

# **P-SERIES TTL INSERTION READER TECHNICAL REFERENCE MANUAL**

**Manual Part Number 99875139 Rev 10**

**SEPTEMBER 2009**

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## REVISIONS

Rev Number	Date	Notes
1	12 Aug 99	Initial Release
2	07 Sep 00	Sec 1, Specs, Mechanical, Length changed to (without bezel) 4.08" (103.6 mm); ( with extended bezel) 4.82" (122.4 mm). Added weight of 3.5 oz to (100 g ±20%). Converted symbols to Metric System [SI]
3	01 Jan 01	Front Matter: Changed copyright date; Changed warranty date from 90 days to one year.
4	06 Apr 01	Front Matter: Changed Agency Approval to Class B, and meets UL50 requirements. Section 2, Installation: Changed Fig 2-5 and accompanying text to reflect 7-pin connector on P/N 21065117.
5	19 Jul 01	Front Matter: Added TTL to Title. Changed agency approvals to Class A, and added UL and CUL.
6	25 Jun 02	Section 2: Changed Tables 2-1 and 2-2 and relevant text for back sensors from active high to active low.
7	09 Jul 02	Sec 1: Added ANSI address and Phone; added to Spec, Output Signal Levels, and rearranged Table 1-2 and removed MagTek connector from I/O connector type. Sec 2: Added headers and Mates to Tables 2-1 and 2-2. Replaced Timing diagram, Fig 2-6, for clarification.
8	16 May 03	Front Matter: added ISO line to logo, changed Tech Support phone number, added new warranty statement.
9	8 May 06	To Section 2, Added support brackets
10	19 Sept 09	Replaced mounting brackets with angle bracket kit (21064519) ; updated Limited Warranty & Agency Approvals

## LIMITED WARRANTY

MagTek warrants that the products sold pursuant to this Agreement will perform in accordance with MagTek's published specifications. This warranty shall be provided only for a period of one year from the date of the shipment of the product from MagTek (the "Warranty Period"). This warranty shall apply only to the "Buyer" (the original purchaser, unless that entity resells the product as authorized by MagTek, in which event this warranty shall apply only to the first repurchaser).

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Service may be obtained by delivering the product during the warranty period to MagTek (1710 Apollo Court, Seal Beach, CA 90740). If this product is delivered by mail or by an equivalent shipping carrier, the customer agrees to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent. MagTek will return the product, prepaid, via a three (3) day shipping service. A Return Material Authorization ("RMA") number must accompany all returns. Buyers may obtain an RMA number by contacting Technical Support at (888) 624-8350.

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### **FCC WARNING STATEMENT**

This equipment has been tested and was found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### **FCC COMPLIANCE STATEMENT**

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### **CANADIAN DOC STATEMENT**

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

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.


### **CE STANDARDS**

Testing for compliance with CE requirements was performed by an independent laboratory. The unit under test was found compliant with standards established for Class A devices.

### **UL/CSA**

This product is recognized per Underwriter Laboratories and Canadian Underwriter Laboratories 1950.

### **RoHS STATEMENT**

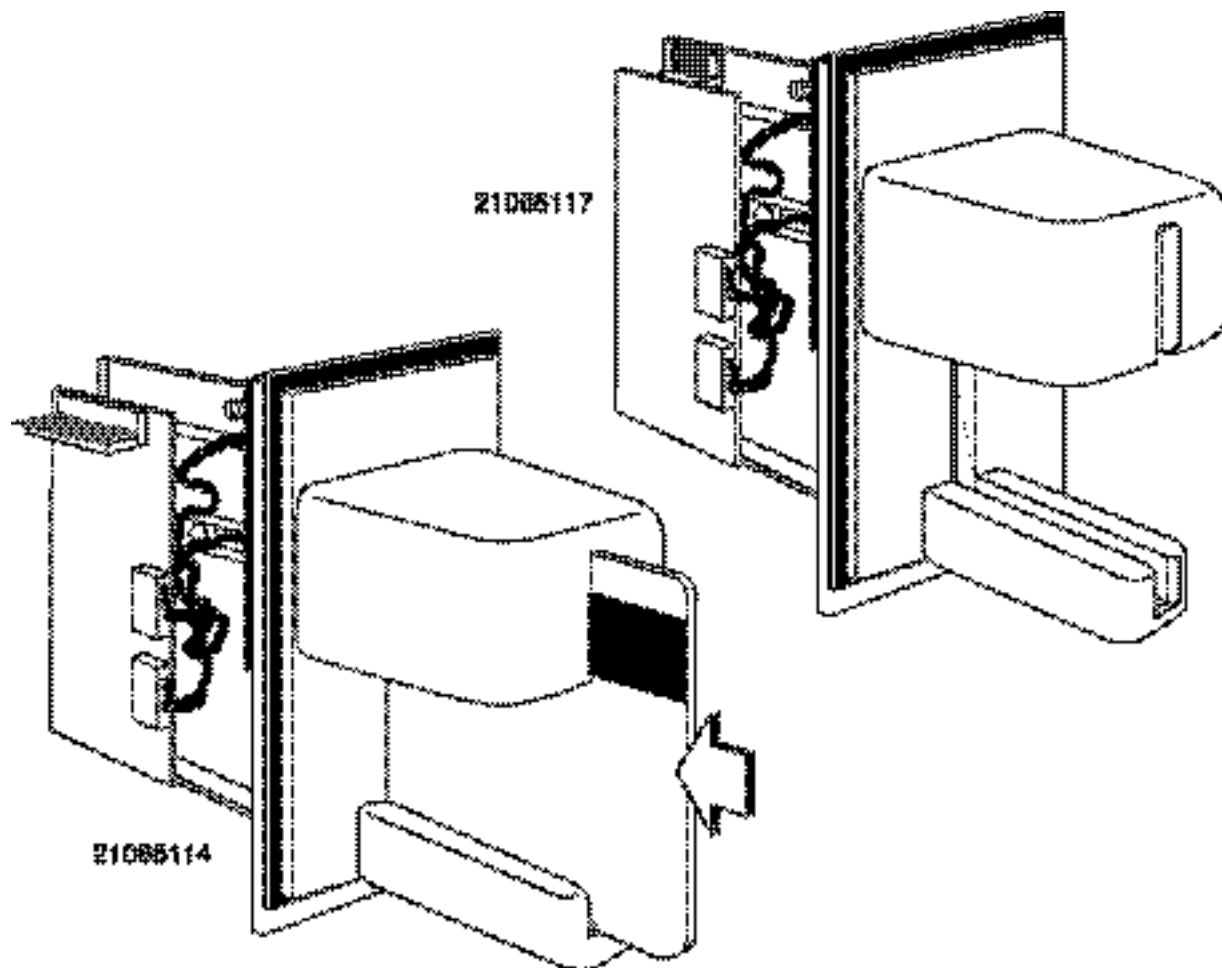
When ordered as RoHS compliant, this product meets the Electrical and Electronic Equipment (EEE) Reduction of Hazardous Substances (RoHS) European Directive 2002/95/EC. The marking is clearly recognizable, either as written words like "Pb-free", "lead-free", or as another clear symbol () .

## TABLE OF CONTENTS

<b>SECTION 1. FEATURES AND SPECIFICATIONS .....</b>	<b>1</b>
FEATURES.....	1
CONFIGURATIONS .....	1
ACCESSORIES.....	1
RELATED DOCUMENTS.....	2
SPECIFICATIONS.....	3
<b>SECTION 2. INSTALLATION.....</b>	<b>5</b>
MECHANICAL INSTALLATION .....	5
OPTIONAL MOUNTING BRACKET.....	6
CARD INSERTION.....	6
CABLE CONNECTIONS AND PIN LISTS.....	7
Back Sensor and Card Present.....	7
Track Data.....	7
Strobe.....	8
HEADERS, CONNECTORS, AND CARD ORIENTATION.....	8
TIMING FOR BACK SENSOR AND CARD PRESENT .....	9
TIMING FOR DATA AND STROBE .....	10
Card Present.....	10
Data.....	10
Strobe.....	11

## FIGURES AND TABLES

Figure 1-1. P-series Insertion Readers with Bezels .....	vi
Table 1-1. Configurations.....	1
Table 1-2. Specifications.....	3
Figure 2-1. Mounting Guides and Card Insertion .....	5
Figure 2-2. MagTek Bezel Mounting Position.....	6
Table 2-1. 9-pin I/O Header, J3, Pin List (P/N 21065114).....	7
Table 2-2. 7-pin I/O Header, J3, Pin List (P/N 21065117).....	7
Figure 2-4. I/O Header, Connectors, and Card Orientation, P/N 21065114.....	8
Figure 2-5. I/O Header and Connectors, P/N 21065117.....	8
Figure 2-6. Timing for Card Present and Back Sensor Signals .....	9
Figure 2-7. Data and Strobe Timing.....	10
Figure 2-8. Dimensions for Mounting .....	12



**Figure 1-1. P-series Insertion Readers with Bezels**

# SECTION 1. FEATURES AND SPECIFICATIONS

The P-series Insertion Readers are designed for use at fuel pumps or other harsh outdoor environments that require a moisture resistant reader. The Readers are electronically TTL-level compatible and mechanically compatible with the industry-standard footprint. The Readers are configured to ISO standard 7811 for reading Tracks 1 and 2 on the magnetic stripe.

## FEATURES

Features of the Readers are as follows:

- Dual Read-Head Capability - allows for easier card orientation when inserted into the Reader. Also supports single read head with no chassis modification
- Beam-mounted Read-heads - improves card tracking capabilities for reading warped or wavy cards
- Sealed Chassis Design - provides superior resistance to moisture
- AGC (Automatic Gain Control) in MagTek IC's - enhances mag-stripe read performance
- Ruggedized Chassis and Bezel Material - improves temperature and impact performance

## CONFIGURATIONS

Table 1-1 lists the part numbers, number of heads, bezel, and connector information.

**Table 1-1. Configurations**

Part Number	Heads	Tracks	Bezel	I/O Connector
21065114	2	1, 2	Extended Arm Bezel	9-pin Header
21065117	2	1, 2	Extended Arm Bezel	7-pin Header

## Accessories

The accessories are as follows:

Part Number	Description
21064519	Angle Bracket Mounting Kit

**RELATED DOCUMENTS**

The P-series Readers will read cards that meet the standards defined by ISO (International Standards Organization):

ISO 7811      Identification Cards - Mag-stripe Cards, Tracks 1-3

ISO 7810      Identification Cards - Physical Specifications (ID-1 Cards)

Available from ANSI, Phone 212-642-4900; [www.ANSI.org](http://www.ANSI.org).

For further information about magnetic stripe readers, refer to MagTek part number 99875148, *I/O Interface for TTL Magnetic Stripe Readers, Technical Reference Manual*.

## SPECIFICATIONS

Specifications for the Readers are listed in Table 1-2.

**Table 1-2. Specifications**

<b>ELECTRICAL</b>	
Input Voltage	+5 VDC $\pm$ 10%.
Current Draw:	Less than 12 mA
MTBF:	Electronics: 125,000 hours. Head: 1,000,000 passes (500,000 insert cycles)
Output Signal Levels	$V_{ol} = 0.4 \text{ V @ } 2.0 \text{ mA}$ $V_{oh} = V_{cc} - 0.5 \text{ V @ } 2.0 \text{ mA}$
Interface:	TTL level.
Dielectric Strength:	DC250 volts, 1 minute
Insulation Resistance:	Greater than 10 M ohms at DC 250V (Measured between PCB ground and frame).
Mag-Stripe Read: Recording Method: Card Speed: TK1: TK2:	Two-Frequency Coherent Phase (F/2F). 3 to 50 IPS and 210 BPI (7.6 to 127 cm/sec) 75 or 210 BPI (MagTek decode ASIC is density independent). 75 or 210 BPI (MagTek decode ASIC is density independent).
<b>MECHANICAL</b>	
Dimensions:	Without Bezel                      With Extended Arm Bezel
Length:	4.08" (103.6 mm)                      4.82" (122.4 mm)
Width:	3.15" (80.0 mm)                      3.54" (90.0 mm)
Height:	1.29" (32.8 mm)                      1.81" (46.0 mm)
Weight:	3.5 oz. (100 g $\pm$ 20%)
I/O Connector Type:	For P/N 21065114: 9-pin straight locking header, AMP P/N 640456-9 For P/N 21065117: Right angle 7-pin locking header, ITW Pancon P/N MLAS100-7.
MSR read-data format specifications supported:	ISO/ANSI/AAMVA/CDL/ 75 or 210BPI on track 1 (normally 210 bpi) ISO/ANSI/AAMVA/CDL/ 75 or 210BPI on track 2 (normally 75 bpi)
<b>ENVIRONMENTAL</b>	
Temperature Operating: Storage:	-22 °F to 140 °F (-30 °C to 60 °C) -22 °F to 158 °F (-30 °C to 70 °C)
Humidity: Operating: Storage:	10% to 90% non-condensing 10% to 90% non-condensing
Altitude Operating: Storage:	0 - 10,000 ft. (3,048m) 0 - 50,000 ft. (15,240m)



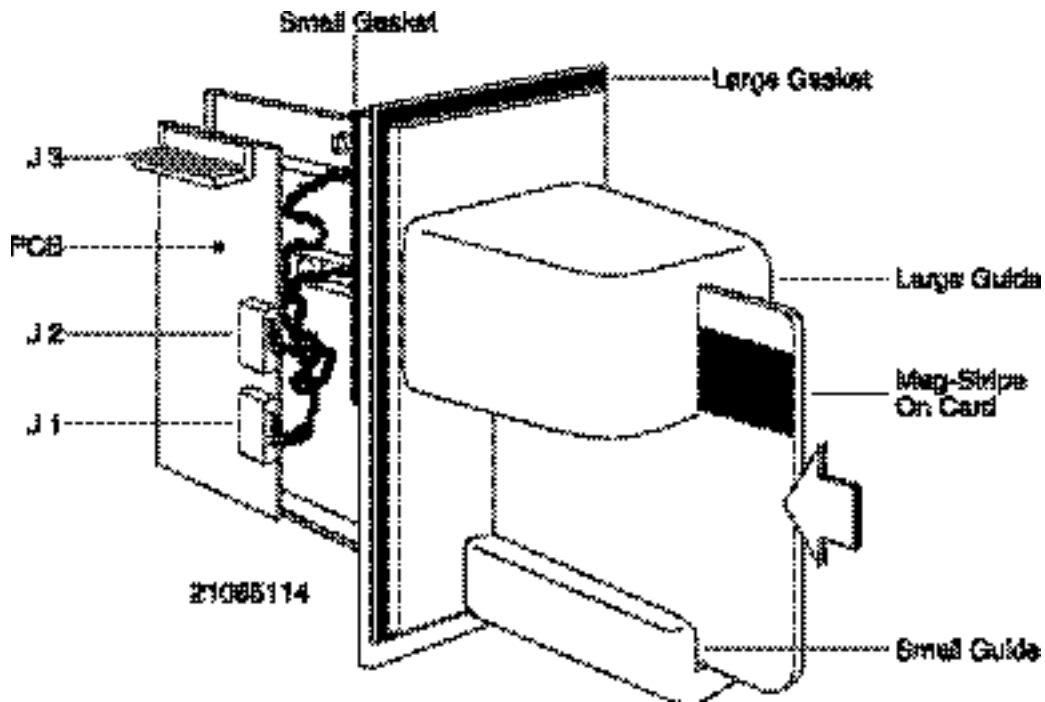
## SECTION 2. INSTALLATION

The reader is supplied with or without a bezel. The user provides all mounting hardware such as brackets, screws, or anything else required to affix the Reader to the pump.

### MECHANICAL INSTALLATION

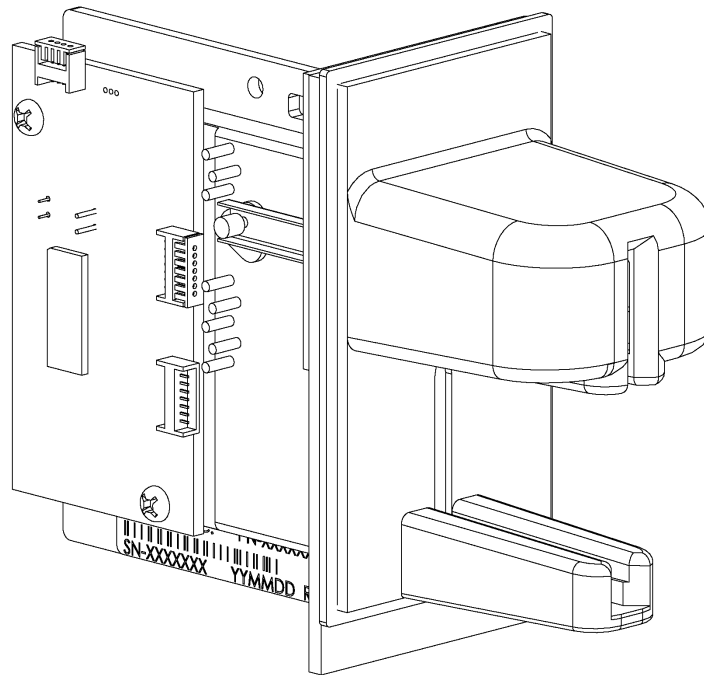
Figure 2-1 shows the 9-pin header, head connectors, and the card orientation of Reader P/N 21065114.

The standard orientation of the Reader is with the larger guide up as shown in the illustration. Although any orientation may be used, this position offers the best protection for the heads from moisture, dust, or foreign particles.



**Figure 2-1. Mounting Guides and Card Insertion**

The recommended method of installation is to position the Reader between two brackets from the inside of a mounting panel, as indicated in Figure 2-2. The large gasket on the bezel presses against the bracket to prevent moisture from entering. Another bracket is positioned and secured over the bezel to hold the Reader firmly against the first bracket.



**Figure 2-2. MagTek Bezel Mounting Position**

### **OPTIONAL MOUNTING BRACKET**

In applications where moisture-intrusion is a concern, it is recommended that the reader be mounted with a 4° - 5° *downward* angle with respect to the horizontal plane. This will allow gravity to drain away any excess moisture that may have entered into the Card Reader slot.

For more information about the mounting bracket kit (21064519) that can be used to tip the reader forward, contact your MagTek salesperson.

### **CARD INSERTION**

The card must be inserted with the magnetic stripe in the larger guide, as shown in Figure 2-1. If there are two heads in the unit, the magnetic stripe may be facing in either direction but must be in the larger guide. If there is only one head in the unit, the primary position of the head is on the same side of the unit as the PCB. The secondary position of the single head is on the side opposite the PCB. When a single head is used, the magnetic stripe must always face the position of the head.

## CABLE CONNECTIONS AND PIN LISTS

The cable connections to the host are J3 on the PCB. Table 2-1 lists the pins and signals for the 9-pin connector, and Table 2-2 lists the pins and signals for the 7-pin connectors.

**Table 2-1. 9-pin I/O Header, J3, Pin List (P/N 21065114)**

Pin Number	Signal	Description
1	<u>Back Sensor</u>	Active low when the card is at the rear of the unit.
2	<u>Track 2 Data</u>	Active low
3	<u>Card Present</u>	Active low
4	<u>Track 2 Strobe</u>	Valid data with falling edge
5	Key	No Connection
6	Vcc	+5VDC
7	<u>Gnd</u>	Ground
8	<u>Track 1 Strobe</u>	Valid data with falling edge
9	<u>Track 1 Data</u>	Active low

Header: AMP P/N 640456-9

Mates: AMP P/N 640442-9 (one in a series of 50 – see AMP catalog)

**Table 2-2. 7-pin I/O Header, J3, Pin List (P/N 21065117)**

Pin Number	Signal	Description
1	Vcc	+5VDC
2	<u>Track 1 Data</u>	Active low
3	<u>Track 1 Strobe</u>	Valid data with falling edge
4	<u>Track 2 Data</u>	Active low
5	<u>Track 2 Strobe</u>	Valid data with falling edge
6	Back Sensor	Active high when the card is at the rear of the unit.
7	<u>Gnd</u>	Ground

Header: ITW Pancon P/N MLAS100-7

Mates: ITW Pancon P/N CE100F28-7, CE100F26-7, CE100F24-7, CE100F22-7

### Back Sensor and Card Present

The back sensor is active low when the card is fully inserted at the back of the unit. If a Card Present signal is used as with P/N21065114 (See Table 2-1 above), the movement of an encoded magnetic stripe past the read head generates the signal active low. These two signals are gated to reduce the dwell time needed before the read-on-withdrawal can be initiated. On P/N 21065117, Back Sensor is active high.

### Track Data

Tracks 1 and 2 data signals are active low when data is read. See Timing below.

## Strobe

The Strobe signal is active with the falling edge of the pulse. See Timing below.

## HEADERS, CONNECTORS, AND CARD ORIENTATION

Figure 2-4 shows the 9-pin header, head connectors, and pin 1 for connection for Reader P/N 21065114. Figure 2-5 shows the 7-pin header, head connectors, and pin 1 for connections for Reader P/N 21065117.

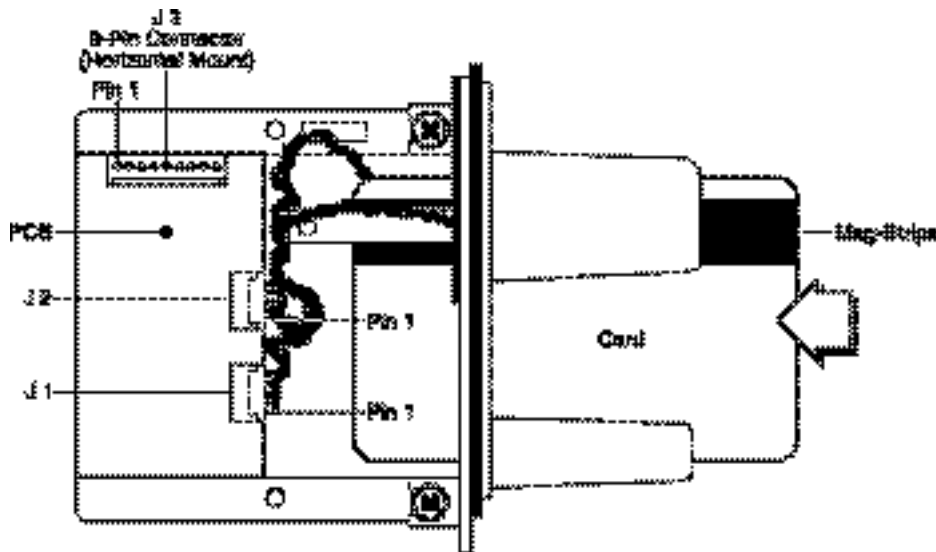


Figure 2-4. I/O Header, Connectors, and Card Orientation, P/N 21065114

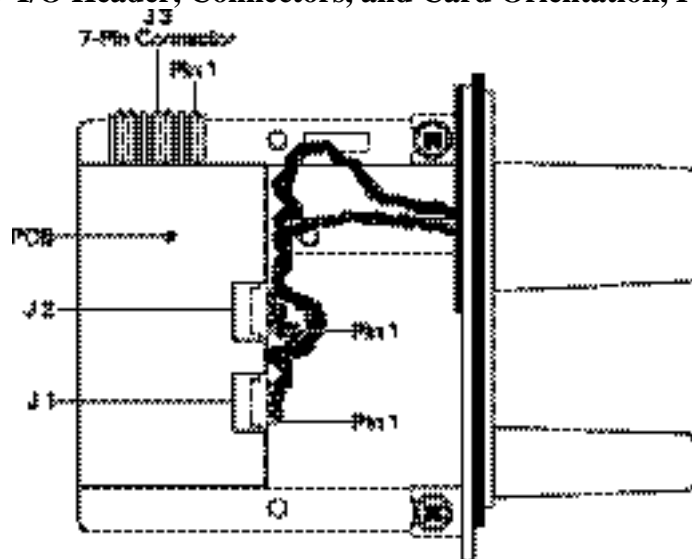
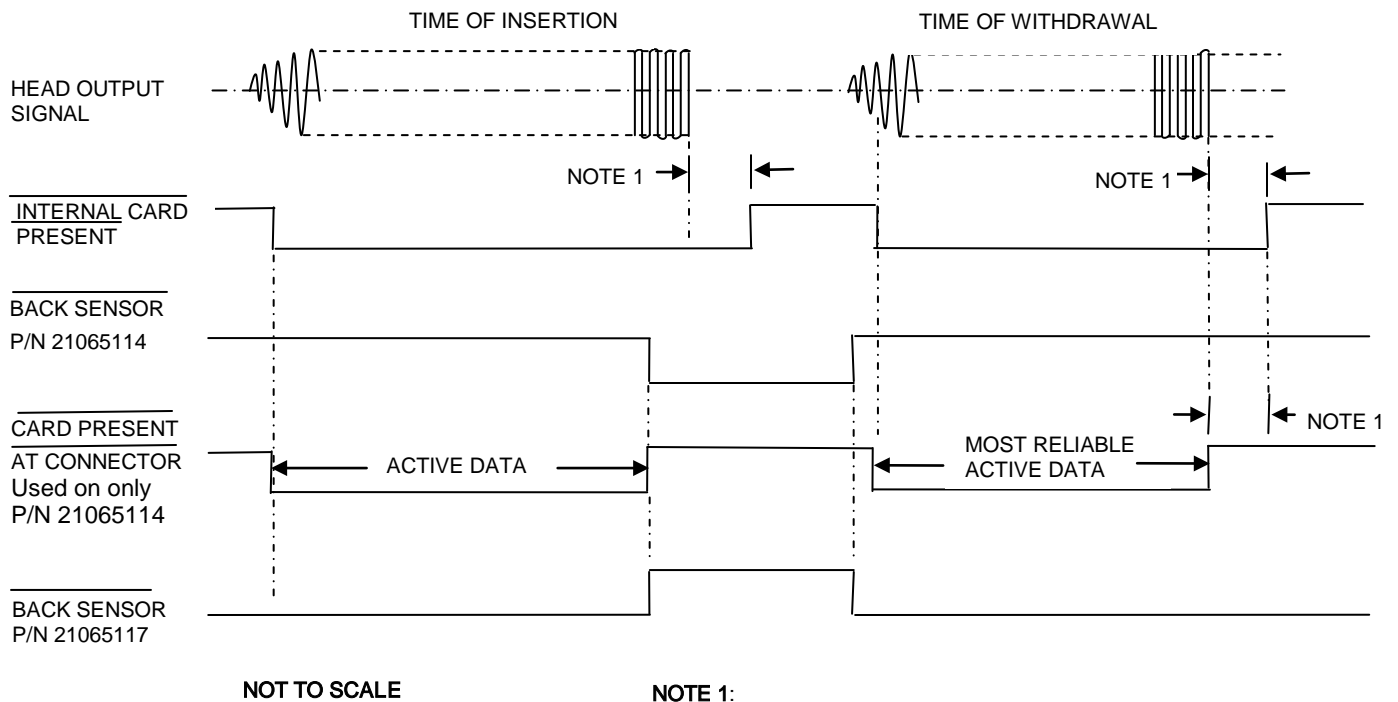


Figure 2-5. I/O Header and Connectors, P/N 21065117

## TIMING FOR BACK SENSOR AND CARD PRESENT

Figure 2-6 shows the timing for the Back Sensor and the Card Present signals.

The card is read in both directions (on insertion and withdrawal), but the data is active on withdrawal.



### NOTE 1:

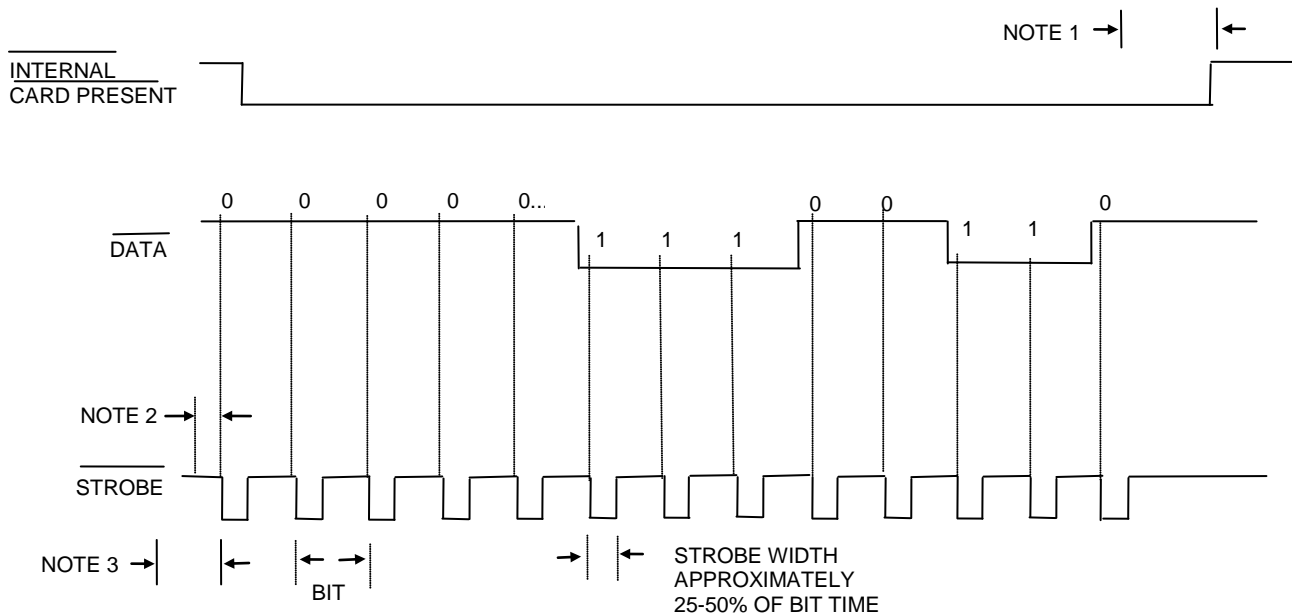
Time out of the internal card present signal occurs approximately 150 ms after the last strobe transition. The internal card present signal becomes active when the movement of an encoded magnetic stripe past the read head generates a signal. The back sensor and internal card present are gated together to reduce the dwell time needed before the read-on-withdrawal can be initiated and is output as `card present` at the connector.

**Figure 2-6. Timing for Card Present and Back Sensor Signals**

While it is possible for the Card Reader to read data on either the insertion or withdrawal stroke, it should be noted that card reading is most reliable during the card withdrawal stroke. For this reason MagTek recommends that customer's software should be designed to emphasize data capture during the card withdrawal stroke. For the most reliable operation: Read the card upon insertion, when the card present goes high, check for errors, if no errors, output the data, start sentinel first, after the card is withdrawn. If an error is detected, clear the stored data and read the card on withdrawal, if no errors, output the data, start sentinel first, otherwise output an error indication or a try again message.

## TIMING FOR DATA AND STROBE

Figure 2-7 shows the timing for Data and Strobe. The timing shown is for active data (see Figure 2-6).



### NOTES

1. TIME OUT OF THE CARD PRESENT SIGNAL OCCURS APPROXIMATELY 150 MS AFTER THE LAST STROBE TRANSITION.
2. DATA IS VALID 1.0  $\mu$ S (MINIMUM) BEFORE THE NEGATIVE EDGE OF STROBE.
3. 6 OR 7 HEAD FLUX REVERSALS ARE IGNORED FOR LOW DENSITY CONFIGURATION AND 14 OR 15 FOR HIGH DENSITY CONFIGURATION.

**Figure 2-7. Data and Strobe Timing**

### Card Present

The Card Present signal (used in P/N 21065114) is low when a recorded card is being moved across the read head. The Card Present signal is gated with the back sensor to ensure that Card Present will go high when the card is fully inserted into the Reader.

### Data

The Data signal is valid while the Strobe is low. If the Data signal is high, the bit is a zero.

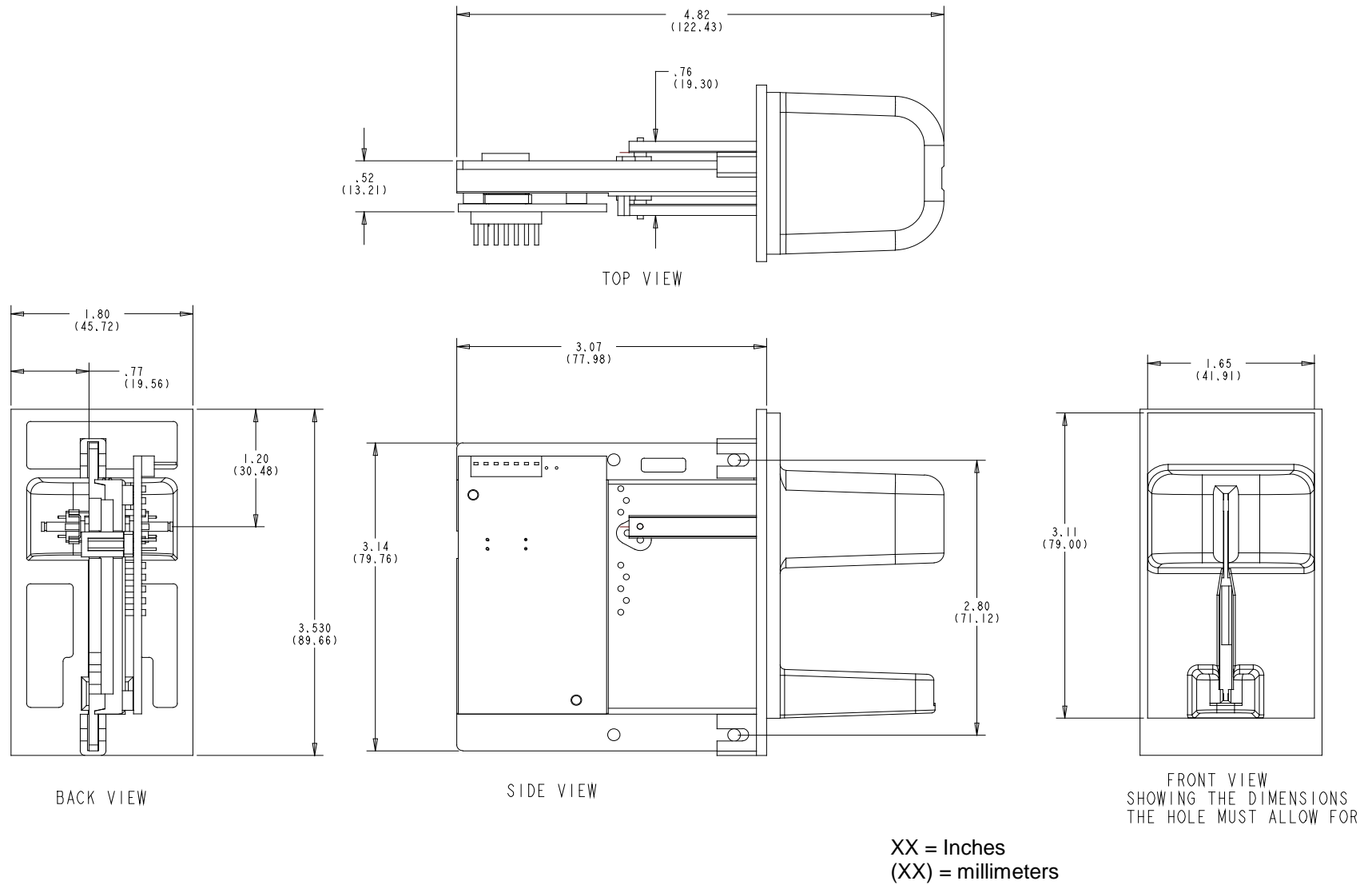
## **Strobe**

The Strobe signal indicates when Data is valid. It is recommended that Data be loaded by the user with the leading edge (negative) of the Strobe.

Figure 2-8 may be used for mounting the Reader.

For further information about magnetic stripe readers, refer to MagTek part number 99875148, *I/O Interface for TTL Magnetic Stripe Readers, Technical Reference Manual*.

**P-series Insertion Reader**



**Figure 2-8. Dimensions for Mounting**