NexWatch

DigiReader® Series

Models Supported:

DR4200K	DR4201	DR4203
DR4205		DR4205GM
DR4205K	DR4208K	DR4208S
DR4208SGM	DR4220	

INSTALLATION and OPERATION

P/N 6600025 Rev. F

10/15/02

THE THREE NOTE SYMBOLS USED IN THIS MANUAL EXPLAINED

Explanatory Note. These notes are for your information, and pose no threat to equipment or life or limb.

Cautionary Note. These notes are for your information. Pay attention to these items, since system performance or function may be affected.

WARNING Note. These warning noted are to alert you to personal danger or serious loss of function or data. IT IS MANDATORY TO READ THESE NOTES AND PERFORM THE ACTIONS OR ATTEND TO THE WARNINGS CONTAINED WITHIN THEM.

Limited Warranty

NexWatch® warrants to the original user the Equipment manufactured by NexWatch® as described herein (the Equipment) to be free from defects in material and workmanship for a period of one year from the date of purchase by such user or fifteen (15) months from the date of shipment from the factory, whichever is sooner (command key and magnetic stripe warranties differ, see below *) provided:

I   NexWatch® has been notified within such period by return of any alleged defective equipment, free and clear of any liens and encumbrances to NexWatch® or its authorized Dealer at the address specified, transportation prepaid; and

II   the Equipment has not been abused, misused, or improperly maintained and / or repaired during such period; and

III such defect has not been caused by ordinary wear and tear; and

IV   such defect is not a result of voltage surges or brownouts, lightning, water damage or flooding, fire, explosion, earthquakes, tornadoes, acts of aggression or war, or similar phenomena; and

V   accessories used as integral to any NexWatch® System have been approved by NexWatch® (such as, coaxial cables and batteries); and

VI   the Equipment has been installed, and the installation has been supervised or tested by an authorized NexWatch® Dealer.

NexWatch® shall, at its option, either repair or replace, free of charge, the equipment found, upon NexWatch®'s inspection to be so defective, or if agreed upon, to refund the purchase price, less a reasonable allowance for depreciation, in exchange for the equipment.

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* Digital command key and magnetic stripe card warranties vary, according to the particular card used. See the product literature.

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FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

WHAT IS NEW IN THIS REVISION?

The principal reason for this new revision (Revision F) is that it has information on three new NexWatch® products, the DR 4208S, the DR 4208SGM and the DR 4208K. To be sure to find all of the new information on these products, the best way is to do a content search for the string 4208. You are sure to find everything in this manual concerning these new products.

A new appendix, Appendix A, Reporting Modes for DRs, provides information on the feature of the DR4201, DR4208S, DR4208SGM and DR4208K readers which enables them to recognize multiple types of non-NexWatch® credentials as well as the basic NexWatch® credential.

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CHAPTER 1 - INTRODUCTION

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The DigiReader® Series is a family of Digital Proximity Reader (*DigiReader*®) devices. (Graphic representations of the DigiReader® Series —not to scale— are shown in "Figure 1: The Different DigiReader® Models" on page 1-2.) A DigiReader® is a bi-directional security device that reads digital credentials, (from either side of the sensor), at ranges from 1 to 20 inches (2½ to 51 cm), depending upon the model and the environmental conditions. DigiReader® devices are used with the NexSentry™ 4100, 4102, 4104, Star I and Star II (4100 Series), SE818SC and SE422 Access Control Units (ACUs), with the ACUs either operating as stand-alone devices or operating in conjunction with a StarGaze (SG), a ProWatch(PW), a NexSentry™ Manager (NSM), a NexSentry™ Command Center (NSCC), an SE6000, or an SE5850, NexWatch® Access Control Host System. Connection between a DigiReader® and an ACU is over the NexWatch® proprietary S-NET interface or over a Wiegand interface to a Wiegand ACU. (The Wiegand data can be either 26- or 34-bit Wiegand standard.) (Also included in the DigiReader® Series is a keypad-only reader, the DR4200K, which is the only family member available with the *analog* SE818SX ACU.)

DR4201　　DR4203

DR4205 / DR4208S

DR4205K / DR4208K

DR4220

Figure 1: The Different DigiReader® Models

CAUTION 1: Read this manual carefully before attempting to wire in place a DigiReader®. **The warranty is void if damage occurs to the unit as a result of incorrect wiring.**

CAUTION 2: The information in this manual is not intended to conflict with building codes, electrical codes, fire codes, or safety codes required for any given installation. In all cases the prevailing building/electrical/fire/safety codes must take precedence.

CHAPTER 2 - SPECIFICATIONS

	DR4201	DR4203	DR4208S / SGM
Description of Reader	Low cost / mounting as 'light switch'	Digital proximity for door mullions	Digital proximity with extra read range
Dimensions (in.)	3.3 x 4.8 x 0.7	1.8 x 7.5 x 1.2	5.3 x 5.8 x 1.3
Dimensions (cm.)	8.4 x 12.2 x 1.8	4.5 x 19.0 x 3.0	13.5 x 14.6 x 3.2
Xmit / Recv Freq'cy	132 kHz, full duplex operation / 66 kHz		
Receiver Demodul'n	Phase-Shift Key (PSK) signal		
Card Read Cycle	100 msec.		
Power Source S-NET	+12.5 to 24 VDC, < 80 mA		+12.5 to 24 VDC, < 150 mA
- Wiegand (Pigtail)			
ACU I/F (9-wire)	9-wire pigtail = dual twisted pair (22 AWG + shield for RS485, S-NET comm) + 26/34-bit 5-wire Wiegand		
ACU I/F (4-wire)	Dual twisted pair (22 AWG + shield for RS485, S-NET comm) for 41xx, 818, 422, Star ACUs		
Power Dissipation	< 2 watts		< 5 watts
Controllers	NexSentry Star I & II, 4100 Series, 818SC, 422.		
Indicators	Single tri-color (green - yellow - red), programmable. Beeper.		
Tamper Protection	Yes		
Humidity / Temp.	10% to 85% non-condensing. / -31°F to 150°F (-35°C to 66°C)		
Environment	Indoor or Outdoor - (PC boards conformally coated for external use).		
Weight (oz. / grams)	5 oz. / 140 gm.	< 16 oz. / 450 gm.	12 oz. / 340 gm.
ADA Compliant	Yes; Special features for facilitating disabled access include: hands-free access, audible and visual indicators to indicate access status.		

Max. Read Range	DR4201		DR4203		DR4208S	
QuadraKey	to 1.5 in.	to 3.8 cm.	to 3 in.	to 7.6 cm.	to 8 in.	to 20 cm.
2Smart						
NexKey						
KeyMate	to 1 in.	to 2.5 cm.	to 1 in.	to 2.5 cm.	to 5.5 in.	to 14 cm.

Table 1. DR 4201, 4203, 4208S Specifications

	DR4208K	DR4220	DR4200K
Description of Reader	Digital proximity with KB	Digital proximity with max read range	DR4205K Look-Alike, KB only
Dimensions (in.)	5.5 x 5.5 x 1.5	14.3 x 12.4 x 1.0	5.0 x 5.0 x 1.3
Dimensions (cm.)	14.0 x 14.0 x 3.8	36.3 x 31.5 x 2.5	12.7 x 12.7 x 3.2
Xmit / Recv Freq'cy	132 kHz, full duplex operation / 66 kHz		NA
Receiver Demodul'n	Phase-Shift Key (PSK) signal		
Card Read Cycle	100 msec.		
Power Source S-NET	+12.5 to 24 VDC, < 120 mA	+12.5 to 24 VDC, <500 mA	Same as DR4201
- Wiegand (Pigtail)			NA
ACU I/F (9-wire)	9-wire pigtail = dual twisted pair (22 AWG + shield for RS485, S-NET comm) + 26/34-bit 5-wire Wiegand		NA
ACU I/F (4-wire)	Dual twisted pair (22 AWG + shield for RS485, S-NET comm) for 41xx, 818, 422, Star ACUs		
Power Dissipation	< 5 watts	< 15 watts	< 2 watts
Controllers	NexSentry Star I & II, 4100 Series, 818SC, 422. NOTE: DR4200 is only device 818SX can use.		
Indicators	Single tri-color (green - yellow - red), programmable. Beeper.		
Tamper Protection	Yes		
Humidity / Temp.	10% to 85% non-condensing. / -31°F to 150°F (-35°C to 66°C)		
Environment	Indoor or Outdoor - (PC boards conformally coated for external use).		
Weight (oz. / grams)	8 oz. / 225 gm.	< 16 oz. / 450 gm.	12 oz. / 340 gm.
ADA Compliant	Yes; Special features for facilitating disabled access include: hands-free access, audible and visual indicators to indicate access status.		
Max. Read Range	DR4208K		DR4220		DR4200K

Max. Read Range	DR4208K		DR4220		DR4200K
QuadraKey	to 5 in.	to 13 cm.	to 20 in.	to 51 cm.	NA
2Smart					
NexKey					
KeyMate	to 3.5 in.	to 9 cm.	to 12 in.	to 31 cm.	

Table 2. DR 4208K, 4220, 4200K Specifications

	DR4205	DR4205GM	DR4205K
Description of Reader	Digital proximity	Digital proximity, able to be glass-mounted	Digital proximity, integrated waterproof KB
Dimensions	5.3 x 5.8 x 1.3		
Dimensions	13.5 x 14.6 x 3.2		
Transmit	132 kHz, full duplex operation		
Receiver	66kHz		
Receiver	Phase-Shift Key (PSK) signal		
Card Read	100 msec.		
Power: S-NET - Wiegand	+12.5 to 24 VDC, < 80 mA		
Wiegand Pigtail	Yes		
ACU I/F (9-wire)	9-wire pigtail = dual twisted pair (22 AWG + shield for RS485, S-NET comm) + 26/34-bit 5-wire Wiegand		
ACU I/F (4-wire)	Dual twisted pair (22 AWG + shield for RS485, S-NET comm) for 41xx, 818, 422, Star ACUs		
Power dissip'n	Less than 2 watts		
Controllers	NexSentry Star I & II, 4100 Series, 818SC, 422.		
Indicators	Single tri-color (green - yellow - red), programmable. Beeper.		
Tamper Protection	Yes		
Humidity	10% to 85% non-condensing		
Temperature	-31°F to 150°F -35°C to 66°C		
Environment	Indoor and Outdoor use - (PC boards conformally coated for external use).		
Weight (oz.)	15	19	15
Weight (grams)	420	532	420
ADA Compliant	Yes; Special features for facilitating disabled access include: hands-free access, audible and visual indicators to indicate access status.		
Maximum Read Range	All DR4205 models		
QuadraKey 2Smart NexKey	to 4 in.		to 10 cm.
KeyMate	to 2 in.		to 5 cm.

Table 3. DR4205, 4205GM, 4205K Specifications

CHAPTER 3 - FEATURES AND OPERATIONS

3

BASIC OPERATION

A DigiReader® emits a low-level 132-kHz field. When a digital credential (card, KeyMate™, etc.) is placed in this field, a digital chip embedded in the credential uses the field's energy for activation. Once activated, the credential responds by broadcasting a 70-kHz signal, modulated with a credential-specific code sequence, back to the reader. The reader receives this signal and converts it to a digital code which is then sent to the ACU, (the Controller). The Controller identifies the digital credential according to its code and makes either an access granted or an access denied decision, based on credential information stored in the Controller's database or the host system's database.

The DR4205K and DR4208K both have a keypad on the face of the DigiReader®. The keypad is used to enter the user's Personal Identification Number (PIN). The DR4205K keypad version can be configured for credential-only use, or keypad-only use, or both.

DigiReader® Set Up for 818SC, 4100-Series or Star I ACUs

The 818SC, 4100-series or Star I ACUs set the use parameters via the ACU DOOR Command. If the S-NET Reader Type entry is set to DKR, the credential use will be activated for that door; set to NONE, the credential use for that door will be de-activated. For the same door/reader combination, if the VIP Enable is set to Yes or No, the keypad portion will be activated or de-activated, respectively.

The DR4200K is a keypad-only reader look-alike of the DR4205K, activated from the ACU DOOR Command by setting VIP Enable (for that door) to Yes.

DigiReader® Set Up for Star II ACUs

The Star II ACU sets the use parameters via the Star II Door Configuration Data screen, Reader Tab, as shown below.

If the DR4200K (which has keypad only) is used as an adjunct to a digital-credential-reading DigiReader® (DR4201, DR4203, DR4205, etc.), it would be selected as Reader 2.
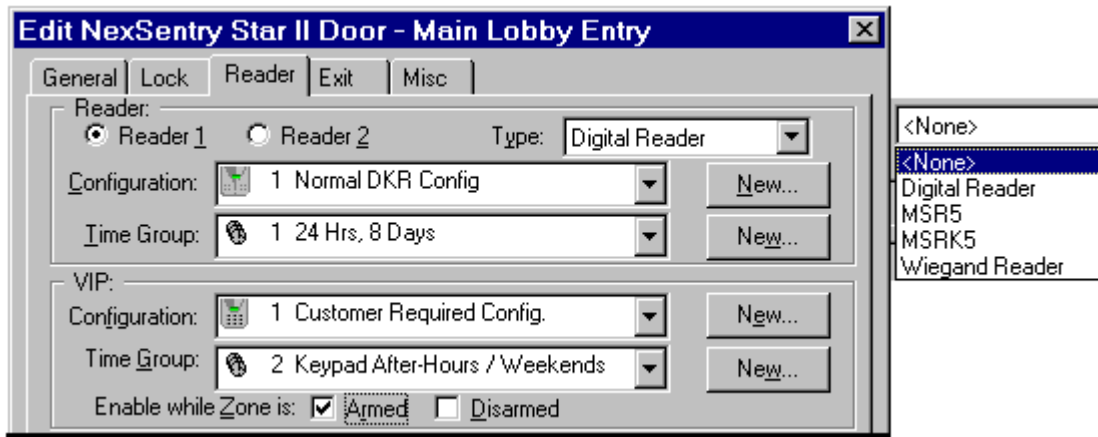
Figure 2: Star II Door Configuration Data: Reader Tab

Table 4. Star II Door Configuration Data: Reader Tab

Reader 1 / Reader 2	Normally, **select Reader 1 only.** If two separate and different kinds of readers (such as DKR and MSR) are used at the same door, then select both Reader 1 and Reader 2.
Type	Select the type of reader being used from the Drop-list as shown above.
Reader Con-figuration	Select the previously configured Reader Configuration.
Reader Time Group	Select a Time Group from the drop-down list to determine when this **Reader** will be needed to gain access.

Table 4a. Star II Door Configuration Data: Reader Tab (continued)

VIP (Keypad) Configuration	Select the previously configured Keypad Config. The choices will be based upon the Keypad Type.
Keypad Time Group	Select a Time Group from the drop-down list to determine when this **Keypad** will be needed to gain access.
Enable while Zone is: Armed or Disarmed	Check either or both boxes to determine when the Keypad will be needed. Armed / Disarmed state can be used in conjunction with Time Groups. Changing the associated Zone to the checked state will override any Time Code.

LED (AND BEEPER) OPERATION

LED (and Beeper) (S-NET Operation)

All DigiReader® models have a single three-color (red-amber-green) LED controlled by the Access Control Unit (ACU) to which the DigiReader® is attached. "Figure 3: LED Locations for the Different DigiReader® Models" on page 3-4 shows the location of the LED on each of the DigiReader® models.

With the DigiReader® on line to an ACU and with power applied, (the ready state), the LED of the DigiReader® will be a constant red. When a DigiReader® is configured to read digital credentials only (with no keypad part of the DR4208K or DR4205K or VIP2 or DR4200K activated for the same door), a valid credential will produce a momentary amber LED, followed by a green LED for the door unlock time or until the door is closed following the credential-holder's access; (the LED will then return to the constant red). With a keypad also activated, the amber LED will continue until either both the valid digital credential and valid PIN, in either order, have been read/entered, producing the green unlock time LED, or until the

PIN grace period has been exceeded, producing the red LED. With only the keypad activated, a valid PIN will produce the momentary amber, the unlock green and the return to the constant red.

The complete operational characteristics (LED and beeper behavior):

• for a DigiReader® with keypad see "Table 5. System LED/Beeper Behavior (DigiReader® & Keypad Enable)" on page 3-5. (DR4205K or DR42xx with DR4200K on same door.)

• for a DigiReader® without keypad see "Table 6. System LED/Beeper Behavior (Reader Capability Only Enabled)" on page 3-5.

• for a keypad only see "Table 7. System LED/Beeper Behavior (Keypad Only Enabled)" on page 3-6.

DR4201

DR4203

LEDs

DR4205
DR4208S LEDs

DR4205K
DR4208K

LED

DR4220

Figure 3: LED Locations for the Different DigiReader® Models

	On-Line		Off-Line		Demo	
Status	**LED**	**Beeper**	**LED**	**Beeper**	**LED**	**Beeper**
No Credential Data Sent to ACU. No KB Key Pressed	Steady red	Off	Cycle: Flash red, steady amber, off for 4, 4, 52 sec.	Off	Steady red	Off
Valid Credential Read	Steady amber until PIN entry or grace period	Single beep	Flash amber continuously ~0.2 seconds while card present	Beep contin ~ 0.8 sec. while card present	Steady amber & for ~ 10 sec. after removing card	Beep every ~2 sec. while card presented
Invalid Credential	Steady off for rdr disable time	Single beep				
Valid PIN Entered	Steady red until PIN entered; steady amber until card read or grace period ended	Beep for each PIN digit entered	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec. (unchanged from no key pressed or card present)	Beep once for every key pressed	Red until 6 keys pressed, then amber for ~10 sec.	Beep once for every key pressed (up to 6)
Invalid PIN	Steady amber until grace period ended	Beep each digit				

Table 5. System LED/Beeper Behavior (DigiReader® & Keypad Enable)
(LED behavior under ACU control, determined by ACU programming.)

	On-Line		Off-Line		Demo	
Status	**LED**	**Beeper**	**LED**	**Beeper**	**LED**	**Beeper**
No Credential Data Sent to ACU	Steady red	Off	Cycle: Flash red, steady amber, off for 4, 4, 52 sec.	Off	Steady red	Off
Valid Credential Read	Steady green as door unlocks	Beep ~5 sec.	Flash amber continuously ~0.2 seconds while card present	Beep contin ~ 0.8 sec.: card present	Steady amber & for ~10 sec. after remov cd	Beep every ~2 sec.: card present
Invalid Credential	Steady off for reader disable time	Single beep				

Table 6. System LED/ Beeper Behavior (Reader Capability Only Enabled)
(LED behavior under ACU control, determined by ACU programming.)

	On-Line		Off-Line		Demo	
Status	**LED**	**Beeper**	**LED**	**Beeper**	**LED**	**Beeper**
No 4200 or 4205K Key Pressed	Steady red	Off	Cycle: Flash red, steady amber, off for 4, 4, 52 sec.	Off	Steady red	Off
Valid PIN Entered	Steady red until PIN entered; momentary amber, steady green for reader disable/ door open time	Beep for each PIN digit entered	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec. (unchanged from no key pressed)	Beep once for every key pressed	Red until 6 keys pressed, then amber for ~10 sec.	Beep once for every key pressed (up to 6)
Invalid PIN	Steady amber	Beep ea digit				

Table 7. System LED/Beeper Behavior (Keypad Only Enabled)
(LED behavior under ACU control, determined by ACU programming.)

LED (Wiegand Operation)

The LED is controlled to be red or green by the level of the Wiegand control input. This is a function of the particular Wiegand unit.

SPECIAL FEATURES OF THE 4201, 4208S AND 4208K DIGIREADER®S

DR4201, DR4208S, DR4208K Operation (S-NET Mode)

- The reader responds as both a DKR-type and an MSR-type device. The assigned address message determines the reporting method for this reader.

- The RF field is powered at all times.

- The microcontroller uses a synchronous technique to sample the incoming data bits and shift them into a 48-byte data buffer. The data collection and reporting techniques are key-type dependent. The reader alternates between the two key types as follows:

- Key type 1 (NexWatch® QuadraKey™, NexKey™, 2Smart™, and KeyMate™).
  For 50 msec the key message data is serially shifted into a buffer while searching for an 88-bit PSK key message signal in NexWatch® format. The received key data is validated if it contains:

  - the proper 8-bit preamble,

  - a 32-bit reserved field,

  - a 32-bit keycode field,

  - a valid mode character,

  - a valid parity character,

  - a valid checksum byte, and

  - the receive buffer contains two identical 88-bit key messages.

  Reporting as an S-NET DKR-type, only the key ID is reported to the ACU.

  Reporting as an S-NET MSR-type, the NexWatch® key is reported to the ACU in an S-NET MSR-type log response with:

  - key data in message characters 2-10,

  - site code (always 9999) in message characters 11-14, and

  - company code (always 9999) in message characters 19-22.

- Key type 2 (HID ProxPro™, ISOProx™, DuoProx™, and Corporate 1000™):

For 120 msec the key message data is serially shifted into a buffer while searching for a 48-bit FSK-modulated Manchester-encoded signal. The received key data is valid if it contains:

- a start character with 2 Manchester code violations,

- no other Manchester coding violations, and

- the receive buffer contains two identical 48-bit key messages.

Reporting as an S-NET DKR-type, only the key ID is reported to the ACU.

Reporting as an S-NET MSR-type, this key is reported to the ACU in an S-NET MSR-type log response. The MSR data sent depends on the key type recognized:

- 26-bit key:

    - key data in message characters 7-10,

    - site code in message characters 11-14,

    - company code (always 9999) in message characters 19-22.

- 35-bit key:

    - key data in message characters 6-10,

    - site code in message characters 11-14,

    - company code (always 9999) in message characters 19-22.

- 37-bit key:

    - key data in message characters 6-10,

    - site code in message characters 11-14,

    - company code (always 9999) in message characters 19-22.

- Only one keycode is received and reported at a time. A 1-second timer is started when a key is read to prevent the same key from being repeated too quickly.

DR4201, DR4208S, DR4208K Operation (26-bit, 34-bit Wiegand Mode)

- The RF field is powered at all times.

- A digital key is received in the same fashion as for the S-NET operation. (See above).

- If the key is in 88-bit NexWatch® format, then either the 32-bit (or 26-bit) keycode is immediately transmitted via the data 0 and data 1 lines, most-significant-bit first.

- If the key is a 48-bit type then the key content is checked to determine if 26-bit, 35-bit or 37-bit data is to be sent. If the content cannot be determined then no message is sent.

- Only one keycode is received and reported at a time. A 1-second timer is started when a key is read to prevent the same key from being repeated too quickly.

DR4205K AND DR4208K SPECIAL OPERATING FEATURES

For the NexSentry Star I, Star II and 4100 Series ACUs, the DR4205K and DR4205K readers have two modes of operation, the Normal Mode and the KeyPad-Credential (or KP-Credential Mode).

Address Switch S1 on the DR4205K

Address switch S1, (the upper byte of the address), determines mode selection. If S1 is set to 0 or 8, the Normal Mode is selected. If S1 is set to 4, 5 or 6, (or C, D or E), the KP-Credential Mode is selected.

Setting Normal Mode on the DR4205K

With DR4205K address switch S1 set to 0, the DR4205K operates in its normal mode. DR4205K address switch S2 is then set to the physical Reader/Door address of the DR4205K: 1 through 9 and A through F, (for DigiReader® addresses 1 through 15). See "Table 8: DR4205K Normal Mode Settings, S1 and S2" on page 3-10.

Since there are 16 possible DR4205K reader addresses, a special provision is made to address the 16th reader in the normal mode. For the 16th address, set switch S1 to 8 and switch S2 to 0.

(With both address switches S1 and S2 set to 0, a DigiReader® DR4205K is off-line.)

Reader Address	**DR4205K Normal Mode**							
Reader Address	(Off-Line)	1	2	3	4	5	6	7
S1	0	0	0	0	0	0	0	0
S2	0	1	2	3	4	5	6	7

	DR4205K Normal Mode							
Reader Address	8	9	10	11	12	13	14	15	**16**
S1	0	0	0	0	0	0	0	0	**8**
S2	8	9	A	B	C	D	E	F	**0**

Table 8: DR4205K Normal Mode Settings, S1 and S2

Address Switch S1 on the DR4208K

Address switch S1 determines both the mode selection and the address. If S1 is set to 0 through 31, the Normal Mode is selected. If S1 is set to 60 through 7F, the KP-Credential Mode is selected.

Setting Normal Mode on the DR4208K

With DR4208K address switch S1 set to 0 through 31, the DR4208K operates in its Normal mode, with these address switch DIPs representing the physical Reader/Door address of the DR4208K. See "Table 9: DR4208K Normal Mode DIP Settings, S1" on page 3-11.

There are 32 possible Normal Mode DR4208K reader addresses. Addresses 1 to 31 are addressed directly with the low-order five DIPs. The 32nd address is selected by activating the 0 off-line setting.

(With the S1 DIPs set to 0, a DigiReader® DR4208K is initially off-line in the Normal mode. Subsequently the 0 DIP setting represents address 32.

DR4208K Normal Mode															
Reader Address	Off-Line	32	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S1	0		1	2	3	4	5	6	7	8	9	A	B	C	D	E

DR4208K Normal Mode															
Reader Address	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
S1	F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F

Table 9: DR4208K Normal Mode DIP Settings, S1

Operational Characteristics of DR4205K and DR4208K Normal Mode:

- **DKR portion only enabled**: the credential is sent as a credential, and no PIN is expected.

- **VIP portion only enabled**: the PIN is sent as a PIN. No credential is expected.

- **Both DKR and VIP portions enabled**: the credential is sent as a credential, the PIN is sent as a PIN. Both the credential and the PIN are expected (in either order).

Deselecting either the DKR or VIP portion requires powering off and on the DR4205K or DR4208K (or issuing a RESET command in the terminal mode) to establish the deselected state.

Setting DR4205K KP-Credential Mode

With DR4205K address switch S1 set to 4, 5 or 6, the DR4205K operates in its 'KP-Credential' mode. In the KP-Credential Mode the DR4205K operates in a special manner if only the DKR portion or the VIP portion of the DR4205K is enabled: see *Operation in KP-Credential Mode*, below. The number of digits in the KP-Credential is determined for the DR4205K by the 4, 5 or 6 of address switch S1. DR4205K address switch S2 determines the physical Reader/Door address of the DR4205K for nodes 1 to 15. See "Table 10: DR4205K KP-Credential Mode Settings, S1 and S2" on page 3-13.

For the DR4205K physical S-NET addresses 1 through 9, set switch S1 to the S-NET values and switch S2 to the number of KP-Credential digits, 4, 5 or 6. For Reader/Door addresses 10 through 15, set switch S1 to A through F and switch S2 to the number of KP-Credential digits 4, 5 or 6.

For the DR4205K 16th address, for a number of KP-Credential digits equal to 4, 5 or 6, set switch S1 to C, D or E, respectively, and switch S2 to 0.

(With both address switches S1 and S2 set to 0, a DR4205K is off-line.)

Reader Address		(Off-Line)	KP-Credential Mode						
			1	2	3	4	5	6	7
S1	**4 PIN Digits**	0	4	4	4	4	4	4	4
	5 PIN Digits		5	5	5	5	5	5	5
	6 PIN Digits		6	6	6	6	6	6	6
S2		0	1	2	3	4	5	6	7

Reader Address		KP-Credential Mode							
		8	9	10	11	12	13	14	15	16
S1	**4 PIN Digits**	4	4	4	4	4	4	4	4	**C**
	5 PIN Digits	5	5	5	5	5	5	5	5	**D**
	6 PIN Digits	6	6	6	6	6	6	6	6	**E**
S2		8	9	A	B	C	D	E	F	**0**

Table 10: DR4205K KP-Credential Mode Settings, S1 and S2

Setting KP-Credential Mode on the DR4208K

With DR4208K address switch S1 set to 60 through 7F, the DR4208K operates in its KP-Credential mode, with the five low-order DIPs (1-5) representing the physical Reader/Door address of the DR4208K and DIPs 6 and 7 set to 1. See "Table 11: DR4208K KP-Credential Mode DIP Settings, S1" on page 3-14.

There are 32 possible KP-Credential Mode DR4208K reader addresses. Addresses 1 to 31 are addressed directly with the low-order five DIPs and DIPs 6 and 7 set to 1. The 32nd address is selected by activating the 60 off-line setting.

(With the S1 DIPs set to 60, a DigiReader® DR4208K is initially off-line in the KP_Credentila mode. Subsequently the 60 DIP setting represents address 32.

	DR4208K KP-Credential Mode														
Reader Address	Off-Line	32	1	2	3	4	5	6	7	8	9	10	11	12	13	14
S1	60		61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E

	DR4208K KP-Credential Mode																
Reader Address	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
S1	6F	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F

Table 11: DR4208K KP-Credential Mode DIP Settings, S1

Operational Characteristics of KP-Credential Mode:

NOTE: For either the DR4205Kor DR4208K, enabling only either the DKR or VIP portion, as described below, i.e.deselecting either theVIP or DKR portion, requires powering off and on (or issuing a RESET command in the terminal mode) to establish the **DKR-only** or **VIP-only** state.

- **DKR portion only enabled**: a credential presented (or a KP-Credential entered) is sent as a credential.

- **VIP portion only enabled**: a KP-Credential entered (or a credential presented) is sent as a PIN.

- **Both DKR and VIP portions enabled**: the operation is the same as for the normal mode.

DR4205K KP-Credentials

- **DR4205K S1 set to 4, 5, or 6** (*or C, D or E*): determines the number of DR4205K KP-Credential digits, 4, 5 or 6.

DR4208K KP-Credentials

- **DR4208K DIP switches 6 and 7 set On**: the DR4208K is put into the KP-Credential mode, so that DIP-switch hexadecimal addresses 61-6F represent KP-Credential DR4208K addresses 1-15; hexadecimal addresses 70-7F represent KP-Credential DR4208K addresses 16-31; hexadecimal address 60 represents KP-Credential DR4208K address 32.

NOTE: Both the Normal hexadecimal address of 0 and the KP-Credential hexadecimal address of 60 on power up are treated as being off-line, but represent address 32 when re-entered.

• **DR4208K KP-Credential length** may be up to 9 digits. The KP input digits must be terminated with a # key.
Example: 1234# entered will send a PIN code of 1234. In the KP-Credential mode: if the keypad is off-line (to the ACU), both the PIN entry and the credential will be reported as a key. If the reader is off-line, both the PIN entry and the credential will be reported as a PIN.

NOTE: When the delimiting # key is entered, the last-entered (up to) 9 digits will represent the KP-Credential.

If "too many" digits are entered, then any digits ahead of the last-entered 9 digits will be discarded.

Example: If 3141592653589792459# is entered then the KP-Credential will be 589792459.

CHAPTER 4 - INSTALLATION

4

GENERAL INSTALLATION

See the procedures for the reader model and installation type below for additional instructions.

Cable Preparation:

1 Route the data and power cable to the DigiReader® location and prepare the cable for attachment to the DigiReader®.

2 Remove two inches of the plastic jacket and the shielding foil from the cable.

3 Strip each wire back 1/4" for connecting to the DigiReader®.

DR4200K, DR4203, DR4205 Series, DR4208S/K, DR4220 Installation:

1 The S-NET cable on the DigiReader® may be routed from the back, bottom or the side of the DigiReader®. The reader is pre-configured for cable installation through the back mounting plate.

NOTE: S-NET cable is routed directly through the back on the DR4203, DR4208S, DR4208K, and DR4220, and, from the back, on the side on the DR4205GM DigiReader® only, (see "Figure 4: Cable Routing Configurations" on page 4-2 and "Figure 14: 4205GM & 4208SGM: Placement of Decal & Reader onto Glass" on page 7-6), and on the back, through the gap made by removing the plastic notch on the DR4200K, DR4205, DR4205E, and DR4205K DigiReader®s.

2 For the DR4200K, DR4205, DR4205E, and DR4205K DigiReader®
models, remove the plastic notch from the bottom of the cover. A
rattail file may be used to enlarge the opening (see "Figure 4: Cable
Routing Configurations" on page 4-2).

3 The DR4208S DigiReader® cable(s) are designed to be routed in two
ways. The unit comes from the factory with the cable, secured by a
'SW-NE' strap, routed through the hole in the middle of the upper left
quadrant (looking at the back of the unit). Alternately you can re-
route the cable through the bottom notch, (removed as in paragraph
2, above) by opening the case, carefully removing the PCB (four
screws), snipping the 'SW-NE' strap, securing the cable with a 'W-E'
strap, (via the holes provided for this purpose in the PCB), and re-
assembling the unit.
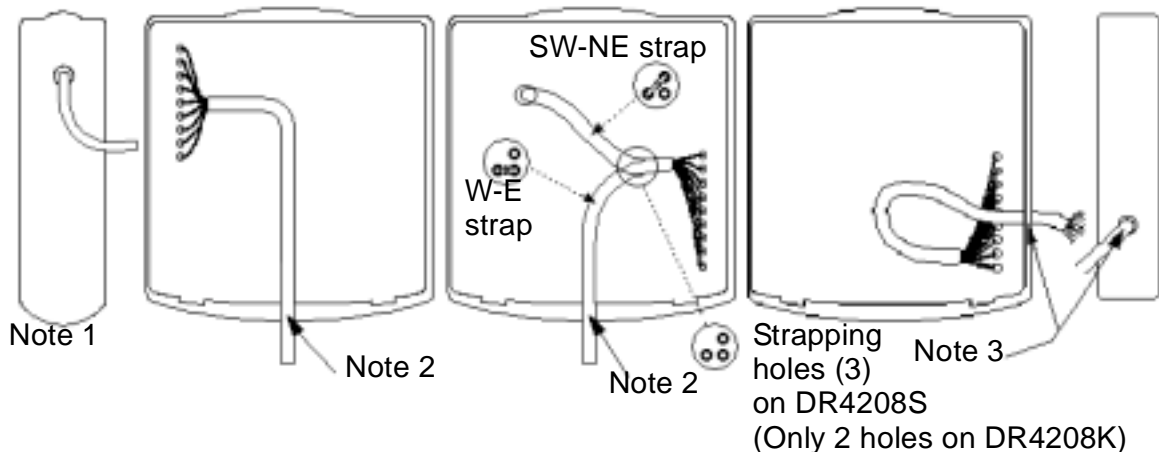
Figure 4: Cable Routing Configurations

NOTE 1: The DR4203 cable is routed through the back only.

NOTE 2: For the DR4200K, the DR4205 and the DR4220 Digi-Readers, and as an alternative for the DR4208S, open the notch for routing the cable through the bottom of the DigiReader®.

NOTE 3: Drill a ¼" diameter hole in the appropriate side of the facia for the DR4205GM only. (See "Figure 15: 4205GM (& 4208SGM): Routing Cable & Attaching Facia" on page 7-7 for the location.)

- Connect the DigiReader® interface cable to the controller wiring run according to "Table 13: Internal InterFace Cable for S-NET and Wiegand" on page 5-2. If the DigiReader® is the last S-NET device on the S-NET cable run, install the termination jumper as directed in "Table 12: Termination Jumpers" on page 5-1.

- Set the address switch, as required.

CHAPTER 5 - SWITCHES, CABLES & JUMPERS

5

120-OHM TERMINATION/JUMPER (INTERNAL/EXTERNAL)

120 ohms of resistance is placed between Data A and Data B for proper end-of-line termination. Apply the terminator only if the DR4200 Series DigiReader® is the last device on the cable.

Reader	Termination/Jumper	
	Internal*	Location
DR4200K	Yes	W1
DR4201	Yes	W1
DR4203	Yes	W3

Reader	Termination/Jumper	
	Internal*	Location
DR4205†	Yes	W1
DR4208S‡	Yes	W1
DR4208K	Yes	S1 dip 10 on
DR4220	Yes	W1

* Jumper only available on surface mount technology (SMT) models
† All models: DR4205, DR4205GM and DR4205K
‡ Both models: DR4208S, DR4208SGM

Table 12: Termination Jumpers

INTERNAL I/F CABLE (4200K/4201/4203/4205/4208S/4208K/4220)

An attached pigtail cable assembly provides the connection from the printed-circuit assembly and keypad to the access control unit wiring on all of the following DigiReader® models: DR4200K, DR4201, DR4203, DR4205, DR4205E, DR4205GM, DR4205K, DR4205W, DR4208S*, DR4208SGM*, DR4208K* (* note the wider voltage range) and DR4220. The cable is color coded as follows:

COLOR	FUNCTION	S-NET Use	Wiegand Use	
Red	+12.5 to +24 VDC	S-NET Nominal	Wiegand Nominal	
Green	S-NET A	For use with Nex-Watch S-NET access control panels	NA	
White	S-NET B			
Black	GND	S-NET DC Return	Wiegand DC Return	
Shield	Earth	S-NET Shield	Wiegand Shield: Tied to Wiegand DC Return	
Blue	Data 0 (Out 0)	NA	For use with Wiegand access control panels	
Orange	Data 1 (Out 1)			
Yellow	LED 0		Red	Both LEDs are ACU controlled and are ON / low or OFF / high
Brown	LED 1		Green	

Table 13: Internal InterFace Cable for S-NET and Wiegand

RECOMMENDED S-NET CABLE
. . . .

The type of cable used for the S-NET will depend on the total length and the number of devices connected. "Table 14: Recommended S-NET Cable" on page 5-2 lists NexWatch®-recommended cables:

	MANUFACTURER	PHYSICAL DESCRIPTION	GAUGE
Data and Power < 4000 ft.	Southwest Wire & Cable SW 179/Gray	2 Conductor: Data 2 Conductor: Power	22 AWG 16 AWG
Data and Power < 500 ft.	Belden 9552 Belden 1069	2-Pair Shielded	18 AWG 16 AWG
Data Only > 500 ft.	Belden 9841	1-Pair Shielded	24 AWG
Power Only > 500 ft.	Belden 9341 Belden 9342 Belden 9343	2 Conductor	18 AWG 16 AWG 14 AWG

Table 14: Recommended S-NET Cable

DIGIREADER® ADDRESS SWITCHES

Rotary Address Switches for DR4200K, 4203, and 4205 (all models)

Each DigiReader® must have a unique address. The DR4200K, DR4203, and DR4205 (all models) DigiReader®s use two address switches S1 and S2, (as shown in "Figure 5: Address Switches for 4200K, 4203 & 4205 (all models)" on page 5-3):
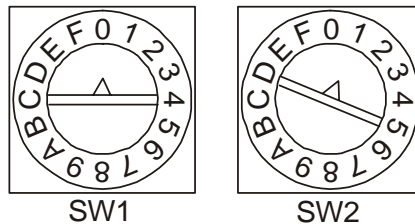
Figure 5: Address Switches for 4200K, 4203 & 4205 (all models)

- Switch S1 has two uses: to select the special reader modes of operation, and to allow address 16 (as shown in "Table 15: Valid Settings - DR4200K, 4203, 4205 S1 and S2" on page 5-4). S1 is set to 0 (factory default setting) for S-NET operation and F for Wiegand operation.

- Switch S2 is used to set the Reader/Door address, and, with S1 set to F, for additional options, including (S2 = A or B) the Wiegand number of bits. S2 has a factory default setting of 1, but it may be set to any address from 1 to F (15). A 16th DigiReader® address is provided by setting switch S2 to 0 and switch S1 to the settings shown in "Table 15: Valid Settings - DR4200K, 4203, 4205 S1 and S2" on page 5-4).

Valid addresses may be limited by the controller. (Please see the appropriate controller manual.)

When used with an SE422, addresses 01 and 02 should be assigned to nodes 13 (VIP2/DR4200K) and 15 (DKR), and 14 (VIP2/DR4200K) and 16 (DKR), respectively, see section 6 of the SE422 Installation Manual (p/n 66108328001), under Entry (Door) programming, questions 14 and 15.

Exceptions and Feature Notes	S1 (Normal Mode)	S1(PIN/ Credential Mode — 4205K Only)	S2	FUNCTION
	0	4, 5 or 6	1	Reader/Door addresses 1-F hexadecimal (1-15 decimal)
	0	4, 5 or 6	2	
	. .	. .	. .	
	0	4, 5 or 6	E	
	0	4, 5 or 6	F	
4205K Only	8	C, D or E	0	Reader/Door address 16 decimal
4205 Only	1		0	
4203/4200K	0		0	(No address 16)
All except 4200K	F		A	Wiegand 26-bit
	F		B	Wiegand 34-bit
All	F		E	Demo Mode
(Not 4200K)	F		F	RF Test Mode

Table 15: Valid Settings - DR4200K, 4203, 4205 S1 and S2

DIP Address Switch S1 for DR4201, 4208S/SGM/K and 4220

The DR4201 and DR4220 each have a 5-position DIP-switch S1. The DR4208S, DR4208SGM and DR4208K all have a 10-position DIP switch S1. These DIP-switches are shown in "Figure 6: S1 Address DIPs for 4201 and 4220 (Address 1 Selected)" on page 5-5, with S-NET address 1 selected. In each case the DIP-switch S1 combines the functions of the rotary address switches   S1 and S2 used by the other DR4200 Series DigiReader®s.

Figure 6: S1 Address DIPs for 4201 and 4220 (Address 1 Selected)

"Table 16: DR4201 and 4220 S1 Address DIP-Switch Settings" on page 5-5 shows selections for S-NET addresses and Wiegand, DEMO mode and TEST mode for these DigiReader®s.

| Switch S1 Settings | | | | | Reader/Door | Switch S1 Settings | | | | | Reader/Door |
1	2	3	4	5	Address / Function	1	2	3	4	5	Address / Function
Off	Off	Off	Off	Off	Off-line 0	On	On	Off	On	Off	11
On	Off	Off	Off	Off	1	Off	Off	On	On	Off	12
Off	On	Off	Off	Off	2	On	Off	On	On	Off	13
On	On	Off	Off	Off	3	Off	On	On	On	Off	14
Off	Off	On	Off	Off	4	On	On	On	On	Off	15
On	Off	On	Off	Off	5	Off	Off	Off	Off	On	16
Off	On	On	Off	Off	6	Off	On	Off	On	On	26-bit Wiegand I/F
On	On	On	Off	Off	7	On	On	Off	On	On	34-bit Wiegand I/F
Off	Off	Off	On	Off	8	Off	On	On	On	On	DEMO Mode
On	Off	Off	On	Off	9	On	On	On	On	On	TEST Mode
Off	On	Off	On	Off	10						

Table 16: DR4201 and 4220 S1 Address DIP-Switch Settings

"Table 17: DR4208S/SGM S1 Address DIP-Switch Settings" on page 5-6 shows S-NET addresses and Wiegand selections for the DR4208S and DR4208SGM. "Table 18: DR4208K S1 Address DIP-Switch Settings" on page 5-6 shows S-NET addresses and Wiegand selections for the DR4208K.

1	2	3	4	5	6	7	8	9	10	S-NET Address/Function
Off	Off	Off	Off	Off	Off	X	X	X	X	0
On	Off	Off	Off	Off	Off	X	X	X	X	1
Off	On	Off	Off	Off	Off	X	X	X	X	2
On	On	Off	Off	Off	Off	X	X	X	X	3
Off	Off	On	Off	Off	Off	X	X	X	X	4
On	Off	On	Off	Off	Off	X	X	X	X	5
Off	On	On	Off	Off	Off	X	X	X	X	6
On	On	On	Off	Off	Off	X	X	X	X	7
Off	Off	Off	On	Off	Off	X	X	X	X	8
On	Off	Off	On	Off	Off	X	X	X	X	9
Off	On	Off	On	Off	Off	X	X	X	X	10
On	On	Off	On	Off	Off	X	X	X	X	11
Off	Off	On	On	Off	Off	X	X	X	X	12
On	Off	On	On	Off	Off	X	X	X	X	13
Off	On	On	On	Off	Off	X	X	X	X	14
On	On	On	On	Off	Off	X	X	X	X	15
Off	Off	Off	Off	On	Off	X	X	X	X	16
On	Off	Off	Off	On	Off	X	X	X	X	17
Off	On	Off	Off	On	Off	X	X	X	X	18
On	On	Off	Off	On	Off	X	X	X	X	19
Off	Off	On	Off	On	Off	X	X	X	X	20

1	2	3	4	5	6	7	8	9	10	S-NET Address/Function
On	Off	On	Off	On	X	X	X	X	X	21
Off	On	On	Off	On	X	X	X	X	X	22
On	On	On	Off	On	X	X	X	X	X	23
Off	Off	Off	On	On	X	X	X	X	X	24
On	Off	Off	On	On	X	X	X	X	X	25
Off	On	Off	On	On	X	X	X	X	X	26
On	On	Off	On	On	X	X	X	X	X	27
Off	Off	On	On	On	X	X	X	X	X	28
On	Off	On	On	On	X	X	X	X	X	29
Off	On	On	On	On	X	X	X	X	X	30
On	On	On	On	On	X	X	X	X	X	31
Off	On	Off	On	Off	On	X	X	X	X	Wiegand I/F (26-bit - 2A HEX) 2-LEDs
On	On	Off	On	Off	On	X	X	X	X	Wiegand I/F (34-bit - 2B HEX) 2-LEDs
Off	Off	On	On	Off	On	X	X	X	X	Wiegand I/F (26-bit - 2C HEX) 1-LED
On	Off	On	On	Off	On	X	X	X	X	Wiegand I/F (34-bit - 2D HEX) 1-LED
Off	On	On	On	Off	On	X	X	X		TEST Mode - 2E HEX (Not Implemented)
On	On	On	On	Off	On	X	X	X		DEMO Mode- 2F HEX (Not Implemented)
Off	Off	Off	Off	On	On	X	X	X	X	Wiegand I/F (42-bit - 30 HEX) 1-LED
On	Off	Off	Off	On	On	X	X	X	X	Wiegand I/F (42-bit - 31 HEX) 2-LED
						Off	X	X	X	9600 S-NET Baud
						On	X	X	X	19200 S-NET Baud

Table 17: DR4208S/SGM S1 Address DIP-Switch Settings

1	2	3	4	5	6	7	8	9	10	S-NET Address/Function
Off	Off	Off	Off	Off	Off	X	X	X	X	32
On	Off	Off	Off	Off	Off	X	X	X	X	1
Off	On	Off	Off	Off	Off	X	X	X	X	2
On	On	Off	Off	Off	Off	X	X	X	X	3
Off	Off	On	Off	Off	Off	X	X	X	X	4
										See the previous table for S-NET addresses 5 through 26
On	On	Off	On	On	Off	X	X	X	X	27
Off	Off	On	On	On	Off	X	X	X	X	28
On	Off	On	On	On	Off	X	X	X	X	29
Off	On	On	On	On	Off	X	X	X	X	30
On	On	On	On	On	Off	X	X	X	X	31

1	2	3	4	5	6	7	8	9	10	S-NET Address/Function
Off	On	Off	On	Off	On	X	X	X	X	Wiegand I/F (26-bit - 2A HEX) 2-LEDs
On	On	Off	On	Off	On	X	X	X	X	Wiegand I/F (34-bit - 2B HEX) 2-LEDs
Off	Off	On	On	Off	On	X	X	X	X	Wiegand I/F (26-bit - 2C HEX) 1-LED
On	Off	On	On	Off	On	X	X	X	X	Wiegand I/F (34-bit - 2D HEX) 1-LED
Off	On	On	On	Off	On	X	X	X	X	TEST Mode - 2E HEX (Not Implemented)
On	On	On	On	Off	On	X	X	X	X	DEMO Mode- 2F HEX (Not Implemented)
Off	Off	Off	Off	On	On	X	X	X	X	Wiegand I/F (42-bit - 30 HEX) 1-LED
On	Off	Off	Off	On	On	X	X	X	X	Wiegand I/F (42-bit - 31 HEX) 2-LED
					Off	Off	Off	X	X	DKR ONLY
					Off	On	Off	X	X	DKR + VIP
					On	On	Off	X	X	DKR + VIP (PIN as Key & Key as PIN)
					Off	Off	On	X	X	MSR+VIP (MSRK)
					Off	On	On	X	X	Wiegand S-NET
								Off	X	9600 S-NET Baud
								On	X	19200 S-NET Baud
									Off	No End of Line Terminator
									On	End of Line Terminator

'PIN as Key & Key as PIN' (DIPs 6 & 7 set) uses S-NET addresses (1-32), (DIPs 1—5), as for 'Normal' usage (to the left & above), with DIPs 6 & 7=1 and DIP 8=0

Table 18: DR4208K S1 Address DIP-Switch Settings

TAMPER SIGNAL (S-NET ONLY)

Each DR4200 Series DigiReader® sends a tamper signal to an S-NET-based Controller each time an address switch is changed: S1 or S2, described above, "Rotary Address Switches for DR4200K, 4203, and 4205 (all models)" on page 5-3. (The DR4201, DR4208S, DR4208K and DR4220 have separate physical tamper switches as shown in "Table 19: Tamper Switches" on page 5-7.)

DigiReader®:	DR4200K	DR4201	DR4203	DR4205	DR4208S	DR4208K	DR4220
Tamper:	via S1 or S2	via S1 / Tamper	via S1 or S2	via S1 or S2	via Tamper	via Tamper	via Tamper

Table 19: Tamper Switches

CHAPTER 6 - CONNECTIONS

6

S-NET CONNECTIONS

The S-NET is an RS485 serial network for communication between the Controller and node devices. Typically, the cable used is two twisted pairs with an overall shield; one pair is for data, the other pair is for DC power. Terminate the last S-NET device with a 120-ohm, ¼ watt resistor or termination jumper as shown in "Figure 7: S-NET Wiring" on page 6-1. The maximum S-NET length is 4000 feet (1200 meters).
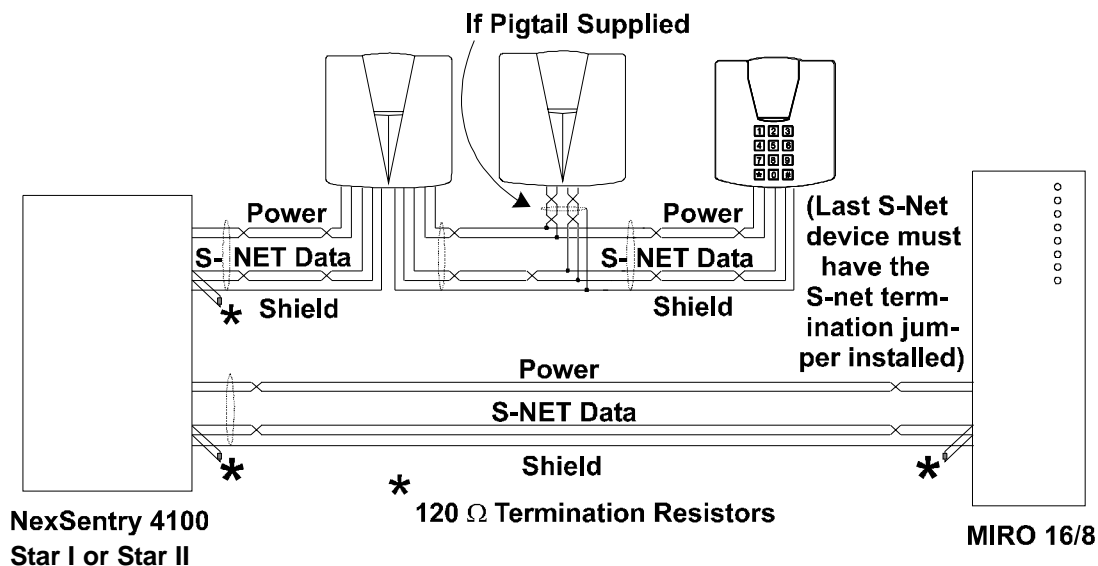

Figure 7: S-NET Wiring

S-NET cable should only be installed in a daisy-chained fashion. NexWatch® strongly recommends replacing all crimp lug/soldered splices by daisy-chained connections in and out of each device. (Note that up to two AD4305 NexStar RS485 Multiplexers may be used to simplify wiring and extend a network.)

Where a pigtail cable is provided with the reader, a splice is required and the installer should, if possible, keep the splice within 3 feet of the reader, to allow splice inspection at the reader location.

The type of cable used for the S-NET should be separate twisted-pair (data and power). See "Table 14: Recommended S-NET Cable" on page 5-2 for NexWatch® recommended S-NET cables.

W IEGAND C ONNECTIONS

Refer to "Table 20: Recommended Wiegand Cable Gauge" on page 6-2 for the proper wire size for a particular cable length to use in a DigiReader® Wiegand application. "Figure 8: Typical Wiegand Connection" on page 6-2 illustrates the use of a Universal Wiegand Interface Unit (UWIU) in a typical Wiegand connection.

6-Conductor Wiegand Cable with Shield			
Minimum Wire Size:	22 AWG	20 AWG	18 AWG
Maximum Length:	200 feet	300 feet	500 feet

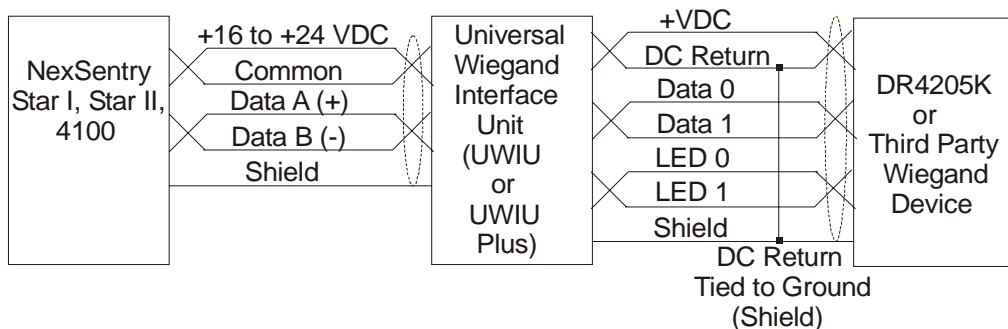**Table 20: Recommended Wiegand Cable Gauge**

Figure 8: Typical Wiegand Connection

CHAPTER 7 - MOUNTING

7

MOUNTING LOCATION

Use care when choosing the installation site. To avoid possible external sources of RF interference, do not locate the unit near motors, pumps, generators, DC-AC converters, AC switching relays, light dimmers, or any other devices that emit an electronic radar frequency. Do not locate the unit within 10 feet (3 m) of a computer terminal.

For the mounting of the DR4201 reader, see "Special Mounting Location: DR4201 Reader" on page 7-2.

The DR4203, which is designed to be mounted on a metal door mullion, is the only reader that is specifically designed to be mounted on metal. Metal in the vicinity of any of the other devices can reduce the read range. In general, as the amount of metal in close proximity to the device increases, the reliable maximum read range decreases. For optimum operation, ensure that a DigiReader® has a minimum of 6 inches (15 cm) clearance at the rear and surrounding sides, as shown in "Figure 9: Mounting 4205, 4208S, 4208K Near Metal: Best Read Range" on page 7-2. Never cover the front of the DigiReader® with any type of metal.

To obtain the maximum performance from the DR4220 reader, mount the reader at least 10 inches away from any conducting metal.

Use the method appropriate to the mounting surface material; if required, use sealing compound to maintain water-resistance.
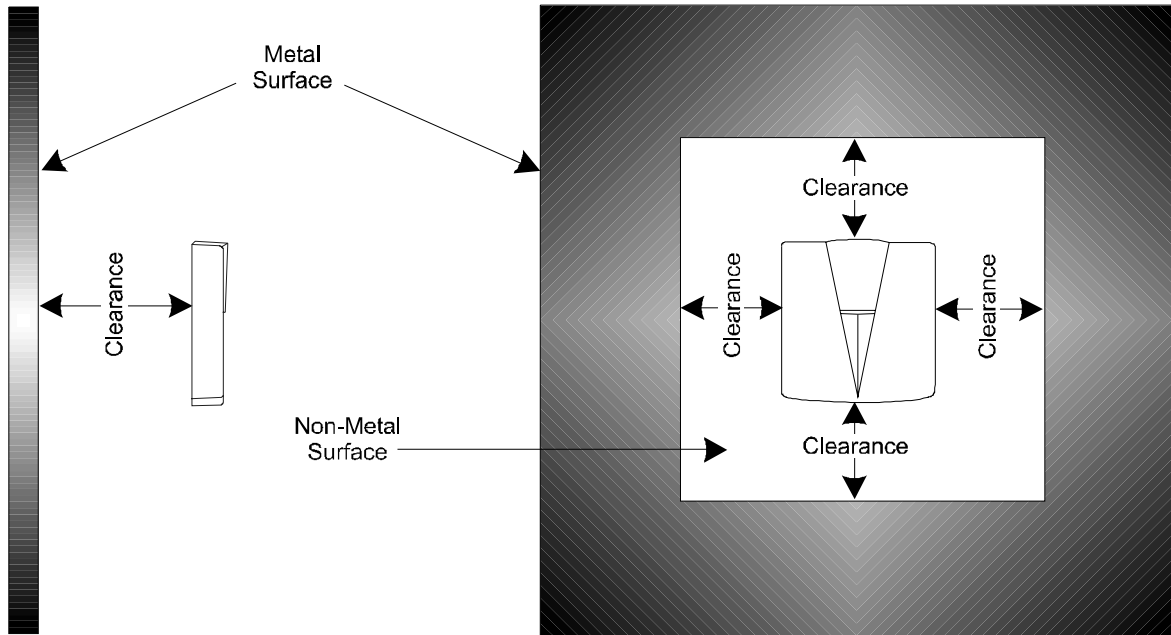
Figure 9: Mounting 4205, 4208S, 4208K Near Metal: Best Read Range

Special Mounting Location: DR4201 Reader

The DR 4201 reader is designed to be mounted in a single-gang wiring box, (European or US), as shown in "Figure 10: European and US Gang Box Mounting Holes Indicated" on page 7-3 and "Figure 11: 4201 Back-Plate and Spacer With Mounting Holes Indicated" on page 7-3, although you can choose to mount it differently, so that "Figure 12: 4201 Example Mounting Template" on page 7-4, (together with the Note), indicates the appropriate dimensions.

(Especially when mounted outdoors, we recommend using a caulking compound around the edges of the unit after mounting.)
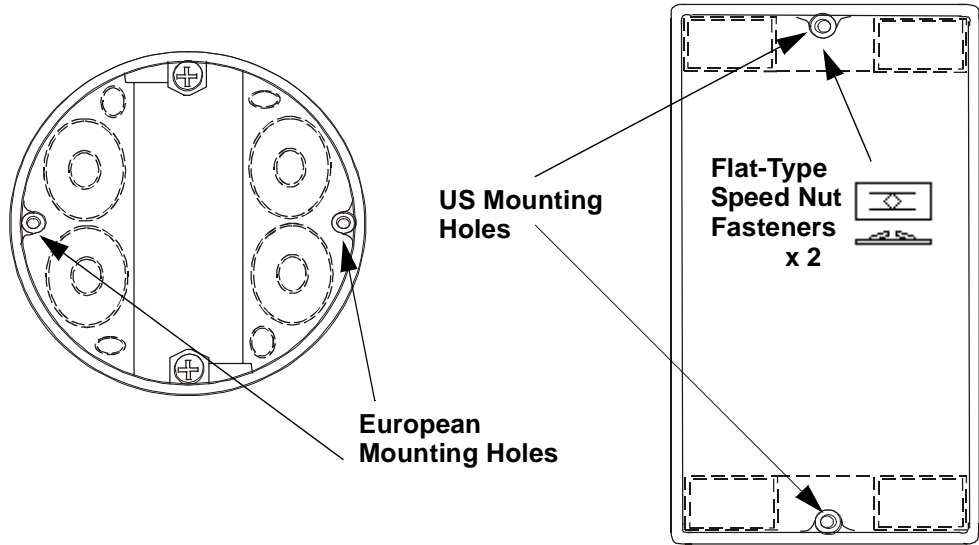
Figure 10: European and US Gang Box Mounting Holes Indicated

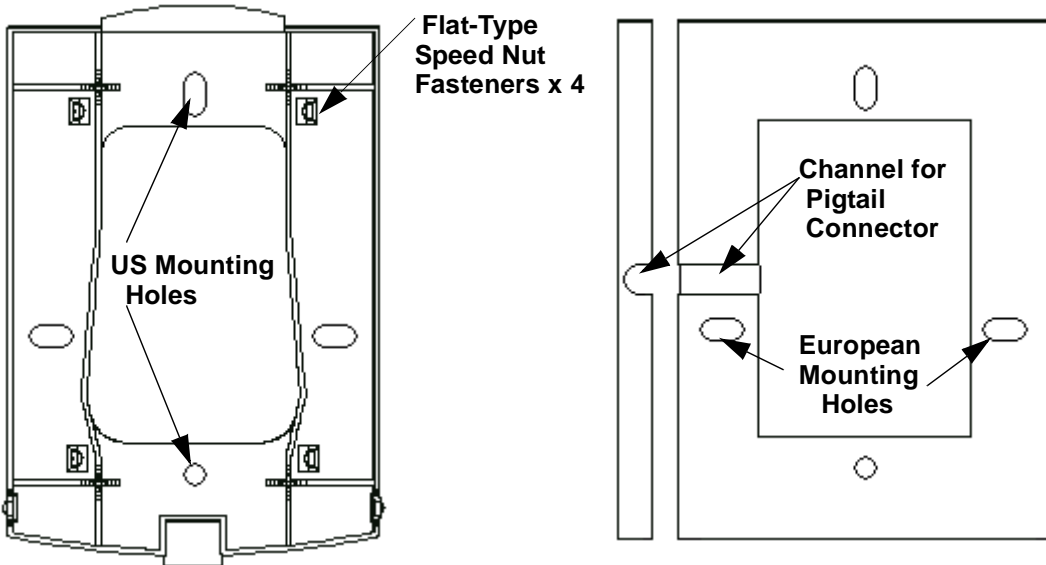**Figure 11: 4201 Back-Plate and Spacer With Mounting Holes Indicated**
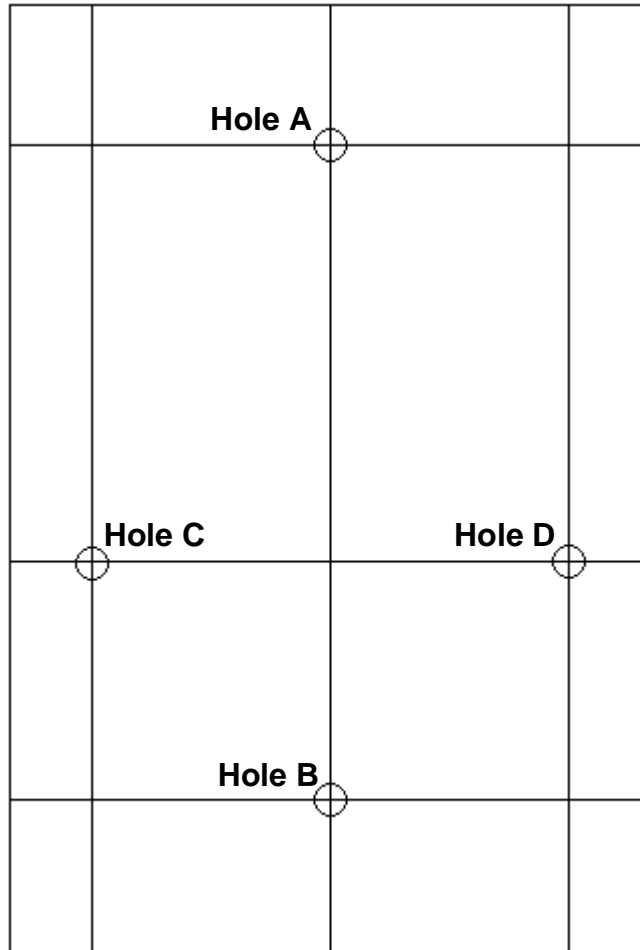
Figure 12: 4201 Example Mounting Template

CAUTIONARY NOTE: "Figure 12: 4201 Example Mounting Template" on page 7-4 is an "example" template only. Draw yourself an accurate template. For the US, the centers A and B will be 3.25 in. (or 8.25 cm.) apart. For Europe, the centers C and D will be 2.36 in. (or 6.00 cm.) apart.

Wall Mounting with Screws (4203/4205/4208S/4208K/4220)

- Mount the reader base to the wall. Use the NexWatch®-supplied, 1¼" Flathead, #6-32 thread or other means appropriate to the wall composition.

- Put the DigiReader® cover in place and secure the cover with the supplied screw(s) from the bottom as shown in "Figure 13: Securing the 4203, 4205 Series, 4208S, 4208K & 4220 Covers" on page 7-5.

DR4203

DR4205 Series and DR4208S
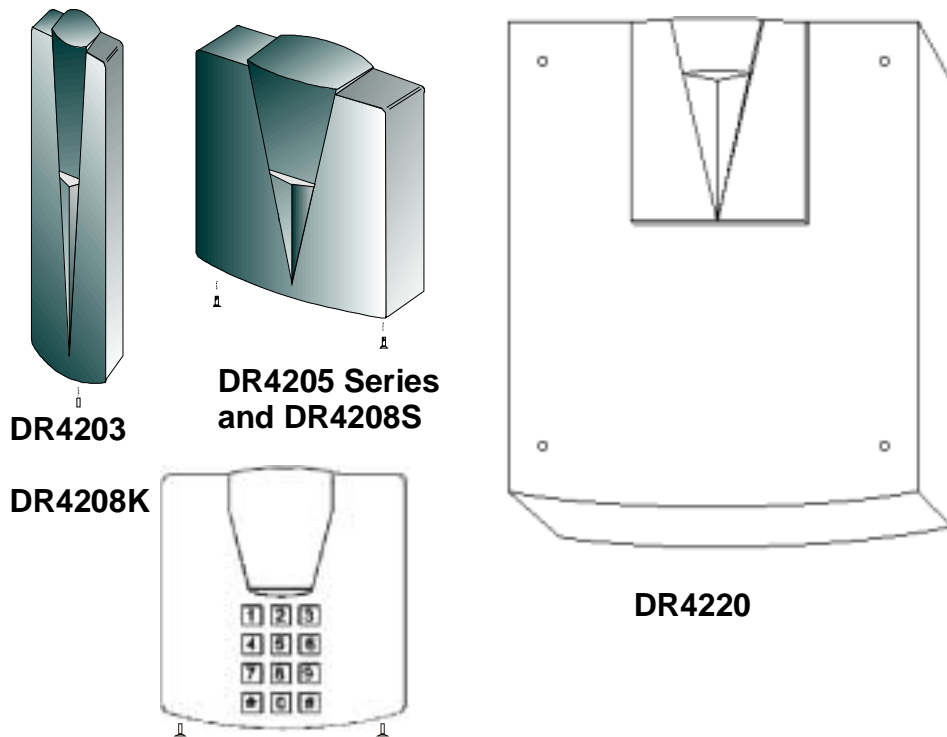
DR4208K

DR4220

Figure 13: Securing the 4203, 4205 Series, 4208S, 4208K & 4220 Covers

Window Mounting the Glass-Mounted Units

This type of mounting is necessary for the DR4205GM and DR4208SGM units.

1. Clean the window with glass cleaner or isopropyl alcohol and dry thoroughly.

2. Spray or wipe the window with slightly soapy water.

3. While the window is still wet, peel off the paper backing of the decal and press against the wet section of the window and move around to release any air bubbles to assure maximum contact with the window. Wipe dry any extra water coming out from the sides.

    See "Figure 14: 4205GM & 4208SGM: Placement of Decal & Reader onto Glass" on page 7-6.

4. Once the reader and decal are in place, it may be necessary to temporarily tape the reader to the window while the adhesive sets. It should take approximately 10 minutes.
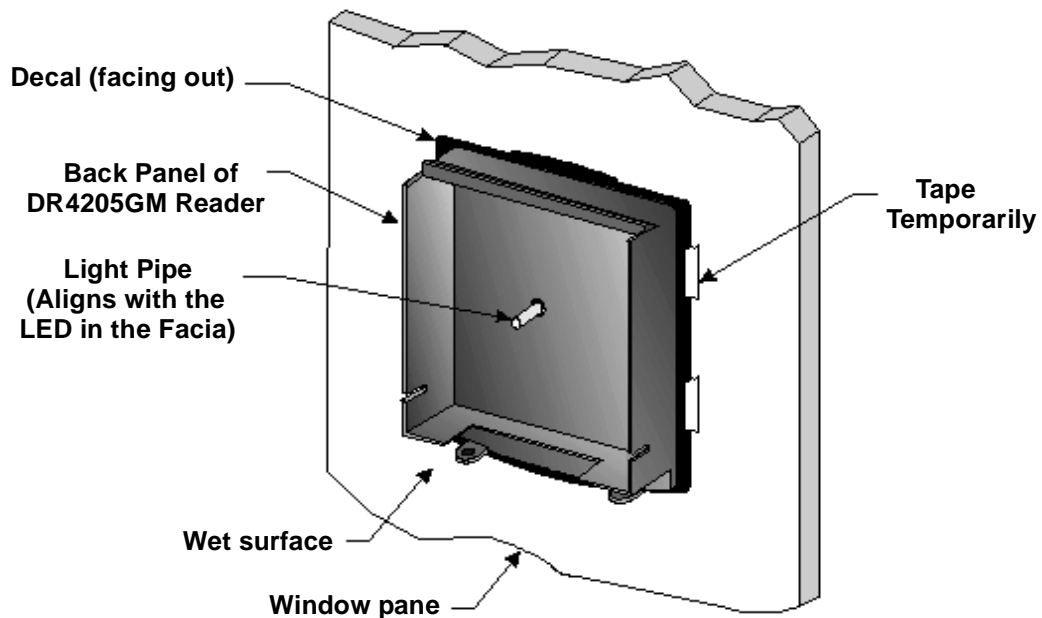
Figure 14: 4205GM & 4208SGM: Placement of Decal & Reader onto Glass

5. While the adhesive is setting, follow the general installation instructions on routing the cable through the side channel and addressing the unit. After determining on which side the cable will be routed through, drill a hole in that side of the front facia to match the pre-drilled slots in the back panel of the reader.

NOTE: Reference "Figure 4: Cable Routing Configurations" on page 4-2 for cabling instructions. Also see "Figure 15: 4205GM (& 4208SGM): Routing Cable & Attaching Facia" on page 7-7.

6. Secure the cover as shown below.

DR4205GM Reader Facia

4.72" (12 cm.)

0.25" (0.63cm) diameter

Drill Hole to Match Slot

Window Pane

S-NET Cable

0.40" (1 cm)

Figure 15: 4205GM (& 4208SGM): Routing Cable & Attaching Facia

7. After the reader is securely set to the window, remove any masking tape used and clean the window surrounding the reader.

Mounting Instructions for the DR 4220 DigiReader®
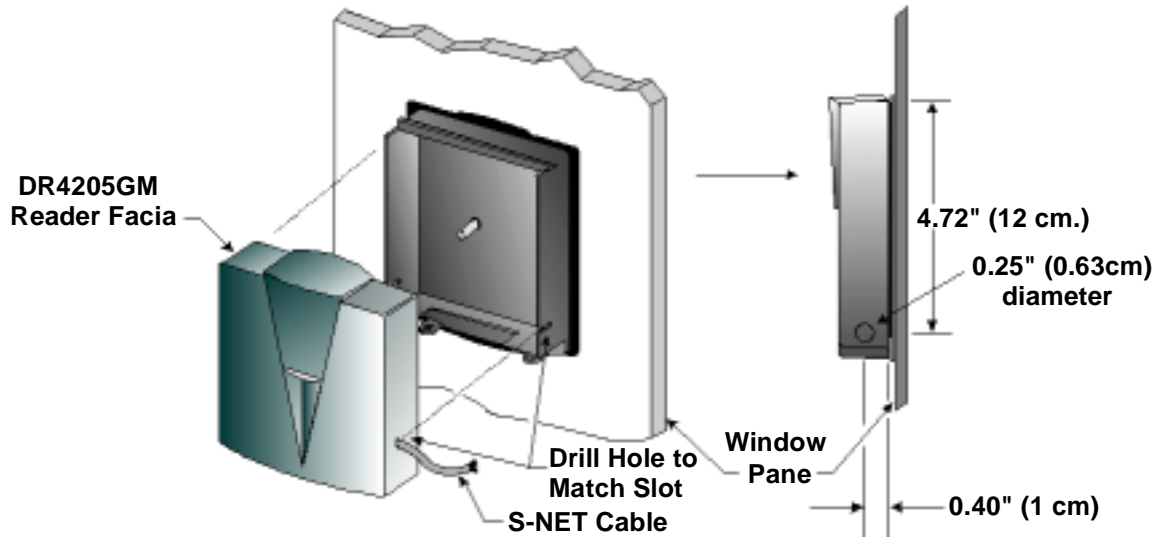
Carefully choose the installation site to avoid possible external sources of RF interference. Interference may cause reduced performance, so **DO NOT** locate the unit near motors, pumps, generators, DC-AC converters, AC switching relays, light dimmers, etc., or within 10 feet (3 m) of a computer terminal.

WARNING: DO NOT mount the unit on or near any type of metal, including nonferrous metals such as aluminum. (Metal may cause reduced performance or possible **damage to the unit**.) The unit may NOT operate properly if it is in near to, or mounted directly on metal, reinforced steel in concrete, screens, or reinforcing bars. In addition, the unit must not be framed with or surrounded by metal of any kind. If the unit must be mounted near metal structures, ensure that it has a minimum of 10 inches (25.4 cm) clearance at the rear and surrounding sides. Never cover the front of the DigiReader®. with any type of metal. Metal anywhere near the device can reduce the read range. In general, as the amount of metal close to the device increases, the reliable maximum read range decreases.

DR 4220 PEDESTAL-MOUNTING INSTRUCTIONS:

There must be no conducting metal closer than 10 inches to the DR4220 reader, except for a unit mounted with a goose-neck pedestal mounting tube, as shown in "Figure 16: 4220 Pedestal-Mounting (Side & Back Views)" on page 7-9.

The recommended mounting method follows:

• Remove the case front (cover).

• Use the NexWatch®-supplied drilling template to pre-drill 4 holes on the plywood or LEXAN® sheet (recommended ¾" thick). A channel must be cut into the plywood or LEXAN® for the cable between the exit point of the reader and the goose-neck
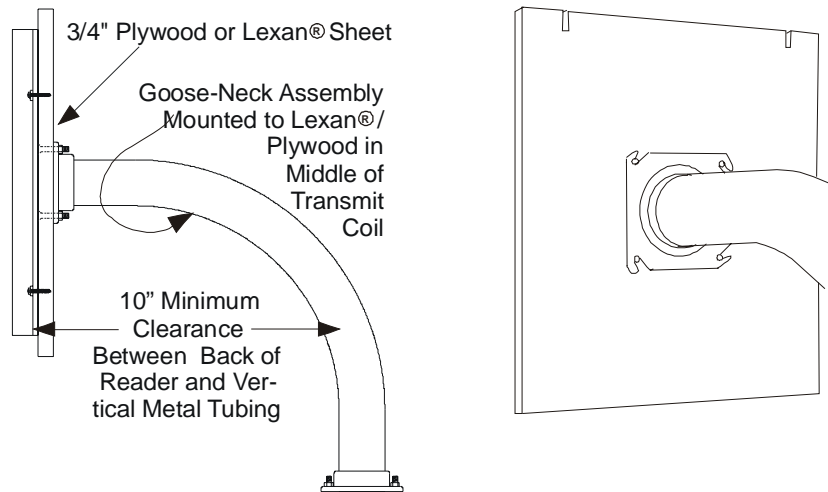
Figure 16: 4220 Pedestal-Mounting (Side & Back Views)

- Mount the plywood or LEXAN® sheet to a goose-neck pedestal mounting tube. (A minimum of 10" clearance is recommended between the back of the reader and the vertical metal tubing). Center the mounting tube. (See "Figure 16: 4220 Pedestal-Mounting (Side & Back Views)" on page 7-9.)

- See "Table 13: Internal InterFace Cable for S-NET and Wiegand" on page 5-2 and the section: "Internal I/F Cable (4200K/4201/4203/4205/4208S/4208K/4220)" on page 5-1 to install the color-coded pigtail cable.

- Route the cable through a channel on the plywood or LEXAN® sheet. (See section: "DR 4220 RECOMMENDED STAND-OFF PLATE" on page 7-12 and "Figure 19: Recommended Stand-Off Plate Dimensions" on page 7-12)

- Now, as shown in "Figure 17: 4220 Pedestal-Mounting (Front View)" on page 7-10, mount the DR4220 board and case back (back plate) to the plywood or LEXAN® sheet.

Figure 17: 4220 Pedestal-Mounting (Front View)

- Set the address switch, as required.

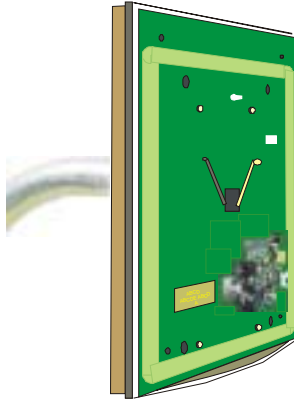- Install the case front (cover) and be sure that the LED is not damaged as it enters the lens assembly.

- Secure the case front with the supplied screws. (See "Figure 18: 4220 Case Front, Showing Four Mounting Holes" on page 7-10.)
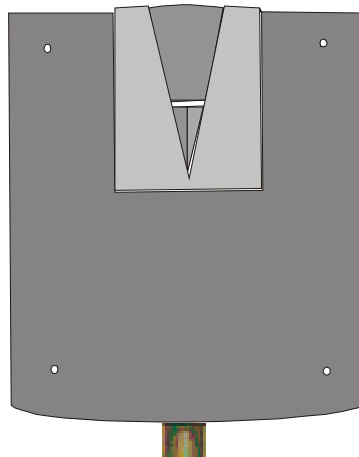
Figure 18: 4220 Case Front, Showing Four Mounting Holes

DR 4220 WALL-MOUNTING INSTRUCTIONS:

There must be no conducting metal closer than 10 inches to the DR4220 reader.

The recommended mounting method follows:

• Remove the case front (cover).

• Use the NexWatch®-supplied drilling template (included with the reader) to drill four holes in the wall.

• See "Table 13: Internal InterFace Cable for S-NET and Wiegand" on page 5-2 and the section: "Internal I/F Cable (4200K/4201/ 4203/4205/4208S/4208K/4220)" on page 5-1 to install the color-coded pigtail cable.

• Mount the DR4220 board and case back (back plate) using 2¼" Panhead #6-32 thread screws (or other means appropriate to the wall composition).

• Set the address switch, as required.

• Install the case front (cover) and be sure that the LED is not damaged as it enters the lens assembly.

• Secure the case front with the supplied screws. (See "Figure 18: 4220 Case Front, Showing Four Mounting Holes" on page 7-10.)

DR 4220 RECOMMENDED STAND-OFF PLATE

Material is ¾" LEXAN®, Plywood or equivalent.
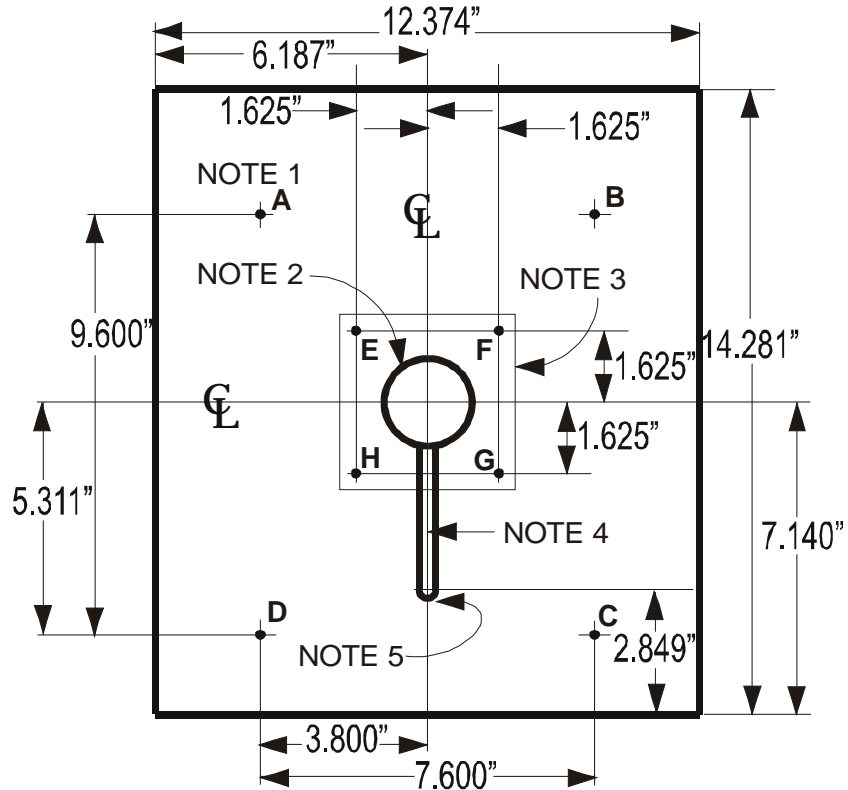
NOTE 1: 0.125" diameter holes @ A, B, C, D, E, F, G & H
NOTE 2: 2.000" diameter center hole
NOTE 3: Square included for reference only
NOTE 4: Route channel 0.25" deep minimum
NOTE 5: Radius 0.188"

Figure 19: Recommended Stand-Off Plate Dimensions

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CHAPTER 8 - TESTING DIGIREADER® LOCATION

8

If you suspect the presence of RF interference at a location where you plan to install a DigiReader®, you should check the site prior to mounting the DigiReader® unit. The presence of RF interference may affect a DigiReader® in two different ways:

- If RF interference is present, the DigiReader® unit may exhibit false reads (or 'ghost' reads), i.e., the unit may beep and the LED illuminate, with no access credential present.

- Alternatively, with RF interference present, the DigiReader® unit may read an access credential inaccurately, slowly, or even may be prevented from reading the credential.

The following procedures will make it easier for you to identify a suitable location and to position the DigiReader® to minimize any RF interference:

1. The DigiReader® models DR4200, DR4203, and DR4205 (all models) have two address switches, S1 and S2 – set the switches on the DR4203 and DR4205 to FF for the test mode. The DigiReader® models DR4201 and DR4220 have a five-position dip-switch for the address – set all five dip-switch positions to ON for the test mode. The DR4208S/SGM have a ten-position dip-switch for the address – set dip switches 2 , 3, 4 and 6 to ON for the test mode (address 2E hex). Then perform the following steps:

- Connect only the S-Net wires which provide power, (DC positive power and the DC return, and the grounding shield), between the DigiReader® and the controller.

- Hold the DigiReader® against the installation surface.

- Verify that there are no cards or other credentials in the area capable of being detected by the reader. (A credential in your pocket, or somewhere-else where it can be detected, could be the source of any beeping, so you must be sure this is not the case.)

- If you are sure no credentials are present and the reader beeps, then there is RF interference present, causing the beeping. (The number of beeps is an indication of the degree of noisiness: more beeping indicates a more noisy environment than less beeping.)

- Keep testing locations until you find one where no false or 'ghost' reads occur.

2.   With no false or 'ghost' reads occurring, and with the reader still in test mode, present a credential to the reader . The reader should now beep, indicating that the card has been read. (If the reader does not beep when the card is presented, there may be a source of RF present blocking the reading of the card. In this case also, keep trying new locations,)

- With the credential reading correctly, verify the read time and the maximum read distance.

   Using "Table 1. DR 4201, 4203, 4208S Specifications" on page 2-1 or "Table 2. DR 4208K, 4220, 4200K Specifications" on page 2-2 or "Table 3. DR4205, 4205GM, 4205K Specifications" on page 2-3, you can determine the reader's capability with your chosen credential type(s). This same performance is what you would expect once the system is completely installed.

3.   When a suitably quiet location has been identified, (relatively free from RF noise), connect the DATA A and DATA B wires between the DigiReader® and the Access Control Unit.

- Set switches S1 and S2, for the DR4203 and DR4205 models (or, for the DR4201, the DR4208S,or the DR4220, the 5-position dip-switch), (or, for the DR4208K, the 10-position dip-switch) to the correct address. With the controller now physically connected to the S-Net, and the address switch(es) set, set up the controller to read credentials.

- Present a valid credential to the unit.

- Verify that the credential can be read from the expected distance.

4. The read-range on the DigiReader® should now be optimal, but,

- If trouble persists, verify the S-Net wiring and grounding, and / or

- Repeat steps 1, 2, 3, as necessary, to assure the best (most optimal) installed location.

CHAPTER 9 - TROUBLESHOOTING

9

Field troubleshooting methods fall into three categories: 1. power problems; 2. communication errors; 3. communication failures.

"Table 21: Troubleshooting" on page 9-1 lists the most common symptoms for these conditions and provides suggested actions to identify and get the system (back) into running order.

Symptom	Troubleshooting Action	
LED not lit in ready mode	Check power	Check power supply
		Check Phoenix connector
		Check fuses
		Check socketed ICs
Comm Failure	Check LED lit in ready mode	If not, see above
	Check S-NET	Check cable connections
		Check power supply grounding
	Check EPROMs	
No Read Slow Read Short Read Range (Comm Errors	Check S-NET	Verify correct termination
		Network length - need NexStar?
		Verify common groundings
		Check shield connections
		Perform TUNE command *
Ghost or mis-reads	See "Chapter 8 - Testing DigiReader® Location" - Chapter 8	

Table 21: Troubleshooting

TUNE Command for NexSentry™ Star I and 4100-Series Controllers

TUNE Command (for NexSentry™ Star I and 4100-Series controllers)

YOUR COMMAND? TUNE

DOOR (1-16) ? 1   (door with a DKR reader)

1. DIGITAL KEY READER RANGE (0-255): 253 ?   (power control)

2. SEND TO ACU ONCE (Y/N): Y ?   (# of times DKR sends key to ACU)

3. NUMBER OF VERIFICATION KEY READS (0-255): 0 ?   (# retries, for high RF environment)

4. VERIFICATION TIME WINDOWS (0000-FFFF): 20 ?   (hex 20 = decimal 32)

5. BEEPER BEHAVIOR WITH A VALID KEY

   ON DURATION (0000-FFFF): A ?

   OFF DURATION (0000-FFFF): A ?   (hex A = decimal 10)

   ON-OFF TOTAL DURATION (0000-FFFF): 14 ?   (hex 14 = decimal 20)

Figure 20: TUNE Command - Star I & 4100-Series ACUs

NOTE: DR4201, DR4208S, DR4208K and DR4220 readers use only question 5, for the beeper.

DKR Configuration (General Tab) for NexSentry™ Star II Controllers

Figure 21: Star II DKR Configuration Data: General Tab

APPENDIX A: REPORTING MODES FOR DRS

SNET REPORTING FORMATS

DR4201, DR4208S, DR4208SGM and DR4208K readers recognize the NexWatch® credential and many types of non-NexWatch® credentials. They can also be programmed to report the credential data in:

- Digital Key Reader format (DKR format) or

- Magnetic Stripe Reader format (MSR format).

The Access Control Unit (ACU) downloads the report configuration to the reader during initialization.

DKR Data Report

Table 22 - How the 32-bit credential is stored in the DKR data report

Data byte	Data Description	Comment
1	Key most significant byte (bits 31-24)	Upper bits are 0 if the key is less than 32 bits long.
2	Key (bits 23-16)	
3	Key (bits 15-8)	
4	Key least significant byte (bits 7-0)	
5	Credential check byte (bits 7-0)	Not used
6	Credential check byte (bits 7-0)	

Notes:

1 The NexWatch® key type is always 32 bits long.

2 The non-NexWatch® key number is found by using the default key position and a key length based on the key type. See "Key Processing (non-NexWatch® keys only)" on page A-4.

MSR Data Report (Normal Format)

Table 23 - How data is stored in the MSR data report (normal format)

Data byte	Data Description	Comment
1	0	
2	Key most significant byte (bits 31-24)	Upper bits are 0 if the key is less than 32 bits long.
3	Key (bits 23-16)	
4	Key (bits 15-8)	
5	Key least significant byte (bits 7-0)	
6	Site code most significant byte (bits 15-8)	Upper bits are 0 if the code is less than 16 bits long.
7	Site code least significant byte (bits 7-0)	
8	Year (7-0)	Year defaults to 10
9	Month (7-0)	Month defaults to 7
10	Company code most significant byte (bits 15-8)	Upper bits are 0 if the code is less than 16 bits long. Defaults to 9999
11	Company code least significant byte (bits 7-0)	
12	0	
13	0	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	

Notes:

1 The NexWatch® key type is always 32 bits long; the site code is 9984; the year is 10; the month is 7; and the company code is 9999.

2 The reader uses the non-NexWatch® key type to find the key and the site codes. The year, month, and company code contain the default data shown when the key is not processed.

MSR Data Report (Raw Data Format)

The raw data format is used to send the non-NexWatch® key **only when the downloaded configuration includes the raw data flag, and only for Star I version 2.40 or Star II version 2.00 (or later).**

Table 24 - How data is stored in the MSR data report (raw data format)

Data byte	Data Description	Comment
1	Key length	Must be 16 or greater
2	Data field least significant bits (bits 7-0)	Bytes 2-13 contain the data as defined by the length (16-96).
3	Data field (bits 15-8)	
4	Data field (bits 23-16)	
5	Data field (bits 31-24)	
6	Data field (bits 39-32)	
7	Data field (bits 47-40)	
8	Data field (bits 55-48)	
9	Data field (bits 63-56)	
10	Data field (bits 71-64)	
11	Data field (bits 79-72)	
12	Data field (bits 87-80)	
13	Data field most significant bits (bits 95-88)	
14	0	
15	0	
16	0	
17	0	
18	0	
19	0	
20	0	

KEY PROCESSING (NON-NEXWATCH® KEYS ONLY)

1 In DKR mode the reader always finds the key code using the default parameters described in this section.

2 In MSR mode the reader can be configured to send the data in "raw data format" or to process it. If processed, the reader checks the type against the length downloaded in the Wiegand Interface Unit (WIU) configuration parameters. If the length is the same as the detected type then the key is processed using the down-loaded parameters. If the length is NOT the same, the reader locates the site and key codes by using default parameters as described in this section.

Default Processing

26-BIT DEFAULT FORMAT

Key bits

```
            1         2         3         4       tens  bit addresses
12345678901234567890123456789012345678          units

                    xxxxxxxxxxxxxxxxxxxxxxxxxx   data in 26-bit key
default 26-bit       xxxxxxxx                    site code
                            xxxxxxxxxxxxxxxx     key code
```

The default reports the site code: start bit 24, 8 bits long, and the key code: start bit 32, 16 bits long.

34-BIT DEFAULT FORMAT

Key bits

```
            1         2         3         4       tens  bit addresses
12345678901234567890123456789012345678          units

            xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx   data in 34-bit key
default 34-bit       xxxxxxxx                    site code
                            xxxxxxxxxxxxxxxx     key code
```

The default reports the site code: start bit 24, 8 bits long, and the key code: start bit 32, 16 bits long.

35-BIT CORPORATE 1000 CREDENTIAL DEFAULT FORMAT

Key bits

```
              1         2         3         4          tens   bit addresses
    12345678901234567890123456789012345678012345678    units

                xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx       data in 35-bit key
    default 35-bit xxxxxxxxxxxx                          site code
                          xxxxxxxxxxxxxxxxxxxx           key code
```
The default reports the site code: start bit 16, 12 bits long, and the key code: start bit 28, 20 bits long.

36-BIT DEFAULT FORMAT

Key bits

```
              1         2         3         4          tens   bit addresses
    12345678901234567890123456789012345678012345678    units

                xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx     data in 36-bit key
    default 36-bit      xxxxxxxx                         site code
                          xxxxxxxxxxxxxxxxxxxx           key code
```
The default reports the site code: start bit 20, 8 bits long, and the key code: start bit 28, 20 bits long.

37-BIT DEFAULT FORMAT

Key bits

```
              1         2         3         4          tens   bit addresses
    12345678901234567890123456789012345678012345678    units

                xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx    data in 37-bit key
    default 37-bit        xxxxxxxx                       site code
                            xxxxxxxxxxxxxxxx             key code
```
The default reports the site code: start bit 24, 8 bits long, and the key code: start bit 32, 16 bits long.

96-BIT DEFAULT FORMAT

The most significant 32 bits are sent as key code and the next 16 bits make up the site code.

Configuration Parameters

CONFIGURATION PARAMETERS FOR 26-BIT FORMAT

Key bits

1 2 3 4 12345678901234567890123456789012345678	tens units	addresses
xxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxx xxxxxxxxxxxxxxxx	data in 26-bit key = start 24, length 8 = start 32, length 16	

The recommended configuration is the same as the default:

- Message length = 26
- key field A start bit = 32
- Site code A start bit = 24
- key field A length = 16
- Site code A length = 8

CONFIGURATION PARAMETERS FOR 34-BIT FORMAT

Key bits

1 2 3 4 12345678901234567890123456789012345678	tens units	addresses
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	data in 34-bit key = start 16, length 12 = start 28, length 20	

The recommended configuration is the same as the default:

- Message length = 34
- key field A start bit = 28
- Site code A start bit = 16
- key field A length = 20
- Site code A length = 12

CONFIG PARAMS FOR 35-BIT CORP 1000 CREDENTIAL FORMAT

Key bits

1 2 3 4 12345678901234567890123456789012345678	tens units	addresses
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxx	data in 35-bit key = start 16, length 12 = start 28, length 20	

The recommended configuration is the same as the default:

- Message length = 35
- key field A start bit = 28
- Site code A start bit = 16
- key field A length = 20
- Site code A length = 12

CONFIGURATION PARAMETERS FOR 36-BIT FORMAT

Key bits

1 2 3 4 123456789012345678901234567890123456789012345678	tens units	addresses

`xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx`
`xxxxxxxx`
`xxxxxxxxxxxxxxxxxxxxxxxx`
	`data in 36-bit key`
	`= start 16, length 8`
	`= start 24, length 24`

The recommended configuration is:

- Message length = 36
- key field A start bit = 24
- Site code A start bit = 16
- key field A length = 24
- Site code A length = 8

CONFIGURATION PARAMETERS FOR 37-BIT FORMAT

Key bits

1 2 3 4 123456789012345678901234567890123456789012345678	tens units	addresses

`xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx`
`xxxxxxxxxxxxxxxx`
`xxxxxxxxxxxxxxxxxxxx`
	`data in 37-bit key`
	`= start 12, length 16`
	`= start 28, length 20`

The recommended configuration is:

- Message length = 37
- key field A start bit = 28
- Site code A start bit = 12
- key field A length = 20
- Site code A length = 16

CONFIGURATION PARAMETERS FOR 96-BIT FORMAT

The 96-bit key is really only compatible with raw data reporting.

Raw Data Mode

In the Star I this mode is enabled by entering Yes to the "raw data" prompt (terminal command MAG question 23). Configurations 1-8 are programmable in the Star I. Configuration #1 is only used for processing by the reader when "raw data" mode is <u>disabled</u>. When

raw data is enabled the reader sends the data as shown in this section and the ACU should have entries as shown for each type.

RAW DATA SETUP 26-BIT FORMAT

The recommended raw data entries (for one of the configurations 2-8) should be:

- Message length = 26
- Site code A start bit = 2
- Site code A length = 8
- key field A start bit = 10
- key field A length = 16

Preamble	Customer codes	S = 27 # = 26	
	c c c c c c c	s #	

48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
				0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1

Site in 25-18 = 0xC3 = 195 decimal								Key in bits 17-2 = 0xDA80 = 55936 decimal																
s	s	s	s	s	s	s	s	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	p
C				3				D				A				8				0				
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1	1	0	0	0	0	1	1	1	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0

A typical printout at the terminal appears as follows

```
raw(1) = 000000da8000c3000000
raw(20) = 00000000000000000000
key code = 55936, site = 195, year = 0, month = 0, company = 0
issue code = 0
72 23:47:58  (3) ABA CARD DATA 1 1A00B587
73 23:47:58  (3) ABA CARD DATA 2 07200000
74 23:47:58  (3) ABA CARD DATA 3 00000000
75 23:47:58  (3) ABA CARD DATA 4 00000000
76 23:47:58  (3) ABA CARD DATA 5 00000000
```

RAW DATA SETUP 34-BIT FORMAT

The recommended raw data entries (for one of the configurations 2-8) should be:

- Message length = 34
- Site code A start bit = 6
- Site code A length = 12
- key field A start bit = 18
- key field A length = 16

Preamble				Customer codes							S = 35 # = 34								Site Code in bits 29-18				
				c	c	c	c	c	c	c			s	#					s	s	s	s	
																				0			
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	
				0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	

= 0x065 = 101 decimal								Key in bits 17-2 = 0x032D = 813 decimal																
s	s	s	s	s	s	s	s	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	p
6			**5**			**0**			**3**			**2**			**D**									
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	1	1	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	1	0	1	0

A typical printout at the terminal appears as follows

```
raw(1) = 000000032d0065000000
raw(20) = 00000000000000000000
key code = 813, site = 101, year = 0, month = 0, company = 0
issue code = 0
98 18:21:51  (3) ABA CARD DATA 1 225A06CA
99 18:21:51  (3) ABA CARD DATA 2 00240000
00 18:21:51  (3) ABA CARD DATA 3 00000000
01 18:21:51  (3) ABA CARD DATA 4 00000000
02 18:21:51  (3) ABA CARD DATA 5 00000000
```

RAW DATA SETUP 35-BIT CORP 1000 CREDENTIAL FORMAT

The recommended raw data entries (for one of the configurations 2-8) should be:

- Message length = 35
- Site code A start bit = 3   • Site code A length = 12
- key field A start bit = 15   • key field A length = 20

Preamble				Customer codes							S = 36 # = 35		Site Code in bits 33-22 = 0xFFF = 4095 decimal							
				c	c	c	c	c	c	c	s	#	s	s	s	s	s	s	s	
															F			F		
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26
				0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1

in bits 33-22				Key in bits 21-2 = 0xFFFFE = 1048574 decimal																
s	s	s	s	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	p
	F				F				F				F				F				E			
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1

A typical printout at the terminal appears as follows

```
raw(1) = 00000ffffe0fff000000
raw(20) = 00000000000000000000
key code = 1048574, site = 4095, year = 0, month = 0, company = 0
issue code = 0
45 19:27:15  (3) ABA CARD DATA 1 23FDFFFF
46 19:27:15  (3) ABA CARD DATA 2 FF2B0000
47 19:27:15  (3) ABA CARD DATA 3 00000000
48 19:27:15  (3) ABA CARD DATA 4 00000000
49 19:27:15  (3) ABA CARD DATA 5 00000000
```

RAW DATA SETUP 36-BIT FORMAT

The recommended raw data entries (for one of the configurations 2-8) should be:

- Message length = 36
- Site code A start bit = 4 • Site code A length = 8
- key field A start bit = 12 • key field A length = 24

Preamble				Customer codes							S = 37 # = 36				Site Code in bits 33-26 = 0x64 = 100 decimal								
				c	c	c	c	c	c	c	s	#			s	s	s	s	s	s	s	s	
																6				4			
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	
				0	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	1	0	0	

Key in bits 25-2 = 0x6525D0 = 6628816 decimal																								
k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	p
	6				5				2				5				D				0			
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	1	1	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0	1

A typical printout at the terminal appears as follows

```
raw(1) = 00006525d00064000000
raw(20) = 00000000000000000000
key code = 6628816, site = 100, year = 0, month = 0, company = 0
issue code = 0
43 22:41:38  (3) ABA CARD DATA 1 24A14BCA
44 22:41:38  (3) ABA CARD DATA 2 C83E0000
45 22:41:38  (3) ABA CARD DATA 3 00000000
46 22:41:38  (3) ABA CARD DATA 4 00000000
47 22:41:38  (3) ABA CARD DATA 5 00000000
```

RAW DATA SETUP 37-BIT FORMAT

The recommended raw data entries (for one of the configurations 2-8) should be:

- Message length = 37
- Site code A start bit = 5
- Site code A length = 12
- key field A start bit = 17
- key field A length = 20

Preamble				Customer codes							# = 37				Site Code in bits 33-22 = 0x4B7 = 1207 decimal								
				c	c	c	c	c	c	c	#				s	s	s	s	s	s	s	s	
															4				B				
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	
				0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	0	1	1	

in bits 33-22					Key in bits 21-2 = 0x2FFF0 = 196592 dec																			
	s	s	s	s	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	k	p
	7				2				F				F				F				0			
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

A typical printout at the terminal appears as follows

```
raw(1) = 000002fff004b7000000
raw(20) = 00000000000000000000
key code = 196592, site = 1207, year = 0, month = 0, company = 0
issue code = 0
43 22:41:38  (3) ABA CARD DATA 1 25E0FFE5
44 22:41:38  (3) ABA CARD DATA 2 96160000
45 22:41:38  (3) ABA CARD DATA 3 00000000
46 22:41:38  (3) ABA CARD DATA 4 00000000
47 22:41:38  (3) ABA CARD DATA 5 00000000
```

RAW DATA SETUP 96 BIT FORMAT

To configure this:

- ANSI format (Y/N) ? Y (This initiates a 5-bit processing mode, with the **least significant bit** –**LSB**– first and with each byte having a trailing odd parity bit —shown shaded in the diagrams below.) **IT IS IMPORTANT TO STRESS THIS ORDER:** *LSB* on the **LEFT**, (since more often the *MSB* is on the left). With the parity bit included, the numbers 0 — 9 are then as follows:

0	1	2	3	4
0 0 0 0 **1**	1 0 0 0 **0**	0 1 0 0 **0**	1 1 0 0 **1**	0 0 1 0 **0**

5	6	7	8	9
1 0 1 0 **1**	0 1 1 0 **1**	1 1 1 0 **0**	0 0 0 1 **0**	1 0 0 1 **1**

- Site Code start bit: 36. (This *is* the Site Code start bit used in the coding, because of the way the data is arranged.)
- Site Code length: 16. (This is the actual data length, not including the parity bits.)
- Key Code start bit: 58. (This *is* the Key Code start bit used in the coding, because of the way the data is arranged.)
- Key Code length: 24. (This is the actual data length, not including the parity bits.)
- Issue Code start bit: 83. (This *is* the Issue Code start bit used in the coding, because of the way the data is arranged.)
- Issue Code length: 4. (This is the actual data length, not including the parity bits.)
- The Site Code presently has a maximum bit-length of 16 bits. (In the example, the Site Code '78901' presently has the '7' dropped.)

Note:

The data does not start at the beginning of the message. There are 96 total bits received. The first 21 bits are not used. The remaining 75 bits are grouped into fifteen 5-bit characters, 4 bits (1 byte) of **BCD**

data with 1 parity bit. (Parity is ODD.) The first character is fixed as a 'B' (as with the magnetic stripe beginning character). The next 5 characters are the site code (in BCD). Then 6 characters for the key (in BCD). Then 1 character for the issue level (in BCD). Then a fixed 'F' (as with the magnetic stripe final character). Finally there is a longitudinal redundancy check (LRC) character.

...........................First 21 bits are not used...........................				Begin = B	...not used...	
8	9	1	0	B	(7)	
addresses:	1		2		3	-tens
1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6	7 8 9 0 1			-units
0 0 0 0 1 0 1 0 0	1 0 1 0 0 0 0 0 0	0 0 0 0 1 1 0	1 0 1 1 1 0 0			

..............................Site Code = 8901..................................				....	
8	9	0	1	9	9
start bit *	4		5	start bit *	6
2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1
0 0 0 1 0 1 0 0 1	1 0 0 0 0 1 1 0 0	0 0 1 0 0 1 1 1 0	0 1 1

......Credential Key Code = 999999..................................				Issue = 1	Final = F	LRC = 2
9	9	9	9	1	F	2
	7		8	* start bit	9	
2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6			
1 0 0 1 1 1 0 0 1	1 1 0 0 1 1 1 0 0 1	1 1 0 0 0 0 1 1 1 1	1 0 1 0 0 0			

A typical printout at the terminal appears as follows

```
raw(1) = 00009999998901000000
raw(20) = 01000000000000000000
key code = 999999, site = 8901, year = 0, month = 0, company = 1
issue code = 0
83 23:14:56   (3) ABA CARD DATA 1 60E8C339
84 23:14:56   (3) ABA CARD DATA 2 E79C1386
85 23:14:56   (3) ABA CARD DATA 3 29B80650
86 23:14:56   (3) ABA CARD DATA 4 0A000000
87 23:14:56   (3) ABA CARD DATA 5 00000000
```

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APPENDIX B: CONTACTING NEXWATCH®

B

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1-510-360-7996   (voice)

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(Pacific Time Zone = Greenwich - 8 hours)

Monday through Friday

1-510-360-7823   (fax)

Europe (Germany):

+49 (0) 70 31 637 782   (voice)

8:30am —to— 12:00noon & 1:00pm —to— 4:15pm

Central European Time Zone = Greenwich + 1 hour)

Monday through Friday

+49 (0) 70 31 637 769   (fax)

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