Magnetic Stripe Data Format

In addition to the Wiegand data format, Pyramid Series Proximity readers can communicate via the ABA Track-II magnetic stripe data format[1] (clock and data), a commonly used interface between readers and control panels used in access control, security, time and attendance, and other related industries. This feature is implemented in revision B or greater Pyramid Series readers.[2]

The ABA Track-II magnetic stripe data format is available for all Pyramid Series readers. This format follows the Dorado standard, a defacto magnetic stripe industry standard. Many manufacturers have adopted this standard to establish a common magnetic stripe interface. This provides a level of compatibility and inter operability for readers and control panels that can be used by consultants, specifiers, and end users when setting product design or system installation criteria.

Pyramid Series readers are capable of transmitting data in the format of the Pyramid Series credential. Special coding on Pyramid Series Cards and Tags allows any of these credentials to be formatted to emulate either magnetic stripe or Wiegand data formats. This means the card or tag controls the data format transmitted by the Pyramid reader to the access panel. Compared to other reader technologies available on the market today the key advantage of this manner of control is that the stock holder does not need to maintain separate inventories of multiple formats of otherwise identical proximity readers. The credential data format can be identified by the number imprinted on the card-Wiegand cards display a date code followed by an ID number, magnetic stripe formatted cards display a date code, an ID number, and an "M" suffix.

A reader format can be permanently fixed through the use of special Format Lock Control Cards (for Magnetic Stripe or Wiegand formats-P/Ns 05577-001 and 05577-002 respectively). This means that regardless of the format of the Pyramid Series Card or Tag presented, the data transmitted by the reader is in the locked format-either Magnetic Stripe only or Wiegand only. This feature may be employed in an application where a building is using a Wiegand formatted card for access control and would like to manage vending, cafeteria, or office equipment with a strictly Magnetic Stripe compatible system.

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1. Pyramid Series Proximity Readers use proximity technology to communicate between the reader and the credential. No physical "magnetic stripe" is required.
2. Please note, the keypad portion of the P-600 Rocky Reader and Keypad outputs data only in a Wiegand format, either the default 8-bit burst format or the optional 26-bit Wiegand format. When the reader portion of the P-600 is fixed in a magnetic stripe output mode, keypad operation is suppressed.

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1.0 Magnetic Stripe Connections

Pyramid Series readers can be connected to virtually any control panel that accepts data formatted in the magnetic stripe format as specified in the standard above. All connections between the reader and control panel are made through the reader's cable. For wiring instructions, see Table 1: Wiring Connections, Figure 1: on page 3, and Figure 2: on page 3.

Table 1: Wiring Connections

Wire Colors	Function
Silver	Shield/Drain
Green	Clock
Blue	Beeper
Red	Reader Power – 5 to 14 VDC
Black	Reader Ground
Brown	Multi-Color LED
Orange	- not used -
White	Data

Magnetic Stripe Data Format

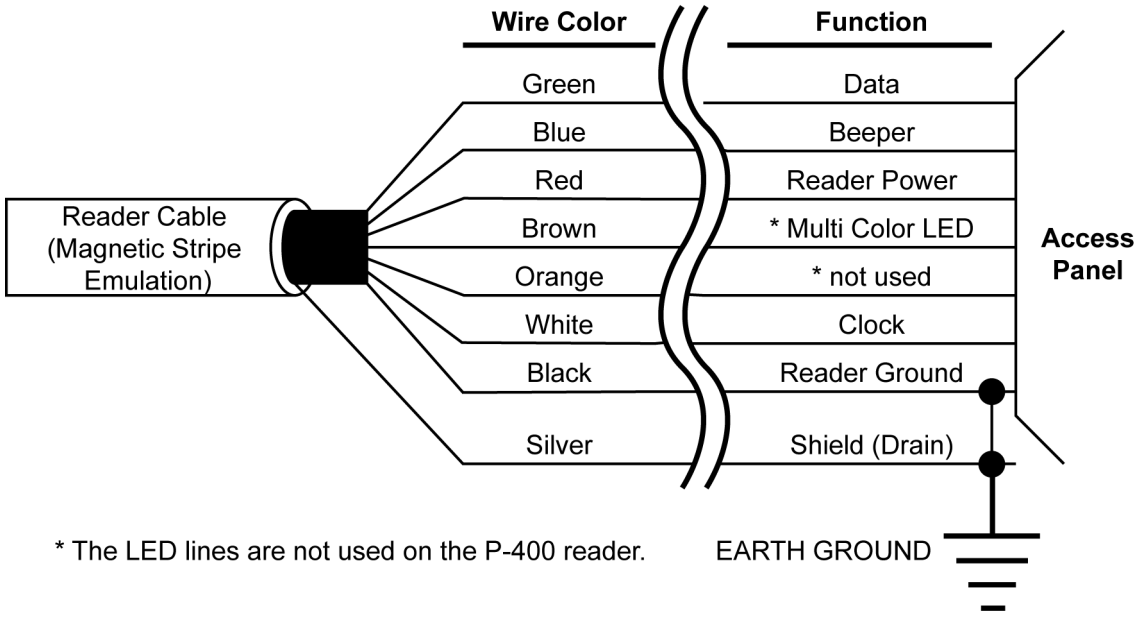

Figure 1: : Magnetic Stripe Format Wiring Connections

Some ABA Track II Magnetic Stripe (clock and data) compatible control panels require a card present signal. An additional circuit can be added external to Pyramid Series readers to emulate this signal. Figure 2 provides an example of a circuit diagram using a 47 µF capacitor and two 1N4148 diodes, illustrating how a card present signal can be emulated.

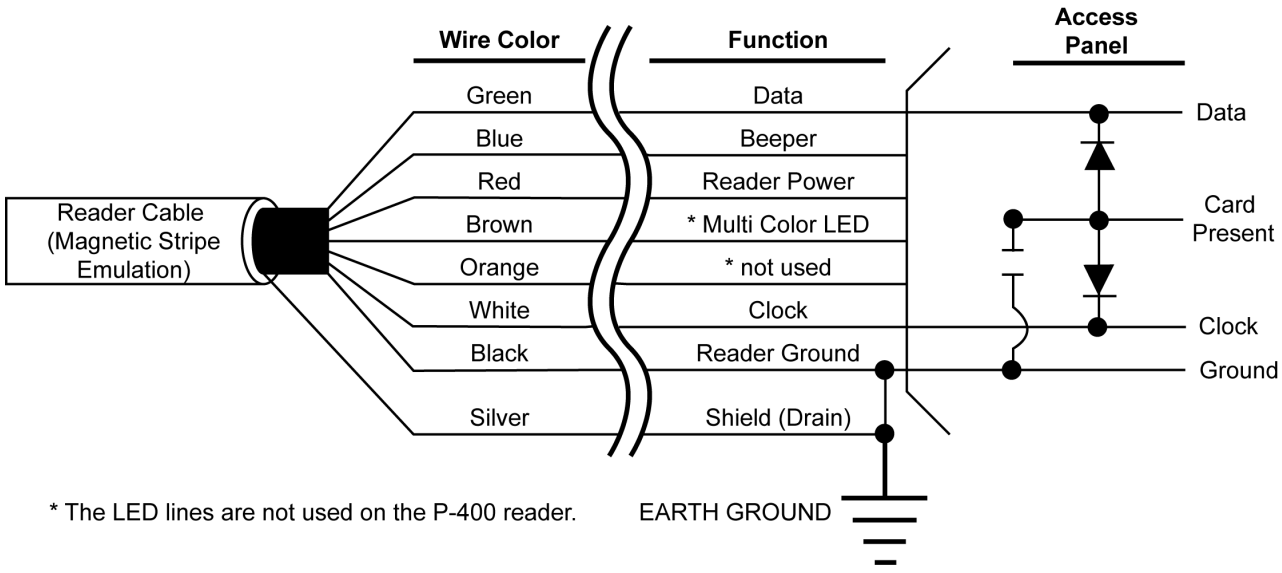

Figure 2: : Magnetic Stripe Format Wiring Connections With Card Present Signal

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2.0 Data Signals

Figure 3 displays the timing pattern for data bits sent by the reader to the access control panel. These are typical timing parameters for readers sending magnetic stripe formatted data, and are based on the defacto industry standard.

Data is sent on a single data line that is held high and must be driven low. Data bits are determined by the state of the data line when the clock pulse is low. A data "1" is indicated if the data line is low when the clock pulse is low. A data "0" is indicated if the data line is high when the clock pulse is low. For data signal pulse and timing information, see Table 2: Pulse Times and Figure 3:.

Table 2: Pulse Times

Parameter	Min	Max	Typical
Data Setup Time (**A**)	90 µs	150 µs	100 µs
Data Hold Time (**B**)	90 µs	–	100 µs
Clock Pulse Width (**C**)	90 µs	150 µs	100 µs
Bit Time (**D**)	900 µs	1,110 µs	1,000 µs

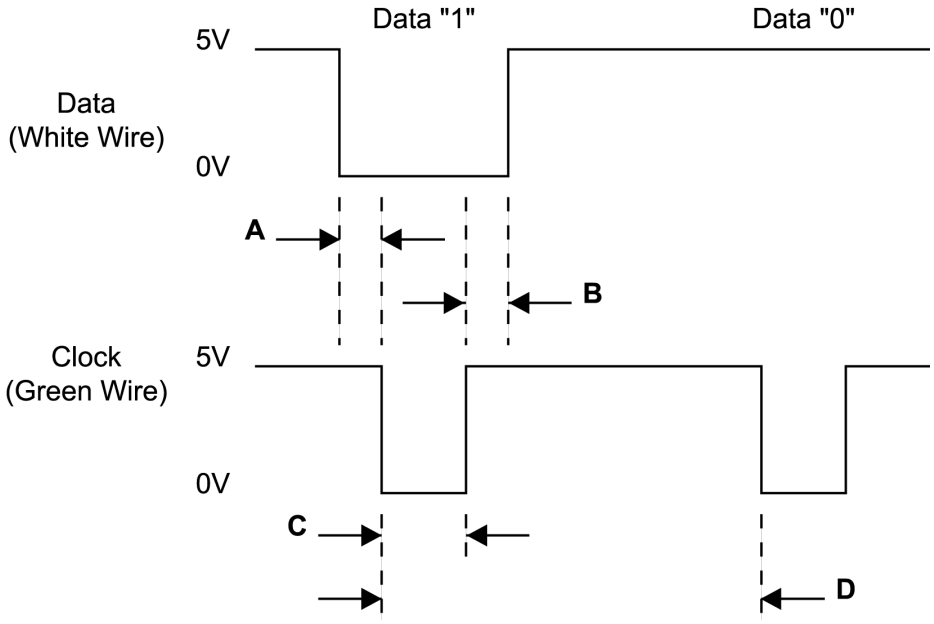

Figure 3: : Data Bit Timing Pattern

3.0 Encoded Magnetic Stripe Data Output Format

The composition of the open Pyramid Series Magnetic Stripe Output Format contains 5 characters for the site code field and 5 characters for the ID number field. Mathematically, the 5 site code field characters allow for a total of 99,999 facility codes (1 to 99,999) and the 5 ID number field characters allow for a total of 99,999 ID numbers per facility code (1 to 99,999). Table 3 provides a summary of the Encoded Magnetic Stripe Data Output Format.

NOTE: Although Pyramid Associates tracks credential coding, it is important to note that due to the open nature of the Magnetic Stripe format, code duplication might occur.

Table 3: Magnetic Stripe Data Output Format

Bits	Characters	Purpose
1 to 10	–	10 leading zeros (0)
11 to 15	1	start character 0x0B w/ odd parity (binary 11010 - LSB first)
16 to 40	2 to 6	facility code (1 to 99,999) - character 2 is MSC
41 to 65	7 to 11	ID number (1 to 99,999) - character 7 is MSC
66 to 70	12	stop character 0x0F w/ odd parity (binary 11111 - LSB first)
71 to 75	13	LRC - calculated over all characters by the reader
76 to 85	–	10 trailing zeros (0)

For characters 1 through 12, the fifth bit is an odd parity bit generated by looking at the previous 4 bits in the character. To ensure bit integrity during data transfers Linear Redundancy Checking (LRC) is performed on every character in the data transfer (bits 11 through 70) and on the entire data transfer stream (using bits 71 through 75). For the entire data transfer stream the first 4 bits of LRC character 13 are even parity bits calculated over the corresponding LRC bits within characters 1 through 12. As in the other characters, the fifth bit is an odd parity bit generated by looking at the previous 4 bits in the character.

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As appropriate, customers have the ability to customize the magnetic stripe output, providing it does not exceed 12 characters (60 bits). Portions of the magnetic stripe output format that may be customized include the start character, facility code, ID number, and stop character. Each character can be encoded with the Most Significant Bit (MSB) first or the Least Significant Bit (LSB) first. The leading zeros, LRC, and trailing zeros are fixed and will be present in each variation of the magnetic stripe output format.

A Field Separator can be included in between the Facility Code and the ID Number. This field separator is similar to the Start or Stop characters, but is made up of a unique value, identified by the user.