

MAG-WEDGE READER INSTALLATION AND OPERATION MANUAL

Manual Part Number: 99821608 Rev 5

NOVEMBER 2005

MAGTEK[®]

REGISTERED TO ISO 9001:2000

1710 Apollo Court
Seal Beach, CA 90740
Phone: (562) 546-6400
FAX: (562) 546-6301
Technical Support: (651) 415-6800
www.magtek.com

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of MagTek, Inc.

MagTek is a registered trademark of MagTek, Inc.

REVISIONS

Rev Number	Date	Notes
1	1992	Initial Release
2	28 Jan 98	Entire manual reformatted; Title changed from "Technical Description" to "Installation and Operation Manual"; Added part numbers and updated specs in Sec 1; identified default commands in Sec 3.
3	01 Aug 2001	Editorial changes to CE and UL./CUL.
4	08 Apr 03	Front Matter: added ISO line to logo, changed Tech Support phone number, added new warranty
5	23 Nov 05	Front Matter: Changed all Mag-Tek to MagTek throughout. Section 1, Table 1-1: Deleted the following obsolete models: 21080007, 21080011, 21080013, 21080070, 21080051, 21080071, 21080052, 21080060, 21080074, 21080075, 21080062; Changed customer assistance number to (651) 415-6800. Sec 3: removed obsolete model in note: 21080007.

LIMITED WARRANTY

MagTek warrants that the products sold to Reseller 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 original purchaser unless the buyer is authorized by MagTek to resell the products, in which event, this warranty shall apply only to the first repurchase.

During the Warranty Period, should this product fail to conform to MagTek's specifications, MagTek will, at its option, repair or replace this product at no additional charge except as set forth below. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of MagTek. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, unreasonable use, misuse, abuse, customer's negligence, Reseller's negligence, or non-MagTek modification of the product. MagTek reserves the right to examine the alleged defective goods to determine whether the warranty is applicable.

Without limiting the generality of the foregoing, MagTek specifically disclaims any liability or warranty for goods resold in other than MagTek's original packages, and for goods modified, altered, or treated by customers.

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.

MAGTEK MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAGTEK DISCLAIMS ANY WARRANTY OF ANY OTHER KIND, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

EACH PURCHASER UNDERSTANDS THAT THE MAGTEK PRODUCT IS OFFERED AS IS. IF THIS PRODUCT DOES NOT CONFORM TO MAGTEK'S SPECIFICATIONS, THE SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. MAGTEK'S LIABILITY, IF ANY, TO RESELLER OR TO RESELLER'S CUSTOMERS, SHALL IN NO EVENT EXCEED THE TOTAL AMOUNT PAID TO MAGTEK BY RESELLER UNDER THIS AGREEMENT. IN NO EVENT WILL MAGTEK BE LIABLE TO THE RESELLER OR THE RESELLER'S CUSTOMER FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE SUCH PRODUCT, EVEN IF MAGTEK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

LIMITATION ON LIABILITY

EXCEPT AS PROVIDED IN THE SECTIONS RELATING TO MAGTEK'S LIMITED WARRANTY, MAGTEK'S LIABILITY UNDER THIS AGREEMENT IS LIMITED TO THE CONTRACT PRICE OF THE PRODUCTS.

MAGTEK MAKES NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, EXPRESSED OR IMPLIED, EXCEPT AS MAY BE STATED IN THIS AGREEMENT, AND MAGTEK DISCLAIMS ANY IMPLIED WARRANTY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

MAGTEK SHALL NOT BE LIABLE FOR CONTINGENT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY. MAGTEK FURTHER LIMITS ITS LIABILITY OF ANY KIND WITH RESPECT TO THE PRODUCTS, INCLUDING ANY NEGLIGENCE ON ITS PART, TO THE CONTRACT PRICE FOR THE GOODS.

MAGTEK'S SOLE LIABILITY AND BUYER'S EXCLUSIVE REMEDIES ARE STATED IN THIS SECTION AND IN THE SECTION RELATING TO MAGTEK'S LIMITED WARRANTY.

FCC WARNING STATEMENT

This equipment has been tested and 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 to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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 for 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.

CE STANDARDS

Testing for compliance to CE and FCC requirements was performed by an independent laboratory. The unit under test was found compliant to Class A.

UL/CSA

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

TABLE OF CONTENTS

SECTION 1. FEATURES AND SPECIFICATIONS	1
SECTION 2. INSTALLATION	5
HARDWARE INSTALLATION	5
CARD READING.....	5
ERROR DETECTED:.....	6
PC CABLE STORAGE.....	6
SECTION 3. OPERATION	7
COMMAND CODES FROM THE PC TO THE READER	7
Enable PINPad Communication (Hex A1) - Default.....	8
Enable Card Reading (Hex A2) - Default.....	8
Enable Keyboard Communication (Hex A3) - Default	8
Disable PINPad Communication (Hex A4)	8
Disable Card Reading (Hex A5).....	8
Disable Keyboard Communication (Hex A6)	8
Request Status (Hex A7)	8
RESPONSE CODES AND TIMING	9
COMMANDS FROM PC TO PINPAD VIA THE MAG-WEDGE READER	9
KEY LOADING SOFTWARE	10
ERROR CONDITIONS	10

FIGURES AND TABLES

Figure 1-1. Mag-Wedge Reader	vi
Table 1-1. Part Numbers for Mag-Wedge Readers	2
Table 1-2. Part Numbers for Mag-Wedge Readers for Older PS/2 Computers.....	2
Table 1-2. Specifications	3

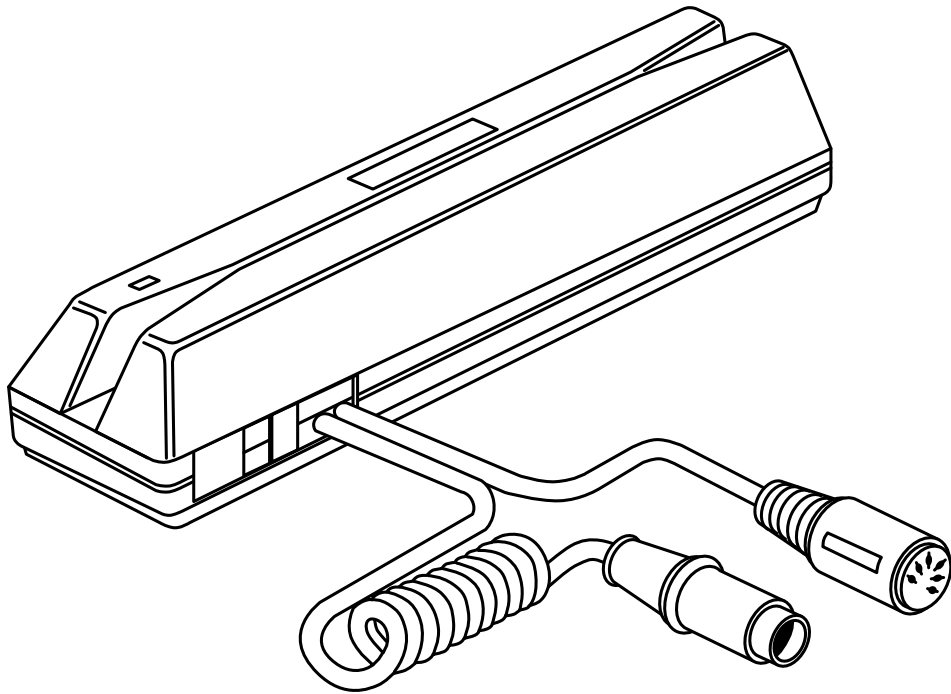


Figure 1-1. Mag-Wedge Reader

SECTION 1. FEATURES AND SPECIFICATIONS

The Mag-Wedge Reader connects in-line between a PC and its keyboard. It is intended to remain virtually invisible to both the keyboard and the PC until a card is read. When a card is read, the Mag-Wedge Reader takes over the interface to the PC and sends card data using the same scan codes used by the keyboard. The PC cannot distinguish between data from the keyboard and data from the Reader. Mag-Wedge Readers are available for connection to PS/2 and XT/AT type PC's.

The Mag-Wedge Reader also supports the operation of an optional encrypting PINPad that can be programmed for encrypting or non-encrypting operation. Commands are passed from the PC to the PINPad, and data from the PINpad to the PC. (XT/AT part numbers 21080005, 21080006 and 21080007 do not support the operation of a PINPad.)

Power is supplied to the Reader by the PC. The Mag-Wedge standard Reader sends card data, including start sentinel and end sentinel, followed by a carriage return. Units are available which do not send a carriage return or the start and end sentinel.

The Mag-Wedge Reader also recognizes commands from the PC to enable or disable the PINPad, the keyboard, or the card reading. When powered up, all devices will be active. The Reader also initializes the optional PINPad to the non-encrypting mode.

Part numbers and descriptions for the Readers are listed in Table 1-1. Part numbers and descriptions for models used on older PS/2 Computers are listed in Table 1-2. These models are available but are not used on modern PS/2 Computers. Configurations other than those in the two tables are available; call the factory for options.

Table 1-1. Part Numbers for Mag-Wedge Readers

IBM XT Uses Existing Keyboard Cable	
Part Number	Description
21080005	XT Tks 1,2 with CR. No PinPad Interface
21080006	XT Track 2 with CR. No PinPad Interface
IBM AT Uses Existing Keyboard Cable*	
Part Number	Description
21080020	AT Tracks 1,2 with CR
21080021	AT Track 2 with CR
21080012	Same as p/n 21080021 except no start and end sentinel output
21080022	AT Track 2,3 with CR
IBM PS/1, PS/2 Compatible - Uses Existing Keyboard Cable*. Cable has female mini din connector -attaches directly to keyboard cable *	
Part Number	Description
21080057	PS/2 Tracks 1,2 with CR
21080072	Same as p/n 21080057 except no start and end sentinel output
21080058	PS/2 Track 2 with CR
21080073	Same as p/n 21080058 except no start and end sentinel output
21080059	PS/2 Tracks 2,3 with CR

*PINPad used is Encrypting PINPad and Cable P/N 30015040.
 For other configurations, check with the factory.
 CR=Carriage Return

Table 1-2. Part Numbers for Mag-Wedge Readers for Older PS/2 Computers

IBM PS/2 Reader Cable Plugs into AMP Connector on PS/2 Keyboard 7' Coiled Cable*	
Part Number	Description
21080050	PS/2 Track 1,2 with CR
IBM PS/2 Reader Cable Plugs into AMP connector on PS/2 Keyboard 10' Straight Cable*	
Part Number	Description
21080061	PS/2 Track 2 with CR

*PINPad used is Encrypting PINPad and Cable P/N 30015040.
 For other configurations, check with the factory.
 CR=Carriage Return

Specifications are listed in Table 1-2.

Table 1-2. Specifications

Color:	Pearl White (Consult Factory for Other Colors)
Power Requirements (without PINPad):	5V, 100mA max drawn from PC. Typical, 45mA.
Dimensions	
Length:	6 1/2"
Width:	1 3/4"
Height:	1 5/8"
Weight:	7 oz.
Cable Length:	PS/2: 7'; AT/XT: 5' (See also Table 1-2)
Connector:	PS/2: 6 Pin Mini Din; AT/XT: 5 Pin Din
Message Format:	Scan Code
Card Speed:	3-125 ips at 75 bpi; 3-50 bpi at 210 bpi
MTBF:	Electronics: 30,000 hours Head: 300,000 passes

SECTION 2. INSTALLATION

The Mag-Wedge Reader connections are very simple. There are two cables from the Reader, the male round connector plugs into a female connector on the PC where the keyboard originally went. The other connector plugs into the keyboard or keyboard cable. The RJ11 connector in the Reader is the connector for the cable from the PINPad.

HARDWARE INSTALLATION

To install the Mag-Wedge Reader proceed as follow:

1. Power down the PC
2. Connect both cables from the Mag-Wedge Reader to the PC. The female connector plugs into the keyboard port at the rear of the computer. The other one plugs into the keyboard or the keyboard cable.
3. Position the Reader on a flat, accessible surface with at least four (4) inches clearance on either end. Remember you need ample room to swipe a card. Most users mount the Reader on the top surface of the keyboard. Orient the Reader so the MagTek logo is facing you. When you have determined the location, clean the area that the Reader will be mounted on with isopropyl alcohol. Remove the adhesive protective cover on the Velcro tabs, and position the Reader and push down firmly.
4. Power up the computer. The LED (Light Emitting Diode) on the Reader will glow orange momentarily and then begin to flash red. The LED will stop flashing red and will glow green. The Reader is now ready to read magnetic stripe cards that are encoded to the ANSI/ISO standards.

CARD READING

Hold card firmly in your hand and swipe the card through the Reader slot. The green LED will turn off momentarily. Keep the bottom edge of the card in contact with the bottom of the slot *all the way through* the swipe. Do not pull the front of the card up or out of the slot until the entire length of the card has passed through the Reader slot. Do not press any keys on the keyboard while you are reading a card.

The data read from the card will be transmitted to the computer and appear on the display. You may see one or two tracks of data depending on the Reader model. If the Caps Lock Mode indicator is on, the alpha characters will be displayed in upper case.

Cards can be swiped from either end with stripe down and facing MagTek logo.

Mag-Wedge Reader

ERROR DETECTED:

If the Reader cannot decode the data on the magnetic stripe, the LED on the Reader will glow red. If only one track of data can be decoded, that track will be transmitted and displayed. The red LED will be lit for the other track. In all cases except at power up, the red LED will only remain lit for two seconds.

If the Reader does not respond as described above, make a note of the prompts or error messages on the display and the status of the LED on the Reader. Then call MagTek customer assistance at (651) 415-6800.

PC CABLE STORAGE

If the PC keyboard cable that was supplied with your computer is not used, store it in an accessible place. If use of the Reader is discontinued, the cable will be needed to reconnect the original keyboard cable.

SECTION 3. OPERATION

After the Mag-Wedge Reader is properly installed, power up the PC as usual. An LED on the Reader should momentarily illuminate an orange color. It will then quickly change to a red color and start blinking. The Reader determines the type of PC it is attached to by checking the commands the PC sends to the keyboard when powering up. The LED then illuminates a green color instead of blinking red. The unit is ready to read a card, accept data from the PINPad (if attached) and receive commands from the PC.

Passing a card through the Reader causes the green LED to momentarily extinguish. The data read from the card will be transmitted to the computer and appear on the display. If the Reader is a single track device, the data will be sent as follows:

SS CARD DATA ES CR (SS= Start Sentinel; ES= End Sentinel; CR=Carriage Return)

If the Reader is a dual track device then one track must be Track 2. Track 2 will always be sent immediately following Track 1 or Track 3. The LED will re-illuminate green after all track data has been sent. If the Caps Lock indicator on the PC keyboard is ON, all alpha characters will be sent in upper case. If the Caps Lock is OFF, all alpha characters will be sent in lower case. If the Shift Key is pressed and held down prior to transmission of the card data, improper data may be sent. This should be avoided.

COMMAND CODES FROM THE PC TO THE READER

With a Reader and PINPad attached to the PC, there are three possible devices that can communicate with the PC. All communication goes through the keyboard port. The Reader is directly connected to the keyboard port and the keyboard and PINPad are connected to the Reader. When the PC receives the data from the keyboard port, it cannot tell if the data has come from the keyboard, the PINPad, or the Reader. Application software should be written to read the information from the keyboard buffer to access the data. When the PC is first powered up, all devices will be active and the non-encrypting PINPad will be in a digit mode.

Note

Part Numbers 2108000 and 21800067 do not support the command code feature.

The commands written to the Reader and PINPad should be written to I/O address Hex 60 for PS/2 Model 50 and AT computers. Commands should be written to Hex 68 for PS/2 Model 30 and PS/2 Model 25 computers.

The communication between the Reader and the PC is always active and the Reader always responds to the following commands, except when the card reading is in progress or data is being transmitted to or from the PINPad:

Enable PINPad Communication (Hex A1) - Default

This command will activate the PINPad and allow the Reader to communicate with the PINPad. It will set the non-encrypting PINPad in a digit mode, or reset the encrypting PINPad.

Enable Card Reading (Hex A2) - Default

This command will activate the Reader, turn the LED on (green color) and allow the Reader to read the card. After the card is read, the card data will be sent to the PC.

Enable Keyboard Communication (Hex A3) - Default

This command will activate the keyboard and allow the Reader to communicate with the keyboard.

Caution

If two or more devices are active at the same time, the PC cannot tell if the data came from the keyboard, the PINPad, or the Reader.

Disable PINPad Communication (Hex A4)

This command will inactivate the PINPad and not allow the Reader to communicate with the PINPad. If you're using a non-encrypting PINPad, this command turns off the LED. If you're using an encrypting PINPad, it will reset and clear the display.

Disable Card Reading (Hex A5)

This command will inactivate the Reader, extinguish the green LED and not allow the Reader to read a card.

Disable Keyboard Communication (Hex A6)

This command will inactivate the keyboard and not allow the PC and the Reader to communicate with the keyboard.

Request Status (Hex A7)

This command requests a status of all devices. The status response will be one of the following (each response is followed by a carriage return):

EPP ACTIVE	NON EPP, KEYBOARD ACTIVE
EPP, READER ACTIVE	NON EPP, READER, KEYBOARD ACTIVE
EPP, KEYBOARD ACTIVE	READER ACTIVE
EPP, READER. KEYBOARD ACTIVE	KEYBOARD ACTIVE
NON EPP ACTIVE	READER, KEYBOARD ACTIVE
NON EPP, READER ACTIVE	ALL DEVICES INACTIVE

RESPONSE CODES AND TIMING

K= Acknowledge

O= No PINPad attached

P=PINPad is attached, but disabled

After receiving a valid command from the PC, the scan code "K" will be sent to the PC. There will be no response if the command is not valid. If the Reader receives the enable PINPad command (Hex A1) and there is no PINPad attached to the Reader, the scan code "O" will be sent to the PC. If the Reader receives a PINPad command (see Command from the PC to the PINPad) and the PINpad is disabled, the scan code "P" will be sent to the Host. There is no carriage return following the response. The response time varies depending on the command. The minimum is 3 milliseconds and the maximum is 1.1 seconds.

COMMANDS FROM PC TO PINPAD VIA THE MAG-WEDGE READER

Commands from the PC to the PINPad are in ASCII, they start with STX and end with ETX. All ASCII characters between STX and ETX will be sent to the PINPad. The response and the data from the PINPad will be converted to the keyboard scan code before being sent back to the PC. All data from the PINPad will be followed by the scan code of the carriage return except for the data in digit mode. The response time is the time from when the PC starts sending the last character of the command until it receives the response. The response time varies depending on the command. The minimum is 180 milliseconds and the maximum is 4 seconds.

Delays to be inserted are as follows:

- 1) When the PC sends a command to the Mag-Wedge Reader or the PINPad, the keyboard also receives this command. Since it is not-a valid command for the keyboard, it issues the resend command (Hex FE) following the invalid byte. There is no response from the PC. Since the resend command is not a valid keyboard scan code, it cannot be detected by application software. For example, INKEY\$ command in programming language Quick Basic cannot detect the resend command (Hex FE) from the keyboard. To avoid any possible problem, it is recommended that a 5 millisecond delay should be inserted between each byte of the PINPad command being sent to the Mag-Wedge Reader.

Mag-Wedge Reader

- 2) All keys on the keyboard are classified as make/break, which means when a key is pressed, the keyboard sends a make code for that key to the keyboard controller. When the key is released, its break code is sent. The time between the make code and the break code of a key pressed varies depending on how long a key is pressed, normally it should not exceed 500 milliseconds. Since the communication between the PC and the keyboard is half duplex and the application software responds to the make code (not the break code), the PC should receive the break code of the last key pressed before sending the command to the Mag-Wedge Reader. To avoid any possible problem, it is recommended that a 500 millisecond delay should be inserted between the make code of the last key pressed and the first byte of the command. Any character that goes from the Reader to the PC has make and break codes. The time between the make codes and the break code is less than 15 milliseconds. To avoid any possible problem, it is recommended that a 15 millisecond delay be inserted between the make code of the last character from the Reader and the first byte of the command.

KEY LOADING SOFTWARE

This software will be supplied to a customer who has a Mag-Wedge Reader and encrypting PINpad. This software is used to add the master key, the session key, the working keys, and the key serial number to each encrypting PINpad, and the initial PIN encryption key.

ERROR CONDITIONS

There are only a few conditions which will produce an error. The only Reader related condition is invalid card data. If the Reader cannot decode the information on the magnetic stripe, the LED illuminates red. If it is a dual track Reader, the Reader will send any valid track of data that it finds. If it only finds one valid track and the other track is invalid, then the valid track will be sent, and the LED will illuminate red for the invalid track.

The PC may also cause an error condition. If the PC inhibits the transmission while data is being transmitted, the Reader will abort its operation and the LED will illuminate red.