



USER MANUAL

EzWriter™ MagStripe Reader & Writer

WorkShop™ Utility & Technical Guide

For Model Number IDWA



80058501-002-G
Jan 20, 2010

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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 is required to correct the interference at his expense.

FCC COMPLIANCE STATEMENT

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ID TECH EzWriter

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EzWriter MagStripe Reader Writer



Introduction

EzWriter is a personal computer peripheral device for reading and writing magnetic stripe card data. WorkShop is the companion software product, which provides operation of EzWriter through a Personal Computer. The MagStripe cards must meet the ISO 7811 standards for an ID1 card (typical credit card). Cards are manually swiped through the slot to perform a reading and/or writing operation. Data can be written and read verified with one swipe. The Reader/Writer supports magnetic stripe track formats defined either by an established industry standard or by a user (customer defined) data format. All formats use F/2F data bit encoding (writing) and either 210 or 75 bits per inch (BPI) data densities. The EzWriter can read and write both High coercivity and Low coercivity (Hi-Co & Lo-Co) magnetic stripes.

The enclosure is a die cast metal housing that provides weight and stability for excellent performance. There are two communication interfaces, either RS232 or USB, available through an attached six-foot cable. There are two command protocols available for EzWriter operations; the IDT protocol is the default and the AMC protocol is selectable using the Workshop application on the Companion CD. A separate power adaptor is required to supply the power needed for writing cards.

There are three Sections to this document:

The First Section provides Quick Start information covering EzWriter installation and installation of ID TECH's WorkShop Utility Application software. WorkShop operates with both RS232 unit and USB units and provides easy to use commands for performing all read and write functions. A simple example of WorkShop operation is given in this section. The example performs the two most basic operations, writing and then reading on a Lo-Co or Hi-Co magnetic stripe card.

The Second Section provides operation details for all the WorkShop functions.

The Third Section is the Technical Guide for the Reader/Writer. This section provides the product specification, commands, and related information. There are two command sets supported by EzWriter units supplied after November of 2006. The default command set is based on prior IDT products; the new command set is based on the Universal Serial Interface, which supports the original AMC products operations. The AMC command set is provided to support backward compatibility with previous software products & applications.

The Magnetic Stripe Reader & Writer is RoHS compliant.

For additional information, contact us or visit our website.

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Quick Start

This Quick Start section covers EzWriter installation and WorkShop software installation. A simple example is given to introduce WorkShop & EzWriter operation. The example guides an operator through the process of writing a few characters onto a magnetic stripe card and then through the process of reading the card to see the written data.

Installing WorkShop Software

The WorkShop software runs on Microsoft Windows platform for EzWriter with an RS232 or USB communication interface.

All the software is provided on a CD or is available on the ID TECH website in the form of a downloadable ZIP file. The downloaded Zip file has internal files, which must be extracted before using. Install WorkShop on a PC by Running the Setup file located on the CD or located in the extracted ZIP files. Follow the directions and process in the installation wizard. The result is a "IDT EzWriter WorkShop Vx.x" menu item added to the Programs menu in the Windows START menu. A file folder is added to the Program Files folder on the local hard drive. The new folder name is "IDT EzWriter Workshop". This folder contains the Workshop application and support files for Reading and Writing cards.

Installing EzWriter

EzWriter is used in an indoor environment. Locate the EzWriter where it is convenient to operate and protected from dust and liquids. For right-handed persons, swiping a card is most convenient from right to left. Position the EzWriter so the flared card entrance is on the right. A 24VDC power adaptor is provided. The adaptor input voltage range is 100 to 240VAC and can be used in most countries. The line power plug may need to be adapted to the power outlet connector. Remove the power adaptor from the packing box. Wait to connect the power adaptor until all the other connections are made.

The communication type can be RS232 or USB-RS232. Proceed to the Communication Interface section corresponding to the interface of your EzWriter unit.

Communication Interface

RS232

The EzWriter has a communication cable with a DB-9 connector that fits most computer serial (RS232) COM port connectors. An adaptor (not supplied) can be used to adapt to a DB-25 connector if necessary. See the Specifications, Interface Section for port settings.

Connect the DB-9 connector to the PC and insure it is fully seated. Connect the power adaptor output to the power connector on the back of the DB-9 housing. Finally, connect the power adaptor to the AC line power outlet. When power is applied, the LED on the Reader/Writer is orange for a moment and then becomes green. If the LED does not light, check the connections and the availability of power from the power outlet.

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USB-RS232

The USB interface operates through a serial COM port like an RS232 device. The USB communication uses a special USB-RS232 driver included in the supplied CD or is available from the ID TECH website. EzWriter is a “Self-Powered” USB device and must be powered using the 24VDC power adaptor provided with EzWriter.

The USB cable has two connectors at the cable’s end. One connector is for the PC USB connection and the other is for the power adaptor connection. Connect the EzWriter USB connector into the PC and insure it is fully seated. Connect the power adapter output to the power adaptor connector on the USB cable. Finally, connect the power adaptor to the AC line power outlet.

When power is applied, the LED is orange for a moment and then becomes green. If the LED does not light, check the power adaptor connections.

When the USB connection is recognized by the operating system for the first time, a Found New Hardware message is given. The operating system must install USB drivers in the PC. The drivers provide the communication link between the PC and EzWriter.

When the New Hardware Wizard window appears, follow the wizard directions to install the USB-RS232 drivers into the PC. The drivers are available online as Signed drivers. If an internet connection is available to the PC or the Workshop CD is available and installed in the CD drive, then perform “Install the software automatically (Recommended)” selection. Otherwise, select the “Install from a list or specific location (advanced)” option. For the advanced option, Workshop software must be installed first to have the drivers on the PC hard drive. *If Workshop is not already installed, stop here and install Workshop as instructed above.* Workshop software is available on the ID TECH website.



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If the Workshop CD is installed or the PC has an internet connection, then select the “(Recommended)” button and Click Next > to continue. The wizard searches for and installs the first driver. Close the Wizard by clicking “Finish”.

The New Found Hardware Wizard appears a second time to install a second driver. Repeat the same process again to install the second driver. When both drivers are installed, the process is complete. The USB communication interface is ready for operation when the “Found New Hardware” bubble appears with the following notice.

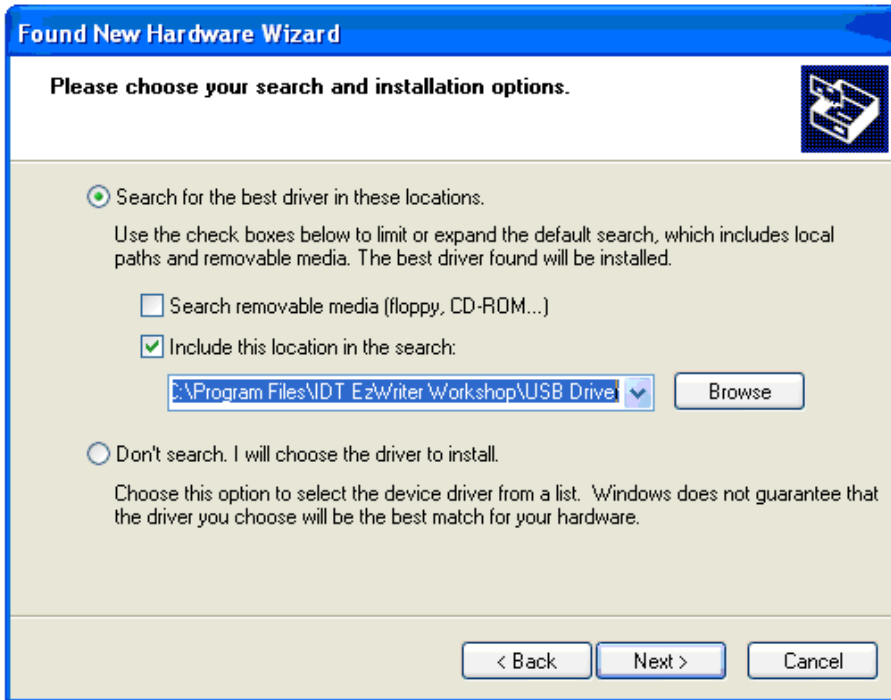


If the Workshop CD or internet connection are not available, select the “(Advanced)” button and Click Next > to continue.



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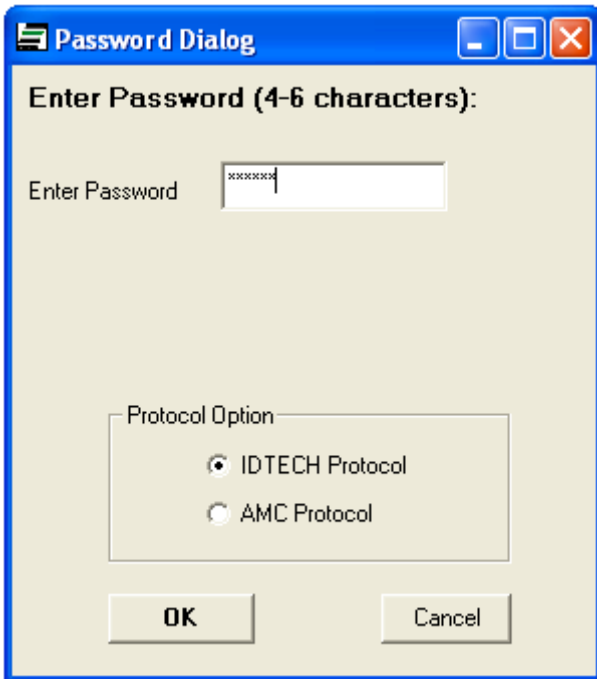
Select “Browse” & establish the path “C:\Program Files\IDT EzWriter Workshop\USB Driver”. Select next and the Wizard locates and loads the driver from the folder.



The wizard searches for and installs the first driver. The New Found Hardware Wizard appears a second time to install a second driver. Repeat the same process again to install the second driver. When both drivers are installed, the process is complete and the USB communication interface is ready for operation.

Using WorkShop

In the “Programs” tab of the Windows START button, double click the “IDT Reader/Writer WorkShop” to RUN the application. The Password Dialog Box appears the first time the installed application is RUN. Select a password, confirm it, and click OK. Each subsequent time WorkShop is RUN, a dialog box (shown below) opens to request the password. The password is required each time the WorkShop is RUN.

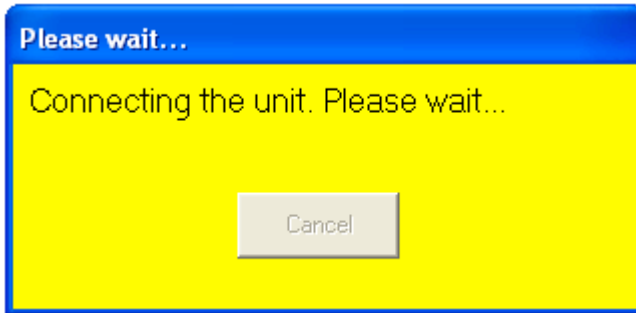


One of the protocol options buttons is already selected; this indicates the protocol in which EzWriter is already set. Change the protocol options if desired. The IDTECH protocol is recommended for use with Workshop. The IDTECH protocol allows more function selections. See the Communication Modes section on page 16.

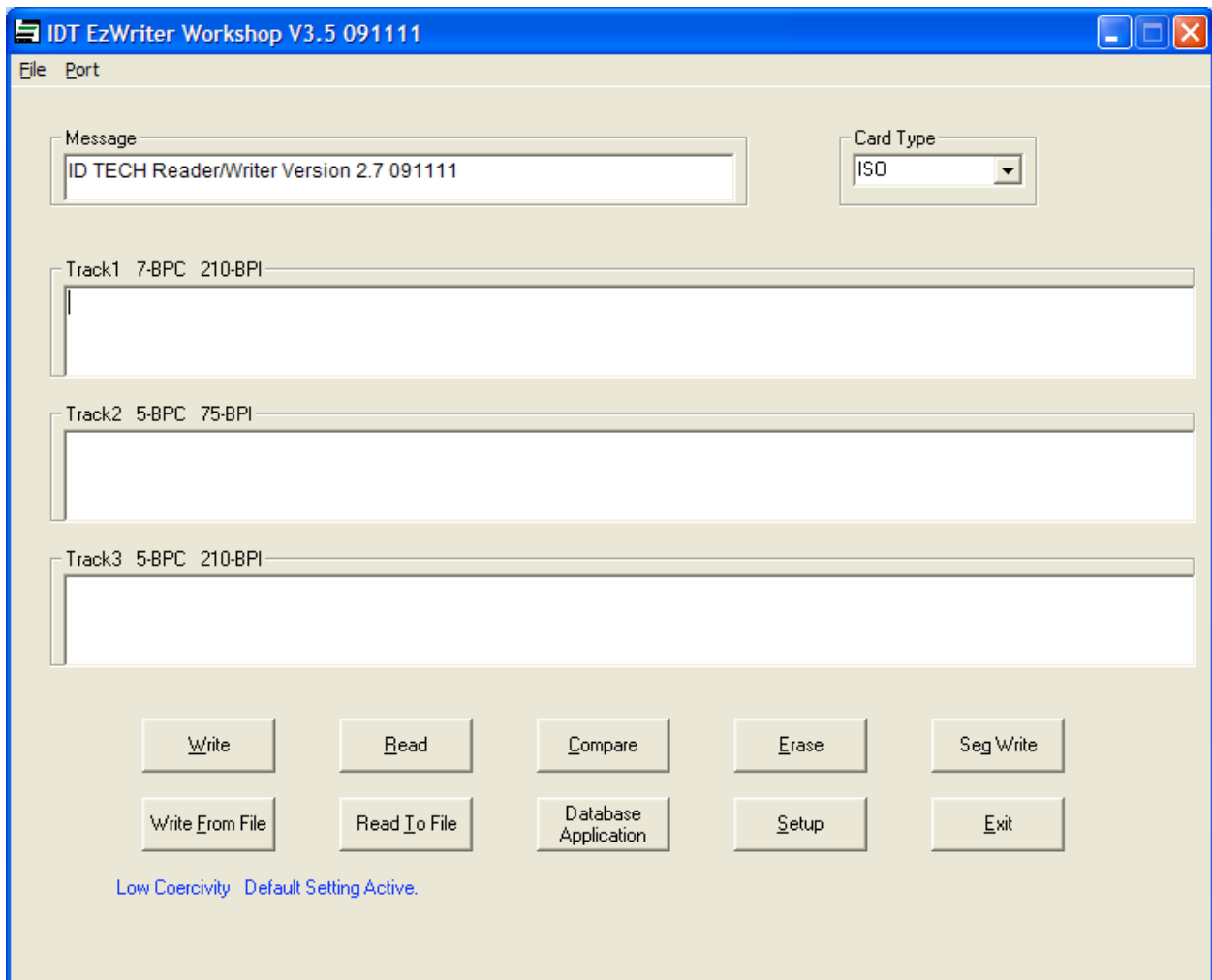
If the “AMC Protocol” box is checked and used the first time since using IDTECH protocol, an “Input Port Number” (1 to 10) message window appears. The user must enter the communication port number. The port number can be found by going to “System Properties”, “Hardware Folder”, “Device Manager” window, and in the Ports.

WorkShop checks the communication link with the EzWriter both before the password window and after. During this process, the “Connecting the unit” window is displayed. The WorkShop window appears when the communication link is verified. If there is an error, check the Reader/Writer LED for a Green (power on) condition and verify the communication connections.

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Notice: The “Connecting the unit. Please wait...” notice may appear several times as Workshop establishes communication with EzWriter. There is a delay period between the “Connecting” notice closing and the “Workshop” window appearing.



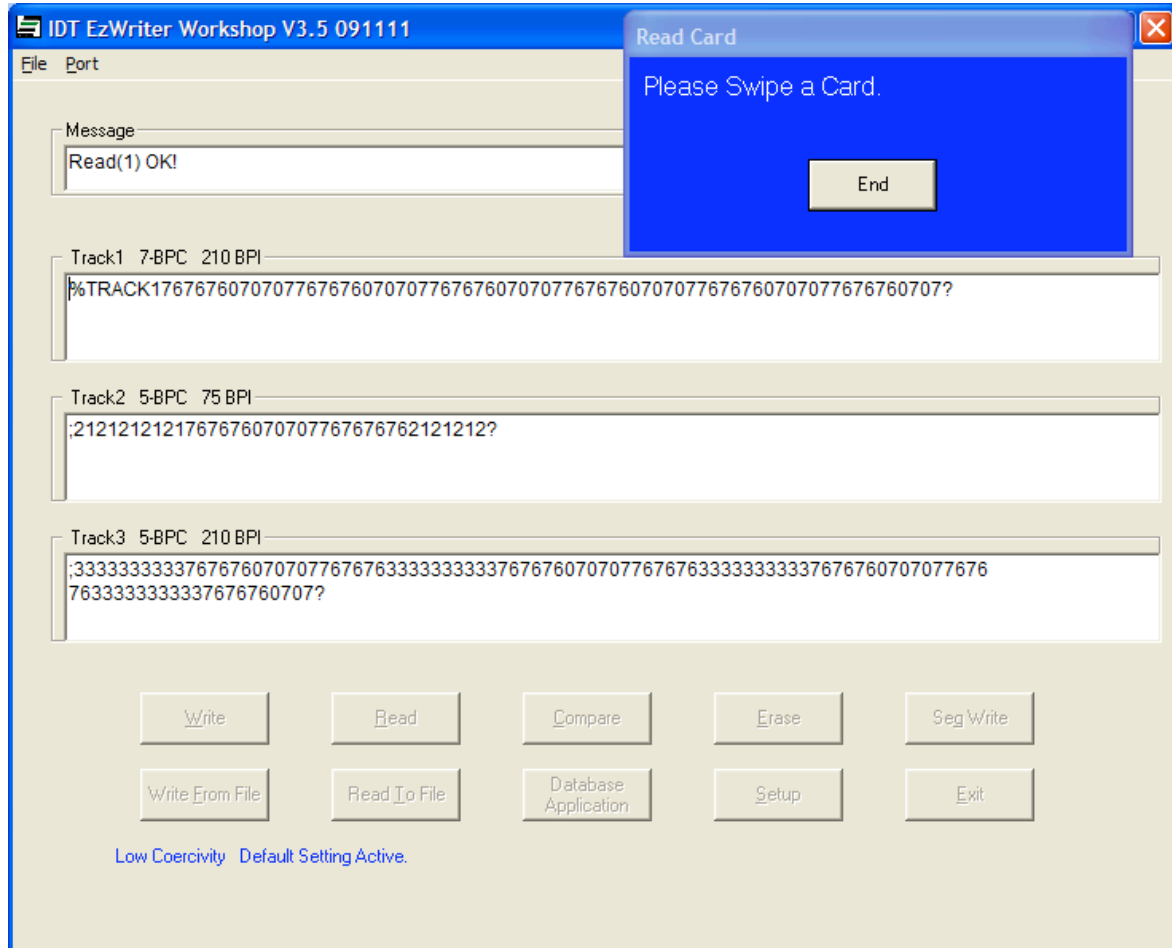
The initial Workshop Window is shown above with the firmware version shown in the Message text box. The latest version may not match the version in the screen above.

Writing on a Card (Quick Start)

The WorkShop window has a separate text box for each magnetic stripe track: Track 1, Track 2, & Track 3. Above each box, a label shows the track number and the encoding format. Characters that are to be written on the magnetic stripe are entered into the text boxes. In this example, the card is written with the ISO standard format. The chart below shows the number of characters that can be written on each track of an ISO formatted card. Entering more characters than allowed for the track or entering alpha characters into a numeric characters only track causes an error.

Track	Number of Characters & Type
1	76 Alphanumeric Characters
2	37 Numeric Characters
3	104 Numeric Characters

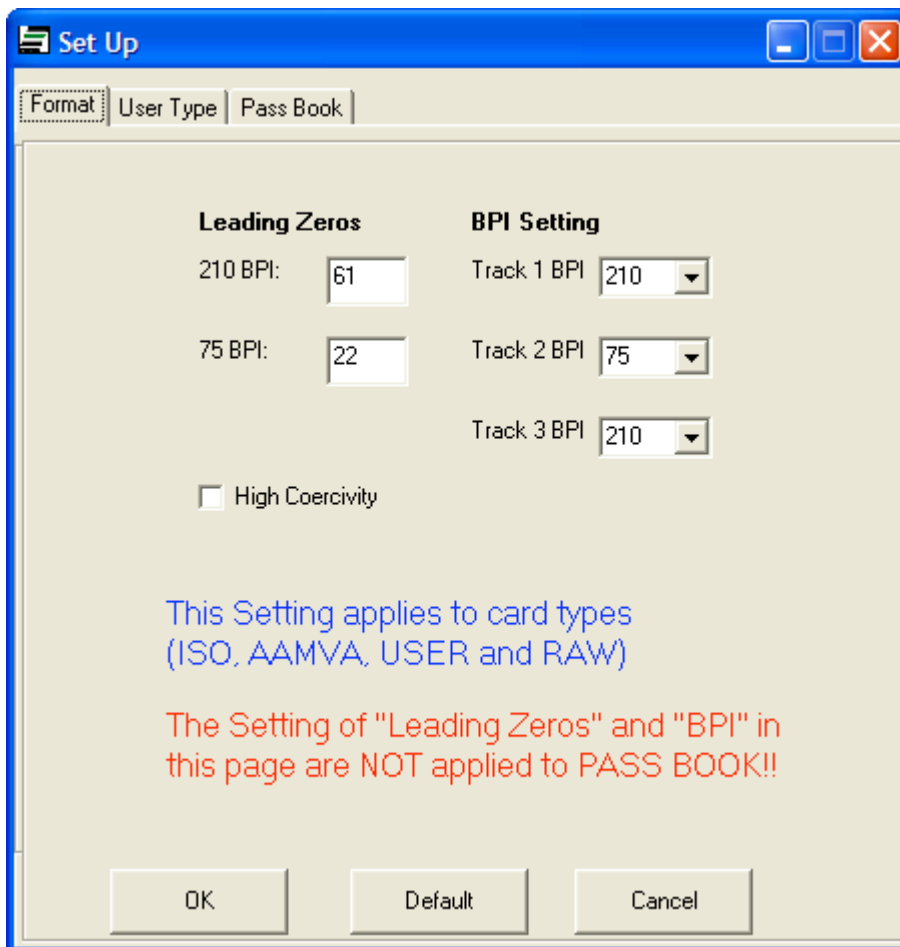
Enter some characters to be written on the card into the track text boxes. For example, enter your name in the Track 1 box, then tab down to the Track 2 box and enter the numbers 0 through 9, and finally, enter a string of number 3's in the Track 3 box. See the example window below.



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The WorkShop default setting is for Lo-Co magnetic stripe cards. For Hi-Co magnetic stripe cards, click the “Setup” button in the lower right corner of the WorkShop window. Then click the High Coercivity check box. See the example with the Hi-Co box checked. Do not change any other selection. Click OK to return to the WorkShop window.

There are two sample cards provided with the EzWriter. One is a Lo-Co type and the other is a Hi-Co type. Either one or the other can be used. The coercivity in the Setup window must be set to match the card type used. Note: the EconoWriter product supports only low coercivity card writing; selecting the High Coercivity check box does not affect EconoWriter.



Click the Write button. The “Write Card” window appears as shown on the previous page.

Caution: When the “Please Swipe a Card” window has a yellow background color and when a card is swiped through the slot, the EzWriter changes data on the magnetic stripe. When there is no data in a Track text box, then that specific track is not written and any data already on that track is not changed or erased.

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Swipe a card at a moderate rate through the card slot. A moderate rate is equivalent to moving a card from the entrance to the exit in about 1/2 second.

When swiping a card, the magnetic stripe must be in contact with the magnetic heads. The heads are on the side with the logo labels. The card must be held so the stripe is down and facing toward the logo when swiped through the slot from right to left.

The card must be registered (held) to the reference surface at the bottom of the card slot. The card must be swiped through the slot without tipping or stopping and moved with one steady movement all the way through the slot. The operation is unidirectional; the operation is only in the forward direction starting from the card slot's tapered end. The EzWriter does not function with cards swiped in the reverse direction.

The Message text box at the top of the WorkShop window shows "Write(1) OK!". If three cards were swiped, all three have the same written data and the Message text box shows "Write(3) OK!". End the card writing process by click the "End" button in the "Please Swipe a Card" window.

Note: The EzWriter has two magnetic heads; one is for writing and the other is for reading. The Reader/Writer performs a read after write operation when writing cards. When a card is swiped, the card passes over the write head first and then the read head. This read after write feature is how the EzWriter determines a Write OK or a Write Error condition.

Reading a Card (Quick Start)

When the Read button is clicked and a card is swiped through the card slot, the EzWriter reads all tracks. When reading a card, the coercivity of the magnetic stripe has no importance. The read operation is the same for all card coercivities.

To read the card just written, Click on the Read button and swipe the card. The Track text boxes fill with the data read from the card tracks. Empty card tracks have no data to be display and those text boxes are empty. Cards can be swiped and read with no limit. The Track box data is refreshed each time a card is swiped and there is no read error. To end the reading process, click the "End" button in the "Please Swipe a Card" window.

This concludes the Quick Start Section. The basic functions of loading the WorkShop application, installing the EzWriter, card writing, and card reading have been demonstrated.

The next sections are the User Manual for the WorkShop Utility. There is practical Magnetic Stripe information in the Appendix B.

WorkShop Utility

The EzWriter and WorkShop software together provide the card reading & writing functions most often needed for magnetic stripe use. These functions & operations are available from a single WorkShop window. Following is a summary of the WorkShop functions:

WorkShop Utility Functions

Write	Writes data to a card in the Card Type format
Read	Reads card data and displays the data in Track boxes
Compare	Compares multiple cards to a single reference card
Erase*	Erases the selected tracks of data on a card
Sequential Write	Writes both fixed and/or sequential data to a card
Write from File	Writes to each card the next record from a pre-formatted data file
Read to File	Reads a card & saves the card data as a record into a data file
Database Write	Writes cards from a database CSV file & Usage file
Card Type	Provides card format selection based on Setup menu or Standard
- ISO	Selects 7811 ISO Standard card format
- AAMVA	Selects AAMVA standard, based on ISO Standards
- USER	Selects the card format from settings in Setup USER tab
- RAW*	Reads & writes data and displays in a Hexadecimal format
- PASS BOOK	Reads & writes data on a passbook
Setup	Provides selections & settings of different card formats
- Leading Zero	Sets number of leading zeros before the Start Sentinel
- BPI Setting	Selects individual track data density (75 or 210 bits/inch)
- Set Coercivity†	Sets the writing coercivity to High or Low for all tracks
- Start Sentinel*	Selects the Start Sentinel character for the individual tracks
- End Sentinel*	Selects the End Sentinel character for the individual tracks
- Bits/Character	Selects the number of bits per character for individual tracks
- Parity*	Selects character parity bit logic for individual tracks
- Default	Resets the parameters & settings to the standard norms

* *These functions are not supported when the "AMC protocol" is selected.*

† *Low Coercivity units cannot be set to Hi Coercivity operation*

This document assumes the user has basic knowledge of magnetic stripe track densities, data formats, character formats, and the like. Basic magnetic stripe information is given in Appendix B.

Communication Modes

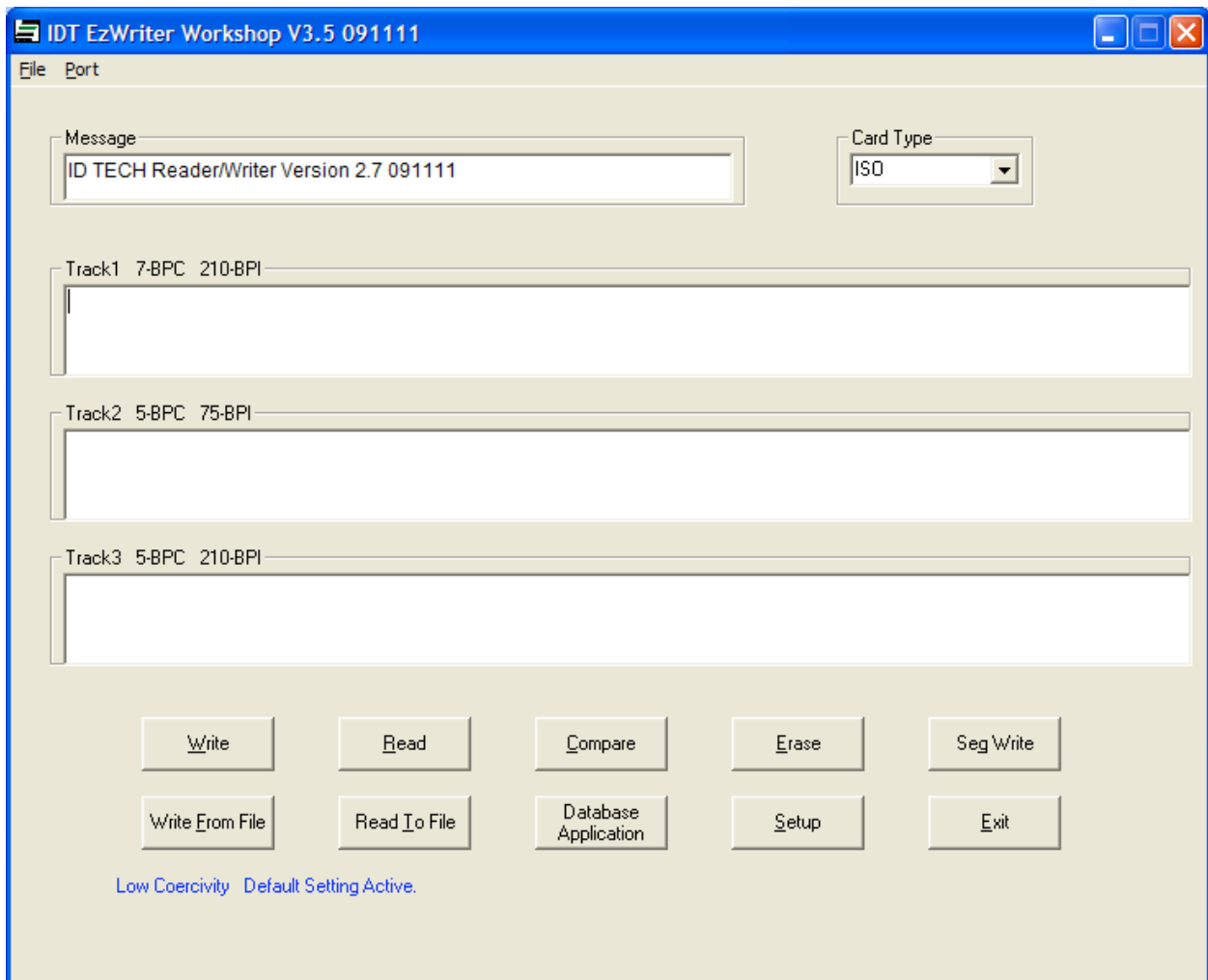
Workshop has two communication protocols the IDTECH or the AMC protocol. Only the IDTECH protocol is described here; it is the default protocol setting. The Workshop Password entry Window allows selection of either the IDTECH or the AMC protocol. Select the protocol to be used. The AMC protocol emulates the AMC USI communication protocol. After one of the protocol Radio buttons is selected, Workshop configures EzWriter for that protocol; the protocol remains fixed in EzWriter unless changes by Workshop. The AMC protocol mode does not support all functions provided by the

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IDTECH protocol mode; see the asterisks items in the Functions List above. Using the IDTECH protocol is recommended.

WorkShop Window

WorkShop operates from this window. There are several areas (boxes) within the window. Above each box is a descriptive label. Starting from the top left, the Message box provides a “result” of the last operation. The information in the Message box shown below is the result of opening the connection to a Reader/Writer and it shows the firmware version number & date. The Card Type box on the right indicates the current selected data format for reading or writing a magnetic stripe. This is the only box with a pull-down menu. More information is provided in a following section. The next three boxes are text boxes; there is one for each track. Either the text boxes provide a display of the data characters to be written to a stripe or the data read from a stripe, depending on the current function being performed. If there is no data in a text box, then that corresponding track is not active during the operation. There are ten function buttons along the bottom. Each of the functions is explained separately in the following sections.



Message Box

The Message Box always displays the result of the last action. Mostly, it indicates a successful read or a successful write operation after swiping a card through the slot. When the operation can be performed on more than one card, the result message provides a count of successful card operations.

Card Type

This provides a selection of reading and writing track formats. Track formats are the combination of the track density, bits per character, selection of Start & End Sentinels, and other parameters. The Card Type pull down menu has four selections: ISO, AAMVA, USER, RAW & PASS BOOK. Each card type is explained below. The settings for each type are available in the Setup window. See the Setup section & Appendix B for more information.

ISO - The ISO format follows the requirements given in ISO Standard 7811-6 and earlier versions. Density is in bits per inch. Bits per character include a parity bit. The number of Data Characters given does not include the Start Sentinel (SS), the End Sentinel (ES), or the Longitudinal Redundancy Character (LRC). The SS, ES, & LRC are automatically inserted into the data when writing to the card tracks.

Track	Density	Bits per Character	ISO Maximum number of Data Characters
1 IATA	210	7 bits per character	76 Alphanumeric
2 ABA	75	5 bits per character	37 Numeric
3 Thrift	210	5 bits per character	104 Numeric

AAMVA - The AAMVA format follows the same character formats as defined by the ISO Standards. The maximum number of Data Characters for Tracks 1 & 3 is different from the ISO format and Track 3 is alphanumeric, following the same format as Track 1. The number of Data Characters shown does not include SS, the ES, or the LRC characters.

Track	Density	Bits per Character	AAMVA maximum number of Data Characters
1 IATA	210	7 bits per character	79 Alphanumeric
2 ABA	75	5 bits per character	37 Numeric
3 Thrift	210	7 bits per character	79 Alphanumeric

User - The User format allows data to be written in a non-standard format. The data density and bits per character are defined in the Setup Window. The bits per character include a parity bit. See Setup section for additional information. The SS & ES characters, density, parity, and BPC are selectable in the Setup Window for the User Card type. Information written in this format may not be readable by ISO standard reading devices (MagStripe readers), as the User format chosen may not meet the ISO standards requirements.

RAW – This is not a true “Card Type”. This is a data decoding & display format for the three tracks. The text boxes display data in “raw binary” using the hexadecimal number format. Data read from a card is decoded into binary starting with the first “binary one” bit (usually the first bit of a start sentinel). All the bits (in Hex) are displayed and including approximately fifteen trailing zero bits at the end of the track data. Writing to a card in this mode is not recommended except for special purposes. When writing in this mode the data density and the number of leading zeros is controlled by the selections in the Setup Window. Information written in this mode may not be readable by ISO standard reading devices (MagStripe readers), as the RAW format chosen may not meet the ISO standards requirements.

PASS BOOK – In this format, users can write to any selected tracks, not restricted to IBM or ISO passbook spec. All tracks will be written in 210 BPI, the data can be written with or without redundant copy. Sync Zero Bits can be selected from 0, 26, or 60, where 0 is to write data without redundant copy. Write command might need one or two swipes. If first time write/verify was failed, the workshop will ask for a second swipe to verify the data.

Setup

Setup is used to specify the track formatting used when reading or writing. Two fixed track parameters are the track locations and the data encoding method. Track locations are track 1 at the top side near the card edge, then track 2 and track 3 toward the middle. The data encoding method is F/2F. These cannot be changed. The track longitudinal redundancy check (LRC) character is automatically calculated by WorkShop and added to the end of track data. Listed below are format parameters that can be changed:

EzWriter format selections include:

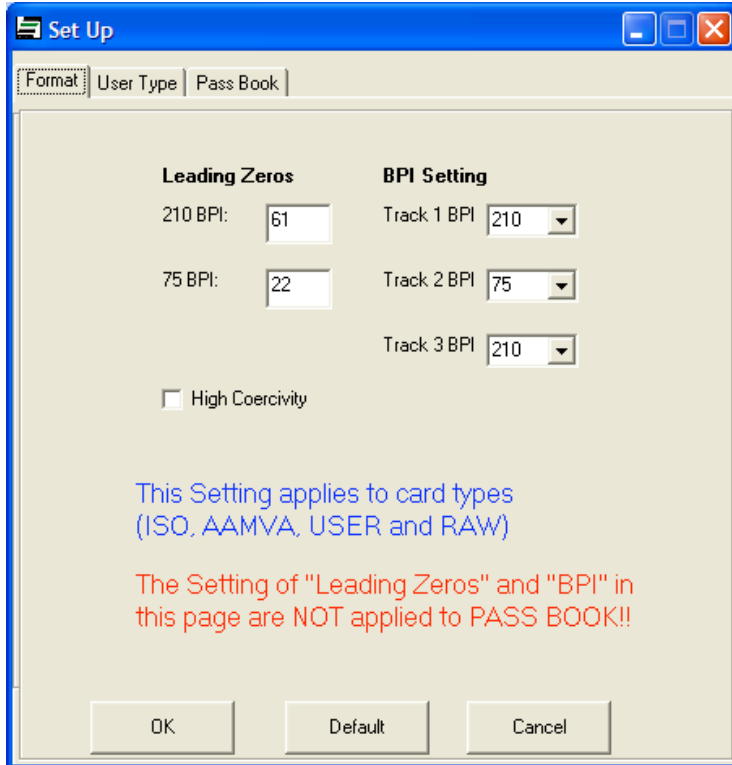
- The Data density can be selected as either 75 or 210 bits per inch.
- The Start Sentinel (SS) location from the card edge is selected.
- The limited selection of SS characters for each track.
- The limited selection of End Sentinels (ES) characters for each track.
- The number of bits per character can be selected from 4 BPC to 7 BPC
- The character parity bit logic selection

In addition to the formatting selections, selection of writing Lo-Co or Hi-Co type cards is provided. Click the Setup button for the Setup window. Two folder tabs are available.

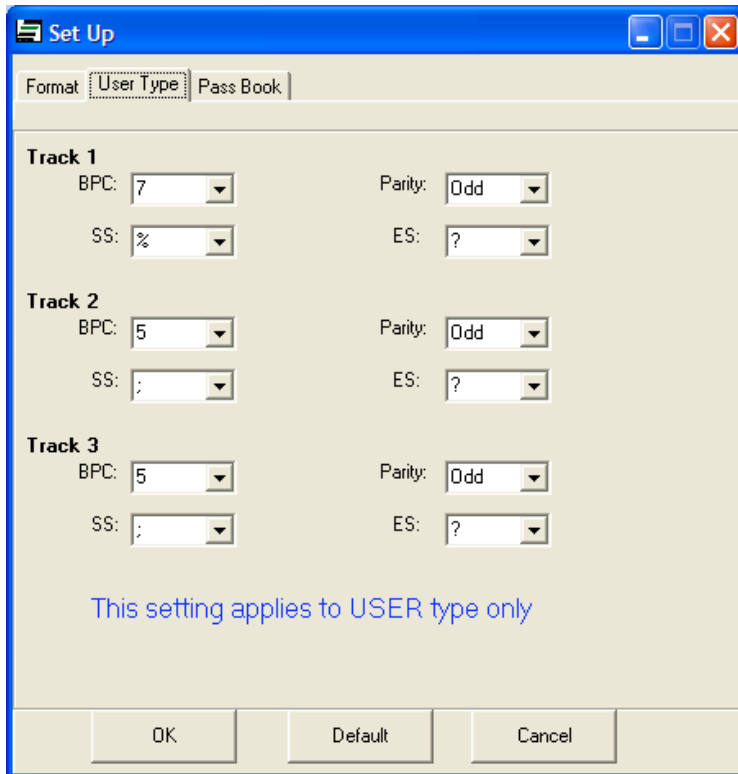
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There are “default” buttons in each tab window; these default buttons force the format settings in the window to be reset to the standardized ISO settings. See Appendix B for additional technical information.

Note: Always use the Default Setup settings unless there is a known, specific, and understood reason for not using the default settings.



Format Tab View



User Tab View

The Format tab view provides settings for card types: ISO, AAMVA, USER, & RAW.

Data Density: The data is encoded on the magnetic stripe as a string of binary bits. The physical length of each bit on the stripe is the data density specified in Bits per Inch (BPI). There are two data densities for magnetic stripe cards: 210 BPI or 75 BPI.

Leading Zeros: This is the number of zero value binary bits preceding the Start Sentinel (SS). These zeros are used for synchronizing the reading circuits and bit-decoding algorithm. These zeros are required. The number of zeros required is based on the data density and the ISO required distance of the SS from the edge of the card.

High Coercivity: This is a check box in the Format window. The EzWriter writes on HI-Co or Lo-Co magnetic stripes. This box selects the coercivity the EzWriter is to use. The default is Lo-Co. If the card coercivity is not known, use Lo-Co first and if there is a consistent write error, then switch to the Hi-Co setting. A Lo-Co Only EzWriter Unit cannot be set into Hi-Co operation.

The User Type tab view provides settings that apply only to the card type USER.

Start Sentinel Characters: This character marks the beginning of the track data field. This character is preceded by leading zero bits.

End Sentinel Characters: This character marks the end of the track data field. There is a Longitudinal Redundancy Check character (LRC) following the end sentinel. The LRC is used for error checking the data bits. The LRC is calculated by WorkShop and added automatically when writing to a card. There are trailing zeros following the LRC.

Bits per Character: The bits per character can be selected from 4 BPC to 7 BPC. The standards are 5 BPC for numeric characters including the parity bit or 7 BPC for alphanumeric characters including the parity bit. See Appendix B for the character tables.

Parity: The character parity bit logic can be selected. The default and standard selection for 5 and 7 bit characters is "Odd" parity. The parity bit for each character is added by WorkShop as the character is written on the card. For 4 or 6 BPC characters, parity must be "None".

Write

This function writes data to the magnetic stripe when the card is swiped through the slot. WorkShop writes the data in the track text boxes together with standard or user defined SS, ES, and LRC each time a card is swiped through the slot. A prompt window opens to inform the user to swipe a card for writing. The Message box at the top of the WorkShop window shows the result for each card swipe, either the card was written OK or an ERROR was the result. The Message box also gives the count of the cards that have been swiped and written with no errors. For sequentially changing numbers, see Sequential Write below. To finish the Write process, click on the End button to close the prompt window.

Caution: When a magnetic stripe track is written, the original data on the track, if any, is replaced by the new data. An individual track can be changed without effecting data on the other tracks. However, if the Track text box is empty, WorkShop does not erase the original data, if any, in that track.

Read

This function reads data from the magnetic stripe on a card, including SS & ES, when it is swiped through the slot. The read data is shown in the track text boxes. There is a prompt window opened to inform the user to swipe a card for reading. The Message box shows the result for each card swipe, either the card was read OK or there was a reading ERROR. The count of the number of cards read is shown. There is no limit on card swipes; each card is read and the card data shown. To finish the Read process, click on the End button to close the prompt window.

Compare

This function compares card data from one card with data read from other cards. The initial data is read from a card and saved in the track text boxes. Comparisons of data read from subsequent cards are made with the initial data saved in the text boxes. A comparison is made each time a card is swiped. This function is useful for checking cards to a standard card. When the Compare button is clicked, the user is prompted to swipe the card having the initial comparison data. After the initial data is read, the prompt changes and the user is prompted to swipe cards; these cards are read and their data compared with the first, initial card data. The result of each comparison is shown in the Message box. To finish the Compare process, click on the End button to close the prompt window.

Erase

This function can be used to erase data on the card tracks. The EzWriter must be set for the correct operating coercivity of the card(s) to be erased. See the Setup section for information on selecting the writing coercivity. Individual tracks can be selected from the pop up track selection window. Select the track boxes to be erased; close the window. Another prompt window appears to prompt a card swipe. Only the selected tracks are erased. The non-erased tracks retain their data. The message box shows the results. After erasing, WorkShop prompts a swipe of another card for erasing. To finish the Erase process, click on the End button to close the prompt window.

Warning: If the EzWriter is set for Hi-Co operation and a Lo-Co card is swiped, all data on the Lo-Co stripe may be erased.

Sequential Write

This function allows creation of a special sequential number “field” in the Track text boxes. The sequential field can be one or more number characters. The sequential number field can be the only characters written in the track or the sequential number can share the track with other “fixed” data (numbers and/or alpha characters) in the track. Any fixed data in the Track text boxes can be entered before or after the sequential number field is entered. Typically, the fixed data is entered first and then the sequential number field is added to the fixed data. The same sequential number can be in one track or the same number can be in all three tracks. Only one sequential number field is allowed per track. The sequential number field(s) must allow the minimum number of sequential digit spaces as needed for the number of digits to be sequenced. As an example, the number 150 must have a sequential number field of three characters minimum or more. The number of digits in the sequential number fields can be different for each track. The sequential number field operates with numbers only.

Click the “Seq. Write” Button. Establish the sequential number field by positioning the cursor at the sequential number field starting location and click. The sequential field can start at any location within the data, if any. WorkShop prompts the user to enter the sequential field digit indicators (x) by typing any printable character on the keyboard. Workshop inserts the “x” characters, which represent each numerical digit in the sequential field. This process can be used on one track or can be repeated for each track. When the field selection is completed, close the prompt box and another prompt box is opened for selection of the starting (initial) value of the sequential number and selection of the number of cards to be written. Insert the values and click OK. The initial starting value is automatically inserted into the sequential field; the balance of the field is filled with the zero digits. WorkShop prompts the user to swipe and write the first card. After each swipe, WorkShop displays the result. If write operation is successful, WorkShop increments the sequential number and prompts for writing the next card. If there is a failure, WorkShop gives a warning and prompts for writing the same number. Other data in the track fields (if any) is not altered. When the “Number of cards to be written” value is reached, the Sequential Write process is ended. Close the Sequential Write Complete window.

Read & Writing File Operations

The Read & Write File operations provide a means to read cards, saving the read track data to a file and using the same file to write the same information to a new set of cards. The cards read are a data source for the opened file. One card or a sequence of cards can be read. Each card read creates a separate record within the file. The records are added to the file in the sequence they are read. The number of records added to the file equals the number of successfully read cards. When writing from the file, each card is written with the data from one of the records starting from the first data record and written in the same order as cards were read.

The Reading & Writing File Operation files are kept in the default file folder “To From Files”, which is a sub-folder in the “IdtMsrwWorkShop” in the Program Files folder. The To From Files can be moved and accessed from other folders. The files have a file extension that matches the “Card Type” used to create the original file. Card Type is defined in the upper right hand menu box on the Workshop main window. The card type cannot be mixed; the card type must be consistent within a file.

Read To File

Selecting this function generates a Windows Explorer window to open an existing data file or create a new data file. If an existing file is selected, the previous data is maintained and the new card data is appended as cards are swiped. After a file selection is made, a second window opens to prompt the swipe of a card. The reading result is shown in the Message box for each swipe. If there is a read error, the card data is not saved; swipe the card again to enter the card data into the file.

Write From File

This functions Writes data from a named file to a card. The card data is in a file records created by the “Read To File” operation as described above. The Write To File function prompts the user to open an existing data file. When a file is selected, the user is prompted to swipe a card (or sequence of cards); each card is written with the next data record from the file. The Message box shows the writing result for each card. If there is a write error, the current data record is used until the record is successfully written to a card. Cards are written until the last record is used. When the last data record is written, a prompt informs the user the writing process is finished.

Database Application

WorkShop does not provide direct access to industry standard data base applications. The word “database” is used here for the convenience of describing the WorkShop function & operation, which emulates a database process. The WorkShop Database Application provides a method for writing on cards using data from two files. The two files are the Database file, which is a csv type file and the Usage file, which is a *txt* type file. The csv file can be an extracted or exported file from a standard database application.

Both files are used together and are required for the Database Application card writing process. Both files must have the same *filename* and both files must be located in the same file folder.

The Database file shown in the example is an Excel csv file type. The file was created using Excel; the Excel file was saved as a .csv type. Any application program that can be used to create the rows and columns of information to be written to cards can be used to produce the WorkShop Database file. The final database file must be saved as a csv type file for WorkShop database operations.

The Usage file in this example was created using Notepad. The Usage file has two functions: it may contain the Card Type and card Setup format rules “[SETTING]”; it must contain a data definition “[DATA]”. The Card Type and card format SETTING parameters are the same Card Types as in the WorkShop window and the same formatting parameters found in the WorkShop Setup tabs. The SETTING rules, if used, are used for all cards written. In the example shown, no SETTING rules are specified; they are ignored by the WorkShop database function because of the double forward slashes placed at the beginning of each line in the SETTING section. If no SETTING rules are specified, the WorkShop database function uses the default ISO 7811 formatting norms.

The information (data) written to a card can have two sources. There is a fixed data source and a variable data source. The DATA definition in the Usage file specifies the fixed card data information and specifies the source of the variable card data information. The Usage file DATA definition has three rows. Each row specifies the data to be written on one track; the first row specifies the data for track one, the second row for track two and the third row for track three. Each card is written as specified by the DATA definition; each card written can have unique data written on the tracks because the variable data is being sourced from the database file.

The Data Usage file Fixed data is defined and directly used from the Usage file as character fields written to a card; the fields cannot contain characters not allowed for the defined track format. In other words, tracks written with five bits per character can use only Appendix B, Table 2 characters; likewise, tracks written with seven bits per character can use the character set in Appendix B, Table 1.

Variable data written to the cards is specified by two characters that define the Data Columns in the Database file. The two characters have a fixed format. The first character is a lower case “f” followed by a second “Column” letter (a through z). The variable names correspond to the column letter in an Excel csv file. The Data Column variable data and the Usage file fixed track data can be mixed in the Usage file DATA definition.

An example database is provided with the WorkShop Utility files. That example is used here to show the format. The example does not define the SETTING rules; the rules are shown and are ignored by the WorkShop Database Application (any line in the User file that starts with two forward slash characters // is ignored). When no SETTING rules are defined, ISO Standard parameters are the default. The DATA definition specifies the data to write on the three tracks. When there is no data specified for a track, the track is not written. The csv file has 10 rows; therefore, ten cards can be written. Each card is written with variable data from one of the ten rows, starting with row one.

ID TECH EzWriter

The data written on the first card is shown. The number in brackets { } indicates the card track number:

```
{1} SLAM-DUNK~SPORTS~EVENT=DAVID=12340999  
{2} 12340=999=250205  
{3} (nothing is written on track three)
```

Using only track 1 as the example, the “SLAM-DUNK SPORTING EVENT=” is a fixed card data field; “DAVID” is a variable field from the database file as defined by “fa” (meaning “field a”); the next “=” is a fixed field; and “12340999” is two variable fields from the database file as defined by “fbfc”. The next card written has the same fixed field data and new variable field data based on row two in the csv file. Defined in row two is the name “MICHAEL” and the card number & validation number is “12341989”. The data in track 2 is a variable and remains the same for all cards because it is defined as the same in the database file. See the example here for the second card written:

```
{1} SLAM-DUNK~SPORTS~EVENT=MICHAEL=12341989  
{2} 12341=989=250205  
{3} (nothing is written on track three)
```

The database Usage file is shown on the following page. This file can be copied from the CD and then modified for other database applications. This file is also located on the hard drive in the Workshop folder.

ID TECH EzWriter

```
////////////////////////////////////
```

```
// ID TECH Sample database Usage file
```

```
// The "/" at the beginning of a line specifies the line is a comment and line content
```

```
// is NOT used for database functions or operations.
```

```
[SETTING]
```

```
// This is the SETTING section. In this example, all the lines begin with "/", so the  
// content here is for your reference & NOT used by the database. When no settings  
// are specified the CARDTYPE default is, in all cases, the ISO format. Remove the "/"  
// from the lines & change values only when a non-ISO format is wanted.
```

```
// Used only one of these lines to select a non-ISO format.
```

```
//CARDTYPE=USER
```

```
//CARDTYPE=AAMVA
```

```
// In the next 3 lines the ISO default BPI is shown. Change settings only if needed.
```

```
// The tracks can have any mix of 75 or 210 value. Only "75" or "210" is a permitted value.
```

```
//BPI1=210
```

```
//BPI2=75
```

```
//BPI3=210
```

```
// Use the following settings ONLY when "CARDTYPE=USER" is selected. Adjust the  
// parameters to specific values for the application. The ISO CARDTYPE format setting  
// is shown as the example. Only a specific, limited set of values are permitted. Check  
// the WorkShop "Setup" window & "USER" folder for the permitted values.
```

```
//BPC1=7
```

```
//BPC2=5
```

```
//BPC3=5
```

```
//PARITY1=ODD
```

```
//PARITY2=ODD
```

```
//PARITY3=ODD
```

```
//SS1=%
```

```
//SS2=;
```

```
//SS3=;
```

```
//ES1=?
```

```
//ES2=?
```

```
//ES3=?
```

```
// The DATA section defines the fields that apply to each track.
```

```
[DATA]
```

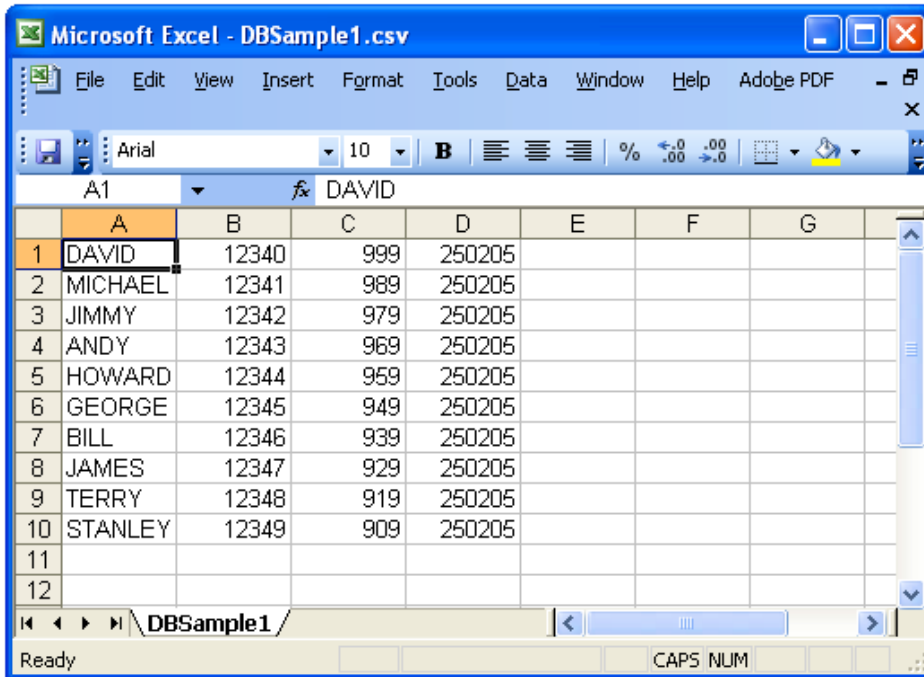
```
Trk1:SLAM-DUNK SPORTS EVENT=fa=fbfc
```

```
Trk2:fb=fc=fd
```

```
Trk3:
```

```
//end
```

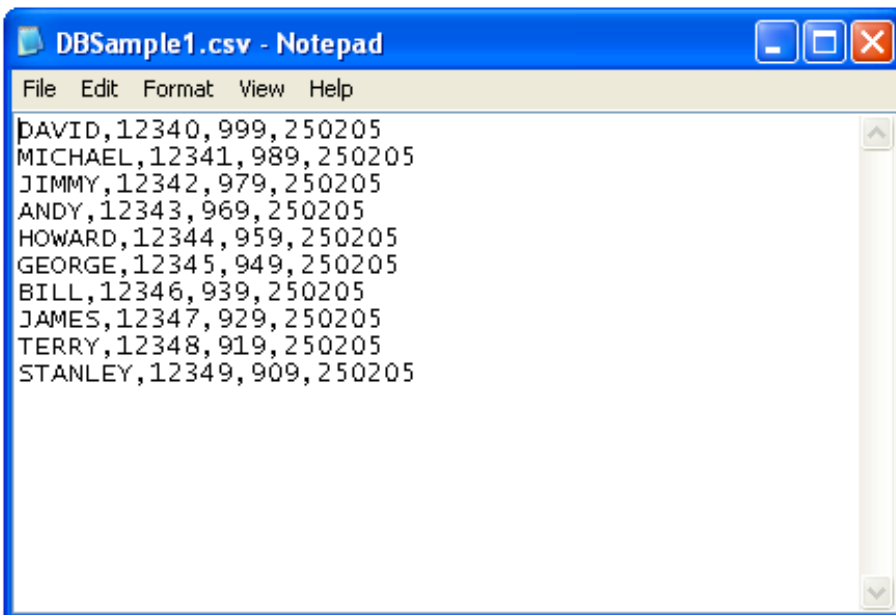
The Excel csv Sample file has the following variable data fields:



The screenshot shows a Microsoft Excel window titled "Microsoft Excel - DBSample1.csv". The spreadsheet contains 10 rows of data. The first row is highlighted, and the formula bar shows "DAVID". The data is as follows:

	A	B	C	D	E	F	G
1	DAVID	12340	999	250205			
2	MICHAEL	12341	989	250205			
3	JIMMY	12342	979	250205			
4	ANDY	12343	969	250205			
5	HOWARD	12344	959	250205			
6	GEORGE	12345	949	250205			
7	BILL	12346	939	250205			
8	JAMES	12347	929	250205			
9	TERRY	12348	919	250205			
10	STANLEY	12349	909	250205			
11							
12							

This same file can be opened from Notepad, as shown below:



The screenshot shows a Notepad window titled "DBSample1.csv - Notepad". The content of the file is displayed as plain text, with each row of data on a separate line, separated by commas:

```
DAVID,12340,999,250205
MICHAEL,12341,989,250205
JIMMY,12342,979,250205
ANDY,12343,969,250205
HOWARD,12344,959,250205
GEORGE,12345,949,250205
BILL,12346,939,250205
JAMES,12347,929,250205
TERRY,12348,919,250205
STANLEY,12349,909,250205
```

The filename extension, .csv, means a comma separated values file. As seen in Notepad above (and like in the Excel example), each row is one record of variable information written on one card. Commas separate each row into columns. Each row must have the same number of columns. Most text editors can create, view, or edit a CSV file.

EzWriter Technical Reference Guide

Introduction

This section of the User Guide pertains to the information for communication directly with the EzWriter. This information is intended to support the development of application specific software that directly operates with the EzWriter. This information is not need when using the ID TECH supplied WorkShop Utility.

Description

The Reader/Writer reads and writes magnetic stripe cards when the cards are swiped through a card slot. The housing encloses the read head and the write head. Both are mounted to a rail assembly. The rail assembly contains the card vertically and has a reference surface, which aligns the magnetic stripe with the heads for track locations. The heads are precision mounted to meet the ISO Standards requirements.

Adjacent to the write head is an optical encoder, which provides timing signals for writing to cards at data densities of 210 and 75 Bits per Inch (BPI). The encoder has a rubber roller that is moved by the card when the card moves past the write head.

The metal housing has an operation LED. The LED is a single lens, capable of generating three colors red, orange, and green. See the operation section for the description of operations associated with the color.

The card slot has a write head and a read head. The space between the two heads allows for writing data to the magnetic stripe and then reading the data in a single card swipe. This is an advantage for checking the integrity of the data being written.

Accessories

80058801-001	WorkShop Software Application Utility
AC0005-9	Power Adaptor, 100-240VAC input, 24VDC @2.5A output
80005211-001	Sample Magnetic Stripe Card, Lo-Co stripe
80005211-002	Sample Magnetic Stripe Card, Hi-Co stripe
80058801-00x	Companion CD (ask for latest revision)

Terms & Related documents

AAMVA	American Association of Motor Vehicle Administrators
Lo-Co card	low coercivity magnetic stripe card.
Hi-Co card	high coercivity magnetic stripe card
ASCII	American Standard Characters for Information Exchange
BPI	Bits Per Inch
BAUD	Roughly the RS232 communication in bits per second
Coercivity	The resistance of a magnetic field to change, in Oersted
CDL	California Drivers License format
EzWriter	Trademark name for the MagStripe Reading & Writing product
Host	The Personal Computer to which the Reader/Writer is attached
IPS	Inches Per Second
ISO	International Standards Organization
Hex	Hexadecimal, base 16 numbering system
LED	Light Emitting Diode
LRC	Longitudinal Redundancy Check a form of error check character
MSR	Magnetic Stripe Reader
PC	Personal Computer (see Host)
PCA	An assembled Circuit Board
RS232	Reference Standard for serial asynchronous communication
Slot	The card path opening for passing a card through an EzWriter
Swipe	The operation of moving a card through the EzWriter slot
USB	Universal Serial Bus—a high speed connection to the host
WorkShop	Trademark name for the EzWriter software application

AAMVA	<i>Best Practices Guidelines for the Use of Magnetic Stripes</i>
ISO 7810:1995	Identification Cards - Physical characteristics
ISO/IEC 7811-2:1995	Identification Cards - Part 2: Magnetic stripe
ISO/IEC 7811-3:1995	Identification Cards - Part 3: Embossed characters, ID-1 cards
ISO/IEC 7811-4:1995	Identification Cards - Part 4: Location of read-only Tracks 1&2
ISO/IEC 7811-5:1995	Identification Cards - Part 5: Location of read-write Track 3
ISO/IEC 7811-6:1996	Identification Cards - Part 6: Magnetic stripe - High coercivity

ID TECH EzWriter

Specifications

Environmental

This product is to be used in an indoor environment.

Operating temperature: 0°C to 50°C, 5 to 95% relative humidity, non-Condensing
Shipping: -40°C to 70°C, 5 to 95% relative humidity, non-Condensing
Storage: -10°C to 60°C, 5 to 95% relative humidity, non-Condensing

Electrical

Supply Voltage: +24VDC ±10%
Power Consumption: < 2 Amps, Triple track reading & writing High Coercivity
Power Adaptor: External switched power 24V/2.5 Amp regulated, 2.1mm power jack, center Positive.
Interface & Cable RS232C: 6.0' cable, DB-9 female connector with a 2.1 mm power jack in the DB-9 housing.
USB: 6.0' cable, Serial A Plug with a 2.1 mm power jack in a pigtail extension to the cable.

Mechanical

Dimensions (H X W X L): 2.64" X 2.52" X 8.03" (6.7cm X 6.4cm X 20.4cm)
General Construction: Die cast metal housing (Zamac) or molded plastic
Media thickness: 0.007" to 0.045 or (0.020 to 0.065" special order)
Media length: 3.38" maximum for reading after writing operation
Cable Color: Beige or Black

Performance

Supports Formats ISO -7811 & AAMVA
Media Densities 75 bpi, 210 bpi
Media Coercivity 250 to 4200 Oersted
Media Speed
Read 5 - 55 IPS
Write 5 - 35 IPS
Write (encoding) Meets or exceeds ISO 7811 requirement for new cards.
Reading Low Amplitude: >30 % @210 bpi, >40% @75 bpi

Durability

MTBF: 160,000 POH for a fully configured unit
Card Swipes: 1,000,000 swipes (with proper maintenance)

Agency Approvals

FCC Class A, CE Class A

ID TECH EzWriter

Interface

The communication parameters (port settings) are fixed for both USB & RS232 operation.

The parameters are:

Baud rate: 9600
Data bits: 8
Parity: None
Stop bit: 1

RS-232:

A 6.0' cable with DB-9 female connector with a 2.1 mm, center-positive power Jack molded into the DB-9 housing. The following is signal pin-out of the connector:

DB-9F (RS-232) connector		
PIN	Signal	Direction
1	Not Used	
2	TXD	Out
3	RXD	In
4	Not Used	
5	Signal Ground	
6	Not used	
7	CTS	In
8	RTS	Out
9	Not used	
CASE	Chassis ground	Connected to the die cast cover
POWER JACK		
Center pin	+24VDC	In
Ring	Signal Ground	

Table 1 RS-232 cable Pin-Outs

ID TECH EzWriter

USB-RS232:

The USB interface uses PC compatible communication drivers, which emulate an RS232 COM port operation through a USB serial connection. This approach allows the application to use the more available USB connections through a virtual COM port.

A 6.0' cable with a Serial A Plug and a 2.1 mm, center-positive power Jack molded into a pigtail of the cable. The following is the signal pin-out of the connector:

USB connector		
PIN	Signal	Direction
1	USB +5V	In
2	-Data	In/out
3	+Data	In/out
4	Ground	--
CASE	Chassis ground	Connected to cover
POWER JACK		
Center pin	+24VDC	In
Ring	Signal Ground ¹	--

Table 2 USB cable

1 - The power jack ground is connected to the USB connector ground.

Command & Response Introduction

The ID TECH EzWriter is designed to industry norms. There are two command sets to allow backward compatibility to past versions of hand swipe Reader/Writers. One Command set is compatible with the model IDT-3840 Reader/Writer product and is labeled as the IDT Command Set.

IDT Command Set

There is no protocol envelope. The commands are sent and responses received. The Host software must deliberately take care with the timing and order of the communication process.

This command set is the default set used for the Workshop utility. New features and associated commands have been added to increase the utility & versatility of the product. New commands added are:

- Command to support BPI setting for each track
- Command to support firmware upload from host interface

The EzWriter supports the following commands. The responses are provided.

Command: Reset Buffer

Command code: <ESC> a

Hex code: 1B 61

Response: none

Description: This command reset the EzWriter buffer to initial state. Encoding settings are not affected by this command.

Command: Read

Command code: <ESC> r

Hex code: 1B 72

Response: [data block] <ESC> [status byte]

Description: This command requests the EzWriter to read a card swiped and respond with the data read.

Command: Write

Command code: <ESC> w [data block]

Hex code: 1B 77 [data block]

Response: <ESC> [status byte]

Description: This command requests the EzWriter to write the data block into the card swiped.

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Command: WRITE Passbook (supported in firmware v2.7 or later version)

Command code: <ESC> W [raw data block]

Hex code: 1B 57 [raw data block]

Response: <ESC> [status bytes]: status = 30 or 35 + 1B 3x

Description: This command processing is similar to raw data writing but responses are different. If first write/verify passes, it responses 1B 30. If first write/verify fail, it responses 1B 35, waiting for second swipe to verify; After second swipe, it send verify result out as 1B 3x. x=0 for no error; x=1 for T1 error; x=2 for T2 error; x=3 for T1&T2 error; x=4 for T3 error; x=5 for T1 and T3 error; x=6 to T2 and T3 error; x=7 for T1, T2 and T3 error.

Command: READ Passbook (supported in firmware v2.7 or later version)

Command code: <ESC> R <option>

Hex code: 1B 52 <option>

Response: [data block] <ESC> [status byte]

Description: This command requests the R/W to read a card swiped and respond with the data read in ASCII format. It will read data in passbook format as well as ISO and AAMVA format.

Status byte: 3x. x=0 for no error; x=1 for T1 error; x=2 for T2 error; x=3 for T1&T2 error; x=4 for T3 error; x=5 for T1 and T3 error; x=6 to T2 and T3 error; x=7 for T1,T2 and T3 error.

<option> = '0' – to send any decoded track data.

<option> = '1' – to send only different track data.

Command: Communication test

Command code: <ESC> e

Hex code: 1B 65

Response: <ESC> y [1B] [79]

Description: This command is used to verify that the communication link between computer and the EzWriter is up and good.

Command: All LED off

Command code: <ESC> <81>

Hex code: 1B 81

Response: none

Description: This command is used to turn off all the LEDs.

Command: All LED on

Command code: <ESC> <82>

Hex code: 1B 82

Response: none

Description: This command is used to turn on all the LEDs.

Command: Green LED on

Command code: <ESC> <83>

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Hex code: 1B 83

Response: none

Description: This command is used to turn on the Green LED.

Command: Yellow LED on

Command code: <ESC> <84>

Hex code: 1B 84

Response: none

Description: This command is used to turn on the Yellow LED.

Command: Red LED on

Command code: <ESC> <85>

Hex code: 1B 85

Response: none

Description: This command is used to turn on the Red LED.

Command: Sensor Test

Command code: <ESC> <86>

Hex code: 1B 86

Response: <ESC> 0 [1B] [30] if test ok

Description: This command is used to verify that the card sensing circuit of the EzWriter is working properly. The EzWriter does not response until a card is sensed or the Reader/Writer receives a RESET command.

ID TECH EzWriter

Command: Ram Test

Command code: <ESC> <87>

Hex code: 1B 87

Response: <ESC> 0 [1B] [30] ram test ok

<ESC> A [1B] [41] ram test fail

Description: This command is used to request The EzWriter to perform a test on its on board RAM.

Command: Set Leading Zero

Command code: <ESC> z [leading zeros of 210 BPI Tracks][leading zeros of 75 BPI tracks]

Hex code: 1B 7A [00~ff] [00~ff]

Response: <ESC> 0 [1B] [30] set ok:

<ESC> A [1B] [41] set fail

Description: This command sets the number of leading zeros written before the start sentinel. The space should be calculated as [leading zeros] X 25.4/ BPI (75or210) = mm

Default setting of leading zero = [3D][16]

TK1 & TK3 [3D] means leading zero=61 TK2 [16] means leading zero=22

Command: Check Leading Zero

Command code: <ESC> l

Hex code: 1B 6C

Response: 1B [00~ff] [00~ff]

Description: This command gets the current setting number of leading zeros. The first byte is for 210 BPI track(s) and the second byte is for 75 BPI track(s).

Command: Erase Card

Command code: <ESC> c [select byte]

Hex code: 1B 63 [select byte]

Response: <ESC> 0 [1B] [30] command select byte ok

<ESC> 1 [1B] [31] erase error

<ESC> A [1B] [41] command select byte fail

Description: This command is used to erase the card data when card swipes.

*[select byte] format:

00000001: Track 1 only

00000010: Track 2 only

00000100: Track 3 only

00000011: Track 1 & 2

00000101: Track 1 & 3

00000110: Track 2 & 3

00000111: Track 1, 2 & 3

ID TECH EzWriter

Command: Select Track 2 BPI

Command code: <ESC> b [Density]

Hex code: 1B 62 [D2 or 4B]

Response: <ESC> 0 [1B] [30] select ok

<ESC> A [1B] [41] select fail

Description: This command is used to select the density of TK 2. [D2]: TK2 BPI=210 [4B]: TK2 BPI=75

Command: Select Track 1 BPI

Command code: <ESC> f [Density]

Hex code: 1B 66 [D2 or 4B]

Response: <ESC> 0 [1B] [30] select ok

<ESC> A [1B] [41] select fail

Description: This command is used to select the density of TK 1. [D2]: TK1 BPI=210 [4B]: TK1 BPI=75

Command: Select Track 3 BPI

Command code: <ESC> g [Density]

Hex code: 1B 67 [D2 or 4B]

Response: <ESC> 0 [1B] [30] select ok

<ESC> A [1B] [41] select fail

Description: This command is used to select the density of TK 3. [D2]: TK3 BPI=210 [4B]: TK3 BPI=75

Command: Read Raw Data

Command code: <ESC> m

Hex code: 1B 6D

Response: [Raw Data Block] <ESC> [status byte]

Description: This command requests the EzWriter to read a card swipe but send without ASCII decode. Refer to [Raw Data Block] & [Raw Data] Format.

Command: Write Raw Data

Command code: <ESC> n [Raw Data Block]

Hex code: 1B 6E [Raw Data Block]

Response: <ESC> [status byte]

Description: This command requests the EzWriter to write raw data block into the card swiped. Refer to [Raw Data Block] & [Raw Data] format.

Command: Get Device Model

Command code: <ESC> t

Hex code: 1B 74

Response: <ESC> [Model] S

Description: This command used to get device model number compatible with IDT3840.

[Model] 1	Track 2
3	Track 1, 2, 3
5	Track 1, 2

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Command: Get Firmware Version

Command code: <ESC> u

Hex code: 1B 75

Response: <ESC> [version]

Description: This command can get the firmware version of the EzWriter

* [Version String] is an 8-byte version number with format: "ID TECH MagStripe Reader/Writer V1.0"

Command: Get IDT3840 Compatible Firmware Version

Command code: <ESC> v

Hex code: 1B 76

Response: <ESC> [version]

Description: This command gets the original IDT3840 compatible firmware version.

* [Version String] is an 8-byte version number with format: "Rev.xx.xx"

Command: Set BPC

Command code: <ESC> o [tk1bit][tk2bit][tk3bit]

Hex code: 1B 6F [05-08][05-08][05-08]

Response: <ESC> 30 [tk1bit][tk2bit][tk3bit]

Description: This command is used to set the bit per character of every track.

Command: Set Hi-Co

Command code: <ESC> x

Hex code: 1B 78

Response: <ESC> 0

Description: This command is used to set the Reader/Writer status to write Hi-Co card

Command: Set Low-Co

Command code: <ESC> y

Hex code: 1B 79

Response: <ESC> 0

Description: This command is used to set EzWriter status to write Low-Co card

Command: Get Hi-Co or Low-Co Status

Command code: <ESC> d

Hex code: 1B 64

Response: <ESC> H – to write Hi-Co

<ESC> L – to write Low-Co

Description: This command is used to get the Reader/Writer write status

Command: Detecting EzWriter

Command code: 9

Hex code: 39

Response: <ESC> 4

Description: This command is used to detect if the EzWriter is existing or not

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Command: Shift to AMC protocol

Command code: <ESC> AMC

Hex code: 1B 41 4D 43

Response: <ESC> 0 :

Description: This command is used to shift the protocol to AMC and perform a reset in AMC protocol.

Data Formats

[Data Block] format

	Start Field	EzWriter Data Field	Ending Field
Command Code	<ESC>s	[Card data]	? <FS>
Hex code	1B 73	[Card data]	3F 1C

[Card Data] format

	Char Data
Char Code	<ESC>1 [string1] <ESC>2 [string2] <ESC>3 [string3]
Hex Code	1B 01 [string1] 1B 02 [string2] 1B 03 [string3]

[Status Byte] format

Status	Description	Hex	ASCII
Ok	Read, Write, or Command ok	30	0
Read / Write Error	Track 1 error	31	1
	Track 2 error	32	2
	Track 1 and Track 2 error	33	3
	Track 3 error	34	4
	Track 1 and Track 3 error	35	5
	Track 2 and Track 3 error	36	6
	Track 1, Track 2 and Track 3 error	37	7

[Raw Data Block] format

	Start Field	EzWriter Data Field	Ending Field
Command Code	<ESC>s	[Raw Data]	?<FS>
Hex code	1B 73	[Raw Data]	3F 1C

[Raw Data] format

	Raw Data
Char Code	<ESC>1[L1][string1] <ESC>2[L2][string2] <ESC>3[L3][string3]
Hex Code	1B 01[L1][string1] 1B 02[L2][string2] 1B 03[L3][string3]

Note: [L1],[L2],[L3] is the length of [string1],[string2],[string3]

None available or none data on tracks does not output when swipe of card

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For example, when reading a card (encoded data on track 2 only) on dual track model, data is transmitted like: 1B 73 1B 0100 1B 02 [L2] [string] 3F 1C

Initialization

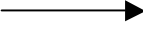
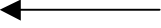
HOST	Direction	EzWriter
Command code: <ESC>a HEX code: 1B, 61	→	(Reset)
Command code: <ESC>e HEX code: 1B, 65	→	(Serial port test)
	←	Command test ACK:<ESC>y HEX code: 1B, 79
Command code <ESC>a HEX code: 1B, 61	→	(Reset)

WRITE DATA Example

HOST	Direction	EzWriter
Command code: <ESC>w<ESC>s<ESC> 01,01 <ESC> 02,23<ESC> 03,45?<FS> HEX code: 1B, 77, 1B, 73, 1B, 01, 30, 31, 1B, 02, 32, 33, 1B, 03, 34, 35, 3F, 1C,	→ (write command)	
	← (status ACK)	(Wait until swipe card) Command ACK:<ESC> <status> HEX code: 1B, status, Status= 30, No Error Status= 31, Track 1 Write Error Status= 32, Track 2 Write Error Status= 33, Track 1, 2 Write Error Status= 34, Track 3 Write Error Status= 35, Track 1, 3 Write Error Status= 36, Track 2, 3 Write Error Status= 37, Track 1, 2, 3 Write Error Status= 38, Read after write timeout

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READ DATA Example

HOST	Direction	Reader/Writer
Command code:<ESC>r HEX code: 1B, 72	(read command) 	
	(status ACK) 	(Wait until swipe card) Command ACK: <ESC>s<ESC> 01,%01?<ESC> 02, 23?<ESC> 03, 45??<FS><ESC> <status> HEX code: 1B, 73, 1B, 01, 25, 30, 31, 3F, 1B, 02, 3B, 32, 33, 3F, 1B, 03, 3B, 34, 35, 3F, 3F, 1C, 1B, status Status= 30, No Error Status= 31, Track 1 Read Error Status= 32, Track 2 Read Error Status= 33, Track 1, 2 Read Error Status= 34, Track 3 Read Error Status= 35, Track 1, 3 Read Error Status= 36, Track 2, 3 Read Error Status= 37, Track 1, 2, 3 Read Error Status= 38, Read after write timeout

AMC Compatible Command Set

This command set provides EzWriter compatibility for existing software applications and product replacements. Workshop can operate with the AMC command set; however, this command set has some limitations not found in the IDT command set. Using Workshop with the IDT command set is recommended.

USI Protocols

The AMC USI protocol is used for information exchange. The user may select from 2 different variations for communicating with the unit.

USI0 (Protocol 0)

In USI0, all characters are transmitted and received using exactly the command characters listed in the chapter on Commands and Responses found later in this manual. There are no Headers, Trailers, or Block Check Characters. Protocol 0 presumes no transmission errors. This is the default protocol after a reader reset, although the reader may be configured to respond in USI0 or USI1 for the power-on message. This protocol also enforces a five (5) second maximum timeout between characters.

USI1 (Protocol 1)

In USI1, all messages are preceded by the ASCII character STX, followed by the ASCII character ETX with one Block Check Character (BCC). The BCC is an XOR of the data bits of the entire message including the STX and ETX characters. (It does not include the BCC itself.) The parity of the BCC is the selected parity, if any. This protocol also enforces a 65ms maximum timeout between characters.

If the Interface detects an error in an incoming transmission, it responds with a "Retransmit". If the host detects transmission error, it may, at its option request a retransmission.

Protocol Selection

After a power-on or reset, the unit is initialized to use USI0. After the unit receives a valid USI1 message from the host, it continues to operate in USI1 until it experiences a power reset or receives a WARM RESET command.

Note: The UIC – AMC compatible reader/writer has EEPROM settings for Protocol 0 or Protocol 1 that breaks the AMC Protocol auto shift rule. EzWriter follows AMC protocol auto shift rule as described above.

Flow Control

For both protocols, the host may at any time stop/start the unit transmission by using the XOFF/XON commands. After a power-on or reset, the unit is initialized to XON (communications enabled) mode.

EzWriter, in the AMC mode, must get commands from the host to operate the LEDs. Workshop sends these commands to EzWriter to emulate the IDT protocol operation.

AMC Commands and Responses

The following sections describe the commands that the host can send to the reader, this is followed by a section describing the reader responses to the host. There are three groups of commands, which can be sent to the reader. The first is used to manipulate the reader (LED's, status, etc.). The second is used to read and process magnetic stripe data. The third group is used to write magnetic stripe data. Table 1, Table 3 and Table 4 summarize the commands of each group.

The unit executes commands received from the host one at a time and cannot execute a new command until the previous command has been completed. Once the unit receives a command, it performs the requested action and reports the results back to the host.

Unless otherwise specified, the examples shown assume that the unit uses the default settings.

Reader Commands

Table 1 – USI Reader Command Summary				
ASCII	HEX	Name	Use	Length*
<XON>	11	Resume transmission	Resume transmission to host	1
<XOFF>	13	Pause Transmission	Pause Transmission to host	1
%	25	Retransmit	Retransmits the last message again	1
9	39	Version Report	Transmits Version String	1
<ESC>	1B	Abort	Abort command	1
	7F	Warm Reset	Simulates power cycle	1
#	23	Configuration Request	Sends Reader Configuration Byte	1
L	4C	Green LED ON	Turns on Green LED	1
l	6C	Green LED OFF	Turns off Green LED	1
M	4D	Red LED ON	Turns on Red LED	1
m	6D	Red LED OFF	Turns off Red LED	1
(	28	Green LED Flash	Start flashing Green LED	1
)	29	Red LED Flash	Start flashing Red LED	1
Y	59	Buzzer ON – Not support	Turns on Buzzer	1
y	79	Buzzer OFF – Not support	Turns off Buzzer	1
&	26	Card edge detect		1
K	4B	Yellow On – UIC command	Turns on both LEDs	1
k	6B	Yellow Off – UIC command	Turns off both LEDs	1
|	7C	Yellow Flash – UIC command	Flashing both LEDs	1

*Length does not include protocol overhead characters, if any.

<XON> (11H) Resume Reader Transmission

ACTION Resume transmission of data by the unit.

<XOFF> (13H) Pause Reader Transmission

ACTION Stops transmission of data by the unit.

% (25H) Retransmit

ACTION Retransmits the last message sent by the reader.

Use this command when you detect a communication error in a message received from the reader. The reader re-transmits the last response it transmitted before this request. The host may request retransmissions as many times as needed.

9 (39H) Version Report

ACTION Transmit version information.

Send this when you want to know the version of the firmware currently loaded.
Example "ID TECH Reader/Writer Version 2.0 061001"

<ESC> (1BH) Abort

ACTION Abort current command and transmit an Acknowledge response ("^" 5EH) if issued: After a single character "Load Encode Data" command (A, B, C) has been responded to by the unit. After a double or triple character "Load Encode Data" command (a3, E_, ...) has been responded to by the unit. After the "Arm to Read" or "Encode data" commands have been responded to by the unit. (The unit would be waiting for a card swipe to read or encode.)

Note *This command byte is not recognized as a command within data strings. It is processed as a data character instead.*

DEL (7FH) Warm Reset

ACTION Abort all current actions and cause the device to execute all initialization functions. The unit responds exactly as it would for a "power up" cycle. It does not send the typical acknowledge response ("^" 5EH). See section

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Reader Responses on page 59 for details. This is the command version of power cycling the reader.

Note This command byte is not recognized as a command within data strings.

(23H) Configuration Request

ACTION Transmit a byte representing the configuration of the unit as follows:

Bit Position*	Bit = 0	Bit = 1
0	Track 1 Read not present	Track 1 Read present
1	Track 2 Read not present	Track 2 Read present
2	Track 3 Read not present	Track 3 Read present
3	not used – should be 0	not used
4	Track 3 Write not present	Track 3 Write present
5	Track 2 Write not present	Track 2 Write present
6	Track 1 Write not present	Track 1 Write present
7	parity bit**	parity bit**

* bit 0 = lsb, bit 7 = msb

** is = 0 for units configured for 8 data bit transmission

Obtain details of the current unit configuration.

EXAMPLE The following byte (in hex) was returned: 63. It indicates a unit capable of reading magnetic data on tracks 1 and 2; and writing magnetic data on to tracks 1 and 2.

& (26H) Card Edge Detect

ACTION The unit performs the following sequence: Transmit command acknowledge (“^” 5EH). If not a reader/writer, then a Can’t Execute “~” reply is sent from the unit. Wait for card swipe. Transmit Card Edge Acknowledge (“>” 3EH) after the unit detects the card edge at the encode head. After a “Card Edge Detect”, command is received and acknowledged. The only valid commands that are accepted for execution are the “Abort” <ESC> and “Warm Reset” commands. All other commands result in an “Invalid Command” “!” response.

LED Commands. Use these commands to manipulate the reader’s LED.

L (4CH) Green LED ON
I (6CH) Green LED OFF
M (4DH) Red LED ON
m (6DH) Red LED OFF

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ACTION The unit performs the following operations: Turn green/red LED colors ON or OFF, as specified. Transmits an acknowledge response “^” (5EH). A bicolor LED is used. If both red and green are ON, the LED appears amber/yellow.

(**(28H) Green LED flash**
) **(29H) Red LED flash**

ACTION The unit performs the following operations: Begin flashing the specified LED color ON and OFF. Transmits an acknowledge response “^” (5EH). The LED flashes approximately .25 seconds ON and .25 seconds OFF. The flashing continues until changed by another LED command. A single, bicolor LED is used on the unit. If both red and green are turned ON, the LED appears amber/yellow.

Buzzer Commands. The reader hardware does not support a buzzer. This command is here for reference only.

Y **(59H) Buzzer ON**
y **(79H) Buzzer OFF**

ACTION The unit performs the following operations: Turn the unit’s buzzer ON or OFF, as specified. Transmits an acknowledge response “^” (5EH).
Note The unit responds to these commands even though there is no buzzer installed.

Magstripe Card Read Commands

Table 3 – Magstripe® Card Read Command Summary				
ASCII	HEX	Name	Use	Length *
P	50	Arm to Read	Clear buffers, wait for card read	1
p	70	Arm to Read with speed prompts	Same as P but send "(" at start of Magstripe data and ")" at end. (Test Tool)	1
Q	51	Transmit ISO standard data, Track 1	Process and send track 1 data after card read using ISO track 1 decoding	1
R	52	Transmit ISO standard data, Track 2	Process and send track 2 data after card read using ISO track 2 decoding	1
S	53	Transmit ISO standard data, Track 3	Process and send track 3 data after card read using ISO track 3 decoding	1
q	71	Transmit ISO standard data, Track 1	Process and send track 1 data after card read using selected ISO track decoding	2
r	72	Transmit ISO standard data, Track 2	Process and send track 2 data after card read using selected ISO track decoding	2
s	73	Transmit ISO standard data, Track 3	Process and send track 3 data after card read using selected ISO track decoding	2
l	49	Transmit "Error Data"	Sends data after a data error is returned	1
U	55	Transmit custom data, forward - Track 1	Sends data with/without nulls parsed using specified bits per custom character	2,3
V	56	Transmit custom data, forward - Track 2	Sends data with/without nulls parsed using specified bits per custom character	2,3
W	57	Transmit custom data, forward - Track 3	Sends data with/without nulls parsed using specified bits per custom character	2,3
X	58	Transmit Passbook Data. Not Support	Process and send passbook data using 0CH or 0FH as the allowed End Sentinel	1
x	78	Transmit Passbook Data Not Support.	Process and send passbook data using the specified End Sentinel	2
?	3F	Write Verify	Perform a Read-After-Write check on data in the read buffers	1

*Length does not include protocol overhead characters, if any.
Magstripe® Card Read Command Description

P (50H, uppercase) Arm to Read

ACTION The unit performs the following sequence: Clear the read data buffers for all tracks. Transmit command acknowledge (“^” 5EH). Wait for card swipe. Transmit read acknowledge (“^” 5EH) after card swipe. After an “Arm to Read” command is received and acknowledged. The only valid commands that are accepted for execution are: “Abort” <ESC>, “Warm Reset” , “Status” “\$”, and LED control commands. All other commands result in an “Invalid Command” “!” response.

p (70H, lowercase) Arm to Read with speed prompts

ACTION The unit performs the following sequence: Clear the read data buffers for all tracks. Transmit command acknowledge (“^” 5EH). Wait for card swipe. If Magstripe® media is detected a “(” (28H) byte is sent, when media detect goes inactive a “)” (29H) byte is sent. This is similar to the 'P' command, except an extra response '(' is reported when a media is detected through the read head. A ')' response is reported when media detect goes inactive. Mainly used as a tool for determining average swipe speed. Most applications should not use this command. They should use the upper case P command instead.

Q (51H) Transmit ISO standard data, track 1

R (52H) Transmit ISO standard data, track 2

S (53H) Transmit ISO standard data, track 3

ACTION The unit performs the following sequence: Process data in the read buffer for the specified track according to ISO standard. If error is detected in card data, transmit proper error response ('*' or '+'). Else, transmit data in ASCII.

Note Q, R, and S are special single byte commands for the corresponding cases of double byte commands, e.g. Q has the same effect as q1.

q (71H) Transmit track 1 data

r (72H) Transmit track 2 data

s (73H) Transmit track 3 data

FORMAT 2-byte command - Command character (q, r, s) is followed by an ASCII number (1, 2 or 3) representing the ISO track format for processing the Magstripe data.

ACTION The unit performs the following sequence: Process data in the read buffer for the specified track and format. If no card data errors, transmit data in ASCII. If error is detected in card data, transmit proper error response ('*' or '+'). These commands allow a track to be transmitted with a different track's ISO format. For example to transmit track 1's data using ISO track 2 format send “q2” (71H, 32H). The uppercase equivalents (Q, R, and S) are equivalent to q1, r2, and s3.

Note The s1 command decodes track 3 using AAMVA format if the unit is configured for ISO and AAMVA decoding.

I (49H) Transmit “Error Data”

ACTION The unit performs the following sequence:
If the previous read command resulted in an error (response was '**', e.g. no end sentinel, parity or LRC error), transmit the data regardless of the error(s). If there was no error, transmit '+'. The “I” command allows you to recover data even if the reader detects data errors. This command does not work for a no start sentinel '+' response.

U (55H) Transmit Custom Data, forward swipe, track 1

V (56H) Transmit Custom Data, forward swipe, track 2

W (57H) Transmit Custom Data, forward swipe, track 3

FORMAT These commands may be either 2 or 3 bytes long.

2-byte command – Used to request custom data with no internal null characters allowed. The command character is followed by an ASCII number (3,4,5,6 or 7) which specifies the number of bits per custom character.

3-byte command – Used to request custom data with internal null characters. The command character is followed by the underline character (5FH) and the ASCII number (3,4,5,6 or 7) which specifies the number of bits per custom character.

ACTION The unit performs the following sequence: Process data in read buffer for the specified track, based upon the “number of bits” character. Transmits data formatted one byte per character with the unused most significant bits in each byte set to '0'.

Note Use the appropriate 2 or 3 byte form depending on the presence or absence of null (00H) characters. Data is returned in the low order bits for 3,4,5,6, or 7 bits per character.

? (3FH) Write verify

ACTION The unit performs the following sequence: Check that valid write data exists in Encode Data storage buffer. Send “*” error if not. Else, Clear the read data buffers for all tracks; Transmit command acknowledge (“^” 5EH); Wait for card swipe; Transmit acknowledge (“^” 5EH) after card swipe if card passes the Read After Write checks on all tracks that were previously encoded; Otherwise, send the proper RAW (1, 2 and/or 3) error response in ASCII. After a “Write Verify” command is received and acknowledged the only valid commands that are accepted for execution are: “Abort” <ESC> and “Warm Reset” commands. All other commands result in an “Invalid Command” “!” response.

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Magstripe Card Write Commands

Table 4 – MagStripe Card Write Command Summary				
ASCII	HEX	Name	Use	Length *
A	41	Load ISO Standard Data for writing Track 1	To encode cards with standard ISO format	1
B	42	Load ISO Standard Data for writing Track 2	To encode cards with standard ISO format	1
C	43	Load ISO Standard Data for writing Track 3	To encode cards with standard ISO format	1
a	61	Load ISO Data for writing Track 1	Allows for ISO track formats in non-standard track assignments	2
b	62	Load ISO Data for writing Track 2	Allows for ISO track formats in non-standard track assignments	2
c	63	Load ISO Data for writing Track 3	Allows for ISO track formats in non-standard track assignments	2
j	6A	Load passbook data for writing tracks 2 and 3. Not support	To encode passbooks with the IBM-Passbook format.	2
E	45	Load Custom Data for Writing Track 1	To encode cards using a user defined data format	2 or 3
F	46	Load Custom Data for Writing Track 2	To encode cards using a user defined data format	2 or 3
G	47	Load Custom Data for Writing Track 3	To encode cards using a user defined data format	2 or 3
;	3B	Set Write Density (for individual tracks)	Change the density of data that is written to the card for the specified track.	3
O	4F	Set Write density to 210 bpi on Tracks 1 and 3	Returns tracks 1 & 3 encoding density settings to ISO standard for those tracks.	1
o	6F	Set Write density to 75 bpi on Tracks 1 and 3	Change encoding density on tracks 1 & 3	1
N	4E	Set Write density to 210 bpi on Track 2	Change encoding density on track 2	1
n	6E	Set Write density to 75 bpi on Track 2	Returns track 2 encoding density setting to ISO standard for track 2.	1
[	5B	Set Default Write Current	Change default write current setting in EEPROM.	4
]	5D	View Default Write Current	View default write current setting in EEPROM.	1
<	3C	Set Temporary Write Current	Change setting of write current used to encode cards.	4
>	3E	View Temporary Write Current	Check setting of write current used to encode cards.	1
@	40	Arm to Write with RAW	Encode cards and perform Read After Write (RAW) verification.	1
Z	5A	Arm to Write, no RAW	Required for encoding Extended length media on VC units.	1
z	7A	Arm to Write with RAW and speed prompts	Same as @ but send "(" at start of write and ")" at end of read. (Test tool)	1

*Length does not include protocol overhead characters, if any.

Load Data Commands Use these commands to load data into the unit's encode storage.

- A (41H) Load ANSI/ISO standard data for encoding track 1**
- B (42H) Load ANSI/ISO standard data for encoding track 2**
- C (43H) Load ANSI/ISO standard data for encoding track 3**

ACTION The unit performs the following sequence: Clear the Encode Data storage for the specified track. Transmit Command acknowledge (“^” 5EH). Wait for download of the encode data in ASCII, terminated by the ASCII EOT character (04H). If data is good, transmit acknowledge (“^” 5EH). Else, transmit “*” error response. *Note Commands A, B and C are special cases of the two byte commands a, b, and c. Example: A = a1, B = b2, and C = c3.*

- a (61H) Load ISO data for encoding track 1**
- b (62H) Load ISO data for encoding track 2**
- c (63H) Load ISO data for encoding track 3**

FORMAT *2-byte command* – Command character (a, b, c) is followed by an ASCII number (1, 2 or 3) representing the ISO track format for processing the Magstripe data.

ACTION The unit performs the following sequence: Clear the Encode Data storage for the specified track. Transmit Command acknowledge (“^” 5EH). Wait for download of the encode data in ASCII, terminated by the ASCII EOT character (04H). If data is good, transmit acknowledge (“^” 5EH). Else, transmit “*” error response

- j (6AH) Load Passbook data for encoding track 2/3**

FORMAT *2-byte command* – The command character (j), is followed by an ASCII character representing the end sentinel used for IBM-Passbook encoding. Only the lower four bits of the ASCII character are used for the end sentinel. If the <ESC> character is sent for the end sentinel, then the command is aborted and the unit sends acknowledge (“^” 5EH).

ACTION The unit performs the following sequence: Clear the Encode Data storage for tracks 2 and 3. Transmit Command acknowledge (“^” 5EH). Wait for download of the encode data in ASCII, terminated by the ASCII EOT character (04H).

If data is good, transmit acknowledge (“^” 5EH). Else, transmit “*” error response

Note (1) Use this command when you only want to write passbook formatted data to a card. Two redundant data fields are encoded on tracks 2 and 3.

(2) Tracks 2 and 3 write data buffers are loaded with the passbook formatted data.

(3) The encoding density for tracks 2 and 3 are always set to 210 bpi when this command is used and completed.

(4) After this command is completed, arming the unit to write always writes over tracks 2 and 3.

(5) Command is only supported on reader/writer units with tracks 2 and 3.

Reader/Writers that have track 1 and 2 only respond with a Can't Execute (“~” 7EH).

- E (45H) Load Custom data for encoding track 1**
- F (46H) Load Custom data for encoding track 2**
- G (47H) Load Custom data for encoding track 3**

FORMAT These commands may be either 2 or 3 bytes long.

2 byte command – Used to load custom data with no internal null characters allowed. The command character is followed by an ASCII number (3,4,5,6 or 7) which specifies the number of bits per custom character.

3 byte command – Used to load custom data with internal null characters. The command character is followed by the underline character (“_” 5FH) and the ASCII number (3,4,5,6 or 7) which specifies the number of bits per custom character.

ACTION The unit performs the following sequence: Clear the Encode Data storage for the specified track. If an invalid track number is sent the unit sends an Invalid Command (“!” 21H) response. Transmit Command acknowledge (“^” 5EH)
Wait for download of the Encode Data string in ASCII, terminated by the ASCII EOT character (04H). If data is good, transmit Acknowledge (“^” 5EH). Else, transmit “*” error response.

Density Commands: Use these commands to set the bit density of the encoded data

;
(3BH) Set Write Density

FORMAT 3-byte command - “;TD” where:

;
; = Command character (3BH)

T = ASCII character (1, 2 or 3) representing the track number being configured.

D = ASCII character (H or h) for 210bpi; ASCII character (L or l) for 75bpi

ACTION The unit performs the following sequence: Set density for the specified track. If an invalid track number or density parameter is sent the unit sends a “*” reply. Transmit Command acknowledge (“^” 5EH). This command allows for full independence in setting the densities for each track. Tracks 1 and 3 are not forced to be the same as in previous models.

Notes (1) On Power-up/Reset, Tracks 1 and 3 default to 210bpi and Track 2 to 75bpi.

(2) These commands must be sent prior to any Load Data commands. Errors may occur otherwise.

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- O (4FH) Set Write Density to 210bpi on tracks 1 and 3**
- o (6FH) Set Write Density to 75bpi on tracks 1 and 3**
- N (4EH) Set Write Density to 210bpi on track 2**
- n (6EH) Set Write Density to 75bpi on track 2**

ACTION The unit performs the following sequence: Set density for the specified track(s). Transmit Command acknowledge (“^” 5EH). These commands were retained to preserve compatibility with the older AMC 712 command set. If track 1 and 3 require different density settings, use the more general Set Write Density (“;” 3BH) command.
Note (1) On Power-up/Reset, Tracks 1 and 3 default to 210bpi and Track 2 to 75bpi. (2) These commands must be sent prior to any Load Data commands. Errors may occur otherwise.

Write Current Commands: Use these commands to set and review the write current used to encode data on to cards. (VC units only)

[(5BH) Set Default Write Current

FORMAT 4-byte command – Command character ([), is followed by three ASCII number characters (0 thru 9) representing the write current used for encoding.

ACTION The unit performs the following sequence: Change the write current setting in EEPROM and RAM to the specified value. Valid values are 000 to 255 only. Any other values outside this range gets a “*” reply from the unit. If not a VC unit, then a “~” reply is sent from the unit. Transmit Command acknowledge (“^” 5EH). This command may be sent anytime prior to an “Arm to Write” command.

Notes (1) In US10 there is a 5-second inter-character timeout

On Power-up/Reset, this value is used for encoding cards.

The previous default current value is lost.

Recommended values:

Typical low coercivity (~300 Oersted) setting = 036

Typical high coercivity (4140 Oersted) setting = 255

] (5DH) Review Default Write Current

ACTION The unit returns a 3 ASCII character response representing the default write current setting stored in EEPROM, MSD first. If not a VC unit, then a “~” reply is sent from the unit.

Note The value returned is not necessarily the value used to presently encode cards with; i.e. the temporary value could be different.

< **(3CH) Set Temporary Write Current**

FORMAT 4-byte command – Command character ([), is followed by *three* ASCII number characters (0 thru 9) representing the write current used for encoding.

ACTION The unit performs the following sequence: Change the write current setting RAM to the specified value. Valid values are 000 to 255 only. Any other values outside this range gets a “*” reply from the unit. If not a VC unit, then a “~” reply is sent from the unit. Transmit Command acknowledge (“^” 5EH). This command may be sent anytime prior to an “Arm to Write” command.

Notes *In USI0 there is a 5-second inter-character timeout*

On Power-up/Reset the unit sets the write current to the default value read from the on-board EEPROM. The temporary value is lost.

Recommended values:

Typical low coercivity (~300 Oersted) setting = 036

Typical high coercivity (4140 Oersted) setting = 255

This is an AMC compatible command. EzWriter only supports either low or high coercivity, all settings above 170 is high coercivity; otherwise, EzWriter is set to low coercivity operation.

> **(3EH) Review Temporary Write Current**

ACTION The unit returns a 3 ASCII character response representing the temporary write current setting stored in RAM, MSD first. If not a VC unit, then a “~” reply is sent from the unit.

Note *The value returned is the value presently used to encode cards with. This value could be different from the default write current value stored in EEPROM.*

Arm to Write Commands: Use these commands to write cards.

ASCII Char Definition of Instruction

@ (40H) Arm to Write with RAW verification

ACTION The unit performs the following sequence: Check that valid write data exists in Encode Data storage buffer. Send “*” error if not. Else, Clear read buffers; Transmit Command acknowledge (“^” 5EH); Wait for card swipe. Transmit acknowledge (“^” 5EH) after card swipe if card passes the Read After Write checks on all tracks that were encoded. Otherwise send the proper RAW (1, 2 and/or 3) error response. After a “Arm to Write” command is received and acknowledged the only valid commands that are accepted for execution are: “Abort” <ESC> and “Warm Reset” commands. All other commands result in an “Invalid Command” “!” response.

Z (5AH) Arm to Write, no RAW verification

ACTION The unit performs the following sequence: Check that valid write data exists in Encode Data storage buffer. Send "*" error if not. Else, Clear read buffers; Transmit Command acknowledge (^ 5EH); Wait for card swipe. Transmit acknowledge (^ 5EH) after card swipe. After a "Arm to Write" command is received and acknowledged the only valid commands that are accepted for execution are: "Abort" <ESC> and "Warm Reset" commands. All other commands result in an "Invalid Command" "!" response.

z (7AH) Arm to Write, with RAW and speed prompts

ACTION The unit performs the following sequence: Check that valid write data exists in Encode Data storage buffer. Send "*" error if not. Else, Clear read buffers; Transmit Command acknowledge (^ 5EH); Wait for card swipe. A "(" (28H) byte is sent when the media is first detected at the write head. After the card passes the read head and the media detect goes inactive, a ")" (29H) byte is sent if the card passes the Read After Write checks on all tracks that were encoded. Transmit acknowledge (^ 5EH) after card swipe.

After a "Arm to Write" command is received and acknowledged the only valid commands that are accepted for execution are "Abort" <ESC> and "Warm Reset" commands. All other commands result in an "Invalid Command" "!" response.

This is similar to the '@' command, except an extra response '(' is reported when a media is detected at the write head. A ')' response is reported when media detect goes inactive. Mainly used as a tool for determining average swipe speed. Most applications should not use this command. They should use the '@' command instead.

Reader Responses

There are two types of responses that the unit, solicited and unsolicited. The unit produces a solicited response after receiving a command from the host. This includes command acknowledgements, card data, etc. The unit produces an unsolicited response normally due to a user's action or a power on situation.

Solicited Responses

Table 5 – Solicited Response Summary				
ASCII	HEX	Name	Use	Length*
^	5E	Command Completed (ACK)		1
!	21	Invalid Command		1
*	2A	Error		1
+	2B	No data found		1
-	2D	Insufficient leading zeros for custom writing		1
/	2F	lsb of first character not a "1" for custom writing		1
?	3F	Communications error		1
~	7E	Can't Execute, hardware does not support command		1

*Length does not include protocol overhead characters, if any.

Unsolicited Responses

Table 6 – Unsolicited Response Summary				
ASCII	HEX	Name	Use	Length*
:	3A	Power On Report		1
^	5E	Card swipe occurred when armed to read or write		1
1	31	Unsuccessful read after write – Track 1		1,2 or 3**
2	32	Unsuccessful read after write – Track 2		1,2 or 3**
3	33	Unsuccessful read after write – Track 3		1,2 or 3**
(	28	Card speed measurement - start		1
)	29	Card speed measurement - end		1
>	3E	Card edge detected		1

*Length does not include protocol overhead characters, if any.

** Responses combined into one message back to the host.

References for AMC protocol design

1. "MSR206-7HL Magnetic Stripe Card Reader/Writer (High & Low Coercivity) Programmer's Manual Revision C - 26 Dec. 2003" ; From UIC
2. "Model 722VC/722LC Magstripe Swipe Reader/Writer Intelligent Series USER GUIDE & SPECIFICATIONS; Revision 50"; From AMC
3. "Writing raw data to magnetic card" (MSR206_7HL-Writing raw data to magnetic card1A.doc) – From UIC;

Difference between AMC R/W and EzWriter

Functions not supported:

1. EzWriter does not support variable coercivity settings. Commands are compatible but functionally EzWriter treats coercivity settings above 1270 as Hi-Co & others as Low-Co.
2. EzWriter does not support Buzzer function

Extra Commands:

- 'K' – Yellow LED on (To be compatible with UIC MSR206-HL)
- 'k' – Yellow LED off (To be compatible with UIC MSR206-HL)
- 'l' – Yellow LED flash (To be compatible with UIC MSR206-HL)
- '9' To detect EzWriter under IDT protocol or to get version string in AMC protocol

Switching Between Protocols:

- 'ToIDT' – Shift back to IDT (UIC) protocol
- '\1BToAMC' – Shift to AMC protocol

Special AMC Emulation Settings

EzWriter Special Settings for special applications
(March 1, 2007)

The following special setting commands are added to EzWriter to support applications that may need the un-documented operation in AMC Protocol.
(Applies to EzWriter firmware V2.2X and later)

There are four commands. Two commands are used to enter & exit the Special Setting mode for the Setting Commands and two are used to perform the settings.

Setting Method:

Any RS232 communication utility program with 9600,7,O,1 settings should work. EzWriter must be in AMC mode for settings. (Workshop can be used to change EzWriter into the AMC mode). (Reference, the EzWriter default settings are: 9600,8,N,1).

ID TECH EzWriter

The IDT internal engineering program MSRW-7-O.exe program can be used to perform the settings.

1. Launch MSRW-7-O.exe program
2. Click “Port” and select proper port to open
3. Select “Keyboard” on the upper-writer corner from the program window.
4. Type in each command followed by “Enter” key.

Enter setting mode

Command: **\09\09\09** Reader Response: **^^!**

Set to “Don’t Send ‘+’ ” // Note: **A1D00** will send ‘+’
Command: **A1D5A** Reader Response: **^^^**

Set to “Single Byte Write Error Report” // Note: **A1E00** will send multiple error report when

// multiple tracks failed
Command: **A1E5A** Reader Response: **^^^**

Save setting

Command: **@** Reader Response: **^:**

Reasons for using these settings:

1. The AMC Reader/Writer has a “conditional bug” – Sometimes it does not response to read command “Q”, “R”, “S”. According to specification, the R/W should always have a response, either normal data or ‘*’ for error data and ‘+’ for no data. Some programs function only with no response when there is no data in the track. A normal no data response ‘+’ from EzWriter will cause the program to fail and require the PC to be rebooted to recover.
2. The some programs do not handle multiple track writing error situations according to specification and send commands before the R/W is finish sending the writing error responses ‘1’, ‘2’ and ‘3’. It then works “properly” with messed up responses from AMC R/W. Program parameters: Com1wr xx 16 1 1 1001, where xx corresponds to one data file.
3. The EzWriter will not write a “No Data” track. The definition of a “No Data” track is an attempt to write a start sentinel character, and end sentinel character, the LRC, and there are no data characters. There must be at least one data character; otherwise, the EzWriter leaves the track “empty” (no writing at all).

Maintenance

The EzWriter requires cleaning of the card slot on a regular interval. The interval is approximate and should be after every 50,000 card swipes. Regular cleaning insures oils and debris do not accumulate on the operating components.

Over time, operation can cause a film to collect on the heads and other surfaces. This film should be removed using "cleaning cards". These are available from magnetic stripe cleaning card sources. Cleaning cards are about the same size as an ID1 (credit card) and have an absorbent surface on one or both sides. The absorbent surface has an alcohol solvent that should remove any film. The absorbent surface should be damp; the surface should not be saturated.

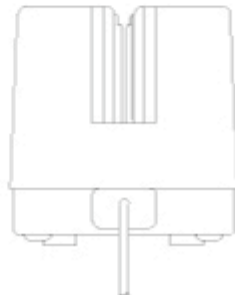
Swipe the card five to ten times with the solvent side of the card toward the read and write heads and then again five to ten times with the solvent side opposite the heads.

The cleaning cards may not remove all the debris. In the case of debris such as dust and card particles in the slot, use an aerosol can product containing clean compressed air. The clean air can be used to blow debris from the slot. Direct the stream of air at a low angle into the slot and run the nozzle along the slot. Direct the air in the direction of the card travel and then in the opposite direction. Inspect the slot by looking down its length with a good backlight to see if all debris is removed.

The metal housing can be cleaned with a mild detergent applied to a soft cloth that is rung almost dry. Detergent should not be allowed to enter the card slot.

Warning: There are no serviceable components inside the EzWriter. Opening the Reader/Writer voids the warranty. Tampering with the write head or tachometer assemblies may change the EzWriter calibration for ISO standards operation.

Appendix A Outline drawings



Appendix B: Card Formats

ISO

Track	Density (bpi)	Bits/Char *	Total Characters **	Character Set	Start Sentinel	End Sentinel	Field Separator
1	210	7	79	Alphanumeric	%	?	^
2	75	5	40	Numeric only	;	?	=
3	210	5	107	Numeric only	;	?	=

* Includes ODD parity bit

** Includes Start Sentinel, End Sentinel, and LRC characters

Track 1 allowed characters

Table 1 – Alphanumeric Character Set

b ₄	b ₃	b ₂	b ₁	b ₆	0	0	1	1
				b ₅	0	1	0	1
				COL	0	1	2	3
				ROW	0	1	2	3
0	0	0	0	0	SP	0	@ ⁽¹⁾	P
0	0	0	1	1	! ⁽¹⁾	1	A	Q
0	0	1	0	2	" ⁽¹⁾	2	B	R
0	0	1	1	3	# ⁽²⁾	3	C	S
0	1	0	0	4	\$	4	D	T
0	1	0	1	5	% ⁽³⁾	5	E	U
0	1	1	0	6	& ⁽¹⁾	6	F	V
0	1	1	1	7	/ ⁽¹⁾	7	G	W
1	0	0	0	8	(	8	H	X
1	0	0	1	9	)	9	I	Y
1	0	1	0	10	* ⁽¹⁾	: ⁽¹⁾	J	Z
1	0	1	1	11	+ ⁽¹⁾	; ⁽¹⁾	K	[⁽⁴⁾
1	1	0	0	12	, ⁽¹⁾	< ⁽¹⁾	L	\ ⁽⁴⁾
1	1	0	1	13	-	= ⁽¹⁾	M] ⁽⁴⁾
1	1	1	0	14	.	> ⁽¹⁾	N	^ ⁽³⁾
1	1	1	1	15	/	? ⁽³⁾	O	DEL ⁽¹⁾

(1) These characters are for hardware control purposes only.

(2) This character is reserved for optional additional graphic symbols.

(3) These characters have the following meanings: Position 0/5 % Represents "start sentinel"
 1/15 ? Represents "end sentinel"
 3/14 ^ Represents "field separator"

(4) These characters are reserved for additional national characters when required. They are not to be used internationally.

Track 2 and 3 allowed characters

Table 2 – Numeric Character Set

Bits					Row	Character
P	b ₄	b ₃	b ₂	b ₁		
1	0	0	0	0	0	0
0	0	0	0	1	1	1
0	0	0	1	0	2	2
1	0	0	1	1	3	3
0	0	1	0	0	4	4
1	0	1	0	1	5	5
1	0	1	1	0	6	6
0	0	1	1	1	7	7
0	1	0	0	0	8	8
1	1	0	0	1	9	9
1	1	0	1	0	10	: ⁽¹⁾
0	1	0	1	1	11	; ⁽²⁾
1	1	1	0	0	12	< ⁽¹⁾
0	1	1	0	1	13	= ⁽³⁾
0	1	1	1	0	14	> ⁽¹⁾
1	1	1	1	1	15	? ⁽⁴⁾

- (1) These characters are for hardware control purposes only.
- (2) Start sentinel
- (3) Field separator
- (4) End sentinel

AAMVA

Table 8 – AAMVA Card Format							
Track	Density (bpi)	Bits/Char*	Total Characters**	Character Set	Start Sentinel	End Sentinel	Field Separator
1	210	7	82	Alphanumeric	%	?	^
2	75	5	40	Numeric only	;	?	=
3	210	7	82	Alphanumeric	%	?	^

* Includes ODD parity bit

** Includes Start Sentinel, End Sentinel, and LRC characters