apC®/8X

INSTALLATION AND CONFIGURATION GUIDE

REVISION L0

Software House
70 Westview Street
Lexington, MA 02421
http://www.swhouse.com
Fax: 781-466-9550 *Phone*: 781-466-6660

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Preface

The apC®*/8X Installation and Configuration Guide* is for new and experienced technicians who need to install or configure the apC/8X hardware. This manual describes the following procedures.

- Installing the apC/8X and optional modules
- Wiring equipment to the apC/8X
- Setting apC/8X switches
- Testing the installation

The manual assumes that you are familiar with the apC/8X Advanced Processing Controller and its operation.

For information about configuring and installing card readers, see the Software House *Readers, Inputs, and Outputs (RIO) Guide*.

In This Preface

Installation Overview

Although you do not have to perform the apC/8X installation in a particular order; use the following checklist as a guide for the steps to install the apC/8X controller

- ❑ Review the apC/8X physical requirements, including external devices, wiring requirements, memory, and power supply ratings. (Chapter 2)
- ❑ Check the apC/8X hardware components and mount the apC/8X cabinet.(Chapter 3)
- ❑ Connect the apC/8X unit to a host computer via RS-232, RS-485, or modem connections. (Chapter 4)
- ❑ Set up and configure the apC/8X panel (Chapter 5)
- ❑ Wire the readers and optional equipment to the apC/8X. (See the Software House *Readers, Inputs, and Outputs (RIO) Guide*.)
- ❑ Configure input and output boards. (See the Software House *Readers, Inputs, and Outputs (RIO) Guide*.)
- ❑ Test the installation (Appendix B)

Warning: Before handling and installing any component, follow these precautions:

– Discharge your body's static electricity charge by touching a grounded surface.
– Wear a ground strap and work on a grounded static protection mat.
– Do not slide a component over any surface.
– Limit your movements during the installation process to reduce static electricity.

How to Use this Manual

This manual contains these chapters and appendixes. Turn to the chapter or appendix in this manual that contains the information you need.

Chapter 1: Overview

Provides an overview of the apC/8X panel and describes the optional modules and card readers.

Chapter 2: apC/8X Physical Requirements

Lists minimum requirements for the apC/8X, including external devices, wiring requirements, memory, power supply ratings and apC/8X event and card storage.

Chapter 3: Mounting the apC/8X

Lists the hardware supplied with the apC/8X and describes how to mount the unit.

Chapter 4: Connecting the apC/8X to a Host

Explains how to connect the apC/8X unit to a host computer via RS-232, RS-485, or modem connections.

Chapter 5: apC/8X Panel Setup

Describes how to set upand configure the apC/8X main board.

Appendix A: Equipment Specifications

Lists the apC/8X operating specifications, and dimension and weight specifications.

Appendix B: Testing the apC/8X Installation

Explains how to test the apC/8X installation, including the apC/8X main board and associated RM readers.

Appendix C: Calculating Maximum Wiring Lengths

Contains the procedures for calculating maximum wire lengths for the apC/8X installation.

Appendix D: Dialup Modem Settings

Contains information about configuring apC/8X modem connections.

Appendix E: Packing and Shipping apC/8X Boards

Describes what to do if your apC/8X needs to be returned or repaired.

Appendix F: Templates and Technical Drawings

Contains the template for the apC/8X main board and other optional boards. These templates show the locations of jumpers, switches, and major components.

Note: For information on wiring card readers and installing input and output modules, refer to the Software House *Readers, Inputs, and Outputs (RIO) Guide*.

UL Listing

The apC/8X controller is UL 294 and UL 1076 Listed. If the apC/8X has a Lien Industries power supply installed, the unit is inherently power limited so no additional excess current protection is needed. If the apC/8X has a Wall Industries (Sinpro) power supply installed, the unit is *not* inherently power-limited and requires the supplied DC harness with 5A in-line fuses.

This unit must be installed in a secure location.

FCC Class A Digital Device Limitations

The apC/8X controller 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 device 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 own expense.

Caution: Equipment changes or modifications not expressly approved by Software House, the party responsible for FCC compliance, could void the user's authority to operate the equipment, and could create a hazardous condition.

FCC Class B Notes

When using properly grounded and shielded cabling for monitor point and control point wiring, the apC/8X meets the requirements for an FCC Class B device, and the following notice applies.

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Radio Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n’emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radiolelectrique edicte par le ministere des Communications du Canada.

CE Compliance

For CE installations, you must have a readily accessible disconnect device incorporated in the fixed power wiring to the apC/8X.

Important Safety Information

Operating problems are often caused by failure to ground system components properly. Be sure to follow all instructions for grounding described in this manual.

Caution: Changes to the apC/8X not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

The following precautions apply to all procedures described in this manual.

1. To meet the life safety requirements, a fail-safe mechanism override must be installed at each card reader exit to allow people to leave the secure area in case of electromechanical device failure.
2. The apC/8X device described in this manual could cause electrical shock. Installation and maintenance should be performed only by qualified personnel. Make sure power is removed before the system is serviced.
3. The apC/8X and printed circuit boards in the reader devices are susceptible to damage by static electricity. When handling these devices:
   - Make sure your work area is safeguarded.
   - Transport all components in static-shielded containers.

Power Supply Information

The apc/8X controller is provided without an uninterruptible power supply (UPS). The Advanced Power Supply (apS) is a UL603-Listed Burglar Alarm Power Supply. This unit will provide nominal 12 VDC output at 3.5 Amps in excess of four hours when using the supplied, single 17 AH battery. An additional 17 AH battery can be installed to provide 8 hours of battery-backed power.

In order to maintain UL regulatory approval for this product, either the apS or another Class-2 (Power Limited) UL 603 or UL 294 Listed Power Supply must be used with a battery appropriate for the required standby time.

Conventions

This manual uses the following text formats and symbols.

Convention	Meaning
Bold	This font indicates screen elements, and also indicates when you should take a direct action in a procedure. Bold font describes one of the following items: ■ A command or character to type, or ■ A button or option on the screen to press, or ■ A key on your keyboard to press, or ■ A screen element or name
Regular italic font	Indicates a new term.
	Indicates an alternate method of performing a task.
Note	Indicates a note. Notes call attention to any item of information that may be of special importance.
	Indicates a caution. A caution contains information essential to avoid damage to the system. A caution can pertain to hardware or software.
	Indicates a warning. A warning contains information that advises users that failure to avoid a specific action could result in physical harm to the user or to the hardware.
	Indicates a danger. A danger contains information that users must know to avoid death or serious injury.

1

Overview

The Software House *apC/8X advanced processing Controller* is an intelligent access control field panel that serves as the basic building block for the Software House C•CURE 800/8000 Systems application.

The apC/8X is a distributed access control decision maker for the host computer. Local access control decisions are made by the apC/8X and transaction information is communicated to the host computer.

Each apC/8X panel supports Wiegand, proximity, magnetic stripe, and biometric reader technologies.

In This Chapter

apC/8X Basics

The apC/8X controller is housed in a 16 AWG metal wall-mounted cabinet, which has tamper switches on the front and rear and can be used in a variety of configurations.

The standard apC/8X panel has eight inputs, eight outputs, and one RS-485 reader port that can support a maximum of eight readers.

In the basic apC/8X installation, the eight card readers are wired in a daisy chain configuration. Installing a Star Coupler or Mini Star Coupler enables you to wire the apC/8X's eight card readers in a star configuration, daisy chain configuration, or a combination of configurations.

Note: As many as 16 apC/8X units can be connected in a communications chain. However, for best results, the recommended maximum number of apC/8X units per chain is nine. On a network connection, the recommended maximum number of apC/8X units is six.

The static RAM of the panel consumes minimal power for storing memory and data. The panel is capable of serial RS-232 bus/daisy chain RS-485 or dual-line communications with an optional board. (Optional boards are described in "apC/8X Optional Modules," on page 1-4.)

The apC/8X panel is compatible with the Software House C•CURE 800/8000 system.

Software-Controlled Options

The apC/8X device offers software-controlled features such as timed activation/deactivation commands, 32-bit card numbers, elevator access, dialup mode operation, and antipassback control.

A single apC/8X device can use multiple card technologies, site codes, and facility codes. The apC/8X full-year real time calendar/clock allows activation and deactivation of cards on specified days.

Supervised Inputs

All apC/8X models have supervised inputs. A *supervised* input reports on the status of the wiring between the apC/8X and the alarm device. If the wiring is cut, the system reports an open circuit. If someone tries to jumper across the wiring (prevent the device from reporting), the system reports a shorted circuit.

Supervised inputs can report a total of five conditions to the apC/8X:

- Short
- Open Loop
- Normal
- Alert
- Line Fault

Note: An **unsupervised** input does not monitor the wiring. Unsupervised inputs can report only two conditions to the apC/8X: Normal or Alert. With a star coupler, the apC/8X has eight unsupervised “normally closed” inputs available.

apC/8X Optional Modules

The apC/8X panel supports the following optional boards:

- I/32 Supervised Input Module (1 module)
- I/8 Input Bus Module (8 modules)
- R/8 Output Bus Module (8 modules)
- R/48 Relay Module (2 modules)
- Standard star coupler (1 module)
- Mini star coupler (1 module)
- Wiegand/proximity star coupler (lower and upper modules)

Note: The Mini star coupler has not been evaluated by UL.

I/32 Supervised Input Module

The I/32 Supervised Input Module (part #132-521) is a separate board, mounted directly on the apC/8X motherboard. If one or two R/48 modules are also used, then the apC-I/32 mounts on the outermost apC-R/48.

The I/32 adds 32 supervised Class A two-wire inputs to an apC/8X. A 1K-ohm resistor is factory-installed on all inputs. These resistors must be cut off when you use the associated input. Tolerance on states is ± 5%. The I/32 does not function until the host computer configures the apC/8X.

I/8 Input Bus Module

The I/8 Input Module (part #AS0073-00) provides eight additional supervised alarm inputs. You can install up to eight Input Modules on an apC/8X anywhere along an RM Reader Bus to provide up to 64 additional inputs.

R/8 Output Bus Module

The R/8 Output Module (part #AS0074-000) connects to the apC/8X reader bus. The Output Module provides eight auxiliary relay outputs. You can connect a total of eight Output Modules to the apC/8X anywhere along an RM reader bus to provide up to 64 auxiliary relay outputs.

R/48 Relay Module

The R/48 Relay Module (part #132-429) provides 48 additional outputs for elevator, lights, HVAC, or control of other security related devices such as closed circuit TV switches and alarm dialers. You can install two R/48 Modules on one apC/8X.

Standard Star Coupler

The standard star coupler provides another way to connect readers to the apC/8X, since the main apC/8X board has only one port for connecting daisy chain readers. Star couplers enable you to wire readers in a star (each reader is individually wired to the apC/8X) or daisy-chain configuration.

The apC/8X is limited to eight total readers, whether or not the readers are connected to the main board or the star coupler.

The star coupler provides eight unsupervised inputs and eight dry contact relay outputs numbered from 9 through 16.

Mini Star Coupler

The mini star coupler provides an economical way to wire readers in a star configuration. However, the module contains no additional inputs or outputs.

Note: The Mini star coupler has not been evaluated by UL.

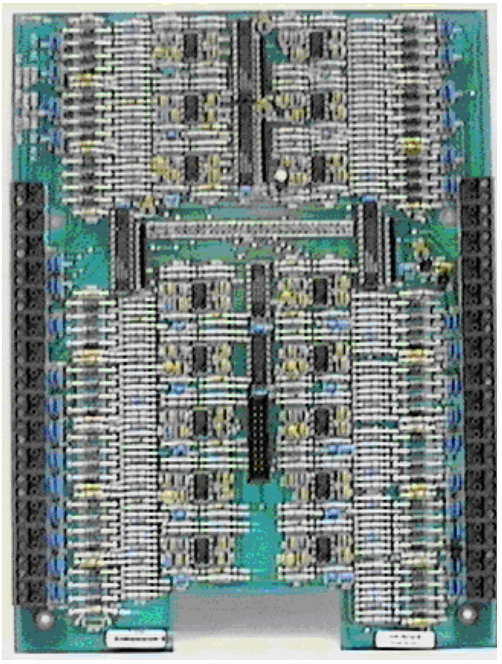
Wiegand/Proximity Star Coupler

The Wiegand/Proximity star coupler (WPSC) is a two board set that lets you connect Wiegand, Wiegand-compatible, and proximity readers with Wiegand output directly to the apC/8X device without using Reader Modules (RMs). Both boards in the set provide four reader connections and four inputs for a total of eight reader connections and eight inputs.

NOTE If a WPSC Star Coupler with revision 1.9 firmware or earlier is used, the reader addressed as number 8 must be an RM reader.

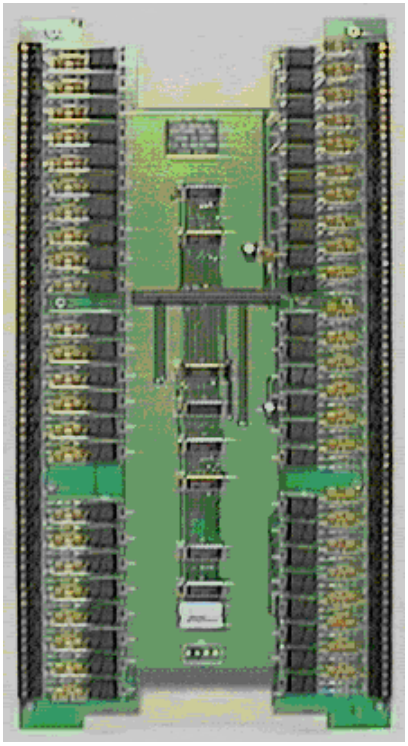
apS Battery Backup

The Advanced Power System (apS) provides operational power battery backup and powerfail capability for the apC/8X. The apS includes powerfail and low battery indicator outputs that connect to apC/8X inputs. Contact Software House for additional information about apS functions.



I32 Mounts on apC (one per apC) **I8?? Connects to Reader Bus (8 per apC, 2 per apC/L)**

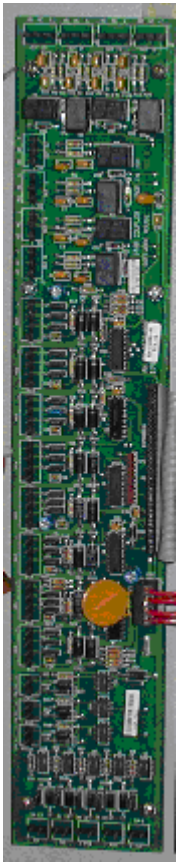
Figure 1.1: apC Add on Boards - I8 and R8



R48 Mounts on apC (2 per apC)

R8?? connects to Reader Bus (8 per apC, 2 per apC/L)

Figure 1.2: apC Add on Boards - R32 and R8

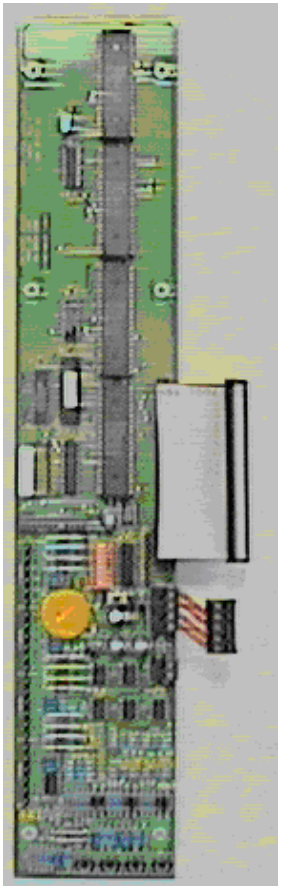


Standard?? Star Coupler

8 RM Ports
(8 inputs*, 8 outputs)
(*only non-supervised inputs)

Mini-Star?? Coupler

8 RM Ports
(No inputs or outputs)



Wiegand/Prox?? Star Coupler

4+4* Wiegand Readers, 4+4* Inputs
(Second 4 readers and inputs
on an upper board)

Figure 1.3: apC Add-on Boards - Star Couplers

Card Readers

A card reader is comprised of a read head or reader electronics and a small circuit board, called a *personality board* or *module*. These boards fit into the reader housing and contain the electronics for accepting magnetic stripe or Wiegand signal technologies. By setting a switch on the board, you can determine which signaling technology will be accepted.

The apC/8X interfaces with the following personality modules:

- RM-4
- RM-4E
- RM-DS
- For information about readers, see the Software House *Readers, Inputs, and Outputs (RIO) Guide*.

Magnetic Stripe Readers

The magnetic stripe reader is enclosed in an all weather housing with a slot through which a magnetically coded card is passed, or "swiped." The RM-4/4E personality module decodes the data on the card and transmits it to the apC/8X for processing.

Wiegand Technology Readers

There are three types of Wiegand technology card readers:

- Swipe reader – through which a card is passed
- Insertion reader – into which a card is inserted and removed
- Key reader – into which a key shaped card is inserted and removed

A charging/sensing coil inside a Wiegand reader creates a magnetic field. When the wires inside the card interact with the magnetic field, they create low voltage impulses in the coil. Depending on the arrangement of the wires in the card, the voltage is either positive or negative. The module translates the impulses and transmits the information to the apC/8X for processing.

Most swipe, insertion, and key Wiegand Readers have a single red LED that indicates the status of the door. Some models are available with a bi-color LED to allow greater flexibility in reporting the door status. Software House RM Wiegand readers have a three-LED display.

See the Software House *Readers, Inputs, and Outputs (RIO) Guide* for information about Wiegand technology readers.

Proximity Readers

Proximity readers transmit a radio frequency signal. A proximity card is a radio frequency transponder or tag, which consists of an antenna coil and an integrated circuit chip encoded with a unique identification number. When a card is passed near the reader, it energizes the card's antenna, causing it to send its identification number to the reader. The card and reader do not make physical contact.

Proximity read heads provide Wiegand signaling to the apC/8X. LED indicators for proximity readers vary according to manufacturer.

See the Software House *Readers, Inputs, and Outputs (RIO) Guide* for information about proximity reader options.

Paired Readers

You can pair any two readers if they are configured with the same door contact at the host computer. Paired readers coordinate door strike control and door contact shunting between themselves.

Note that request-to-exit does not function if a door is configured with two readers for anti-passback.

2

apC/8X Physical Requirements

This chapter describes physical requirements for the apC/8X:

In This Chapter

Connecting External Devices to the apC/8X

External devices connect to the apC/8X via numbered ports located on the left and right sides of the board.

- Table 2.1.lists the device types and connectors.
- Figure 2.1 shows the groups of ports reserved for connecting specified types of devices.

External Device Types and Connections

Table 2.1 lists external device connectors on the apC/8X panel.

Table 2.1: External Device Connections

Devices	Connector	Comments
Inputs (2 pins per input)	P9-P16	Supervised as NC or NO.
Card readers (four pins per reader)	P43	Reader bus.
Relay outputs (3 pins per output)	P1-P8	Common, NC, and NO
Main Fail (2 pins per input)	P21	Indicates that the apS has experienced a power failure. This is reported only if the apC/8X panel is configured in C•CURE 800 to report the failure. Either jumper across the pins to disable the sensor or connect the AC Fail relay (the C and NC pins) from the apS.
Aux port (5 pins)	P36	Used for apC Test utility
Host port (5 pins)	P30 or P32	Only use the P32 (bottom) connector. If you are connecting an RS-485 daisy chain, double-connect on the pins (input and output wires connected on the same pins).
Main Battery Low (2 pins)	P27	The apS will report main battery low only if the apS battery low output is connected to an input on the apC/8X and is configured in C•CURE 800 to report the failure.

apC/8X Ports to Connect External Devices

Figure 2.1 shows the groups of ports for connecting specified device types.

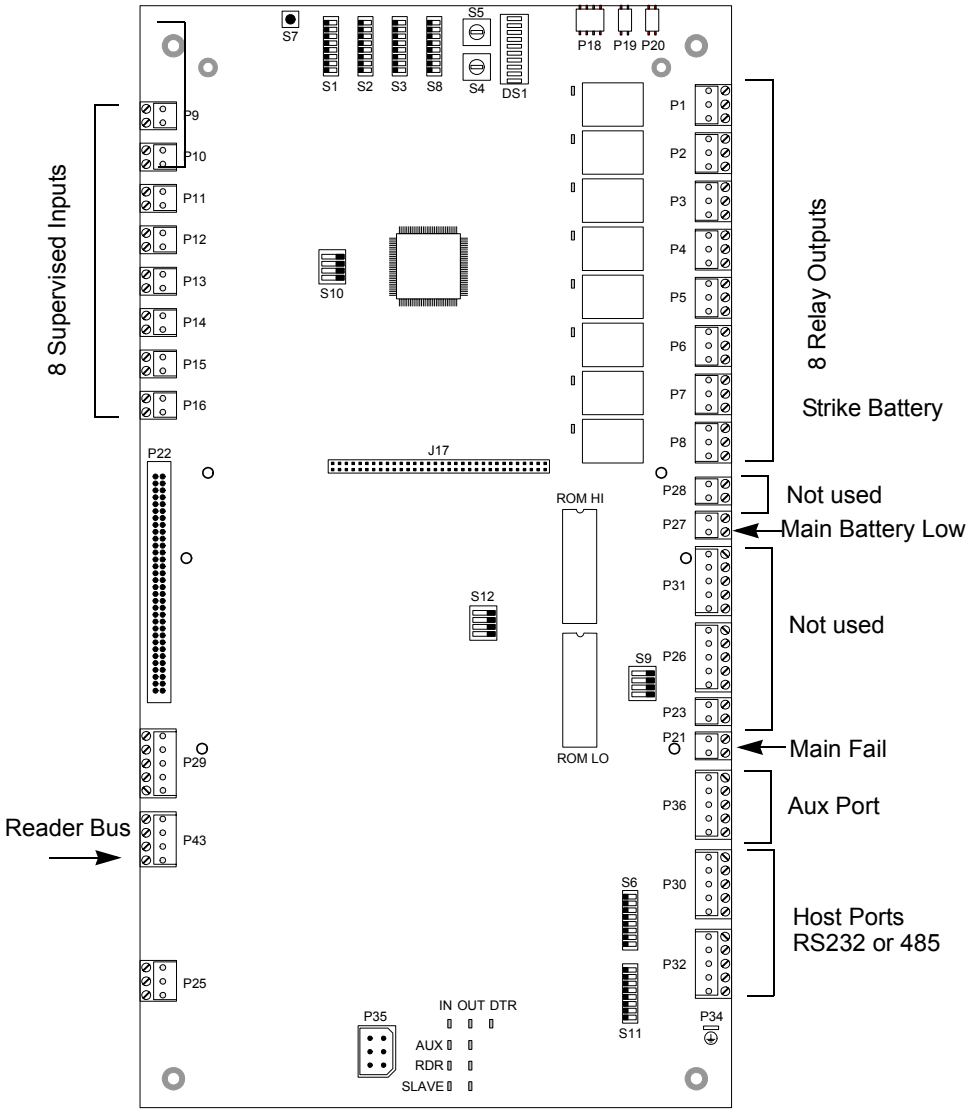


Figure 2.1: Ports to Connect External Devices to apC/8X Main Board

Equipment Wiring Requirements

Table 2.2 lists the wiring requirements for the apC/8X device and its components. Consult the Belden specifications for information on capacitance and resistance.

Table 2.2: Equipment Wiring Specifications

Signal	From	To	Belden#	Gauge	# Prs	Shielded?	Max Length
RS-232 Comm	Host	apC/8X	9855	22	2	Yes	50 ft.
RS-232 Comm 5-wire	Host	apC/8X	8303	22	3	Yes	50 ft.
RS-485 Comm	Host	apC/8X	9842*	24	2	Yes	4000 ft.
Comm	apC/8X	RM Module	9841*	24	1	Yes	4000 ft.
Power	apC/8X	RM Module	8442/8461	22/18	1	No	Appendix C
Control	Output	Strike	8461	18	1	No	??Appendix C
Supervised/ Unsupervised Input	Input	Switch	8442/8461	22/18	1	No	2000 ft.
Request-to-exit	Input	Switch	8442/8461	22/18	1	No	2000 ft.
Door Contact	Input	Contact	8442/8461	22/18	1	No	2000 ft.
Relay	RM-4, RM-4DS	ARM-1	9462	22	1	Yes	25 ft.
Reader	RM Module	Wiegand/Prox Signaling Read Head	9536	22/24 20 18	3	Yes	200 ft. 300 ft. 500 ft.
Reader	RM Module	Wiegand Signaling Read Head	9942 9260 Alpha wire 5386 C	22 20 18	3	Yes	200 ft. 300 ft. 500 ft.
Reader	RM Module	Magnetic Signaling Read Head		22		No	10 ft.

Table 2.2: Equipment Wiring Specifications

Signal	From	To	Belden#	Gauge	# Prs	Shielded?	Max Length
Reader	Wiegand Prox Star Coupler	Indala	9536/9537	24	3	Yes	500 ft.
		Sensor	9941	22	5-wire	Yes	500 ft.
		Hughes/IDI	8723	22	2	Yes	500 ft.

* For plenum or underground applications:

- Use Manhattan M63995 for 2 pair only, 150 ohm, 8.8 pf/ft to Belden 89182 for 1 pair 22 AWG, 100 ohm 12.95 pf/ft. Control, Supervised Input cables must be shielded for FCC Class B operation.

You can also substitute the following plenum-rated cables:

- Manhattan (PN#M63995) for 2-pair only, 24 AWG, 120 ohm, 12.5 pf/ft, with foil shield. For the apC/8X-to-RM connection, use only one of the pairs.
- Belden 89729 for 2-pair, 24 AWG, 150 ohm, 8.8 pf/ft. Use Belden 89182 for 1-pair 22 AWG, 100 ohm, 12.95 pf/ft., with foil shield. These two cables are also rated for underground burial.

apC/8X Event and Card Storage

Event storage space in the apC/8X memory is automatically adjusted according to the space required for storing cardholder information. Increasing the number of stored records decreases the number of events (transactions) that the memory can hold. Adding optional software features, such as elevator control (10 bytes), anti-passback (4 bytes) activation and expiration dates (4 bytes each), and 32-bit card records reduces cardholder counts and event storage space.

Calculating Number of Cards Supported in Memory

Use the following formula to estimate the number of cards that can be supported for a given memory size.

$$\text{number of cards} = \frac{(\text{memory size} - 64) \times (1024 - (\text{events} \times 10))}{\text{card\_record\_size}}$$

where:

`memory size` is the total apC/8X RAM in kilobytes.

Card_record_size is the number of bytes comprising a record. A typical card_record_size for C•CURE 800/8000 system can be estimated as follows:

Table 2.3: Card_Record_Size Estimate

Item	Bytes
Card number	4
Issue + PIN	4
Activation date	4
Expiration date	4
Clearances	10
Total	26

Events are the average number of events that an apC/8X must store between uploads to the host. A typical value is 1000.

Table 2.4 lists the apC/8X memory requirements corresponding to the supported number of cardholder records.

The values in this table are approximate. Your exact memory requirements depend on the number of cards and optional features in your system. The calculations assume an event record memory of 10KB, or 1000 events. The more options you add, the fewer the number of cards the apC/8X can support.

Table 2.4: apC/8X Memory Requirements

If SRAM Is	Number of Cardholder Records with No Elevator	Number of Cardholder Records with One Elevator
256K	7,177	5,184
512K	17,260	12,465
1M	37,425	27,029
2M	77,754	56,156
4M	158,414	114,410

Calculating apC/8X Memory Requirements

Use the following formula to determine the exact memory requirements in kilobytes for a given number of cardholder records and events if the data from the above table is not sufficient

$$\text{memory\_size} = 64 + \frac{\text{card record size x num cards + (events x 10)}}{1024}$$

Suppose your site has the following requirements:

- 30,000 26-byte cardholder records must be maintained in memory
- The apC/8X must buffer 1,000 offline events
- The apC/8X is configured for local anti-passback and elevator control

Substituting these values in the formula:

$$\text{memory\_size} = 64 + \frac{26 \times 30000 + (1000 \times 10)}{1024}$$

The result from the above calculation is 835.48, so you would need to purchase an apC/8X with 1MB of memory.

apC/8X Power Supply Current Ratings

Power supply current ratings depend on the type of power supply unit:.

- With a Lien Industries power supply (SP40W1P-147), the apC/8X has a rating of 120-240 VAC, 50-60 Hz, 2 A, and the output is rated for a maximum continuous load at 12 VDC of 3.5 A. However, Software House recommends that you do not exceed a total current load of 2.8 A.
- With a Wall Industries (Sinpro) power supply (SBU120-105), the apC/8X has a rating of 100-240 VAC, 47-63 Hz, 1.7 A, and the output is rated for a maximum continuous load at 12 VDC of 4.75 A.

Table 2.5: Power Supply Ratings for apC/8X and Components

Power Supply	Lien Industries	Wall Industries (Sinpro)
Maximum Input	2 A @120-240 VAC	1.7 A @100-240 VAC
Line Frequency	50-60 Hz	47-63 Hz
Maximum Recommended Current Draw	2.8 A @12 VDC	4.75 A @12 VDC

Table 2.6 lists typical currents for the apC/8X and its components.

Table 2.6: Current Drawn By apC/8X and Components

Component	Current in Milliamperes
apC/8X main board	175mA
RM-4 personality board[a]	75mA
Star coupler	60mA (+ relay)
Mini star coupler[b]	40mA
apC R/48 option board	60mA (+ relays)
apC I/32 option board	310mA
apC/I32 LED	140mA
Active relay (any board)	20mA
Wiegand/proximity star coupler (lower board)	60mA

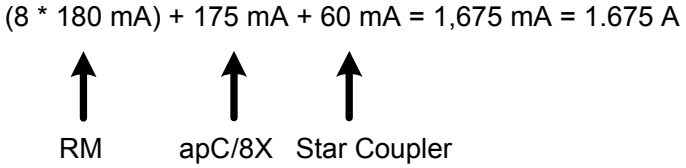
Table 2.6: Current Drawn By apC/8X and Components

Component	Current in Milliamperes
Wiegand/proximity star coupler (upper board)	70mA
R/8 option board	100mA (+ relays)
I/8 option board	120mA
Active Relay	25mA

a. Use of the RM-4/RM-4E/RM-4DS board in the apC/8X enclosure has not been evaluated by UL.
b. This unit has not been evaluated by UL.

Calculating Power Supply Limits

Suppose you are powering eight readers on an apC/8X using a star coupler. The reader you are using requires 180mA of current. Use the following formula to calculate the maximum current draw.



If your combination of apC/8X accessories requires more current than the recommended maximum, you must power some of your readers locally. Software House recommends that you use linear supplies for this auxiliary reader power.

When you use the apC/8X internal power supply to power readers, observe the limitations listed in Table 2.7.

Table 2.7: Power Supply Limitations[a]

Reader Type	Part Number	Current in Milliamperes
Indala	ASR-110, ASR-112	150 mA
	ASR-103, ASR-105	150 mA
	ASR-101	150 mA
	PR-10, PR-12, PR-5	130 mA
	ASR-120, ASR-122	350 mA
	PR-20, PR-22	350 mA
Sensor Eng.	WR1 or WR2	30 mA
HID	MiniProx	60 mA
	ProxPro	100 mA
	MaxiProx	200 mA
	iCLASS with keypad	45 mA
Barantec	Everswitch	35 mA
Software House Smart Card Readers	SWH-1100, SWH-1100, SWH-2100, SWH-3000, SWH-3100, SWH-4100, SWH-4200, SWH-5000, SWH-5100, SWH-5200	125 mA
Software House Reader	RM2L-4K	210mA
Bioscrypt	V Smart iCLASS	5W or 415 mA
	V Station iCLASS	12W or 1 A[b]
Biocentric Solutions	CombiSmart	10W or 830 mA

a. Not all readers have been evaluated by UL. For a complete list of approved readers, call Software House customer support.
b. Separate power supply recommended.

apC/8X Power Output Ratings

apC/8X power output ratings are as follows:

- Aux Power (5V) = 300 mA
- Aux Power (12V) = 200 mA
- Reader Port = 350 mA
- Expansion Power = 2.8 A

3

Mounting the apC/8X

This chapter lists the apC/8X hardware components, and explains how to mount the apC/8X cabinet, connect a relay output for monitoring the primary AC line, and connect the Advanced Power System (apS).

In This Chapter

apC/8X Hardware Components

The apC/8X panel ships with the following components.

Table 3.1: apC/8X Hardware Components

Qty	Description
1	PCB, door illuminator (pre-installed)
2	push button tamper switches (pre-installed)
1	power supply assembly (optional)
1	chassis ground cable assembly (pre-installed)
1	door illuminator cable assembly (pre-installed)
1	apC/8X cabinet enclosure
1	apC/8X board (pre-installed)
1	installation map label (pre installed on apC/8X cabinet door)
1	apC/8X label (pre-installed)
1	power limit label (pre-installed)
1	FCC/UL/CE label (pre-installed)

Caution: Before handling and installing any component, follow these precautions:

– Discharge your body's static electricity charge by touching a grounded surface
– Wear a grounding strap and work on a grounded static protection mat.
– Do not slide a component over any surface.
– Limit your movements during the installation process to reduce static electricity.

Mounting the apC/8X Cabinet

Before beginning an installation, make sure the installation location provides enough space for the apC/8X cabinet, the card readers, and the necessary electrical conduit. Appendix A lists the hardware dimensions for the apC/8X cabinet and readers.

Figure 3.1 gives the dimensions for mounting the apC/8X cabinet.

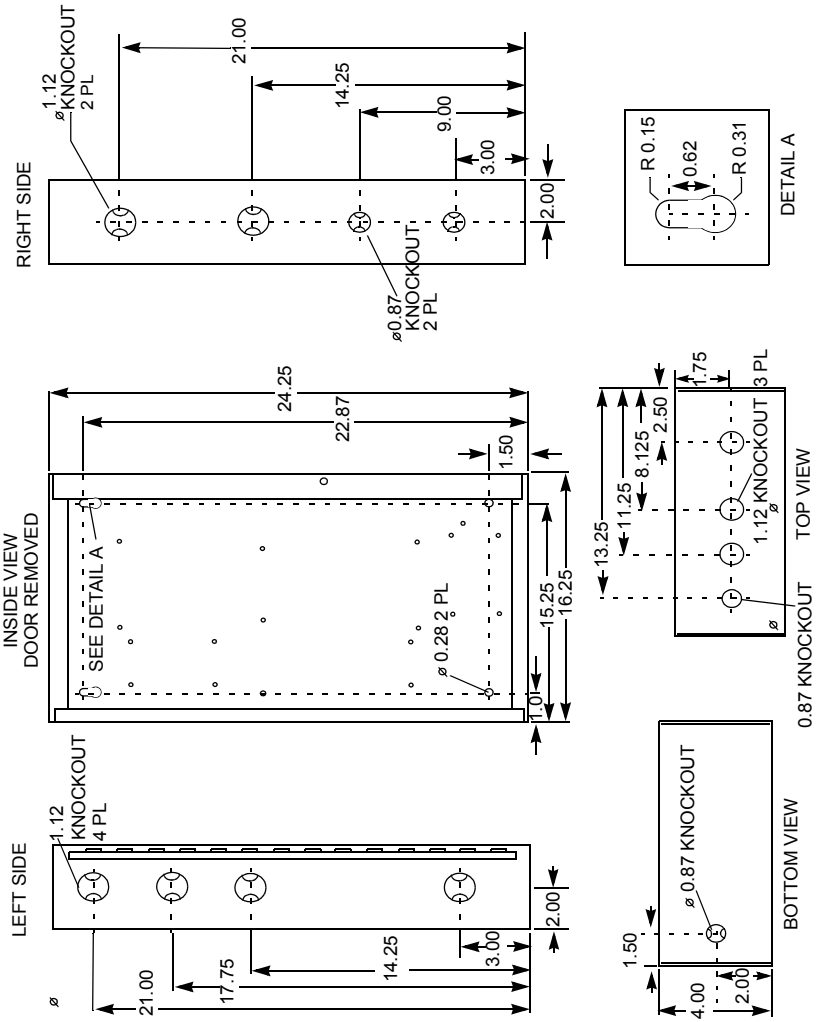


Figure 3.1: apC/8X Mounting Specifications

Connecting the apC/8X Input Voltage

The Lien Industries or Wall Industries (Sinpro) power supply for the apC/8X is already installed in the cabinet when shipped. See Figure 3.2 and Figure 3.3 for power supply diagrams.

You can connect the apC/8X unit to two types of power supplies.

- Lien Industries power supply (SP40W1P-147)
- Wall Industries (Sinpro) power supply (SBU120-105).

The Lien Industries power supply automatically accepts an input voltage of 120-240 VAC, 50to 60 Hz, 2A input. The Wall Industries (Sinpro) power supply accepts an input voltage of 100-240 VAC, 47 to 63 Hz, 1.7 A input.

Connecting the apC/8X to a Lien Industries or Wall Industries (Sinpro) power supply

1. Connect the apC/8X panel to a fused or similarly protected AC main.
2. Connect the earth ground from the AC main to the ground stud at the right of the power supply. The earth ground should be the first wire attached to the stud.
3. Secure the earth ground with the supplied lock washer and nut.

   You can place other ground connections on top of this nut.
4. Attach the hot wire (black or brown) to the top screw.
5. Attach the neutral wire (white or blue) to the center screw.
6. Use wire tie downs to ensure proper spacing between SELV circuits and primary wiring, and from chassis/metal.

Caution: Cable harnesses for the Wall Industries (Sinpro) SBU120-105 power supply unit contain in-line fuses and are not interchangeable with cable harnesses for the Lien Industries power supply. See Figure and Figure 3.3 for diagrams of the power supplies.

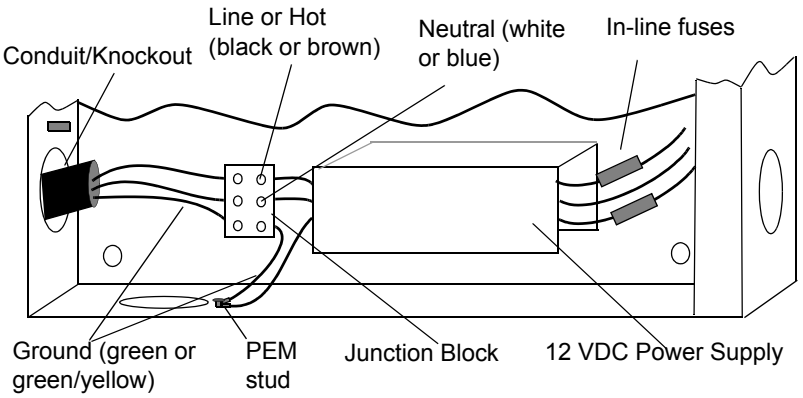


Figure 3.2: Wall Industries (Sinpro) Power Supply

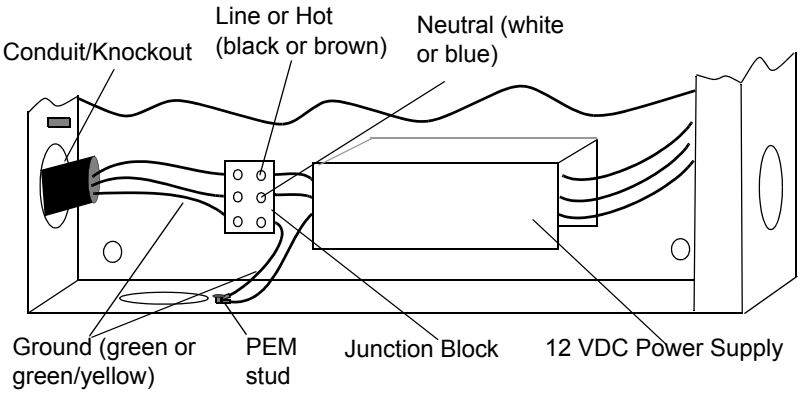


Figure 3.3: Lien Industries Power Supply

Caution: Differences exist in the AC input connector pin outs for a Lien Industries power supply and a Wall Industries (Sinpro) power supply. See Figure 3.4 for the correct pin outs, as shown from the top of the power supply.

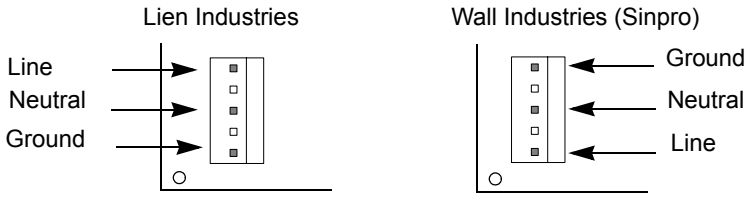


Figure 3.4: Top View of Power Supply Units with Pin Out

Connecting a Power Failure Input

Many uninterruptible and battery backup power supplies provide a relay output for monitoring the primary AC line. The apS connector P21 MAIN FAIL provides a normally-closed power failure input.

If you use a apS or battery backup power supply with the apC/8X, connect the relay common and normally closed outputs of the AC Fault Output to P21. This input reports all AC faults to the host computer; you do not have to configure it to do so. To bypass the apS input, place a piece of hookup wire or a wire jumper across its terminals.

Note: On new modules, the hookup wire may already be in place.

Connecting the Advanced Power System (apS)

The apS is an optional[1] power supply unit that provides uninterrupted power backup for the apC/8X. It has knockouts that line up directly to those on the apC/8X, and compatible terminal blocks and cable harnesses that keep wiring to a minimum (see Figure 3.5).

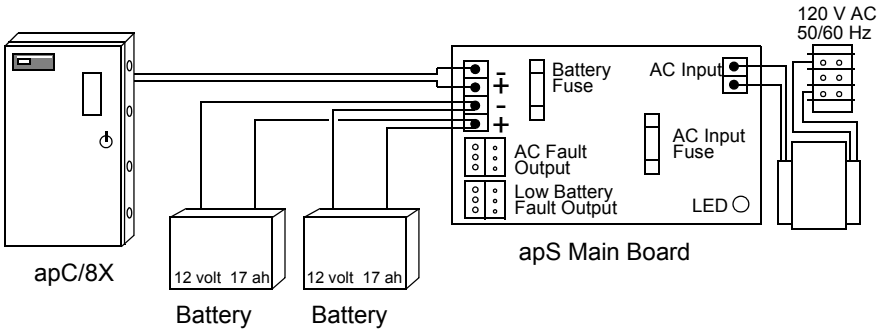


Figure 3.5: apS Connection to apC/8X

Note: Battery cables are not power limited and should be isolated from all other cabling by a minimum of 1/4". Route the battery cables away from all other wires.

The apS provides two relay outputs for connecting inputs to the apC/8X.

- One relay is connected to the MAIN FAIL input on the apC/8X and indicates when AC power is lost.
- The second output is connected to the MAIN BATT input on the apC/8X and indicates low battery voltage or impending loss of backup power.

LEDs on the cabinet door of the apS indicate AC power loss and the state of the battery charge as relative battery voltage level.

The apS low battery fault and power fault outputs can be looped together and attached to the apS fail on the apC/8X or tied to separate monitor points on the apC/8X.

1. The apS is optional only in UL294 access control applications. The apS, or some other UL-Listed Class 2 power-limited UL603 or UL294 power source (with the necessary standby capability) is required for UL1076 applications.

Caution: If the apC/8X has a built in power supply it must be disconnected before attaching the apS.

The apS comes with 17 Amp hours of backup capacity. You can order an additional battery to increase this capacity to 34 Amp hours. The length of time that an apS can power an apC/8X and readers depends on several factors:

- configuration you are using
- number of card readers connected to the apC/8X panels
- number of batteries in the apS

4

Connecting the apC/8X to a Host

This chapter describes how to connect the apC/8X to a host.

In This Chapter

Connecting to a Host Computer

The host port **P32** connects the apC/8X to a host computer (see Figure 4.1).

- A single apC/8X can connect to the host via an RS-232 serial connection.
- Multiple apC/8Xs communicate via an RS-485 chain, but the apC/8X chain must communicate with the host through an RS-232 to RS-485 converter.

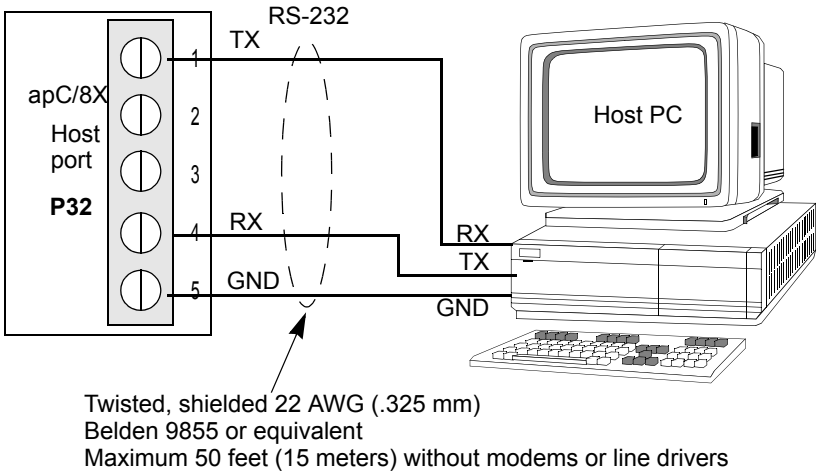


Figure 4.1: RS-232 Three-wire Connection between apC/8X and Host

You can use modems, line drivers, or other communications devices to increase the distance between the host and the apC/8X.

The following sections describe these connections:

- RS-232
- RS-485
- Modems for dialup apC/8Xs
- Modems for directly connected apC/8Xs

Connecting via RS-232, RS-485, and Modems

This section describes how to connect the apC/8X unit to the host via RS-232 or RS-485 serial communications, and Modems.

For information about setting switches on the apC/8X panel, see Chapter 5, “apC/8X Panel Setup.”

RS-232 Connection

1. Use twisted, shielded 22 AWG (0.325 mm) cable, Belden type 9855 or equivalent.
2. Connect the cable shield to the apC/8X chassis ground.

   The apC/8X can be no further than 50 ft. (15 m) from the host, unless you extend this distance with a modem, line driver, or other communications device. Table 4.1 shows how to connect the apC/8X directly to the host.

Table 4.1: apC/8X Connection to Host PC

apC/8X		Host		
Pin	Signal	DB-25 Pin	DB-9 Pin	Signal
P32-1	Data transmit (TX)	3	2	Data receive (RX)
P32-4	Data receive (RX)	2	3	Data transmit (TX)
P32-5	Ground	7	5	Ground (GND)

RS-485 Connection

Use the RS-485 serial protocol to connect apC/8X panels in a chain. It is possible to connect 16 panels on one chain. However, panel activity may affect performance, so Software House recommends limiting the maximum number of panels in a busy chain to 12.

Connecting apC/8X panels in an RS-485 chain

If the apC/8X is not the last panel in the chain (no termination):

1. Set S6-1 through S6-8 to Off, On, Off, On, Off, Off, Off, Off
2. Set S11-1 through S11-8 to Off, On, Off, On, Off, On, Off, On

Continue at step **3**.

If the apC/8X is the last panel in the chain (with termination):

1. Set S6-1 through S6-8 to Off, On, Off, On, On, On, Off, Off
2. Set S11-1 through S11-8 to Off, On, Off, On, Off, On, Off, On
3. Use twisted, shielded 24 AWG (0.288 mm) cable, Belden type 9842 or equivalent between the apC/8Xs and the host computer.
4. Tie the shield wires together where the two cables meet, but do not connect the shield at the apC/8X.
5. Ground the shield wires at the converter board. A converter board is a small circuit board with attached connectors into which you plug the connectors from the host and the apC/8X chain.

   If the converter does not have an available point to connect the shield to chassis ground, connect the shield at the chassis ground connection on only **one** apC/8X. A daisy chain line can have a total length of 4,000 ft. (1,219 m).

RS-232 to RS-485 Converter

You must use an RS-232 to RS-485 converter to convert the communication chain to RS-232 at the host. Software House recommends a Black Box model IC108A or equivalent. Additional information on the converter can be found on the manufacturer's web site, http://www.blackbox.com/.

Plug connectors from the apC/8X and the host into the converter. The pin connections for the apC/8X, converter, and host are listed in Table 4.2 and Table 4.3.

Note: Each side (host side and apC/8X side) of the converter can be configured as DTE or DCE. If configured as DTE, pin connections must be a crossover. If configured as DCE, pin connections must be straight through.

Table 4.2 and Table 4.3 assume that each side of the converter is configured as DTE, so crossover connections are shown. If you configure either side of the converter as DCE, use straight through pin connections on that side. For example, Pin 1 of P32 on the apC/8X should be connected to Pin 4 of the converter.

Table 4.2: apC/8X Pin to Converter Pin Connections

apC/8X P32		RS-485 Converter	
Signal	Pin #	Signal	Pin#
TX-	1	RX-	6
TX+	2	RX+	24
RX+	3	TX+	22
RX-	4	TX-	4
GND	5		

Table 4.3: Converter to Host Connections

Converter	RS-232	Host	RS-232	
Signal	DB-25 Pin #	Signal	DB-25 Pin #	DB-9 Pin #
RX	2	TX	2	3
TX	3	RX	3	2
GND	7	GND	7	5

Note: The RS232 to RS485 converter has not been evaluated by UL for use with the apC/8X.

Line Drivers for Directly Connected apC/8Xs

You can use a short haul modem or line driver to extend the distance the apC/8X can be located from the host. For information about connecting a modem to the host, see the appropriate documentation for your modem.

Note: Short haul modems and line drivers have not been evaluated by UL for use with the apC/8X.

Modems for Dialup Mode apC/8Xs

Use dialup mode to connect a host to an apC/8X at a remote location using standard, voice-grade telephone lines instead of hard wired or leased telephone lines. For many applications, dialup mode can be more convenient and cost-effective than other communications modes.

In dialup mode, the apC/8X modem must use DTR. Connect modems using standard straight through cables.

Caution: Connect DTR to the apC/8X only if you are connecting the apC/8X to a modem. Using DTR with an apC/8X connected directly to the host can result in hardware malfunction.

Table 4.4 lists the pins used for dialup mode. See “Configuring Modems for Use with Dialup Lines,” on page D-2 for information about DIP switch settings.

Table 4.4: apC/8X to Dialup Modem Connections

apC/8X	Modem	
P32 Pin #	DB-25 Pin #	Signal
1	2	Data transmit (TX)
2	20	DTR (connected for dialup only)
(3)	(5)	Required for some modems, Turn S1:3 to Off for 5-wire connection.
4	3	Data receive (RX)
5	7	Ground (GND)

Note: The use of modems in conjunction with the apC/8X has not been evaluated by UL.

5

apC/8X Panel Setup

In This Chapter

Setting Up the apC/8X Main Panel

Setting up the apC/8X main panel involves setting the panel's address switches and DIP switches.

Layout of apC/8X Panel

Figure 5.1 shows the layout of the apC/8X main board and the location of the components to configure the panel.

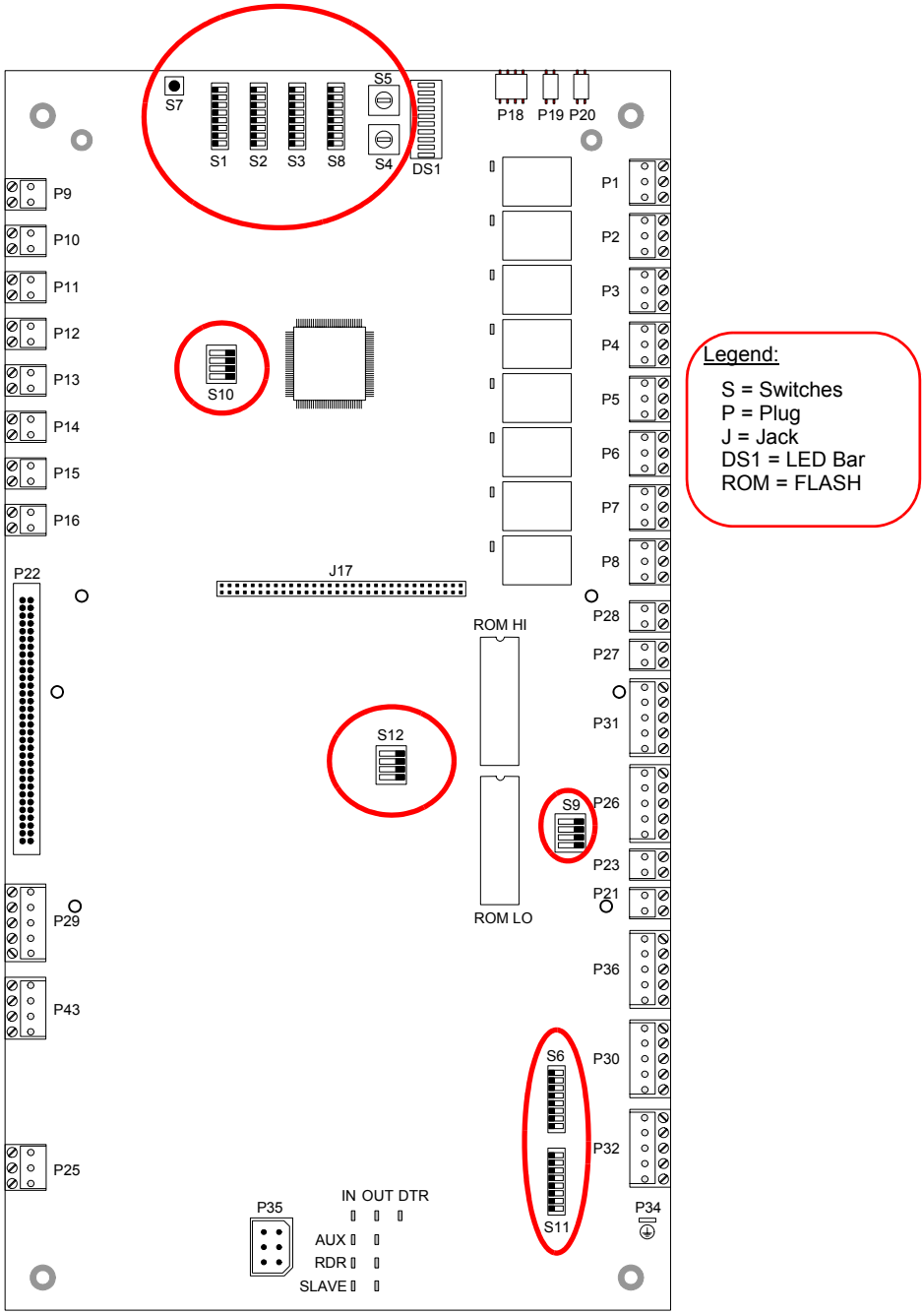


Figure 5.1: apC/8X Address Switches, DIP Switches, and LEDs

Summary of apC/8X Switches and Functions

This section describes the apC/8X switches and their functions. The apC/8X panel contains two types of switches.

- DIP Switches - This type of switch has two positions: ON (closed) and OFF (open). For most common installations, all switches should be in the OFF position.
- Rotary switches - S4 and S5 are rotary address switches. To set a rotary switch, use a screwdriver to turn the arrow to the correct number.

Table 5.1 summarizes the apC/8X switch settings and their functions. The default position is OFF, which is used for most installations. Refer to the section “apC/8X Switch Settings” for additional information.

Table 5.1: apC/8X DIP Switch Settings

Switch		Setting (* = Default)	System Feature
S1	S1:1	ON OFF*	Database cleared on power up and/or reset Database not cleared on power up and/or reset
	S1:2	ON OFF*	No LEDs for online magnetic stripe reader Amber LED for online reader
	S1:3	ON OFF*	5-wire RS-232 format used for apC/8X Normal operation: 3-wire RS-232 or RS-485 format used for apC/8X or 4-wire connection used for dialup mode apC/8X
	S1:4	ON OFF*	Dialup mode communication is enabled Dialup mode communication is disabled
	S1:5-7	See page 5-8.	Set host baud rate 5,6,7 = 0 = 9600 baud
	S1:8	ON OFF*	Host parity none, 8 bits, 1 stop bit, no flow Host parity even, 8 bits, 1 stop bit (normal operation), no flow

Table 5.1: apC/8X DIP Switch Settings

Switch		Setting (* = Default)	System Feature
S2	S2:1[a]	ON OFF*	Relay link on when door forced open No link when door forced open
	S2:2[a]	ON OFF*	Relay link on when door held No link when door held
	S2:3[a]	ON OFF*	Relay link on when apC/8X is offline No link when apC/8X is offline
	S2:6[b]	ON OFF*	Reader keypad for PIN entry, if enabled Keypad for elevator floor selection, if enabled
	S2:7	ON OFF*	apC/8X ignores card misreads apC/8X reports misreads
	S2:8	ON OFF*	AUX port for local printout AUX port for apC/8X test program
S3	S3:1[b]	ON OFF*	Card entry through keypad enabled Card entry through keypad not enabled
	S3:2	ON OFF*	Optional LED access pattern enabled at reader Normal LED access pattern enabled at reader
	S3:3[b]	ON OFF*	Card numbers less than or equal to 65535 (16 bit) Card numbers greater than 65535 (32 bit)
	S3:4[b]	ON OFF*	Activate/deactivate dates are stored Activate/deactivate dates are not stored
	S3:5[b]	ON OFF*	Space reserved in card record for local anti-passback No space reserved in card record for local anti-passback
	S3:6[b]	ON OFF*	Space reserved in card record for elevator control No space reserved in card record for local elevator control
	S3:7	ON OFF*	Magnetic stripe encryption used No Magnetic stripe encryption used
	S3:8[b]	ON OFF*	Reverse card swipe signals duress Duress alarm disabled

Table 5.1: apC/8X DIP Switch Settings

Switch		Setting (* = Default)	System Feature
S4	S4	2-digit address of apc/8X	Set address rotary switches S4 and S5 to 2-digit hex address for each apC/8X
S5	S5	2-digit address of apc/8X	Set address rotary switches S4 and S5 to 2-digit hex address for each apC/8X.
S6	S6:1 - S6:8	See Table 5.4, Table 5.5, and Table 5.6.	Use S6 in combination with S11 for RS-232 and RS-485 serial connections with the host.
S7	S7	Push button	Push to reset
S8	S8:1 - S8:8	OFF*	Reserved. Set to Off.
S9	S9:1	ON*	Factory-preset to On to select the M68306A processor. Do not change.
	S9:2 - S9:4	OFF*	S9:2 - S9:4 are not used. Set to Off.
S10	S10:1	ON*	Factory preset to On. Do not change.
	S10:2	OFF*	Factory preset to Off. Do not change.
	S10:3	OFF* ON	Enable cabinet tamper. Inhibit cabinet tamper.
	S10:4	OFF	Not used.
S11	S11:1 - S11:8	See Table 5.4, Table 5.5, and Table 5.6.	Use S11 in combination with S6 for RS-232 and RS-485 serial connections with the host.
S12	12:1	ON* OFF	Factory preset based on size and type of memory chip.. On is 512 K memory chips. Do not change. Off is 128K memory chips. Do not change.
	12:2	OFF	Factory preset. Do not change.
	12:3	ON	Factory preset. Do not change.
	12:4	OFF	Not used.

[a] This switch setting is obsolete and is typically not used.
[b] This switch is overridden by C•CURE 800/800 software.

apC/8X Switch Settings

This section describes details of the apC/8X switch settings.

S1:1

If S1:1 is set to ON, the database is cleared whenever the apC/8X is reset (S7) or when power is applied. This switch is used only during your initial database setup. For normal operation, set the switch to OFF.

Note: If you install a new apC/8X or an apC/8X that has been connected to another system, or change the software, power up the apC/8X panel with S1:1 ON to clear the apC/8X memory. Then turn S1:1 OFF.

S1:2

When S1:2 is set to ON, an online but inactive magnetic stripe reader has no LEDs lit. Set the switch to OFF to light the amber LED for online readers and distinguish them from offline readers.

S1:3

For dialup operation, set switch S1:3 to OFF. Use the following table to determine the appropriate settings for switch S1:3.

Table 5.2: S1:3 Switch Settings

apC/8X Comm Format	Setting
RS-485	OFF (Normal operation)
Standard, 3-wire RS232	OFF (Normal operation)
Dialup	OFF (Normal operation)
4-wire dialup connection	OFF (Normal operation)
5-wire RS-232 protocol	ON

S1:4

S1: 4 enables apC/8X dialup communication mode. Set S1:4 to ON to operate in dialup mode. (Note: for dialup operation, switch S1:3 must also be set to OFF.) Set S1:4 to OFF to disable dialup communication.

Note: If you change any S1:*n* switch settings, we recommend that you set S1:1 to ON and press the reset button (S7). Then set S1:1 to OFF.

S1:5–S1:7

Switches S1:5 through S1:7 set the baud rate at which the apC/8X communicates with the host computer. Set the baud rate to the highest rate compatible with the host. (The maximum baud rate supported for RS-485 is 9600.) If the devices are physically far apart or if communications errors occur, lower the baud rate.

All apC/8Xs in a chain must run at the same rate. If you are using a modem, set these switches to match the baud rate of the modem. Baud rates and their corresponding switch settings are as follows:

Table 5.3: Baud Rates for Switches S1:5 through S1:7

Baud Rate	S1:5	S1:6	S1:7
19200[a]	ON	OFF	OFF
1200	OFF	ON	OFF
2400	ON	ON	OFF
4800	OFF	OFF	ON
9600* (default)	OFF	OFF	OFF
2400 X.25	ON	OFF	ON
4800 X.25	OFF	ON	ON
9600 X.25	ON	ON	ON

a. For RS-232 only. Not supported for RS-485 chains.

S1:8

Switch 1:8 sets the parity for communications with the computer or modem. Set it to ON for no parity; set to OFF for even parity.

Use even parity (OFF) with directly connected apC/8Xs. For modem communications, including apC/8X dialup mode, match the apC/8X parity to the host parity. With either setting, the apC/8X communicates 8-bit characters with one stop bit.

Note: The apC/8X and the host will not communicate if their parity settings are the not same. The same is true with the parity settings of the apC/8X and modem; the parity settings must be the same or the devices will not communicate with each other.

S2:1–S2:6

These switches are not used with C•CURE 800/8000. Setting them has no effect on C•CURE 800/8000 systems.

S2:7

Card misreads occur when the card has the wrong parity or the wrong number of bits. When switch S2:7 is set to ON, the apC/8X takes no action when it misreads a card. When switch S2:7 is set to OFF, the apC/8X sends an **access denied for misread** report when it misreads a Wiegand or magnetic stripe card.

S2:8

Set switch S2:8 to ON to print access messages and monitor point changes on a local printer connected to apC/8X diagnostic port P36. Set the switch OFF to connect to the apC/8X test program through port P36.

S3:1

This switch is not used with C•CURE 800/8000. Setting it has no effect on C•CURE 800/8000 systems.

S3:2

Set switch S3:2 to OFF to use the default access LED pattern on all readers. Set this switch to ON to cause the green LED to light solid (no flash) for an access grant or door unlock. An access deny causes the red LED to flash rapidly for two seconds.

S3:3–S3:8

These switches are NOT used with C•CURE 800/8000. Setting them has no effect on C•CURE 800/8000 systems.

S4 and S5

Use rotary switches S4 and S5 to set the apC/8X's unique 2-digit hex address. Each apC/8X on an RS-485 chain must have a unique address.

S6:1–S6:8

Use switches S6 and switch S11 to establish RS-232 and RS-485 serial connections with the host.

Refer to Table 5.4, Table 5.5, and Table 5.6 for specific switch settings.

Note: Set switches S6:5 and S:6-6 to ON when the apC/8X is the last unit in an RS-485 daisy chain (unit is terminated).

S7

Switch 7 is a momentary push button that resets the apC/8X. During reset, the apC/8X performs a self-test and sends the test results to the control system. If S1:1 is set, the database is also cleared.

S8:1–S8:8

These switches are NOT used with C•CURE 800/8000. Setting them has no effect on C•CURE 800/8000 systems.

S9:1

S9:1 should always be ON. This switch is factory preset to ON to select the M68306A processor.

S9:2–9:4

These switches are not used with C•CURE 800/8000. Turn S9:2 through SW9:4 to OFF.

S10:1–S10:4

S10:1 and 10:2 are factory preset for normal operations. Do not change these settings. S10:1 must be set to ON. S10:2 must be set to OFF.

S11:1–S11:8

Use S11 in combination with S6 switch settings to communicate with the host via RS-232 or RS-485 serial protocol.

Refer to Table 5.4, Table 5.5, and Table 5.6 for specific switch settings that set the interface on P30 and P32 to RS-232 and RS-485.

Table 5.4: Switch Settings for RS-232 Host Connection (Direct or Modem)

RS-232	1	2	3	4	5	6	7	8
SW6	Off	On	On	Off	Off	Off	Off	Off
SW11	On	Off	On	Off	On	Off	On	Off

Table 5.5: Switch Settings for RS-485 Host Connection (No Termination: Not E of L)

RS-485 (No Termination)	1	2	3	4	5	6	7	8
SW6	Off	On	Off	On	Off	Off	Off	Off
SW11	Off	On	Off	On	Off	On	Off	On

Table 5.6: Switch Settings for RS-485 Host Connection (With Termination: End of Line)

RS-485 (With Termination)	1	2	3	4	5	6	7	8
SW6	Off	On	Off	On	On	On	Off	Off
SW11	Off	On	Off	On	Off	On	Off	On

.

S12:1– 12:4

Switch S12:1 is factory preset for memory chips. Do not change this setting.
ON = 512K memory chips
OFF = 128K memory chips

Switch S12:2 is factory preset for normal operations. Do not change this setting. S12:2 must be set to OFF.

Switch S12:3 is factory preset for normal operations. Do not change this setting. S12:3 must be set to ON.

Switch S12:4 is not used with C•CURE 800/8000 software. S12:1 must be set to OFF.

apC/8X LEDs

The apC/8X has several types of LEDs:

- Communications LEDs indicate when data is transmitted and received from the AUX port, host computer, or reader. These LEDs are located on the bottom right-half of the apC/8X (see Figure 5.2).
- LED bar at the top of the apC/8X indicates the various system status conditions.
- LEDs on the apC/8X's cabinet door indicate that the apC/8X power is ON.
- Status LEDs on the upper right-half of the apC/8X indicate that the relays are activated.

Communications LEDs

The communications LEDs are located on the bottom right half of the apC/8, as shown in Figure 5.2.

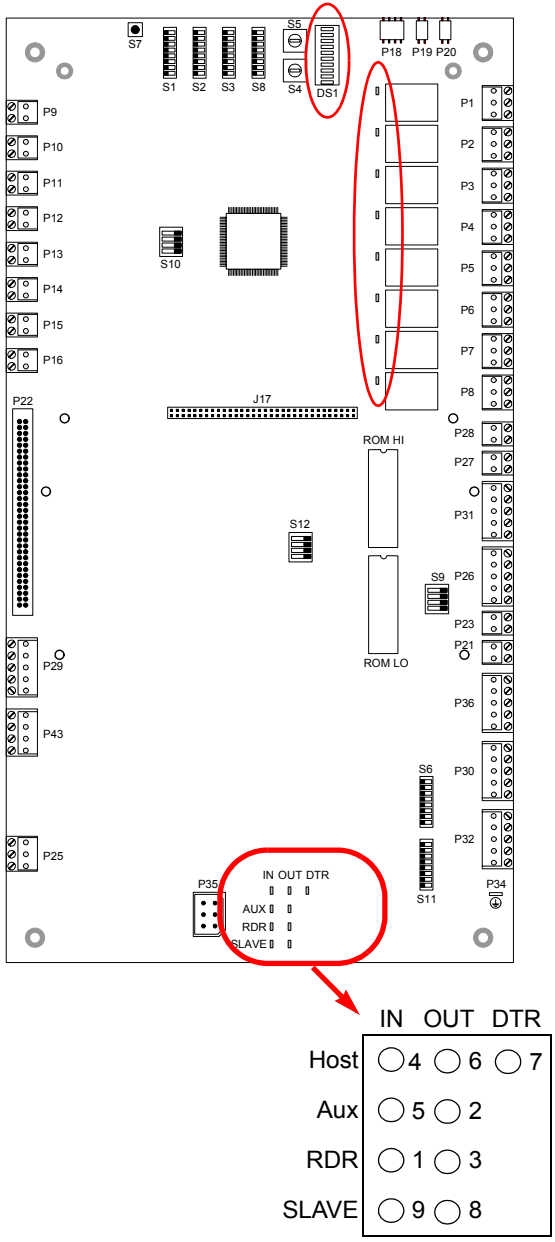


Figure 5.2: Location of apC/8X LEDs

Table 5.7 describes the communications LEDs at the bottom of the apC/8X.

Table 5.7: apC/8X Communications LEDs

LED		Indication
Aux port	LED 5 LED 2	ON = Aux port receiving data (In) ON = Aux port transmitting Data (Out)
Reader port	LED 1 LED 3	ON = Receiving data from reader bus (In) ON = Transmitting data to reader bus (Out)
Host port	LED 4 LED 6 LED 7	ON = Receiving data from host (In) ON = Transmitting data to host (Out) ON = Active DTR
Slave (Not used)	LED 9 LED 8	Data In (Not used) Data Out (Not used)

LED Bar

The LED bar at the top of board (next to S 4 and S 5) indicates the various status conditions.

Table 5.8 lists the color of the 10 LEDs in the bar, their state, and their meaning.

Table 5.8: apC/8X LED Bar

LED	If On....	If Off...	If Flashing...
Red1	Reset/Fault	Normal operation	
Red2	Reader error; a configured reader is offline	Normal operation	
Red3	Reserved for system use	Normal operation	
Yellow1	DTR enabled but apC/L on hook with a modem that is not reporting as if it is on-line	DTR disabled	DTR on and apC/8X off the hook with modem
Yellow2	0.5 second flash when card is swiped (online reader only)	Normal operation	
Yellow3	0.5 second flash when monitor point changes (online monitor point only)	Normal operation	
Yellow4	Offline from host	Normal operation	Message received from host

Table 5.8: apC/8X LED Bar (Continued)

LED	If On....	If Off...	If Flashing...
Green1	0.5 second flash while scanning monitor points	Hardware problem	
Green2	1 second flash during normal operation (program heartbeat)	Hardware problem	
Green3	Power on	Power off	

Note: When power is applied to the apC/8X or if the apC/8X is reset, the LED bar goes through a diagnostic self test. The LEDs should return to normal operation within 10 seconds.

LEDs on the apC/8X Cabinet Door

Three LEDs on the apC/8X cabinet door indicate the various states of the apC/8X (see Table 5.9).

Table 5.9: apC/8X Door LED

LED	Indicates	State
Green1	Power	Power is on the apC/8X
Yellow2	Host	apC/8X is on-line with the host
Red3	Fault	Reset condition seen at initial power up or when you push the reset switch (S7). If the LED cycles between Fault and Host, there is a problem with the unit. (Same as Red1 on the LED bar).

A

Equipment Specifications

In This Appendix

Operating Environment

- **Power consumption:** 10-20 watts, nominal
- **Temperature range:** 32° F to 120° F (0° C to 49° C)

Equipment Dimensions and Weights

Table A.1: Equipment Dimensions and Weight

Unit	Height	Depth	Width	Weight
apC/8X w/ cabinet w/circuit board	24 in. (61 cm)	4 in. (10.2 cm)	16.55 in. (42.3 cm)	19 lb. w/o power supply (8.62 kg) 20 lb. w/ power supply (9.07 kg)
apC/8X circuit board	16.01 in. (40.7 cm)	0.6 in. (1.5 cm)	8.6 in. (21.8 cm)	1 lb. 2 oz. (510 grams)
apC I/32	7.6 in. (19.3 cm)	0.7 in. (1.8 cm)	9.7 in. (24.9 cm)	13 oz. (369 grams)
apC R/48	15.5 in. (39.37 cm)	0.75 in. (1.9 cm)	8.1 in. (20.57 cm)	27 oz. (765 grams)
ARM-1	1.7 in. (4.3 cm)	0.53 in. (1.3 cm)	0.75 in. (1.91 cm)	1 oz. (28 grams)
Standard star coupler	16 in. (40.6 cm)	0.6 in. (1.5 cm)	3.0 in. (7.65 cm)	10 oz. (283 grams)
Wiegand/proximity star coupler, upper board	9.6 in. (24.5 cm)	0.6 in. (1.5 cm)	3.0 in. (7.65 cm)	7 oz. (198 kg)
Wiegand/proximity star coupler, lower board	16 in. (40.6 cm)	0.86 in. (2.18 cm)	3.0 in. (7.65 cm)	10 oz. (283 grams)

B

Testing the apC/8X Installation

This chapter describes installation test procedures for apC/8X components and associated RM readers.

In This Chapter

Testing RM Readers

This section describes the test procedures for the Software House RM readers. To test a reader for normal operation, put the reader into test mode by setting the address switch to 9, power up the reader, and follow the steps below.

The readers can also be bench tested without being connected to an apC/8X. When you complete the test, reset the address switch to its original setting.

The LEDs on the reader indicate whether each step in the test procedure is successful. This section describes each step in the test and the expected LED response.

Note: If the reader has no keypad, the test procedure consists of steps 15 and 16 only.

To put the RM reader into test mode:

1. Set the reader address switch to **9.** (Note the original setting.)
2. Power the reader by connecting **+12 V** to **P1-1** and **GND** to **P1-4**.
3. All LEDs light up briefly and turn off.

To test the keyboard and LEDs of the RM reader:

1. Press the **1** key. The red LED lights up.
2. Press the **1** key again. The red LED flashes slowly.
3. Press the **1** key again. The red LED flashes rapidly.
4. Press the **1** key again. The red LED goes out.
5. Press the **2** key. The amber LED lights up.
6. Press the **2** key again. The amber LED flashes slowly.
7. Press the **2** key again. The amber LED flashes rapidly.
8. Press the **2** key again. The amber LED goes out.
9. Press the **3** key. The green LED lights up.

10. Press the **3** key again. The green LED flashes slowly.
11. Press the **3** key again. The green LED flashes rapidly.
12. Press the **3** key again. The green LED goes out.

To test the outputs of the RM reader:

13. Press the **4** key. If an ARM-1 is connected to output 1 or 2, the relay(s) should activate. Press the **4** key again to deactivate the relay(s).

Note: Pressing the **4** key activates both relay outputs on an RM reader.

To test the read head of the RM reader:

14. Press the **5** key to activate the card swipe test. The LEDs make no response when the key is pressed.
15. Present a card. If it is a magnetic stripe reader, swipe in the forward direction. The green LED lights up for two seconds. If the red LED lights up, there is an error in the card read.
16. *This step only applies to magnetic stripe read heads*. Swipe the card in the reverse direction. The amber LED lights up. If an error is read, the red LED lights up.

To test the inputs of the RM reader:

17. Press the **6** key to test supervised input number **1**.
18. Use resistors across the inputs to simulate the conditions listed in the following table and check the LED responses.

Table B.1: LED Indications

LED Response	Condition
Green LED lights	Input is in secure condition (1K)
Amber LED lights	Input is in alarm condition (500Ω)
Amber LED lights	Input is in alarm condition (2K)
Red LED flashes slowly	Input is left open (open)
Red LED flashes rapidly	Input is shorted (shorted)

19. Press the **7** key to test supervised input number **2**. The LED responses indicate the conditions listed in the previous table.

To test the tamper switch of the RM reader:

20. Set SW3-4 (Tamper Override) to **OFF** (Open)
21. Press the **8** key to test the tamper switch. If the tamper switch is depressed, the red LED is off. When the switch is released, the red LED lights up.

Turn off Test Mode:

22. When the RM reader completes the tests, turn off Test Mode by returning the address switch to its original address setting.

RM LEDs

Each RM reader has three LEDs: red, green, and amber. The various conditions indicated by these LEDs are described in Table B.2.

Table B.2: RM Reader LED Indications

Red LED	Amber	Green	Indication
Brief flash	Brief flash	Brief flash	Power up
Off	Off	Off	Online (Alternate indication)*
Off	On	Off	Online (Normal indication)*
On	Off	Off	Offline or reader tamper
Solid for 1 sec.	Off	Off	Access denied (Normal indication)*
Fast flash for 2 sec.	Off	Off	Access denied (Alternate indication)*
Off	Off	On	Access granted or door unlocked (Alternate indication)*
Off	Off	Fast flash	Access granted (Normal indication)*
Off	Off	Slow flash	Door unlocked (Normal indication)*
Off	Slow flash	Off	Enter second card (escorted access only)
Off	Fast flash	Off	Enter PIN
Off	Fast flash	Off	Enter floor # (systems configured for elevator control only)
Flash w/ each key press	Off	Flash w/ each key press	Keypad input
Slow flash	Off	Off	Reader not configured
Fast flash	Fast flash	Fast flash	Alarm: door forced/held open
On	On	On	Error condition: Remove power to prevent damage to RM

Note: *To set Reader LEDs to *Normal* (default) or *Alternate* indications, select Diagnostics System (Diag) utility> Dialup > *ReaderLEDSettings* > Entry Value = **0** (normal) or **3** (alternate).

Non-Software House Readers

Present a card. The red LED on the reader lights up.

If you have questions regarding testing non-Software House readers, contact Software House customer support for assistance.

Testing the apC/8X Main Circuit Board

The apC/8X should be disconnected from the host when you test it. LEDs on the apC/8X main circuit board indicate whether the board is functioning properly.

To test the main circuit board:

1. Remove power from the apC/8X and disconnect the reader wiring.
2. Apply power to the apC/8X.
3. About one second after turning on power, the top RED LED on the LED BAR turns ON for approximately one-half second.
4. RED1 goes OFF, and the other nine LEDs turn ON.
5. After a delay of approximately 5 seconds, the LED BAR cycles from RED2 through YELLOW2. If larger memory options are installed, the other LEDs turn on, indicating a memory test.
6. GREEN3 remains ON, GREEN2 flashes every second, GREEN1 flashes every 1/2 second, and YELLOW4 remains ON.
7. Reader Data LED1 at the bottom of main board should flash rapidly about every three seconds. This indicates that the apC/8X is attempting to poll a reader.

   If the test procedure does not complete all of the preceding steps, contact Software House customer support.

Note: When the apC is configured and connected to the host, the YELLOW4 will blink rapidly.

The apCTest Program

The apC test program lets you perform a full test of the apC panel and the readers connected to it. You can test an apC either as a stand-alone device or as a device that is online with the host.

The apC test program is very useful in determining what is actually encoded on an access card using the Swipe test.

Note: When apC test is executed on an online panel, the control point tests are not supported.

Setting up the apC Test Program

Connect an RS-232 crossover cable from a COM port of the PC that is running apC Test and the AUX port, P36 of the apC or apC/8x or P11 of the apC/L.

If the C•CURE 800 driver is running on that PC, set the COM port to offline from within the Administration application. Be sure to set the PC COM port to 9600 baud, 8 data bits, 1 stop bit, even parity, and no flow control.

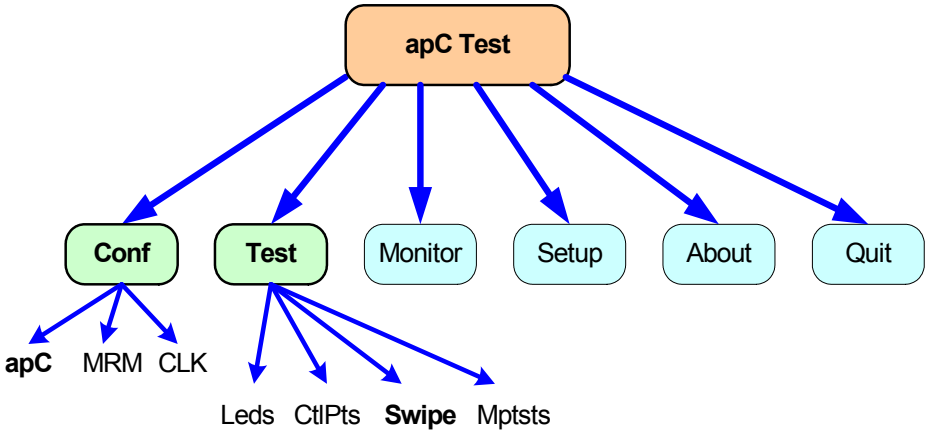


Figure B.1: Main Menu

Main Menu

The following function keys are available from the Main Menu, as indicated in Table B.3

Table B.3: Main Menu Function Keys

Function Key	Action
F1	View help text for the program.
F2	View configuration information about the connected apC.
F3	Run diagnostic tests on the connected apC.
F4	Monitor operation of the connected apC.
F8	Configure the apCtest program.
F9	View information about the apCtest program.
F10	Leave the apCtest program and return to DOS.

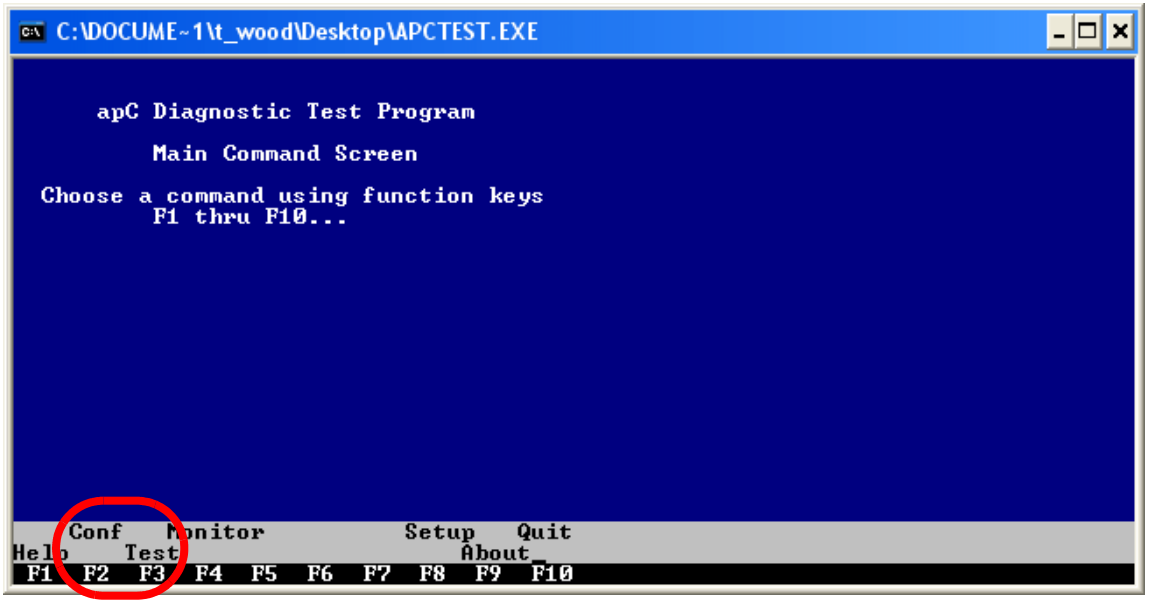


Figure B.2: Main Command Screen

The following figures show examples of using apC Test to get configuration information about the apC and to execute the Swipe test.

1. Select **F2** (Conf)
2. From the sub-menu, select **F3** (apC Configuration)

Table B.4: Function Keys Available from Configuration Sub-menu

Function Key	Action
F1	View help about the Main Configuration screen.
F2	Return to the Main Command screen.
F3	View apC configuration information.
F4	View RM/MRM configuration information.
F5	Set the date and time for the apC.

Configuration Display and Setup Menu

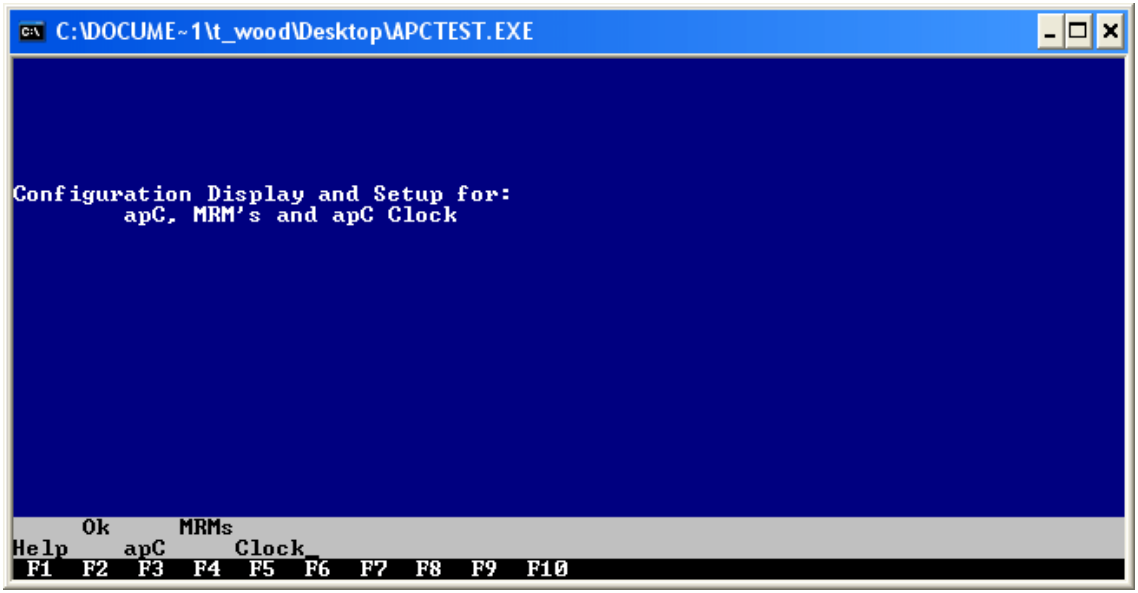


Figure B.3: Configuration Display and Setup Sub-Menu

apC Configuration Display

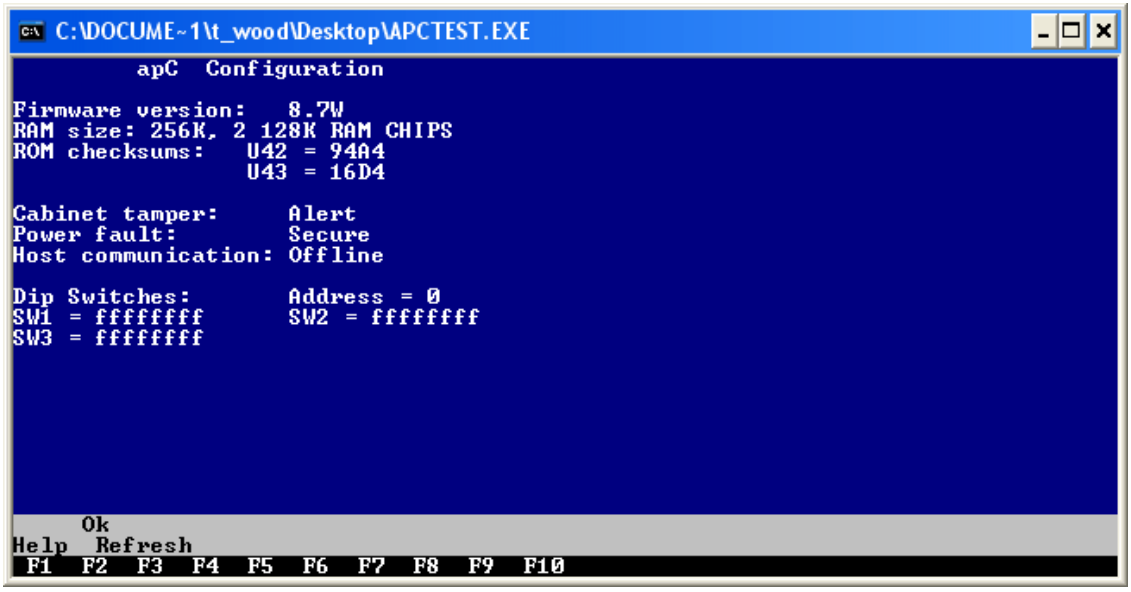


Figure B.4: apC Configuration Display

Table B.5 shows the meaning of the variables.

1. Select **F3** to refresh the data; it is not dynamic.
2. Select **F2** to return to the Configuration menu.

Table B.5: Configuration Variables and States

Configuration Variable	State
Firmware version	8.7W
RAM Size	Number of RAM chips and their size
ROM Checksums	Not used with Flash ROM
Cabinet tamper Status	Secure or alert
Power fault status	Secure or alert
Host communication status	Online or Offline
Address switches	SW4 and SW5

Table B.5: Configuration Variables and States

Configuration Variable	State
DIP switches	Switches are shown as 8 7 6 5 4 3 2 1 f=off and o=on

Configuration Sub-menu for MRM

If MRM is selected from the Configuration menu, the sub-menu will allow you to select any one of the eight readers that may be connected to the apC.

For each online reader, the following configuration data appears:

- Reader address
- Port address (if connected to a Star coupler)
- Reader firmware version
- Reported read head type
- Reader tamper status
- State of RM inputs 1 and 2

Configuring the Clock

If you select CLK (Clock) from the Configuration menu, the sub-menu allows you to change the:

3. Select **F2** to return to the Main menu.

Diagnostic Test Program - Main Menu

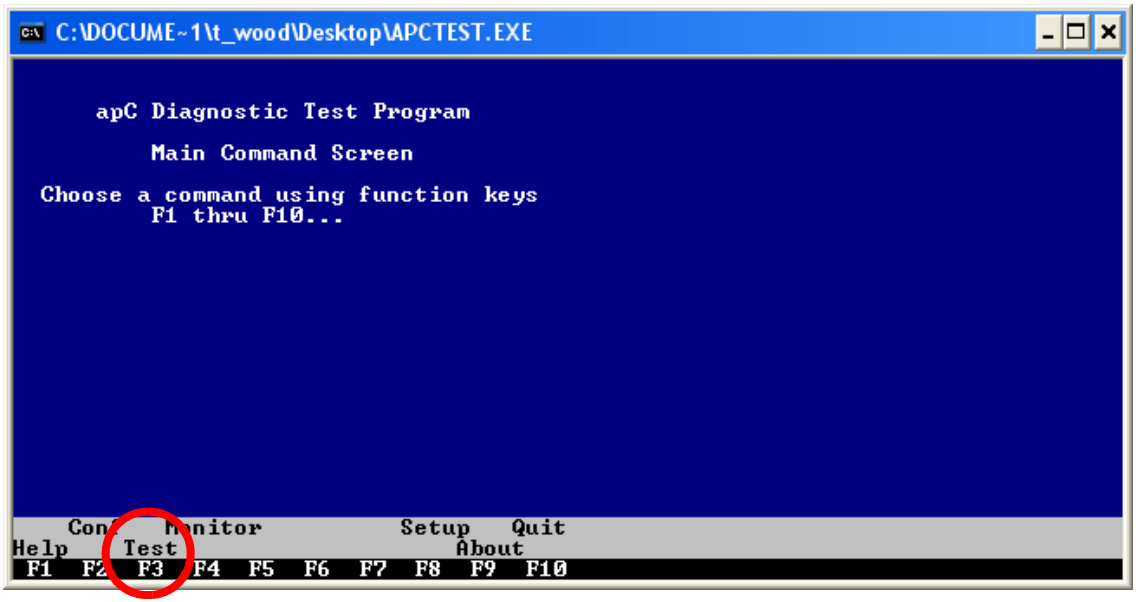


Figure B.5: Main Command Menu

4. Select **F3** from the Main Command menu to display the Diagnostic Test Program menu.

The Diagnostic Test menu allows you to test Control points and Monitor points, and to use the Swipe Test to display card reads. The Swipe test is useful for determining what data is actually recorded on an access card.

Table B.6: Function Keys for Diagnostic Test Menu

Function Key	Action
F1	View help about setting the Test Functions screen.
F2	Return to the Main Command screen.
F3	Test the apC's LED bar.
F4	Test the apC's control points, or put the control points into on/off cycle mode

Table B.6: Function Keys for Diagnostic Test Menu

Function Key	Action
F5	Test a reader by swiping a card through it.
F6	Display the status of the apC's monitor points.

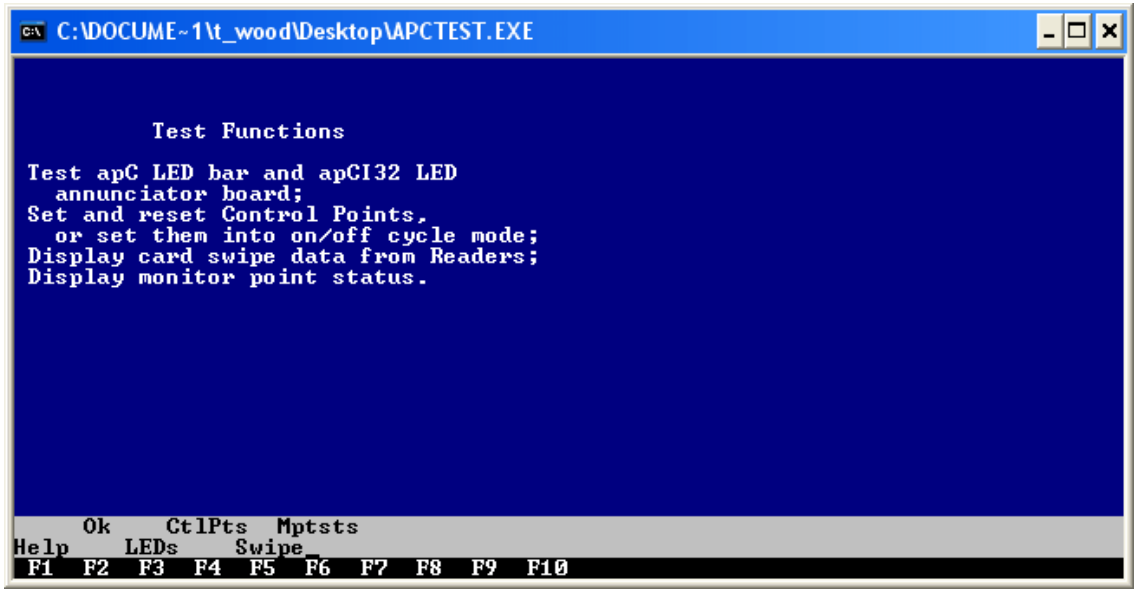


Figure B.6: Test Functions Menu

5. Select **Swipe (F5)** from the Test Functions menu.

Test Swipe Menu

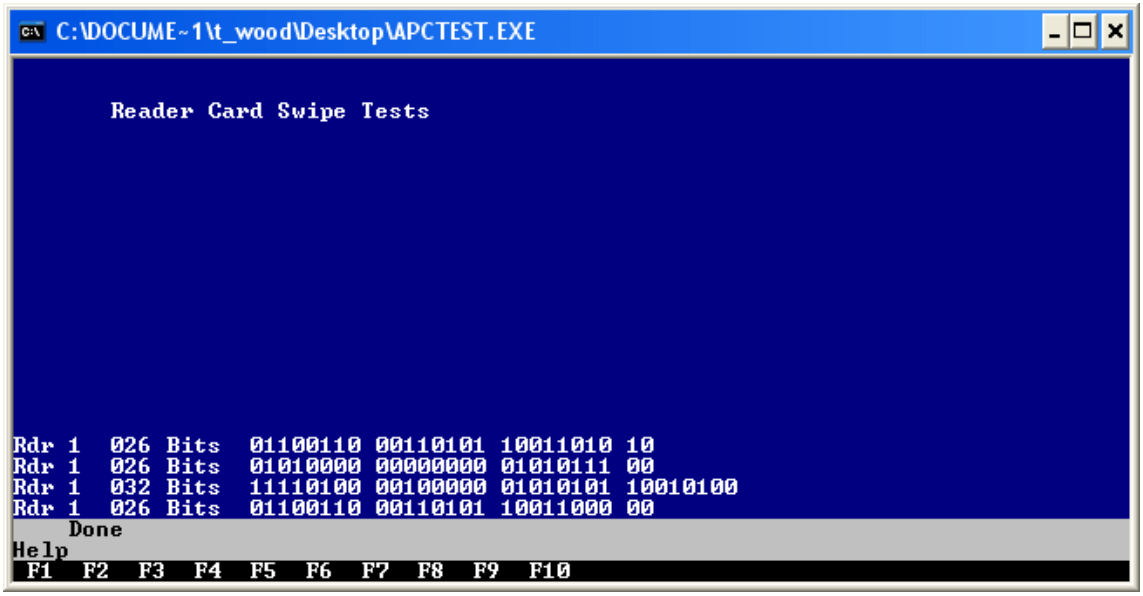


Figure B.7: Reader Swipe Test

The swipe test will display card reads from any reader connected to the apC. Figure B.7 shows sample output from several different card swipes.

The sample swipe test output indicates the reader, number of bits recorded on the card, and the value of the bits.

The display will either be Wiegand (binary) or Magnetic (4 bit BCD).

- If the display is Wiegand, all bits are shown including parity at each end.
- If the display is Magnetic, the first (Hex B) and last (Hex F) characters are not displayed.

The first line displayed in Figure B.7 shows a Wiegand 26 card with Facility Code 204 and a card number of 27445.

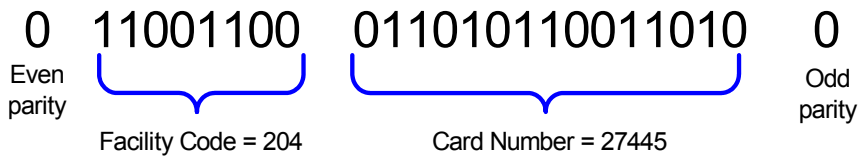


Figure B.8: Wiegand 26 Sample Card Data

Test LED

The Test LED operation is no longer supported.

Test CtlPts

The Test CtlPts (Control Points) menu allows you to activate relays associated with the apC. You can activate individual relays or all at once. You can cycle through all of them one at a time at a frequency that is configured.

- Use **F3** and **F4** to select control points
- Use **F5** (Set), **F6** (Reset), or **F7** (Cycle) to control the control points
- Use **F8** to control the cycle duration

Note: When you exit from the control points menu, the control points will remain in the state in which you set them. When you exit the apC Test utility, the control points return to a non activated state.

Test Mptsts

The Monitor Point test will display the state of selected monitor points dynamically.

- Use **F3** to display monitor points 1-16
- Use **F4** to display monitor points 17-32
- Use **F5** to display monitor points 33-48
- Use **F6** to display monitor points 49-64

Monitor Menu

The monitor menu will display access reports and card swipes that are also sent to the host computer.

Table B.7: Monitor Menu Function Keys and Actions

Function Key	Action
F1	Display Monitor Help
F2	Return to the Main Menu
F3	AccRpt - Display access message sent to the host
F4	Swipe - Display card swipes
F5	NoAcc - Do not display access messages to the host
F6	NoSwipe - Do not display card swipes
F7	Mpts - Display selected messages about monitor point changes

If **F7** is selected, the sub-menu allows you to control the monitor point message content.

Table B.8:

F1	Display Help
F2	Return to Monitor menu
F3	Display all MPT state changes
F4	Display equipment related reports: cabinet tamper, power fault, or host offline
F5	Display access alarm reports: tamper, reader offline, etc.
F6	Display supervised input monitor point state change reports
F7	Do not display monitor point state change reports
F8	Initialize all monitor points to secure

Setup Menu Allows you to use either COM1 or COM2 to connect to apC Test.

About Menu Displays the date that apC Test was built.

Quit Menu Exits apC Test and returns to the Command Prompt.

C

Calculating Maximum Wiring Lengths

In This Appendix

Introduction

The apC/8X supplies 12 volts at its connectors; however, the amount of power that actually reaches each personality board in a chain is less than 12 volts.

- The RM-4 requires at least 7.5 volts to operate properly.
- The RM-4E requires at least 11 volts to operate properly.

The total voltage is lowered by each reader and by the resistance of the wire. Whether the personality board chain needs a local power supply depends on **all** the following factors:

- Number of devices on the bus
- Current draw of each device
- Distance between the devices in the chain
- Distance between the devices and the apC/8X
- Wire gauge used to connect the readers and the apC/8X

Refer to sections that follow to calculate the power in a chain. Be sure you read and understand the instructions and examples in each section before beginning to calculate the maximum wiring lengths for your application.

Determining Wiring Ranges

To calculate wiring ranges, you need to know:

- Wire type used to connect the RMs to the apC/8X
- Resistance (ohms per foot) based on the wire type
- Number and type of readers on the chain.
- Distances between each element (reader) in the chain

Wire Types and Resistance

The following table lists the resistance (ohms per foot) for common wire types.

Table C.1: Wire Types and Resistance

Wire Type	Resistance (ohms per foot)
18 AWG	0.00879
22 AWG	0.002340
24 AWG	0.03600

Current Draw for Readers

The following table lists the current draw for RM4 and RM4E readers.

Table C.2: Wire Types and Resistance

Reader Type	Current Draw
RM4	75 mA (round up to 100 mA or .1A)o
RM4E	175 mA (round up to 200 mA or .2A)

Diagram of apC8X and Readers

Figure C.1 shows a sample diagram of an apC/8X and RM4/4E readers on the chain. As shown in the diagram, the three readers are laid out as follows.

- Reader A is 50 ft. from the apC/8X
- Reader B is 500 ft. from Reader A.
- Reader C is 250 ft. from Reader B.

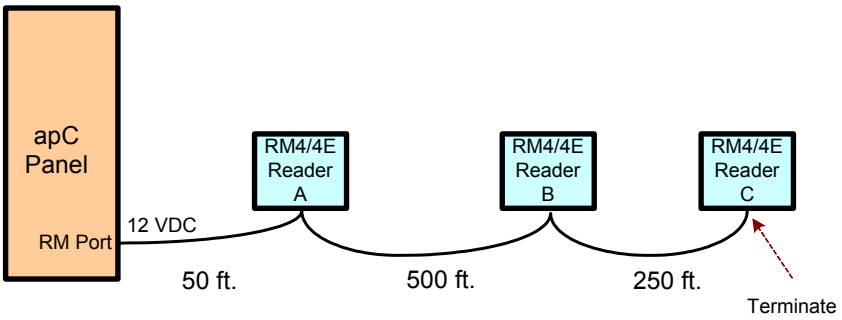


Figure C.1: Sample Diagram apC/8X and Readers

Calculating Wire Ranges for RM4 Readers

From Table C-1, the RM4 Reader draws 75 mA (rounded up to 100 mA or .1 A), as listed in

From Table C-2, the resistance with 18 AWG wire is 0.00879 ohms per foot.

From Figure C.1, the diagram shows that you are going to connect three RM4s to the apC/8X. The RM4/4Es are laid out as follows.

- RM A is 50 ft. from the apC/8X
- RM B is 500 ft. from RM A.
- RM C is 250 ft. from RM B.

Perform wire range calculations, as follows:

1. Calculate the voltage drop for each reader in the chain by multiplying the distance between each device by power (amps) by resistance (ohms per foot).
2. Add the voltage drop for each reader to get the total voltage drop.
3. Subtract the total voltage drop from the original apC/8X supply.
4. Is remaining voltage sufficient to operate the readers?

1a. Calculate Voltage Drop for RM A

Multiply 50 ft. * .1 A * .00879 = **.04395 volts dropped** for RM A

1b. Calculate Voltage Drop for RM B

Multiply (50 ft. + 500 ft.) *.1 A * .00879 = .48345 volts dropped

Multiply (550 ft.) *.1 A * .00879 = .**48345 volts dropped** for RM B

1c. Calculate Voltage Drop For RM C

Multiply (50 ft. + 500 ft. + 250 ft.) *.1 A * .00879 = .7032 Volts dropped

Multiply (800 ft.) *.1 A * .00879 = **.7032 volts dropped** for RM C

2. Add Voltage Drop for each Reader = Total Volts Dropped

Add .04395 (A) + .48345 (B) + .7032 (C) = **1.2306 Total Volts Dropped**

3. Subtract Total Volts Dropped from Original Supply

12.0 VDC (original) - 1.2306 (volts dropped) = **10.7694 VDC remaining**

4. Is remaining voltage sufficient to operate the readers?

- The RM-4 requires at least **7.5 volts** to operate properly.
- All RM-4 readers in the chain must have at least 7.5 volts.
- **10.7604 volts is sufficient** to power the RM-4 reader chain.

Note: Although the maximum wire length for an RS-485 connection is 4000 ft., the power to operate an RM-4 must be equal to or greater than **7.5 volts.** Therefore, the minimum power requirements may impact the “maximum” wire length. For example:

- 1 RM at 4000 ft. = 3.516 volt drop using 18 gauge.
  12 VDC - 3.512 = **8.488 volts** (OK - Sufficient power for an RM-4).
- 1 RM at 4000 ft. = 9.36 volt drop using 22 gauge
  12 VDC - 9.36 = **2.64 volts** (Not OK - Insufficient power for an RM-4).
- 1 RM at 1932 ft. = 4.5 volt drop using 22 gauge.
  12 VDC - 4.5 = **7.5 volts** (OK - Sufficient power for an RM-4)

Calculating Wire Ranges for RM-4E Readers

From Table C-1, the RM-4E Reader draws 1.75 mA (round up to 200 mA or .2 A).

From Table C-2, the resistance with 18 AWG wire is 0.00879 ohms per foot.

From Figure C.1, the diagram shows that you are going to connect three RM-4Es to the apC/8X. The RM-4Es are laid out as follows.

- RM A is 50 ft. from the apC/8X
- RM B is 500 ft. from the first
- RM C is 250 ft. from the second

Perform calculations, as follows:

1. Calculate the voltage drop for each reader in the chain.
2. Add the voltage drop for each reader to get the total voltage drop.
3. Subtract the total voltage drop from the original apC/8X supply.
4. Is the remaining voltage sufficient to operate the readers?

1a. Calculate Voltage Drop for RM A

Multiply 50 ft. * .2 A * .00879 = **.0879 volts dropped** for RM A

1b. Calculate Voltage Drop For RM B

Multiply (50 ft. + 500 ft.) *.2 A * .00879 = .9669 volts dropped

Multiply (550 ft.) *.2 A * .00879 = .**9669 volts dropped** for RM B

1c. Calculate Voltage Drop For RM C

Multiply (50 ft. + 500 ft. + 250 ft.) *.2 A * .00879 = 1.4064 Volts dropped

Multiply (800 ft.) *.2 A * .00879 = **1.4064 volts dropped** for RM C

2. Add Voltage Drop for each Reader = Total Volts Dropped

Add .0879 (A) + .9669 (B) + 1.4064 (C) = **2.4612 Total Volts Dropped**

3. Subtract Total Volts Dropped from Original Supply

12.0 VDC (original) - 2.4612 (volts dropped) = **9.5388 VDC remaining**

4. Is remaining voltage sufficient to operate the readers?

- The RM-4E requires at least **11 volts** to operate properly.
- All RM-4E readers in the chain must have at least 11 volts.
- **9.5388 volts is insufficient** to operate the RM-E reader chain.

If there is insufficient power, perform one of the following steps to ensure proper operation of the RM-4E module:

- Shorten the wire lengths
- Use a heavier wire
- Use a local power supply

Note: Although the maximum wire length for an RS-485 connection is 4000 ft., the power to operate an RM-4E must be greater than **11.0 volts.** Therefore, the minimum power requirements may impact the "maximum" wire length. For example:

- 1 RM-4E at 4000 ft. = 7.032 volt drop using 18 gauge
  12 VDC - 7.032 = **4.968 volts**. (Not OK - Insufficient power for an RM-4E).
- 1 RM-4E at 213 ft. = 1.0 volt drop using 22 gauge (OK - Sufficient power for an RM-4E).

Table C.3: Wiring Length Worksheet for 18 AWG - Multiply Across and Add Total Voltage Drop Column

Reader #	Current (amps drawn)	Wire resistance per foot (18 AWG)	Wire length from apC/8X or previous reader	Total voltage drop for this reader
H		0 .00879	_____=	_____
G		0 .00879	_____=	_____
F		0 .00879	_____ =	_____
E		0 .00879	_____ =	_____
D		0 .00879	_____ =	_____
C		0 .00879	_____ =	_____
B		0 .00879	_____ =	_____
A		0 .00879	_____ =	_____
Note: **A** is closest reader to apC/8X			Total Voltage Drop	

D

Dialup Modem Settings

Note: The apC/8X has not been evaluated by UL for use with dialup modem communication.

An apC/8X in dialup mode at a remote location connects to the host using standard, voice-grade telephone lines instead of hard wired or leased telephone lines. In many applications, dialup mode is more cost-effective and convenient than other communications modes.

Software House has identified a special OEM modem for dialup and lease-line applications. This modem has been manufactured to Software House access control device specifications to guarantee optimal performance when used with the C•CURE 800/8000 in either dialup or lease-line configurations.

Note: Software House does not guarantee operation or offer technical support for any modem other than our OEM modem.

When using the OEM modem for dialup mode, make sure the modem is operating with the “Echo Off” command and enable Data Terminal Ready (DTR).

Configuring OEM Modems

OEM modems work for dialup and leased line communications on C•CURE 800/8000 hosts.

Configuring Modems for Use with Dialup Lines

Table D.1: apC/8X Switch Settings for Dialup Modem

Switch	Status	Description
1	ON	Clears memory on the panel, after communications, should switch to OFF.
2	OFF	Amber LEDs on readers.
3	OFF	Must be Off
4	ON	Enable dialup.
5	OFF	9600 baud.
6	OFF	9600 baud.
7	OFF	9600 baud.
8	ON	Sets parity to NONE.

Table D.2: OEM Modem Switch Settings for Dialup

Switch	Host	apC/8X
#1	UP	DOWN
#2	UP	UP
#3	DOWN	DOWN
#4	UP	UP
#5	DOWN	DOWN
#6	UP	UP
#7	DOWN	DOWN
#8	DOWN	DOWN

Table D.2: OEM Modem Switch Settings for Dialup

Switch	Host	apC/8X
#9	DOWN	DOWN
#10	UP	UP
#11	UP	UP
#12	DOWN	DOWN
#13	DOWN	DOWN
#14	DOWN	DOWN
#15	UP	UP
#16	DOWN	DOWN

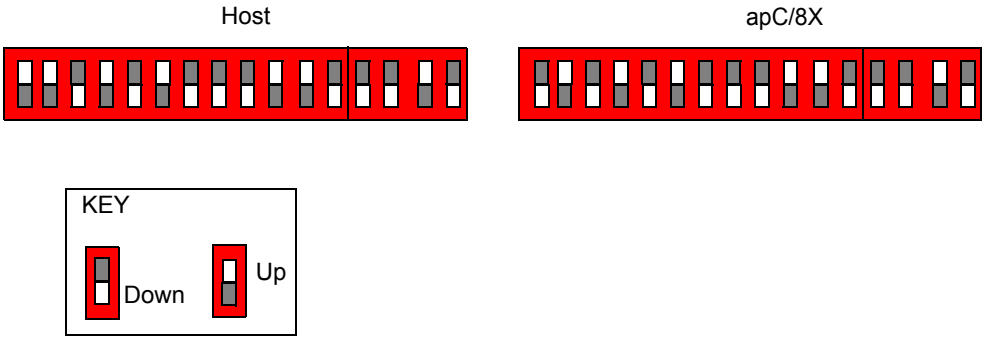


Figure D.1: Host and apC/8X Switch Settings

Host Computer Settings

The host computer should have these settings:

- Baud rate: 9600
- Bits: 8
- Parity: None
- Stop Bit: 1
- Flow Control: None

Note: Do not add or configure a modem from the Windows Control Panel. Use the Control Panel only to specify port settings.

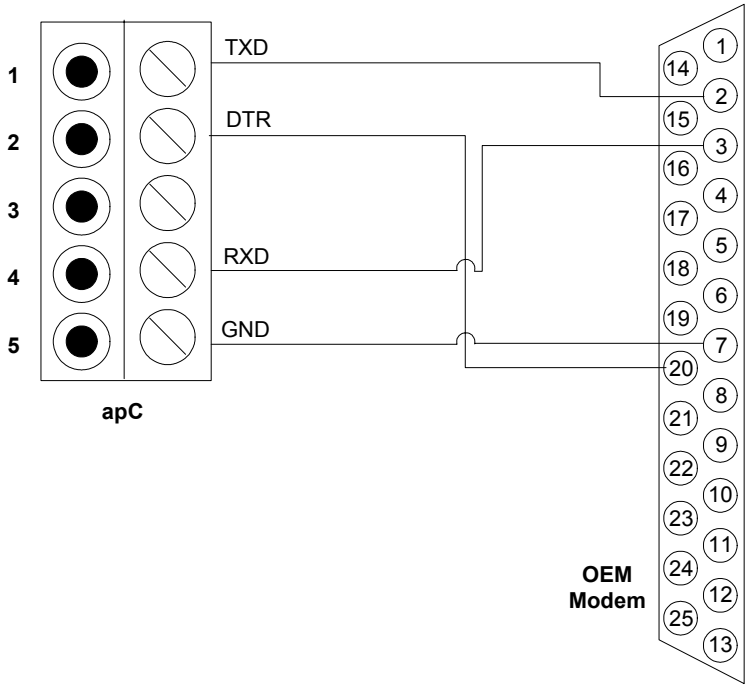


Figure D.2: apC/8X-to-Modem Wiring Diagram

OEM to Host Computer Cable Connection

Use an off-the-shelf straight-through modem cable (DB9-DB25 or DB25-DB25).

Configuring Non-OEM Modems with Software

The apC/8X automatically sets up modems that are configured using software commands, based on the modem's default settings. However, the default settings of some modems do not turn command echo off and enable DTR. This causes unpredictable behavior when the apC/8X is used in dialup mode.

To ensure proper operation with modems normally configured with software commands, you must program the modems manually at a terminal with the following Hayes Modem programming commands.

Table D.3: Hayes Modem Programming Commands

Use this command	For
AT&F <CR>	Recall factory defaults
ATE0 <CR>	Command echo off
AT&D2 <CR>	Enable DTR
AT&W <CR>	Save as the first user-defined configuration

Note: If your modem does not accept the Hayes Modem commands, consult the modem documentation for the equivalent commands.

Perform this procedure only once after installation, since the user-defined configuration will be restored with each power-up. Consult your modem documentation for more information about configuring your particular modem.

Configuring Modems for Use with Leased Lines

For use with a leased line, the apC/8X panel must be set for a direct connection instead of dial up. Set SW3-1 to ON, SW3-2 to OFF, and power on the apC/8X.

It is important to understand the decibel (dB) attenuation specifications of the leased line to be used. Depending on the proximity of the modem to the source of the leased line, there may be a requirement to attenuate or de-tune the signal strength. For details about attenuation requirements or "buildout," contact the provider /carrier.

Buildout is the amount of signal attenuation or resistance applied to the Leased Line. The shorter the distance between equipment, the stronger the signal and the greater the need for signal attenuation. The further the distance between equipment, the less attenuation is needed so a stronger signal can be received.

Figure D.3 shows some common scenarios. In most cases, if the modem is close to the source, it will have to attenuated by -15 db. If the modem is a long distance from the source, it will be attenuated by -9 db. These settings are available on the OEM MT2834BL modem using SW3.

Certain carriers have a weaker signal and must be attenuated at a different rate. In these cases, if the modem is a long distance away, the signal should not be attenuated at all. If the modem is very close to the source then it should be attenuated at -10 db rather than -15 db. The MultiTech MT1932BL provides these settings using SW3.

Note: The MT1932BL does not have the OEM firmware of the MT2834BL, and should only be used for leased line connections, not for dialup.

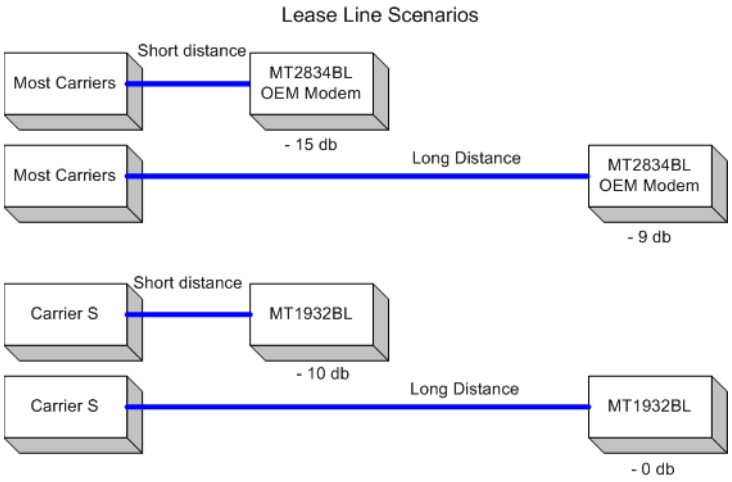


Figure D.3: Lease Line Scenarios

MT2834BL Series (OEM)

DIP-Switch #3 adjusts dB attenuation levels required by most lease line carriers. Set DIP-Switch #3 to the DOWN position to enable -9 dB attenuation. Set DIP-Switch #3 to the UP position to enable -15 dB attenuation.

-9dB attenuation = Switch #3 DOWN (Factory Default Setting)

-15dB attenuation = Switch #3 UP

MT1932BL Series (non OEM)

DIP-Switch #3 adjusts dB attenuation levels required by some lease line carriers. Set DIP-Switch #3 to the DOWN position to enable 0 dB attenuation. Set DIP-Switch #3 to the UP position to enable -10 dB attenuation.

0dB attenuation = Switch #3 DOWN (Factory Default Setting)

-10dB attenuation = Switch #3 UP

Table D.4: OEM Modem Switch Settings for 2-Wire Leased Lines

Switch	Host	apC
#1	DOWN	DOWN
#2	UP	UP
#3	DOWN	DOWN
#4	UP	UP
#5	DOWN	UP
#6	UP	UP
#7	DOWN	DOWN
#8	DOWN	DOWN
#9	DOWN	DOWN
#10	DOWN	DOWN
#11	DOWN	DOWN
#12	DOWN	DOWN
#13	UP	UP
#14	UP	UP
#15	UP	UP
#16	UP	UP

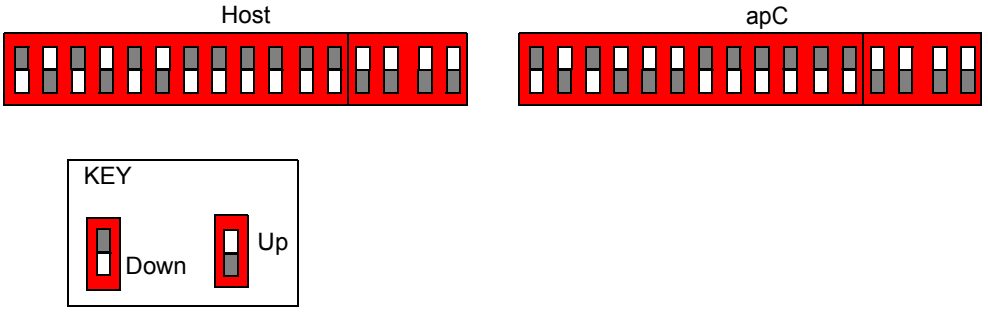


Figure D.4: Host and apC/8X Switch Settings for 2-Wire Leased Lines

Table D.5: OEM Modem Switch Settings for 4-Wire Leased Lines

Switch	Host	apC
#1	DOWN	DOWN
#2	UP	UP
#3	DOWN	DOWN
#4	UP	UP
#5	DOWN	UP
#6	UP	UP
#7	DOWN	DOWN
#8	DOWN	DOWN
#9	DOWN	DOWN
#10	DOWN	DOWN
#11	DOWN	DOWN
#12	DOWN	DOWN
#13	UP	UP
#14	UP	UP
#15	UP	UP
#16	DOWN	DOWN

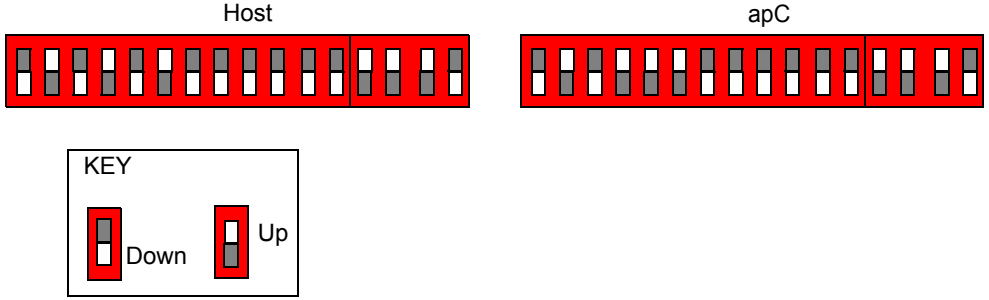


Figure D.5: Host and apC/8X Switch Settings for 4-Wire Leased Lines

OEM HyperTerminal Edits for 4-Wire Leased Lines

From a HyperTerminal session, type the following commands:

Note: You must switch DIP Switch #10 to the UP position for your HyperTerminal session to work properly. Ensure that after you make these changes, you return DIP Switch #10 back to the DOWN position.

It is normal to not see the commands as you type them. The only response you will see in your session is after you press <ENTER> following the list s-register command.

ALT6	**<ENTER>**	Lists the S-registers.

S0	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S13	S18	S19	S24	S25	S30
000	043	013	010	008	004	055	004	006	007	080	037	030	001	020	000	000

ATS18=0	**<ENTER>**	Sets the ATS18 Register to 000
ATS19=0	**<ENTER>**	Sets the ATS19 Register to 000
AT&W	**<ENTER>**	Stores the changes you just made to the Registers
ATL6	**<ENTER>**	Verify your 18 and 19 Registers are now "000"

S0	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S13	S18	S19	S24	S25	S30
000	043	013	010	008	004	055	004	006	007	080	037	000	000	020	000	000

E

Packing and Shipping apC/8X Boards

This appendix contains instructions for Authorized Dealers and Distributors to pack and ship apC/8X boards for repair, advance replacement, or credit.

In this Appendix:

- Request an RMA number
- Information for Material Support Center.
- Complete and RMA form and pack boards.
- Use RMA number for reference.

Process for Returning Boards

For Authorized Dealers and Distributors only.

If you are an authorized dealer or distributor, follow this process to pack and ship apC/8X boards for repair, advance replacement, or credit only. Do not include enclosures.

Request an RMA Number

1. Before packing and shipping apC/8X boards, request a Return Merchandise Authorization (RMA) number. Packages that are not marked with an RMA number may be refused and returned to sender.
2. To request an RMA number, contact the Software House Material Support Center.

   Telephone: **800-507-6268, Option 1**

Information for Material Support Center

3. When you call the Material Support Center, please have available:
   - Company name (Authorized Dealers or Distributors only), Account number, Phone number, FAX number, Contact name (Person requesting the return).
   - Reason for the request – Repair, Advance Replacement, or Credit.
   - Model number, Serial number, original Purchase Order number or Sales order, Description, Quantity, Problem reported.
   - PO number to cover any non-warranty repairs, even if the unit is under warranty.
   - Bill To address, Ship To address, and Shipping Method.
4. Complete a Return Merchandise Authorization form and fax it to Material Support Center who will provide an RMA number and shipping labels.

Pack Boards and Attach Shipping Labels

5. After receiving the RMA number and shipping labels, pack the board(s) carefully to avoid damage in transit. Make sure the outside of each package is clearly marked with the RMA number assigned to you by the Material Support Center.

Use RMA Number for Reference

6. Reference the RMA number in all communications about the returned equipment.

Caution: The printed circuit boards inside the apC/8X unit can be damaged by static electricity. When handling boards:

– Make sure your work area is static safeguarded.
– Transport all apC/8X components in static shield containers.

F

Templates and Technical Drawings

This appendix contains the following templates(NEED updated info)??:

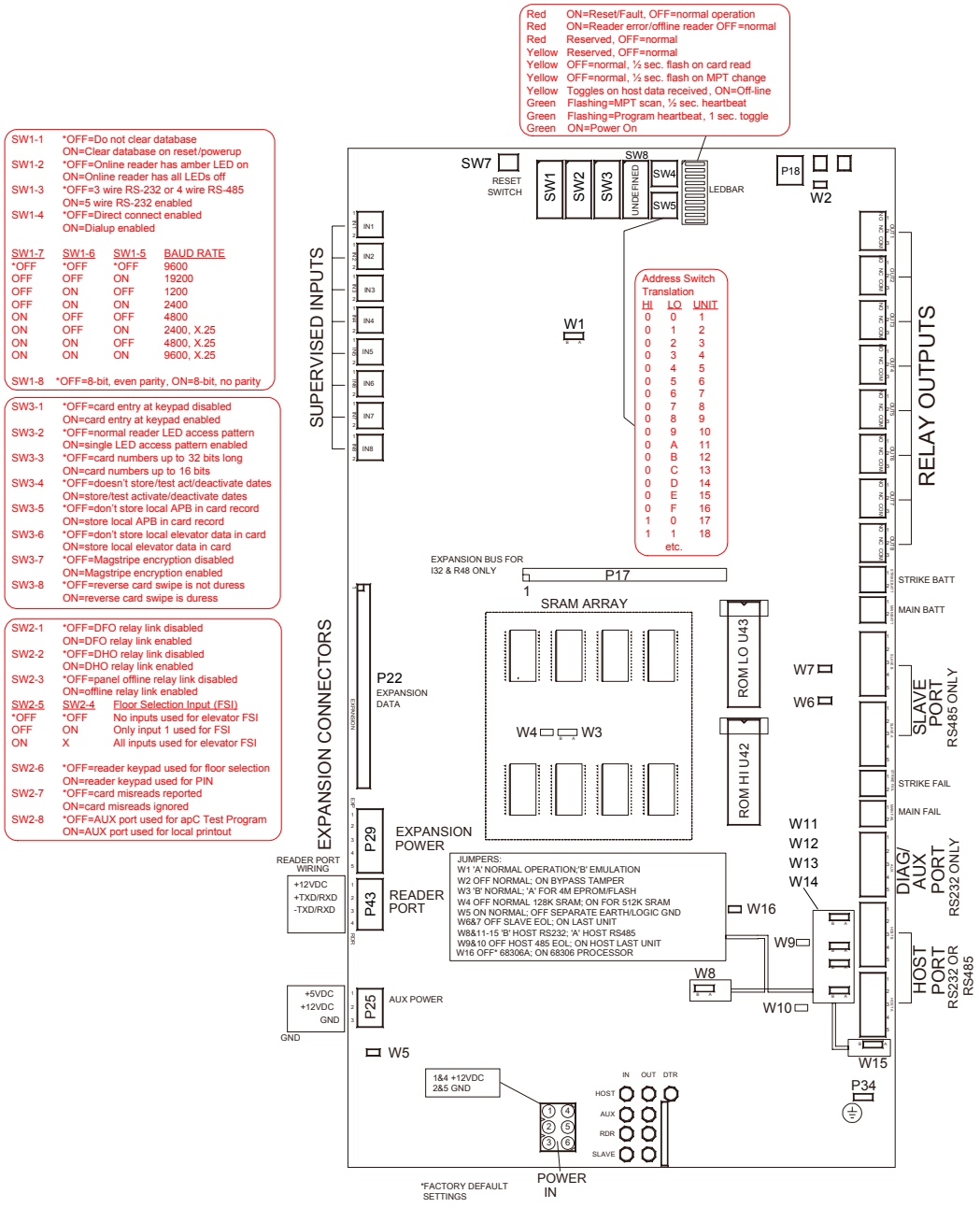


Figure F.1: apC/8X Template

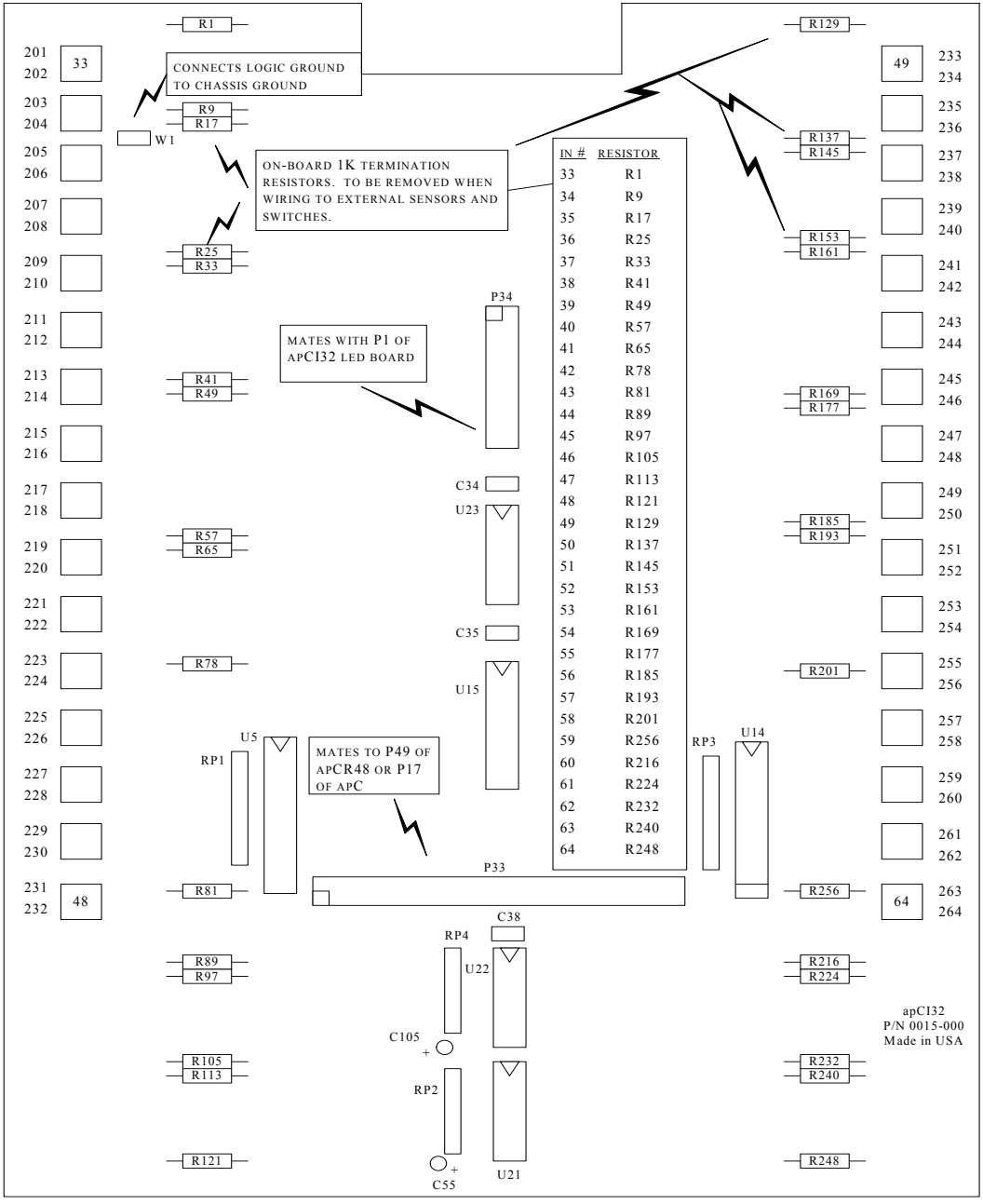


Figure F.2: apC I/32 Supervised Input Module

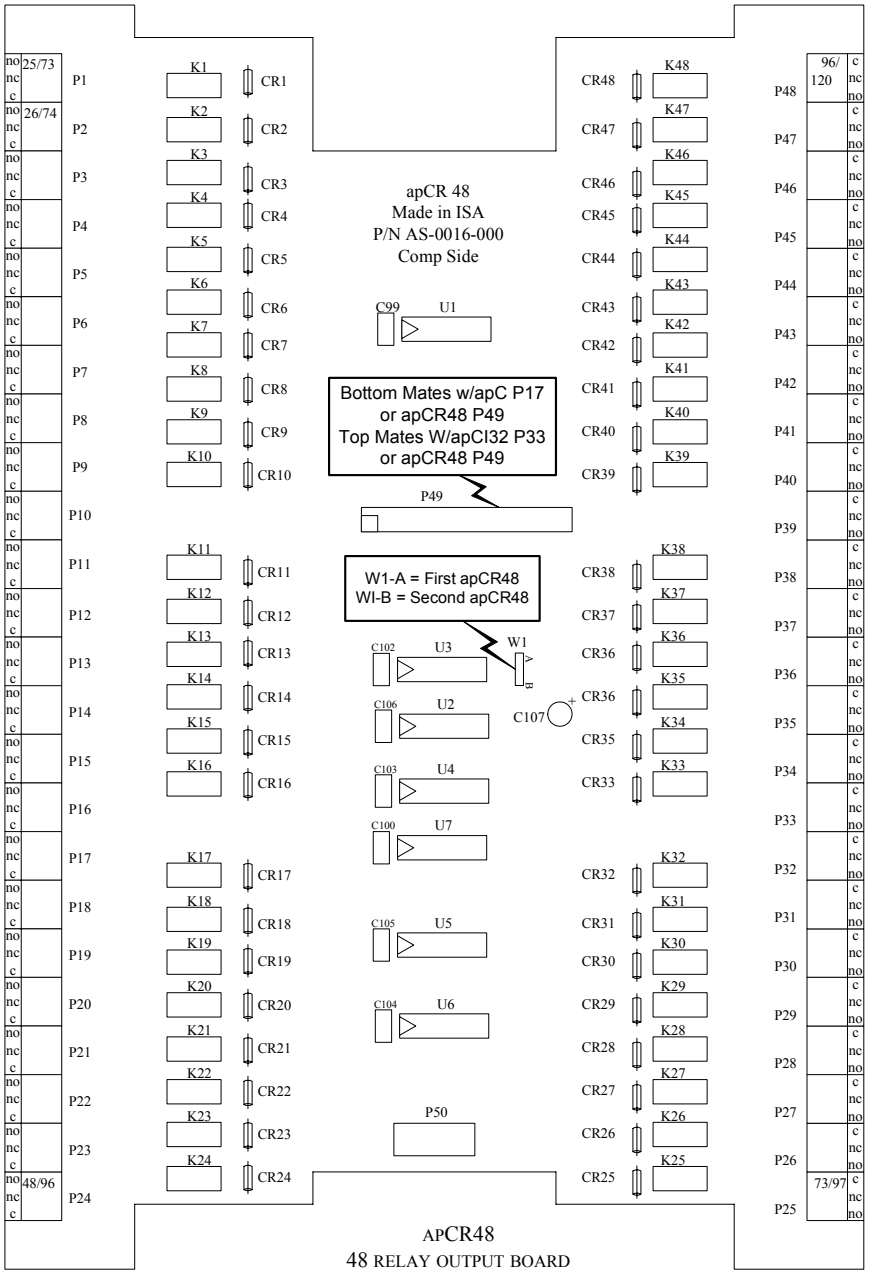


Figure F.3: apC R/48 Relay Module

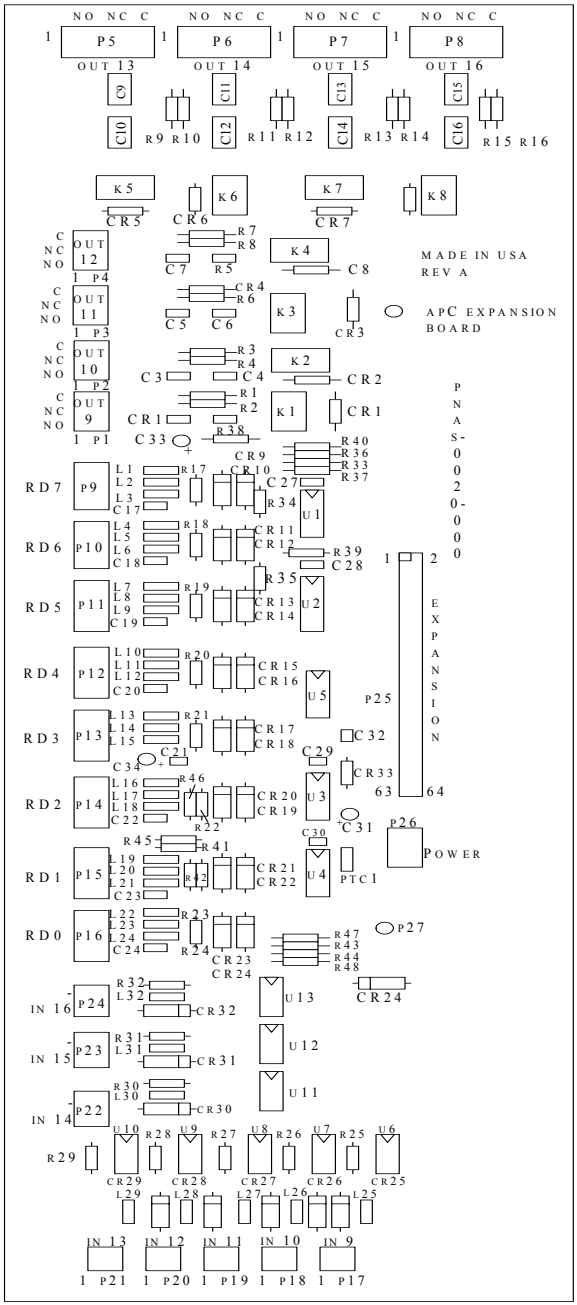


Figure F.4: apC Star Coupler

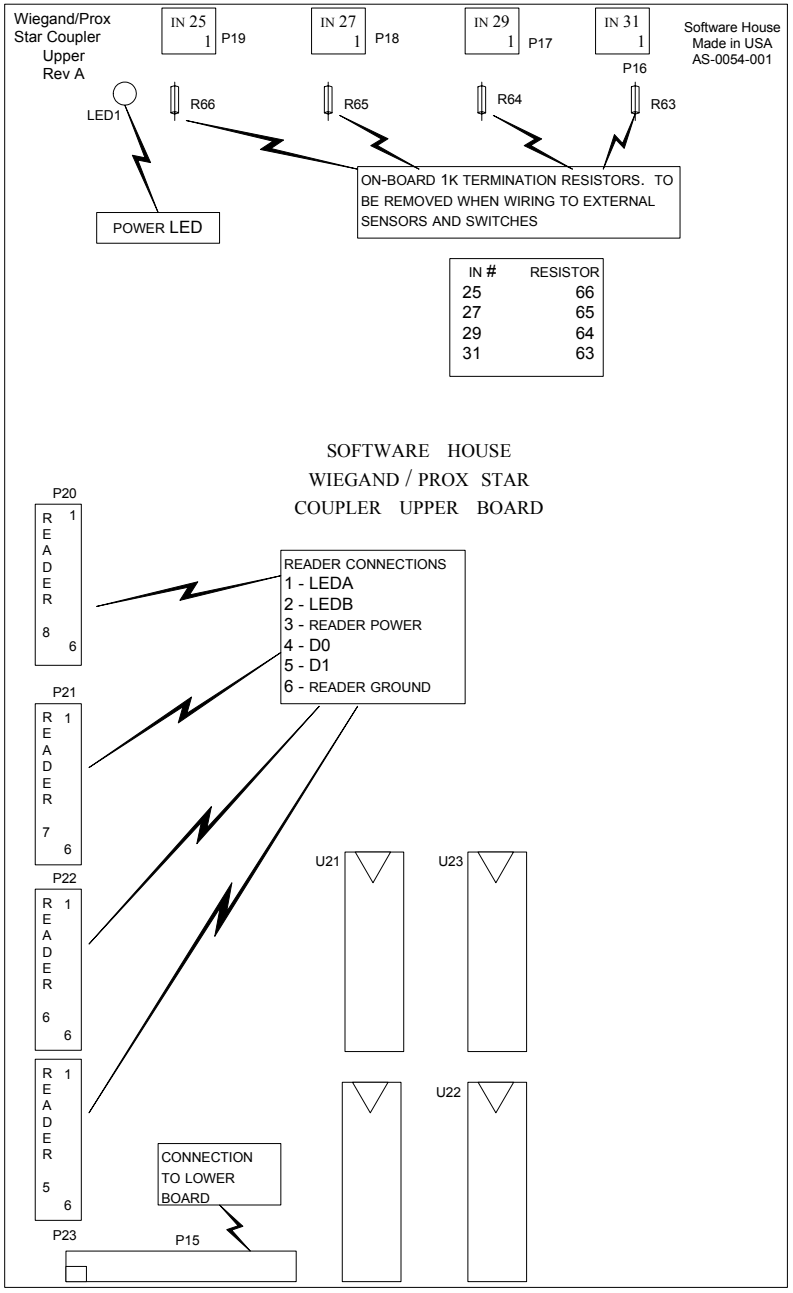


Figure F.5: Wiegand/Proximity Star Coupler (Upper Board)

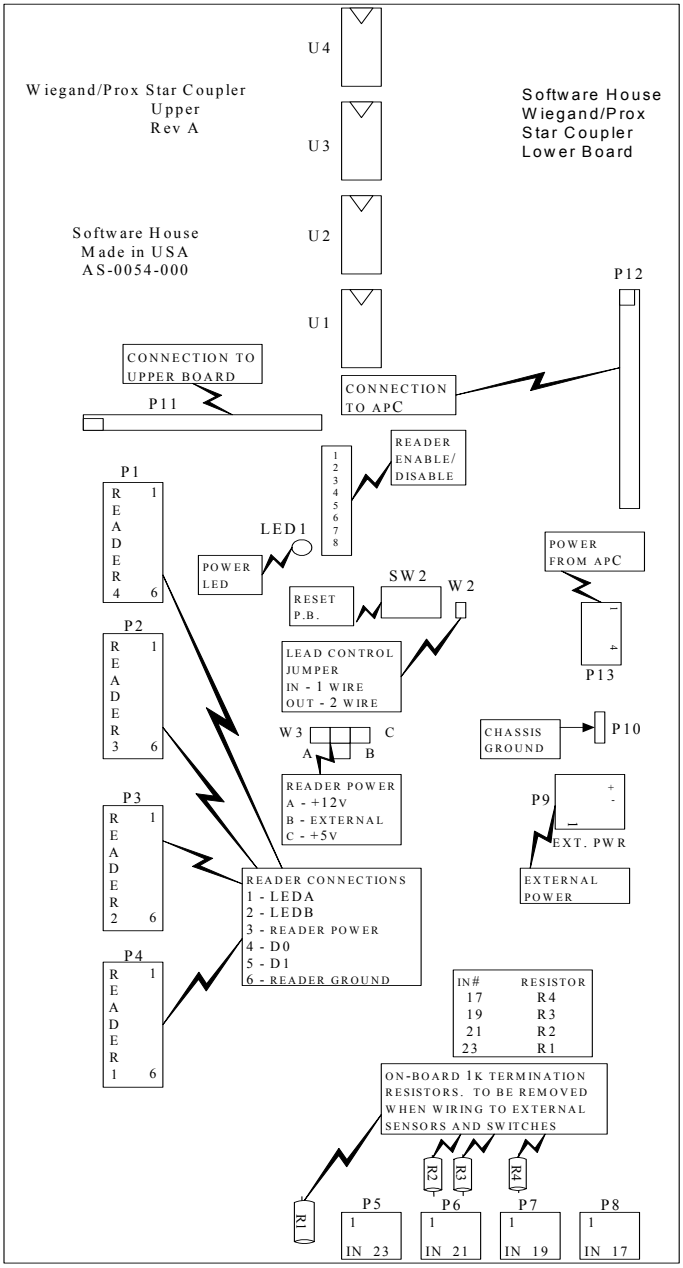


Figure F.6: Wiegand/Proximity Star Coupler (Lower Board)

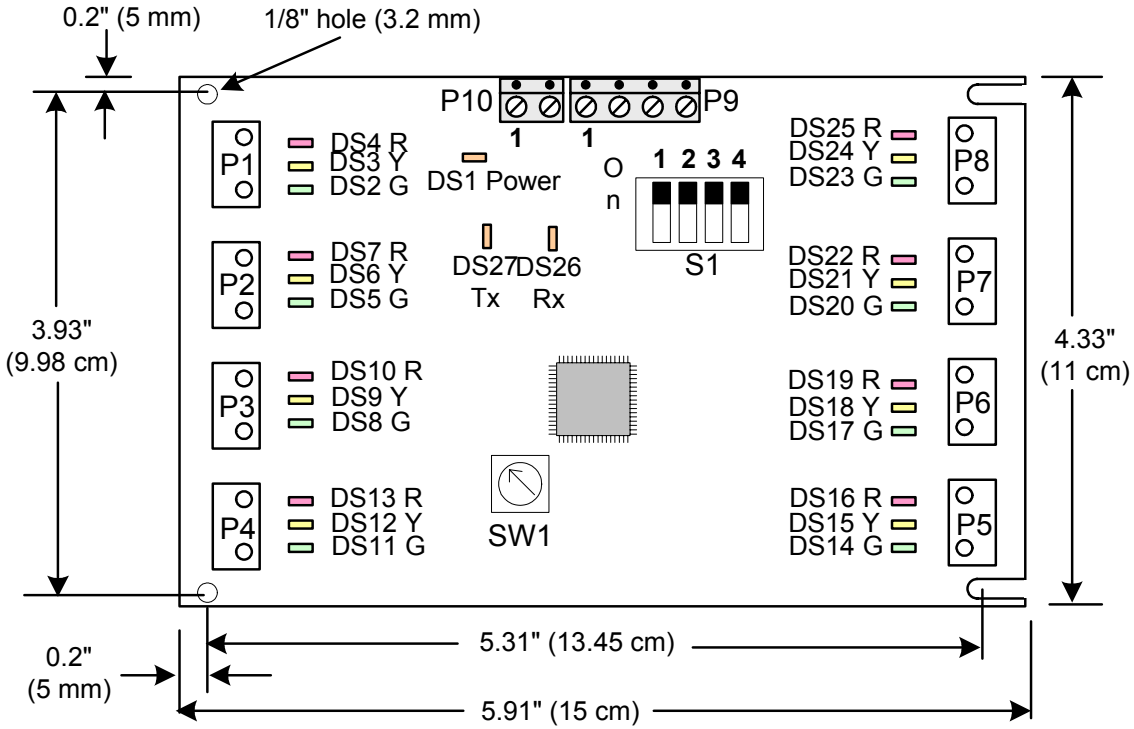


Figure F.7: Input Bus Module

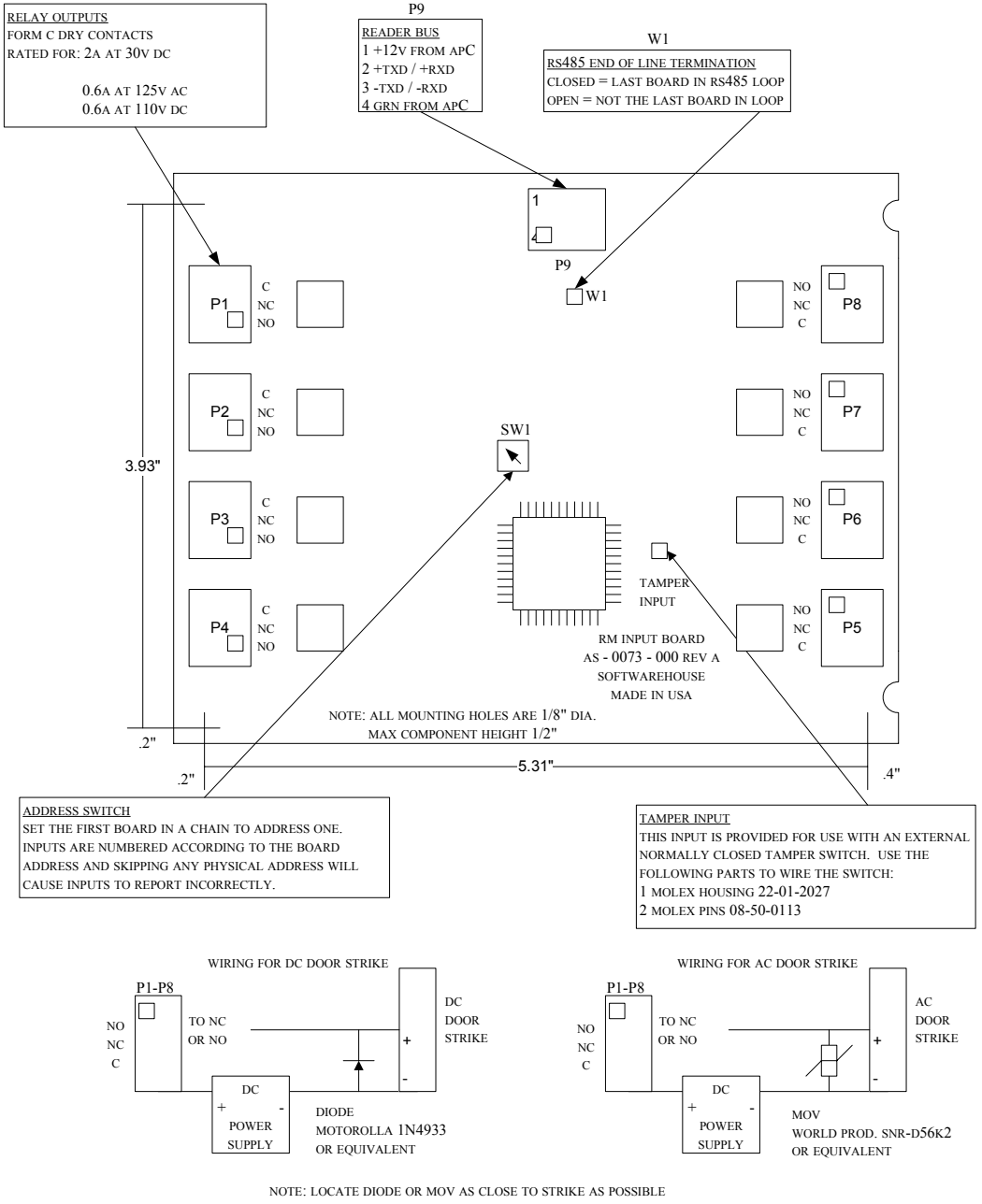


Figure F.8: Output Bus Module

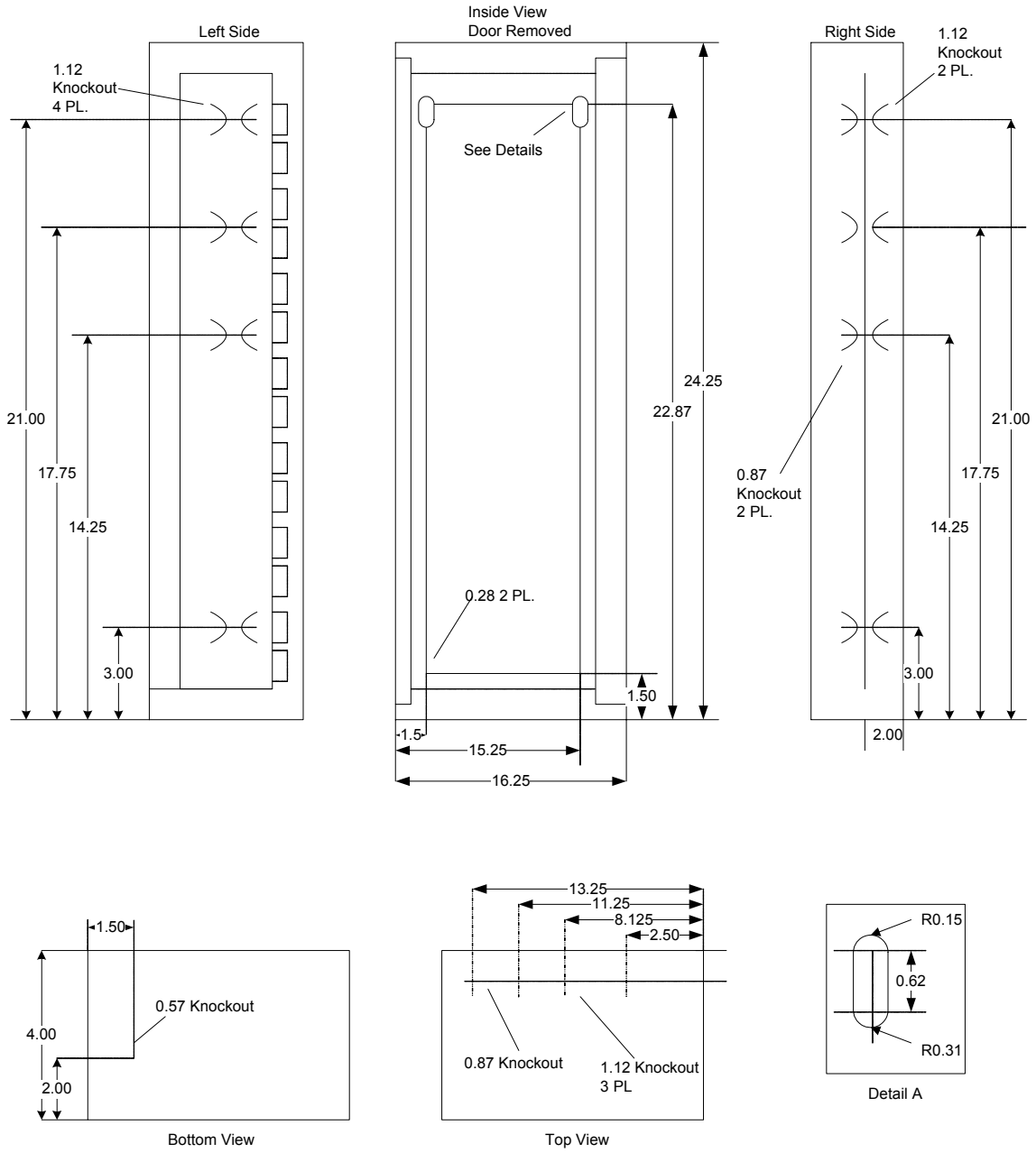


Figure F.9: apC/8X Housing

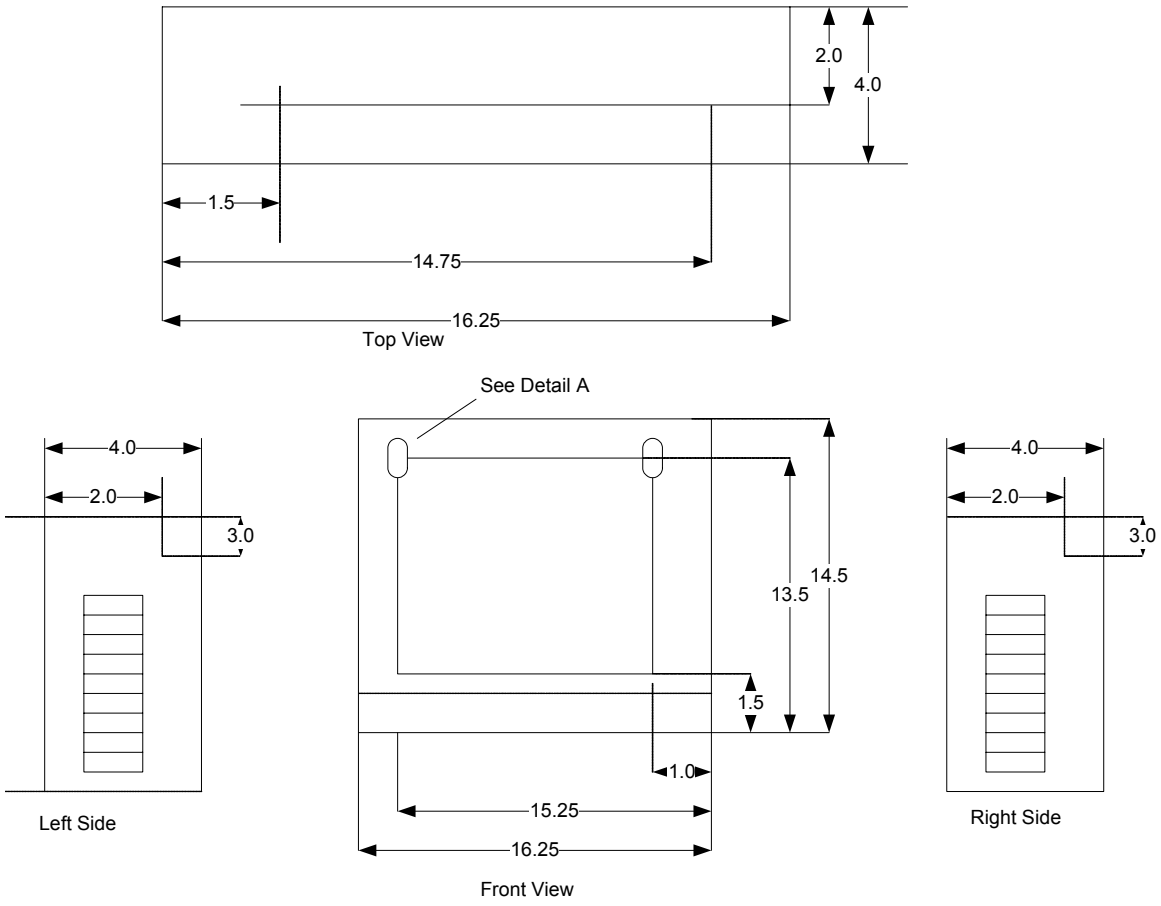
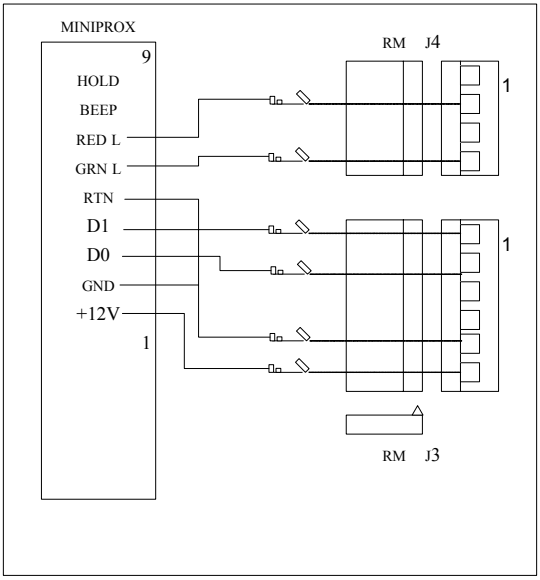
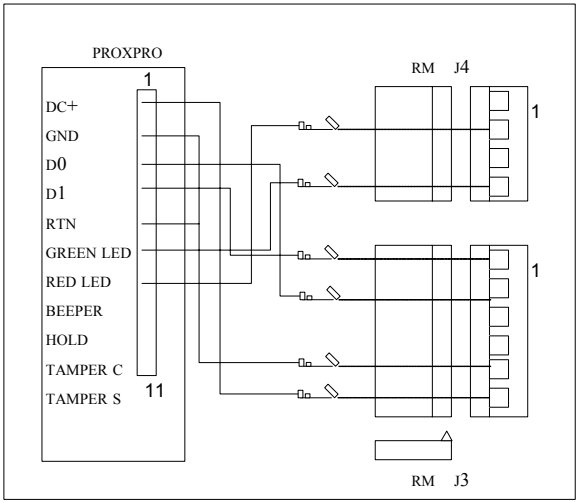
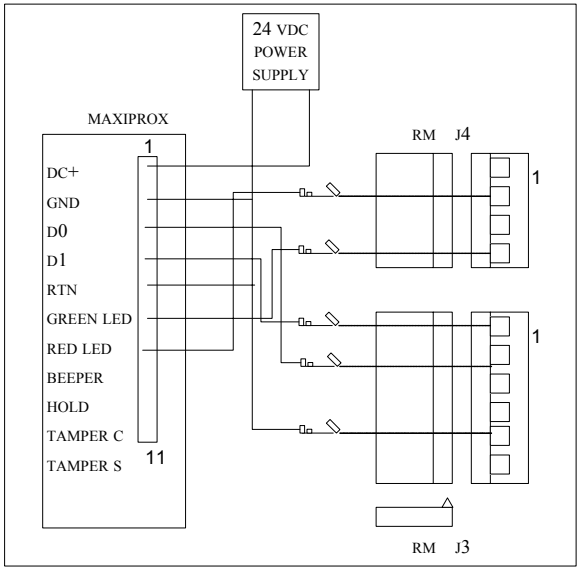


Figure F.10: apS Housing







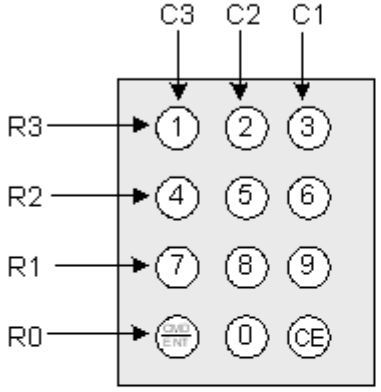
NOTES:
THE MINIPROX AND PROXPRO CAN EACH DRAW 175MA MAX. DEPENDING ON YOUR SYSTEM CONFIG., THIS MAY EXCEED THE APC'S POWER SUPPLY RATING AND EXTERNAL POWER MAY BE REQUIRED FOR THE READERS.

THE MAXIPROX NEEDS AN EXTERNAL 24VDC LINEAR POWER SUPPLY WITH A COMMON GROUND TO THE RM-4 AND MAXIPROX.

Figure F.11: Wiegand/Proximity Wiring to the RM-4

RM-4 Keypad Wiring

A typical keypad matrix is shown below. To avoid confusion we are now labeli
axes as rows (***R0-R3***) and the vertical axes as columns (***C0-C3***).



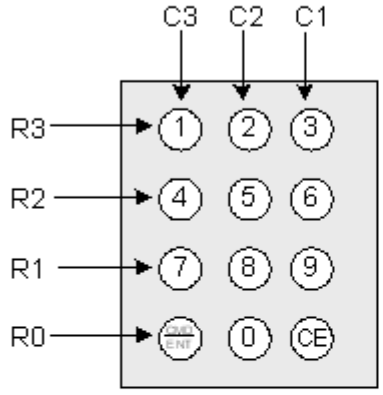
Wire a 4 x 4 or 3 x 4 matrix keypad as shown below.
If a 3 x 4 matrix is used, Pin 4 (C0) is not used.

	RM Reader	HID	Motorola Indala	CardKey	Xetron
J2-1	C3	7	1	2	Black
J2-2	C2	6	2	3	Green
J2-3	C1	5	3	7	Purple
J2-4	-	-	-	-	-

Figure F.12: Keypad Connections (RM-4)

RM-4E Keypad Wiring

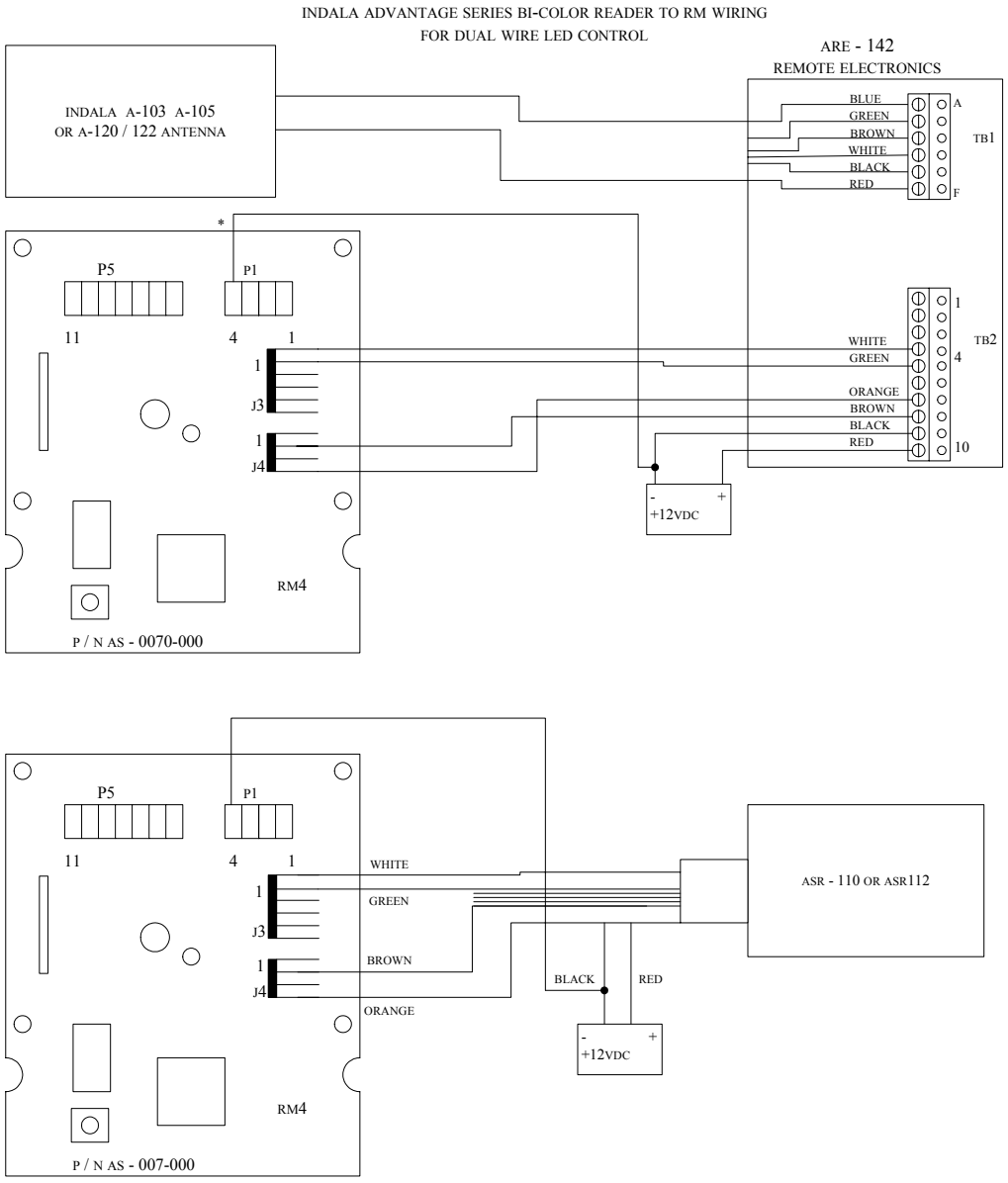
A typical keypad matrix is shown below. To avoid confusion we are now labeli
axes as rows (***R0-R3***) and the vertical axes as columns (***C0-C3***)



Wire a 4 x 4 or 3 x 4 matrix keypad as shown below.
If a 3 x 4 matrix is used, Pin 5 (C0) is not used.

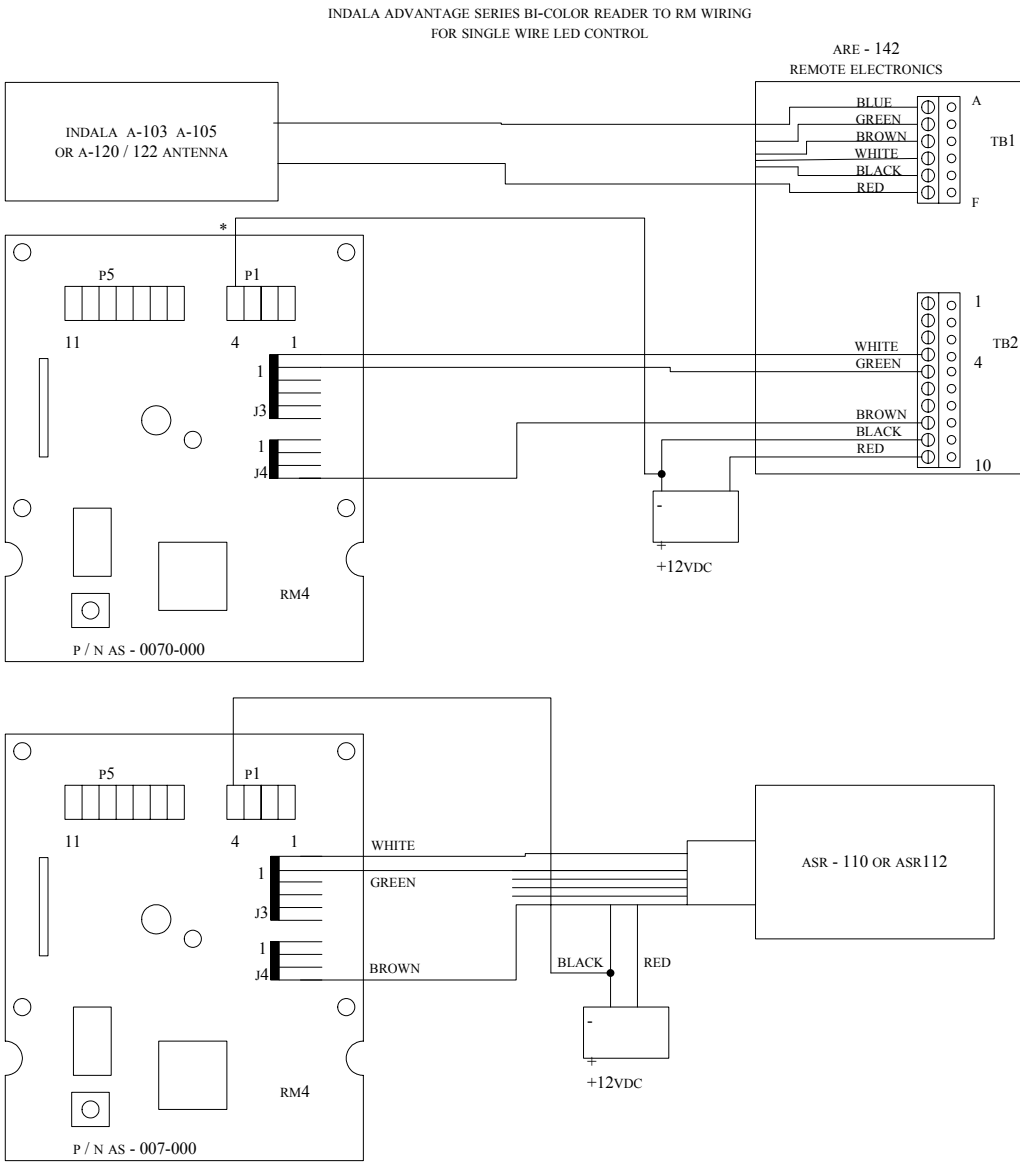
	RM Reader	HID	Motorola Indala	CardKey	Xetron	
J2-1	R0	4	7	4	Yellow	
J2-2	R1	3	6	6	White	
J2-3	R2	2	5	9	Orange	
J2-4	R3	1	4	1	Blue	
J2-5	-	-	-	-	-	

Figure F.13: Keypad Connections (RM-4E)



NOTES:
1. RM AND ISOLATED POWER SUPPLY MUST HAVE COMMON GROUND
2. SHIELD SHOULD BE CONTIGIOUS AND TIED TO A PROPER EARTH GROUND AT THE DPC / APC
3. THE LED IS NORMALLY OFF AND SHOWS GREEN FOR A VALID ACCESS AND RED FOR ACCESS DENY
*GROUND CONNECTION MAY BE MADE AT EITHER P1 - 4 OR J3 - 5

Figure F.14: Indala Two Wire LED Control Wiring



NOTES:

1. RM AND ISOLATED POWER SUPPLY MUST HAVE COMMON GROUND
2. SHIELD SHOULD BE CONTIGIOUS AND TIED TO A PROPER EARTH GROUND AT THE DPC / APC
3. IN THE CONFIGURATION SHOWN, THE LED WILL BE RED AND FLASH GREEN ON A VALID ACCESS

*GROUND CONNECTION MAY BE MADE AT EITHER P1 - 4 OR J3 - 5

Figure F.15: Indala Single Wire LED Control Wiring

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