip Readers:

- 4302 - singe gang plate, read head, with one green 12VDC LED
- 4303 - singe gang plate, read head, with one green and one red 12VDC LED
- 4304 - slim line plate, read head, with one green 12VDC LED
- 4305 - slim line plate, read head, with one green and one red 12VDC LED
- 4306 - read head, with one green and one red 12VDC LED
- 4307 - slim line, surface mount, backlit, with bi-color 12VDC LED

Data Chips

Corby Data Chips can be used as an alternative to Cards and Keypads. Data Chips resist dirt, moisture, corrosion and static discharge. This superior design allows the Data Chip to be easily attached to any smooth surface including existing photo ID cards or badges and keychains.

When the Data Chip is touched to the reader, 64 bits of digital data is transferred from the Data Chip to the reader. Unlike keys or other security cards, the Data Chip is user-forgiving... it doesn't need to be precisely aligned to transfer its digital data. The Data Chip is about the size of two stacked dimes.

Data Chips:

- 4320 - Data Chip assembled on a keytag with Corby logo
- 4321 - Data Chip only - use with badges, photo ID cards, any smooth surface
- 4323 - Roll of double stick tape (dots) for adhering Data Chips

Data Chip Reader Wire Runs

These Readers require five wires with shield. Data Chip Readers are limited to 250 feet from the System 2000 panel. It must be multiconductor (not twisted pairs) 22 gauge and MUST be shielded. If you are using eight conductor cable, Corby LEDS and RTE switches may use the extra wires.

If you wish to exceed the 250 feet distance, a separate two-conductor ***twisted-pair*** wire must be used for the Data (grey) and the Ground (black) wires on the Data Chip Reader. It can be shielded, but our tests indicate slightly better distance can be achieved with unshielded wire. When using a two-conductor wire for these two connections, the maximum distance can be increased to 500 feet. The use of twisted-pair wire for this application is the exception to the rule since all other readers require non-twisted wire.

Data Chip Reader & LED Connections (Refer to Figure 11 or 12).

Connections from the Reader to the System 2000 panel terminal strip:
Black or Reader to #22 Grey of Reader to #25

LED Connections:

Green LED	Red to #29	Yellow to #30.
Red LED	Red to #29	Yellow to #31.

So you can keep track of your color codes used in this installation, write in the color match below.

Reader:	Your Color:	Terminal #:
Black	_____	#22
Grey	_____	#25
LEDS:		
Red of Green LED	_____	#29
Red or Red LED	_____	#29
Yellow of Green LED	_____	#30
Yellow of Red LED	_____	#31

Magnetic Stripe Card Readers

Overview

Corby Mag-Stripe Readers are available in indoor and outdoor versions. The reader is equipped with a wire harness for all connections. Magnetic Stripe readers read data on ABA track II.

Magnetic Stripe Reader Styles

The Magnetic Stripe reader measures 1.95" wide by 5.5" in length. They are surface mountable and protrude 1.30" from the mounting surface. The Magnetic Stripe Reader is available in two versions. A swipe reader is available for indoor use, and another for outdoor use. Readers can be installed up to 500 feet from the Access System.

For outdoor installations:
The electronics are coated for moisture protection. A tube of dielectric grease is supplied for the installer to field coat the connections to complete the procedure. After field connections are made, apply the grease to the RJ-11 jack to seal out the moisture.

Magnetic Stripe Readers:
- 4073 - Indoor, surface mount, swipe (black)
- 4075 - Outdoor, surface mount, swipe (beige)

Magnetic Stripe Cards:
- 4074 - For use with 4073 and 4075 readers

Magnetic Stripe Reader Wire Runs

These Readers require a minimum of five wires with shield. Readers may be 500 feet from the System 2000 panel. Wire must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDS and RTE switches may use the extra wires.

Magnetic Stripe readers are very sensitive to the supply voltage for proper operation. Minimum operating voltage for Magnetic Stripe readers is 4.75 volts DC measured at the reader. (Refer to Figure 13 or 14). Use 18 AWG for long wire runs that approach the 500 ft. Maximum. 22 AWG can be used for shorter wire runs up to 200 ft. It is also possible to double up on the conductors that supply power to the reader. In this way, 22 AWG may be used for longer wire runs as long as the voltage measures at least 4.75 volts at the reader.

Magnetic Stripe Reader & LED Connections

Indoor Magnetic Stripe Reader & LED Connections from the wiring harness:
Brown to #22 Green to #23 Yellow to #24 Red to #28

LED Connections:
Green of LED to #28 Yellow of LED to #30

Outdoor Magnetic Stripe Reader & LED Connections from the wiring harness:
Blk to #22 Grn to #23 White to #24 Red to #28 Orng & Brwn to #30

The Orange Wire is for the optional buzzer. It does not need to be connected.

A 1K OHM resistor must be connected between the Brown and the Red Wire for proper LED operation of the 4075 reader.

So you can keep track of your color codes used in this installation, write in the color match below

Indoor:	Color:	Terminal #:	**Outdoor:**	Color:	Terminal #:
Brown	_____	#22	Black	_____	#22
Green	_____	#23	Green	_____	#23
Yellow	_____	#24	White	_____	#24
Red	_____	#28	Red	_____	#28
Green of LED	_____	#28	Brown	_____	#30
Ylw of LED	_____	#30	Orange	_____	#30

Proximity Readers

Overview

Corby Proximity Cards are read when they are brought within reading distance of a Card Reader, typically 3”-36” depending upon the style of the reader. It is not necessary for the Card to have physical contact with the Card Reader for a read to occur.

Corby Proximity Readers are available in a variety of indoor and outdoor versions.

When a Proximity Card is presented to the reader, it is triggered into a transmission mode and the Card transmits a 30 bit digital signal to the reader by means of an electrostatic coupling. Proximity Cards do not have batteries to restrict their life but instead receive power to transmit as part of the trigger signal from the Card Reader. When a valid Card is presented the LED will flash and then turn to a steady green status for the relay time duration.

Unlike other Proximity systems which use resonant circuits as code elements, Corby/Motorolla ASP Cards actually contain miniature CMOS circuits. These cards can also be read while still in a wallet or purse. In addition, readers may be installed behind walls for enhanced security, and *some* models may be mounted on a solid metal surface. Readers should not be mounted within a few feet of a PC monitor since this may reduce the read range.

Proximity Reader Styles

Standard size readers measure 5.5 X 4.5 inches. They are surface mountable and protrude 1.375 inches from the mounting surface. Typical read distance is 5-8 inches but this may vary depending on the installation. There is an outdoor weatherproof version and an indoor version. Both have a bicolor LED and beeper for audible status.

Wiegand size proximity readers measure 5.25 X 2.25 inches. They are surface mountable and protrude 1.5 inches from the wall. These readers are designed to replace a standard Wiegand style swipe reader. Read distance is up to 4 inches. This is an indoor and outdoor reader in black only. This style reader may be mounted on a metal surface.

Switchplate size readers are also available. This reader measures 3 X 4.625 inches and protrudes .5 inches from the mounting surface. Read distance is approximately 4-5 inches. This unit is beige in color. A bicolor LED indicator and beeper is included. This unit may be mounted to a single gang metal electrical junction box or on a flat wall. It will not operate on a solid metal surface. This unit is not for outdoor use.

Mullion size readers are only 1.6” wide and 5.5 “ high which means they will fit most 1.75” wide aluminum storefront door frames. The reader protrudes .5 inches from the door frame. Typical read distance is 3-4 inches. The reader (black) has a built-in bicolor LED indicator and beeper. These units are specifically designed to operate outdoors on a metal surface but will also operate on non-metallic surfaces.

Switchplate and mullion style readers best reading will occur by moving the card or tag at any convenient angle toward the reader rather than swiping it across. A slight read delay of approximately one second is normal. Hold the Card parallel to the reader within the read range and pull the Card away. The Card Reader LED will flash (and beeper sound - if connected) then the LED will switch to green indicating a valid card was read.

Motorola Proximity Card Readers:

- 4177 - Indoor/Outdoor Wiegand Style, black up to 4" read range
- 4178 - Indoor/Outdoor door frame mullion size, black, 3-4" read range
- 4179 - Indoor switchplate size, beige, 4-5" read range
- 4182 - Indoor surface mount, beige, 5-8" read range
- 4183 - Indoor/Outdoor surface mount, black, 5-8" read range
- 4184 - Indoor/Outdoor surface mount, bi-directional 12" read range
- 4186 - Indoor/Outdoor 30" read range requires 24V power supply

HID Proximity Readers

- 4173 - Indoor/Outdoor, 10" - 27" range
- 4174 - Indoor/Outdoor, 1" - 9" range
- 4175 - Indoor/Outdoor, 2" - 4" range
- 4176 - Mini Prox, mullion, 2" - 5" range

Proximity Cards

Corby Access Systems Proximity Cards and tags manufactured by Motorola, consist of three elements: power receiver, code generator, and electrostatic transmitter. Cards are credit card size: 1.125" X 3.375" X .070" Tags are ½ the size of the Cards but are slightly thicker and have a hole for a key chain. Each Corby Proximity Card contains 30+ bits of unique data. Duplicate Corby Proximity Cards are not available. Corby Proximity Cards have a 5 digit code which is the card holders PIN number for the System 2000 panel. Proximity tags generally have a reduced read range than the proximity cards.

Motorola Proximity Cards:

- 4190 - Credit Card size
- 4192 - Key tag size

HID Proximity Cards

- 4170 - 26 bit, Keyfob
- 4171 - 26 bit, Credit Card Size
- 4172 - 26 bit, Iso Proximity, Photo ID

Proximity cards manufactured by HID are 26 bit Wiegand standard cards.

Proximity Reader Wire Runs

These Readers require a minimum of five wires with shield. Proximity Readers are limited to 500 feet from the System 2000 panel. If distances greater than 500 feet are necessary a Line Extender Module (Corby P/N 4056) must be installed (use only with 30-bit cards). Wire must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDS and RTE switches may use the extra wires.

Proximity Readers are very sensitive to voltage drop in long wire runs. It's best to use 20 or 18 gauge wire for runs which exceed 100 ft. Read range decreases significantly as the voltage at the reader drops below 12VDC.

So you can keep track of your color codes used in this installation, write in the color match below

Motorola

Harness Color:	Your Color:	Terminal #:
Black	_____	#22
Green	_____	#23
White	_____	#24
Red	_____	#29
Brown	_____	#30
Blue	_____	#30

HID MiniProx

Harness Color:	Your Color:	Terminal #
Black	_____	#22
Green	_____	#23
White	_____	#24
Red	_____	#28
Orange	_____	#30
Yellow	_____	#30

HID Proximity

Harness Color:	Your Color:	Term #
Black	_____	#22
Green	_____	#23
White	_____	#24
Red	_____	#29
Orange	_____	#30
Yellow	_____	#30

HID MaxiProx

Harness Color:	Your Color:	Terminal #:
Black	_____	#22
Green	_____	#23
White	_____	#24
Red	_____	Connect to 24VDC Power Supply
Orange	_____	#30
Yellow	_____	#30

Wiegand Readers

Overview

All wire connections are made using the screw terminal located on the back of the reader. Readers can be installed up to 500 feet from the Access System. Wiegand Readers normally supplied for the System are swipe-style, and are designed to be surface mounted. A swipe style reader has an open slot in the unit where the Card is passed through sideways from right to left in a rapid fashion. Mount the Reader in a vertical or horizontal position. If the Reader is used outdoors, or mounted in a humid location, protect the wire terminals from corrosion by applying a light coat of silicone grease to the terminals. It may also be necessary to mount the reader with the "slot" on the bottom of the reader, to keep snow and ice out of the slot. A flush mount, insertion reader style of reader is also available.

Wiegand Reader Styles

Wiegand Card Readers are available in three versions. All Wiegand Readers are weatherproof.

Wiegand Readers:

- 4042 - Indoor/Outdoor, surface mount, swipe (beige)
- 4044 - Indoor/Outdoor, surface mount, swipe (black)
- 4046 - Indoor/Outdoor, flush mount, insert (black)

Wiegand Cards

These Cards use high security Wiegand effect wires embedded inside the vinyl. Each Card is unique and contains 30 high security data bits. Duplicate Cards are not available. They are virtually impossible to counterfeit or duplicate. Each Card contains a site code, company ID and the five digit encoded Card Number. The five digit number of the card is also part of the Cardholders PIN for the System. These numbers are placed on the Card with a printed label during testing and may be removed prior to putting the Card into use. Cards are available in a standard format, and four Photo ID formats. Custom Cards with unique artwork on either side are also available.

Cards are sequentially numbered. Starting/Ending numbers cannot be specified prior to ordering.

Wiegand Cards:

- 4047 - Plain white photo ID
- 4048 - Corby logo photo ID
- 4049 - Standard Card with Corby graphics

Wiegand Reader Wire Runs

These Readers require a minimum of five wires with shield. Wiegand Readers are limited to 500 feet from the System 2000 panel. If distances greater than 500 feet are necessary a Line Extender Module (Corby P/N 4056) must be installed. Wire must be multiconductor (not twisted pairs) and MUST be shielded. If using eight conductor cable, Corby LEDS and RTE switches may use the extra wires.

Wiegand Reader & LED Connections from the Reader to the System 2000 panel: (Figure 19). GND to #22 LED (-) to #30 DATA 0 to #23 DATA 1 to #24 (+) 5VDC to #28 HOLD - Not Used

So you can keep track of your color codes used in this installation, write in the color match below:

Harness Color:	Your Color:	Terminal #:
GND	_____	#22
LED (-)	_____	#30
DATA 0	_____	#23
DATA 1	_____	#24
(+) 5VDC	_____	#28

Door Locks

Direct Current (DC) door strikes or DC magnetic door holding devices (mag locks) require a diode be installed across the door lock coil. A 1N4001 diode or equivalent is wired at the door lock, parallel to the coil with the striped end (cathode) to the positive side of the coil.

Door Strike Overview

ANSI Door Strikes are designed to minimize installation time in all standard door frames and strike plates. If a time schedule is necessary, and a door strike is specified, a continuous duty Door Strike must be used. AC door strikes are not recommended because they generate electrical noise and Electro-magnetic interference.

Door Strike Wiring

Door Strikes that draw less than 1 amp can be wired to the System with 20 AWG solid or stranded wire for runs up to 50 ft. For longer runs or for door strikes that draw more than one amp, use 18 AWG, or larger, wire. Power for all door locking devices must be supplied from external power sources, no lock power is available from the System 2000 panel. AC door strikes are not recommended and should not be used.

Magnetic Lock Overview

The Corby 12VDC Magnetic Locks are extremely well suited for high traffic doors; there are no bars, bolts, safety latches or other moving parts that can stick or bind and thus prevent exit.

The Magnetic Lock is Fail Safe, the door is unlocked when the power is interrupted. Since they use DC, they operate silently, without any buzz or hum. They are rated at 1500 lbs of holding force.

Typical uses are securing emergency exits, escape doors or any other Access Controlled door.

Magnetic Lock Wiring

Magnetic Locks that draw less than 1 amp can be wired to the System with 20 AWG solid or stranded wire for runs up to 50 ft. For longer runs or for Magnetic Locks that draw more than one amp, use 18 AWG, or larger, wire. Power for all door locking devices must be supplied from external power sources, no lock power is available from the System 2000 panel.

Door Ajar / Forced Entry / Time Cancel

Door Ajar & Forced Entry

Door Ajar & Forced Entry require a switch that is a "closed circuit" when the door is closed. When the door opens, the switch contacts open. Shielded two conductor cable is required. This connection can be made utilizing the same cable as the Card Reader or Keypad provided that the eight conductor shielded cable is used. Refer to Figures 9 - 19.

The System can sense when a door (or switch) is opened, the length of time it remains open, when it's closed, and if programmed to do so, activate any of the auxiliary outputs.

Door Ajar

If the door is not closed before the programmed strike time has elapsed plus five seconds, a “Door Ajar” event will be generated with the door location, time & date. This event can be used to activate any of the auxiliary outputs.

Forced Entry

A Forced Entry condition is created when a door is opened prior to a valid code, Card entry or Request-To-Exit. Any of the System’s auxiliary outputs can be programmed to activate.

Time Cancel

After a valid door opening, the System can sense when a controlled door is first "opened", and then "closed". As soon as the door is closed, the System will cancel any remaining door release time and reset it to zero. Even if the door release time is set to 250 seconds, as soon as the person enters and the door is closed, the door will be re-locked. This prevents follow throughs.

The Time Cancel feature is disabled if the relay for that Port is programmed for latching operation.

Zone Inputs

Zone Inputs require a switch that is a "closed circuit" when the door is closed. When the door opens, the switch contacts open. Shielded two conductor cable is required for this connection.

You can use a standard Magnetic Contact typically used in alarm installations to monitor a door or window. Passive Infrared detectors may also be used to monitor larger areas like a hallway. When activated, a Zone on or off event is generated and this Zone condition can be programmed to trigger any of the auxiliary outputs. A Zone Input is available for each door that is in use. (Refer to Figure 24).

Request-To-Exit Button (RTE) / Passive Infrared

With the addition of a Normally Open “button” or Passive Infrared device, the door relays can be activated to release the door locks. The RTE must have a set of normally open contacts that close a circuit when activated. It is also recommended to break power to the electromagnetic door lock (Mag-Lock) with a separate set of contacts in the RTE switch. These extra contacts must be a normally closed circuit that breaks power to the Mag-Lock when activated.

The Request-To-Exit (RTE) function is used to allow emergency exit from a locked area without having to use the Keypad or Reader. This function can also be activated from a remote guard location to open or close doors on command. The System supports up to two "normally open" RTE switches. When the main relays are set for latching, the RTE switch will activate the relay (toggle) each time the switch is used.

RTE Wiring

The RTE or Passive Infrared can be located up to 500 ft. from the System 2000 panel.

You must ensure that the RTE wire from Terminal #27 Never can be accessed by unauthorized personnel at any location where the Keypad or Card Reader Wires are available. During Installation, breakout Terminal #27 wire prior to the Keypad or Reader site and run it direct to the RTE switch. If the Terminal #27 wire is shorted to Terminal #22, the door will Open!

RTE Ground

Request-To-Exit (RTE) buttons do not need to be grounded at the RTE location. The shield of the cable running to the RTE should be connected to Terminal #1 of the System 2000 panel, which must be an earth ground.

RTE, Lamp & LED Connections

RTE’s may be located up to 500 ft. from the System. Generally they are wired using the same cable that is used for the Card Reader. RTE p/n 4035 contains a “Bayonet Base” LED lamp to illuminate the button. This LED amp draws very little current and far outlasts an incandescent bulb. Polarity must be observed when connecting to this LED. **CAUTION!!! The LED must not be replaced with an incandescent “Bayonet Base” bulb when used with the System 2000 panel because it will draw too much current and exceed the maximum allowed by the System.** (Refer to Figures 9 - 19).

Fail Safe Operation for RTE

RTE p/n 4035 and 4135 have two sets of contacts. The open set of RTE contacts is used to trigger the RTE input on the System which will unlock the door for the programmed relay time. The closed set of RTE contacts should be used to break the power to the magnetic lock. This provides an extra margin of safety to exit if the System is taken down or goes off-line for any reason.

Heavy-Duty RTE Button (p/n 4035) Use the following wire connections.
Normal Operation:
Green Set of Contacts (3 & 4) to #22 & #27
Lamp to #22 & #29
Green LED to #28 & 30

Fail Safe:
Red Set of Contacts (1 & 2) to #34 and Positive side of Magnetic Lock coil
Lamp to #22 & #29
Green LED to #28 & 30

Light-Duty RTE Button (p/n 4135) Use the following wire connections.
Normal Operation:
Green Set of Wires to #22 & #27
Green LED to #28 & 30

Fail Safe:
Blue Set of Wires to #34 and Positive side of Magnetic Lock coil
Green LED to #28 & 30

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CHAPTER 6

NETWORK INTERFACE CONTROLLER (NIC) INSTALLATION

PLAN THE JOB
UNDERSTAND THE EQUIPMENT
READ THE MANUAL

This short section is included in this manual to aid you in analyzing the job requirements to ensure that the System will perform to specifications and that the job will be completed successfully.

Mounting the Network Interface Control Cabinet

The cabinet must be mounted in a dry secure area. *It is not waterproof*. It contains all the electronic circuits which control the communications between the Network Interface Controller (NIC), the PC and the System panels.

The NIC must be mounted within fifty (50) feet of the PC. This ensures proper communication with the PC at a data rate of 115K baud.

Corby supplies an actual size paper mounting template. Position the template in place and mark the exact center of all four mounting screws. Installation is easier if you pre-drill the screw holes. Using #8 pan-head screws, install the top two screws and tighten to within 1/16 in. (about the thickness of a penny). Hang the NIC on the top two screws and slide it down so the screws align in the cabinet slots. Install the bottom two screws and tighten securely. Do not attempt to adjust or tighten the top two screws. The cabinet contains ¾" and 1¾" knockout holes for installation of interconnect wires.

Earth Ground

This is **very important** because the NIC must be protected from voltage transients, static, and lightning discharges for proper operation and long life. The ground connection should be made to a proper ground as defined by the National Electrical Code. Refer to the *Shield and Grounding Layout*. (Figure 33).

CAUTION: The section of shield which is exposed, after stripping the cable, must be insulated to protect it from shorting out any components of the circuit board. Use a piece of heat shrink tubing, a piece of cable jacket or electrical tape.

This is extremely important when cables enter the cabinet under the circuit board.

The connection from the stripped end of the cable to earth ground (Terminal #1) should be as short as possible. The longer the drain wire the less effective the shield.

Voltage transients must be kept out of the cabinet for proper, successful, and continued operation. This can only be done by diverting these high-voltage transients to a good earth ground.

DO NOT OPERATE THIS SYSTEM WITHOUT A GOOD EARTH GROUND

Run at least a 14 ga. wire from a suitable earth ground to Terminal #1 of the NIC. A suitable ground could be a cold water pipe or building ground. The ground you use must be bonded to the main electrical ground as defined by the National Electrical Code. Proper bonding is required for safety reasons and to prevent flashover in an electrical storm. If you are not sure you have a good ground, measure the difference in ohms between electrical ground and your earth ground. If it exceeds five ohms, one of the two grounds is not a good earth ground and will need to be corrected. Ground wire runs should be as straight and direct as possible avoiding sharp bends.

Never daisy chain a ground from the NIC to a System panel. Remember that a voltage transient from electrical noise or lightning will always find the path of least resistance to ground. This path must be kept as short as possible to direct the transient away from the NIC.

Failure to properly install and use an earth ground defeats all safety, lightning, static and electrical noise protection. Loss of programmed memory and erratic operation may also occur.

FAILURE TO CONNECT AN EARTH GROUND WILL VOID ALL LIGHTNING AND TRANSIENT PROTECTION BUILT INTO THE SYSTEM.

Transformer and Battery

Transformer

The main power source for the NIC is a UL listed transformer. Primary 120V, 60hz, .48A / Secondary 16.5VAC, 40 VA. If the 16.5VAC output terminals are shorted, the internal fuse will open and the transformer will be useless. It should be noted that the fuse is impossible to repair. Attempting to repair it is dangerous and also voids the UL Listing! The transformer measures 2.75" x 2.625" x 3.875" (69.8 mm x 66.6 mm x 98.4 mm). It may not be used to power any other devices, other than the NIC. Refer to Figure 32.

CAUTION: This transformer has an internal fuse which cannot be repaired or replaced.

External Standby Battery

If AC power is lost, the NIC will operate normally by automatically switching to the standby lead-acid battery. The NIC charges this battery at a voltage of 13.8 volts. Operating time under battery standby conditions vary.

To install the battery, locate the supplied wire harness. It consists of a nylon plug attached to a pair of six inch red and black wires, each with a .187 inch spade terminal for connection to the battery. Observe polarity and connect the RED to Positive (+) and the BLACK to Negative (-). Plug the nylon plug into socket H1 located in the lower left hand corner of the circuit board. The battery may be connected after the AC power is connected. Allow 24 hours for the battery to reach full charge. Refer to Figure 32.

External Back-up Power

If you are using an external 12 volt back-up power supply that has its own back-up battery and charging circuit, and do not wish to use the supplied 4 amp hr. back-up battery, follow the instructions below. This modification will disconnect the charging circuit of the NIC.

- Remove power from the NIC
- Cut the lead ends off the battery connector
- Connect the ends of the connector to your external power supply
- Apply power to the NIC

Battery Replacement

Modern maintenance-free sealed lead acid rechargeable batteries have an approximate life of three to five years, or 1000 charge/discharge cycles. When replacement is necessary, the battery must be replaced with a lead acid type of the same capacity (i.e. = 12 volts, 4 or 6 amp/hrs.). The connecting wires require .187 inch quick disconnect tabs. The recommended battery measures 3.5 in. x 2.75 in. x 4.0 in. and is manufactured by YUASA Battery Co., LTD., Part No. NP4-12. Installing a battery with less capacity will degrade the standby performance times and likewise installing a battery with more capacity will increase standby time.

CAUTION! Do not use dry cell or ni-cad type batteries. They may explode if connected to the NIC.

Testing The Battery

After the battery has been charged for at least 24 hours, the voltage measured across the battery terminals with the charging circuit still connected should be 13.5 to 13.8 volts. A digital voltmeter is required for this measurement.

To test the quality of the battery, disconnect the battery from the System and attach a 33 ohm, 10 watt resistor to the battery terminals with jumper leads or test clips. Measure the battery voltage with a voltmeter. If after 60 seconds, the voltage falls below 12.0 volts, the battery should be replaced. CAUTION! The 33 ohm resistor will get hot if the battery has a full charge!

Wiring Surge Protection

The wire between the transformer and the NIC should be two conductor, stranded or solid, low voltage wire of at least 18 AWG. Using a one nanosecond surge protection device installed at the 120VAC outlet, the wire between the 16.5VAC transformer and the NIC must be at least ten feet long. The reason is: high voltage transients travel about one foot per nanosecond. A one nanosecond device will require at least one nanosecond for it to "start" clamping the surge and in one nanosecond, the destructive voltage has already traveled one foot towards the NIC. A ten foot long connection will provide a safe margin. The idea is to have the clamping action in place before the high voltage gets into the equipment.

Wire

We recommend two conductor, twisted pair with shield, 22 AWG wire to connect the System's to the NIC. 18 AWG should be used for the 16.5 VAC.

WARNING! Class II wiring practices must prevail as defined by the National Electrical Code. Wiring that carries AC voltage may not be run in the same conduit or next to DC wiring. Depending on voltages and the actual type cable used, System operation may be a problem in areas with high electrical noise. It is best to not run wires on or near fluorescent light fixtures.

Personal Computer (PC)

Serial data is sent to and received from a PC via a RS232 data link which requires a 9-pin male connector (P1). The baud rate is factory set at 115K. The number of data bits is 8, there is one stop bit and no parity.

A standard 6' serial cable is included for connecting the PC and NIC. If a longer cable is needed, you may use a standard serial cable. **Be sure this is a "straight-through" and *not* a "null-modem" cable.** These are available in 3', 6', 10', 15' and 25' lengths from computer dealers and resellers.

For cable runs which require longer distances, and/or runs through conduit, you may want to use multi-conductor wire and solder the connections.

PC Wiring

The PC requires a five conductor, 22 or 24 gauge stranded wire, with an overall shield. Maximum cable length from the NIC to the PC is 50 ft.

PC Connections

You will need a 9 pin female "D" connector at the NIC and a 25 pin male "D" computer connector at the PC. Note: Some PC's require a 9-pin connector. Refer to Figure 34.

If soldering your own cable, use a five conductor, shielded wire to make the following connections:

9 Pin Connector (P1 - NIC)	**25 Pin Male DB25 Connector (PC):**
Pin #2	Pin #3
Pin #3	Pin #2
Pin #5	Pin #7
Pin #7	Pin #4
Pin #8	Pin #5

DO NOT CONNECT THE FOIL SHIELD TO PIN #1 OF THE 25 PIN "D" CONNECTOR.

Plug the 25 pin "D" connector into the COM port on the rear of the PC.

CHAPTER 7

SYSTEM 2000 OPERATION

Programming Functions

Programming is accomplished using a PC running Microsoft Windows® 95, 98, 2000 or NT.

User Functions

Users can gain access through a Keypad, Bar Code, Data Chip, Magnetic Stripe, Proximity or Wiegand Card Reader. Five possible results can occur when a user enters a code or card. Each one is outlined below and assumes a user number of 0101:

1) When the valid code for user number 0101 is entered any or all of the programmed outputs will activate. A Valid User message, user number, door, time, and date will be displayed.

2) When a valid code is entered outside the programmed time schedule the output(s) will not activate. A Door Permission message, user number, door, time, and date will be displayed.

3) When a valid code is entered on a port that it does not have permission for the output(s) will not activate. A Door Permission message, user number, door, time, and date will be displayed.

4) When an invalid code is entered the output(s) will not activate.
An Invalid Keypad Code message, user number, door, time, and date will be displayed.

5) When an invalid card is used the output(s) will not activate.
An Invalid Card message, user number, door, time, and date will be displayed.

Door Functions

Time Cancel

When the door is closed before the allotted time, any remaining programmed door release time will be canceled. This prevents unauthorized "follow throughs".

Door Ajar

After a valid entry or exit, if the door is held open five seconds beyond the programmed door release time, an event is generated and a “Door Ajar” message will be displayed by the System 2000 application. When the door closes, a “Door Closed” event is generated and a message will be displayed by the System 2000 application.

Forced Entry

If the door is opened without first using a valid code or by using an RTE button, an event is generated and a “Forced Entry” message will be displayed by the Windows® software.

Request-To-Exit

When the RTE button is pushed, the main relay will close for the programmed door release time, an event is generated and a “Request To Exit” message will be displayed by the System 2000 application.

Status of AC Power

If AC power is lost and the System has a standby battery connected, a message will be displayed by the Windows® software. When AC power is restored a message will be displayed by the System 2000 application.

Reset

System 2000 has a "watchdog" circuit that resets automatically on power up or when electrical noise interrupts the microprocessor. A manual reset button can also create a reset condition. When a reset occurs, a “System Reset” event will be created and two “Module Reset” messages will also be displayed on the PC’s monitor. Other messages may also appear on the PC’s monitor: “Forced Entry” and “Zone On” events will be created if connections to these terminals are not completed and their inputs are open.

User Numbers

System 2000 uses of two sets of numbers to organize its data. One is the user number, the other is the code number. When programming users, the System first requests a user number of four digits, it will later request the code or Card Number. When a code is deleted from the System its user number becomes available to be used again. User numbers, not the card or keypad number, are displayed when a valid code is used at the Keypad or Reader. Card or Keypad numbers are only displayed when they are not programmed into the System.

Time Schedules

System 2000 has sixteen programmable time schedules which act as user selectable time clocks. Time Schedules can be assigned to user codes to limit access. They can also be assigned to the door relay(s) for automatic activation and deactivation. In each time schedule there are 64 time cells.

User Time Schedules

Time restriction is a very useful management tool used to restrict user access at preset times of the day or week. A user code can have up to sixteen time schedules assigned to it. When a user enters a code the System checks if the code is valid, and also if the user is allowed access at the time of code entry. Start time for a user refers to the time of day when the user code becomes valid. End time for the user refers to the time of day when the user code/ becomes invalid. The user code is valid between the start and end time of the time cells assigned to it in the schedule.

If a user is allowed 24 hour access seven days a week, a schedule is NOT needed for access and should not be assigned.

Relays & Time Schedules

Auto relay activation is a very powerful security management tool that can lock/unlock a door or gate, arm/disarm an alarm system, or control energy management systems without any user involvement. The System can automatically activate the Door Relay(s). The start time for a schedule refers to the time of day when the Relay automatically activates. End time for a schedule refers to the time of day when the Relay automatically deactivates. This activation and deactivation refers to the relay contacts physically changing states. The relay will be in the active state between the start and end time for any time zone.

Caution must be used when assigning a schedule to a relay. If a time schedule is assigned to the door relay in the middle of a valid time zone, the relay activates as soon as the System is returned on-line.

Auxiliary Outputs

The System has four auxiliary outputs that can be triggered from any system event. User codes and time schedules can also trigger these outputs. These outputs can be momentary (65,535 seconds) or latching on/off-on/off.

Clearing the Keypad

The X button can be used before entering a code on a Keypad to clear Keypad buffer. After the code has been entered, the # must be pressed to complete the operation. Using the # as an "Enter" key allows various keypad code lengths of one to nine digits.

Keypad and Reader Operation

Keypads can be used along with any of the Reader technologies supported by the System. A Keypad and a Reader may also be used together. When using a card technology, you must have similar reader technologies on each System 2000. The System does not support different technologies on the same unit. Example: If using Data Chip on Door #1, and you wish to add another reader on Door #2, it must be a Data Chip reader.

User LED Operation

Reader and Keypad LED outputs provide the user with feedback of System functions at the door location. These LEDs are linked to the Main door relays only.

The Green LED will go on solid for the programmed relay time whenever a valid user presents a card. It will flash four times for an invalid card and two times for an error in reading a card. A card error could be caused by incorrect wiring or an incorrect swipe. Failure to complete a swipe of the card or "dipping" the card may produce a card error. This feature allows system administrators a degree of trouble shooting for new and existing systems.

The Red LED output will be on solid except when a main relay is active for a valid user.

System 2000 Network LEDs

The System has two LEDs for monitoring RS485 communications. These LEDs are located in the lower right hand corner of the circuit board. The RS485 RXD LED indicates that the panel being observed is receiving data from the Network Interface Controller (NIC) and the RS485 TXD LED indicates that the panel is sending data to the NIC. The panel's RXD LED will flash only if it is being polled by the NIC.

NIC Network LEDs

The NIC has four sets of LEDs for monitoring RS485 communications. These LEDs are located on the right of the circuit board. The RS485 RXD LEDs indicate that the NIC is receiving data from the panel(s) on the selected channel. The RS485 TXD LEDs indicate that the NIC is sending data to the panel(s) on the selected channel.

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CHAPTER 8

NETWORKING

Introduction

Networking allows multiple System 2000 panels to be combined together into one System. This option permits 31 System units, at two doors each, to be linked into a 62 door System. If the 248 door upgrade is installed, the number of networked panels may be 124 for a total of 248 doors.

Once each unit is set up, all programming is accomplished using a PC with Windows® software. All users, door and schedule information is stored on each individual system panels. This distributed processing method insures rapid processing of user information for fast door access and allows continued operation even if the communication link is broken.

RS485 Communications

The System 2000 uses a high-speed RS485 bus for communications between the Network Interface Controller (NIC) and the System panels. The NIC supplies four RS485 channels. Each channel can communicate with System panels at a maximum length of 4000 feet. The RS485 bus requires a shielded, twisted pair of wires.

A two conductor, 22 gauge, twisted pair, shielded cable is needed to link the System panels to the NIC. The System utilizes a “multi-drop” wiring configuration, as opposed to a “home-run” from each RS485 channel to the panels.

NIC RS485 Communication Channels

The NIC contains four RS485 channels for communications to the networked System 2000 panels. Each channel can support a maximum of 31 System panels (p/n 2025) at a maximum of 4000 feet. The standard System 2000 has Channel #1 active. The 248 door upgrade must be purchased to activate Channels #2-4, and allow the NIC to support a maximum of 124 System panels (p/n 2025).

It is recommended that the total number of System panels are distributed between all four available channels. This will minimize the number of System panels “lost” due to a channel’s failure to communicate (ie. cut wire, lightning strike). The transmission of data between the NIC and the System’s panels is maximized by using all the available channels, as apposed to using one channel.

RS485 Wiring

Attach the wires to each RS485 channel being used on the NIC. Be sure the polarity is observed from the Network Interface Controller (NIC) to all of the System panels attached to the network. For example, most twisted pair cables have a copper conductor and a tin plated conductor. Using Channel #1 as an example, attach the tin conductor to Terminal #4 and the copper conductor to Terminal #5. All connections should wire directly to the screw terminals on the circuit board - do not make any "pig-tail" connections from the main RS485 bus. Attach the other end of the RS485 line to Terminals #14 & #15 on the System. To add additional panels to Channel #1's wire run, continue to "daisy chain" all connections using Terminals #14 & #15 of each System being added. Refer to Figure 29.

Network Interface Controller (NIC)	**System 2000 Panels**
Channel #1 - Terminals #4 & #5	to Terminals #14 & #15 of System 2000
Channel #2 - Terminals #6 & #7	to Terminals #14 & #15 of System 2000
Channel #3 - Terminals #8 & #9	to Terminals #14 & #15 of System 2000
Channel #4 - Terminals #10 & #11	to Terminals #14 & #15 of System 2000

The placement of the NIC can be located anywhere on the RS485 bus. Example: The NIC can be located in the center of the building with panels located on each side of it. In this example, two sets of wires will be attached to the RS485 screw terminals on this channel.

IMPORTANT: *Each end of the RS485 bus must have a 120ohm terminating resistor installed. In some applications, the NIC may be one end of the communication bus. In this instance a terminating resistor must be placed across Terminals #4 & #5, Terminals #6 & #7, Terminals #8 & #9 and/or Terminals #10 & #11. The terminating resistor must be installed across Terminals #14 & #15 of the first or last System 2000 panel on the bus. Failure to install these resistors will result in erratic operation of the entire System.* Refer to Figure 29.

Examples:
NIC û Panel #1 û Panel #2 û Panel #3 (A resistor is place on the NIC and Panel #3).
Panel #1 û Panel #2 û NIC û Panel #3 (A resistor is place on Panel #1 and Panel #3).

Trouble Shooting System 2000 Panels

If you are experiencing problems with the RS485 bus, follow the sequence of testing procedures below to verify there is communications between all units on the System.

RS485 Line Continuity and Impedance Test

U Remove all the units from the RS485 communication line.
U Attach an ohm meter between each wire of the RS485 communications line.
U The reading should be approximately 60 ohms.

If the reading is either above or below 60 ohms, you may have wired the termination resistors incorrectly. Refer to Figure 29.

If the reading is "infinity", the line is open somewhere on the RS485 bus. Check all connections.

RS485 Transmission Test

U Remove all the units from the RS485 communication line.
U Attach an AC volt meter between Terminal #14 and ground (Terminal #1).
U Enter program mode. Go to Option #18 - Networking, choose Test RS485 and press #.

AC voltage should be present between 1.9VAC and 2.2VAC. This voltage will last about 10 seconds.

U Put the meter between Terminal #15 and ground (Terminal #1).
U Enter program mode. Go to Option #18 - Networking, choose Test RS485 and press #.

AC voltage should be present between 1.9VAC and 2.2VAC. This voltage will last about 10 seconds. Now put the meter ***between*** Terminals #14 & #15.

U Enter program mode. Go to Option #18 - Networking, choose Test RS485 and press 3.

AC voltage should be between 3.8VAC and 4.4VAC. This voltage will last about 10 seconds. This test assures the RS485 transmission ability of this circuit board.

If the proper voltages are not present, the RS485 communications circuit may be damaged and the circuit board may have to be replaced.

RS485 Reception Test

When you have two circuit boards that have passed the transmission test, then wire these units back on the RS485 communication line.

Go back into programming and attempt to establish communications between the NIC and the System panel.

Visually inspect the panel. Look at the RS485 LEDs (lower right hand corner of circuit board). The RS485 RXD LED (Reception) should blink every second. If this LED is not blinking, this panel is not functioning properly.

Testing Additional Units

Additional units can now be tested for transmission ability. Refer to RS485 Transmission Test.

Once a unit passes the Transmission Test, it can be wired back into the RS485 bus. Now it must be checked using the Reception Test - see above. Continue to test and add additional units (one at a time) onto the RS485 bus.

CHAPTER 9

PC CONNECTION

Introduction

Getting Started

Determine which COM port you will be using for your connection to the Network Interface Controller (NIC).

Making the Connection

All COM ports on PC's are either 9 pin or 25 pin male connectors. To make the connection from the NIC to the PC, you will need a 5 conductor 22 gauge cable with an overall shield.

If you're using a 25 pin connection at the PC, follow the illustration in Figure 34.
Your connection should be:

9 Pin Connector (P1) - NIC	25 Pin Male Connector (PC Location)
Pin #2 - RXD	Pin #3 - RXD
Pin #3 - TXD	Pin #2 - TXD
Pin #5 - GND	Pin #7 - GND
Pin #7 - RTS	Pin #4 - RTS
Pin #8- CTS	Pin #5 - CTS

If your using a 9 pin connection at the PC, your connection should be:

9 Pin Connector (P1) - NIC	9 Pin Connector (PC Location)
Pin #2 - RXD	Pin #2 - RXD
Pin #3 - TXD	Pin #3 - TXD
Pin #5 - GND	Pin #5 - GND
Pin #7 - RTS	Pin #7 - RTS
Pin #8- CTS	Pin #8 - CTS

A standard serial cable is included for connecting the PC and NIC. If a longer cable is needed, you may use a standard 6' serial cable. **Be sure this is a "straight-through" and *not* a "null-modem" cable.** These are available in 3', 6', 10', 15' and 25' lengths from computer dealers and resellers.

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CHAPTER 10

INSTALLING AN EPROM OR RAM

1. Remove the external battery. (Unplug the battery harness - H1) - Refer to Figure 28.

2. Unplug or disconnect the internal battery (H4).

3. Unplug or disconnect the 16.5VAC transformer.

4. Wait 120 seconds for all power supply capacitors to discharge.

5. Locate the EPROM or RAM chips. They are located to the left and directly under the programming keypad. The EPROM is identified as U4. Expansion RAM1 is identified as U5. Expansion RAM2 is identified as U6.

STATIC SENSITIVE PARTS - DISCHARGE YOURSELF TO GROUND

6. Touch earth ground (Terminal #1) to discharge any static electricity on yourself before touching the circuit board.

7. Remove the old EPROM and/or RAM chips from their sockets. This is accomplished using a professional-type DIP extractor or it can be removed by using a very small screwdriver. Carefully insert the blade of the screw driver or DIP extractor between the chip and its socket. With a rocking-pulling motion, work the chip loose.

8. Align the pins. As shipped to you, the chip will not fit into its socket. Ensure you are "static free". Grasp the chip at both ends and lay one row of pins on a flat surface. Gently apply pressure in a slight rocking motion until one side is perpendicular to the chip's body. Then, do the same procedure to the other side. The objective is to align all the pins so they are perpendicular to the chip's body.

9. The notch in the chips body must be at the "TOP".

10. Line up the pins of the chip with the socket and using your fingers, gently press into place with a slight rocking motion. Sometimes a pin will bend inward under the chip and not be readily noticeable. If this happens, remove the chip and reinsert it correctly.

11. The RAM sockets will accept two widths of chips. You may receive either. Line up the pins of the RAM chip with the left most socket associated with that chip. The pins on the right side of the chip will automatically align to the proper socket.

12. Connect the 16.5VAC transformer to power up the unit and reconnect the external standby battery.

13. The System panel will automatically ***CLEAR ALL MEMORY***.

14. If the RAM or EPROM is installed backwards, or if it is handled improperly, it will be damaged.

15. Memory will be reloaded the next time the System 2000 Windows® software is accessed.

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CHAPTER 11

TROUBLESHOOTING

Nothing on LCD/ no LEDs on

Possible Cause:

- U Electrical Outlet - Check for 120vac.
- U Is the transformer plugged in?
- U Check for 16.5-19 VAC on Terminals #2 and #3.
  If plugged into 120vac, but no 16.5vac on panel, power wires may be broken or transformer fuse blown.

Power on board but no LCD display

Possible Cause:

- U Make sure LCD display is plugged firmly into socket (under Left-hand side of display).
- U Look for any chips that appear loose or crooked. Do not touch anything before grounding yourself - the chips will be damaged if you "shock" them badly enough. If something DOES appear out of place, give us a call.
- U If the back-up battery is low, power down the unit, remove the battery and apply power again.

(You will have to remove the faceplate - there are 4 phillips screws)

Purchased options don't work

Possible Cause:

- U Locate the sheet that came with unit. It has the activation codes that you will need to turn on your options.
- U Go to option 13. The system will prompt you for the number of the option you are turning on and the activation code (the big number on the pink sheet) If you don't see the options you think you purchased, contact your distributor. Have the panel's ESN number ready.

Door Ajar & Forced Entry messages appear without being wired

Possible Cause:

- U When the system is first initialized, and whenever you press the reset button or let the system time out of programming by itself, you will see those messages, along with other messages, appear on the LCD.
- U Possible noise problem due to the wire runs. Make sure the card reader or keypad wire runs are at least one foot away from AC lines, phone lines and flourescent lighting.

When I hook up and test a Door Ajar or Zone contact, no relay activates

Possible Cause:

- The Auxiliary outputs have not been programmed to activate from those events.

The "#" sign isn't clearing my mistakes like it does on other Corby Systems

Possible Cause:

- The "#" sign isn't the "clear" button anymore - the "X" sign is.

The keypad I hooked up doesn't work

Possible Cause:

- Verify you used the appropriate header for the keypad
- Make sure the black wire on the header lines up with the red wire label, on the keypad printed circuit board.
- Make sure you have the system programmed for keypads not cards.
- When you are using a keypad code, remember to **press "X"**, first. Then type in your code, and press "#"

When I swipe a card, I get nothing on the monitor

Possible Cause:

- The system may not be set for cards.
- The port parameters may not be set for "Card Only".
- Make sure the port doesn't have any time-schedules on it - you can work on that later.
- The Data 1/Data 0 wires going out to the card reader may be reversed.

My proximity reader works, but doesn't have the advertised read-range

Possible Cause:

- Installing the read head in the vicinity of metal will reduce the read-range slightly.
- Do not install the read-head near a PC monitor.
- Verify that the voltage out at the read-head is 10.5 - 14 VDC.

When the main relay activates, the system locks up, loses memory or resets

Possible Cause:

- When using a DC door lock, a diode must be properly installed across the coil of the lock.
- Check Terminal #1 (earth ground). Make sure a resistance reading between earth ground and electrical ground is 5 ohms or lower.
- Be sure AC locks are not being used.

When I power the board down and power it back up I lose memory

Possible Cause:

- Check the lithium battery BT1 on the upper right hand corner of the board, it should measure 2.8 to 3.0 VDC.
- Before you power down make sure the jumper is across pins 1,2 on header H4.

"Memory Corrupt" and "Reset" messages while programming the unit

Possible Cause:

- The system is probably getting a great deal of electrical noise.
- Make sure Terminal #1 is connected to a good earth ground. Generally a cold water pipe that goes to ground is best.
- Remove the reader/keypad wiring and attempt to reload the panel after pressing the "Reset" button. If the problem clears up, verify that the correct shielded, non-twisted wire is not being run near AC lines or flourescent lighting (both of which emit a great deal of noise)
- Disconnect the power transformer and run the unit on it's backup battery during programming. If the problem disappears, the AC line being used probably has noise on it being generated by other equipment powered from the same line. Try a good surge suppressor/filter or find a "cleaner" power line.

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CHAPTER 12

FREQUENTLY ASKED QUESTIONS

Q. Must I have an earth ground for the System 2000?

A. Yes. A good earth ground is essential for proper operation because it provides a path around the System for unwanted electrical noise and spikes from electrical storms. The ground must adhere to National Electrical Code guidelines.

Q. Is there a way to activate both of the relays with my alarm panel or with a manual button in an emergency?

A. When 12VDC is applied to Terminal #4 (+) and Terminal #5 (-) on the System, the closed circuit contacts of the main door relays will open until the voltage is removed.

Q. Can I put more than one RTE device on a single RTE input?

A Yes, you can put several Normally Open devices on the same input (Example: PIR with a backup manual RTE button and an additional button at a person's desk so they can "Buzz" someone in).

Q. Will the System 2000 power my locks, PIRs, and other externals?

A. No. The System will not power any locking devices or other products. You will need to add an external power supply with adequate current capacity for those devices.

Q. Can I program the System 2000 on my test bench and then install it?

A. Yes. The System 2000 application stores all information in its database and can be powered down and reloaded at anytime.

Q. Can I use any credit card on the System 2000 magnetic reader?

A. Yes. Credit/Bank cards will work on the system provided they are ABA track 2 format. Corby Mag-Stripe cards are also available. Option #2020 must be purchased to activate this feature.

Q. Will any Data Chip made by Dallas Semiconductor work on the System 2000?

A. Any "Touch Memory" device which supports the MicroLAN protocol will function with System.

Q. Is there a faster way to program Data Chips then by typing in the entire code?

A. The software includes a utility which will batch load Data Chips. It is designed to work with Corby P/N #2027.

Q. Will the System 2000 automatically handle Daylight savings time?

A. Yes. You can enable or disable DST.

Q. Can I assign temporary users to the system?

A. Temporary users can be assigned to a unit if the second door option has been installed. Then, users can be restricted by a future date or the number times they can use their code or card.

Q. Can the System 2000 use other manufacture's Wiegand cards?

A. The System supports both Corby's customized 30-bit Wiegand cards and industry standard 26-bit Wiegand cards.

Q. How long can my RS485 wire run be?

A. The RS485 communication link is a two conductor, shielded pair connecting the NIC and System panels. Total wire length is 4000 feet for each communications channel.

Q. I've already have a System 2 network installed at a location. What do I need to get it to work with Windows®?

A. Upgrading your current System 2 network requires the addition of one Network Interface Controller (NIC), an EPROM upgrade for each of your System 2 panels and one Windows®-compatible personal computer (PC) running the System 2000 Windows application. The NIC gets connected right into your existing RS-485 bus, and comes with the necessary connectors to connect it to the PC.

Q. How long can I expect my System 2 network to be down while I upgrade to System 2 for Windows?

A. One of the nice things about System 2000 is that it allows you to setup the entire network in software before actually connecting it up to the System 2000 network. If you set up everything ahead of time, including door configuration and user codes, the amount of actual downtime can be kept to one or two hours, depending on how many panels need to be loaded.

Q. Will my current System 2 panel configurations and user codes be transferred into the System 2 for Windows application?

A. Unfortunately, the System 2000 uses different memory mapping from the old System 2 so door, user and schedule information cannot be automatically transferred from the old System 2 to the new System 2000. We recommend that you backup all System 2 panels before attempting to switch over to System 2000, and that you generate Panel, Port and User Configuration Reports before you enter any information into your System 2000 application. These reports will make it much easier to input door configuration and user codes into your new System.

Q. I am installing a System 2 Access Control System from scratch. What do I need to run System 2000?

A. You will need a Windows-compatible PC running the System 2000 application, one Network Interface Controller (NIC), and one System 2 panel with the Windows network EPROM installed for every two doors you wish to configure. In addition, you will need keypads and/or card or Data Chip readers for each door, and any associated cables and wires.

Q. What is the minimum system requirements for my computer to run System 2000?

A. System 2000 will run on any computer running *Microsoft Windows 95®*, *Windows 98®* and *Windows NT®* 4.0 or greater. The computer must have at least an Intel 486 processor (or equivalent), 16 Megabytes (MB) of RAM, 25 MB of available hard drive space, a CD-ROM drive and one available communications (or serial) port. However, we recommend your computer have at least a Pentium-class processor (or equivalent), 32 MB of RAM, 30 MB of available hard drive space, a CD-ROM drive and two available communications (or serial) port.

Q. What is the maximum door capacity of System 2000, and how is that better than my current System 2 network?

A. The current System 2 network is limited at up to 8 panels, which controls up to 16 doors. With System 2000 and a NIC, this capability is immediately expanded to 31 panels, controlling up to 62 doors. With an optional firmware upgrade, each NIC is capable of controlling 124 panels, giving you the ability to handle up to 248 doors from a single location.

Q. Can I operate my System 2000 remotely via modem, like I can with my current System 2 network?

A. The System 2000 application currently does not allow modem communications with the NIC (PC to Modem to NIC to System 2), however it is possible to control the System 2000 application via remote software packages like Net Meeting. This allows remote operation via a modem or LAN, but it does requires a second PC (PC to Modem to PC to NIC to System 2). Corby is working on allowing direct modem communications between the PC and NIC.

Q. Is there a limit to the number of Users I can have in the System 2000 application? How about Schedules?

A. The System 2000 uses an expandable database stored on the hard drive to track all configuration information. The only limit to how much is stored in the database is the capacity of your hard drive. I you require 54,045 users operating on 99 schedules, the application will accommodate. However, each System 2 panel is limited as to how many schedules and users may be stored in its memory. Every System 2 is limited to 16 Schedules, and approximately 200 to 6000 users, depending on whether extra RAM has been installed in the panel. You could have 3000 different users and 16 different schedules on every System 2 panel if you wish.

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APPENDIX A

LCD/EVENT MESSAGES

AC Off = AC power loss.

AC On = AC power restored.

AP Error = Anti-Passback Error. Someone attempted to go in a door using their code / Card before using it at an exit door.

Auto Aux On = An auxiliary relay was automatically triggered On from a Time Schedule.

Auto Aux Off = An auxiliary relay was automatically triggered Off from a Time Schedule.

Auto Output = On, An output was automatically triggered On from a Time Schedule.

Auto Output = Off, An output was automatically triggered Off from a Time Schedule.

Comm Int 1 = The communications to "small processor" #1 has failed. If this happens, it is most likely due to a power surge or possible lightning strike.

Comm Int 2 = The communications to "small processor" #2 has failed. If this happens, it is most likely due to a power surge or possible lightning strike.

Daylight Savings = Daylight Savings Time was activated.

Door Ajar = A door is being held open.

Door Closed = The door which was ajar closed.

Door Perm = Door Permission Error. A person attempted to enter a door in which they did not have permission to enter.

Expired User = A temporary user code has expired.

Forced Entry = A door has been forced open without a valid code or card entry.

Inv = An invalid card was used at a door.

Inv Code = An invalid code was used at a door.

Mem Clear = All memory was cleared.

Module Reset = One of the small processors have reset.

Net Noise = Electrical noise has been detected somewhere on the network.

On Line = Program mode was exited.

PIN Error = After a valid card was used, the code which followed (Card & Keypad) was incorrect.

Program Mode = Someone entered program mode.

Relay Override = The relay was manually switched.

Request-To-Exit = The RTE button or Passive Infrared was used to exit a door.

Sched Error = Schedule Error. A user tried to enter a door during an invalid Time Schedule.

System Reset = Reset button is pressed on circuit board.

Timeout = The System has timed-out of program mode and returned on-line. The System automatically times out if programming has ceased for five minutes.

Unknown Event = If this event appears consistently, call Corby Tech department.

Unv = This will precede any card number or Data Chip which has been programmed using the universal mode.

Valid User = A valid code / card was used to enter a door.

Zone On = A zone has been triggered On.

Zone Off = A zone has been triggered Off.

APPENDIX B

SYSTEM 2000 PANEL TERMINAL DESCRIPTIONS

Terminal #1 - Earth Ground

This terminal must be connected to a suitable and approved ground as defined by the National Electrical Code. Use a 12 gauge or larger solid copper wire. All shields from Keypads or Card Readers must also connect to Terminal #1.

Terminals #2 and #3 - AC Power

A 16.5 volt 40VA transformer is recommended.

Terminal #4 - Drop Input (+)

This input can be used to open the normally closed contacts on both main relays. When (+)12VDC is applied to this input the main relays will “drop out”. This would generally be used in an emergency condition.

Terminal #5 - (-) Common

This is the System's common power supply negative.

Terminals #6 through #8 - Aux Relay # 1

The contacts are rated at 5 AMPS 30 volts DC. This relay can be activated by time schedules, codes or any System event. Terminal #6 is Normally Open, #7 is Common, and #8 is Normally Closed.

Terminals #9 through #11 - Aux Relay # 2

The contacts are rated at 5 AMPS 30 volts DC. This relay can be activated by time schedules, codes or any System event. Terminal #9 is Normally Open, #10 is Common, and #11 is Normally Closed.

Terminal #12 - Aux Voltage Output #1

This contact is rated at 50 mA maximum. They are capable of switching negative for up to 50 mA. This output can be activated by time schedules, codes or any System event.

Terminal #13 - Aux Voltage Output #2

This contact is rated at 50 mA maximum. They are capable of switching negative for up to 50 mA. This output can be activated by time schedules, codes or any System event.

Terminal #14 & #15 RS485 Bus

This is where the multiple System's are wired. Polarity must be observed from the Master to any additional Slaves (System's) on the bus.

Terminals #18 through #21 - BCD Keypad Input Data Lines

All Keypads used with the System output a Binary Coded Decimal (BCD) output. BCD has four data lines DATA 1 (#18), DATA 2 (#19), DATA 4 (#20), and DATA 8 (#21).

Terminal #22 - (-) Common negative
This is the System's common negative for Readers, Keypads, RTE buttons, Magnetic Contacts and LEDS.

Terminal #23 - DATA 0 and Magnetic Stripe Data
This terminal serves as the data 0 connection for Wiegand and Proximity readers and as the data input for Magnetic Stripe and Bar Code readers.

Terminal #24 - DATA 1 and Magnetic Stripe Clock
This terminal serves as the data 1 connection for Wiegand and Proximity readers and as the clock input for Magnetic Stripe and Bar Code readers.

Terminal #25 - Data Chip DATA
This is the Data line for the Data Chip reader. No other readers use this terminal.

Terminal #26 - Door Ajar, Forced Entry and Time Cancel Input
This input serves three functions at the same time and uses a closed circuit switch contact mounted to the door. This switch is a typical alarm type magnetic switch and must be closed when the door is closed for proper operation. Use this terminal in conjunction with terminal #22 common negative.

Terminal #27 - Request To Exit Input
Terminal #27 is the Request-to-Exit (RTE) input line. Whenever Terminal #27 is shorted to Terminal #22 common (-), the main relay will activate as if a valid code/Card was entered. RTE contacts must be open circuit. Please Note: RTE connections should be made away from the Keypad or Card Reader for security reasons.

Terminal #28 - Reader / Keypad (+)5VDC
This terminal is rated at 125 mA maximum. It is used to supply power to Wiegand, Magnetic Stripe and Bar Code Card Readers.

Terminal #29 - Reader / Keypad (+)12VDC
This terminal is rated at 250 mA maximum. It is used to supply power to Keypads, LED's and Proximity readers. No power is available to power door strikes or Mag-Locks.

Terminal #30 Green LED (-) Driver
This is a negative output for Light Emitting Diodes (LED). It is rated at 50 mA Maximum. When the main relay is activated the LED on the Keypad or Card Reader will light to show that a valid code/Card was entered.

Terminal #31 Red LED (-) Driver
This is a negative output for Light Emitting Diodes (LED). It is rated at 50 mA Maximum. Normally this output is on, lighting the LED. The Red LED goes off when the main relay is activated.

Terminals #32 through #34 - Door Relay
These contacts are rated at 5 AMPS 30 volts DC. They can be used to switch power to a lock or gate, or arm / disarm an alarm system. Terminal #32 is Normally Open, #33 is Common, and #34 is Normally Closed.

Terminals #35 through #36 - Shunt Contacts

These contacts are rated at 5 AMPS 30 volts DC. They can be used to shunt a door contact. This set of contacts follows the main relay because they activate at the same time the main relay activates. Terminal #35 is Normally Open, and #36 is Normally Open.

Terminal #37 - Zone Input

The System can monitor a normally closed contact wired between this terminal and Terminal #22. When the switch opens, a Zone On event is generated. When the switch closes, a Zone Off event is generated. These events can activate an Auxiliary output.

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APPENDIX C

NIC TERMINAL DESCRIPTIONS

Terminal #1 - Earth Ground
This terminal must be connected to a suitable and approved ground as defined by the National Electrical Code. Use a 12 gauge or larger solid copper wire.

Terminals #2 and #3 - AC Power
A 16.5 volt 40VA transformer is recommended.

Terminal #4 & #5 - RS485 Channel #1
This is where the multiple System 2000's are wired. Polarity must be observed between all devices wired on this bus.

Terminal #6 & #7 - RS485 Channel #2
This is where the multiple System 2000's are wired. Polarity must be observed between all devices wired on this bus.

Terminal #8 & #9 - RS485 Channel #3
This is where the multiple System 2000's are wired. Polarity must be observed between all devices wired on this bus.

Terminal #10 & #11 - RS485 Channel #4
This is where the multiple System 2000's are wired. Polarity must be observed between all devices wired on this bus.

RS232 Connector (P1)
Pin 1 = DCD Carrier Detect - Input
Pin 2 = TXD Transmit Data - Output
Pin 3 = RXD Receive Data - Input
Pin 4 = Not Used
Pin 5 = Ground
Pin 6 = Not Used
Pin 7 = CTS Clear To Send - Input
Pin 8 = RTS Request To Send - Output
Pin 9 = Not Used

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APPENDIX D

GLOSSARY

ABA
American Bankers Association. This association set a standard used in Magnetic Stripe credit cards. The standard format uses specific start and stop characters and typically uses track two of a four-track card. Example: ABA Track two format

AC
Alternating Current, used as a primary power source for the access system.

AMP
A measure of current for AC and DC voltages. A milliamp (mA) = 1/1000 of an Amp.

Anti-passback
A feature that prevents a user from giving their code to someone else to use. A user code must be used to enter then used to exit before it can be reused to enter again. This feature requires one port for entry and a second port for exit.

AWG
American Wire Gauge, denotes the size of wire conductors used in a system.

Batch
A group of users with the same door permission and restrictions.

BCD
Binary Coded Decimal. A parallel method of encoding digital data.

Baud Rate
Speed at which serial data is being transmitted. 14400, 9600, 2400 etc.

Bonding
As it applies to grounding. The joining of metal parts in a building (beams, plumbing, grounds, etc.) to form an electrically conductive path to earth ground for the purpose of safety.

Code
A sequence of digits which are sensed by the System when the user enters a Card or presses numbered Keypad buttons.

Code 39
A Bar-Code symbology also known as “code 3 of 9".

Card
A plastic Card containing user ID information. Cards come in four different technologies Bar Code, Magnetic Stripe, Proximity and Wiegand. This Card is inserted into, swiped through, or presented to a reader.

CPU
Central Processing Unit. Usually the main microprocessor in the system.

CTS
Clear to Send. An RS232 input on the system that tells a transmitting device attached to it that its OK to transmit its data.

Data Chip
A stainless steel canister, the size of two stacked dimes, containing an integrated circuit that sends a 64 bit number when touched to a reader designed for the purpose.

DC
Direct Current. A type of voltage usually specified as having a positive and negative source.

Default
Preset values in the software which the System will use if the user does not change them.

Disabled
Turned off. Not active.

Door Ajar
A condition that occurs when a door is left open after a valid user has passed through.

Earth Ground
A direct electrical path to earth. Usually a cold water pipe, the steel beams of a building, or a steel rod driven at least six feet into the earth and bonded to the Electrical System as defined by the National Electrical Code.

Enabled
Turned on. Active.

Enter
To type information on the System in response to a prompt. To complete the entering of a code or command by pressing the #.

EEPROM
Electrically Erasable Programmable Read Only Memory. A memory chip used in the System that contains special information. EEPROMs retain all information without the need for backup power.

ESN
Electronic Serial Number. A 64 bit number, permanently programmed into a non-volatile memory device. Used to identify a particular unit, date of manufacture and other parameters.

Events
An action, condition or something that happens on the access system and becomes part of the information stored in the event data base. Event conditions can be used to trigger auxiliary outputs.

Fail-Safe
If and when power to the door fails, the door will be made permanently-open and allow entrance or exit without the need for access control codes or Cards.

Fail-Secure
If and when power to the door fails, the door will be made permanently closed and will not allow entry or exit.

Forced Entry
A condition that exists when a door is forced open prior to a valid user entering the door.

Form A Relay
A type of relay that has a single pole, single throw, normally open contact.

Form C Relay
A type of relay which has contacts including a common, a normally open (NO) leg and a normally closed (NC) leg.

Initializing
The automatic process of configuring the system at power-up. Default values are set and memory is tested.

LED
Light Emitting Diode. A semiconductor device that emits light.

Magnetic Stripe
Card technology that uses a Magnetic Stripe to hold its data. System uses a track 2 ABA format.

National Electrical Code
A document published by the National Fire Protection Association. Its purpose is the practical safeguarding of persons and property from hazards arising from the use of electricity.

Networking
The ability of System's to be linked together. A multi-drop, twisted pair of wire is connected to the Network Interface Controller (NIC) and each System unit in the network.

PCB
Printed Circuit Board. This board contains the electrical components of the system.

PIN
Personal Identification Number. A number which is unique to each user of the system, and is entered at a Keypad in order to gain access.

Port
A designation given to all the input and output connections required to operate a door. It may contain an input for RTE, Door Ajar, Keypad, Card Reader etc. and a relay output for controlling the door.

Power Supply
A source of power for the access system, door locks and auxiliary devices. Usually consists of a plug in transformer, circuit board and standby battery. Power supplies are rated by their voltage and current capacity.

Prompt
A cue. When programming, the System will "ask" you to enter various information. This "asking" is called a prompt.

Proximity
A type of card technology that sends wireless digital data from a card to a reader through means of an electrostatic coupling.

RAM
Random Access Memory. Semiconductor memory that can be both written to and read from. Specified by size (128K x 8).

RS232
Data transmission standard using +/- 12 volt transitions to transmit digital data.

RS485
Data transmission standard using differential voltage levels to send and receive data on a shielded, twisted pair of wire in a multi-drop configuration up to four thousand feet long. Highly immune to electrical noise.

RTE
Request to Exit. A circuit controlled by a push button installed within a secured area which, when pressed, allows a user to exit the area. RTE's should always be redundant, that is, a second method should be used to allow an exit.

RTS
Request to Send. An RS232 output from the System. It tells a device attached to it that its OK to send data. Generally connected to the CTS of the sending device.

RXD
Receive Data. An RS232 input that receives data from a transmitting device. This Input must be connected to the TXD output of the transmitting device.

SPDT
Single Pole Double Throw. Also a "C" form switch contact having a Normally Open (NO), Common and Normally Closed (NC) arrangement

SPST
Single Pole Single Throw. A switch or relay contact having Common and Normally Open (NO) or Normally Closed (NC)
arrangement. Can also be referred to as a form "A" (NO) or form "B" (NC) contact.

Time Cancel
A feature that cancels any remaining door open time as soon as the door is closed.

TXD
Transmit Data. An RS232 output that sends data to a receiving device. This output must be connected to the RXD input of the receiving device.

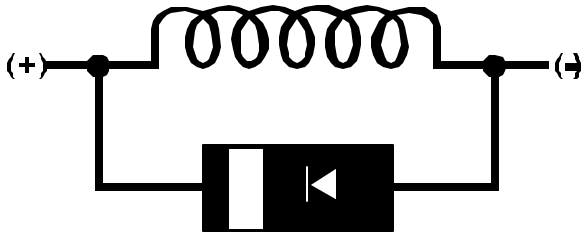
UL
Underwriters Laboratories. An organization that certifies the safety and functionality of electrical devices.

Watchdog
A circuit in the System that prevents microprocessor latch up. The watchdog circuit minimizes the likelihood that voltage transients will "crash" the system.

Wiegand Technology
Card technology that uses special patented wires imbedded inside the Card to encode its data.

APPENDIX E

WIRING DIAGRAMS



CAUTION!!!

If you use this System to operate a DC door strike, magnetic lock, relay, or any device that has a coil (inductive load) that is powered from a DC source, you MUST install a diode, in parallel, across the coil terminals.

Use a 1N4001, 1N4002 or equivalent diode.

Connect the stripe side of the diode to the coil terminal that becomes positive (+).

Connect the other side of the diode to the other end of the coil.

Proper installation of this diode will prevent the high voltage spike that occurs whenever a coil is de-energized.

If you do not use this diode, you will eventually damage the system and any other electronic devices that are attached to it. Corby supplies the necessary diodes with this product, please use them.

Figure 1 - SYSTEM 2000 Block Diagram

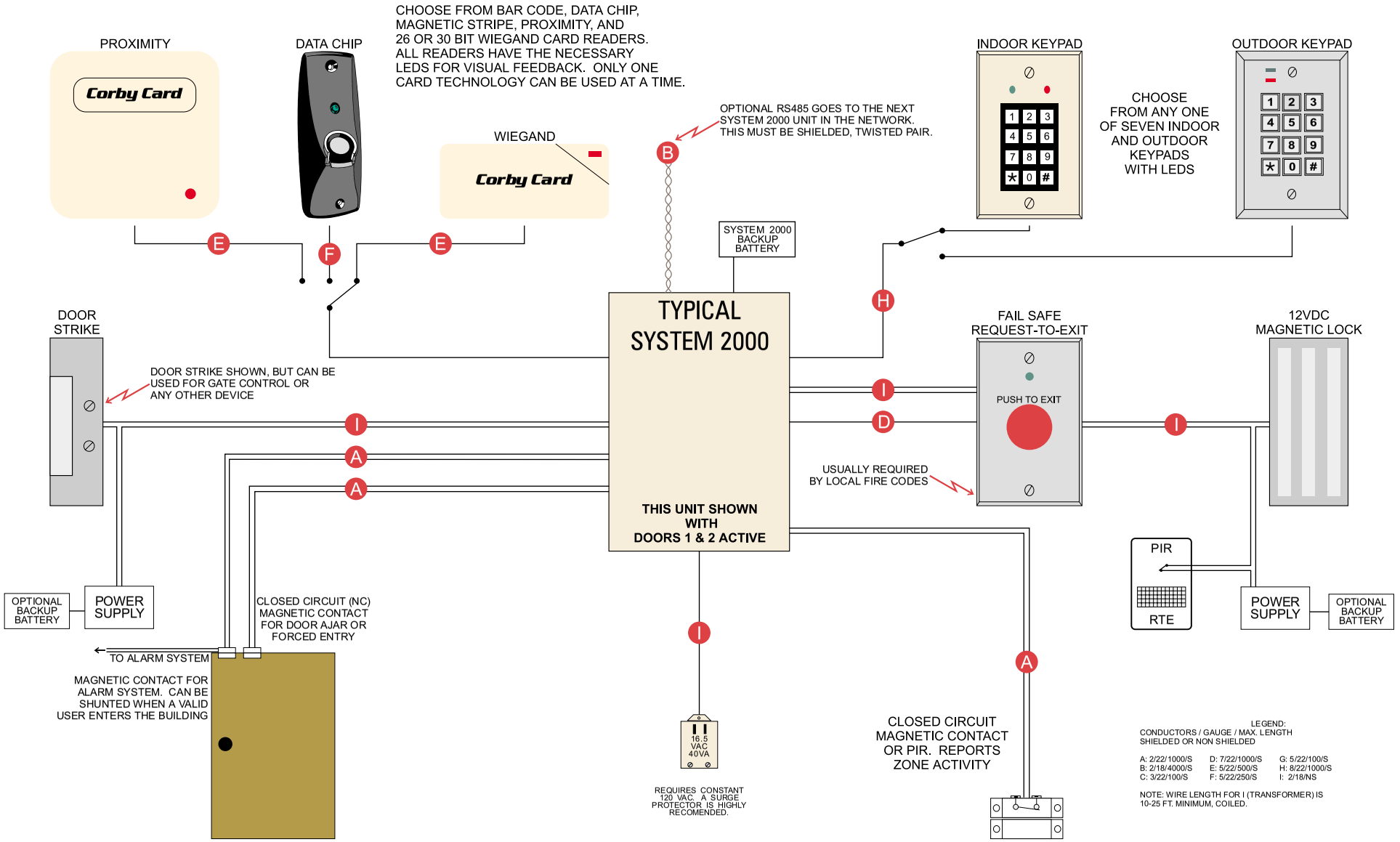
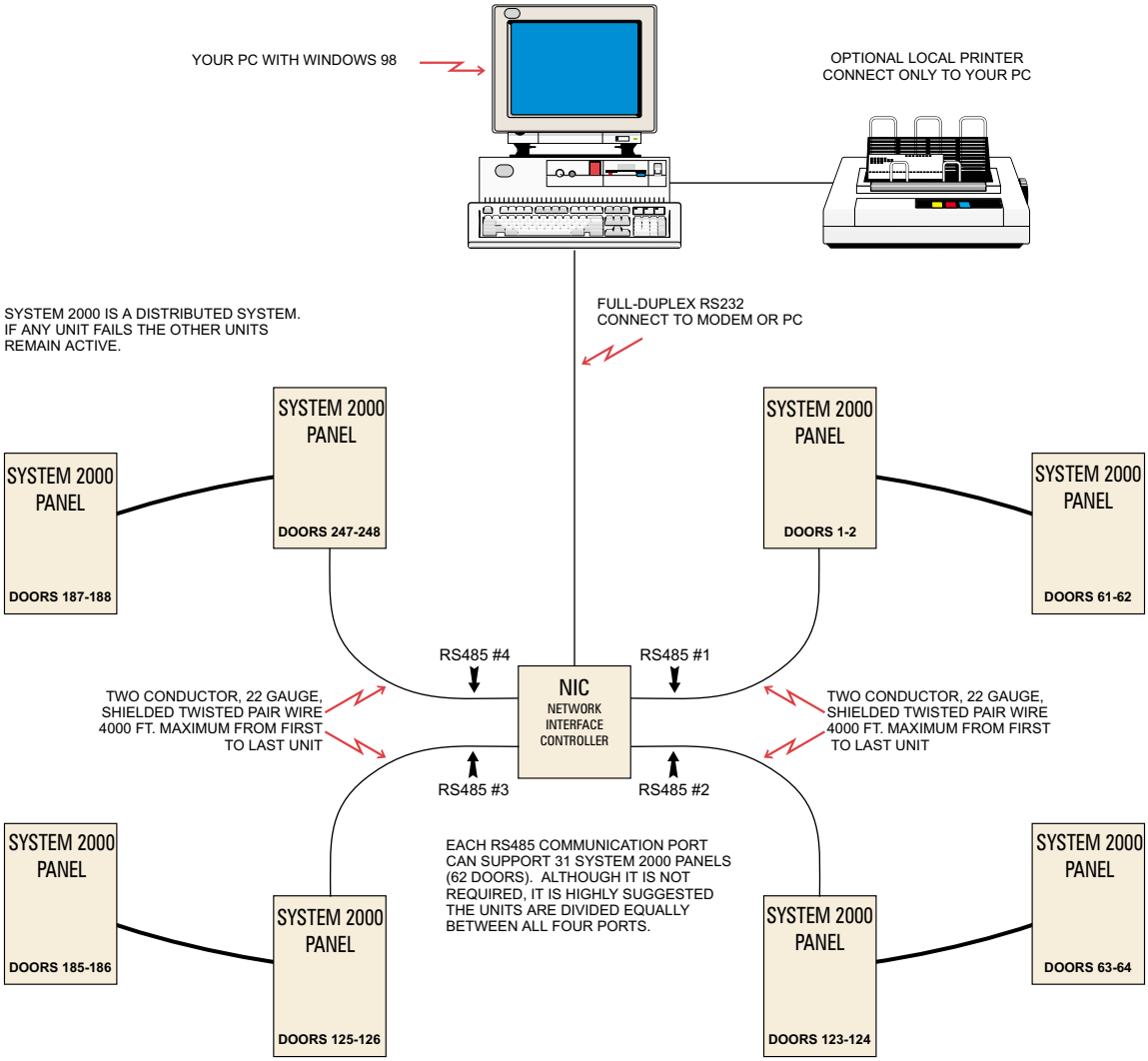


Figure 2 - Networking Block Diagram



THIS DIAGRAM DOES NOT SHOW OPTIONAL INPUTS/OUTPUTS
TO DOORS OR OTHER DEVICES. SEE THE SYSTEM 2000 BLOCK DIAGRAM.

System 2000 248 Door Network

Figure 3 - System 2000 Panel Descriptions and Layout

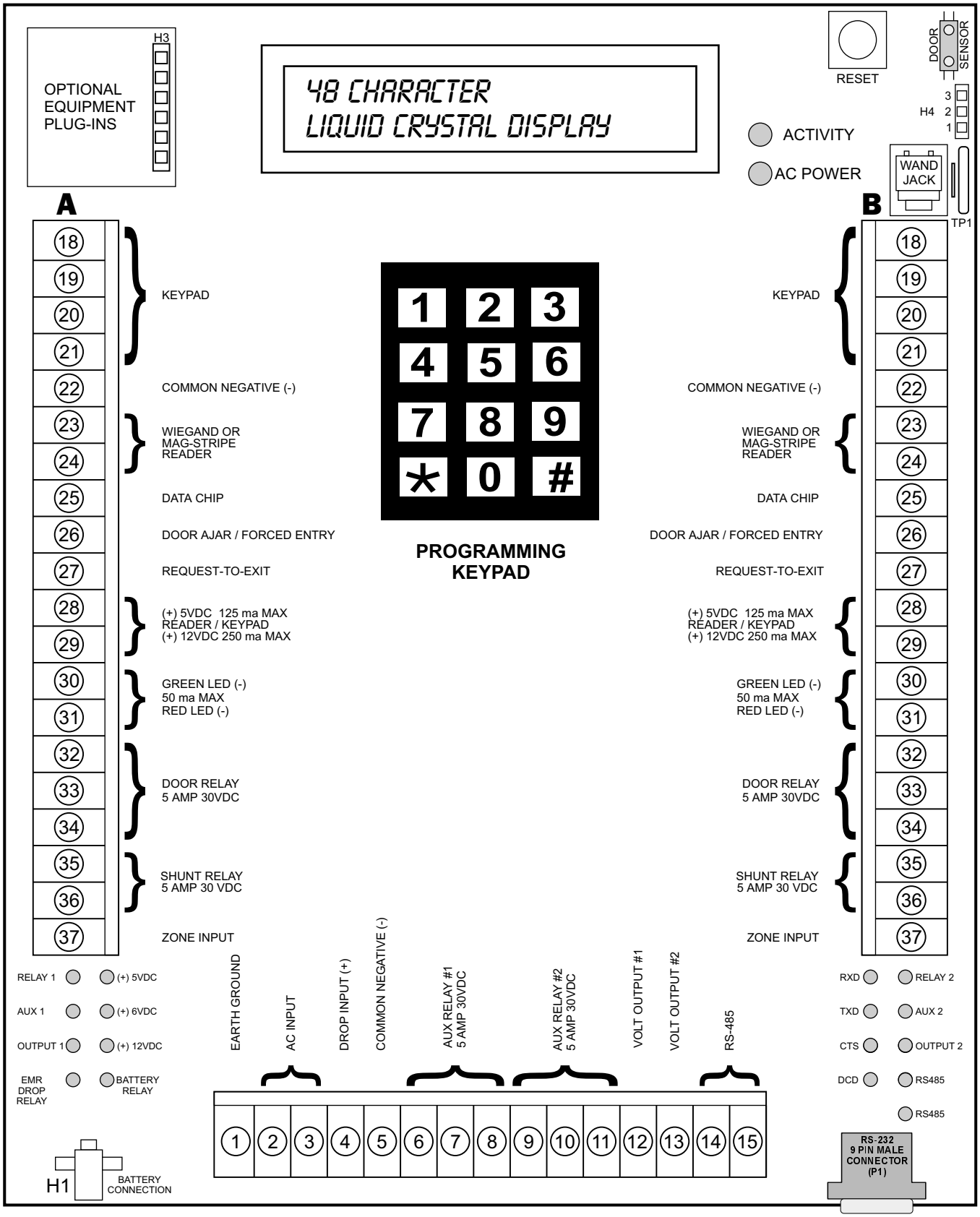


Figure 4 - System 2000 Panel Terminal Descriptions

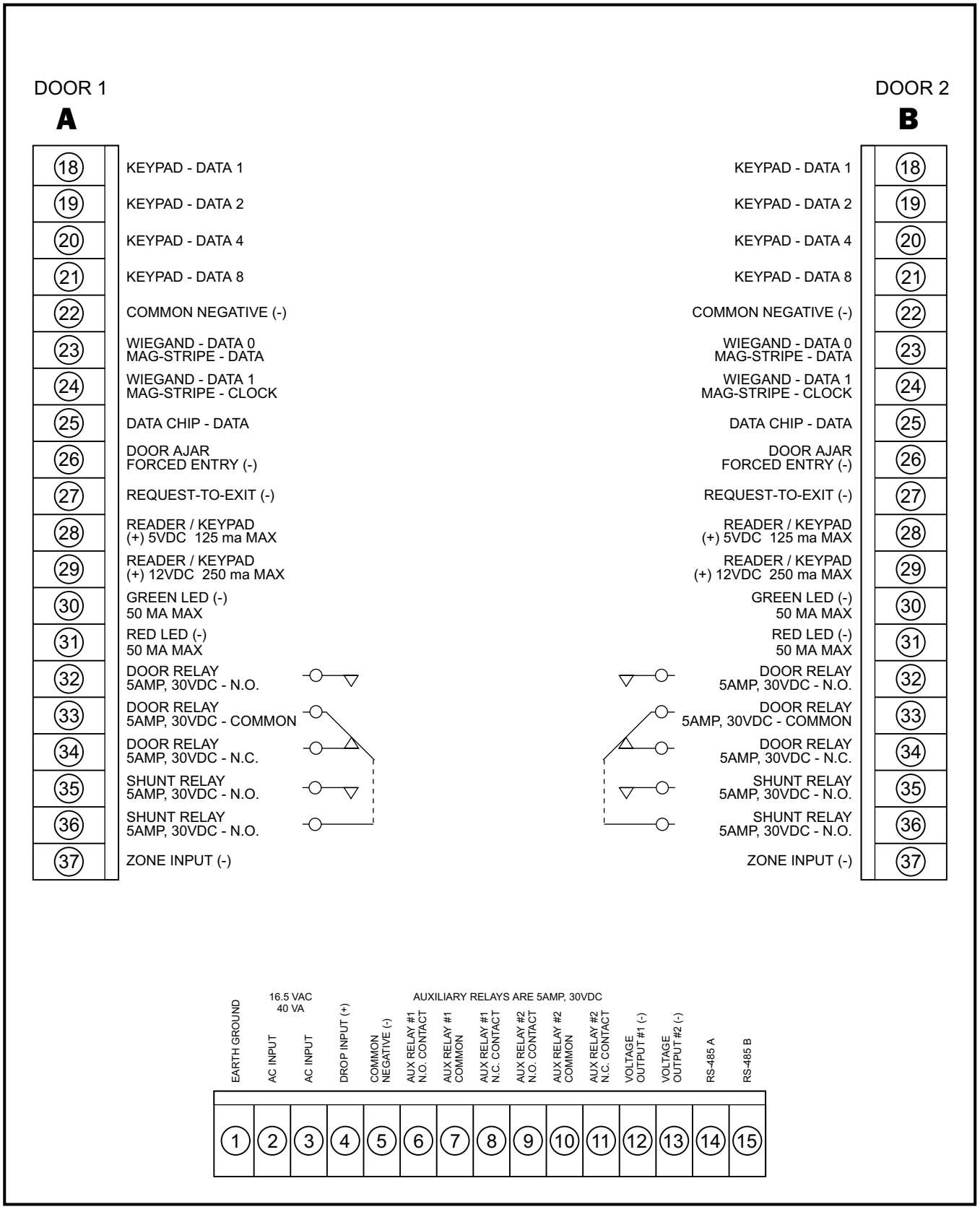
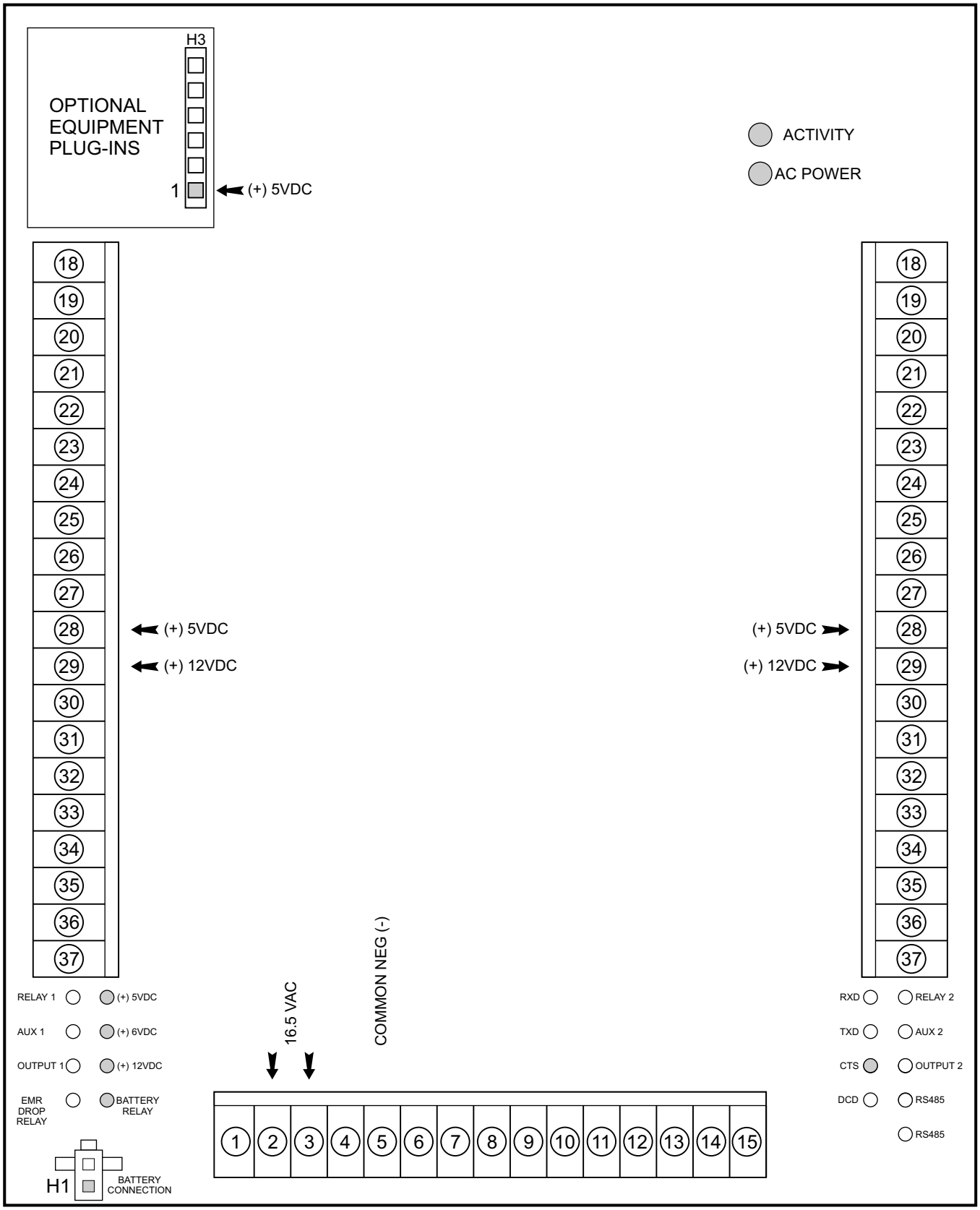


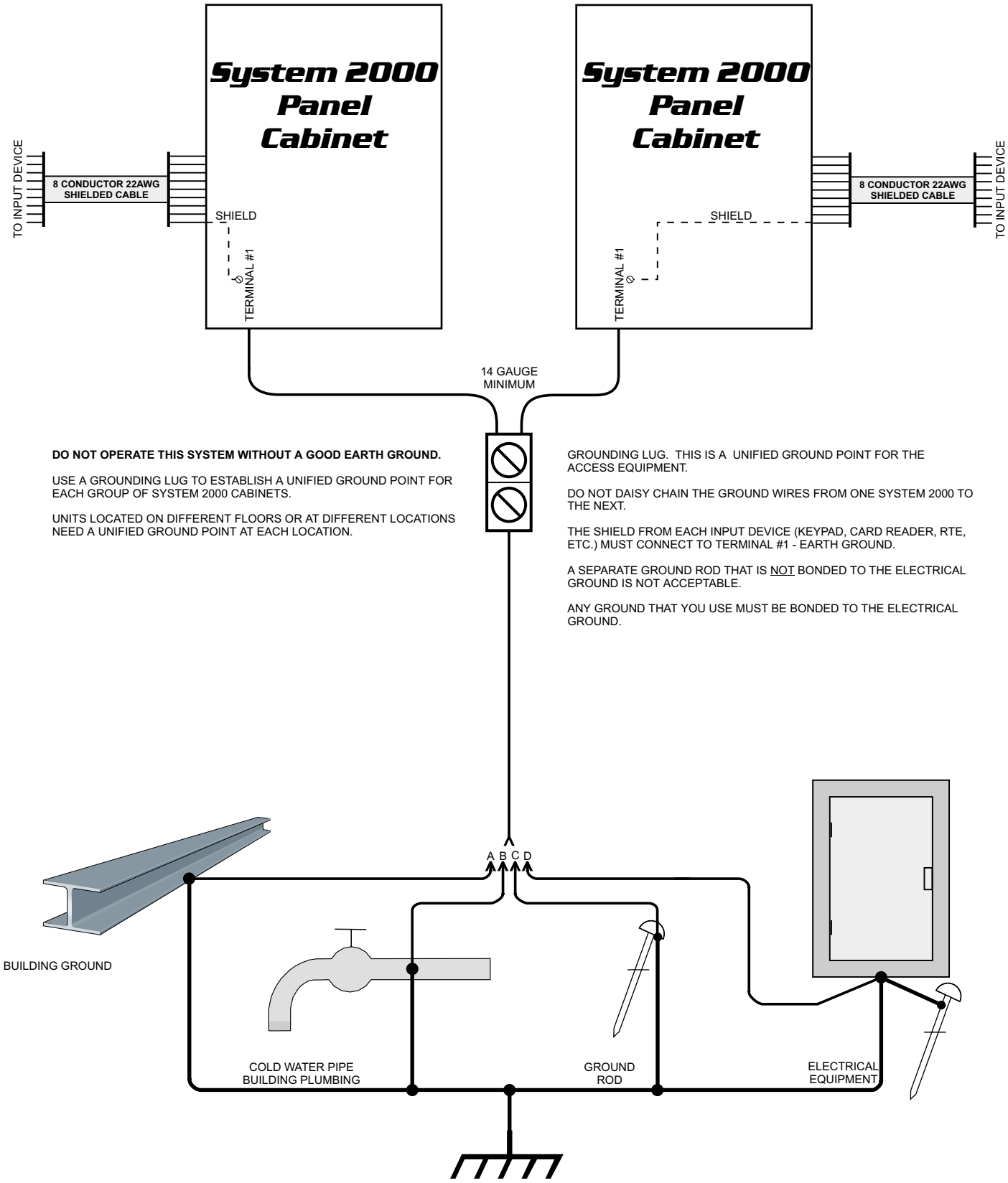
Figure 5 - System 2000 Panel Test Points



THESE LEDs SHOULD BE ON: (+) 5VDC, (+) 6VDC, (+) 12VDC, BATTERY RELAY, CTS, AC POWER
THE ACTIVITY LED SHOULD BE "FLASHING".
THE CTS LED WILL GO "OFF" IF A PRINTER, TERMINAL OR PC IS CONNECTED.

MEASURE THESE TERMINALS: #28 & #5 = (+) 5VDC, #29 & #5 = (+) 12VDC, #2 & #3 = 16.5 VAC,
BOTTOM PIN ON H1 & #5 = (+) 12VDC, PIN #1 ON H3 & TERMINAL #5 = (+) 5VDC

Figure 6 - Panel Shield and Grounding Layout



DO NOT OPERATE THIS SYSTEM WITHOUT A GOOD EARTH GROUND.

USE A GROUNDING LUG TO ESTABLISH A UNIFIED GROUND POINT FOR EACH GROUP OF SYSTEM 2000 CABINETS.

UNITS LOCATED ON DIFFERENT FLOORS OR AT DIFFERENT LOCATIONS NEED A UNIFIED GROUND POINT AT EACH LOCATION.

GROUNDING LUG. THIS IS A UNIFIED GROUND POINT FOR THE ACCESS EQUIPMENT.

DO NOT DAISY CHAIN THE GROUND WIRES FROM ONE SYSTEM 2000 TO THE NEXT.

THE SHIELD FROM EACH INPUT DEVICE (KEYPAD, CARD READER, RTE, ETC.) MUST CONNECT TO TERMINAL #1 - EARTH GROUND.

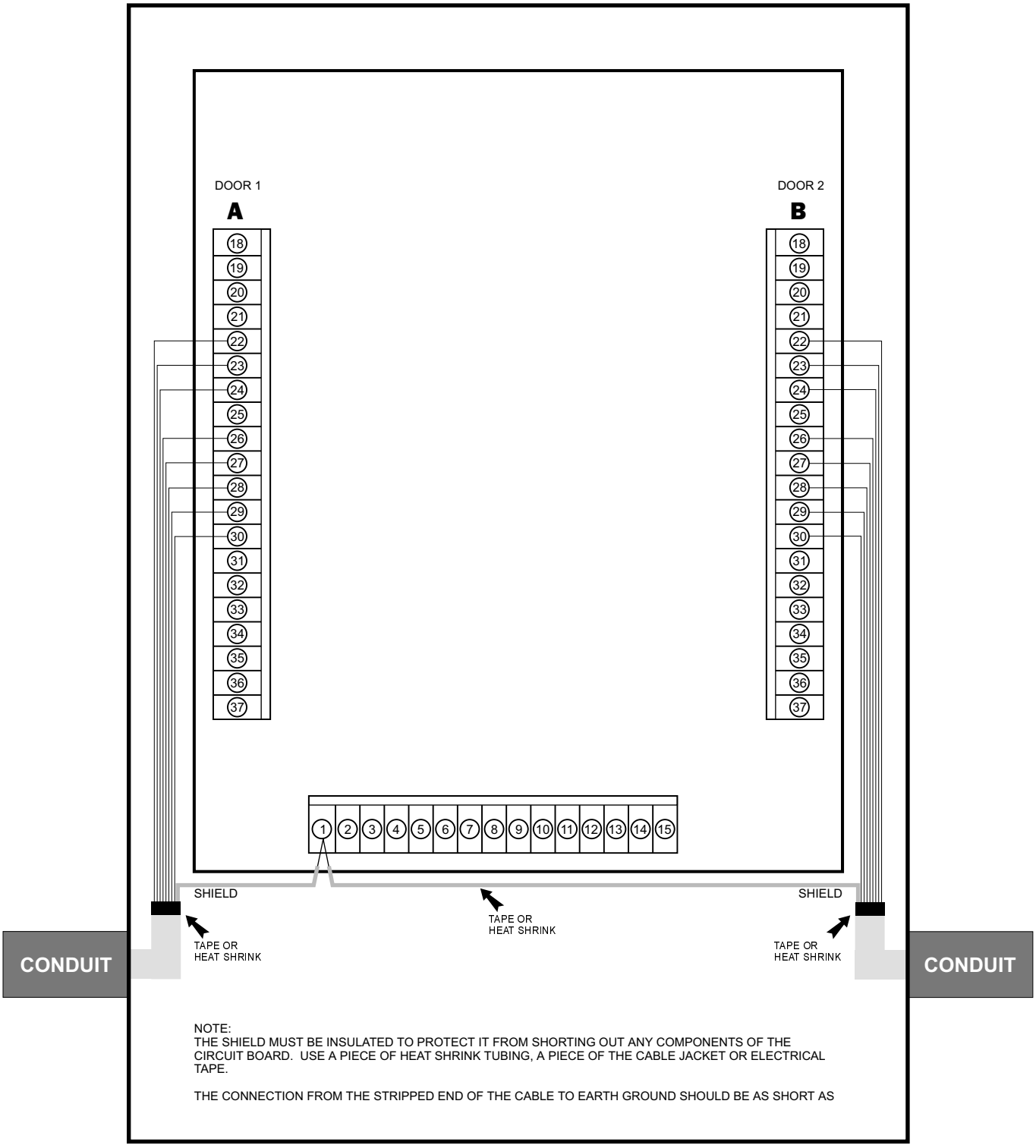
A SEPARATE GROUND ROD THAT IS NOT BONDED TO THE ELECTRICAL GROUND IS NOT ACCEPTABLE.

ANY GROUND THAT YOU USE MUST BE BONDED TO THE ELECTRICAL GROUND.

TYPICAL GROUNDING AND BONDING LAYOUT.

ALL GROUNDS AND BONDS MUST CONFORM TO NATIONAL ELECTRICAL CODE STANDARDS.

Figure 7 - Wiring the Shield to Earth Ground



NOTE:
THE SHIELD MUST BE INSULATED TO PROTECT IT FROM SHORTING OUT ANY COMPONENTS OF THE CIRCUIT BOARD. USE A PIECE OF HEAT SHRINK TUBING, A PIECE OF THE CABLE JACKET OR ELECTRICAL TAPE.

THE CONNECTION FROM THE STRIPPED END OF THE CABLE TO EARTH GROUND SHOULD BE AS SHORT AS

Figure 8 - Panel Battery and Transformer Connections

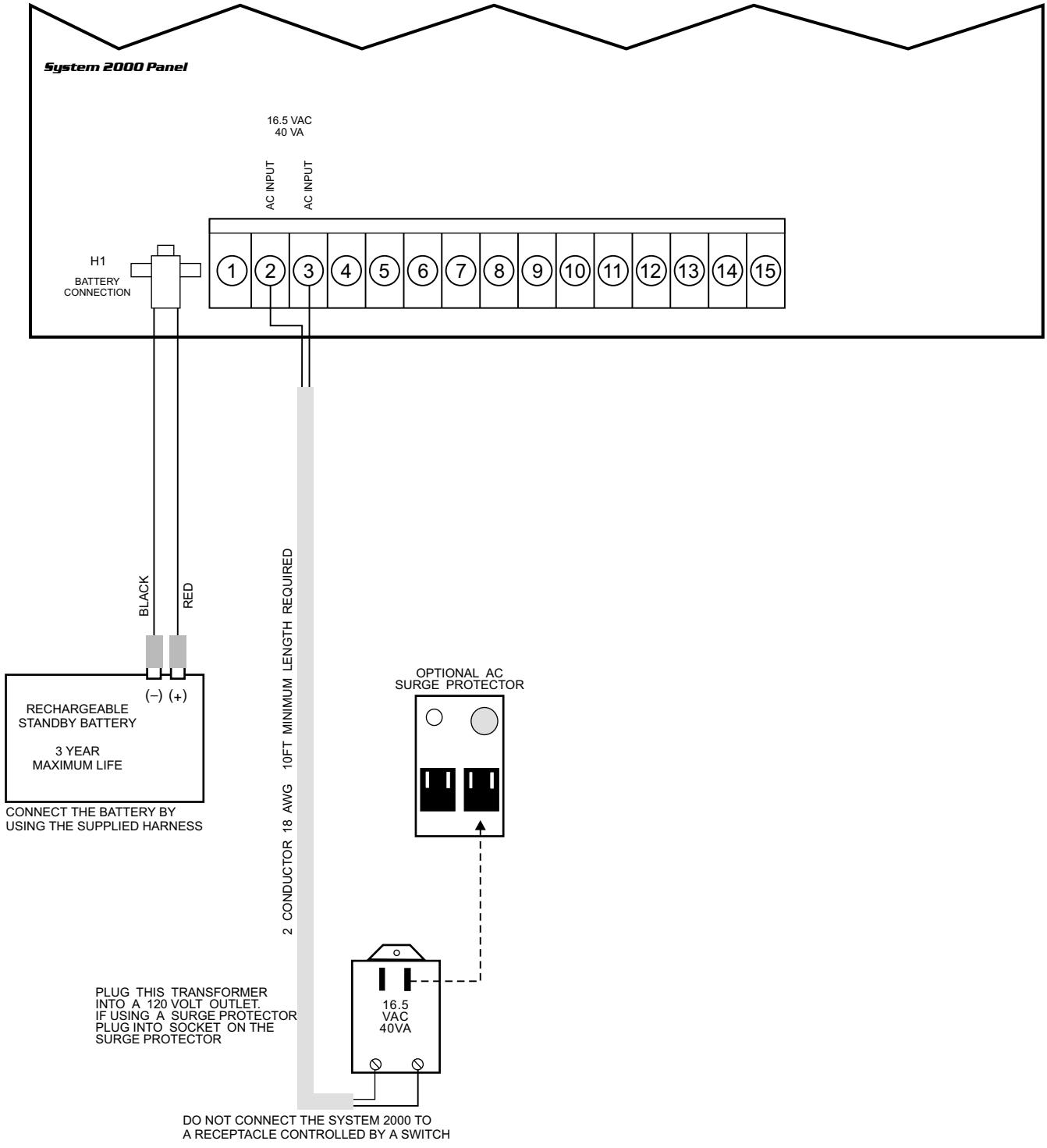


Figure 9 - Keypad w/ Door Ajar & RTE

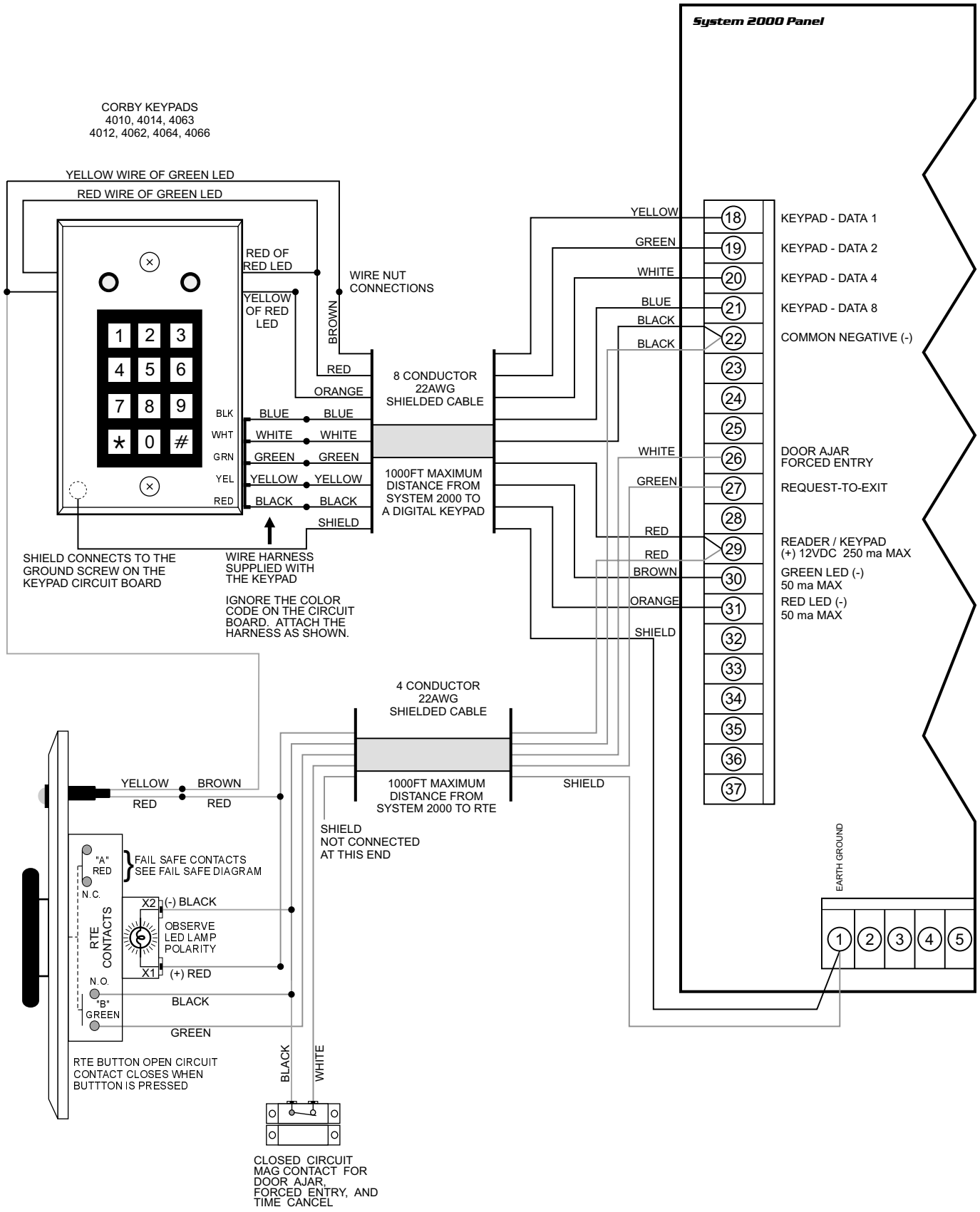


Figure 10 - Bar Code Reader w/ Door Ajar & RTE

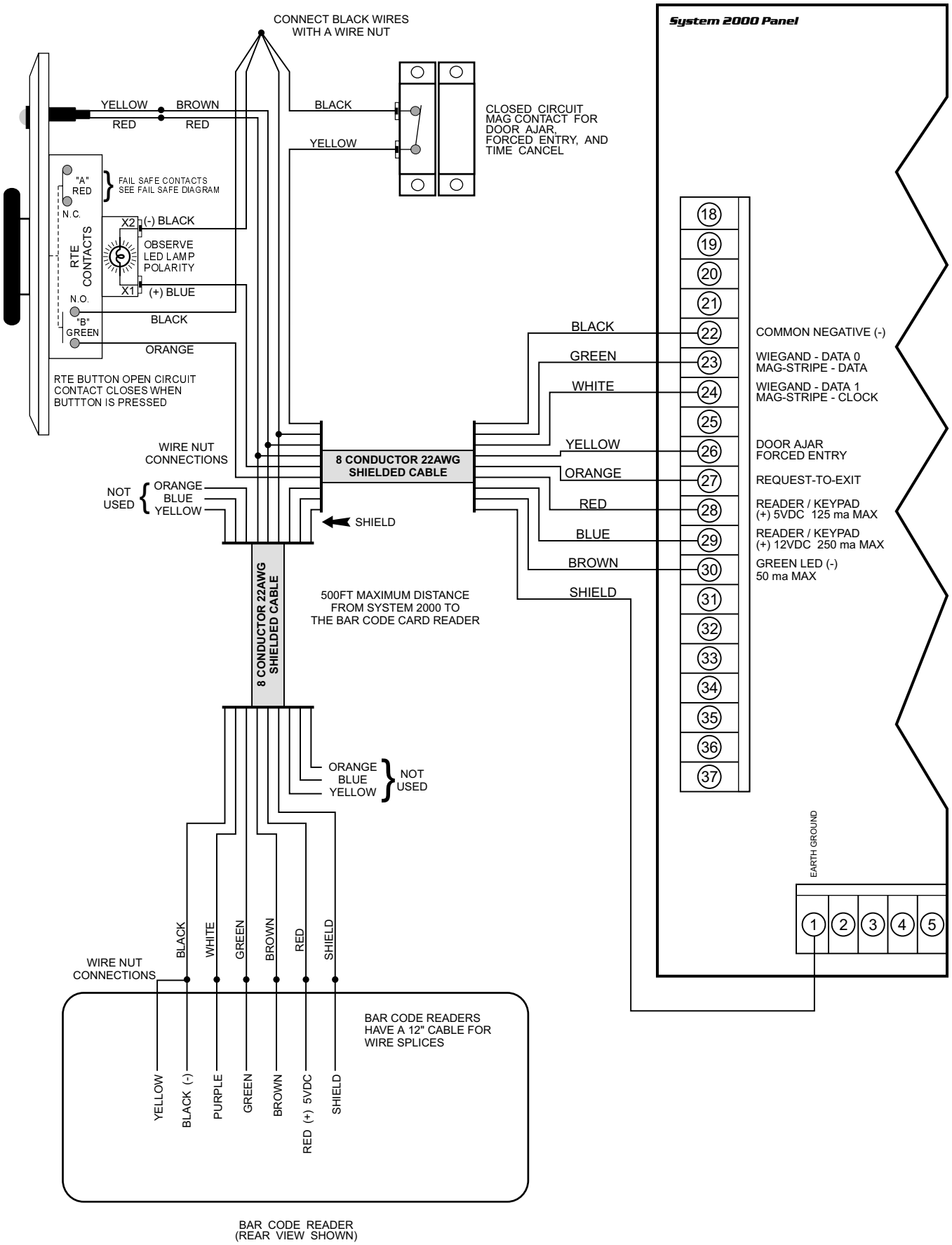


Figure 11 - Data Chip Reader w/ Door Ajar & RTE

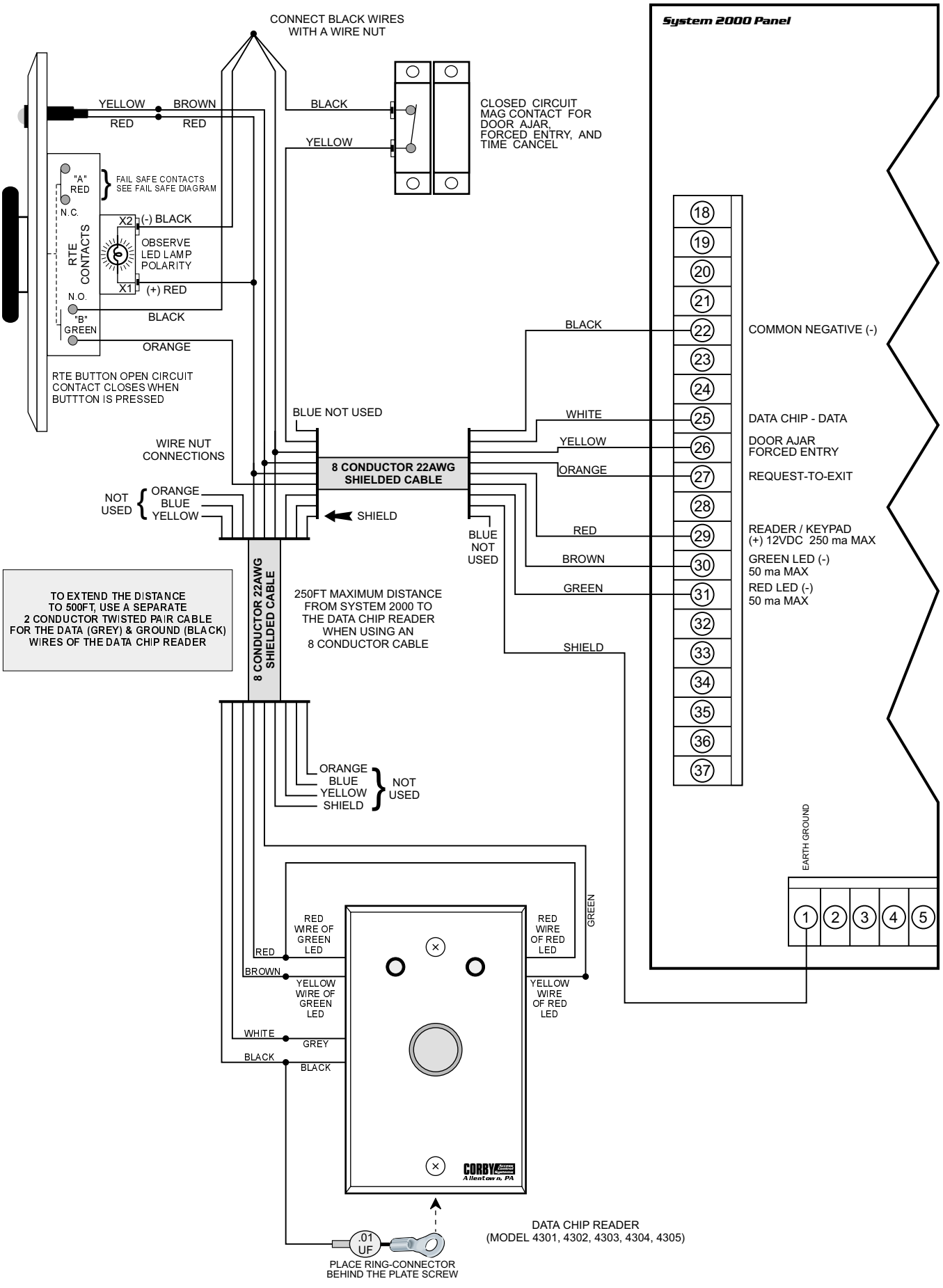
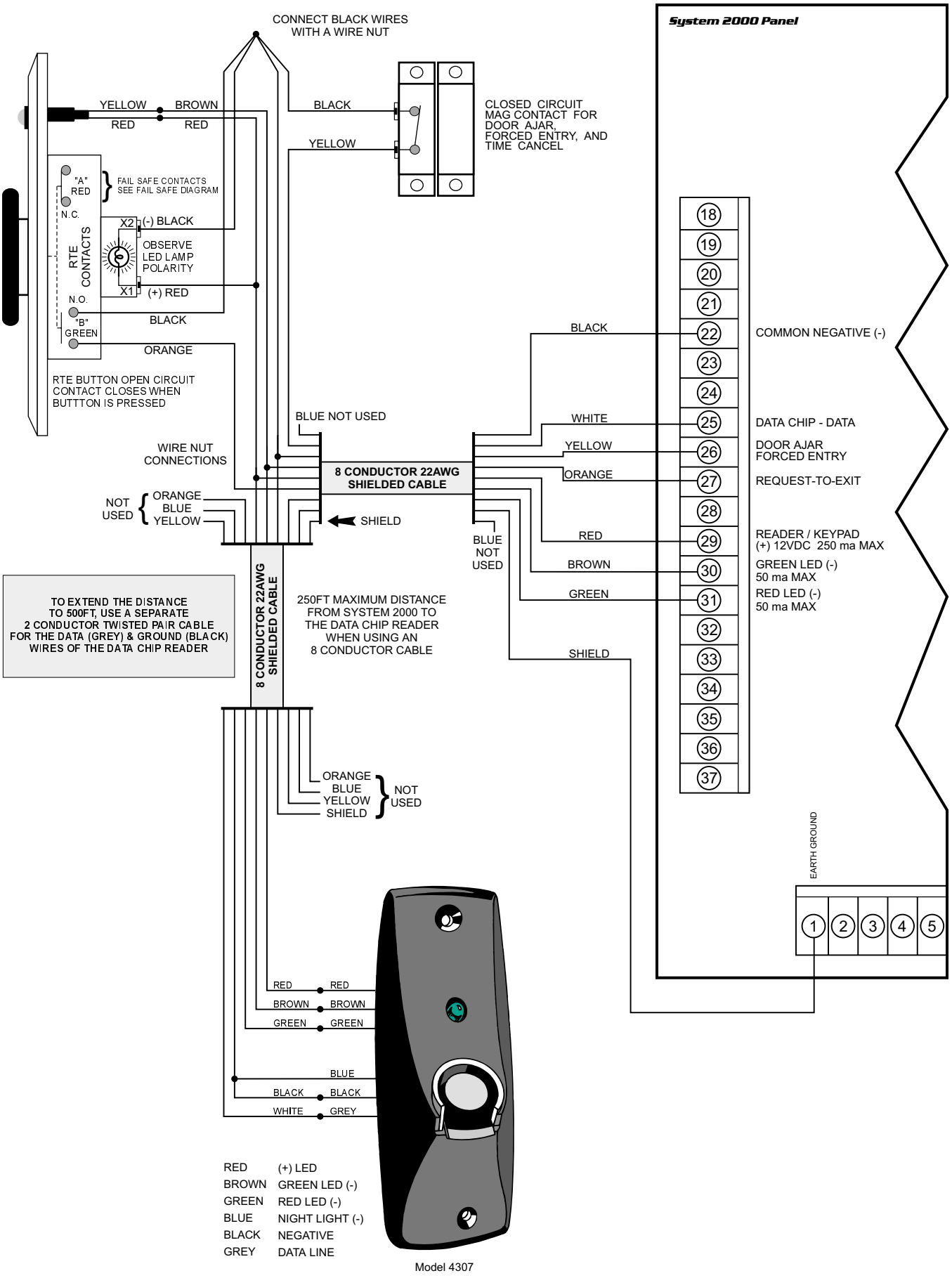


Figure 12 - Data Chip Reader w/ Door Ajar & RTE



Model 4307

Figure 13 - Indoor Mag-Stripe Reader w/ Door Ajar & RTE

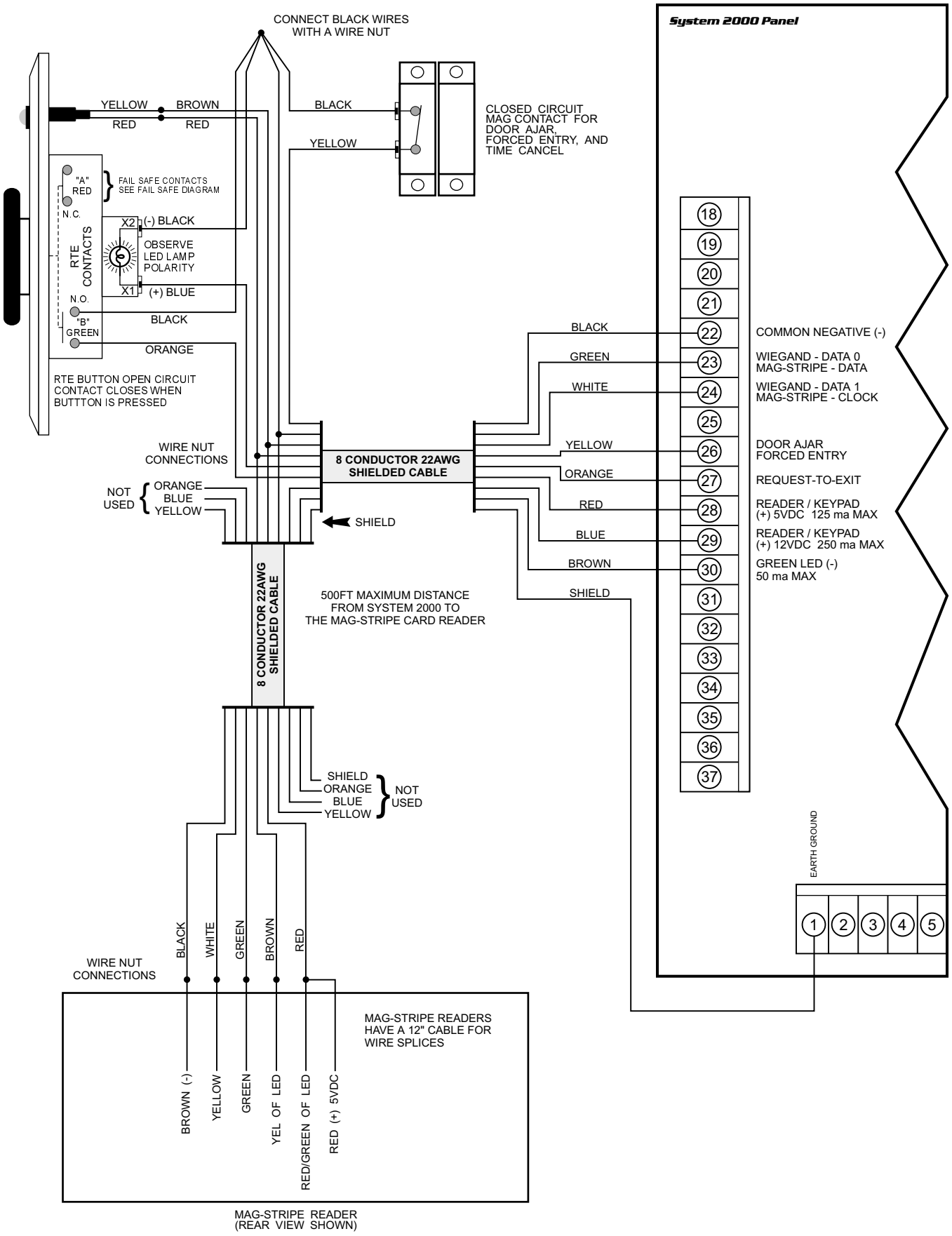


Figure 14 - Outdoor Mag-Stripe Reader w/ Door Ajar & RTE

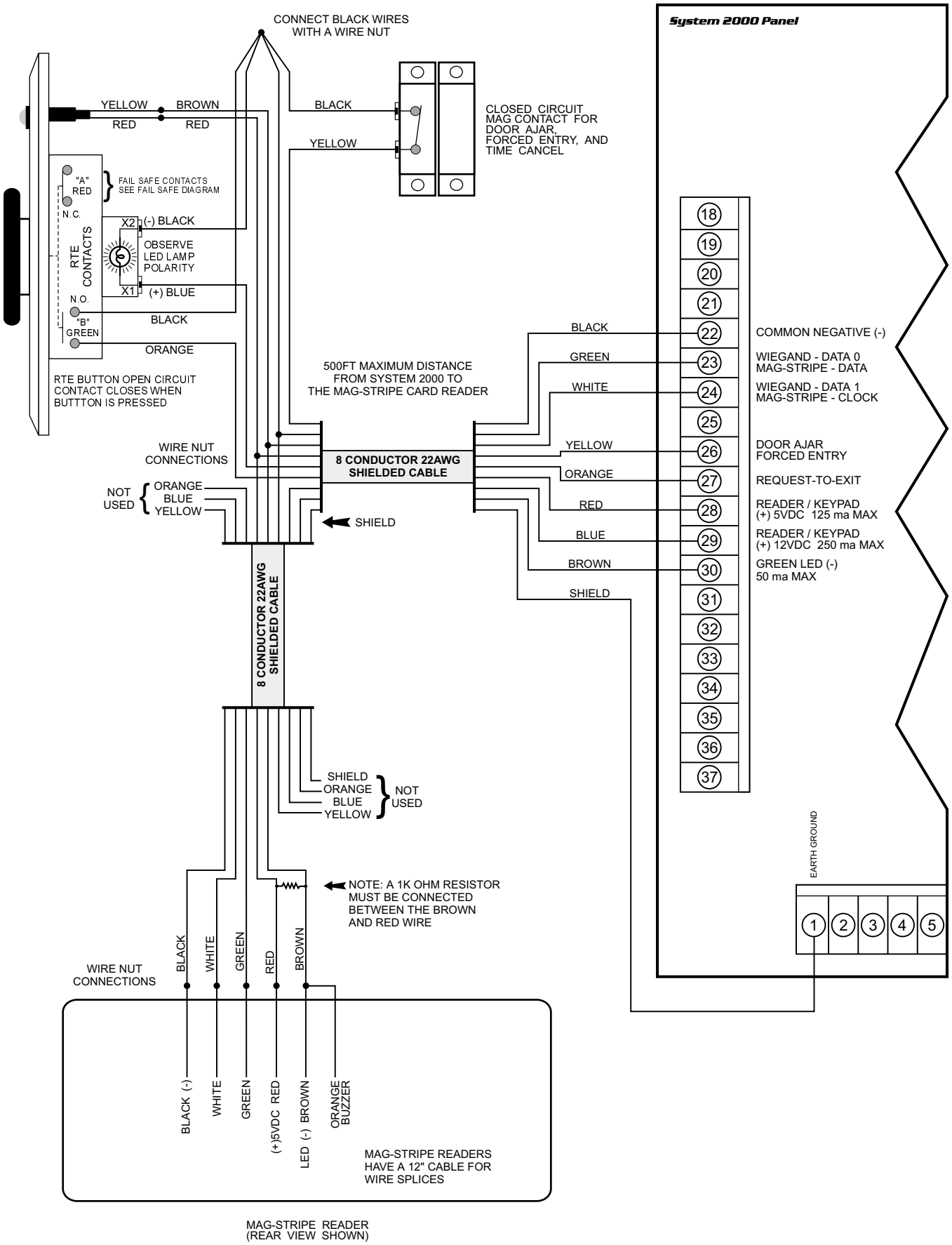


Figure 15 - Proximity Card Reader w/ Door Ajar & RTE

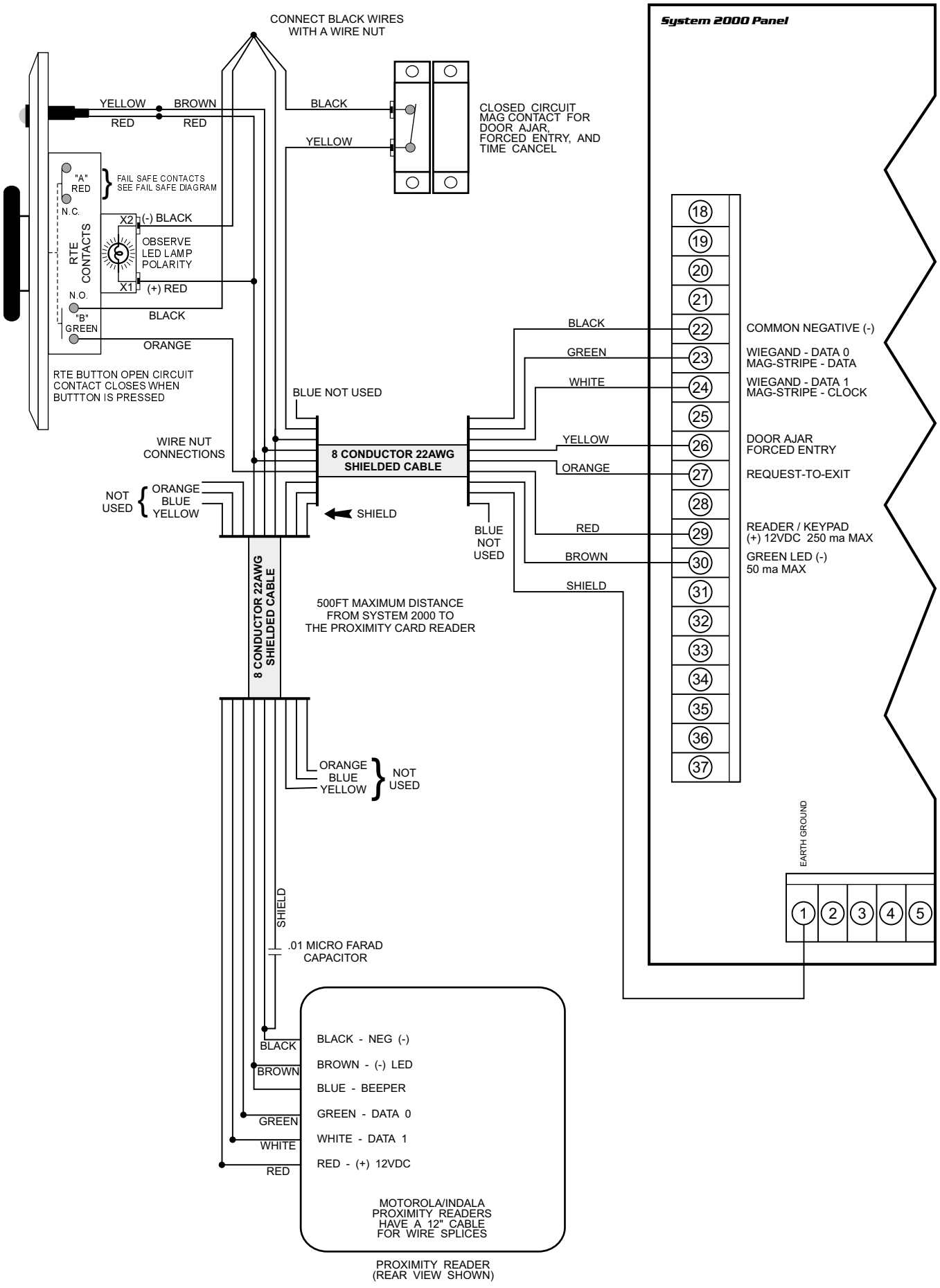
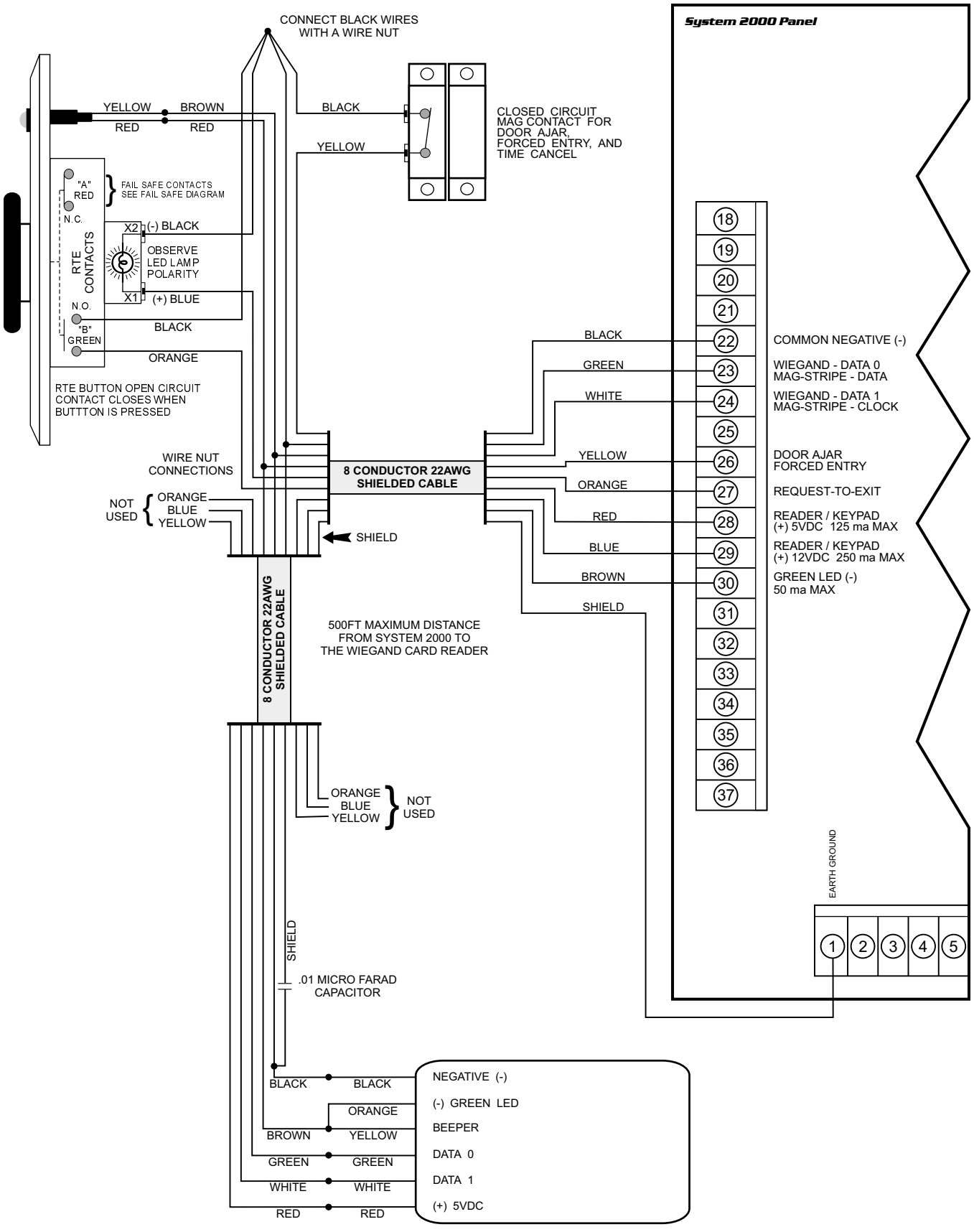


Figure 16 - HID MiniProx Reader w/ Door Ajar & RTE



MODEL 4176 MINI PROXIMITY READER SHOWN

Figure 17 - HID Proximity Reader w/ Door Ajar & RTE

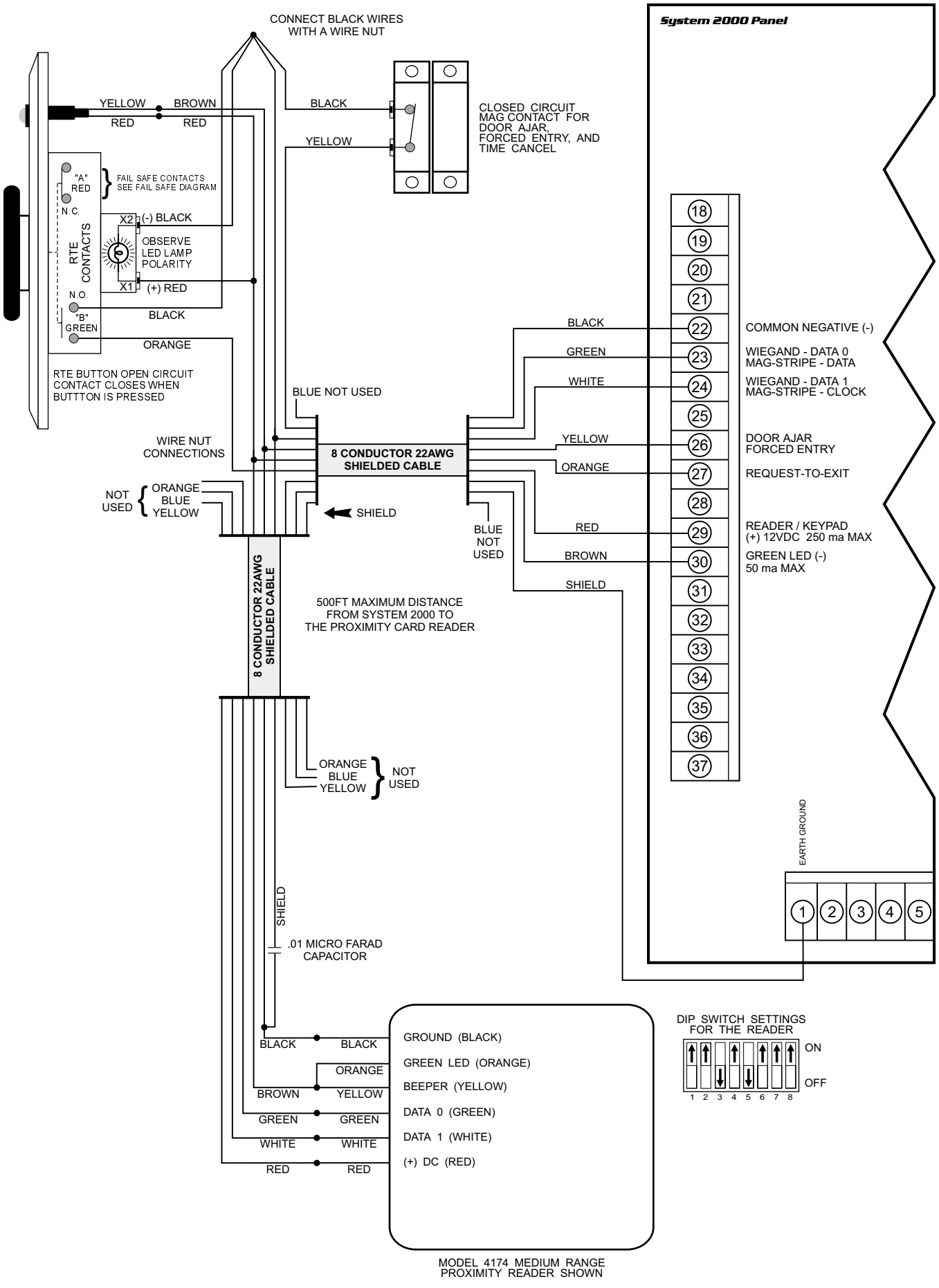


Figure 18 - HID MaxiProx Reader w/ Door Ajar & RTE

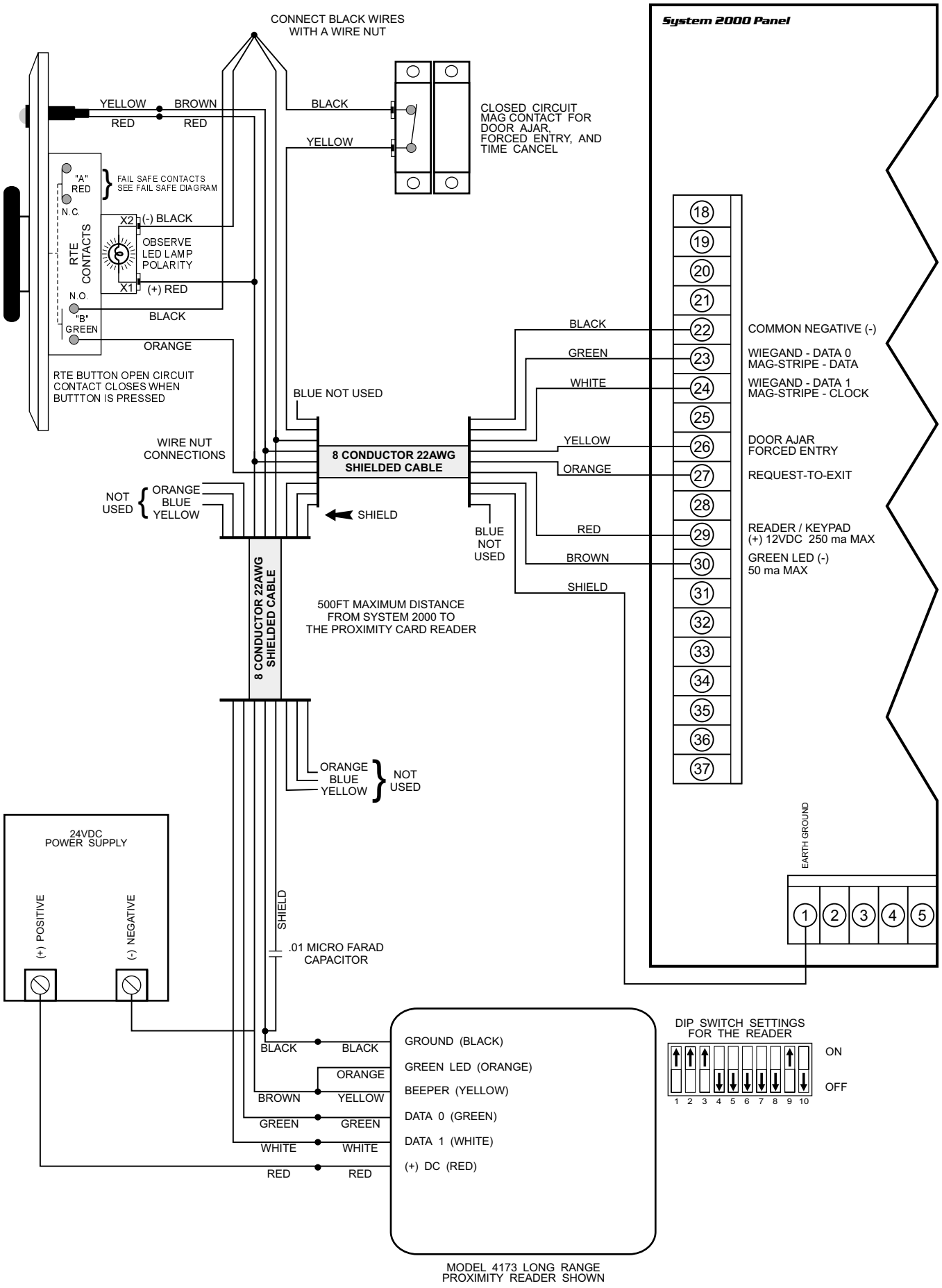


Figure 19 - Wiegand Card Reader w/ Door Ajar & RTE

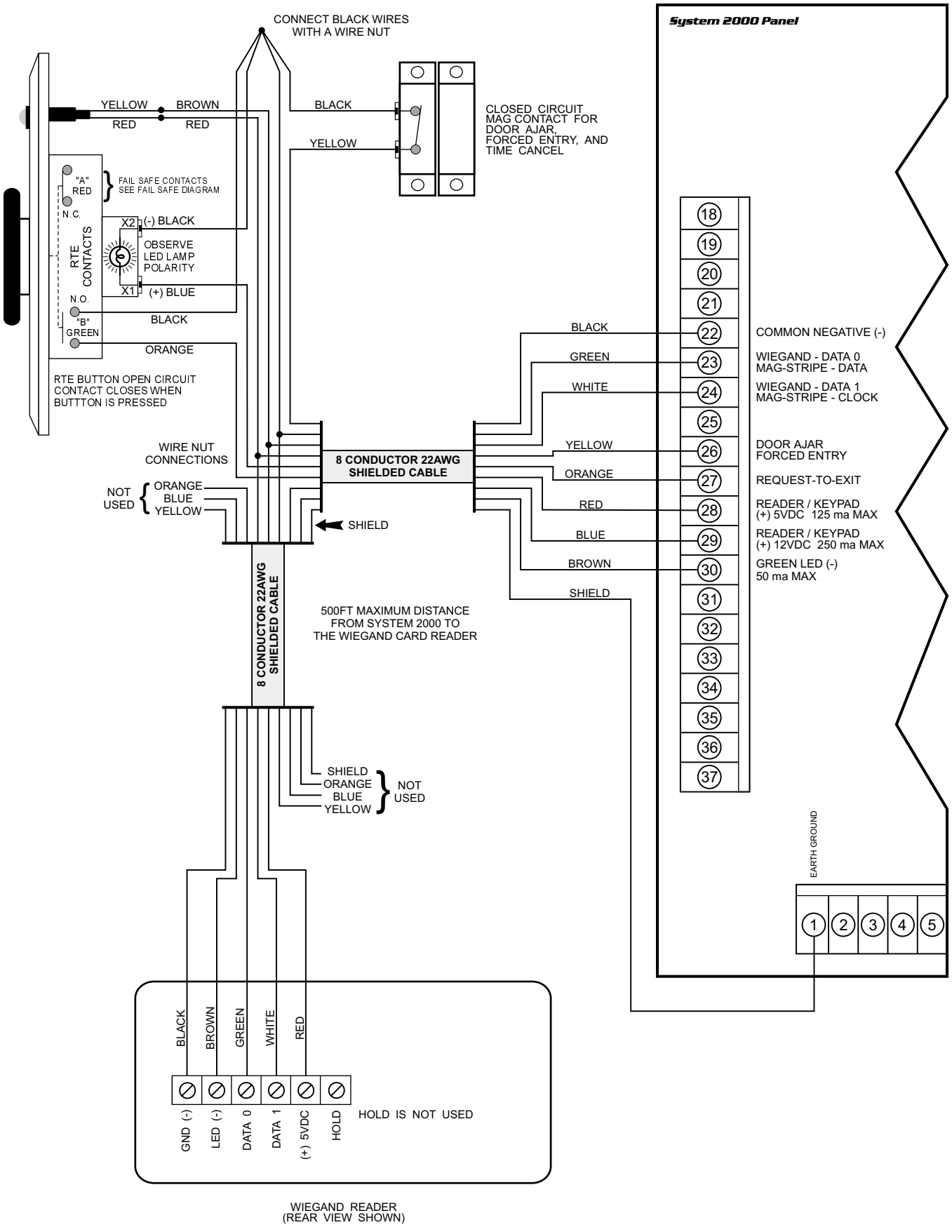


Figure 20 - Door Strike and DC Power Supply

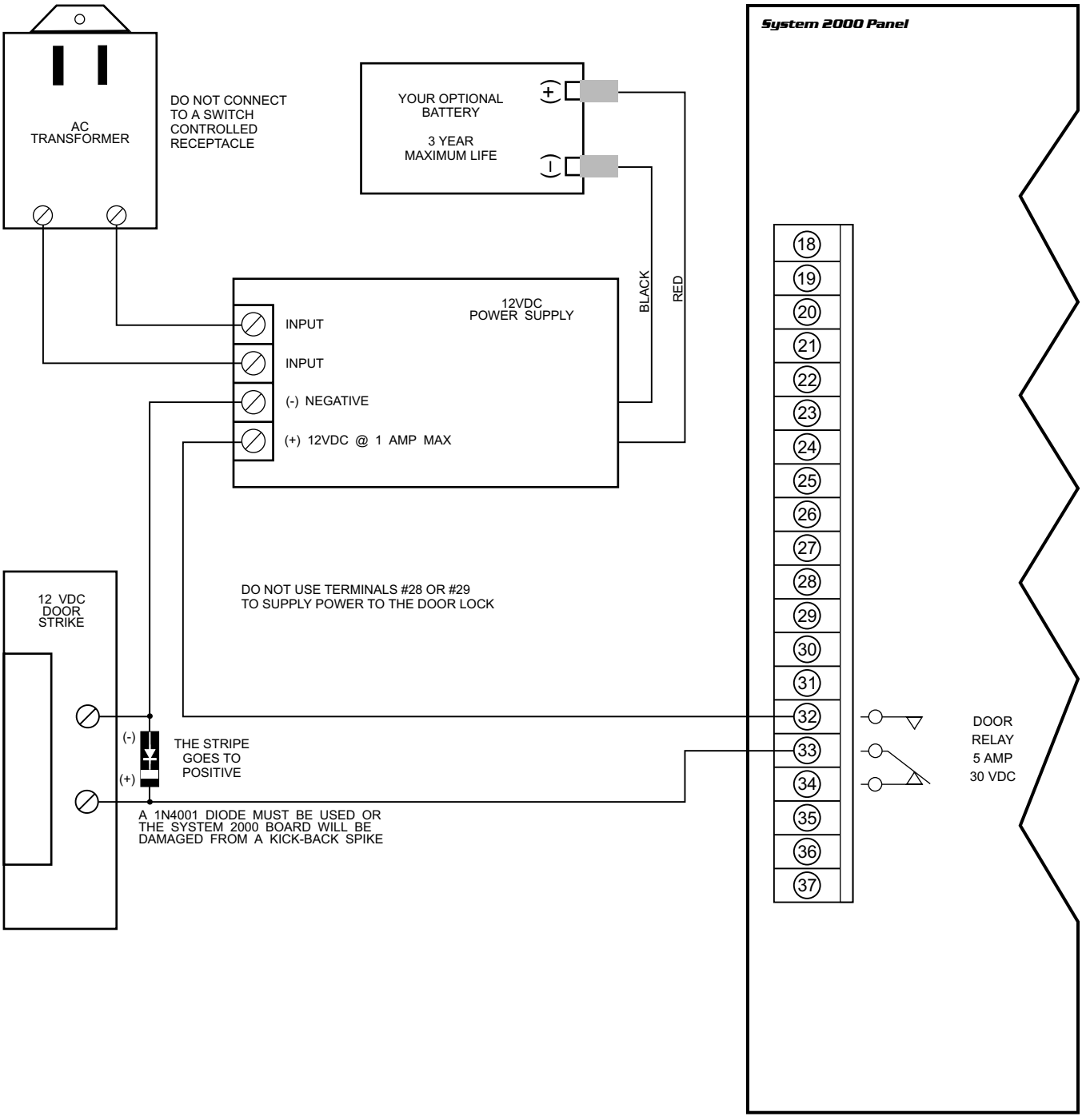
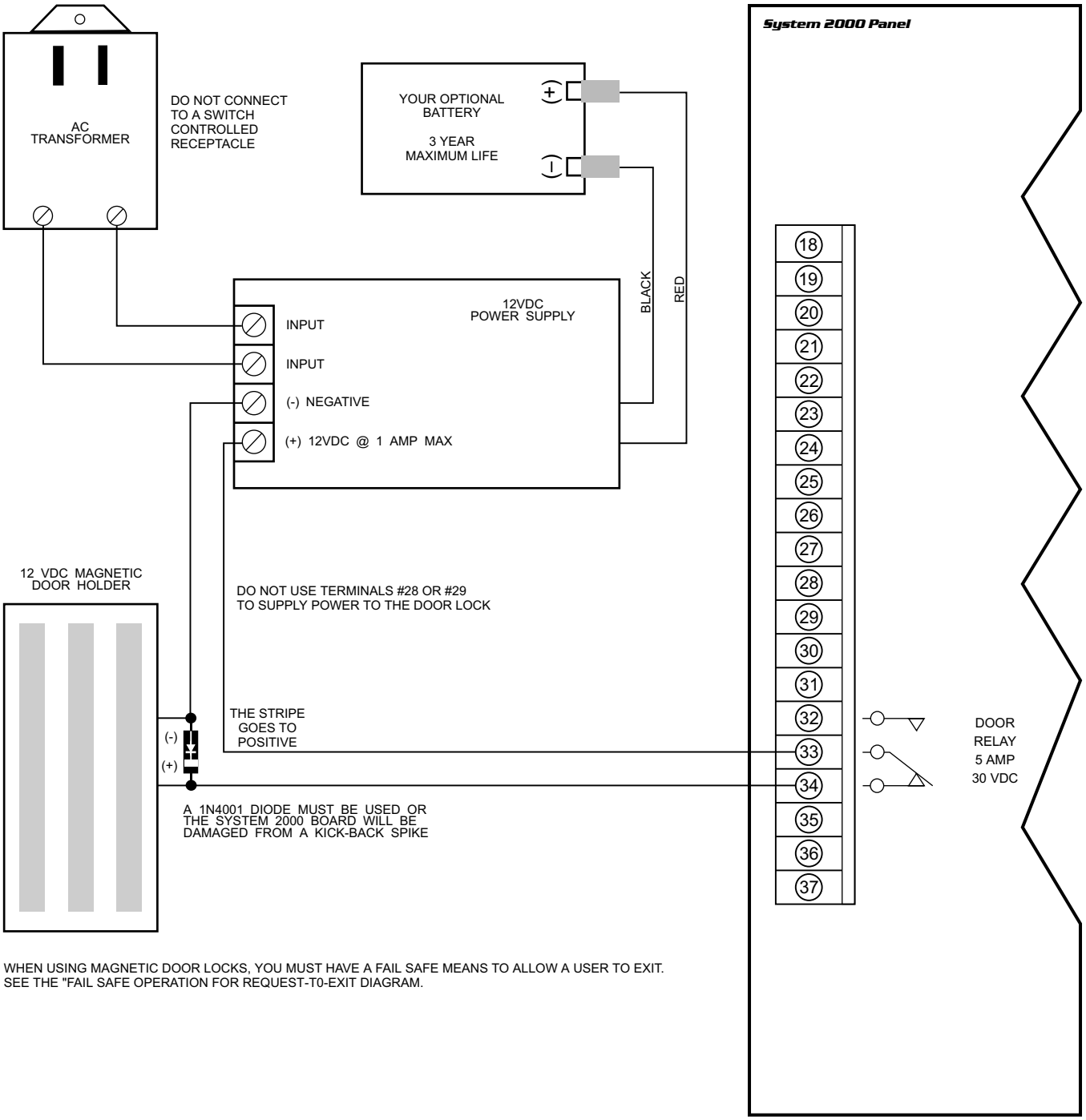


Figure 21 - Magnetic Lock and DC Power Supply



WHEN USING MAGNETIC DOOR LOCKS, YOU MUST HAVE A FAIL SAFE MEANS TO ALLOW A USER TO EXIT.
SEE THE "FAIL SAFE OPERATION FOR REQUEST-T0-EXIT DIAGRAM.

Figure 22 - Door Ajar & Request-To-Exit

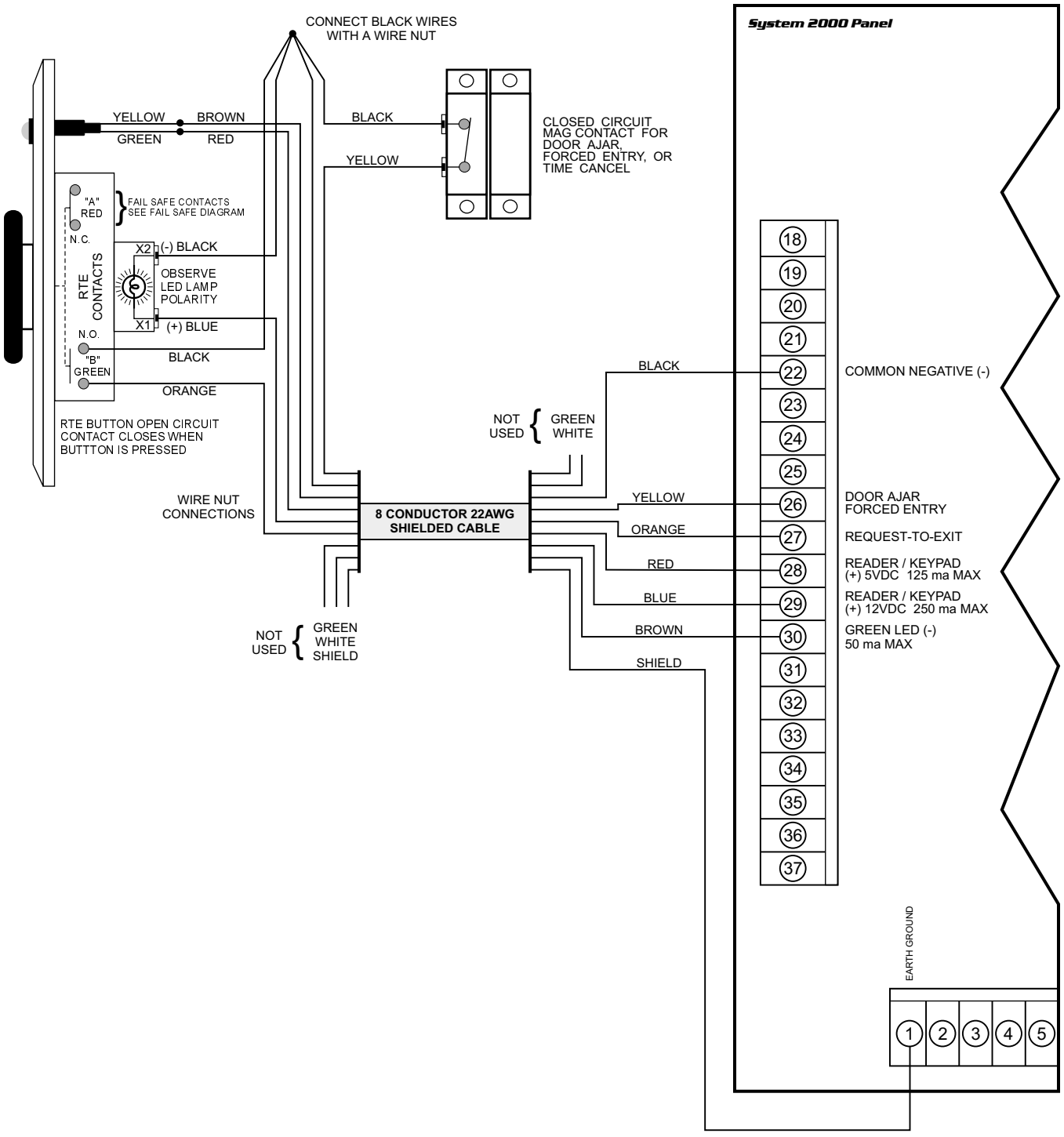


Figure 23 - Fail Safe Operation for Request-To-Exit

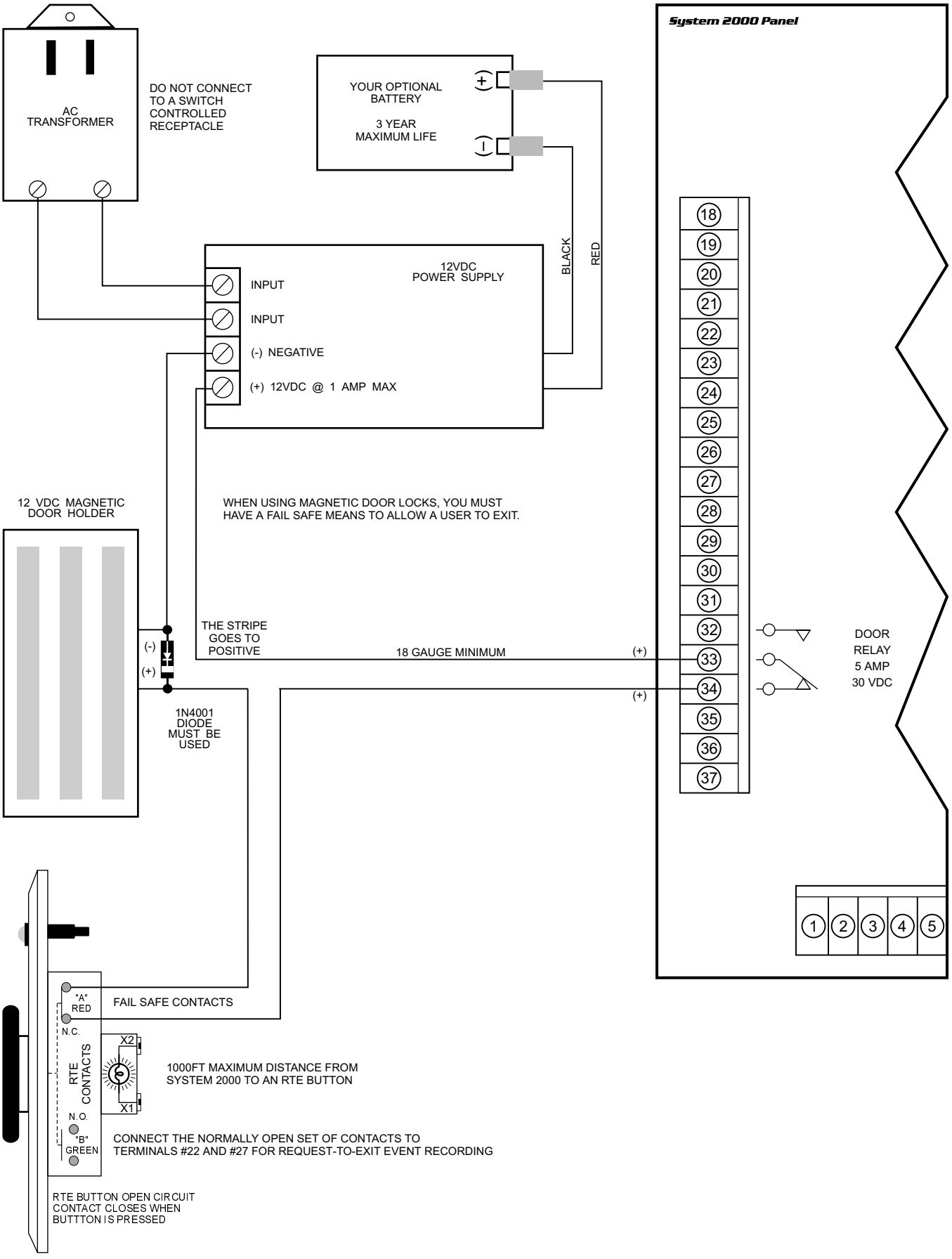


Figure 24 - Zone Input using a Magnetic Contact

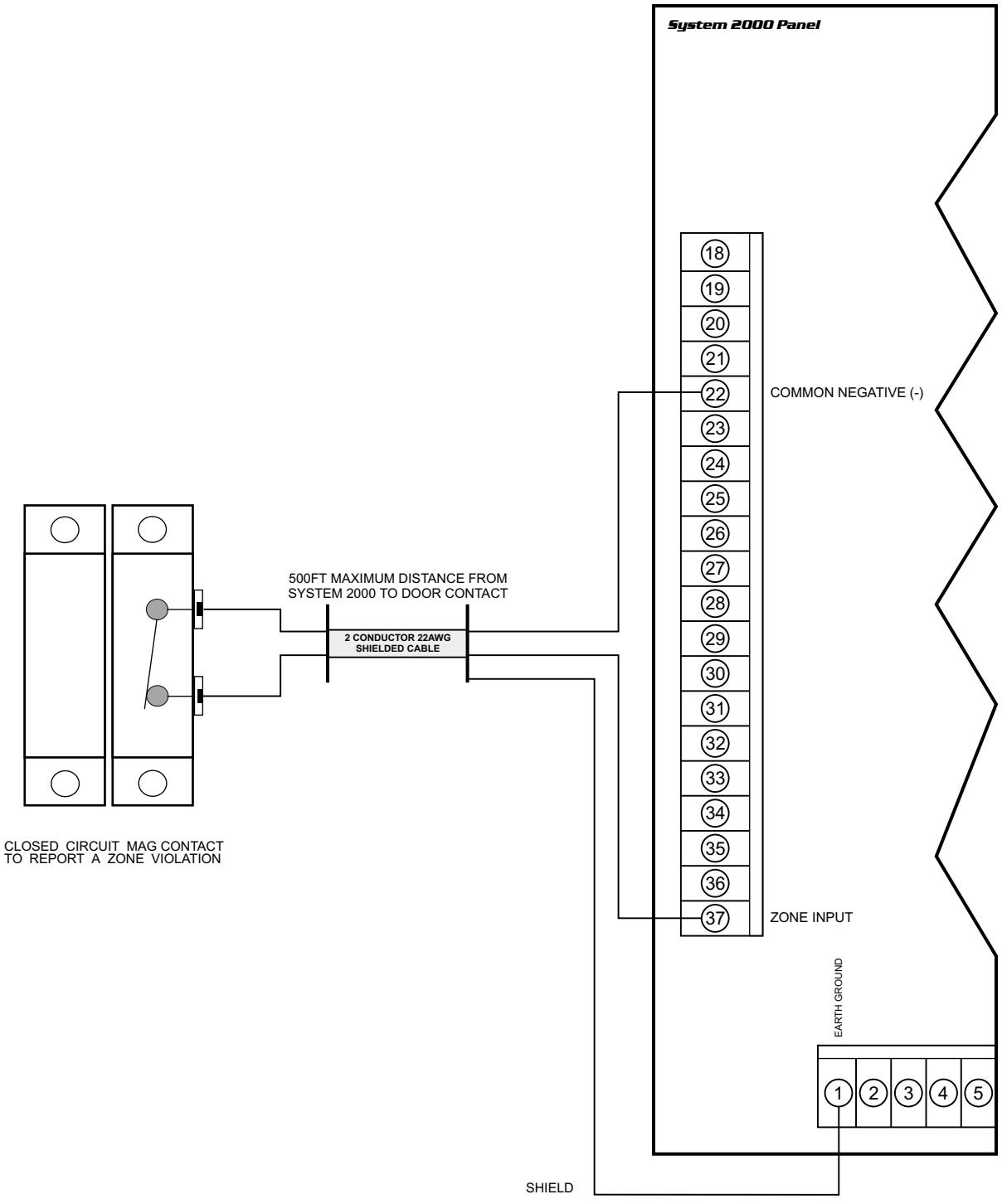


Figure 25 - Line Extender Module and Wiegand Card Reader

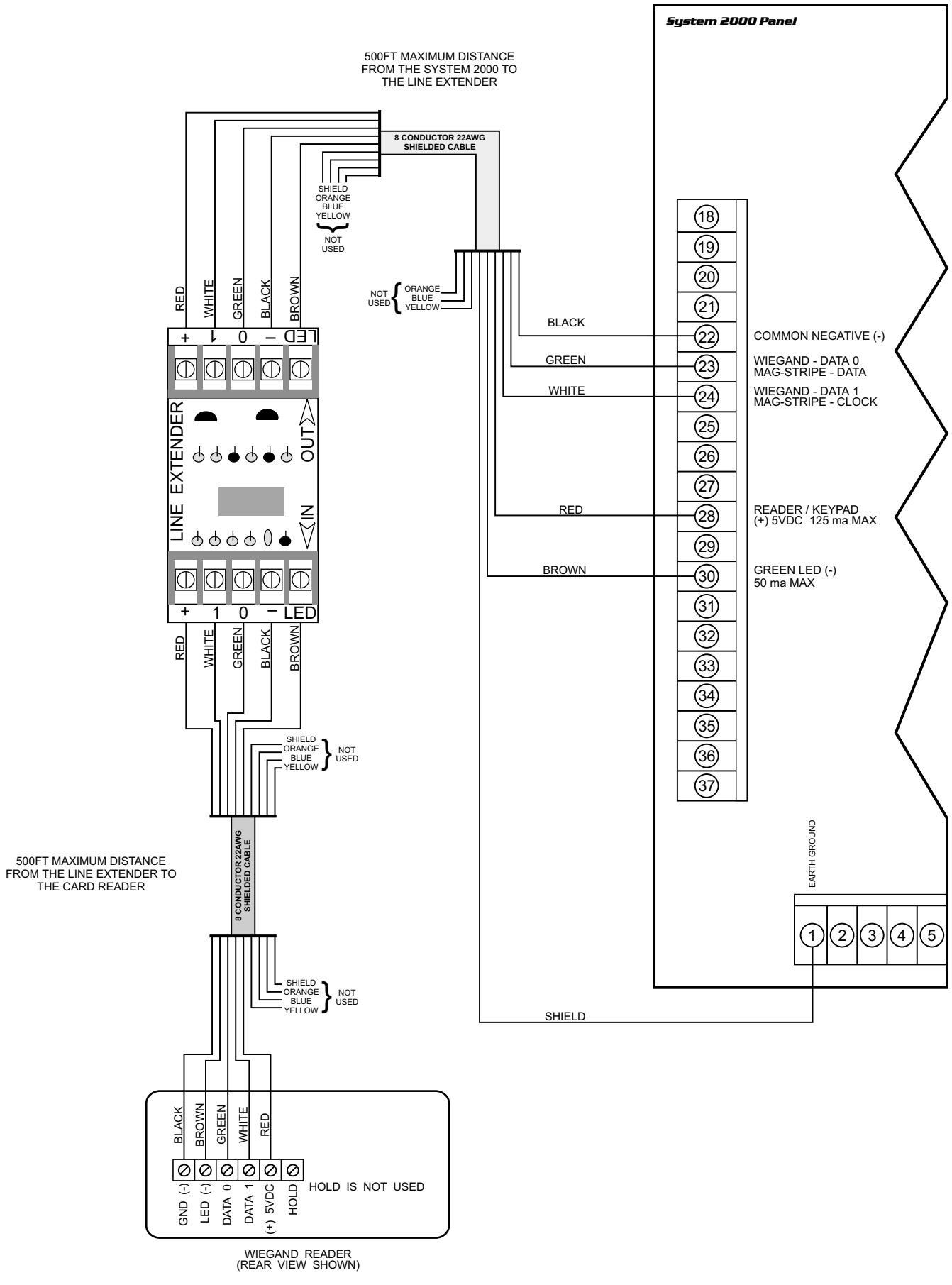


Figure 26 - Shunt a Closed Circuit Alarm Contact

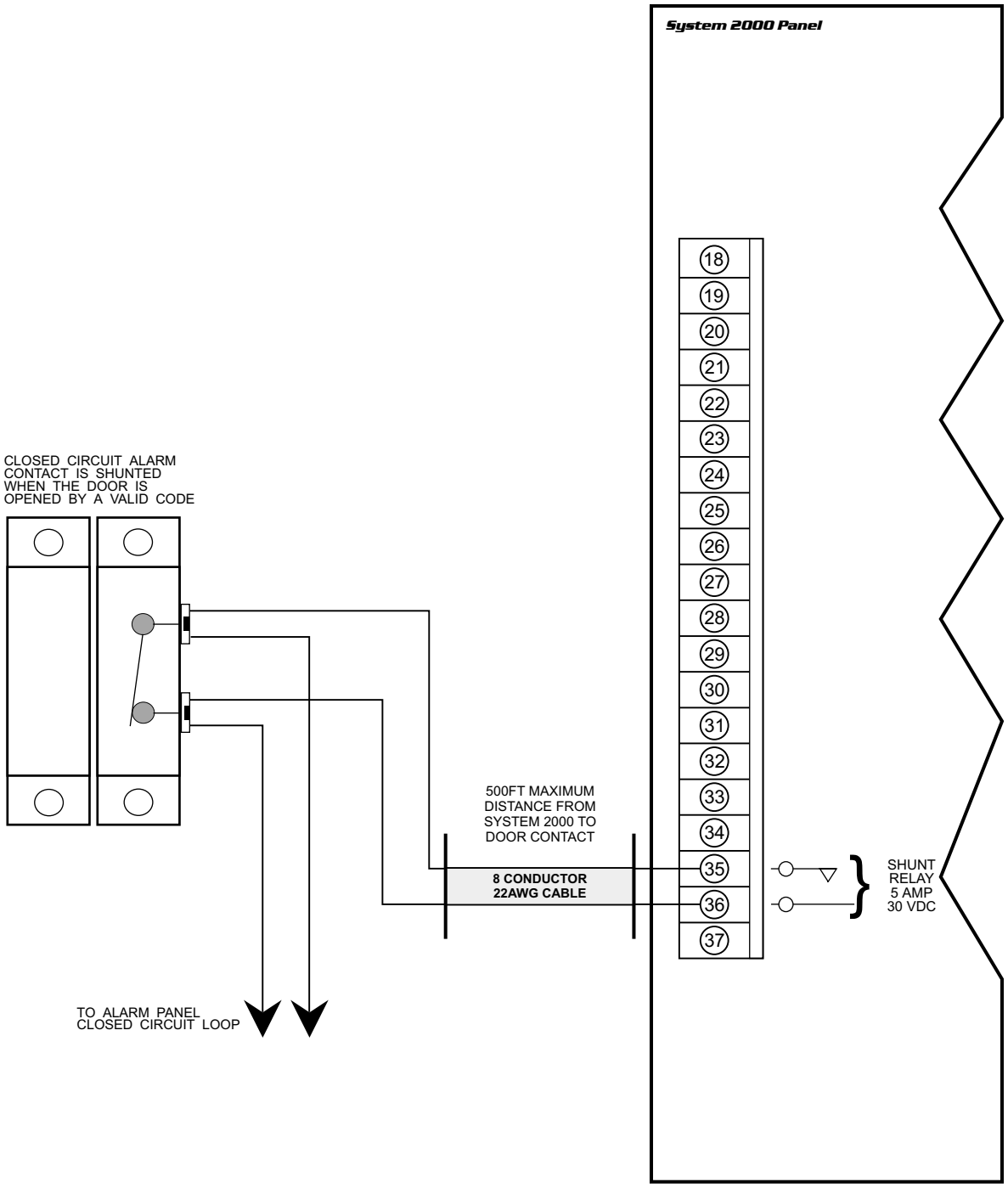


Figure 27 - Emergency Drop Input

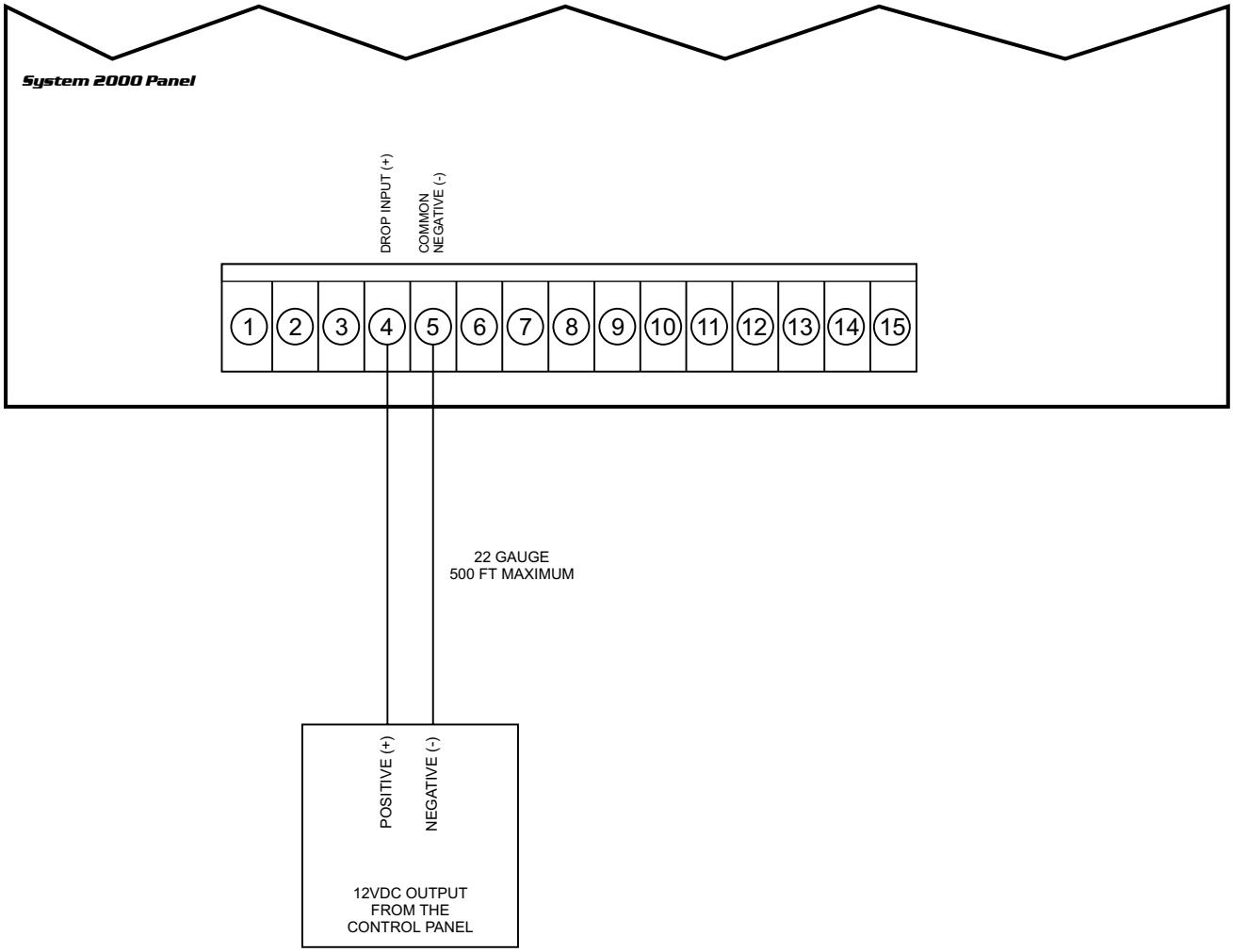
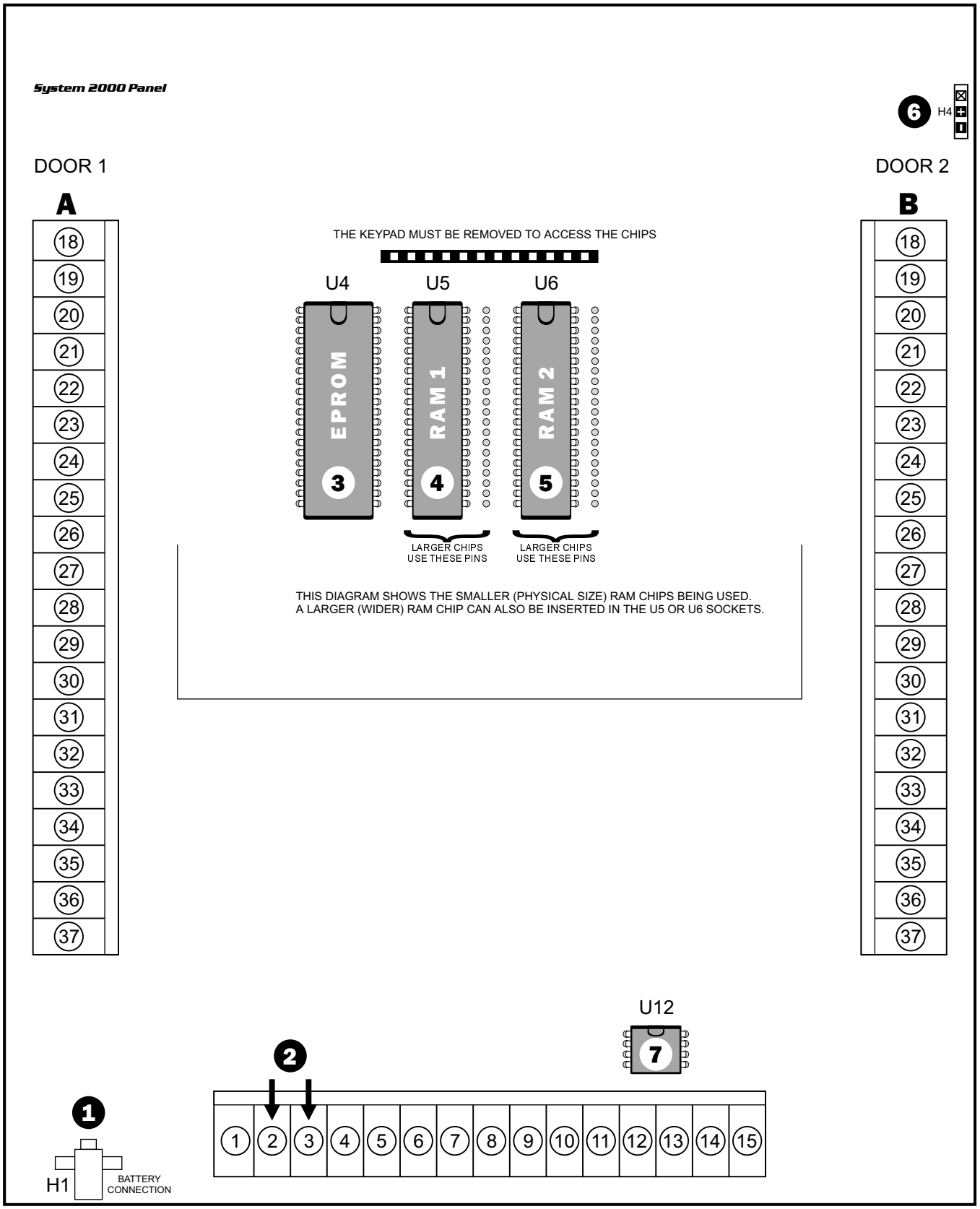


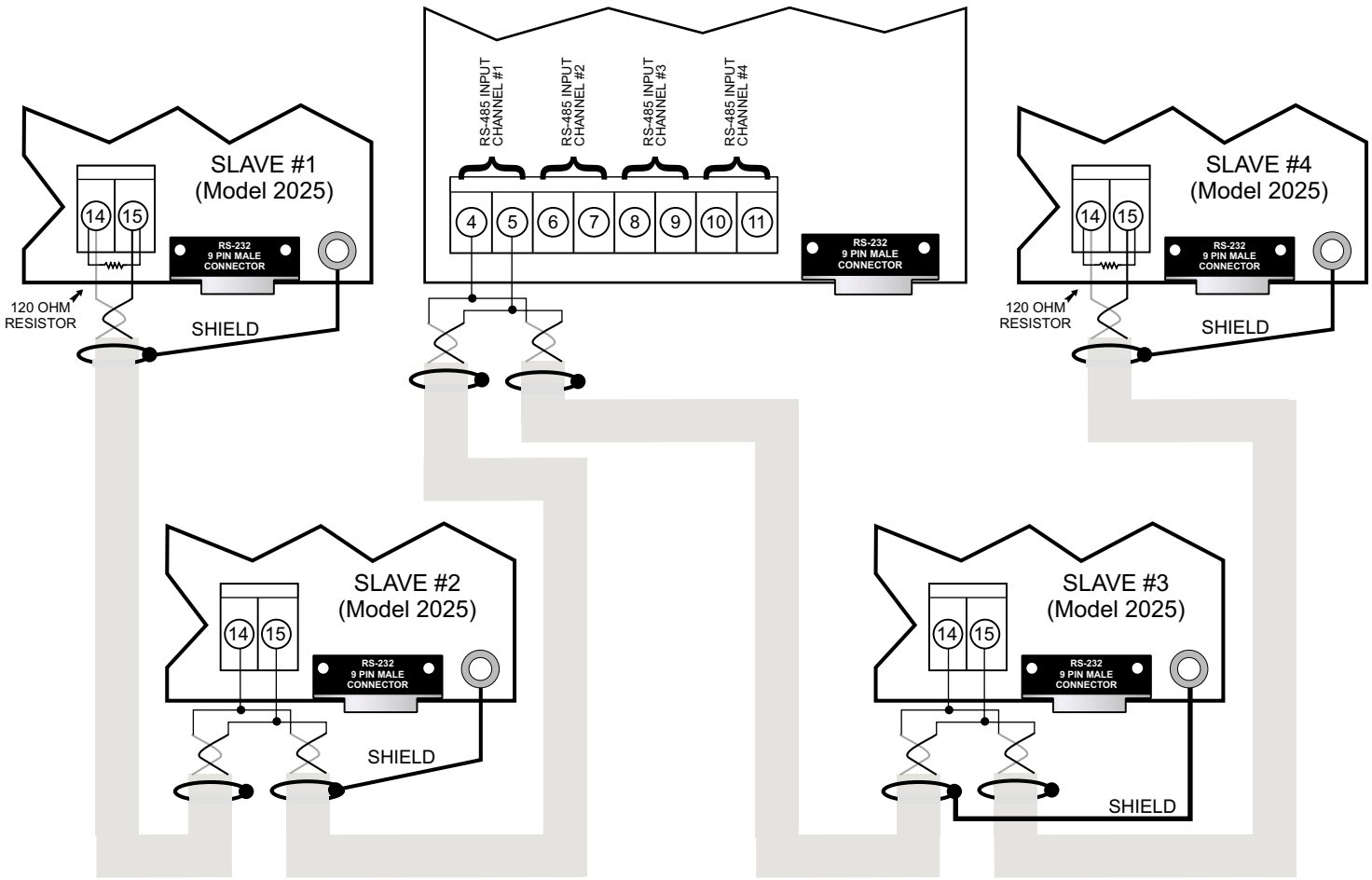
Figure 28 - EPROM and RAM Chip Upgrades



BELOW ARE THE LOCATIONS YOU WILL NEED TO KNOW FOR EPROM AND/OR RAM CHIP UPGRADES.
FOR DETAILED INFORMATION ON THEIR REPLACEMENT REFER TO THE CHAPTER ENTITLED "INSTALLING EPROM AND RAM CHIPS".

1. EXTERNAL BATTERY
2. AC POWER
3. EPROM (U4)
4. RAM 1
5. RAM 2
6. EXTERNAL LITHIUM BACKUP BATTERY (H4)
7. U12 RS485

Figure 29 - Networking Multiple Panels Together



1) The diagram above illustrates the Network Interface Controller (NIC) in the middle of the RS485 bus. It is not necessary to place the NIC in the middle, it can be placed anywhere on the line.

2) Be sure one end of the shield from the twisted pair wire is screwed to the mounting stud in the lower right hand corner of the System 2000 panel.

3) Each section of wire must be grounded at one side only.

4) When attaching the wires from the System 2000's in the network, polarity must be observed.

5) The wire length from the NIC to the last System 2000 panel on the RS485 channel cannot exceed 4000 feet. Additional circuit boards can be placed anywhere within this "string".

6) A 120 ohm resistor must be wired in parallel with the two wires on the first and last units on the RS485 bus. In the example above, the NIC is being designated as the first unit in each of the network "runs".

7) Each RS485 channel can support 31 System 2000 panels (62 doors). Although it is not required, it is highly suggested the units are divided equally between all four ports. In order to d this, you must purchase the 256 door upgrade option (p/n 2001). Example: If your network has a total of 16 panels (32 doors), place four panels on each of the RS485 channels to maximize the communication between all units.

8) Maximum RS485 bus length is 4000 feet.

.

Figure 30 - NIC PCB Descriptions and Layout

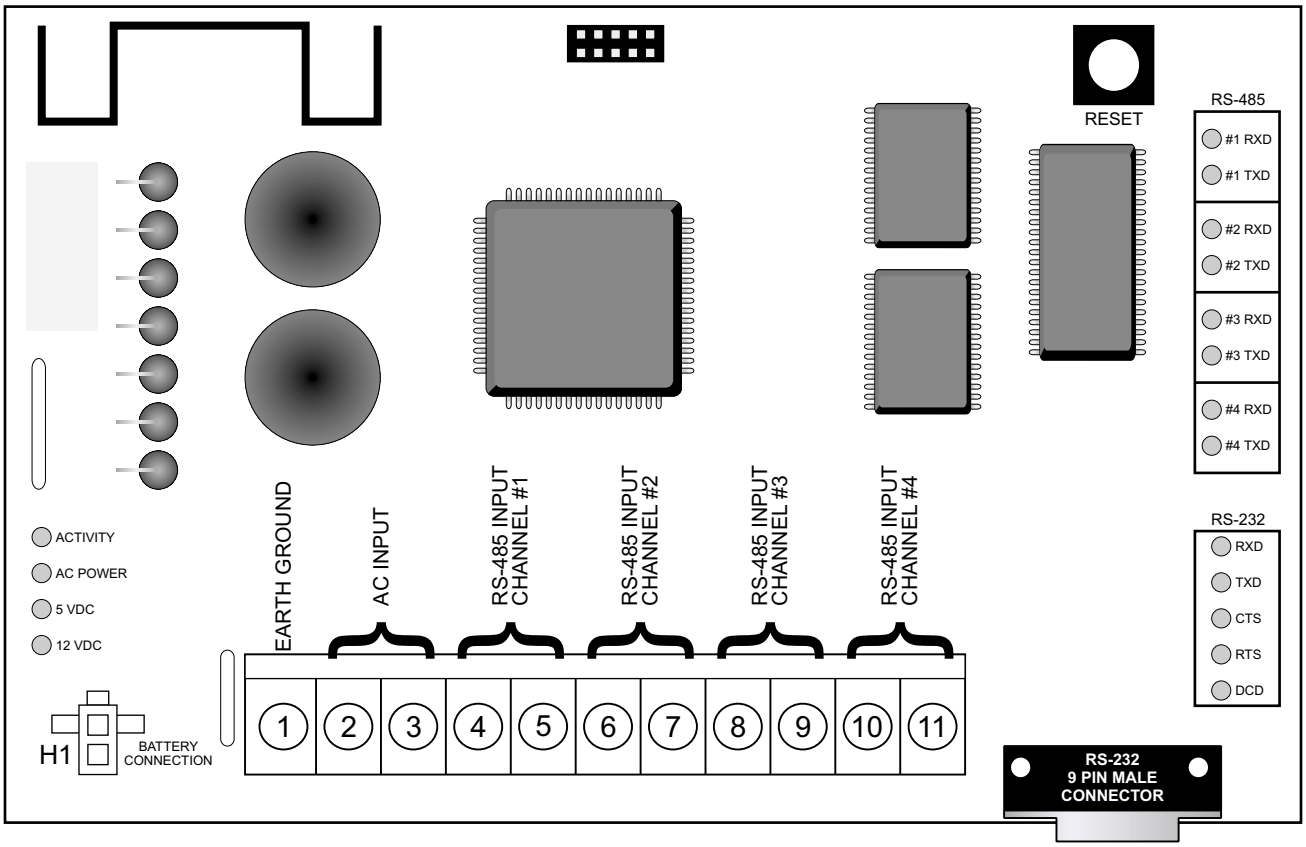
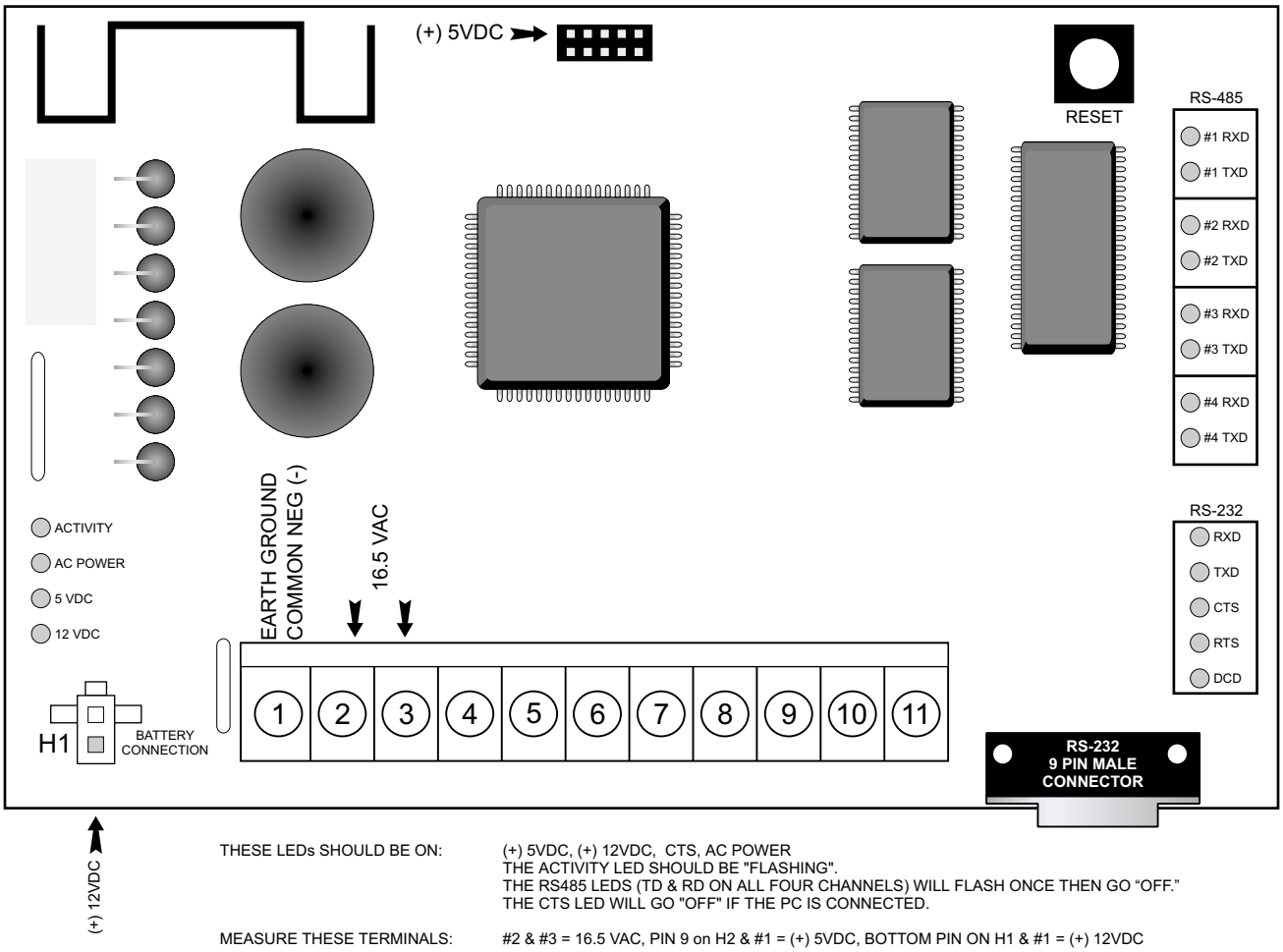


Figure 31 - NIC Test Points



THESE LEDs SHOULD BE ON:	(+) 5VDC, (+) 12VDC, CTS, AC POWER THE ACTIVITY LED SHOULD BE "FLASHING". THE RS485 LEDS (TD & RD ON ALL FOUR CHANNELS) WILL FLASH ONCE THEN GO "OFF." THE CTS LED WILL GO "OFF" IF THE PC IS CONNECTED.
MEASURE THESE TERMINALS:	#2 & #3 = 16.5 VAC, PIN 9 on H2 & #1 = (+) 5VDC, BOTTOM PIN ON H1 & #1 = (+) 12VDC

Figure 32 - NIC Battery and Transformer

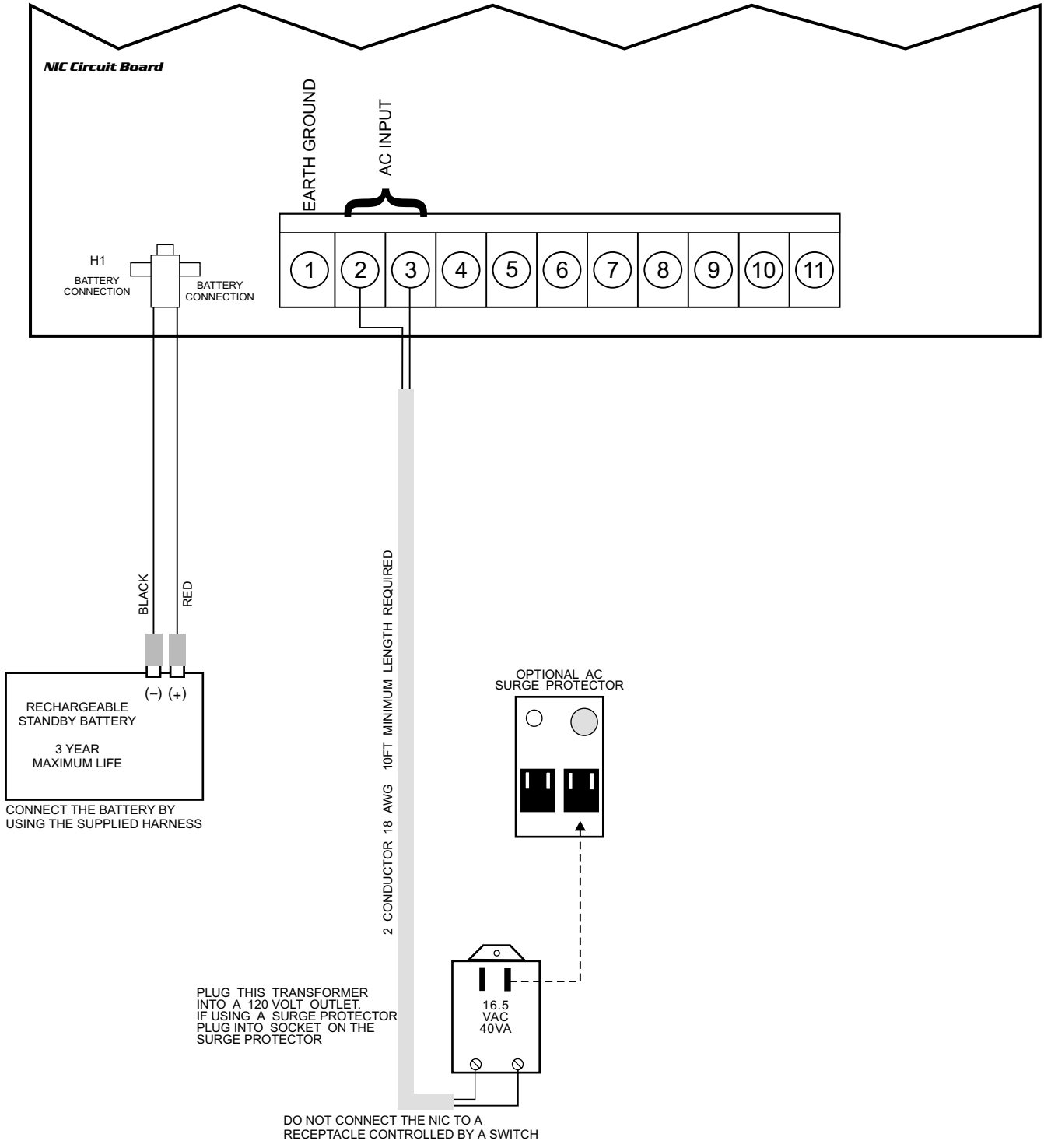
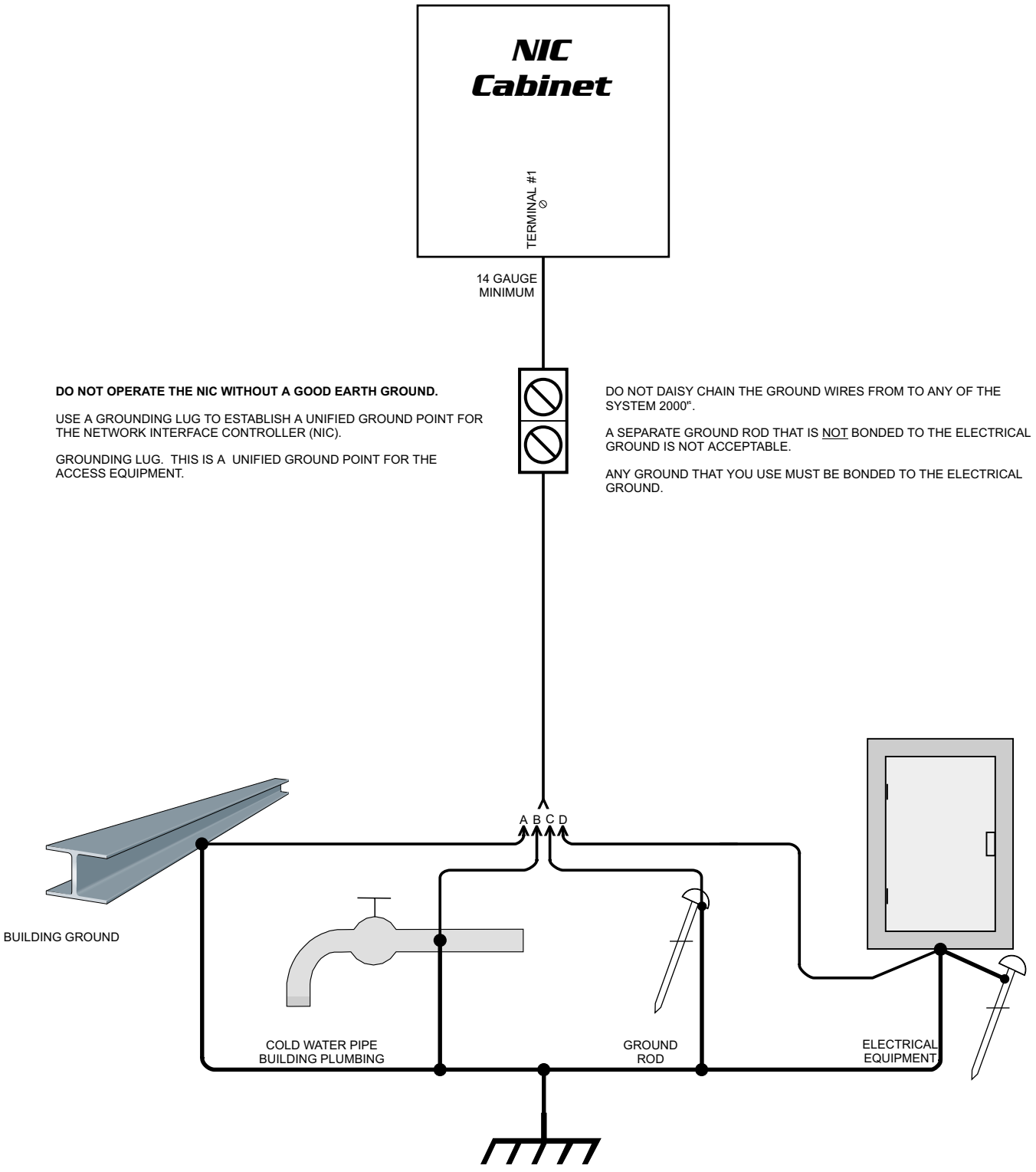


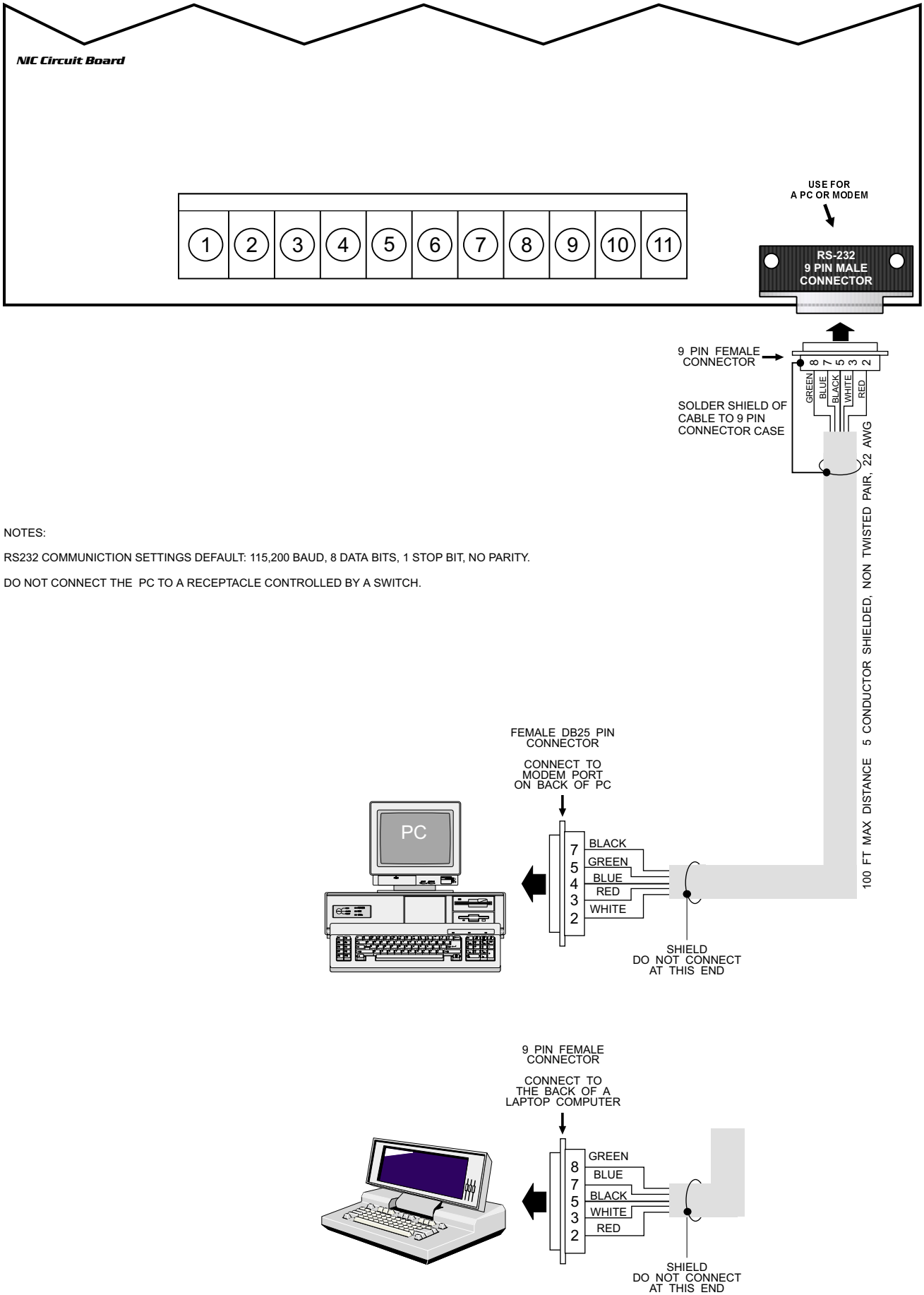
Figure 33 - NIC Shield and Grounding Layout



TYPICAL GROUNDING AND BONDING LAYOUT.

ALL GROUNDS AND BONDS MUST CONFORM TO NATIONAL ELECTRICAL CODE STANDARDS.

Figure 34 - PC Connections



NOTES:

RS232 COMMUNICTION SETTINGS DEFAULT: 115,200 BAUD, 8 DATA BITS, 1 STOP BIT, NO PARITY.

DO NOT CONNECT THE PC TO A RECEPTACLE CONTROLLED BY A SWITCH.

INDEX

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