

# **MINIWEDGE™ SWIPE READER TECHNICAL REFERENCE MANUAL**

**Manual Part Number: 99875123 Rev 11**

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**MAGTEK®**

**REGISTERED TO ISO 9001:2000**

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### REVISIONS

Rev Number	Date	Notes
1	30 Nov 98	Initial Release
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3	17 Mar 99	Sec 1: Editorial Changes; Sec 2: Editorial Changes; Sec 3: Editorial Changes, added Windows Drivers application, changed Parameter Address List, Moved Response Codes and Timing; Appendix A: Added Character Timing Diagram.
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6	21 Sep 00	Sec 1: Added 35 language configurations under Part Numbers; under features, added Auto-detect; Table 1-1, Specifications, added track formats; under Dimension and Length changed to 3.94" (100.0 mm); weight changed to 5.8 oz; Converted symbols to Metric System [SI]. Sec 2: added error and LED descriptions. Sec 3: Corrected Table 3-1, and 3-2; Added responses to examples.
7	8 Jun 01	Front Matter: Updated Agency Approval page to include Class B and UL approvals; Sec 1: added P/N 21080244; Sec 3: to Device Specific Operation Table added Mag Wedge and DOS Mode. Added new section, Index.
8	5 Apr 02	Sec 1, 2, 3: Added index entries. Sec 2: changed Fig 2-2, 2-3, and added Fig 2-4 to reflect new cable.
9	22 Aug 02	Sec 1: added P/N 21080246 to Table, Trk 1,2, pearl white (no cover); Sec 3: To Table 3-3 added 02E, Start Sentinel char for Trk 1, to P014 added BAT AA, Basic Assurance Test/twice, to P080 added S1, Keyboard uses shift lock; Index: added LED entries.
10	13 May 03	Front Matter: added ISO line to logo, changed Tech Support phone number, added new warranty statement.
11	19 Apr 04	Section 1: Removed P/N table and added configuration table. Editorial throughout.

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## **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.

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

## **CE STANDARDS**

Testing for compliance to CE requirements was performed by an independent laboratory. This equipment has been tested and demonstrated compliance to current European Union Directive 89/336/EEC for Class B disturbance level.

## **UL/CSA**

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

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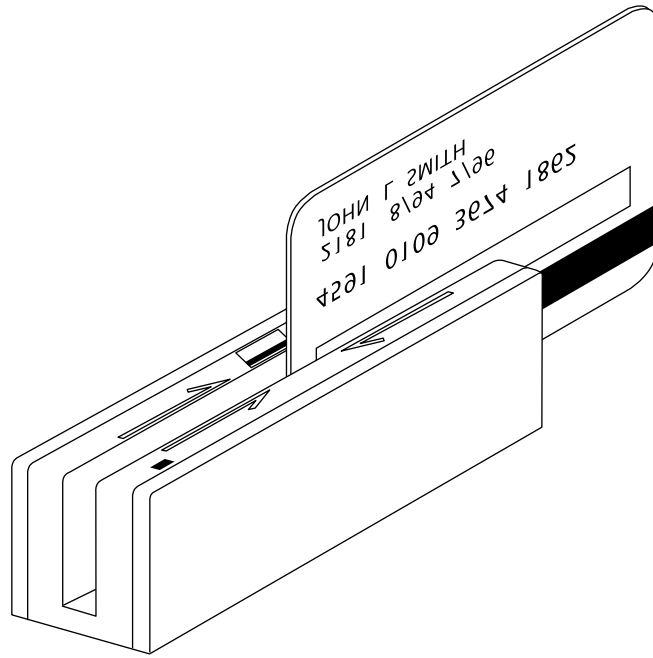
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**Figure 1-1. MiniWedge Reader**

## **SECTION 1. FEATURES AND SPECIFICATIONS**

The MiniWedge™ Swipe Reader connects between a PC and its keyboard. The Reader looks transparent to both the keyboard and the PC until a card is read. When a card is read, the Reader disables the keyboard 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. MiniWedge Readers can connect to PS/2 or AT type PCs.

The PC keyboard supplies power to the MiniWedge Reader. The Reader can be configured to send card data with or without start sentinel, end sentinel, and carriage returns. The MiniWedge Reader also recognizes commands from the PC to enable or disable the keyboard or card reading. When powered up, all devices are active.

### **CONFIGURATIONS**

Part numbers for the MiniWedge Swipe Reader are 21080201 through 21080247. For information on individual models, contact MagTek sales.

### **FEATURES**

Major features of the Swipe Reader are as follows:

- Powered through the keyboard interface – no external power supply required
- Hardware Compatible with PC or any computer or terminal with PC keyboard interface
- Bidirectional card reading
- Reads encoded data that meets the standards of ANSI (American National Standards Institute); ISO (International Standards Organization); CA DL/ID (California Driver License) AAMVA (American Association of Motor Vehicle Administrators).
- Auto-detects track encoding format. Can read 7-bit, 210 bpi data on all three tracks.
- Two-color LED for status
- Small Footprint

## RELATED DOCUMENTS

*MagTek Device Drivers For Windows, Programming Reference Manual, P/N 99875125.*

## SPECIFICATIONS

**Table 1-1. Specifications**

<b>OPERATING</b>	
Reference Standards	ISO/ANSI/ CDL/ AAMVA
Recording Method	Two-frequency coherent phase (F2F)
Message Format	Scan Code
Card Speed	3 to 50 IPS
Track Format	Reads 75-210 bpi on all 3 tracks
MTBF	Electronics: 125,000 hours. Head: 1,000,000 passes
<b>ELECTRICAL</b>	
Power Input	From PC: 5VDC; power supplied by keyboard interface
Current	20 mA max
<b>MECHANICAL</b>	
Dimensions	Length 3.94" (100.0 mm) Width 1.28" (32.5 mm) Height 1.23" (31.3 mm)
Weight, Reader only	5.8 oz. (165 gr.)
Reader with Cable	6.5 oz. (184 gr.)
Cable length	6 Ft. (1.8 m)
Connectors	6-pin Mini Din and 5-pin Din; includes adapter cable
<b>ENVIRONMENTAL</b>	
Temperature	
Operating	32 °F to 131 °F (0 °C to 55 °C)
Storage	-22°F to 158°F (-30 °C to 70 °C)
Humidity	
Operating	10% to 90% noncondensing
Storage	Up to 100% noncondensing
Altitude	
Operating	0-10,000 ft. (0-3048 m.)
Storage	0-50,000 ft. (0-15240m.)



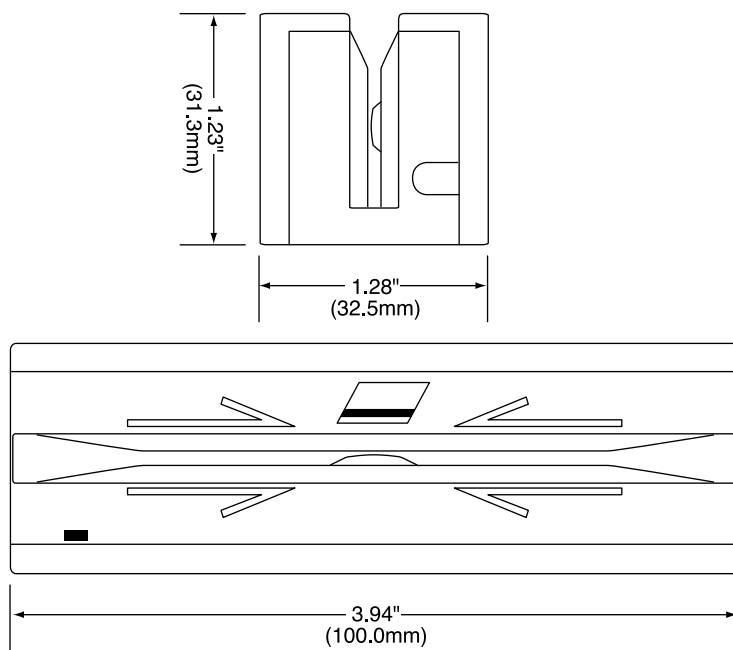


Figure 1-2. Dimensions



## SECTION 2. INSTALLATION

The MiniWedge Reader cable is a Y cable that permits the MiniWedge Reader to be installed between the PC and the PC keyboard. There is also an adapter cable that is used to adapt various connector configurations to interface with the Reader. These configurations are described and illustrated below.

### HARDWARE INSTALLATION

To install the MiniWedge Reader proceed as follow:

#### Mounting

1. The Reader can be mounted on a surface in three ways:
  - By two screws through the surface attached to the bottom of the unit and running the cable on the top of the surface;
  - By two screws through the surface attached to the bottom of the unit and by drilling a hole in the surface for the cable and running the cable through the hole;
  - By attaching the unit to the surface with Velcro or Dual Lock mounting pads and running the cable on the top of the surface.

#### *Note*

*The two mounting inserts are 3 mm diameter; 0.5 mm pitch; 6.4 mm deep. The length of the screws used depends on the mounting surface thickness and the thickness of washers (if used).*

The mounting dimensions are shown in Figure 2-1. Determine the method of mounting required.

2. Ensure the Reader is positioned on a flat, accessible surface with at least 4 inches clearance on either end for room to swipe a card. Orient the Reader so the side with the LED is facing the direction of intended use.

If Velcro or Dual Lock mounting pads are to be used, clean the area that the Reader will be mounted on with isopropyl alcohol. Remove the adhesive protective cover on the pads, and position the Reader and push down firmly.

3. Mount the Reader.

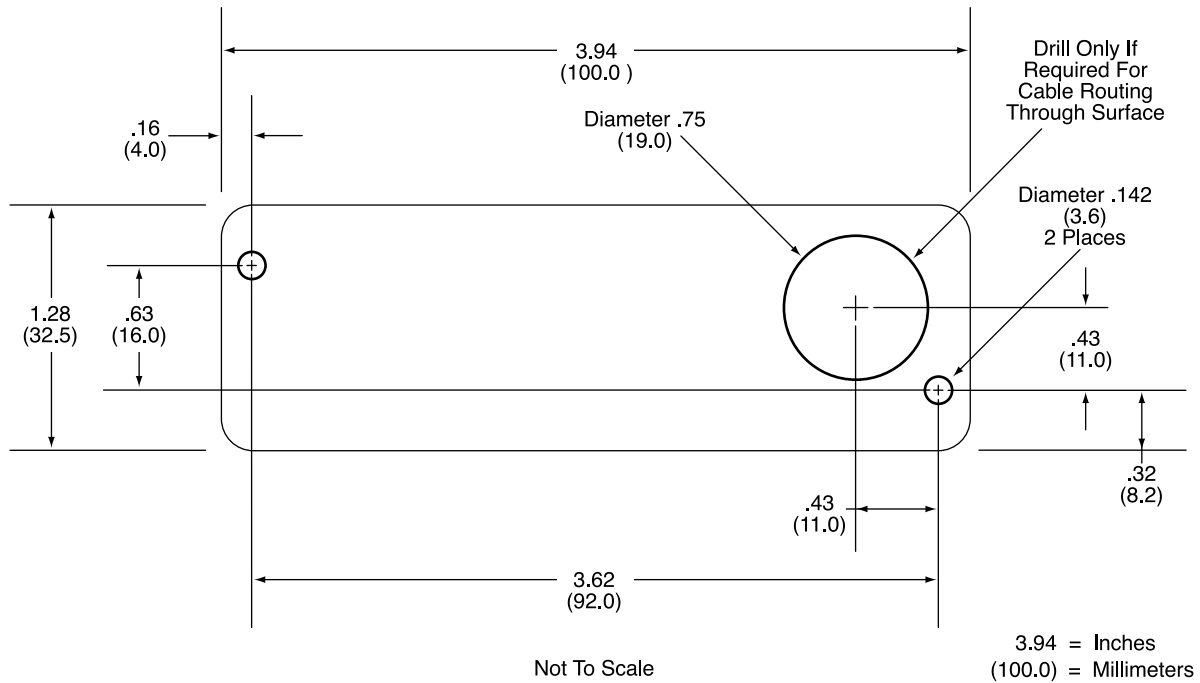


Figure 2-1. Mounting Hole Dimensions For Surface

## Cabling

1. Power down the PC.
2. Connect the cables as indicated in Figure 2-2, Figure 2-3, or Figure 2-4. One end of the Y cable plugs into the PC. The other end plugs into the keyboard; however, if a keyboard is not required, leave this end unconnected. Pin lists with illustrations for the 5-pin and 6-pin connectors are provided in Tables 2-1 and 2-2.

Since the MiniWedge Reader provides its own clock, it is not necessary to connect a keyboard. This can be beneficial in applications that use a touch screen for user interface or when the interface is for a portable computer.

### Note

*If multiple devices are connected to the PC via the keyboard port, the MiniWedge Reader must be connected closest to the PC.*

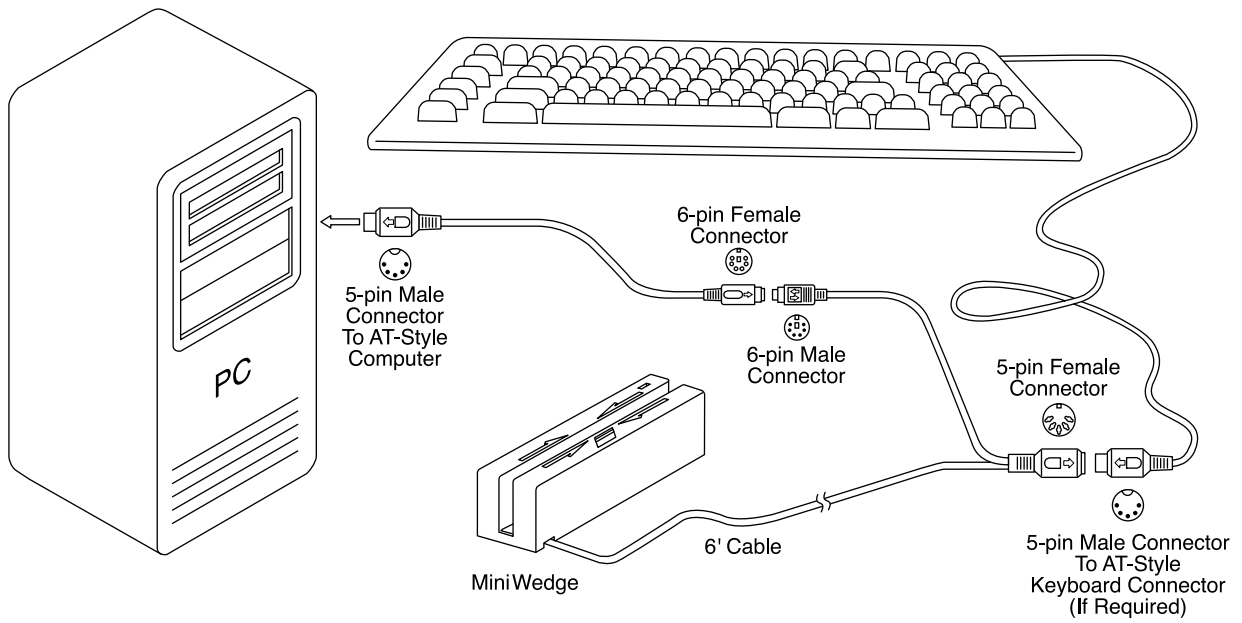


Figure 2-2. AT-style Configuration – Old Style Cable

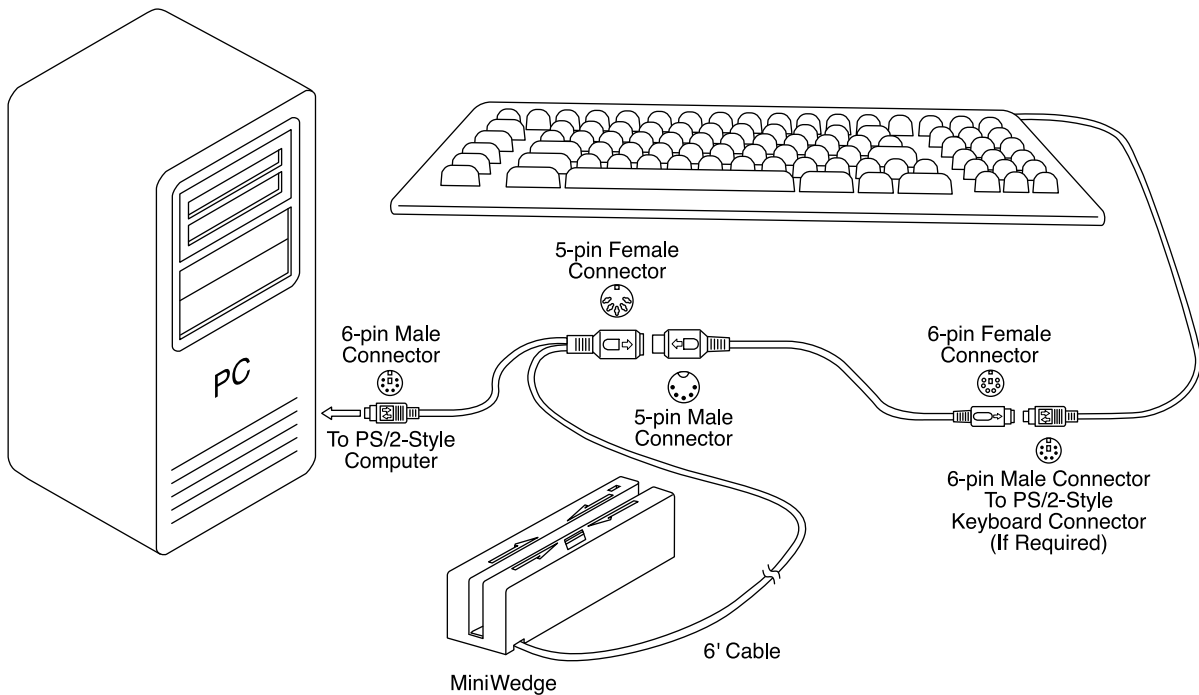


Figure 2-3. PS/2-style Configuration – Old Style Cable

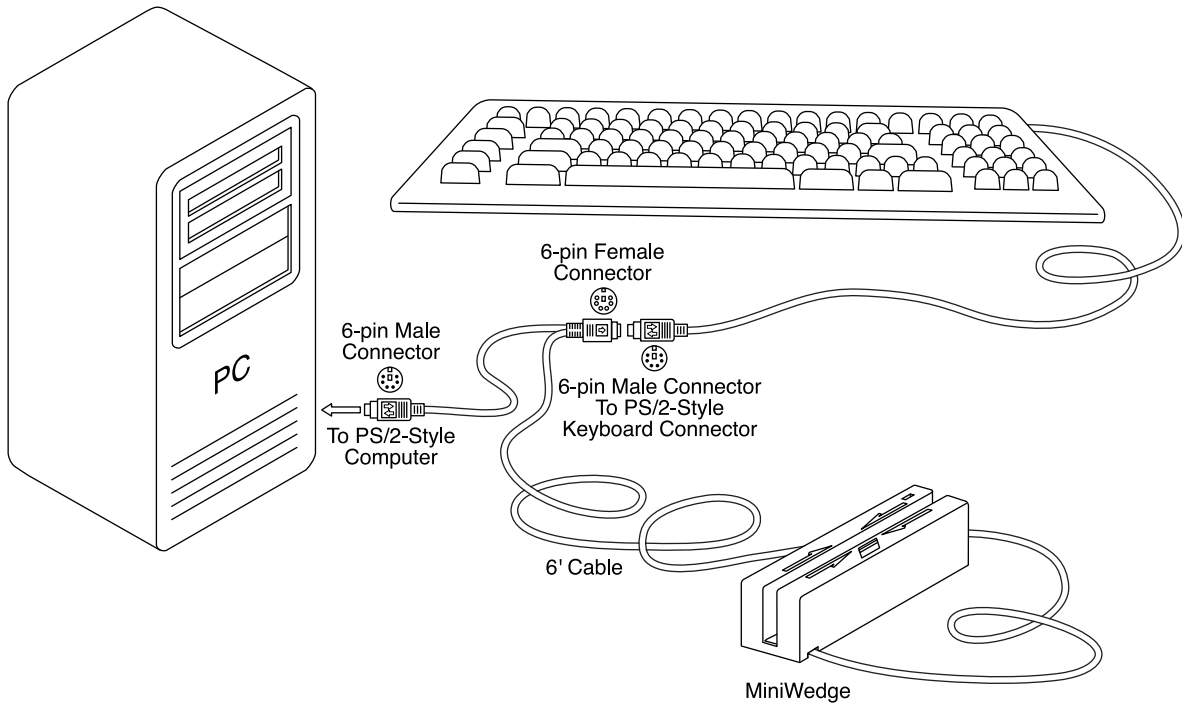
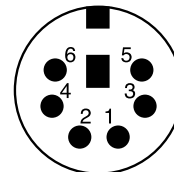


Figure 2-4. PS/2-style Configuration – New Style Cable

Table 2-1. Six-pin Mini DIN connector

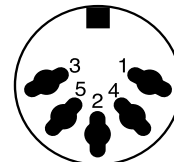
Pin	Signal
1	Data
2	Reserved
3	Ground
4	+5VDC
5	Clock
6	Reserved



Looking Into PC Connector

Table 2-2. Five-pin DIN Connector

Pin	Signal
1	Keyboard Clock
2	Keyboard Data
3	N/C
4	Ground
5	+5VDC



Looking Into PC Connector

3. Power up the computer. After a few seconds, the LED (Light Emitting Diode) on the Reader will glow green. The Reader is now ready to read magnetic stripe cards that are encoded to the ANSI/ISO, AAMVA, or CDL standards. If the Reader encounters an internal problem during its power-on self-check, the LED will be red or will flash red and green.

## **CARD READING**

Hold the card firmly and swipe it through the Reader slot. The green LED will turn off while the card is being read and while the data is being transmitted. 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. The keyboard is disabled while a card is being read and while the data is being transmitted.

The data read from the card will be transmitted to the computer and will appear on the display. You may see one, two, or three tracks of data depending on the card information. The alpha characters will be displayed in upper case if so configured, regardless of the setting of the Caps Lock on the keyboard. (See Section 3, P014, Track Data Send Flags, for upper and lower case configurations.)

Cards can be swiped from either end with stripe down and facing the side with the LED.

## **DATA ERROR DETECTED**

If the Reader cannot decode the data on the magnetic stripe, the LED on the Reader will glow red for a few seconds. If at least one track of data can be decoded, that track will be transmitted. Any track containing an error will be indicated with an upper case 'E' if the feature is enabled. If no errors are encountered, the LED will go off for a few seconds during the transmission.

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 888-624-8350.





## SECTION 3. OPERATION

After the MiniWedge Reader is properly installed, power up the PC as usual. The LED on the Reader remains off. 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. The unit is then ready to read a card and receive commands from the PC. If the CRC (Cyclic Redundancy Check) of the code is incorrect or the internal RAM is bad, the LED will be red until power is removed. The keyboard will not operate. If the CRC of the parameter table is incorrect, the LED will slowly flash red and green. The Reader will be disabled, but the keyboard will operate.

Passing a card through the Reader causes the green LED to extinguish. The data read from the card will be transmitted to the computer and appear on the display. The LED will reilluminate green after all track data has been sent. All alpha characters will be sent in upper case if the option is enabled.

When used with the MagTek Windows Drivers, the green LED will only illuminate when the application program has enabled a read operation. This feature prevents card data from being sent to an application that is not expecting it.

### COMMAND CODES FROM THE PC TO THE READER

With a Reader attached to the PC, multiple devices can communicate with the PC. All communication goes through the keyboard port. The Reader is directly connected to the keyboard port and the keyboard or other device is 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 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.

The MiniWedge defaults to keyboard scan set 2 but will be switched by the BIOS to scan set 1 on some models. The commands written to the Reader 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. If the MagTek MTD Windows Driver (P/N 30037385) is being used, it will handle all communication with the Reader.

The communication between the Reader and the PC is always active, and the Reader always responds to the commands listed below, except when the card reading is in progress.

### MESSAGE FORMAT

Characters used in the message format are as follows:

Characters	Hex Value	Description
<stx>	02	Start of Text
<etx>	03	End of Text
<cr>	0D	Carriage Return

## DEVICE-SPECIFIC OPERATION

For compatibility with existing applications, the MiniWedge Swipe Reader uses the MagWedge style commands shown in Table 3-1. The “A8” commands are provided specifically for use with the MagTek MiniWedge Windows Driver. After sending the 2-byte 0xA8, 0x41 (or 0x42), the MiniWedge will operate in a “Windows driver-compatible” mode. (The mode command can be bracketed by <stx>/<etx> for compatibility.)

**Table 3-1. Device Specific Operation**

Character	Function	Description
0xA0	ID	The reader responds: KMINIWEDGE (C) MAG-TEK 1999<cr> 210822xx.rnn/CCCC<cr>
0xA1	Enable Pinpad	Not implemented; reader responds with 'O'
0xA2	Enable Reader	Reader responds with 'K', LED lights green
0xA3	Enable KB	Reader responds with 'K', KB enabled (should probably be left in this state)
0xA4	Disable Pinpad	Not implemented; reader responds 'K', has no affect
0xA5	Disable Reader	Reader responds 'K', LED goes off
0xA6	Disable KB	Reader responds 'K', KB disabled
0xA7	Request Status	Reader responds with one of the following, terminated with <cr>. Note that each is preceded by ACK (K). KREADER ACTIVE KKEYBOARD ACTIVE KREADER KEYBOARD ACTIVE KALL DEVICES INACTIVE
0xA8 0x40	MagWedge Mode	Restores unit to MagWedge compatibility. Responds same as 0xA0 above except for the leading "K".
0xA8 0x41	WinDriver mode using scan codes*	All messages sent as scan codes. Responds with: <stx>Wl210822xx.rnn/CCCC<etx>
0xA8 0x42	WinDriver mode using direct characters	All messages sent as direct characters. (This allows faster communication since only a single character is sent for each character in a message.) Responds with: <stx>Wl210822xx.rnn/CCCC<etx>
0xA8 0x43	WinDriver mode using scan codes*	Same as 0xA8 0x41 but no ACK sent to any command.
0xA8 0x44	WinDriver mode using direct characters	Same as 0xA8 0x42 but no ACK sent to any command.
0xA8 0x45	MagWedge	DOS Mode. Same as 0xA8 0x40 except that each message begins with <stx> and terminates with <etx>.

\* Driver mode will always use the US keyboard scan codes`.

where:

*xx* = final two digits of the firmware part number

*rnn* = Revision + sub-revision

*CCCC* = CRC for version verification

To conform to the keyboard protocol, 0xFA code is sent as an acknowledge for each byte that is correctly received by the Reader. With Windows NT, it may be desirable to disable the acknowledge for each character since the error log tends to fill up due to unexpected keyboard responses. Optional driver modes are offered for the two WinDriver modes. The acknowledge characters can be suppressed for non-keyboard commands by sending 0xA8 0x43 in place of the 0xA8 0x41 command or 0xA8 0x44 in place of the 0xA8 0x42.

The maximum time between characters in a command should not exceed about 125 milliseconds or the device may assume that the command has been terminated.

### **RESPONSE CODES AND TIMING**

K= Acknowledge  
O= No PINPad attached

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 (0xA1), the scan code "O" will be sent to the PC since the MiniWedge does not support a PINPad. There is no carriage return following the response. The response time varies depending on the command. The maximum response time is 50 milliseconds in cases where a parameter is modified.

### **MINIWEDGE COMMANDS AND RESPONSES**

The basic structure of commands and messages (or responses) consists of a message prefix (<stx> or M), a device identifier ("W"), the message, and the terminator (<etx> or <cr>). The following are examples of request status and response:

<b>Mode</b>	<b>Request</b>	<b>Response</b>
WinDriver	<stx>WST<etx>	<stx>WSEE<etx>
MagWedge	MWST<cr>	WSEE<cr>

## MiniWedge Swipe Reader

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All command messages consist of two ASCII letters as shown in Table 3-2 below. Some commands include additional characters for parameters. Any completed command will generate a response.

Responses include an identifying letter following the “W”. All responses are returned as scan codes, e.g., <stx> is returned as <ctrl>b. The only exception is when the device is configured for direct character modes (0xA8 0x42) in which case characters are sent as binary values.

**Table 3-2. Commands and Responses**

Command ID	Function	Response
ID	Return ID	WI210822xx.rnn/CCCC
CY	Copyright	WCMINIWEDGE (C) MAG-TEK 1999
ST	Status	WSrk
PVxxx	Parameter View	WPyy
PWxxx=yy	Parameter Write	WPyy (note: does not affect WinDriver mode)
DK	Disable Keyboard	WSrk
EK	Enable Keyboard	WSrk (default after power on)
DR	Disable Reader	WSrk (LED goes off)
ER	Enable Reader	WSrk (default after power on - LED green)
TK	Get Track Configuration	WTtk
TKtk	Set Track Configuration	WTtk
DL	Character Delay	WXdd (defaults to 0x12 = 9.2 ms)
DLdd	Set Character Delay	WXdd
(none)	Track Data	<track data>

Where the following apply to the above commands:

*r* = E (reader enabled)  
D (reader disabled)

*k* = E (keyboard enabled)  
D (keyboard disabled)

U (keyboard not detected)

*xxx* = 000 to 1FF

*yy* = 00 to FF

*tk* = Track/ID parameter as defined in P013 parameter

*dd* = Delay between characters (\* 0.512  $\mu$ sec.) in hex

track data will be in the following format:

WD%....?<cr>[;|@]....?<cr>[+!|#&]....?<cr>

where:

% = 7-bit Track 1

; = ISO/ABA 5-bit Track 2

@ = 7-bit Track 2

+ = ISO/ABA Track 3

! = CA Driver License Track 3

# = AAMVA Track 3

& = 7-bit Track 3

Any unrecognized command will respond with an error message:

W?<P025>

*Note*

*The MiniWedge monitors the Caps Lock state for the keyboard. If the Caps Lock is off, it will not send any shift-key scan codes. If the Caps Lock is on, the MiniWedge sends shift-key scan codes to capitalize all alpha characters.*

## MAGWEDGE COMPATIBILITY

There are a number of single-byte parameters that uniquely define the operation of the MiniWedge device when operating in the MagWedge compatibility mode. These parameters are listed in Table 3-3. The parameters (or properties) are stored in EEPROM and should not be updated unless the value is incorrect for the operation. It is suggested that the parameter be interrogated prior to writing to a particular address. If the value is correct, there is no need to write to that address. The parameters and their attributes are shown in the table below. Only the Start Sentinel Character parameters **are used** when operating in the Windows Driver mode.

When a parameter is modified, it may take about 50 milliseconds before the response will be returned. Other responses will be returned in about 5 ms.

*Note*

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

## PARAMETER ADDRESS LIST

Table 3-3. Parameter Address List

Address (Hex) <sup>1</sup>	Access	Default Value	Parameter
001	R	0x00	Parameter ID #
013	R/W	0x95	Track/ID Enable
014	R/W	0x63	Track Data Send Flags
015	R/W	'@' (0x40)	Start Sentinel Char for TK2 - 7-bit data
016	R/W	'!' (0x21)	Start Sentinel Char for TK3 - CA Driver License
017	R/W	'+' (0x2B)	Start Sentinel Char for TK3 - ISO/ABA
018	R/W	'#' (0x23)	Start Sentinel Char for TK3 - AAMVA
019	R/W	'&' (0x26)	Start Sentinel Char for TK3 - 7-bit data
01A	R/W	18 (0x12)	Char Output Delay ( x 512 $\mu$ s) default = 9 ms +
01B	R/W	50 (0x32)	Special Char <sup>2</sup> Delay ( x 512 $\mu$ s) default = 25 ms +
01C	R/W	0x00	Pre Card Data code (hex value sent) <sup>3</sup>
01D	R/W	0x00	Pre Card Data char (Scan codes sent) <sup>4</sup>
01E	R/W	0x00	Post Card Data char (Scan codes sent)
01F	R/W	0x00	Post Card Data code (hex value sent)
020	R/W	0x00	Pre Track char (Scan codes sent)
021	R/W	0x00	Post Track char (Scan codes sent)
022	R/W	0x0D	Terminating Char + per track/per card flag
023	R/W	0x00	Pre response data code value (hex value sent)
024	R/W	'W' (0x57)	Command Prefix Character
025	R/W	0x0D	Post response data char value (scan codes)
026	R/W	0x00	Post response data code (hex value sent)
027	R/W	'M' (0x4D)	Command prefix <sup>5</sup>
028	R/W	'W' (0x57)	Device ID
029	R/W	0x0D	Command Terminator
02A	R/W	0x00	Hardware Track mapping
02C	R/W	0x00	Table ID Number (to identify configuration parameters)
02D	R/W	0x00	Table Version Number (to identify configuration parameters)
02E	R/W	0x25	Start Sentinel Character for TK1
080	R/W	0x00	KB Flag
081-082	R/W	0x00	KB ID #. Not used by MiniWedge. Based on Language ID in Windows
083-114	R/W	0x00	Flags and scan codes for selected ASCII codes as defined below.
1FE	R	--	CRC of parameter table – Low byte
1FF	R	--	CRC of parameter table – High byte

<sup>1</sup> Any address not shown is reserved for future use.

<sup>2</sup> A special character is any character with an ASCII value less than 0x20. See Appendix A for character timing.

<sup>3</sup> When a "Hex code" is defined, only a single character is sent (e.g., 0x41 sent as 0x41).

<sup>4</sup> When a character requiring scan codes is defined, the appropriate set of scan codes is sent for that character (e.g., 0x41 sent as scan codes representing the letter A).

<sup>5</sup> The Command prefix must not be set to a character that could appear in a command since a new command is started whenever this character is detected.

Here are definitions of a few of the parameters (Pxxx):

**P001 Parameter Table ID #**

mod	I	I	I	I	I	I	I
-----	---	---	---	---	---	---	---

mod    0 – Parameters as set by MagTek  
          1 – Parameters have been modified from the factory default

I        0-127 – MagTek Parameter Identification #

**P013 Track/ID Enable**

id	0	T <sub>3</sub>	T <sub>3</sub>	T <sub>2</sub>	T <sub>2</sub>	T <sub>1</sub>	T <sub>1</sub>
----	---	----------------	----------------	----------------	----------------	----------------	----------------

Id        0 – Reads Std ISO/ABA cards only  
          1 – Decodes AAMVA & CA DL/ID Cards also

T<sub>#</sub>      00 – Track Disabled  
          01 – Track Enabled  
          10 – Track Enabled/Required (Error if blank)

Default: 0x95 = Include Driver licenses, all 3 tracks enabled but not required.

**P014 Track Data Send Flags**

BAT	SS	ES	LRC	NBR	LC	Er	Er
-----	----	----	-----	-----	----	----	----

BAT      0 – Normal Basic Assurance Test (Twice)  
          1 – Single BAT (for some special terminals)

SS        0 – Don't send Start Sentinel for each track  
          1 – Send Start Sentinel for each track

ES        0 – Don't send End Sentinel for each track  
          1 – Send End Sentinel for each track

LRC      0 – Don't send LRC for each track  
          1 – Send LRC for each track

## MiniWedge Swipe Reader

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- NBR 0 – Send numbers (top of keyboard)  
1 – Send numeric keypad
- LC 0 – Send card data as upper case  
1 – Send card data as lower case
- Er 00 – Don't send any card data if error  
01 – Don't send track data if error  
11 – Send 'E' for each track error

Default: 0x63 = send SS and ES, all upper case, send [SS]E[ES] for each track error.

### P022 Terminating Char

mod	c	c	c	c	c	c	c
-----	---	---	---	---	---	---	---

- mod 0 – Send c after card data  
1 – Send c after each track
- c 1-127 – 7 bit ASCII char code  
0 – send nothing

Note: 0x80 sends a "NUL" as ^@.

Default: 0x0D = Carriage return at the end of full card message.

### P02A Hardware Track Mapping

In some cases, it may be desirable to read a certain track format on a different physical track. The track mapping parameter allows the electronics to be set so that track 1 data, for example, can be read from the track 2 position. The table below indicates how the tracks can be mapped.

Hardware track	1	2	3
Map value			
0	1	2	3
1	3	2	1
2	2	1	3
3	1	3	2
4	2	3	1
5	3	1	2



**P080 KB Flag**

S	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	-	-	-	E
---	----------------	----------------	----------------	---	---	---	---

- E     0 – Use internal US keyboard scan codes  
       1 – Use table stored in parameter area
- A<sub>1</sub>    0 – OEM, ALT+ASCII Code  
       1 – ANSI, ALT+'0'+ASCII Code
- A<sub>3,2</sub>   00 – No Alt codes  
       01 – Alt only if no scan code in table  
       10 – Alt for all but fixed keys (CR, LF, TAB, SPACE, ESC, BS, DEL)  
       11 – Alt for all keys
- S     0 – keyboard uses Caps Lock  
       1 – Keyboard uses Shift Lock

**Shift Flag**

The Shift Flag is included in flags for each scan code.

A <sub>4</sub>	A <sub>3</sub>	A <sub>2</sub>	A <sub>1</sub>	-	-	-	-
----------------	----------------	----------------	----------------	---	---	---	---

- A<sub>1</sub>    0 – non-Alpha or (a-z)  
       1 – key affected by Caps Lock/upper case flag
- A<sub>2</sub>    0 – Does not need Ctrl key  
       1 – Needs Ctrl key
- A<sub>3</sub>    0 – Does not need AltGr key  
       1 – Needs AltGr
- A<sub>4</sub>    0 – Does not need Shift key  
       1 – Needs Shift key

Keyboard scan codes, other than English Language, are stored in locations 083H-114H as two-byte values. The first byte describes the shift flag condition; the second byte is the scan code.

## Card Data Format

The card data codes are not included if the value = 0.

For two tracks of data:

<P01C><P01D><P020>%....?<P021><P22><P020>[;<P015>]....?<P021><P022><P01E><P01F>  
if track 3 is included, it will follow track 2 data after <P022>:  
<P020>[<P016>|<P017>|<P018>|<P019>]....?<P021><P022>

## Parameter Modifications

Parameters can be viewed and modified by sending the following command strings:

<P027><P024>PVxxx To view a Parameter xxx=000-1FF, responds with hh (00-FF)

for example,

Command: MWPV025

Response: WP0D<P025><P026>

<P027><P024>PWxxx=hh To change a Parameter

for example,

Command: MWPW013=95

Response: WP95<P025><P026> if successful.

## Examples of Command Sequences

In some cases, it may be required that a message be preceded by an <stx> (0x02) character and terminated with an <etx> (0x03) with no carriage return at the end (0x00). The following command sequence can be used to modify each of the three parameters.

Insert <stx>:

MWPW01D=02

Response:

WP02

Insert <etx>:

MWPW01E=03

Response:

WP03

Remove <cr>:

MWPW022=00

Response:

WP00

If it is necessary to place a carriage return (0x0D) after each track (+0x80), the following command can be used.

Send <cr> after each track:

MWPW022=8D

Response:

WP8D

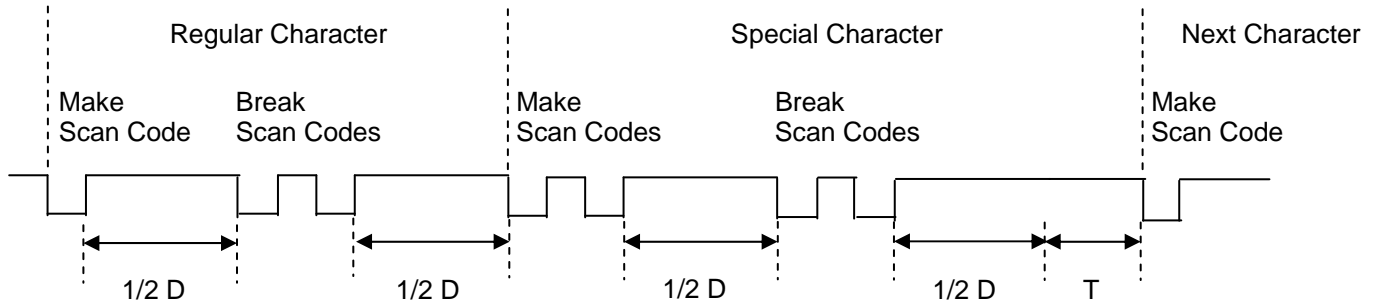
### **DATA ERROR CONDITIONS**

There are only a few conditions that will produce an error. The only Reader related condition is invalid card data. If the Reader detects Start Sentinel but cannot decode the information on the magnetic stripe, the LED illuminates red. The Reader will send any valid track(s) of data that it finds. If it only finds two valid tracks and the other track is invalid, then the valid tracks will be sent, and the LED will illuminate red for the invalid track.



## APPENDIX A. CHARACTER TIMING

The character timing is as follows:



Where  $D$  = Character delay specified by 01A parameter

Where  $T$  = Special character delay specified by 01B parameter (follows special character break code)

**Figure A-1. Character Timing Diagram**



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