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SAFETY PRECAUTIONS

A number of safety precautions appear in various paragraphs on the following pages.   A summary of those precautions are repeated below for emphasis:

CAUTION

If any damage to the shipment is noticed, a claim must be filed with the commercial carrier responsible.

CAUTION

Several important procedures should be followed to prevent electro-static discharge (ESD) damage to sensitive CMOS integrated circuits and modules.

- All transport of electronic components, including completed reader assemblies, should be in static shield packaging and containers.

- Handle all ESD sensitive components at an approved static controlled work station. These work stations consist of a desk mat, floor mat and a ESD wrist strap.   Work stations are available from various vendors including the 3M company.

WARNING

Power should not be applied to the system until after the

installation has been completed. If this precaution is not observed, personal injury or death could occur, and the equipment could be damaged beyond repair.

WARNING

Verify that the external circuit breaker which supplies power to the device power supply is turned off prior to installation.

WARNING

Verify that the output voltage of the power supply is within specifications prior to connection to the device.

WARNING

This equipment generates, uses, and can radiate radio frequency energy.   If not installed and used in accordance with the installation and operating manuals, it may cause interference to radio communications.

Operation of this equipment in a residential area may cause interference.   In this case, the user will be required to take necessary measures to correct the interference (This warning is provided as required by federal law).

Section 1   Unpacking

1.1   General

This section provides a step by step procedure for unpacking, inspecting and returning equipment.

1.2   Unpacking Procedure

CAUTION

If any damage to the shipment is noticed before unpacking, a claim must be filed with the commercial carrier.

All containers should be opened and unpacked carefully in order to prevent damage to the contents.

The following steps are used to unpack equipment in preparation for installation:

1. Open the container and remove the unit(s) and all packing material.   Retain the container and all packing materials. They may be used again for re-shipment of the equipment, if needed.

2. Inspect the contents for shortage.   If items are missing, contact the order entry department.

3. Visually check contents. If damage is discovered, perform the following:

a. If damage was caused by shipping, claim must be filed with the commercial carrier.

b. If any other defect is apparent, call for return authorization.

1.3   Shipping Instructions

The following steps are used to ship any equipment:

1. Contact the customer service department prior to returning equipment. When you call, please have available:

   a. A description of the problem or reason you are returning the equipment.

   b. Your original purchase order number, invoice number, and if the unit is still under warranty.

   c. A new purchase order number if the unit is not under warranty

2. Obtain the Return Authorization Number (RMA) from the customer service department.

3. Show the RMA number on all packages shipped. Packages which are not marked with an RMA number will be refused at the factory and returned to you - COD.

4. Carefully pack the equipment prior to shipment.

Section 2   Introduction

2.1   Overview

The N-450 standalone access controller accommodates up to 1000 sequentially numbered magnetic stripe cards and personal identification numbers (PINs), or up to 100 randomly numbered credit cards (or PINs). It provides time zone control of access with its battery-backed real time clock, and provides a serial printer interface for configuration and event logging. A 'Help' text printout is available to aid the user in configuration.

The card reader contains the electronics for reading magnetic stripe cards, and interfaces to a 12 position **(0-9, CLR, ENT)** keypad which is used for access requests and programming. The N-450 senses door contact, exit push button, reader tamper and an auxiliary alarm input. It outputs control lines for the electric door strike and an auxiliary output. The AUX output can be used for a local door alarm, to arm/disarm another alarm system, or for any other output functions. Each output control line can drive an N-450-RK relay module (SPDT 5A contacts).

2.2   Reader Description

The N-450 is housed in a small, rugged, attractive, cast aluminum bezel and contains read head electronics, micro controller, non-volatile memory,

IO control electronics, and a 12 character raised membrane keypad with tactile and audio feedback. The bezel features wide lead-ins for easy card entry. Cards may be swiped top-to-bottom or bottom-to-top. A voltage regulator in the N-450 allows operation from +6 to +24 volts dc.

The N-450 reads an encoded card, accepts a PIN input from the keypad, then examines its database to validate the input. If access is granted, the reader performs its programmed function.

The N-450 provides the following features:

- Wide input voltage range (+6 to +24 Vdc)

- Low power/surface mount
- 1 million pass read head, standard
- Small, rugged, die cast aluminum (mullion mount)
- Complete array of coordinated mounting hardware
- Mounts with security screw/tamper switch
- Attractive, weatherized finishes
- 3 LEDs for access and reader status
- 12 position keypad with audible feedback
- Real time clock with battery back-up
- RS-232 printer interface
- 'Help' text printout available
- Support credit cards or Northern supplied high coercivity magnetic stripe cards
- Bi-directional swipe

- 1000 sequential/100 random or credit cards
- 4 time zones/7 access levels
- 20 holidays
- Monitors and reports reader tamper/door alarm
- Output for door strike/output for auxiliary use
- Non-volatile memory for card/PIN storage
- Installs with plug-in connectors

Section 3   N-450 Installation

3.1   Guarding Against Lightning Damage

Lightning can cause serious damage to electronic equipment. The following guidelines minimize the risk of lightning damage to the equipment.

- DO NOT run wires across or near any lightning rod grounding wires. AVOID running wires near any cable or wires connected to an outside TV or radio antenna.
- Ground the case of the N-450 reader as shown in Figure 91.
- The following list of ground choices are in descending order of preference:

  1. An 8-foot (2.5 meters) copper rod driven into the earth near the equipment.

  2. A copper cold water pipe. The pipe must not be isolated by plastic coupling. DO NOT use radiator, plastic plumbing, or hot water pipes.

3. The AC electrical system ground wire.

- Use copper wire of 16 AWG minimum for grounding.
- Minimize ground wire length and choose a ground location as near the equipment as possible.
- Follow installation procedures from the manufacturer when using MOVs or spark gap devices for protection.

3.2 Installation Site Preparation

Before installation of the N-450 reader and the door hardware, the installer must first prepare the site. The following steps are involved in the preparation:

1. Determine the exact location where the N-450 is to be installed (See Figure 32).

2. For in-wall mount, cut a hole on the wall to mount an 1-gang junction box.

3. Cut a hole in the door jamb or door to mount the door strike.

4. Install the door contact monitor switch.

5. Install the exit push button.

6. Mount the N-450-RK Relay Module(s) as close to the load as practicable.

3.3 Junction Box Installation

Cut a hole 2-1/8 inch by 4-1/2 inch (54 mm x 114mm) on the wall. The installer must ensure that the hole cut is not larger than the N-450 back plate. One side of the junction box should be against a wall stud so that the junction box can be fastened to the stud. (Refer to Figure 91)

3.4 Back Box Installation

The N-450-SMB surface mount enclosure is designed for mounting a reader on concrete, stone or masonry surfaces. Knockouts for 3/4" conduit are provided on the top and bottom. See Figure 90. Fasten the enclosure to the surface with appropriate hardware.

3.5 Adapter Plate Installation

The N-450-MP is a brushed finish stainless steel plate which is used for mounting a reader to a single-gang electrical box. The plate covers the J-box opening. See Figure 91.

3.6 Weather Shield

Use the N-450-WP-3 metal weather shield, N-450-WP-1, clear Plexiglas weather shield, or N-450-WP-2 smoked Plexiglas shield, to protect the reader from rain, ice, and snow.

For in-wall mount, the reader mounting bracket, adapter plate, and weather shield are mounted together onto the junction box.

When used for surface mount, the reader mounting bracket, back box, and weather shield are mounted together onto the wall, using appropriate anchors. Drill mounting holes in the weather shield as required.

Apply weather-stripping and or sealant between the weather shield and the mounting surface to seal out moisture from the mounting holes and the cable access hole.

WARNING

Power should not be applied to the reader until after the installation has been completed. If this precaution is not observed, personal injury or death could occur, or the equipment could be damaged beyond repair.

WARNING

Verify that the external circuit breaker which supplies power to the reader power supply is turned off prior to installation.

WARNING

Verify that the output voltage of the reader power supply is within specifications (+6 to +24 Vdc) prior to connection

to the reader circuit board.

3.7   Wiring

All wires are terminated on pluggable, screw-type, connectors (J2, J3, J4), which accept wire from 28 to 18 AWG. Refer to Figure 92.

3.7.1   Reader Power Wiring

The N-450 reader is powered by a +6 to +24 Vdc regulated source. Pull a twisted pair for the reader power. Wire the input power to the reader as indicated.

Do not apply greater than 28 Vdc or any AC voltage to the reader !

3.7.2   Door Hardware Wiring

Pull cable (NC2441/PK or NCP2441/PK) from the door hardware to the reader as follows:

1.   Pull twisted pairs (200 feet maximum) for the door contact (normally closed), exit push button (normally open), and aux input (normally closed), if used.

   Connect the wires as shown in Figure 92.

2. Pull wires for the door strike control and AUX Output (200 feet maximum).

3.7.3   Serial Printer Wiring

Connect the printer as shown in Figure 92.

Section 4   Operation

The N-450 operates either in one of its access control modes or in the programming mode. The operation of the N-450 in its access control modes is described in this section. The N-450 provides audible and visual indication of its operating status and user feedback.   (See Figure 93)

4.1   Making an Access Request

Access may be requested by reading a card when the red LED is flashing. The card is read by swiping it through the reader slot, top to bottom or bottom to top, with the magnetic stripe on the right side.

Access may be requested by entering a PIN while the yellow LED is flashing. A 15 second inter-digit timer is used to terminate an abandoned PIN entry attempt. The normal PIN entry is terminated by depressing **ENT**. Leading zeroes are automatically added by the reader if fewer than 4 characters are entered. The **CLR** key may be used to clear an erroneous entry.

Card or PIN access mode is indicated by the red and yellow LEDs flashing.

The red LED flashes in **Card and PIN** access mode until a valid card is read. The request for the PIN is signalled by a double beep (beep-beep) of the buzzer and by flashing the yellow LED.

4.1.1   Indicators when an Access Request is Granted

Access granted is indicated by a short and a long tone (beep-beeeep) of the buzzer and by flashing the green LED for 1 1/2 seconds. The door strike control and the AUX output is activated for the programmed time.

4.1.2   Indicators when an Access Request is Denied

The denial of an access request is indicated by three short tones (beep-beep-beep) and by the red LED turning ON for 1 1/2 seconds.

Section 5   Access Modes

The N-450 standalone card reader operates in one of five access modes, each requiring a different form of identification before granting access. The initial access control mode (after a power-up) is **Card Only**. The mode may be changed after power up by operator commands from the reader keypad.

5.1   Card Only

An access request is made by swiping a card through the reader. The data is verified against the N-450 database to ensure that it has a valid Facility Code and Card Number.

5.2   Card or PIN

Access requests are made either by swiping a card or by keying in a PIN. A card entry is processed as in **Card Only** access mode (Facility Code is tested).

When the access request is made by entering a PIN, the entry is verified against the database. There is no Facility Code test. (Convenient when high security is not required).

5.3   Card and PIN

A card must be read to start the access request. If the card is valid, the user is prompted to enter his PIN. The request is granted only if the card and PIN match. (This mode provides the highest security - rejecting lost/stolen/counterfeit cards). This mode is available in Sequential Mode only.

5.4   Facility Code Only

An access request is made by reading a card. The data is then verified to lie within the range of valid Facility Codes. The identification number, however, is not tested.

5.5 Unlocked

Access is not restricted. The door strike is activated and the door alarms are internally suppressed during this mode.

NOTE : The Exit Push Button operates in all modes except during a one minute delay after a reader tamper.

Section 6   Configuration

DIP switch SW2 (see Figure 91) configures the reader power-up modes. The switch settings specify the Cards Mode, the Power ON Reset Mode, and the printer communication parameters, as shown in the following table (0=OFF, 1=ON, X=Don't Care):

USED FOR	8	7	6	5	4	3	2	1	COMMENT
Card Mode								0	Random
								1	Sequential
Power on Reset Mode							0		No Reset
							1		Reset
Printer Baud Rate					0	0			1200
					0	1			2400
					1	0			4800
					1	1			9600
Printer Control				0					XON/XOFF
				1					Control Line
Not Used	x	x	x						

6.1   Cards Mode

DIP switch position 1 OFF selects Random cards (up to 100 bank or ATM cards or PINs), position 1 ON selects the Sequential cards mode.

6.2   Power ON Reset

When DIP switch position 2 is ON during power-up, all database entries are deleted and all configuration parameters are reset to their default values as shown:

Reader Number	0
Password	1 2 3 4 5 6
AUX Password	0
Access Mode	Card Only
Strike Time	5 Seconds
Held Open Time	15 Seconds
AUX Out Time	15 Seconds
APB Delay	0
Starting Card No.	0
Access Level	0
Offsets	0
Length of Card	0
Length of FC	0
Printer Mode	0
AUX Mode	1

6.3 Printer Baud Rate

Use positions 3 and 4 to configure the required Baud rate.

6.4 Print Control

DIP switch position 5 OFF selects XON/XOFF (software) control of the printer, position 5 ON selects a hardware control line (CTS) from the printer to control the printout.

6.5 Initial Configuration

The following sequence should be observed:

1. With power Off, set SW2 position 2 to ON. Set the other switches to their desired positions.

2. Apply power; wait 3-5 seconds.

3. Remove power

4. Set DIP switch position 2 to OFF.

5. Mount the reader

6. Apply power

7. Set the Password (Command 4)

8. Execute all required commands.

9. Printout configuration (command 70). Check for and correct errors.

10. Add Cards

11. Printout database (Command 70). Check and correct.

12. Exit Programming Mode (Command 0).

Section 6.6 Mounting the Reader

Fasten the mounting bracket (slotted hole down) to the selected surface. Align the bracket then tighten down the mounting screws. The ground wire is installed on the top mounting bracket screw.

Verify that the DIP switches are configured as required (Section 6) and that all wiring is in place and securely connected. Neatly fold back all excess cable into the wall or box.

Verify reader operation (Section 8), then continue.

Hook the reader's mounting flange over the top tab of the mounting bracket, then push the reader flush against the mounting surface. Tighten down the security screw at the bottom of the reader to fasten the reader in place.

Section 7   Programming

The Programming Mode is selected by pressing **CLR**, then pressing **ENT** within 1 second. A double beep is sounded and the yellow and green LEDs flash, waiting for entry of the password (default password is **1 2 3 4 5 6**). Key in the password, then

press **ENT**. If the password is correctly entered, the green LED is turned ON and the yellow LED is set to flashing.

A one minute timer, restarted after each command entry, is used to automatically exit the programming mode if no key activity is detected.

Commands are input from the keypad as one or two digit codes, followed by **ENT**. Upon successful completion of a command, the 'good tone' (beep-beeeep) is sounded and the program returns, awaiting entry of the next command. If not successful, the 'bad tone' (beep-beep-beep) sounds and the program also returns.

The available commands are listed below:

- **0** **Exit Programming Mode:** Log-off, resume access control.

- **1** **Print 'Help' Text:** The N-450 prints out a brief synopsis of all available commands.

- **2** **Set Reader Number:** Input a number (0-9), then press **ENT**. The **Reader Number** is the first digit printed in each line of event, configuration, and database printouts.

- **4** **Set Password:** Key in up to a 6 digit password, then press **ENT**. A double beep (beep-beep) is sounded. Key in the same password, again followed by **ENT**. The 'good

tone' sounds if the password is accepted. The 'bad tone' sounds if the password is not accepted.

5   Set Secondary Password :   The secondary password toggles the AUX Output. This can be used as a remote control for a variety of functions, controlling HVAC, or other security systems, for example.

The secondary password would normally be used when in AUX mode 2, with the AUX Out Time set to 0. (refer to commands 71 and 22).

Input the secondary password as was done for the primary password (command 4).

10   Set the access mode to **Card Only**.

11   Set the access mode to **Card or PIN**.

12   Set the access mode to **Card and PIN.** (Sequential Mode only)

13   Set the access mode to **Facility Code**.

14   Set the access mode to **Unlocked**.

NOTE :   Access mode changes may be delayed for up to 60 seconds from the time **ENT** is pressed because they are executed only at the start of the next minute.

20   Set Strike Time : Key in the desired strike time (0-99 seconds), followed by **ENT**. The

strike time setting should be compatible with the type of access point being configured (door, gate, turnstile, etc.).

21 **Set Held Open Time :** Key in the desired held open time (0-99 seconds), then press **ENT**. The held open time is the length of time that the access point can be held open, after a valid access, before the system generates a held open alarm.

22 **Set AUX Output Time :** Key in the AUX Output time (0-99 seconds), then press **ENT**.

23 **Set Antipassback Delay Time :** Key in the APB delay time (0-99 minutes), followed by **ENT**. The card number that was last granted access and a timer value are saved. If the next access request is from the same card number, and the APB delay time has not expired, access is denied. This feature is very effective in discouraging passing a card back to the next car in line, in parking control applications.

30 **Random Card (or PIN) Add :** Random cardholder data is stored in 100 allocated memory slots. Use a form, such as Figure 94, to maintain slot assignment records. Key in the slot number (1-100) which will store the cardholder data, then press **ENT**. If the slot is available, 2 short beeps are sounded. Input the cardholders Access Level, (ACL) then

press ENT. Again 2 short beeps are sounded, prompting for entry of the Card Number (or PIN). The Card Number (or PIN) may be entered via the keypad, or read in by swiping the card through the reader. If the Card Number (or PIN) is verified as unique, the 'good tone' is sounded. If the slot is already filled, or the Card Number (or PIN) exists in another slot, the 'bad tone' is sounded, and the add is not completed.

31 **Random Card Delete :** Key in the slot number, followed by **ENT**, or swipe the card through. Remember to update the slot assignment form.

32 **Set Facility Code Low Limit :** Key in the FC (0-6 digits), then press **ENT**, or swipe the card through.

33 **Set Facility Code High Limit :** Key in the FC, then press **ENT**, or swipe the card through.

34 **Set Offset to Facility Code :** Configure the starting location of the FC on the card. Key in the number of digits from the start, followed by **ENT**.

35 **Set Offset to Card Number :** Configure the starting location of the Card Number on the card. Key in the number of digits, followed by **ENT**. For maximum security, when using bank or ATM cards, set the offset to 11 to use only

the 6 least significant digits of the Card Number.

36   **Set Number of Facility Code Digits :** Key in the number of FC digits (0-6), then press **ENT**.

37   **Set Number of Card Number Digits :** Key in the number of Card Number digits (1-6), then press **ENT**.

40   **Sequential Card Add :** Key in the cardholder's Access Level, then press **ENT**. After 2 short beeps, key in the Card Number, followed by **ENT**, or swipe the card through.

41   **Sequential Card Delete :** Key in the Card Number, followed by **ENT**, or swipe the card through the reader.

42   **Add Card Block :** Key in the Access Level used, then press **ENT**. After 2 beeps, key in the first Card Number of the block followed by **ENT** or swipe the card through. Again, after 2 beeps, key in the last Card Number of the block, followed by **ENT**, or swipe the card through.

43   **Delete Card Block :** Key in the first Card Number, then **ENT**, or swipe the card through. After 2 beeps, key in the last Card Number, then **ENT**, or swipe the card.

44   **Set Starting Card Number :** Key in the starting Card Number of a sequential group, then press **ENT**, or swipe the card.

50   **Enter Current Date : Year**   Key in the current year (4 digits), then press **ENT**.

51   **Enter Current Date : Month**   Key in the current month (1-2 digits), then press **ENT**.

52   **Enter Current Date : Day**   Key in the current day (1-2 digits), then press **ENT**.

53   **Enter Current Time:** Key in the current time (4 digits), in the 24 hour format (H:H:M:M:), then press **ENT**.

60   **Configure Time Zones :** The N-450 provides 6 Time Zones (1-6), where: 1=never, 2=always, and 3-6 are configurable. Key in the Time Zone number (3-6), followed by **ENT**. After 2 beeps, key in the enable (1)/disable (0) codes for the 7 days of the week and the holiday (8 entries), followed by **ENT**. The first entry is Monday, second is Tuesday,——and eighth is for holiday. Again, after 2 beeps, key in the starting time (4 digits), followed by **ENT**, then, after 2 beeps, the ending time, followed by **ENT**. Use Figure 95, to maintain Time Zone configuration.

61   **Configure Holidays :** The system provides 20 holidays. These can be configured as temporary (valid only for the current year), or

permanent (always valid). Use Figure 95.

Key in a holiday slot number, 1-20 for temporary holidays, 21-40 for permanent holidays, followed by **ENT**. After the double beep, configure the holiday date. Key in the month (1-12), then **ENT** , and after double beep, key in the day (1-31), followed by **ENT**.

62 **Configure Access Levels :** The N-450 provides 7 Access Levels. Key in the Access Level number (1-7), followed by **ENT**. After 2 beeps, key in its corresponding Time Zone (1-6), then press **ENT**.

63 **Set Time Zone Controlled Access Mode :** The access mode can be modified by time. The configured mode becomes valid for the full duration of the selected Time Zone, then returns to the preset access mode. The access modes and their corresponding mode numbers are as follows:

Access Mode	Number
Card Only	0
Card or PIN	1
Card and PIN	2
Facility Code	3
Unlocked	4

Key in the access mode number (0-4), followed by **ENT**. After 2 beeps, key in the Time Zone (3-6), then press **ENT**.

NOTE :   Access mode changes may be delayed for up to 60 seconds from the time **ENT** is pressed because they are executed only at the start of the next minute.

70   **Set Printer Mode :** Four printer modes are provided by the N-450. These are:

0= Off (Permanent-saved in memory)
1= Print events (Permanent-saved in memory)
2= Print configuration, then return to permanent mode.
3= Print database, then return to permanent mode.

Key in the desired mode, followed by **ENT**.

WARNING : Do not change modes 2 or 3 until printout is complete.

71   **Set AUX Output Mode :** The system provides 3 modes of operation for the AUX Output. In mode 1, the AUX Output is turned ON during any of the following conditions: door forced open, reader tamper, AUX input open. The AUX output turns OFF only when all inputs are OFF. The AUX Output is pulsed for the configured AUX Output time, in mode 2, when a cardholder with Access Level 5, 6, or 7 is granted access. In mode 3, the output is toggled when a cardholder with Access Level 5, 6, or 7 is granted access.
Key in the desired mode (1-3), then press **ENT**.

Section 8   Installation Verification

Apply power to the N-450. On completion of a successful power-up sequence, the reader LEDs indicate the following:

- Flashing red - waiting for a card to be entered
- Flashing red, flashing yellow - waiting for a card or a PIN to be entered

Verify correct operation by exercising the program commands.

Section 9   Access Cards

9.1   Sequential Cards

The factory generally supplies sequentially numbered blocks of up to 1,000 magnetic stripe cards, and a corresponding list of PINs. The user must provide the factory with the Facility Code and the starting card number, at time of card order.

9.1.1   Magnetic Stripe Format

Start Sentinel	Facility Code	Facility Code	Facility Code	Facility Code	Facility Code	Cardholder ID	Cardholder ID	Cardholder ID	Cardholder ID	Cardholder ID	Cardholder ID	Issue Code	End Sentinel	Check Digit

The N-450 card must be encoded by an an encoder which meets the standards for ANSI Track 2

recording (ANSI X4. 16-1976). The encoder will automatically supply the **Start Sentinel** (B), the **End Sentinel** (F), and **Check Digit**. The card format shown is referred to as M-1.

Facility Code

A fixed number for all access cards for a specific facility. The M-1 format uses the 5 digits following the start sentinel.

Previously assigned Facility Codes may be ordered to expand existing installations.

Cardholder ID Number

The portion of the card that is unique from card to card. The M-1 Format uses the 6 digits following the facility code. The first card number in the series must have a value between 1 and 998975. The difference between the highest and lowest card numbers must not exceed 1000.

Issue Code

Identifies replacement cards without having to change the cardholder ID number. The N-450 does not check this field, but it must be present. It is normally set to 0.

9.2 Random Cards

Random cards must conform to the ANSI X4.16

track 2 specification. This spec is used for most commonly used credit cards and ATM cards.

9.3 Facility Code Check

Each digit of the Facility Code is compared individually, Low Limit against High Limit. Digits must fall between the Limits (inclusive) to be valid. This method allows the use of Facility Codes of up to 6 digits, as well as allowing for a range of Facility Codes to be accepted by the reader. The following are examples:

No FC check

0	0	0	0	0	0	Low Limit
9	9	9	9	9	9	High Limit

All digits fall between these limits, therefore no FC check.

3 digit FC -734

7	3	4	0	0	0	Low
7	3	4	9	9	9	High

In this example, 7=7, 3=3, 4=4 and other digits are not checked.

FC range:

4566-4597

4	5	6	6	0	0	Low
4	5	9	7	9	9	High

In this example: 4567, 4576, 4577, 4586, 4587, and 4596 are also valid Facility Codes.

6 digit FC -1 2 3 4 5 6

1	2	3	4	5	6	Low
1	2	3	4	5	6	High

Section 10   Maintenance

10.1   General

The N-450 reader requires periodic maintenance for it to remain reliable and trouble free.

10.2   Safety Precautions for CMOS Electronics

The readers contain sensitive CMOS integrated circuits.   Several important precautions shall be be followed to prevent electro-static discharge (ESD) damage to CMOS integrated circuits in the electronic modules.

• All transport of electronic components, including completed assemblies shall be in static shielding packaging and containers.

- All handling (configuring, repairing, etc.,) of the electronic modules must done at an approved static controlled work station.   Work stations consist of a desk mat, floor mat, and wrist trap. They are available from various venders, including the 3M company.

10.3   Cleaning the Magnetic Read Head and Card Slot

During use, dust particles, dirt, magnetic oxides and other contaminants will accumulate on the magnetic read head and in the card slot.   These contaminants will affect the longevity of the read head and cards, and will also cause mis-reads.

To maintain high reliability and prevent excessive wear, the read head and card slot must be regularly cleaned.   The following cleaning schedule is recommended:

- Once per week for indoor, low usage readers.
- Once per day for outdoor or high usage readers.

To clean, use the pre-saturated, disposable head cleaning card. Follow the cleaning instructions on the card package.

10.4   Cleaning the Exterior Surface

The exterior surfaces and the membrane keypad may be regularly cleaned with a soft cloth and mild detergent to remove finger prints and smudges.

Section 11   Specifications

11.1   Reader Interface Terminals

All N-450 wiring terminates on 3 pluggable, screw-type, connectors (J2, J3, J4), as shown in the following tables:

J2 - Power Input

Pin No.	Signal	Function
1	VIN	Power Input (+6 to +24 VDC)
2	GND	Ground (Signal/Power Ground)

J3 - Serial Printer

Pin No.	Signal	Function
1	TXD	Transmit Data (to printer)
2	RXD	Receives Data (from printer)
3	CTS	Control Line (from printer)
4	GND	Ground
5	GND	Ground

NOTE : Serial printer data is comprised of one **START** bit, eight **DATA** bits, and one **STOP** bit (minimum), with no parity.

J4 - Door Hardware/AUX

Pin No.	Signal	Function
1	GND	Ground
2	DC	Door contact Input (normally closed)
3	EPB	Exit Push Button Input (normally open)
4	AUX	AUX Input (normally closed)
5	GND	Ground
6	STRK	Door Strike Output
7	OUT	AUX Output
8	GND	Ground

11.2 Power Requirements

+6 to +24 Vdc @ 50 mA typical

11.3 Dimensions

Reader: 5.6"L X 1.98"W X 1.4"H (14.2 X 5 X 3.6 cm)

Adapter plate: 6.0"L X 3.0"W X (15.2 X 7.6 cm)

Back box: 5.8"L X 2.2"W X 1.2"H (14.7 X 5.6 X 3 cm)

11.4   Operating Environment

Temperature: -40 to +75 $^{\circ}$C

Relative Humidity: 0 - 80% non-condensing

RED	YELLOW	GREEN	INDICATION
OFF	OFF	ON	Unlocked
FLASH	OFF	OFF	Enter Card
FLASH	FLASH	OFF	Enter Card or PIN
OFF	OFF	FLASH (1 1/2 sec)	Access Granted
ON (1 1/2 sec)	OFF	OFF	Access Denied
OFF	FLASH	FLASH	Enter Password
OFF	FLASH	ON	Enter Command

Buzzer in Access Mode

1-short (beep)	Keypad echo
3-short (beep, beep, beep)	Access Denied
1-short, 1 long (beep, beeeep)	Access Granted

Buzzer in Programming Mode

1-short (beep)	Keypad echo
2-short (beep, beep)	Enter password/Add card
3-short (beep, beep, beep)	Error tone
1-short, 1 long (beep-beeeep)	Good tone

Figure 93 LED and Buzzer Indications

Slot	ACL	Card Number (PIN)	Notes

Figure 94 Slot Assignment Record
(page 1 of 2)

Slot	ACL	Card Number (PIN)	Notes

Figure 94 Slot Assignment Record
(page 2 of 2)

Time Zone

TZ	MO	TU	WE	TH	SA	SU	H	Start	End	Notes
3										
4										
5										
6										

Holiday Record

Slot	Month	Day	Notes

Figure 95 Time Zone/Holiday Records
page 1 of 3

Slot	Month	Day	Notes

Figure 95 Time Zone/Holiday Records
page 2 of 3

Slot	Month	Day	Notes

Figure 95 Time Zone/Holiday Records
page 3 of 3

N-450 READER

User's Manual

RETURNING MERCHANDISE

No merchandise will be accepted for return to our factory without prior authorization. Unauthorized returns will be refused and placed in the hands of the carrier at the cost of the shipper. Upon request by Customer for a Return Merchandise Authorization (RMA), whether for credit or repair of the Product, Northern agrees that it will either issue such RMA or provide Customer with a written explanation for its refusal to issue the RMA within (30) days of the request by Customer. No returns will be accepted more than 90 days after delivery except for warranty claims. Orders that are accepted for return within 45 days after shipment are subject to a 15% restocking charge. Orders that are accepted for return within 45 to 90 days after shipment are subject to a 40% restocking charge.

No returns will be accepted for special order or custom products except for warranty claims.