

CITADEL

 **Synergistics, Inc.**
We Make Access Control Make Sense

Citadel

* * *

**INSTALLATION
GUIDE**

NOTICES

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing device pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against such interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Synergistics, Inc. reserves the right to make improvements in the hardware and software described in this manual at any time without notice.

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Synergistics warrants this access control product to be in good working order for a period of 1 year after shipment from Natick, Massachusetts. Should this product fail to be in good working order at any time during this 1 year period, Synergistics, at its option, will repair or replace the defective portion of this product at no additional charge except as set forth below.

Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of Synergistics, Inc. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, lightning, misuse, abuse or modification of the product.

Warranty service may be obtained by calling Synergistics, Inc. at (508) 655-1340 and reporting the failure or problem with the equipment. At that time, warranty service will be determined, and upon verification of the purchase, a return authorization will be issued and replacement or other required service will be initiated. In the case of replacement, if the product is to be returned by mail, you agree to insure the product or assume risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. Synergistics, Inc. does not warranty any part of the installation of the system or the degree of security attained by the equipment. These items are dependent on persons and things outside the control of Synergistics, Inc.

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INTRODUCTION

Congratulations on your purchase of Citadel.

You have purchased a distributed processing, access control system designed to control personal physical access and monitor perimeter alarms for local and remote buildings. The host computer system operates on a Windows 98, ME, NT4.0, XP or 2000 platform and offers its users easy to understand, logically organized menu driven screens with extensive on-screen help for simplified data entry and system operation.

Citadel operates on a standard desktop PC. The minimum computer requirements are: 500 mhz Pentium III or newer PC with 128 mbytes RAM, 10 gbyte Hard Disk, 15 inch color monitor, 3.5 inch, 1.44 Mbyte Floppy disk drive, 1 or 2 Serial ports, 1 Parallel printer port, 1 Full function keyboard, 1 Windows printer. The Citadel system software may be loaded on a computer with a Windows 98, NT4.0, 2000, ME or XP platform, currently being used, sharing the memory with other programs, thereby saving on both the cost of a new computer, and also on the space necessary to operate it.

System hardware is easy to install and service in the Citadel system due to its multi-drop network. This network requires only a single shielded twisted pair of wires to form a network of up to 16, 2 reader controllers per site. A virtually unlimited number of sites are supported over dial-up telephone lines. The Citadel system supports all popular card reader and keypad technologies including different technologies in different sites. This allows the user to select a technology that fits the requirements of each site without compromising technology in one site to match that of another site.

Expansion of the Citadel system to secure other buildings or expand within the local building is easy, practical and inexpensive. No additional software is required for this expansion. Simply add the controllers and readers to the system and perhaps a modem if a newly expanded building is a remote site. Simple, direct and cost effective. That's what Citadel offers its user.

Software for Citadel is always being improved and upgraded. The first years software upgrade is free on request. Following that, upgrades are available at reasonable cost. Annual software upgrades will keep your system current with the latest technologies for years to come. Keep in touch with your installing dealer to find out current information on your Citadel system and its latest capabilities. As time goes on, you will find more and more uses for its capabilities as I have in developing enhancements to its software.

Gregory I. Goldman, CEO

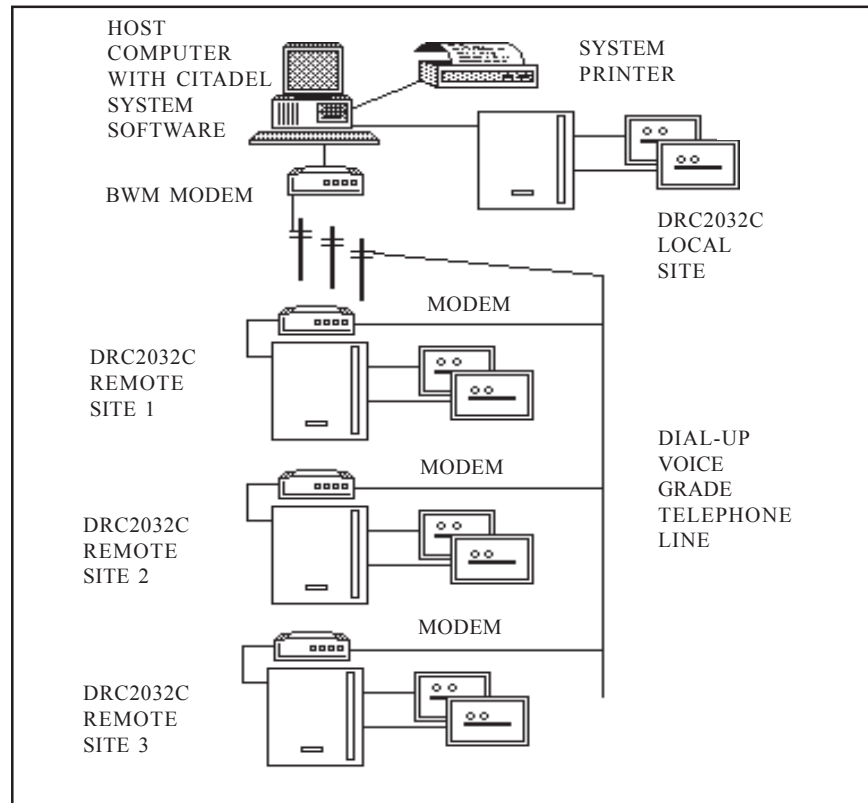


Figure 1.1 TYPICAL CITADEL MULTI SITE SYSTEM CONFIGURATION

Note: Citadel will support up to 16 DRC2032C controllers per site. 1 local site and a virtually unlimited number of remote sites will be supported by the software.

Note: Synergistics modems are highly recommended because they have been tested with Citadel and are known to communicate well over clean dial up telephone lines. Not all other brands of modems have been tested. European style modems will not operate with the Citadel system.

Internally mounted modems are recommended for mounting convenience. These modems (Models IMOD56K or ISHM48) are installed in the DRC2032C enclosure at the factory. If externally mounted modems are desired, use Synergistics part number MOD56.

Replaceable Spare Parts

The following parts are replaceable in the field by trained technicians:

Fuse: 2A (Circuit Board Fuse)	Buss MDL-2
Fuse (Battery Charger Fuse)	Buss AGC-3
XFMR 12V, 40VA (Standard Power)	RTG1240SL/M
XFMR 16.5V, 40VA (Battery Backup)	RTG1640SL/M
Battery Charger	CPS1
Battery (Battery Backup) 12V, 4AH	Batt12/4AH
5V Voltage Regulator	7805 TO-3
Network termination resistor platform:	RTERMBW
2 pin Jumpers	JMP2
56K Modem	MOD 56
Short Haul Modem	SHM48
Computer to Modem cable (9 pin to 25 pin)	MC9-25

BEFORE STARTING

1.0 BEFORE STARTING

Before proceeding with the installation, you should have the following system software and components.

1.1 SOFTWARE AND DOCUMENTATION REQUIREMENTS

Operating Platforms - Windows 98, NT 4.0, 2000, ME and XP.

Software - Citadel Distribution CD ROM.

1.2 HARDWARE REQUIREMENTS

Citadel requires the following equipment at the computer and at the supported sites:

1.2.1 COMPUTER HARDWARE REQUIREMENTS

Your Citadel computer must meet one of the following minimum PC configurations:

500 mhz Pentium III or newer PC with 128 mbytes RAM, 10 gbyte Hard Disk drive, 15 inch color monitor, 3.5 inch, 1.44 Mbyte Floppy disk drive, 1 or 2 Serial ports, 1 Parallel printer port, 1 Full function keyboard, 1 Windows printer.

- 1 Dial-up Telephone line (optional) for remote site communications.
- 1 Modem for computer interface with remote site telephone line.
- 1 Short Haul modem (optional) for local site communications of over 100 feet.

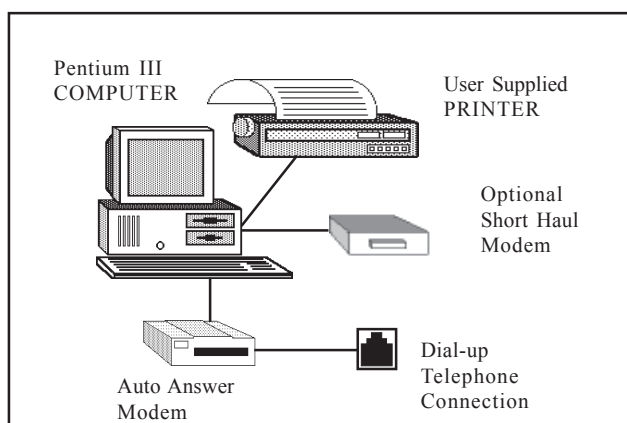


Figure 1.2 HOST COMPUTER SYSTEM CONFIGURATION.

1.2.2 SITE HARDWARE REQUIREMENTS

Citadel supports both local sites (1) and remote sites (virtually unlimited) from a single host computer. See figure 1.1.

1.2.2.1 STANDARD SITE EQUIPMENT REQUIREMENTS

- DRC2032C Control Panels with power supplies. Maximum, 16 per site.)
- Card readers or keypads. (mag stripe, Wiegand, proximity, bar code or biometric. Maximum 32 readers or keypads per site.)
- Electric door locking devices.
- Power supplies for electric door locks.
- Alarm and door position sensors.
(Input devices must use normally closed contacts.)
- Wire and Cable.
- Optional modems or short haul modems if not directly wired to computer.

1.2.2.2 DIRECT WIRED LOCAL SITE EQUIPMENT REQUIREMENTS

- Local sites that locate the lead controller within 100 feet of the host computer only require a serial port cable connecting the lead controller to the host computers' serial port. (See figure 1.1)

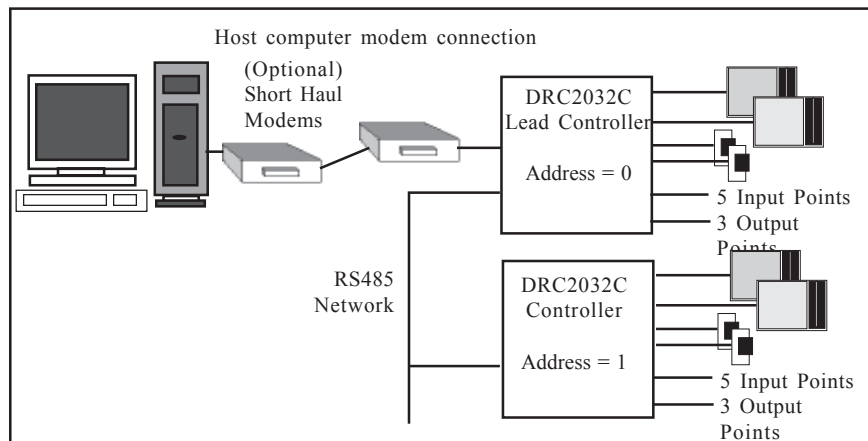


Figure 1.3 LOCAL SITE CONFIGURATION

- Local sites which locate the lead controller over 100 feet from the host computer, require 2 Synergistics BWSHM short haul modems to support distances of up to 2 miles between the host and the first controller (See figures 1.3 and 2.1).

1.2.2.3 DIAL-UP REMOTE SITE EQUIPMENT REQUIREMENTS

- 1 Synergistics modem at computer
 - 1 Voice grade, dial-up telephone line at computer
 - 1 Synergistics modem at each remote site
 - 1 Voice grade dial-up telephone line at each remote site
- (See figure 1.1 and 2.1)

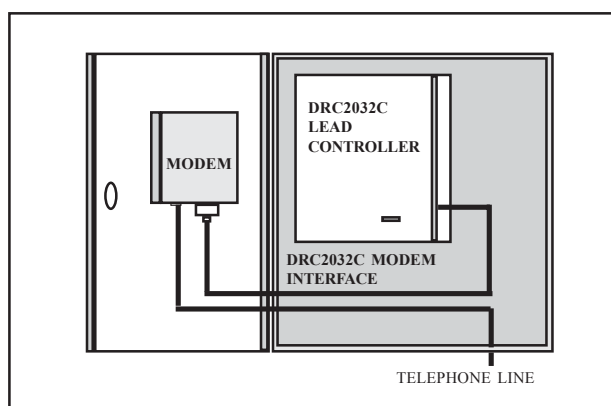


Figure 1.4 - DRC2032C LEAD CONTROLLER

1.2.2.4 BATTERY BACKUP

DRC2032C controllers may be equipped with operational battery backup by installing the battery backup option. This option will power the DRC2032C controller for approximately 3 hours for each 12v, 4ah battery. 2 batteries may be housed in the controller's enclosure along with the battery charging circuit. See figure 4.2.

Note: Battery backed up DRC2032C controllers will not communicate with the host computer when using the controller's battery power. Separate DC power is required to power the modem. If battery backup is installed on the lead controller, the modem must be powered separately from the controller using a separate modem DC power source.

Warning: When using battery backup on a DRC2032C controller, the AC input from the 12v transformer used in standard AC powered controllers must not be connected to the controller board or serious damage will result. For battery backup, use only the 16.5 volt transformer, connected to the battery charging board as illustrated in figure 4.2. *Connecting both the 12v and 16.5v transformers to the DRC2032C will cause damage to the board.*

SYSTEM ARCHITECTURE

2.0 SYSTEM ARCHITECTURE

Citadel is a card or keypad access control system controlling access to single buildings or groups of buildings such as might be found on a College campus, or in scattered commercial buildings. A virtually unlimited number of building sites can be supported from a single host computer which may also be shared with other programs operating on a Windows platform.

The primary purpose of Citadel is to control access to buildings or secured areas. A secondary purpose is monitoring alarm conditions within the secured sites. Citadel may be installed in Hospitals, Schools, Colleges, Apartments, Professional buildings and other commercial locations.

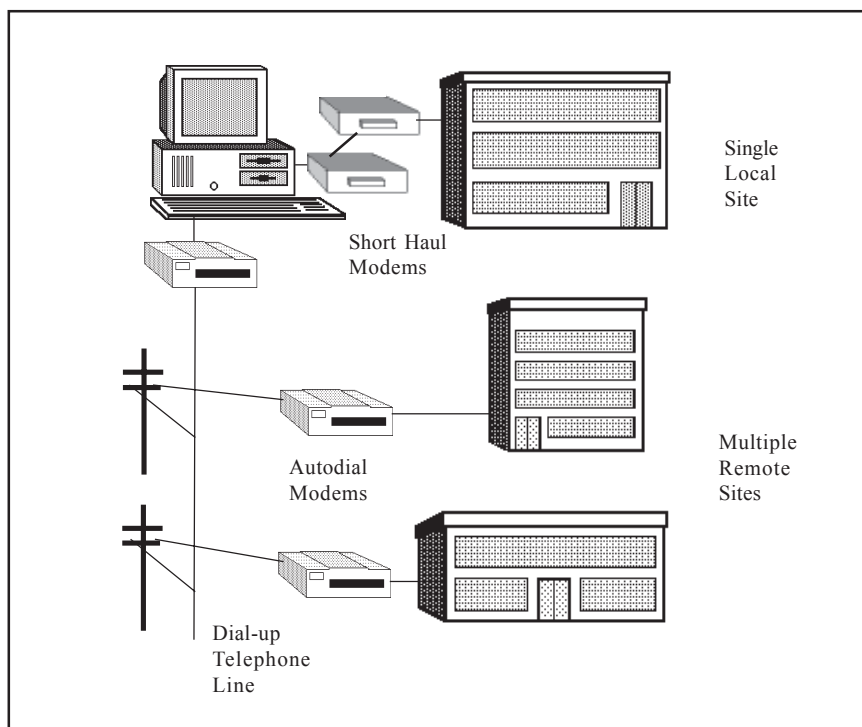


Figure 2.1 CITADEL SYSTEM CONFIGURATION

2.2 COMMUNICATIONS

Because many buildings may be secured or controlled by a single host computer, dial-up telephone lines are used for communication between the computer and each sites' lead controller for all but the local site. The local sites' lead controller is connected directly to the computers serial port if it is located within 100 feet of the computer. Short haul modems may be used to communicate in situations where the local site is over 100 feet and up to 2 miles from the host computer. The host computer will support one local site and many dial-up remote sites. Citadel does not support more than 2 serial ports at the host computer but will operate on ports 1 through 4.

2.3 THE HOST COMPUTER

The Citadel host computer is used to develop and edit the systems database tables, to communicate those database tables to the site controllers and to upload alarm and transaction logs from the controllers to be stored on the computers hard disk. Citadel is often shared on a computer with other programs to avoid the expense of supplying a computer exclusively for access control. It is recommended that the Citadel.mdb file is saved and periodically backed up off the host computer in case of a hard drive crash on the host computer.

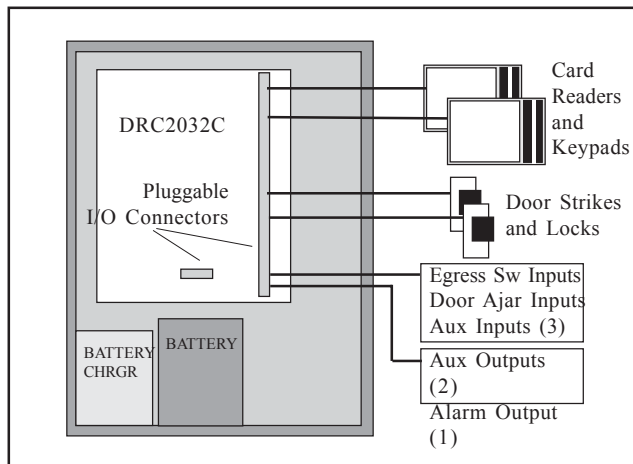


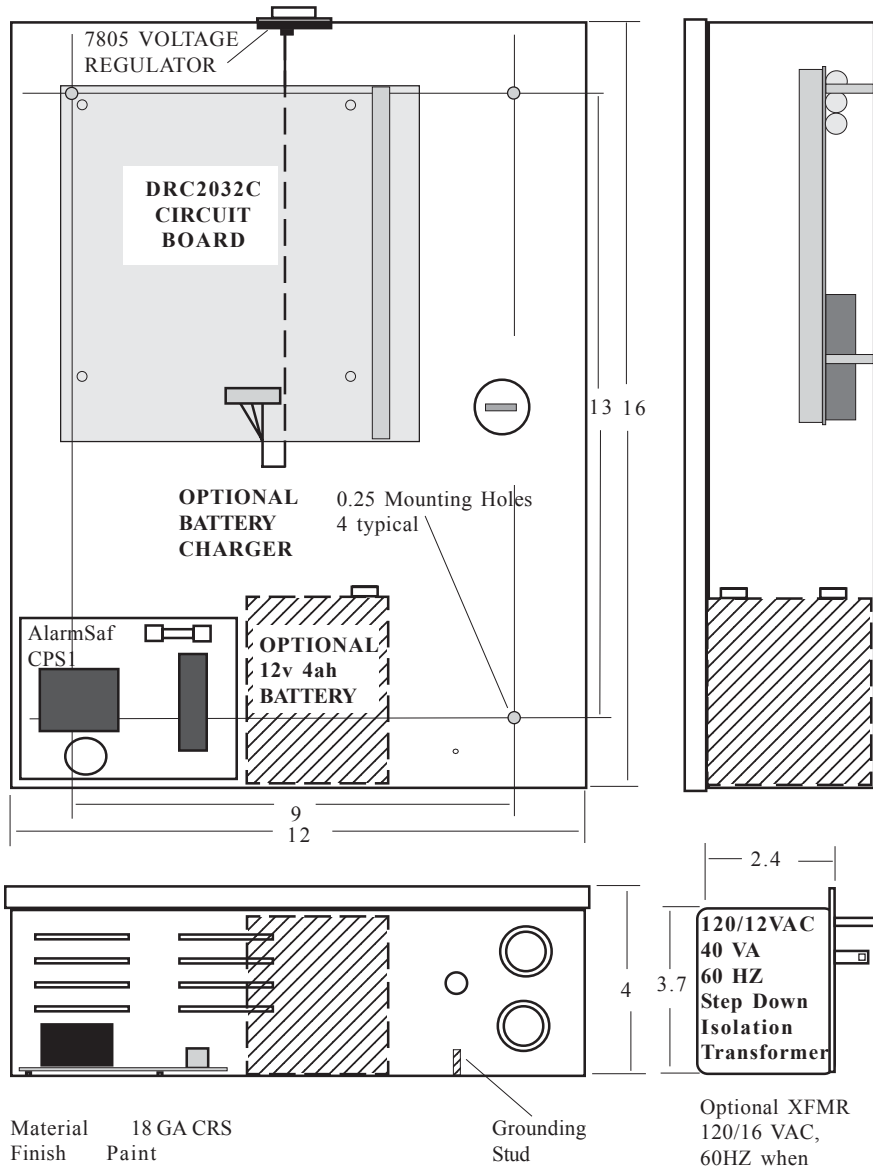
Figure 2.2 DRC2032C CONTROLLER ASSEMBLY

2.4 SYSTEMSITES

The Citadel system may be configured as either one or a group of sites. Each site may have as many as 16 DRC2032C Dual Reader Controllers. In its standard configuration, each controller supports:

- 2 card readers,
- 2 egress input points,
- 2 door ajar /door forced input points,
- 3 auxiliary input points,
- 4 relay output points
- 1 transistor output point

Controllers are intended to be wall mounted in a temperature controlled environment with temperatures falling within 32 and 120 degrees F and a maximum humidity rating of 90% non condensing.



Material 18 GA CRS
 Finish Paint
 Color Easton Chem-LAC Gray
 Weight 11 pounds, Battery and charger not included
 Weight 14.5 pounds, Battery and Charger included
 2 Electrical Knockouts located Top and Bottom, 1/2 and 3/4 conduit
 1/2 inch communications wiring hole located on Enclosure Bottom
 Electrical Requirements 12vac, 60Hz, 2a (Plug-in, step down isolation transformer included)
 1 Grounding Stud for connection to Cold Water Ground.

Figure 2.4 DRC2032C ASSEMBLY

COMMUNICATIONS

3.0 COMMUNICATIONS

Citadel uses the following protocols to communicate between the elements of the system:

3.1 HOST COMPUTER TO SITE CONTROLLER COMMUNICATIONS

3.1.1 LOCAL SITES

Direct RS232 4800 baud serial port wiring is used if the distance between the lead controller and the computer is less than 100 feet. Short haul, 4800 baud modems are required if wiring distance from computer to lead controller is greater than 100 feet.

3.1.2 REMOTE SITES

Dial-up telephone communications is used to communicate between the host computer and remote sites using Synergistics auto dial modems. There is virtually no physical limit to the number of remote sites, and hundreds of sites can be supported. One modem is required at the host computer and one at each site.

3.2 INTERSITE COMMUNICATIONS - DRC2032C CONTROLLER TO CONTROLLER

RS485, 9600 baud protocol over 22 AWG shielded twisted pair. The maximum distance from the lead controller to last controller is 8000 feet. The maximum number of DRC2032C controllers on the network is 16.

3.3 DRC2032C TO CARD READER AND KEYPAD

3.3.1 SITE DRC2032C TO MAG STRIPE READERS WITH INTERNAL DRIVER BOARDS

Synergistics mag stripe protocol using clock, data and card-in-reader is used for this interface. The maximum distance between the controller and the card reader is 750 feet.

3.3.2 SITE DRC2032C TO MAG STRIPE READERS WITH IN-THE-WALL DRIVER BOARDS

This interface uses Synergistics mag stripe protocol using clock, data and card-in-reader. The maximum distance between the controller and the card reader is 750 feet.

3.3.3 SITE DRC2032C TO MAG STRIPE KEYPAD CARD READERS

This interface uses the standard Synergistics mag stripe protocol using clock, data and card-in reader. The maximum distance between the controller and the card/keypad reader is 500 feet.

3.3.4 SITE DRC2032C TO WIEGAND CARD READERS

Standard TTL Wiegand card reader interface. Maximum distance from controller to card reader is 500 ft.

3.3.5 SITE DRC2032C TO BAR CODE READERS

Bar code readers use the Synergistics In-Wall Driver Board interface. This driver provides a Synergistics TTL interface using clock, data and card-in-reader to the controller. The maximum distance from controller to reader is 500 ft.

3.3.6 SITE DRC2032C TO PROXIMITY CARD READERS

This interface uses the standard Wiegand protocol. The maximum distance between the controller and card/keypad reader is 500 feet.

3.3.7 SITE DRC2032C TO WIEGAND READERS WITH KEYPADS

This interface uses the standard Wiegand protocol. The maximum distance between the controller and card/keypad reader is 500 feet.

3.3.8 SITE DRC2032C TO KEYPADS

This interface uses the standard Synergistics mag stripe protocol using clock, data and card-in-reader. The maximum distance between the controller and the keypad is 500 feet.

SYSTEM WIRING

4.0 WIRING THE CITADEL SYSTEM

The diagrams on the upcoming pages illustrate the system wiring of Citadel. Cable specifications and recommendations should be followed at all times to minimize problems created by electrical noise.

Note: Synergistics uses Belden part numbers for most cables to provide the installer with a specification widely known and available throughout the Industry. It should be noted that although Belden manufactures high quality cable, they are only used as a guideline and are not a requirement in choosing a cabling manufacturer.

Note: Synergistics recommends stranded wire for its interface wiring. This is due to resistance to breakage at the wires termination. Solid wire will work for all interfaces, but it is more susceptible to breakage due to nicks when being stripped for termination.

Note: Electrical noise may be present when wires are located near high voltage lines, florescent lighting ballasts, or around motor driven machinery, etc. Although Citadel specifies shielded cabling in all circuits where noise is a factor, it is highly recommended that special care be given to avoid electrical noise when routing system cables to avoid unnecessary problems.

Note: Special note should be made here for installers to avoid running signal cabling parallel and in close proximity to high voltage lines. Signal noise immunity is based on voltages being switched from +5v to ground, with the noise immunity being about 0.8v. When induced with hundreds of volts from wires running parallel with Citadel signal lines, the noise immunity level is quickly violated, even when shielding is used. Synergistics has taken many precautions in preventing disturbance of signals by outside sources, but high voltage and current may cause incorrect signals to enter the controllers when care is not taken to avoid such problem areas.

Note: Magnetic door locking devices are highly inductive and unless suppressed by the manufacturer will cause high voltage transients when activated. Care should be taken if you suppress these transients, and power for these devices should be taken from an outside source and not the controllers power supply. Running these wires, unsuppressed and parallel to the reader signal cable has been known to cause problems under certain circumstances.

The following section provides illustrations and guidelines to help the user in wiring the Citadel system.

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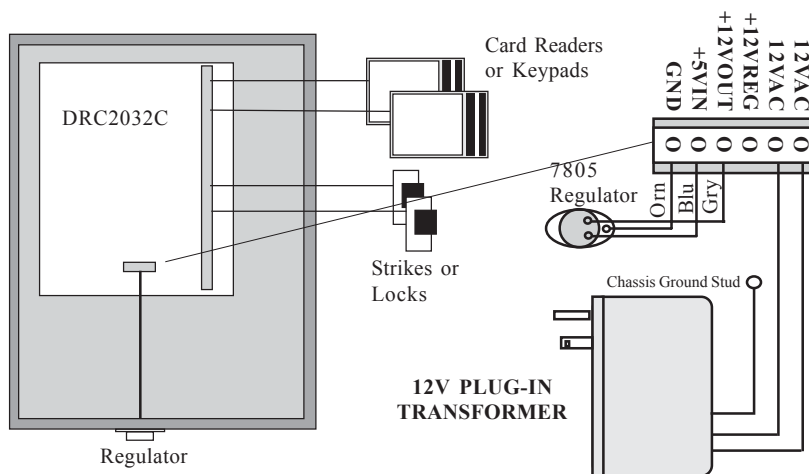


Figure 4.1 - POWERING THE DRC2032C

Note: If the battery backed up DRC2032C is the Lead Controller, the controllers modem must be separately powered from an external AC source. Communication with the host computer will not take place if AC power is lost, but the DRC2032C will operate off the battery power.

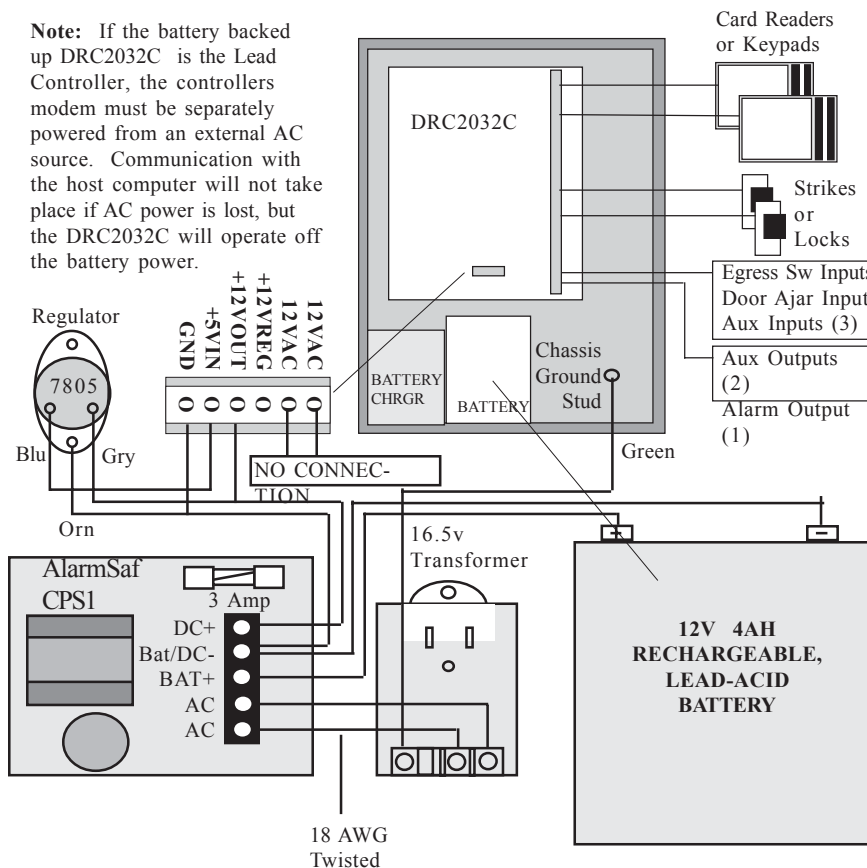
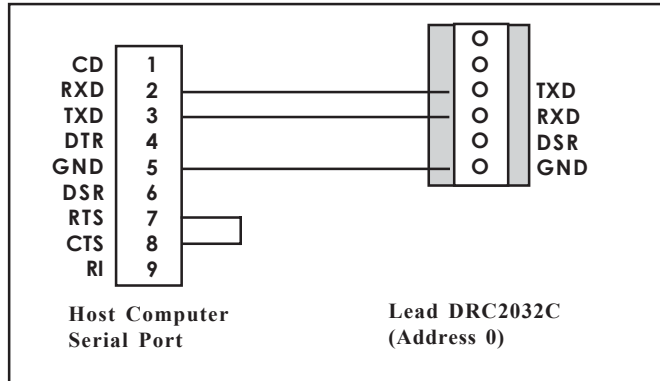


Figure 4.2 - POWERING THE DRC2032C WITH BATTERY BACKUP

Figure 4.3

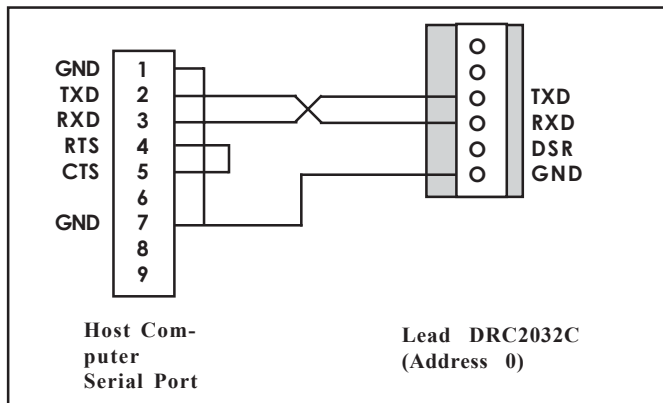
DIRECT 9 PIN SERIAL PORT WIRING TO DRC2032C LEAD CONTROLLER



RECOMMENDED CABLE	BELDEN #8443
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	100 FEET
CONNECTOR HOST END	9 PIN FEMALE D SUBMIN.
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)

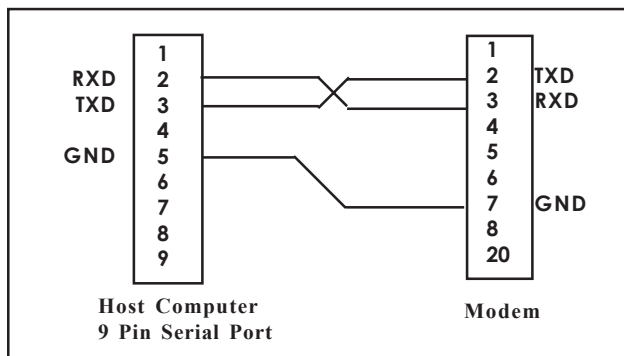
Figure 4.4

DIRECT 25 PIN SERIAL PORT WIRING TO DRC2032C LEAD CONTROLLER



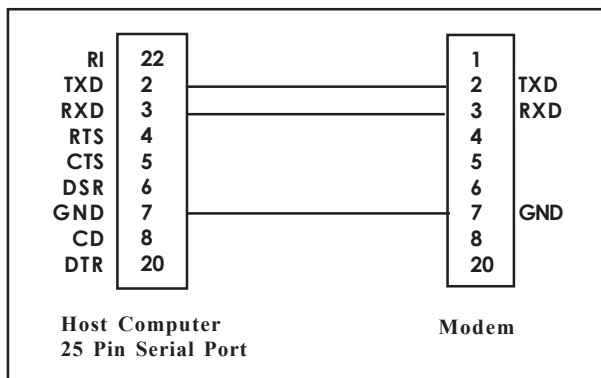
RECOMMENDED CABLE	BELDEN #8443
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	100 FEET
CONNECTOR HOST END	25 PIN FEMALE D SUBMIN.
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)

Figure 4.5
SHORT HAUL MODEM WIRING TO 9 PIN SERIAL PORT



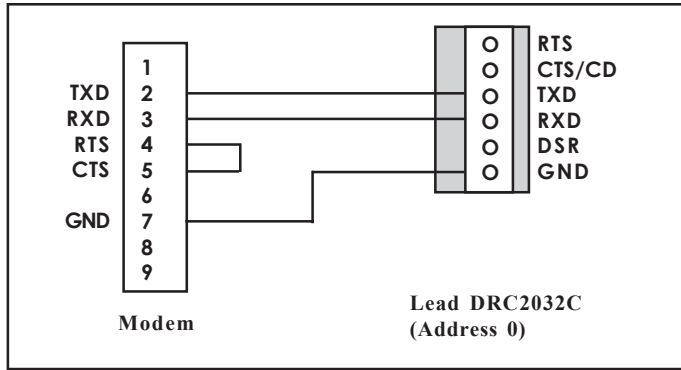
RECOMMENDED CABLE	STANDARD SERIAL MODEM CABLE
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	10 FEET
CONNECTOR HOST END	9 PIN FEMALE D SUBMIN.
CONNECTOR MODEM END	25 PIN MALE D SUBMIN.

Figure 4.6
SHORT HAUL MODEM WIRING TO 25 PIN SERIAL PORT



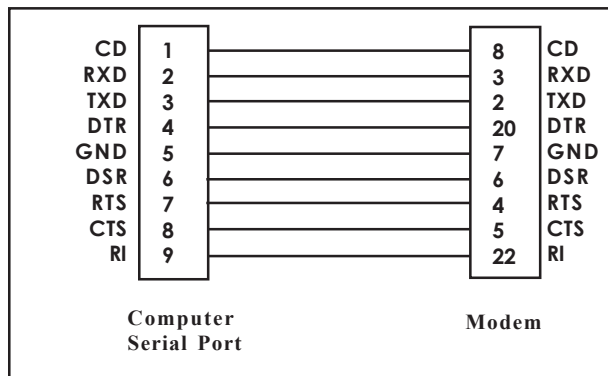
RECOMMENDED CABLE	STANDARD SERIAL MODEM CABLE
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	10 FEET
CONNECTOR HOST END	25 PIN FEMALE D SUBMIN.
CONNECTOR MODEM END	25 PIN MALE D SUBMIN.

Figure 4.7
SHORT HAUL MODEM WIRING TO DRC2032C LEAD CONTROLLER



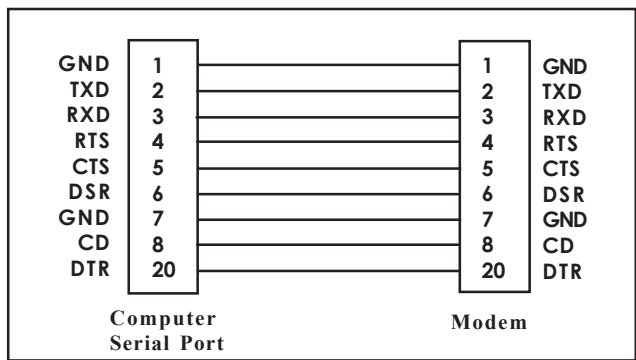
RECOMMENDED CABLE	BELDEN #8445
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	10 FEET
CONNECTOR MODEM END	25 PIN MALE D SUBMIN.
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)

Figure 4.8
REMOTE SITE MODEM WIRING TO HOST 9 PIN SERIAL PORT



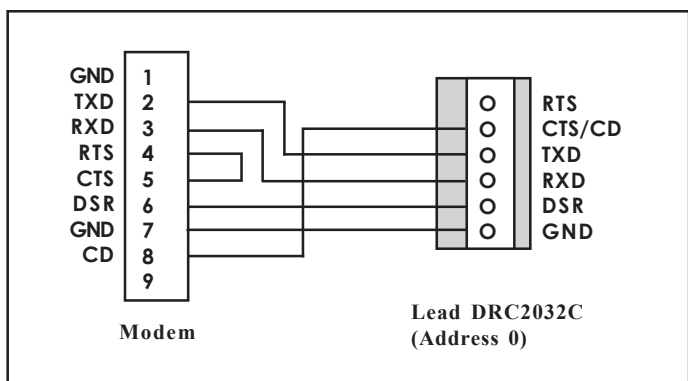
RECOMMENDED CABLE	STANDARD SERIAL MODEM CABLE
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	10 FEET
CONNECTOR HOST END	9 PIN FEMALE D SUBMIN.
CONNECTOR MODEM END	25 PIN MALE D SUBMIN.

Figure 4.9
REMOTE SITE WIRING TO HOST 25 PIN SERIAL PORT



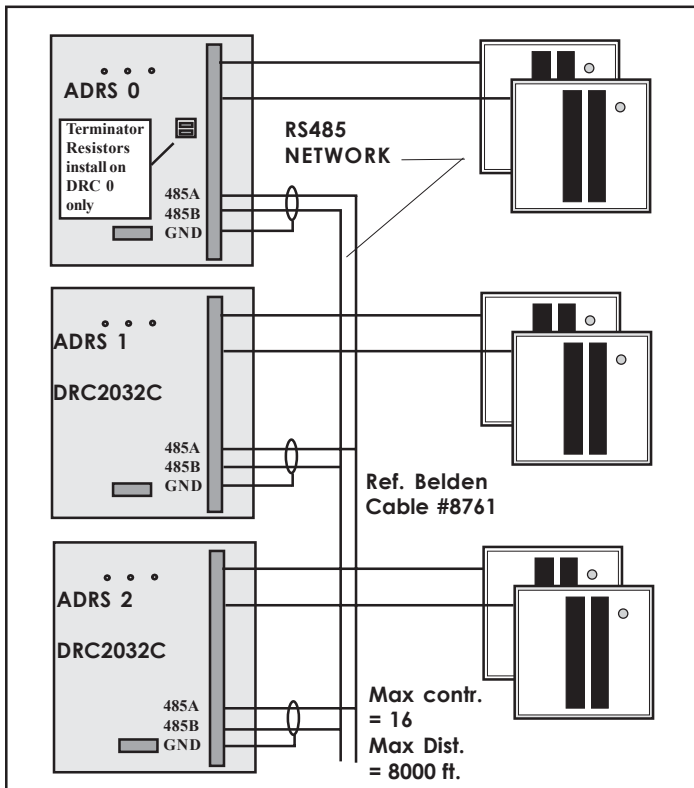
RECOMMENDED CABLE WIRE	STANDARD SERIAL MODEM CABLE
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	NOT REQUIRED
CONNECTOR HOST END	10 FEET
CONNECTOR MODEM END	25 PIN FEMALE D SUBMIN.
	25 PIN MALE D SUBMIN.

Figure 4.10
REMOTE SITE MODEM WIRING TO DRC2032C LEAD CONTROLLER



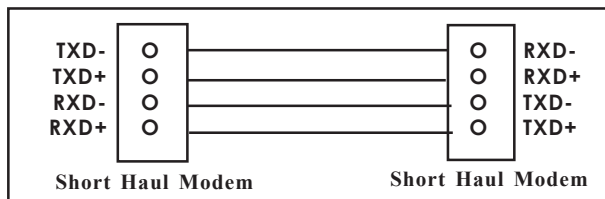
RECOMMENDED CABLE WIRE	BELDEN #8445
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	NOT REQUIRED
CONNECTOR MODEM END	10 FEET
CONNECTOR DRC2032C END	25 PIN MALE D SUBMIN.
	Pluggable termination blocks (supplied)

Figure 4.11
RS485 CONTROLLER TO CONTROLLER NETWORK WIRING



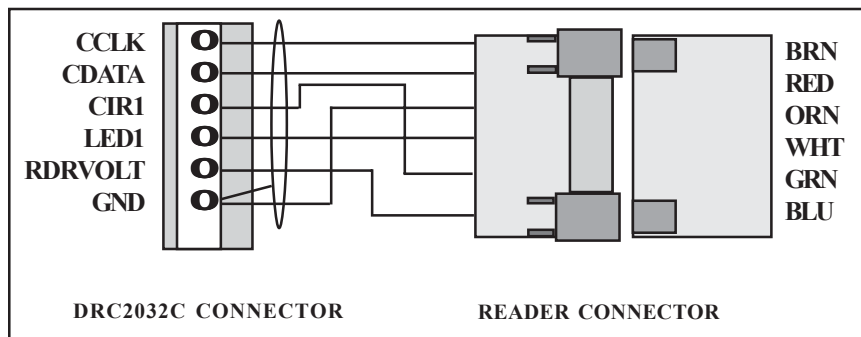
RECOMMENDED CABLE WIRE	BELDEN #8761 - 1 pair, shielded twisted pair 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	8000 FEET
CONNECTOR	DRC2032C Pluggable termination blocks (supplied)

Figure 4.12
SHORT HAUL MODEM WIRING TO SHORT HAUL MODEM



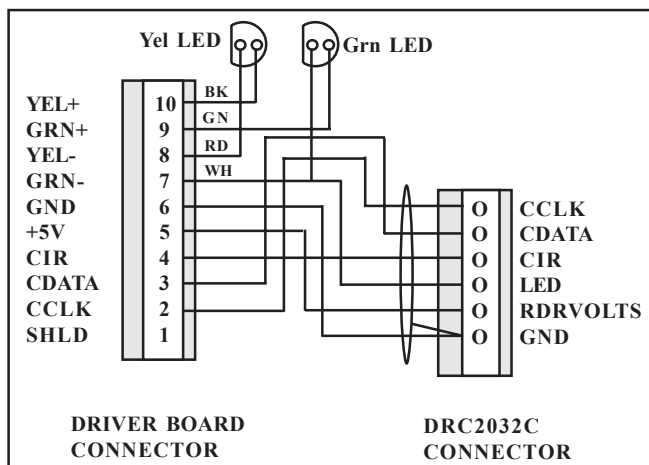
RECOMMENDED CABLE	STANDARD SERIAL MODEM CABLE
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	2 MILES

Figure 4.13
DRC2032C to MAG STRIPE READER WITH INTERNAL DRIVER



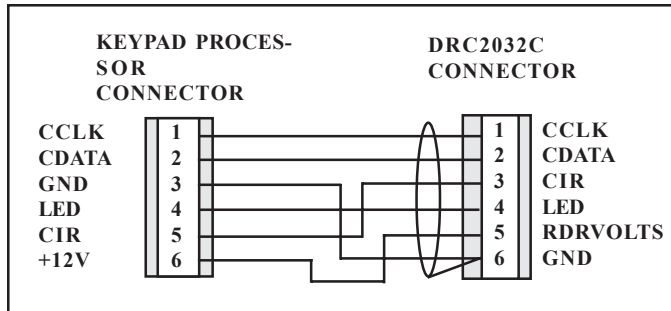
RECOMMENDED CABLE WIRE	BELDEN #8777 - 3 shielded twisted pair 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR READER END	6 PIN MALE AMP CONNECTOR
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
VOLTAGE	+5VDC

Figure 4.14
DRC2032C to MAG STRIPE READER WITH IN-THE-WALL DRIVER BOARD
 USED WITH READERS SR1053SLM, SR1054FL AND SR1063



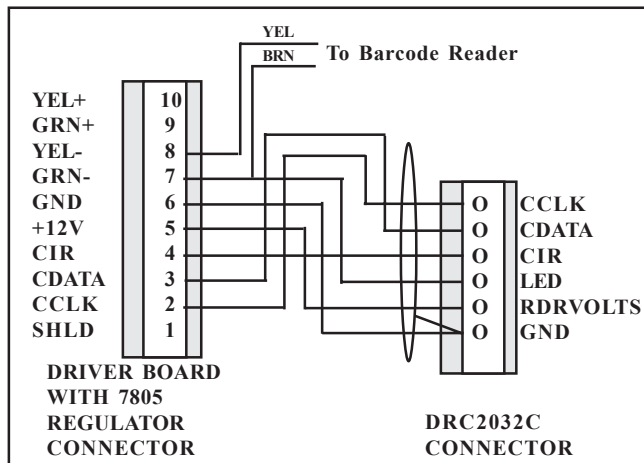
RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR, BELDEN #8777 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR DRIVER BOARD	Termination blocks, (supplied with driver)
VOLTAGE	+5 VDC

Figure 4.15
DRC2032C to KEYPAD OR READER WITH KEYPAD



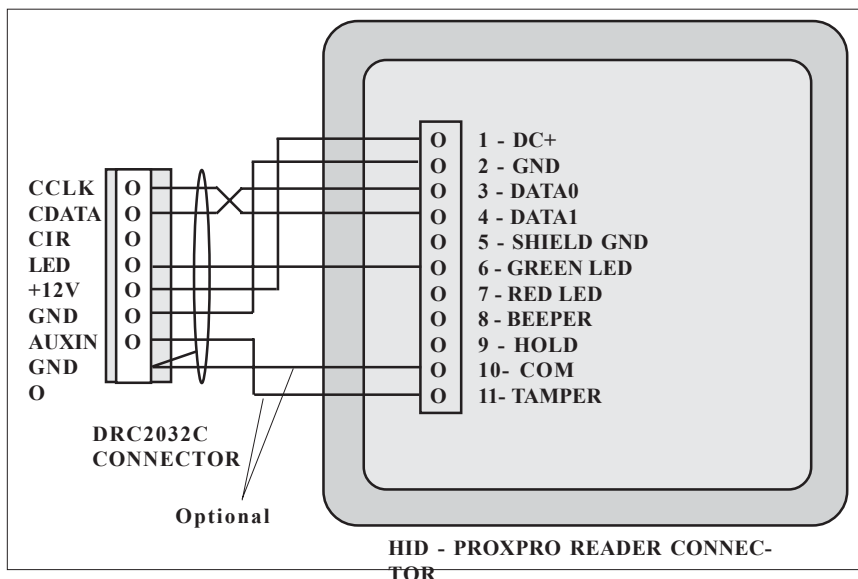
RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR, BELDEN #8777
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	REQUIRED
CONNECTOR DRC2032C END	500 FEET
CONNECTOR DRIVER BOARD	Pluggable termination blocks (supplied)
VOLTAGE	Pluggable termination blocks , (supplied)
	+12VDC

Figure 4.16
DRC2032C to BAR CODE READER WITH IN-THE-WALL DRIVER



RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR, BELDEN #8777
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	REQUIRED
CONNECTOR DRC2032C END	500 FEET
CONNECTOR DRIVER BOARD	Pluggable termination blocks (supplied)
VOLTAGE	Termination blocks , (supplied with driver)
	+12VDC

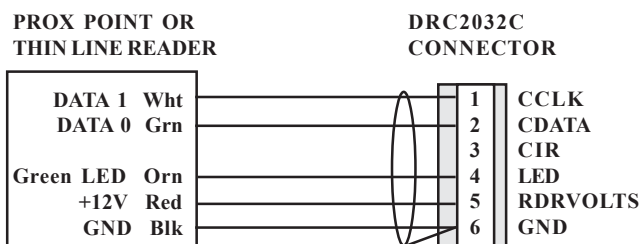
Figure 4.17
DRC2032C to HID PROXPRO READER WITH TAMPER SWITCH



Note: RDRVOLTS jumper on DRC2032C must be set at +12v for HID ProxPro readers.

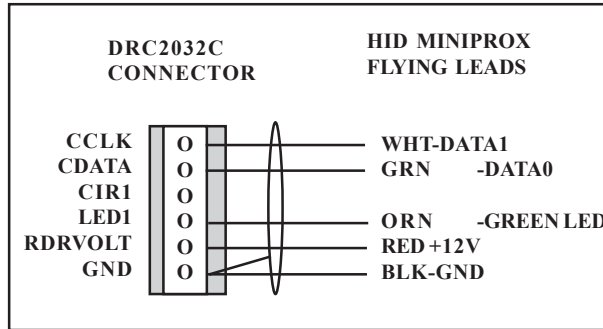
RECOMMENDED CABLE	3 SHIELDED TWISTED PAIR - BELDEN #8777
WIRE	22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	500 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
VOLTAGE	+12VDC
CONNECTOR HID READER END	Terminal Block screw connections.

Figure 4.18
DRC2032C to HID PROXPOINT OR THIN LINE READER



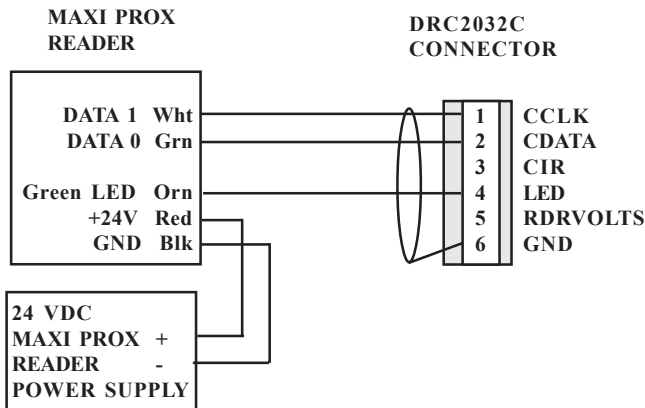
RECOMMENDED CABLE	3 SHIELDED TWISTED PAIR - BELDEN #8777
WIRE	22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	500 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR HID READER END	Terminal Block screw connections.
VOLTAGE	+12VDC

Figure 4.19
DRC2032C to HID MINI PROX READER



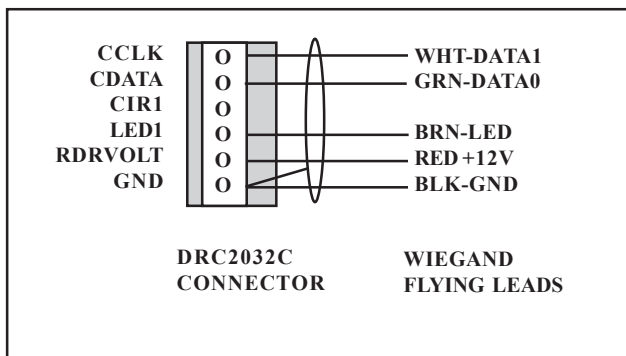
RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR - BELDEN #8777
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	REQUIRED
CONNECTOR DRC2032C END	500 FEET
CONNECTOR READER END	Pluggable termination blocks (supplied)
VOLTAGE	FLYING LEADS
	+12VDC

Figure 4.20
DRC2032C to HID MAXI PROX READER WITH POWER SUPPLY



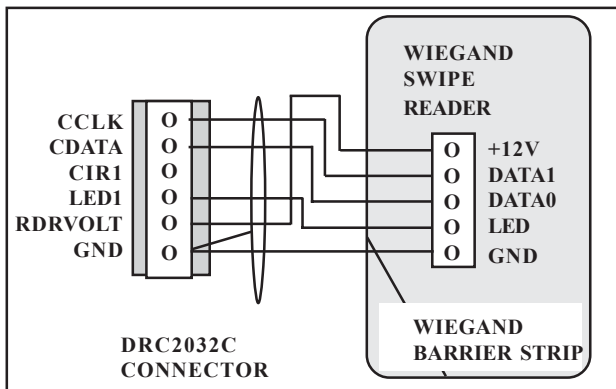
RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR - BELDEN #8723
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	REQUIRED
VOLTAGE	500 FEET
CONNECTOR DRC2032C END	+24VDC
CONNECTOR READER END	Pluggable termination blocks (supplied)
	FLYING LEADS

Figure 4.21
DRC2032C to WIEGAND SWIPE READER WITH FLYING LEAD INTERFACE



RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR - BELDEN #8777 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	500 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR READER END	FLYING LEADS
VOLTAGE	+12VDC

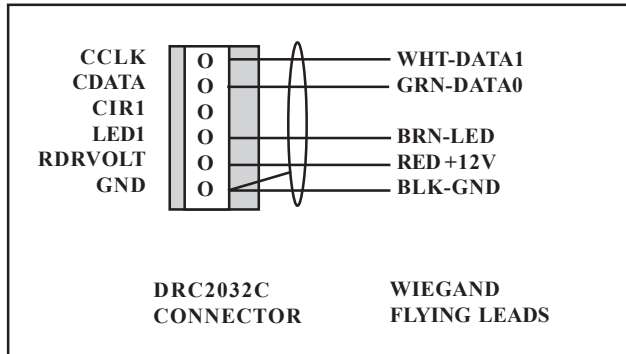
Figure 4.22
DRC2032C to WIEGAND SWIPE READER WITH BARRIER STRIP



RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR - BELDEN #8777 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	500 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR READER END	Termination block - supplied with reader
VOLTAGE	+12VDC

Figure 4.23

DRC2032C to WIEGAND INSERTION READER WITH FLYING LEAD INTERFACE



RECOMMENDED CABLE WIRE	3 SHIELDED TWISTED PAIR - BELDEN #8777
CABLE SHIELDING	22AWG - STRANDED
MAXIMUM CABLE LENGTH	REQUIRED
CONNECTOR DRC2032C END	500 FEET
CONNECTOR READER END	Pluggable termination blocks (supplied)
VOLTAGE	FLYING LEADS
	+12VDC

Figure 4.24
DRC2032C to RECOGNITION SYSTEMS ID3D
HAND GEOMETRY READER WITH WIEGAND READER INTERFACE

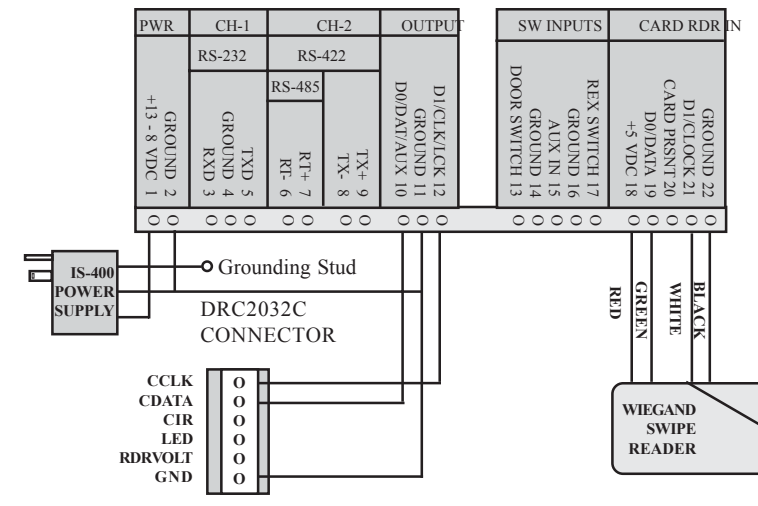


Figure 4.25
DRC2032C to RECOGNITION SYSTEMS ID3D
HAND GEOMETRY READER WITH MAG STRIPE READER INTERFACE

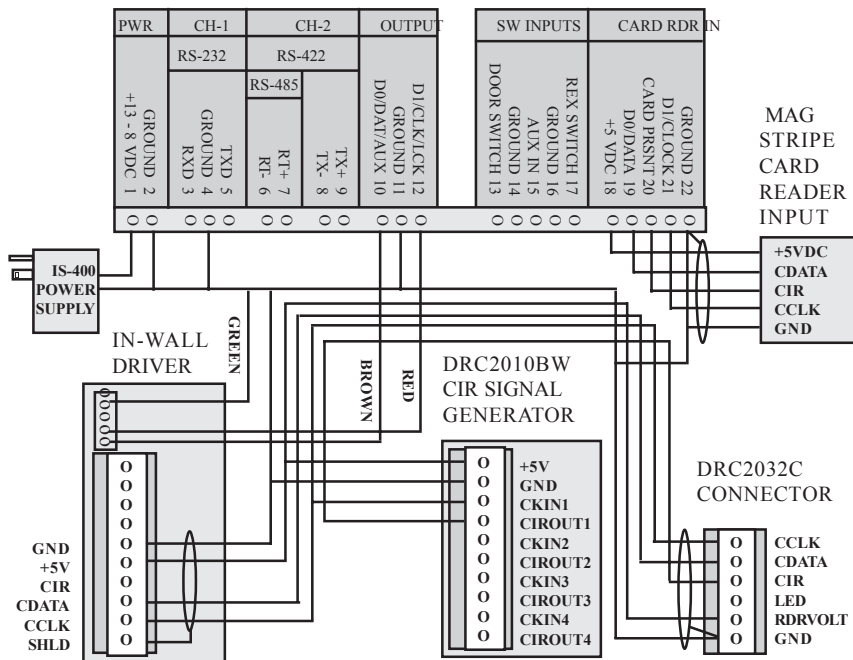
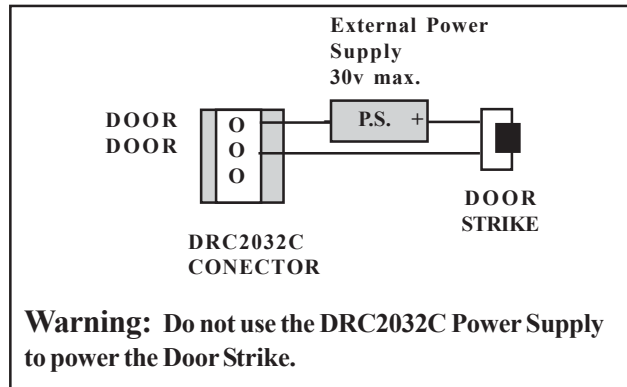
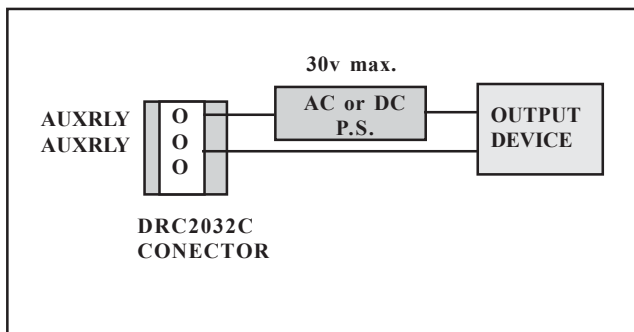


Figure 4.26
DRC2032C to DOOR STRIKE RELAY OUTPUT POINT



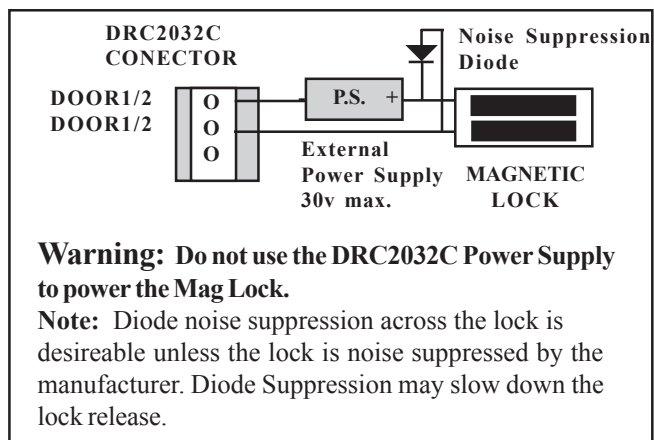
RECOMMENDED CABLE	TWISTED PAIR - BELDEN #8461
WIRE	18 or 16 AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR EGRESS SW. END	FLYING LEADS

Figure 4.27
DRC2032C to AUXILIARY RELAY OUTPUT POINT



RECOMMENDED CABLE	BELDEN #8461
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR EGRESS SW. END	FLYING LEADS

Figure 4.28
DRC2032C DOOR RELAY OUTPUT POINT TO MAGNETIC LOCK



RECOMMENDED CABLE WIRE	BELDEN #8461 22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR EGRESS SW. END	FLYING LEADS

Figure 4.29
DRC2032C RELAY OUTPUTS TO HIGH VOLTAGE CIRCUITS.

CONTROLLERS MUST USE AN EXTERNAL RELAY WHEN SWITCHING VOLTAGE GREATER THAN 30 VOLTS AC OR DC

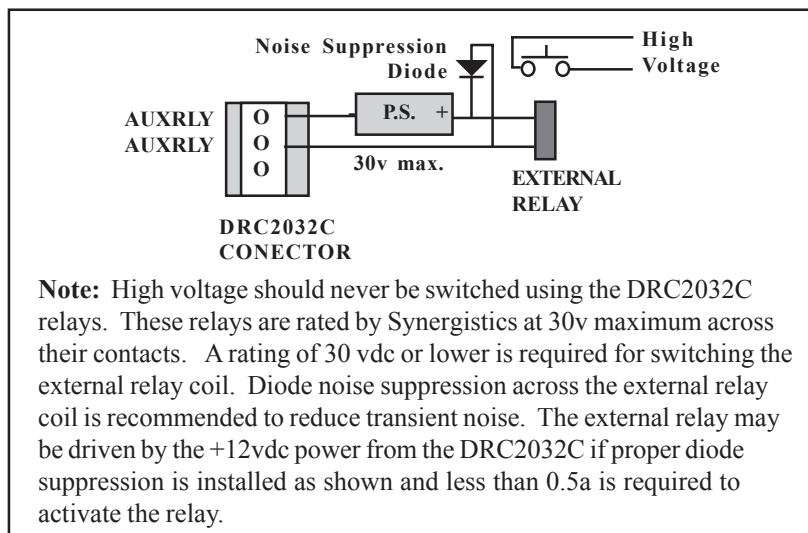
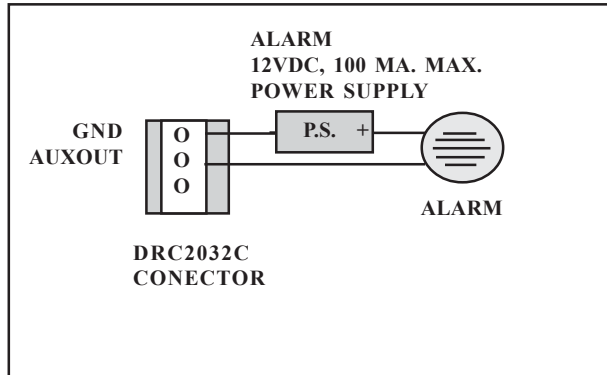
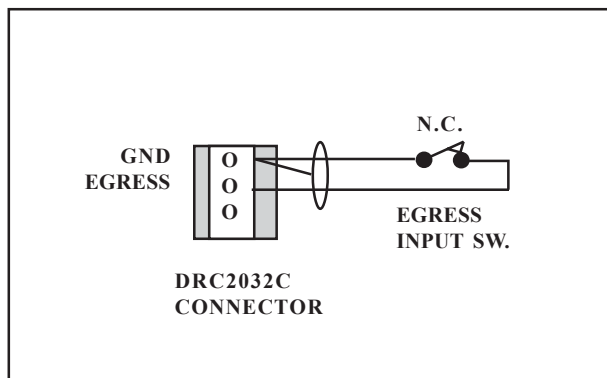


Figure 4.30
DRC2032C to AUXILIARY OUTPUT POINT



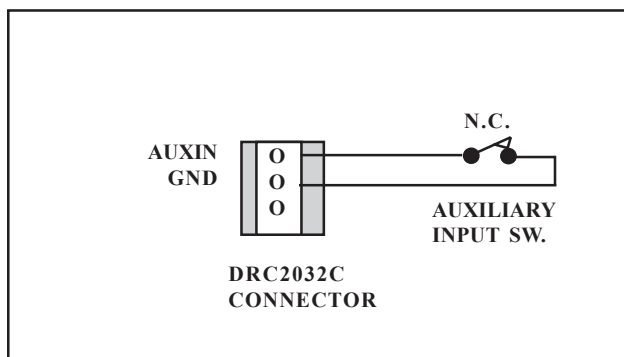
RECOMMENDED CABLE WIRE	BELDEN #8442 22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	100 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR EGRESS SW. END	FLYING LEADS

Figure 4.31
DRC2032C to EGRESS SWITCH INPUT



RECOMMENDED CABLE WIRE	Single Shielded Twisted Pair - BELDEN #8721 22AWG - STRANDED
CABLE SHIELDING	REQUIRED
MAXIMUM CABLE LENGTH	750 FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR EGRESS SW. END	FLYING LEADS

Figure 4.32
DRC2032C to AUXILIARY SWITCH INPUT



RECOMMENDED CABLE	SINGLE TWISTED PAIR - BELDEN #8442
WIRE	22AWG - STRANDED
CABLE SHIELDING	NOT REQUIRED
MAXIMUM CABLE LENGTH	750FEET
CONNECTOR DRC2032C END	Pluggable termination blocks (supplied)
CONNECTOR AUX. SW. END	FLYING LEADS

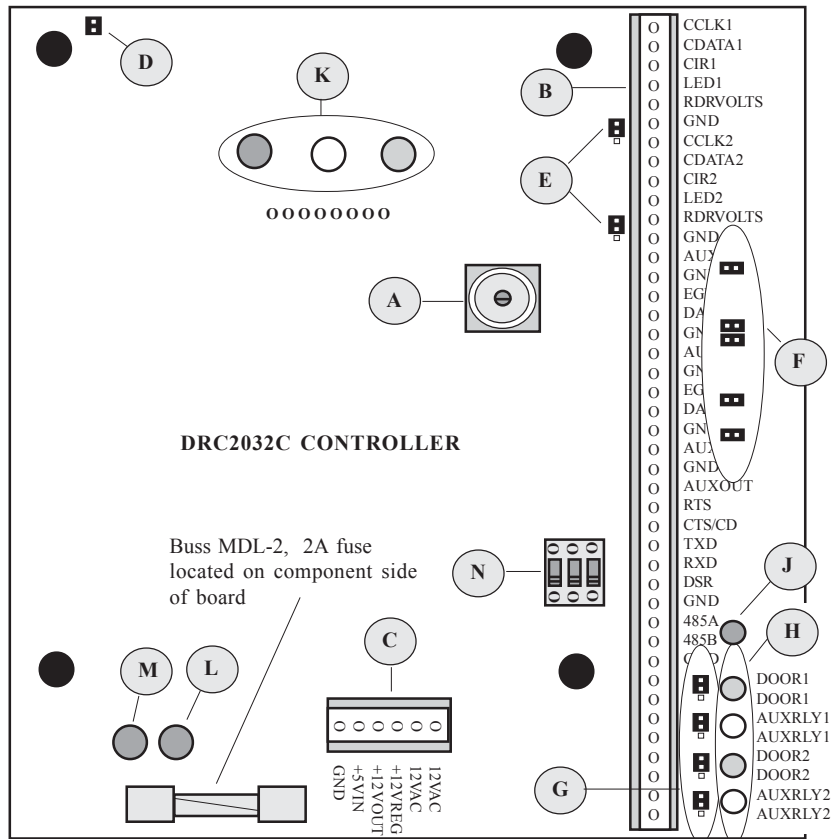


Figure 5.1 - DRC2032C FUSE, JUMPER, LED AND CONNECTOR LAYOUT

DRC2032C CIRCUIT BOARD

5.0 DRC2032C DUAL READER CONTROLLER

5.1 BOARD LAYOUT

- A ADDRESS SWITCH** This switch sets the network address of the DRC2032C controller. A ZERO setting addresses the first (LEAD) controller. The remaining controllers use addresses 1 through 9 and A,B,C,D,E,F. A maximum of 16 controllers may be addressed.
- B DRC2032C I/O CONNECTOR** Use these connectors to wire all Input and Output signal wires to the DRC2032C.
- C POWER CONNECTOR** This connector is used to input 12vac or 12vdc power to the DRC2032C and to interface the 7805 voltage regulator to the circuit board.

- D BATTERY JUMPER** Install this jumper as soon as your DRC2032C is wired to the system to provide battery backup to the boards memory.
- E READER VOLTAGE SETTING JUMPERS** Use these jumpers to set the input voltage for the card readers or keypads supporting the DRC-2032C controller. For specific instructions for wiring each reader supported by the DRC2032C controller, refer to Section 4.

Jumper Settings:



- F INPUT POINT SHUNTS** The Jumpers located in these locations are used to shunt input points so that they do not appear as violated inputs when they are not in use. To activate the input point, remove the jumper.

- G RELAY OUTPUT CONFIGURATION JUMPERS** These Jumpers are used to configure the relay contacts as Normally Open or Closed.

Jumper Settings:



- H RELAY STATUS INDICATORS** These Indicators will illuminate when the relays are active.
- GREENLEDS** = Door Relays 1 and 2
YELLOWLEDS = Auxiliary Relays 1 and 2
- J NETWORK LED INDICATOR** This LED will illuminate when data is being received by the DRC2032C over the RS485 network.
- K DRC2032C STATUS INDICATORS**
- | | |
|------------------------------|---|
| Red LED (Flashing) | Data is being received from the computer. |
| Yellow LED (Flashing) | Data is being sent to the RS485 network. |
| Green LED | (not used). |
- L SPEAKER INDICATOR** This indicator will illuminate when the speaker is activated or when there is no User database in the controller.
- M POWER INDICATOR** This Red LED will illuminate when +12vdc is present on the DRC2032C.
- N TERMINATING RESISTORS** These resistors are used to terminate the DRC2032C RS485 network at controller 0 only. The resistor platform must not be installed in other controllers on the network.

6.0 LIGHTNING, STATIC AND OTHER VOLTAGE SURGE PROBLEMS

Violent voltage disturbances are known to cause problems in electronic circuitry. Citadel is designed with many clamping devices to squash these surges before they cause damage to the circuitry or the databases stored in controller memory, even though that memory is battery backed up. However, even with these devices installed, voltage transients can sometimes get through and cause your system to fail in one mode or another.

You can help solve these problems by observing proper wiring techniques when installing your Citadel equipment.

6.1 Isolated Ground Receptacles

These orange colored wall receptacles are used to provide proper grounding to the line voltage powering your computer and your controllers. They help provide electrically quiet lines for powering your computer equipment through proper grounding techniques and should be one of the first considerations in eliminating noisy line voltages which create computer failure.

6.2 Conduit Wiring Techniques

Running wire through conduit has often been the cause of data corruption. Especially when high voltage and current lines are run through the same conduit as the low voltage signal lines used for card readers and other noise sensitive communication lines. Avoid this practice.

6.3 UPS Power Supplies

A common mistake made by installers is believing that installing an uninterruptable power supply at the computer will filter noise transients that cause memory corruption and program failure. The fact is that many UPS power supplies do little to squelch voltage transients and are designed mainly to provide a constant voltage when power failure occurs. When you suspect that noise is a problem, think first of installing the orange isolated ground receptacle mentioned above. Then investigate what other equipment is powered by the same line as your computer equipment. Often noise generated by this equipment is the culprit. Usually, this troubleshooting technique will provide a solution to your noise problem without the necessity of using a UPS power supply.

6.4 Card Reader Wiring

One common problem in a card access system is static electricity from the person using the card reader. If improperly wired, this static, which could reach 20,000 volts, is discharged into the DC power supply at the card reader. This causes reader failure. When static is a problem, the proper wiring technique is to ground the reader to Earth Ground at the reader. When this is not possible, another way to discharge the static is to connect the shield of the reader cable to the housing

of the card reader on one end, and to DC Ground at the DRC2032C controller end. Then provide a proper Earth Ground to the controllers cabinet. By doing this, the static will find the path of least resistance over the shield to the controller where it will discharge to Earth Ground without disturbing the card reader.

6.5 Lock and Door Strike Wiring

Magnetic Locks can send voltage surges in excess of 500 volts back into the DRC2032C controller if they are not properly suppressed at the door. Door strikes are not quite so noisy, but they also can generate voltage disturbances that can cause the low voltage signals of the controller to misbehave. Proper suppression must take into consideration the speed of the surge as well as the voltage. DC locks and strikes are the easiest surges to suppress. A 1N4000 series diode placed across the coil at the lock or strike will knock the surge voltage down to nothing, and it will react very fast. The cathode of the diode (the end with the stripe) must be connected to the positive terminal of the strike and the anode to the negative end. Metal Oxide Varistors (MOV) are also used for this voltage clamping but the slow speed of these devices really does not provide enough suppression of the surge to kill it. MOVs are normally used in AC circuits where diodes will not work. The DRC2032C controller uses an MOV across each relay contact to help squash these noise spikes, but suppression at the door will provide the best results.

6.6 Surge Suppressor Installation

In isolated cases where voltage surges are extreme, such as in high lightning areas, installation of surge suppressors may be necessary. Outside reader installations or remotely located DRC2032C controller installations are a good example of this. Synergistics carries an assortment of surge suppressors by ECLIPS which provide reliable high speed surge suppression for line and signal wiring.

6.7 Outdoor Wiring

When outdoor wiring is a requirement, using properly grounded underground conduit is not a cure for voltage surges. Lightning will cause ground current surges which will radiate into your wiring and cause problems. Should you experience or suspect problems with remote sites or readers caused by voltage surges, consider surge suppression using the ECLIPS high speed suppressors. Keep in mind that voltage surges may enter your equipment by power lines as well as signal lines, so suppressing one and not the other may not clear up your problem. Similar problems will be caused by running power lines in the same conduit as signal lines. Try to keep this wiring separated, especially in outdoor gate circuits where high currents and voltages are often experienced. Voltage transients are always problematic in electronic circuits and common sense and proper wiring techniques are sometimes simply not enough to squelch them. Surge suppressors installed in the DRC2032C controller may not always solve your transient problems either. External surge suppression sometimes may be your only recourse in disposing of these unwanted transients.

START-UP PROCEDURE

7.0 SYSTEM START-UP PROCEDURE PRIOR TO APPLYING POWER

After wiring is completed and prior to applying power to the DRC2032C controllers you will want to verify certain things within the controllers.

1. Inspect each controller and verify that the BATTERY JUMPER is installed. This jumper provides battery power to the boards memory circuits to retain memory database tables when power is lost from the controller board. (Pg. 33-D)
2. Inspect each controllers ADDRESS SWITCH to verify that each controller in a site has a unique address and that no addresses are repeated. The controller with Address zero must be the LEAD CONTROLLER and will be the controller to which you will attach the host computer, by modem, short haul modem, or direct wiring.
3. Inspect the jumpers to be certain that they are in the correct position to support the unique system that you have installed. Reference pages 33 and 34.
 - Relay contact configuration jumpers may be set so that the relays controlling door strikes and locks are properly configured as normally open or closed. (Pg. 33-G)
 - Auxiliary relay configuration jumpers must be set to normally open or closed as required by the equipment that they are controlling. (Pg. 33-G)
 - Reader voltage selection jumpers must be properly set up for the readers that you are using. Failure to properly set the reader voltage may cause reader damage, especially when +12 volts is used for powering a +5v reader. Consult section 4 for details on the voltage requirements for the reader that you are using. Consult Pg. 33/34-E for reader voltage jumper settings.
 - Input point shunting jumpers must be removed from all input points that are being used in your system. If they are left in, the input point will never report a violation (open contact). (Pg. 33-F)
 - The Terminating resistors must be installed on controller 0 (zero) of each network. These resistors match the impedance of the network wiring to reduce noise due to signal reflections. (Pg. 33-N)
 - Visually check each connection on the I/O and Power connectors. Wires must be cleanly stripped such that there is no chance of short circuit possibility from stray strands of wire bridging the gap between connector pins.

7.1 APPLYING VOLTAGE TO THE CONTROLLERS

Each controller is supplied with a 12vac plug in transformer which will power the controller and its card readers. Do not use this power source or the DC power from the controller to power the door strikes or magnetic locks. These devices can be electrically very noisy and can effect controller operation.

Plug the transformer into a 115v, 15a, 60hz wall outlet and observe the POWER INDICATOR at the bottom left side of the controller circuit board. It will illuminate if 12vdc is being generated by the DRC2032C. All other LED indicators on the board will remain unlit if no activity is taking place with the computer or RS485 network. The speaker LED will also be lit if there is no database information loaded in the DRC2032C.

SOFTWARE INSTALLATION

8.0 INSTALLING THE SOFTWARE ON THE COMPUTER

(See Page 4 for more computer information).

Citadel Software is licensed to run on a single computer.

It may be installed on Windows 98, NT 4.0, 2000, ME and XP platforms.

Citadel requires a minimum of 10 mbytes of free disk space to run properly.

The software is resident on 1 CD ROM. Follow the screen instructions for loading the software onto your hard drive.

Note: It is the recommendation of Synergistics, Inc. that a *Virus Check* be performed on your hard disk prior to running setup.

9.0 Troubleshooting Citadel

The following troubleshooting guide assumes that the Citadel database has been entered in the host computer, downloaded to the site controllers and has been operational prior to the observance of the trouble.

Database problems such as missing information can cause the system to malfunction. If the database is unproven, then it should be the first thing to suspect in case of trouble. Creating a temporary access code which allows all card numbers to work in all system readers at all times is a good way to test the system prior to assigning custom access privileges to system users.

Symptoms	Possible Cause	Possible Correction
No LEDs lit on the DRC.	No power on panel.	Check power connections. Check all fuses. Check transformer output voltage.
Reader 1 is inop. Reader 2 is OK.	Check reader 1 connector. Check reader 1 cabling. Do swap test. Output not checked in SW No Privilege in SW.	Swap readers 1 & 2. and test. If problem moves to reader 2, reader is bad. If problem stays with reader 1, DRC is probably bad.
Reader 2 is inop. Reader 1 is OK.	Check reader 2 connector. Check reader 2 cabling. Do swap test.	Swap readers 1 & 2. and test. If problem moves to reader 1, reader is bad. If problem stays with reader 2, DRC is bad probably
Neither reader works	DRC controller is bad. Bad Power	Check all connections and power to DRC controller. Change DRC controller.
Input point does not indicate violation.	Input point jumper is shunting point. Input point is shorted.	Remove input point jumper. Check input point wiring for short. Remove input point wiring to connector. If wiring is shorted, violation should occur. If violation is not reported, DRC is bad.
Input point is always violated.	Connector wiring is open.	Short input point to ground at connector. Check connector wiring for open circuit.
Selected relay output point doesn't activate.	Faulty conector wiring. Bad relay or relay driver.	Check and repair wiring. Check device being controlled by selected relay. Check to see if relay green or yellow LED illuminates. If so, relay is bad. Replace DRC. If not, suspect database.

Troubleshooting Citadel (Continued)		
Symptoms	Possible Cause	Possible Correction
Selected relay output point is always activated.	Shorted or open wiring at I/O connector. Bad Relay or relay driver.	Check and repair wiring. Check green or Yellow LED relay indicator. If lighted, bad relay or driver. If not lighted, suspect database.
Selected Door relay is open when it should be closed and closed when it should be open.	Relay jumper is positioned wrong.	Move relay jumper position.

Synergistics, Inc.

9 Tech Circle

Natick, MA 01760

Tel: (508) 655-1340

Fax: (508) 651-2902

email: sales@synergisticsinc.com

web: www.synergisticsinc.com