

SPECTRUM™

Full Insert Magnetic Stripe Reader Keyboard Wedge

User's Manual



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This equipment has not been tested to comply with Part 15 of the FCC Rules for a digital device. This device is designed to be incorporated into a product that will be tested to comply with all regulatory requirements.

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Section 1

INTRODUCTION

Description

The Spectrum Magnetic Stripe Insert Reader can be configured to read and decode 1, 2, or 3 tracks of magnetic stripe data from cards conforming to ISO 7810 and 7811 standards. In addition, the unit is fully programmable through the keyboard, so that data can be formatted with preamble/postamble and terminator characters to match the format expected by the host, and edited as desired.

All communication (i.e. reader and message configuration set-up) is accomplished via keyboard wedge interface. When connected to the host computer, the reader is completely compatible with the host's software. The decoded data appears to the host as if it were entered manually by the operator through the keyboard. Power is obtained from the host.

The reader's chassis is molded from a glass and lubricant-filled engineering plastic that supports the magnetic head and electronics, and serves as a guide for the card. The head is spring-loaded for good contact with warped or bowed cards.

The reader has an open internal design that allows foreign matter entering through the bezel to fall away and not clog or otherwise obstruct the card path. It has multiple mounting options, and can be securely mounted in any position. A separate molded bezel (choice of style) attaches to the chassis to guide the card, and serves as a mount for a tri-colored LED.

Environmentally, the reader is designed to function at temperatures ranging from 32° to 131° F (0° to 55° C) in humidity up to 95% non-condensing. It can be stored or shipped at more extreme temperatures ranging from -40° to 158° F (-40° to 70° C).

Section 2

INSTALLATION

Host Connections

The Spectrum Insert Reader is set at the factory to read magnetic stripe cards on withdrawal, but can be configured to read on both insertion and withdrawal or on insertion alone, as desired. The magnetic reader's output can be formatted with terminating characters and special preamble and/or postamble character strings to match the data format expected by the host.

Different bezel and chassis combinations are available with the reader. Proper mounting of the unit depends upon the specific bezel and chassis configuration utilized.

The reader with the standard bezel can be mounted via the front mounting flanges that are part of the bezel assembly. Side mounting studs are also provided.

A reader with the compact bezel has three threaded mounting points on the chassis. A set of mounting brackets may also be used. A drawing of a typical set of mounting brackets can be found in Appendix D.

The flush-mount bezel comes with four threaded 1" studs that are used to securely mount the reader to surfaces with varying thicknesses of up to 3/4". It needs no mounting bracket.

The reader can be mounted in any orientation. It is connected between the keyboard input port of the host computer and the keyboard itself using a "Y" adapter cable. It can also be plugged directly into the port if no keyboard is used.

The "Y" cable has a 6-pin mini-DIN male connector on one end, and a 6-pin mini-DIN female on the other. To connect the reader to the host, turn the power off and disconnect the keyboard from the computer. Insert the male end of the "Y" cable into the keyboard port. Then connect the keyboard to the female end of the "Y" connector. This "wedges" the reader between the host and the keyboard. Manually-entered data from the keyboard passes through the unit to the host, leaving the keyboard fully functional at all times.

Magnetic data read by the unit is transmitted to the host keyboard port, where it appears to the host as coming directly from the keyboard. This makes the reader, as a data source, completely transparent to the host's application software. In other words, if it is expecting data from the keyboard, that same data can be entered via the insert reader and make no difference to the host.

The default setting for the reader is to read magnetic stripes on withdrawal, but it can be set to read on both insertion and withdrawal or on insertion alone, as desired. Since the host computer's application software is expecting data to be input in a particular order and format, the reader's output can be configured to simulate the keyboard-entered data stream by editing the data field, adding terminating characters and/or special preamble and/or postamble character strings to the data. Any programming that is done, however, must be done with a desktop computer, rather than a notebook or laptop, because the computer must allow for the connection of an external keyboard.

Section 3

CONFIGURATION PARAMETERS

The Spectrum Magnetic Stripe Insert Reader must be properly configured to communicate with the host. These settings are programmed into the reader through the host computer's keyboard. Once programmed, these configuration settings are stored in the reader's non-volatile memory (so they are not affected by the cycling of power).

Default Settings

The reader is shipped from the factory with default settings pre-programmed. In the following sections, the default settings are shown in boldface. For a table of default settings, see Appendix A. In order to modify these settings, the host computer and keyboard must be IBM PC/AT compatible.

If you have a different keyboard, you must use an AT-compatible keyboard to first change the configuration settings, being sure to change the default terminal type last. After changing the terminal type, you must then connect the reader to the appropriate computer. (Most keyboards on PCs with 5 pin DIN and 6 pin MiniDIN connectors are AT compatible.)

To enter the setup mode and change the configuration via keystroke entry, a special data entry format is used. Each setup command starts with /e/d/fx where the "x" is a lower-case character that identifies the command group. (Command groups are case-sensitive, so the e,d,and f characters must be lower case.) This character string is followed by a space and then characters representing the options selected for the commands in that particular group.

When entering numbers (rather than letters) be sure to type slowly—two characters per second—and use the number keys on the main keyboard, not the ones on the number pad to the right of the main keyboard. Options selected for a command group will take effect when you press ENTER.

If you make an error typing, start again--do not backspace and re-enter the character. If the reader is unplugged while you are in the middle of entering a command option and you have not pressed ENTER, the option selected will not be saved. If, however, ENTER has been pressed after selecting a particular option, that option will be saved until it is changed or all settings are reset to default.

Command Entry Steps

1. Using an AT-compatible computer, enter any document editor. (When running Windows, the Notepad accessory will work fine.)
2. Enter the GROUP SETUP MODE by typing /e/d/fx (where the "x" is the group name).
3. Enter a SPACE <space>.
4. Type the two-character selection code for the feature you wish to change.
5. Press the ENTER key. The reader's LED indicator will flash amber-green three times to indicate the command has been successfully entered. (The LED will not respond if the command was not successfully entered.)

Section 4

GENERAL SELECTIONS

The following table is a summary of the command groups described in this section:

COMMAND GROUP SETUP MODE	COMMAND GROUP	NAME	USAGE
/e/d/f	a	General Selections	To select type of terminal and intercharacter delay
/e/d/f	n	Change to Default Settings	To revert back to the selections set at the factory
/e/d/f	o	Review Settings	To review the reader's current settings
/e/d/f	u	Reading and Decoding Settings	To enable or disable the reader and set the reading direction

When a preamble and/or postamble are set, data will be sent out from the reader in the following format:

[Preamble] [Track 1 Data] [Track Separator] [Track 2 Data] [Track Separator] [Track 3 Data]
[Postamble] [Terminator]

This first group of commands sets the basic operating parameters for the reader. The character string you will type is:

/e/d/fa<space>X0Y<ENTER>

where "X" selects the type of host terminal you will be using (from the choices below), "0" functions as a place-keeper, and "Y" is the intercharacter delay selection (also from the choices below).

Terminal Type Selections

The reader can be programmed to interface to different types of terminals. Terminal types supported are:

0 for IBM-PC Compatible

1 for PS/2 Models 25 and 30

2 for PS/2 Model 50

3 for PS/2 Model 70

Intercharacter Delay

This is the time period the reader will wait before sending the next successive character. Certain terminals and computers require an intercharacter delay to simulate their own keyboard's intercharacter delay.

- 0** for 2 ms intercharacter delay
- 1 for 5 ms intercharacter delay
- 2 for 10 ms intercharacter delay
- 3 for 20 ms intercharacter delay
- 4 for 25 ms intercharacter delay
- 5 for 50 ms intercharacter delay

EXAMPLE:

Set the terminal type at AT and the intercharacter delay at 10 milliseconds. The entire character string is:

```
/e/d/fa<space>002<ENTER>
```

1. Enter group setup mode by typing /e/d/fa, where, in this case, the "a" represents the General Selections command group.
2. Enter a SPACE <space>.
3. Enter both command options for this command group: "0" for AT, another "0" as a place-keeper, and "2" for a 10 ms intercharacter delay.
4. Exit the setup mode by pressing ENTER <ENTER>.

Change to Default Settings

This command, /e/d/fn, returns the settings for all groups to their default values. Data Editing will be turned off, but the formulas will be retained. The entire character string is:

```
/e/d/fn<ENTER>
```

Review Settings

This command, /e/d/fo, activates the review settings command. This will send the current settings for the General Selections group to the host computer for review. The firmware version number will also be shown. The entire character string is:

```
/e/d/fo<ENTER>
```

Reading and Decoding Settings

This group of commands will turn the reader on or off and set the reading direction(s). If the reader is disabled, no data will be sent to the host. The entire character string is:

```
/e/d/fu<space>u1u2<ENTER>
```

where “u1” is the reading enabled/disabled setting and “u2” is the selected reading direction.

MSR READING SELECTIONS

- 0 MSR Reading Disabled
- 1 MSR Reading Enabled**

DECODING METHOD SELECTIONS

The reader can support three kinds of reading directions. With the bi-directional method, the reader will read data on both insertion and withdrawal. Otherwise, the reader will either read on withdrawal (recommended) or insertion, as selected.

- 1 Reading on insertion and withdrawal
- 2 Reading on insertion only
- 3 Reading on withdrawal only**

Section 5

SIGNAL SELECTIONS

The following table is a summary of the command groups described in this section:

COMMAND GROUP SETUP MODE	COMMAND GROUP	NAME	USAGE
/e/d/f	w	Card Switch Setting	To select notifications from card switches
/e/d/f	x	Card Data Output Format Setting	To select card data formats
/e/d/f	y	Leading Zero Adjustment	To adjust the leading zero on tracks 1 and 3

Card Switch Setting

The reader can be programmed to send or not send notifications from the media detect and card seated switches.

/e/d/fw<space><Card Switch Setting><ENTER>

- 0 for no "Card Seated" or "Card Removed" notifications
- 1 for "Card Seated" notification, but no "Card Removed" notification
- 2 for no "Card Seated" notification, but with "Card Removed" notification
- 3 for "Card Seated" and "Card Removed" notifications**

Card Data Output Format

The format of the data output by the reader can be adjusted to provide or not provide certain notifications, as desired.

`/e/d/fx<space><Data Output Selection><ENTER>`

- 0 for no "Error Indication", no "No Data", and no "Media Detect"
- 1 for "Error Indication", but without "No Data" and "Media Detect"
- 2 for no "Error Indication", but with "No Data" and without "Media Detect"
- 3 for "Error Indication" and "No Data", but without "Media Detect"
- 4 for no "Error Indication" and "No Data", but with "Media Detect"
- 5 for "Error Indication", without "No Data", but with "Media Detect"
- 6 for no "Error Indication", but with "No Data" and "Media Detect"
- 7 for **"Error Indication", "No Data", and "Media Detect"**

Leading Zero Adjustment

This command is used to adjust the leading zero on Tracks 1 and 3 for sampling. It eliminates a possible problem caused by acceleration or deceleration. This command is not recommended for use in normal operation.

`/e/d/fy<space><Adjustment><ENTER>`

The valid `<Adjustment>` is ASCII character 0x30 to 0x40.

The leading zero for sampling will be set to $0x10 + \text{<adjustment>} - 0x30$ (bits).

The default value of `<Adjustment>` is 0x34. The leading zero is $0x10 + 0x34 - 0x30 = 20$ bit.

Section 6

MESSAGE FORMATTING SELECTIONS

The following table is a summary of the command groups described in this section:

COMMAND GROUP SETUP MODE	COMMAND GROUP	NAME	USAGE
/e/d/f	b	Terminator Setting	To add a terminator character to the end of a data string
/e/d/f	c	Preamble Setting	To add preamble characters at the start of a data string
/e/d/f	d	Postamble Setting	To add postamble characters at the end of a data string

When a preamble and /or postamble are set, data will be sent out from the readers in the following format:

[Preamble][Track 1 Data][Track Separator][Track 2 Data][Track Separator][Track 3 Data][Postamble]
[Terminator]

Terminator Setting

Use this command to add a terminator character to the end of a string of decoded data. The entire character string is:

/e/d/fb<space>b1<ENTER>

where "b1" indicates the selection of a terminator character.

- 1 **for ENTER**
- 3 for none

Preamble Setting

Characters can be added to the beginning of a string of decoded data. These can be special characters for identifying a specific reading station, to format a message header expected by the receiving host, or for any other character string. Up to nine ASCII characters can be defined. The entire character string is:

```
/e/d/fc<space><string of 0 to 9 characters><ENTER>
```

EXAMPLE:

Add a preamble of four characters (a, b, c, and d) to the beginning of a string of data. The entire character string is:

```
/e/d/fc<space>abcd<ENTER>
```

1. Enter group setup mode by typing /e/d/fc, where, in this case, the “c” represents the Preamble command group.
2. Enter a SPACE <space>.
3. Enter the characters that constitute the four-character preamble.
4. Exit the setup mode by pressing ENTER <ENTER>.

Postamble Setting

The postamble serves the same purpose as the preamble, except it is added to the end of a string of decoded data (after any terminator characters). The entire character string is:

```
/e/d/fd<space><string of 0 to 9 characters><ENTER>
```

Note: /e/d/fc or /e/d/fd without parameters will go back to default: no preamble and postamble.

Section 7

MAGNETIC TRACK SELECTIONS

The following table is a summary of the command groups described in this section:

COMMAND GROUP SETUP MODE	COMMAND GROUP	NAME	USAGE
/e/d/f	p	Track Selection Setting	To indicate which tracks are to be read
/e/d/f	q	Track Separator Setting	To add a separator character between tracks
/e/d/f	v	Start/End Sentinel Setting	To invoke the start/end sentinel and enable special options

Track Selection

There are up to three tracks of encoded data on a magnetic stripe. Use this command to select the tracks that will be read and decoded. Note that the reader must have heads aligned for reading the specified tracks. If a single or dual-track reader is being used, the heads must be positioned to read the tracks selected by this option. (This is normally done at the factory.) The entire character string is:

```
/e/d/fp<space>p1<ENTER>
```

where “p1” indicates the tracks to be read and decoded.

- 0** for Any Tracks
- 1 for Track 1 only
- 2 for Track 2 only
- 3 for Tracks 1 and 2
- 4 for Track 3 only
- 5 for Tracks 1 and 3
- 6 for Tracks 2 and 3
- 7 for Tracks 1, 2, and 3

Note: If any of the multiple tracks fails to read for any reason, no data for any of the tracks will be sent.

Track Separator Selection

This option allows the user to select the character to be used to separate data decoded by a multiple-track reader. The entire character string is:

/e/d/fq<space>q1<ENTER>

where “q1” indicates the track separator character selected.

Note: The track separator character can be selected from the keyboard (for printable characters) or from Appendix B: Function Code Table. However, only one function code can be specified at a time.

The character string:

/e/d/fq<ENTER>

will return the separator character to its default value, which is <ENTER>.

The character string:

/e/d/fq<space>\nul

will turn the separator character off.

EXAMPLE:

Make the track separator TAB. The entire character string is:

/e/d/fq<space>\tab<ENTER>

1. Enter group setup mode by typing /e/d/fq, where, in this case, the “q” represents the Track Separator command group.
2. Enter a SPACE <space>.
3. Enter the function code for TAB, which is: \tab (as shown in the table in Appendix B).
4. Exit the setup mode by pressing ENTER <ENTER>.

Start/End Sentinel (and track 2 account number only)

The reader can be set to either send or not send, to invoke the Start/End sentinel, and to send either the Track 2 account number only, or all the encoded data on Track 2. (The Track 2 options are for reading credit cards, as there is no Track 3 on a credit card. This setting does not affect the output of Tracks 1 and 3.) The entire character string is:

/e/d/fv<space>v1<ENTER>

where “v1” indicates one of the following selections:

- 0 Do not send the Start/End sentinel
- 1 Send the Start/End sentinel**
- 2 Do not send the Start/End sentinel, but do send the account number on Track 2 (of a credit card).
- 3 Send the Start/End sentinel on Tracks 1 and 3 and send the account number on Track 2 (of a credit card).

Section 8

DATA EDITING

In addition to adding preambles and postambles, the Spectrum Insert Reader can also rearrange, drop, or add to the data it reads from a magnetic stripe. This enables the data to be sent to the host in the exact format expected by the application software, thus eliminating the need for software modifications.

To accomplish this, the decoded data is divided into smaller blocks of data known as “fields.” in accordance with established standards such as ISO, ANSI, AAMVA, and CDL.* With these fields of data defined, the order in which they are sent to the host can be changed. They can also be added or eliminated as needed.

** Please see Appendix E for formats and definitions.*

Functions

Specifically, the following functions can be performed:

Rearrange the Data: The fields that make up one track of data can be transmitted to the host in any order desired, regardless of the order in which they occur on the magnetic stripe itself.

Insert Character Strings into the Data: Additional fields of characters can be created and inserted into the data at any place on any track.

Duplicate Fields: Fields of data within a track can be duplicated and transmitted to the host as many times as desired—and in any order desired.

Select Fields to Output: Fields of data can be sent to the host or not sent to the host, as desired.

Fields

By separating decoded data into blocks known as “fields,” each block of data can be treated individually. Fields can also be added to the data, permitting specific functions, such as a carriage return, to be included.

A field is identified with a one-character ID starting with the character “a.” A total of 26 separate fields (that is, a through z) can therefore be defined. These fields can then be sent to the host in the order you specify.

For example, if the credit card data on Track 2 is:

```
;1234567890123456=9912xxxxxxx?c
```

It is divided into seven fields (a, b, c, d, e, f, and g) as shown below:

```
;1234567890123456=9912xxxxxxx?c  
|a|      b      |c| d | e |f|g|
```

If your application software needs the data sent in the following format:

```
9912<ENTER>  
1234567890123456<ENTER>
```

You can create that format by selecting only the fields you need, reversing the order in which they are sent to the host, and then creating a new field <ENTER> to insert after each field.

We do this by using the fields as defined above and adding a new field:

```
Field b = 1234567890123456  
Field d = 9912  
Field h = <ENTER>
```

and then sending {Field d}{Field h}{Field b}{Field h} to the host.

Formulas

The set of instructions programmed into the reader to define data fields and then arrange them into a format is known as the data editing “formula.”

A maximum of four formulas can be resident in the reader’s memory at any one time. If more than one formula is stored in memory, the reader will apply the first formula to the decoded data. If the data format matches the format (credit card, driver’s license, etc.) of the first formula, then it will re-arrange, add, and drop the data fields as you have indicated and output the reformatted data to the host.

However, if the data does not match the criteria spelled out in the first formula, then the criteria of the second formula stored in memory will be applied. And so on. This process will continue for each of the successive formulas until a match is found. If no matches are found for any of the formulas programmed into the reader, then the unedited data record will be transmitted to the host.

The reader will store one formula each for credit card, California driver’s license, and AAMVA formats, as well as a formula for a customized format of your own creation. The user can define all four formulas, or define only one. However, the reader can keep only one credit card, one California driver’s license, one AAMVA, and one customized format and its associated formula in memory at any one time.

Using the Data Editing Function

The data editing function is usually applied to driver's licenses, where the magnetic stripe contains three tracks of information about the license holder, and the host application may need only certain details (such as name, address, and birth date) rather than all the data the stripe holds.

In the AAMVA format, for example, the unedited output for a driver's license might look like this:

```
TRACK 1:  %CABREA^DOE$JANE$R$^310 S JEFFERSON ST^?  
TRACK 2:  ;636014028198457=051219639924?  
TRACK 3:  %!!92870 C F503121BLKBRN D69119980116 M;+!ZH(50?1?
```

Track 1 contains the license holder's name and address. Track 2 includes the expiration date and the holder's birthdate. Track 3 includes such details as height, weight, sex, hair, and eye color.

You can identify exactly what fields the various bits of data occupy by referring to the AAMVA format in Appendix E. Read the data from a sample license, print it out, and then mark the fields accordingly. Now decide what fields of data you need, and what fields of data you don't need. For instance, if you don't need eye and hair colors, you can discard this data once it is read and decoded. You don't need to send it to the host.

Once you know what data you'll need for your host application, decide what order you'll need it in. Should the name come first? Should the city come last? Is there other data or formatting you need? If so, you will have to add fields that contain that data.

Knowing what fields you need to add, drop, and re-arrange will enable you to make full use of the commands on the following pages.

Data Editing Setup Commands

The following table is a summary of the command groups described in this section:

COMMAND GROUP SETUP MODE	COMMAND GROUP	NAME	USAGE
/e/d/f	e	Data Editing On/Off	To turn the data editing function on or off and indicate what to do when no formula matches data
/e/d/f	r	Data Editing Added Field	To add up to six new fields to decoded data
/e/d/f	s	Data Editing Search Command	To search within a user-defined format that is not credit card or driver's license format
/e/d/f	t	Data Editing Send Command	To send fields to the host in a user-defined order

DATA EDITING ON/OFF, MATCHED/UNMATCHED

Use this command to turn the Data Editing function on or off, and to tell the reader what to do if none of the formats stored in the reader's memory matches the data on the card. The entire character string is:

/e/d/fe<space>e1e2<ENTER>

where "e1" turns Data Editing on or off, and "e2" tells the reader what to do when no formula matches the format of the data on the card.

1 Data Editing On
0 **Data Editing Off**

1 If no formula matches card data, send all card data
0 If no formula matches card data, do not send any data

DATA EDITING ADDED FIELD

Use this command to create an additional field containing a specified character string. Up to six fields can be defined. The maximum number of characters for each field is six.

An example of the entire character string for the adding of six fields is:

```
/e/d/fr<space>f1<space>f2<space>f3<space>f4<space>f5<space>f6<ENTER>
```

where "f1" "f2" "f3" "f4" "f5" and "f6" are the individual fields of added data.

EXAMPLE:

Add various characters and functions to decoded data by adding multiple data fields. The entire character string is:

```
/e/d/fr<space>idt<space>;<space>\cr<space>\f1<space>\htITS<ENTER>
```

In this example:

The first added field contains the letters "idt"

The second added field contains a semicolon (;)

The third added field is a carriage return (by entering \cr from the Function Code Table)

The fourth added field is "F1" (by entering \f1 from the Function Code Table)

The fifth added field is a tab followed by the letters "ITS" (by entering \htITS)

DATA EDITING SEARCH COMMAND

When working with a user-defined format that is not credit card, CA DMV, or AAMVA, the reader can support any combination of the following five search methods:

Length Match: For a particular track, indicate the minimum and maximum number of characters acceptable. The Length Match command begins with an "a" followed by the track number, minimum characters, and maximum characters.

String Match: For a particular track, indicate a specific string of characters, as well as the character position at which that string must begin, in order to be acceptable. The String Match command begins with a "b" followed by the track number, the offset (if any), length, and string.

Search Before: For a particular track, create a field which contains all characters that come before the specified occurrence of a given character sequence. (For example, the second occurrence of the character sequence ABC.) The Search Before command begins with a "c" followed by the track number, the field number, the number of times, length, and string.

Search Between: For a particular track, create a field which contains all characters that come between the specified occurrence of one sequence of characters and another. The Search Between command begins with a “d” followed by the track number, the field number, the first number of times, the first length, and the first character string, and then the second number of times, the second length, and the second character string.

Search After: For a particular track, create a field that contains the specified number of characters that come after the specified occurrence of a given character sequence. (For example, the three characters that come directly after the second occurrence of the character sequence ABC. An offset of a given number of character positions can be indicated as well.) The Search After command begins with an “e” followed by the track number, the field number, the number of times, length, and character string.

An example of the entire character string is:

```
/e/d/fs<space>[length_match] or [string_match] or [search_before] or [search_between] or  
[search_after]<ENTER>
```

where [length_match] is the full Length Match command:

```
a{track_no}(minimum characters)(maximum characters)
```

[string_match] is the full String Match command:

```
b{Track_no}(offset)(length)(string)
```

[search_before] is the full Search Before command:

```
c{track_no}{field_no}(times)(length)(string)
```

[search_between] is the full Search Between command:

```
d{track_no}(field_no)(times1)(length1)(string1)(times2)(length2)(string2)
```

and [search_after] is the full Search After command:

```
e{Track_no}(field_no)(times)(offset)(length2)(length1)(string1)
```

In the above commands, the track number can be either 1, 2, or 3, and the field number can be represented by the letters a through z. The terms “times,” “times1,” and “times2” define how many times a specified string is searched, from the start of data, on a specific track. Specifically, “times2” defines how many times a specified string is searched, from the rest of the data on a specific track, after the first string has been searched.

The offset of [string_match] is from the start of data for a particular track. The offset of [search_after] is from the start of the rest of the string after the specified string, after the specified number of times.

EXAMPLE:

An example of an entire character string, when defining two flexible fields, is:

```
/e/d/fs<space>c1a0101?<space>d2b0101=0101=
```

where “c” in the first definition means Search Before, “1” indicates Track 1, “a” means the first field of data on that track, “01” is the number of times the reader must search (that is, once), “01” is the length of the searched string (one character), and “?” the string searched.

and where “d” in the second definition means Search Between, “2” indicates Track 2, “b” means the second field of data on that track, “01” is the number of times the reader must search (that is, once), “01” is the length of first the searched string (one character), “=” the first string searched, “02” is the number of times the reader must search the second string (that is, two), “01” is the length of the second searched string (again, one character), and “=” the second string searched.

DATA EDITING SEND COMMAND

Use this command to send fields of data to the host in a user-defined order. When defining formulas for four different formats—credit card, State of California driver’s license (CDL), AAMVA, and custom—the entire character string is:

```
/e/d/ft[space]7a{field}{field}[space]7b{field}{field}[space]7c{field}{field}[space]  
7d{field}{field}[ENTER]
```

where “7a” is for credit card format, “7b” is for CA driver’s license, “7c” is for AAMVA, and “7d” is for a custom format. Fields within these formats can be defined by a combination of track number and field number (that is, Track 1, 2, or 3 followed by field a or b or c, etc.). An added field can be defined by an Added Field Tag of “0” (instead of a track number) followed by a field number (again a, or b, or c, etc.).

EXAMPLE:

Define different “send” commands for three formats: credit card, CDL, and one custom format. The entire character string in this example is:

```
/e/d/ft<space>7a0e1b0c1c0c2d0b0c<space>7b1c0c1e0c1f0c3d3e0c2f0c<space>  
7d1a0c2b0c<ENTER>
```

where “7a” specifies the credit card format, and fields are arranged in the following order: “0e” meaning Added Field 5, “1b” meaning Track1/ Field 2, “0c” meaning Added Field 3, “1c” meaning Track 1/Field 3, “0c” meaning Added Field 3 again, “2d” meaning Track 2/Field 4, “0b” meaning Added Field 2, and “0c” meaning Added Field 3 for a third time.

If the added fields in this case are LINE FEED, SEMICOLON, CARRIAGE RETURN, IDT, and ITS, respectively, data will be output from the credit card as:

```
<ITS><B>  
<Account No.>  
<Expiration Date><;>
```

For the second card, “7b” specifies the CDL format, and fields are arranged in the following order: “1c” meaning Track 1/Field 3, “0c” meaning Added Field 3, “1e” meaning Track 1/Field 5, “0c” meaning Added Field 3 again, “1f” meaning Track 1/Field 6, “0c” meaning Added Field 3 a third time, “3d” meaning Track 3/Field 4, “3e” meaning Track 3/Field 5, “0c” meaning Added Field 3 a fourth time, “2f” meaning Track 2/Field 6, and “0c” meaning Added Field 3 for yet a fifth time.

If, as before, the added fields in this case are LINE FEED, SEMICOLON, CARRIAGE RETURN, IDT, and ITS, respectively, data will be output from the driver’s license as:

<Cardholder Name>
<Address>
<City>
<State><Zip Code>
<Birthday>

For the third card, “7d” specifies the custom format, and fields are arranged in the following order: “1a” meaning Track 1/Field 1, “0c” meaning Added Field 3, “2b” meaning Track 2/Field 2, and “0c” meaning Added Field 3 again.

If, as before, the added fields in this case are LINE FEED, SEMICOLON, CARRIAGE RETURN, IDT, and ITS, respectively, data will be output as:

<Track 1 data before the end sentinel>
<Track 2 data between the first equal sign and the second equal sign>

EXAMPLE:

To output the data on a driver’s license so that just the name, address, city, and zip are sent, follow these steps:

1. Clear all previous settings and return to the default settings by entering /e/d/fn<ENTER>.
2. Enable data editing by entering /e/d/fe<space>11<ENTER>. (The first “1” turns data editing on, while the second “1” tells the reader to send data even if it doesn’t match a preset formula).
3. Add three data fields which are not part of the card data by entering /e/d/fr<space>ITS<space>;<space>\cr<ENTER>. (The “ITS” and the “;” are characters to be inserted into the sent data, while the “\cr” is the function code for a CARRIAGE RETURN (as shown in the table in Appendix B).
4. Generate the formula for an AAMVA card by entering the data entry SEND command /e/d/ft<space>7c0a0c1d0c1e0c1c0b1b3d0c<ENTER>.

Insert the card and the output should be as follows:

ITS
<Cardholder Name>
<Address>
<City>; <State><Zip Code>

Section 9

OPERATION

Operating Procedure

The Spectrum Magnetic Stripe Insert Reader is easy to operate. Make sure the reader is properly connected and receiving sufficient power. The green LED will indicate that it is ready to read.

To read a magnetic stripe card, just follow these steps:

1. Insert the card, magnetic stripe down, into the reader as far as it will go. As soon as the magnetic stripe is detected by the reader, the green LED indicator will go off.
2. When the card has been inserted all the way, the green LED will light again.
3. Withdraw the card in one continuous motion. The green LED will go off again.
(The reader is capable of reading a magnetic stripe on both insertion and withdrawal, but a more reliable read is achieved on withdrawal.)
4. The LED will turn red (to indicate a bad read) or green (to indicate a good read).

Section 10

TROUBLESHOOTING

The ID TECH Insert Reader is easy to install and use. Most problems encountered can be attributed to:

- Incorrect Interface Cabling
- Incorrect Configuration Setup
- Bad Magnetic Stripe Quality

General Procedures

The troubleshooting process can be simplified by following these simple diagnostic procedures.

1. Once it has been confirmed that the unit is correctly powered, try inserting a card. The LED should respond as indicated in the previous section.
2. Once the unit has indicated a “good read,” then proceed to check the interface cabling connections.

Keyboard Interface Problems

Installation of the reader is generally trouble free, but there are some things to watch for if you are experiencing problems.

Do you have the proper cable?

Most modern computers and terminals use a PC/XT/AT-compatible keyboard. However, the cable connecting it to the keyboard port may have variations in either the signal pins or the connector itself. Make sure that you have the proper cable for the computer/terminal with which you are interfacing.

Does the keyboard work?

Since the data from the keyboard must pass through the reader, the cabling connections are correct if the keyboard is operational.

Can the host computer accept the data fast enough?

Some computers and terminals are expecting the data rate from the keyboard port to come in at a keystroke rate, and might not be able to accept it as fast as the reader is transmitting. Try adjusting the intercharacter delay to simulate the effects of keystroke delays.

Appendix A

DEFAULT SETTINGS

Default Settings and Definitions

ID TECH's Spectrum Insert Reader is shipped from the factory with the following default settings already programmed:

Magnetic Track Basic Data Format

Track 1: <SS1><T₁ Data><ES><ENTER>*

Track 2: <SS2><T₂ Data><ES><ENTER>*

Track 3: <SS3><T₃ Data><ES><ENTER>*

** Note: The <ENTER> commands shown above for Tracks 1 & 2 and Tracks 2 & 3 denote the default character for this position, the Track Separator position. The <ENTER> command shown for Track 3 denotes the default character for this position, the Terminator position.*

where:

SS1(start sentinel track 1) = %

SS2(start sentinel track 2) = ;

SS3(start sentinel track 3) = ; for ISO, ! for CDL, % for AAMVA

ES(end sentinel all tracks) = ?

The reader will send a BAD READ indicator in default mode. BAD READ indications for each track are:

Track 1: %E?

Track 2: ;E?

Track 3: +E?

Keyboard Wedge Communication Default Settings

Terminal type: IBM PC/AT

Intercharacter delay: 2 ms

Language: US English

DEFINITIONS FOR MAGNETIC STRIPES

Start or End Sentinel: Characters in encoding format which come before the first data character (start) and after the last data character (end), indicating the beginning and end, respectively, of data.

Track Separator: A designated character which separates data tracks.

Terminator: A designated character which comes at the end of the last track of data, to separate card reads.

LRC: Check character, following end sentinel.

CDL: Old California Drivers License format.

Default Settings Table

<u>Setting</u>	<u>Default</u>
Terminal Type	IBM-PC Compatible
Intercharacter Delay	2 ms
MSR Reading	Enable
Magnetic Decoding Method	Withdraw Only
Send Option	Send Start/End Sentinel
Terminator Setting	ENTER
Preamble Setting	None
Postamble Setting	None
Track Selected Setting	Any Track
Track Separator Setting	ENTER
Data Edit Setting	Disabled

Appendix B

FUNCTION CODES

Function Codes Table

Character	Keystroke	Character	Keystroke
F1	\f1	End	\end
F2	\f2	Right	\right
F3	\f3	Left	\left
F4	\f4	Up	\up
F5	\f5	Down	\down
F6	\f6	PgUp	\pgup
F7	\f7	PgDn	\pgdn
F8	\f8	Tab	\tab
F9	\f9	Back Tab	\btab
F10	\fa	Esc	\esc
F11	\fb	Enter	\enter
F12	\fc	CR	\cr
Ins	\ins	LF	\lf
Home	\home	Backspace	\bs

To input the “\” character, type it twice. For example, typing ab\\cd in a preamble string will result in ab\cd as the preamble.

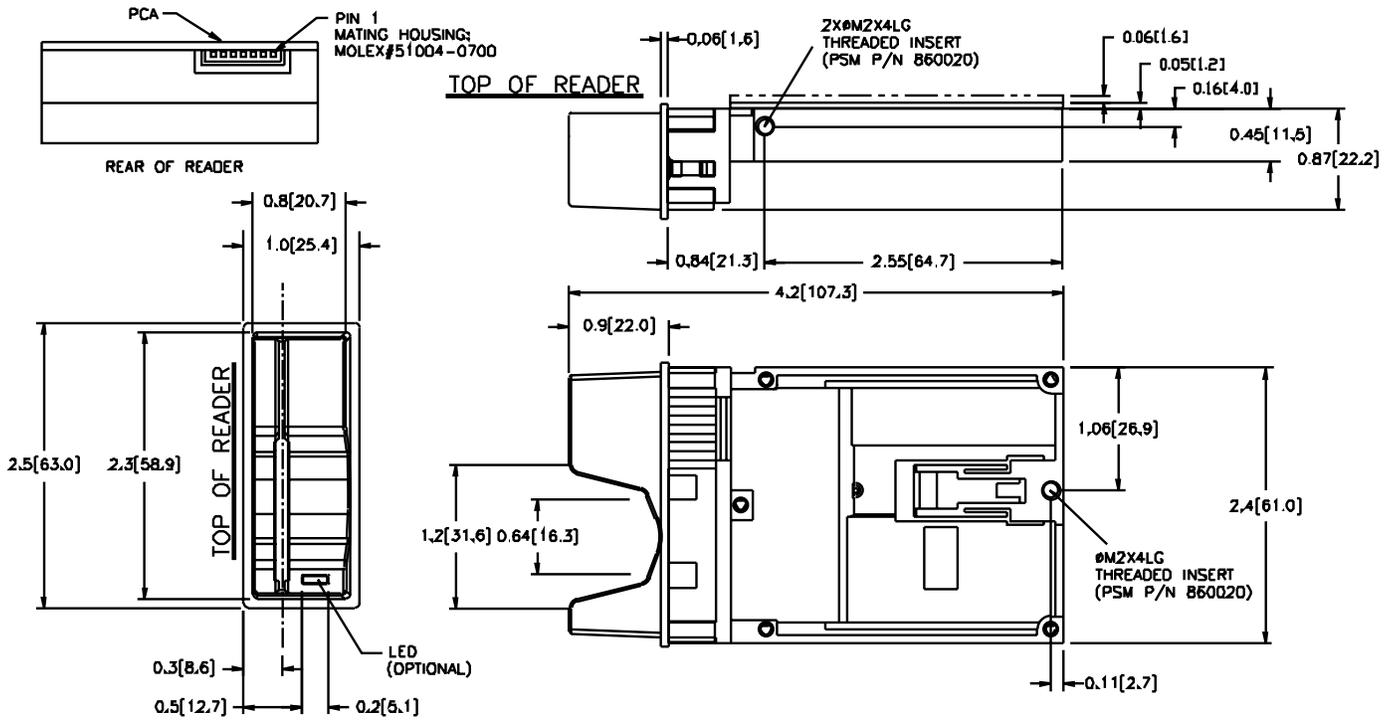
Appendix C

NON-PRINTABLE ASCII CHARACTERS

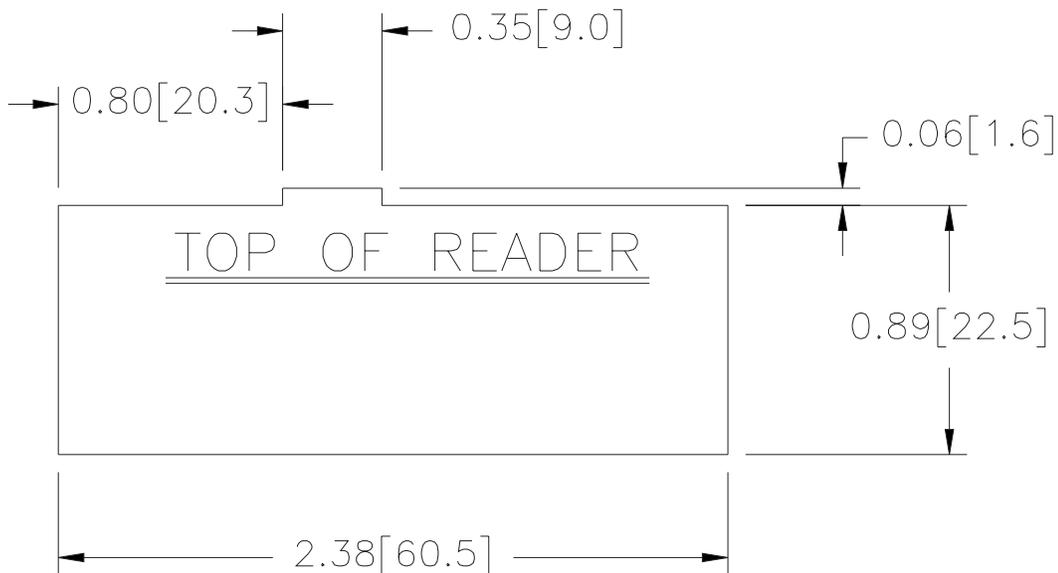
<u>Character</u>	<u>Keystroke</u>
NULL	\nul
SOH	\soh
STX	\stx
ETX	\etx
EOT	\eot
ENQ	\enq
ACK	\ack
BEL	\bel
BS	\bs
HT	\ht
LF	\lf
VT	\vt
FF	\ff
CR	\cr
SO	\so
SI	\si
DLE	\dle
DC1	\dc1
DC2	\dc2
DC3	\dc3
DC4	\dc4
NAK	\nak
SYN	\syn
ETB	\etb
CAN	\can
EM	\em
SUB	\sub
ESC	\esc
FS	\fs
GS	\gs
RS	\rs
US	\us

Appendix D

OUTLINE DRAWING OF READER WITH COMPACT BEZEL OPTION



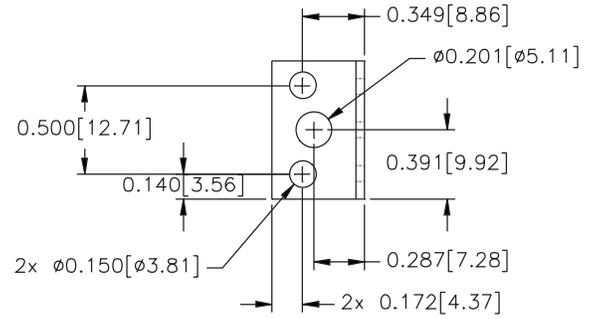
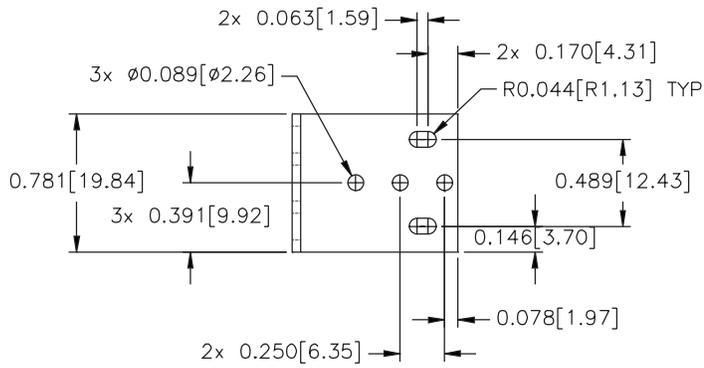
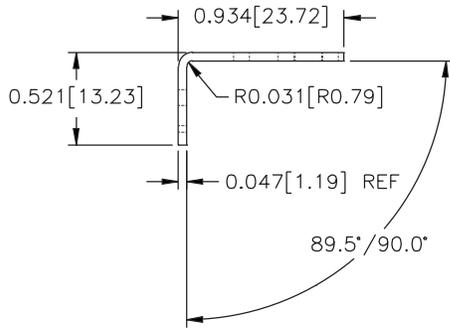
RECOMMENDED CUT-OUT FOR COMPACT BEZEL



RECOMMENDED CUTOUT

CUTOUT TOLERANCES: $\begin{matrix} 0.00 \\ -0.01 \end{matrix} \left[\begin{matrix} 0.00 \\ -0.25 \end{matrix} \right]$

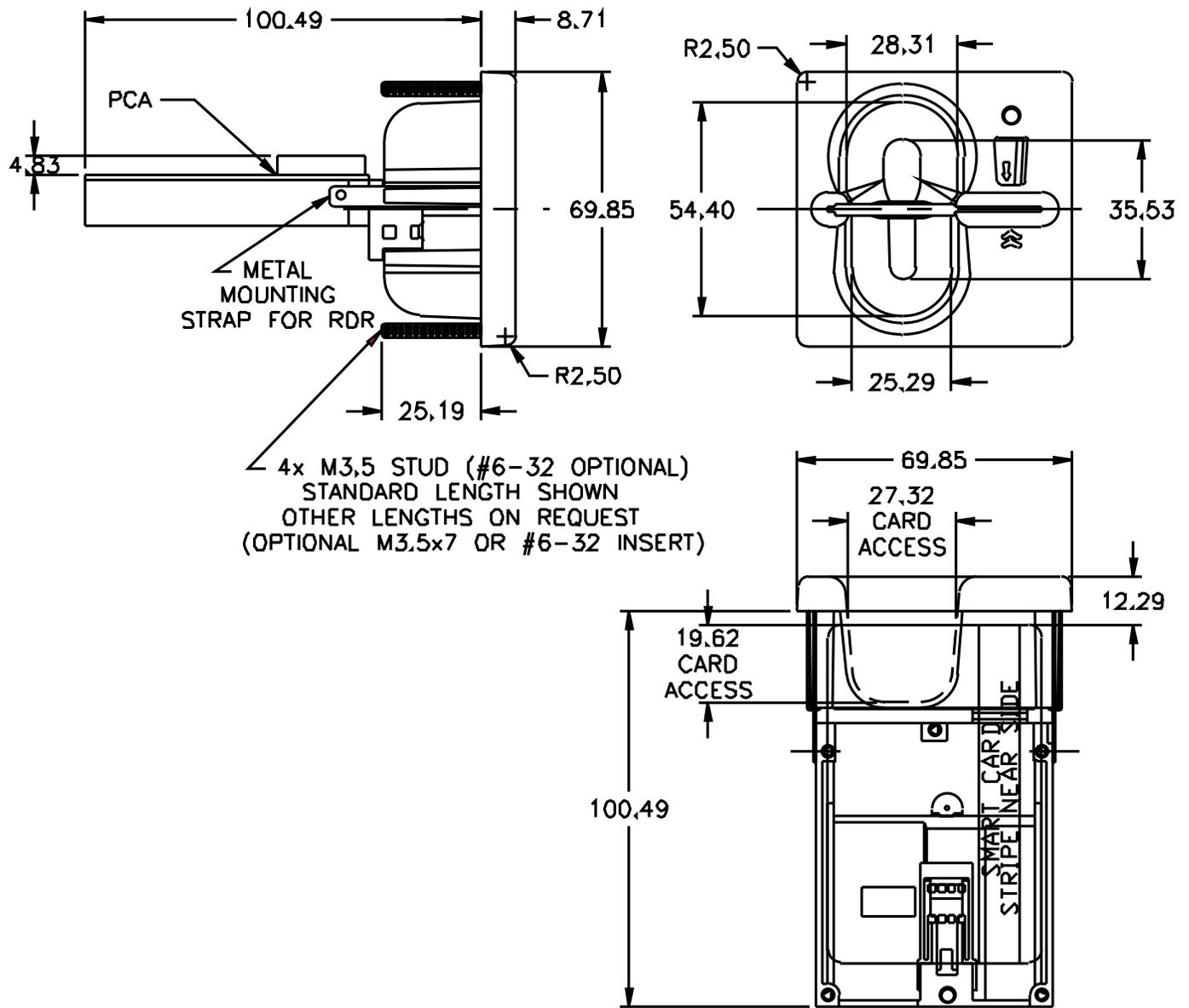
TYPICAL MOUNTING BRACKET FOR COMPACT BEZEL



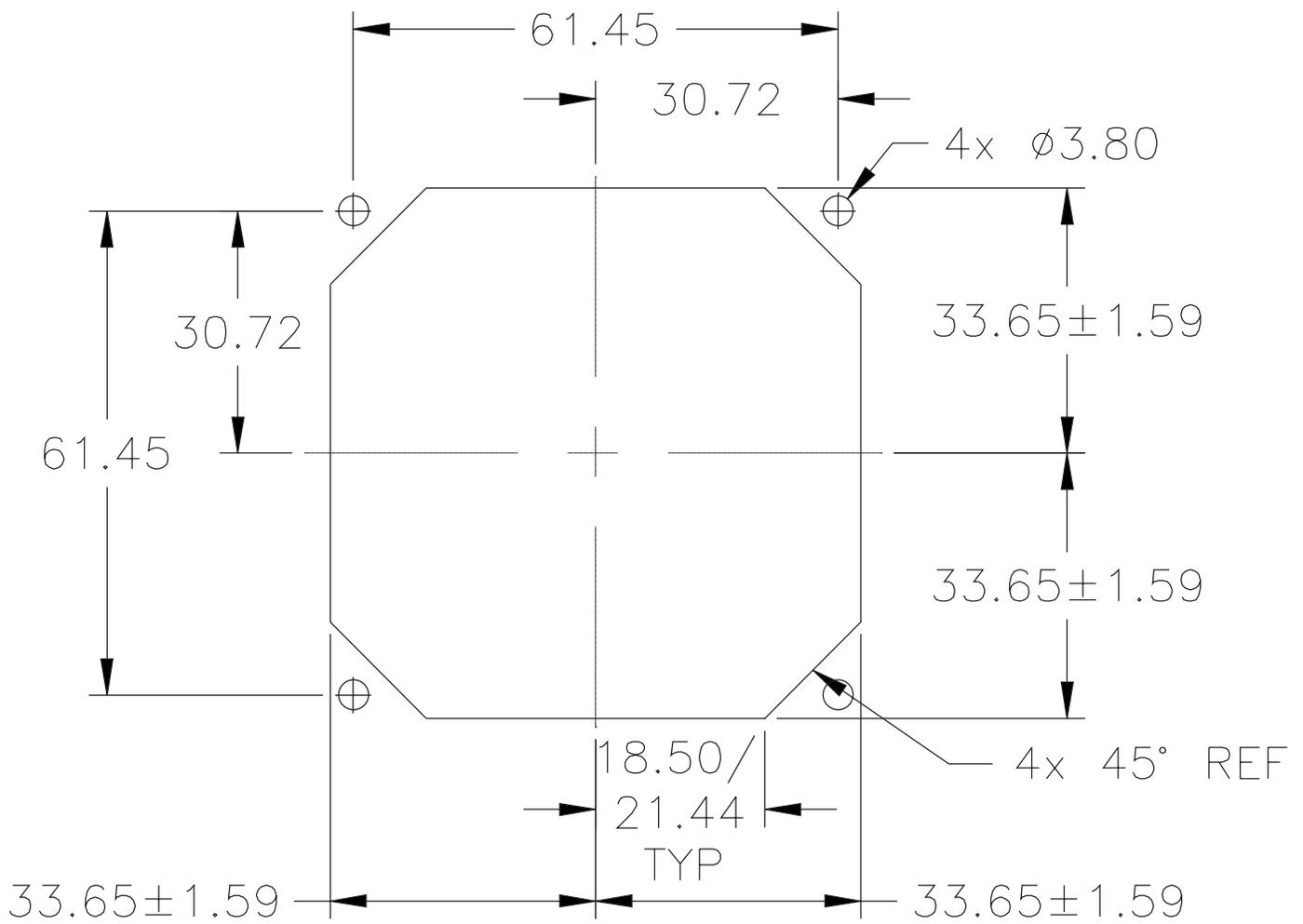
RECOMMENDED MTG BRKT (2 OR 3 PER UNIT)

MATERIAL: 18GA SS (FOR OUTDOOR INSTALLATIONS)
 18GA CRS FOR INDOORS

OUTLINE DRAWING OF READER WITH FLUSH-MOUNT BEZEL OPTION



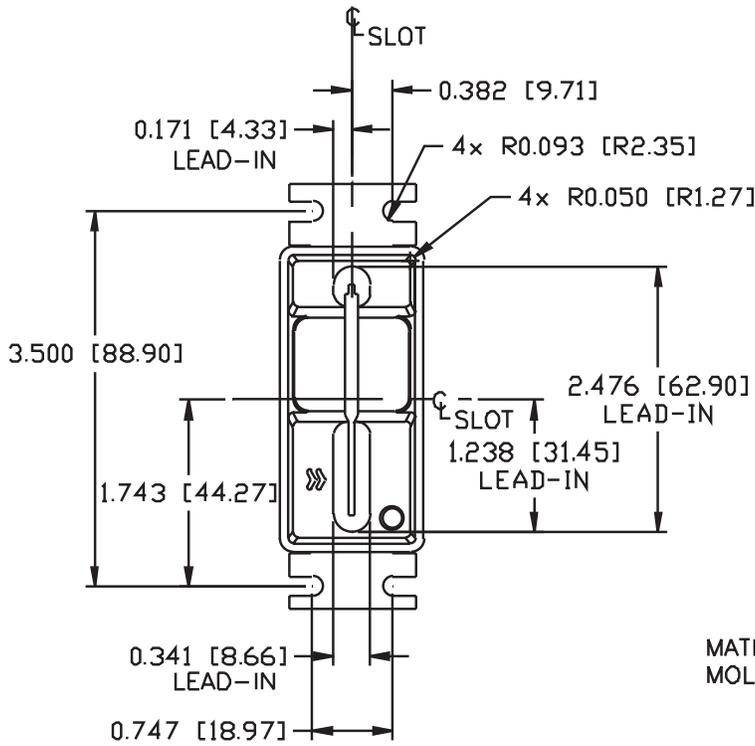
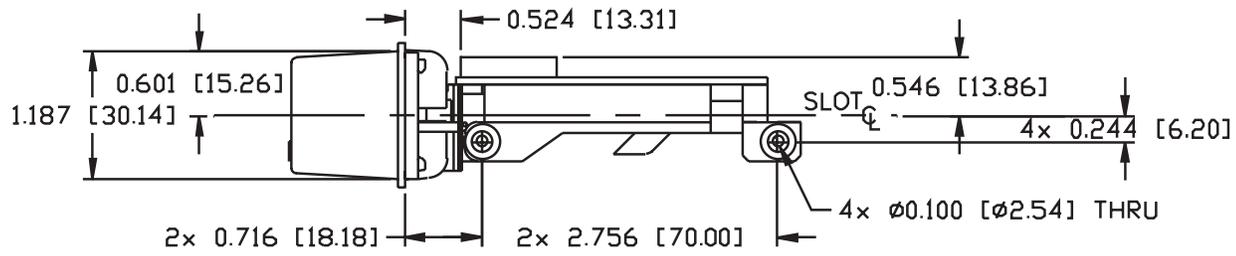
RECOMMENDED CUT-OUT FOR FLUSH-MOUNT BEZEL



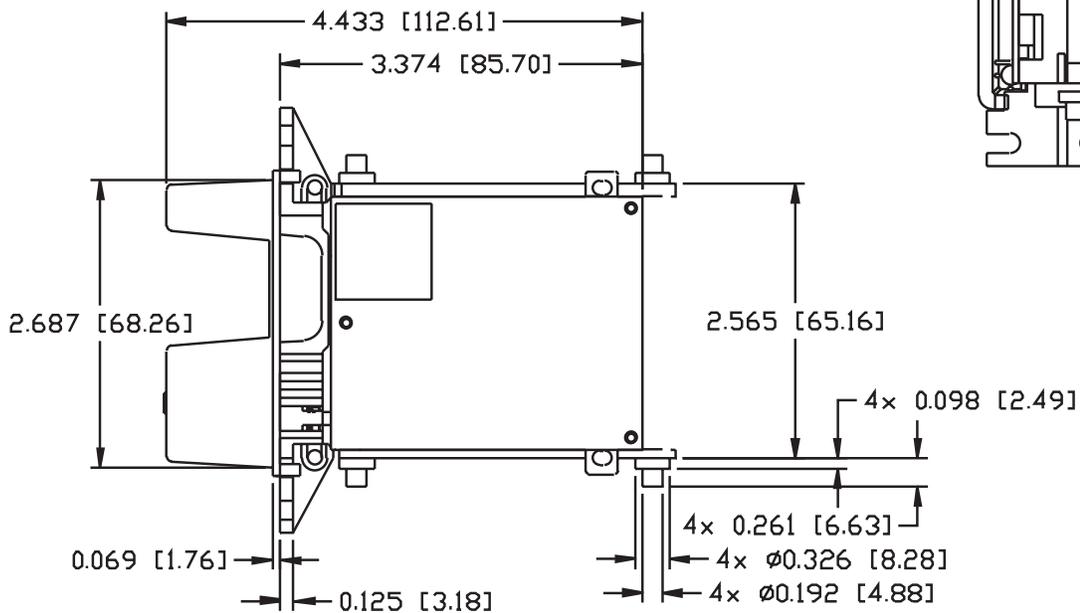
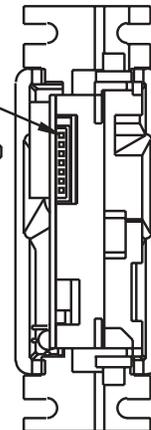
RECOMMENDED CUTOUT

(READER MOUNTS IN ANY ORIENTATION)

OUTLINE DRAWING OF STANDARD BEZEL AND COMPATIBLE CHASSIS



PIN #1
MATING HOUSING:
MOLEX#51004-0700



Appendix E

MAGNETIC STRIPE STANDARD DATA FORMATS

International Standards Organization (ISO) Credit Card Format

Track 1

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Format Code "B"	1
c	Account Number	13 or 16
d	Separator "^"	1
e	Cardholder Name	Variable
f	Separator "^"	1
g	Expiration Date	4
h	Optional Discretionary Data	Variable
i	End Sentinel	1
j	Linear Redundancy Check (LRC) Character	1

Track 2

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Account Number	13 or 16
c	Separator "="	1
d	Expiration Date "YYMM"	4
e	Optional Discretionary Data	Variable
f	End Sentinel	1
g	Linear Redundancy Check (LRC) Character	1

California Driver's License Format (Old Stlye)

Track 1

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Format Code Type: C = Commercial, S = Salesperson, D = Driver, I = Identification, R = Senior Citizen	1
c	Name Line 1	29
d	Name Line 2	29
e	Address Line 1	29
f	City	13
g	End Sentinel	1
h	Linear Redundancy Check (LRC) Character	1

Track 2

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Identification Number:	
	ANSI User ID	6
	DL/ID Alpha Translated	2
	7 position DL/ID number	7
	Check Digit	1
c	Field Separator “=”	1
d	Expiration Date	4
e	Field Separator “=”	1
f	Discretionary Data, 8 position Birthdate	8
g	End Sentinel	1
h	Linear Redundancy Check (LRC) Character	1

Track 3

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Class	4
c	Endorsements	4
d	State Code	2
e	Zip Code	9
f	Sex	1
g	Hair	3
h	Eyes	3
i	Height	3
j	Weight	3
k	Restrictions	10
l	Issue Date	8
m	Office	3
n	Employee ID	2
o	LRE ID	2
p	Fee Due Year	4
q	Address Line 2	29
r	Reserved Space	10
s	End Sentinel	1
t	Linear Redundancy Check (LRC) Character	1

AAMVA Driver's License Format

Track 1

Field ID Character	Contents	Length
a	Start Sentinel	1
b	State or Province	2
c	City	13
d	Name	35
e	Address	29
f	End Sentinel	1
g	Linear Redundancy Check (LRC) Character	1

Track 2

Field ID Character	Contents	Length
a	Start Sentinel	1
b	ANSI User Code	1
c	ANSI User ID	5
d	Jurisdiction ID/DL	14
e	Expiration Date	4
f	Birthdate	8
g	Remainder of Jurisdiction ID/DL	5
h	End Sentinel	1
i	Linear Redundancy Check (LRC) Character	1

Track 3

Field ID Character	Contents	Length
a	Start Sentinel	1
b	Template Version #	1
c	Security Version #	1
d	Postal Code	11
e	Class	2
f	Restrictions	10
g	Endorsements	4
h	Sex	1
i	Height	3
j	Weight	3
k	Hair Color	3
l	Eye Color	3
m	ID #	10
n	Reserved Space	16
o	Error Correction	6
p	Security	5
q	End Sentinel	1
r	Linear Redundancy Check (LRC) Character	1