MSR106

Magnetic Stripe Card Reader/Writer

(Low Coercivity)

Programmer's Manual

Document PM016-U
Revision A
27 Jun. 2001

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Section 1 Introduction

Thank you for purchasing the MSR 106 series Manual Swipe Magnetic Card Reader/Writer. It is ideal for access control, time keeping, ID recognition & credit verification and related applications. The MSR 106 is designed to offer a card reading/writing solution that will attractively complement an existing system.

This manual provides detailed information about the MSR 106. For ease of installation and use, we have addressed everything from its attractive features to its various configurations.

When designing the MSR 106 we selected what we felt were the most useful features and functions. If in some cases you may find that your specific needs differ from our existing products, we welcome your comments and suggestions. Custom-designed models are also available.

The MSR106 series has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This MSR106 series also had been tested and found to comply with the agency requirements of specification for CE mark Class B:

EN 50 082-1: 1992	EN 55 022: 1994 Class B
IEC 801-2: 1984	EN 61000-3-2: 1995 Class A
IEC 801-3: 1984	EN 61000-3-3: 1995
IEC 801-4: 1988	

➢ Accessories of MSR106

Make sure all the following accessories are contained in your package:

1. Power adapter, AC 120, or 230V in / DC 9V, 1.0 A out.
2. Utility disk (A/P S/W).
3. Magnetic test card.
4. Programmer's manual

➢ Warranty

One year after purchase of MSR106, any alteration and/or erasure or modification of the MSR106 will void the warranty.

Section 2 General description

This Manually Operated Card Reader/Writer can read up to 3 tracks of data or encode and verify up to 3 tracks of data simultaneously. It communicates with a host computer or other terminal using a standard RS-232 interface.

Section 3 Technical specifications

Card format	Compatible with ISO 7811		
Encoding/Decoding Density	Track 1 & Track 3 : 210BP		
	Track 2: 75 BPI (210BPI optional)		
Character capacity	Track 1: 7 bit × 79 characters.		
	Track 2: 5 bit × 40 characters.		
	Track 3: 5 bit × 107 characters.		
Card swipe speed	Reading 5-50 IPS, Writing 10-35 IPS		
Communication	RS232C, 9600 Baud, Non-parity, 8 bit per character		
Power supply	Operating voltage: 9VDC +/-10%		
Current consumption	Typical 150mA Max. 100mA plus for each writing track		
Media Coercivity	Read 300-4000 Oe. Mag. Card Write 300 Oe. Mag. Card		
Head Life	500,000 passes minimum for both read and write head		
Environment	Operating	-10ºC ~60ºC, 10~85% humidity	
	Shortage	-30ºC ~70ºC, 10~90% humidity	
Dimension	200.4L× 60.4W× 55.7H mm		
Configuration (Available Models)	Model	Read/Write track	Standard
	MSR106-1S	Track 2	ISO 7811
	MSR106-1P	Track 2	ISO 8484
	MSR106-2S	Track 2 & 3	ISO 7811
	MSR106-2P	Track 2 & 3	ISO 8484
	MSR106-3	Track 1,2 & 3	ISO 7811
	MSR106-5	Track 1 & 2	ISO 7811
Interface Connector	9 Pin D-Sub Female with Power Jack		
PIN Assignment	PIN 1	None	
	PIN 2	T X D (From MSR106)	
	PIN 3	R X D (To MSR106)	
	PIN 4	None	
	PIN 5	GROUND	
	PIN 6,7,8	None	
	PIN 9	None	

Section 4 Setup

1. Power off your PC system.

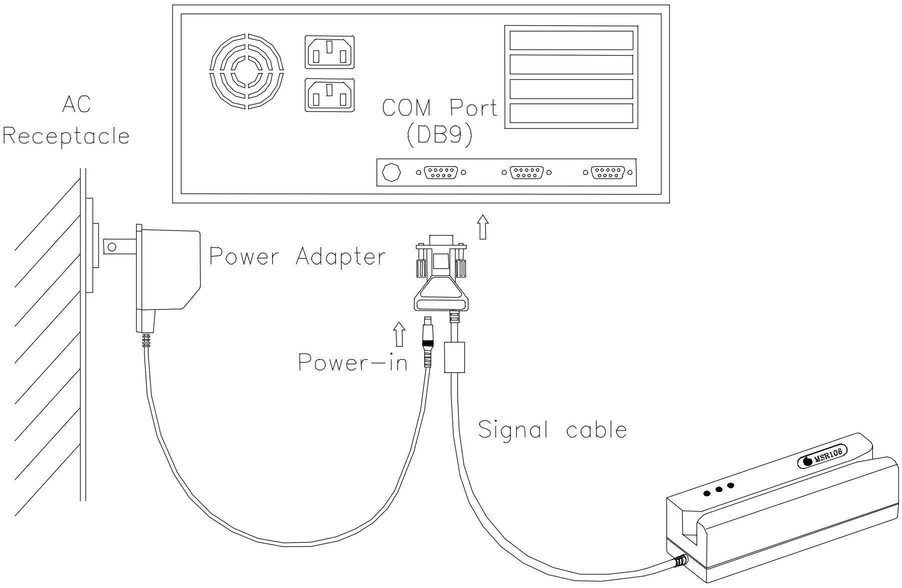
   Connect PC and MSR106 as below.

   Connect DB9 of signal cable to a free serial port and power in barrel plug into DB9 connector of signal cable.

   Plug in the power adapter to proper AC receptacle; see instruction on adapter of the proper voltage, 110V, 120V, 230V or 240V power in.

   See green LED light on MSR106 ON means power up ok.

   Switch power on PC system.



Section 5 Utilities test program

Every MSR106 comes with a utilities test program disk that includes a **Windows** version. This program is to verify and demonstrate the functionality of the MSR106. In some cases, it can be used as a card reading and writing program.

➢ System requirement

a. 80286 PC/AT compatibles or later model with color display.

b. Either the following operating systems: Windows 95, Windows 98, Windows 2000, or NT4.0.

c. 256K available conventional memory.

d. A free serial port (Com 1 or Com 2) with DB9 male connector.

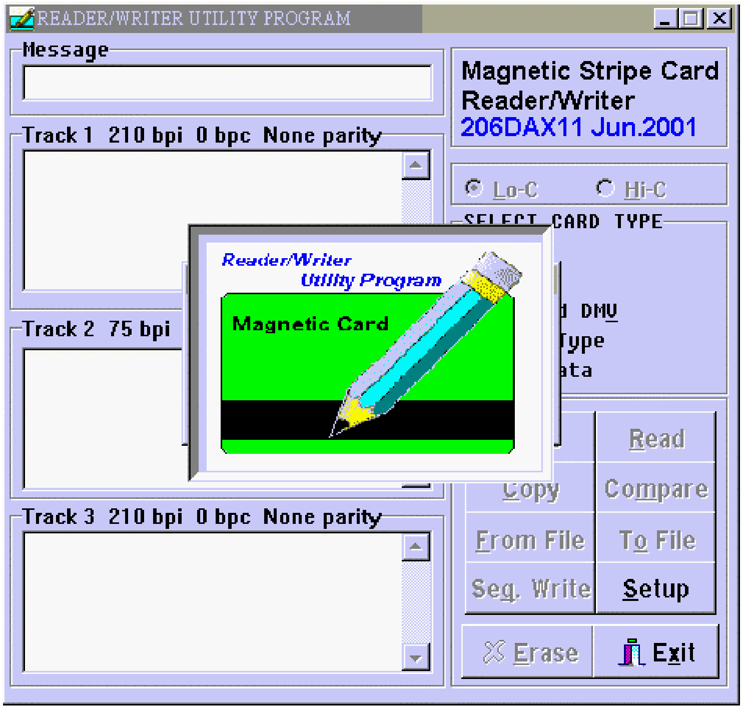
➢ Test program installation

User shall follow the steps below in order to install test program

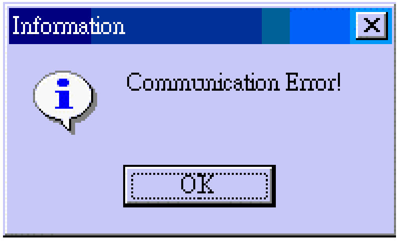
A. Connect MSR106 to RS232 port, and power on it.

B. Insert utility diskette into floppy disk drive on PC, and execute the self-extracting file (e.g.: MSR106.exe)

C. Execute test program from the subdirectory of 'Demo AP' (e.g. 206DAX11.exe)

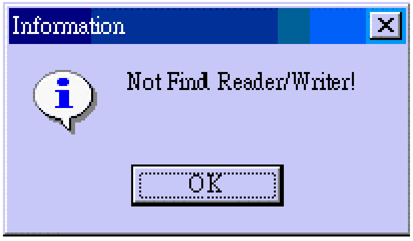


D. The test program will auto-detect communication port. If there is any errors occurred, it'll appear in the information dialog box after opening the program. User can close the AP by pressing OK button.

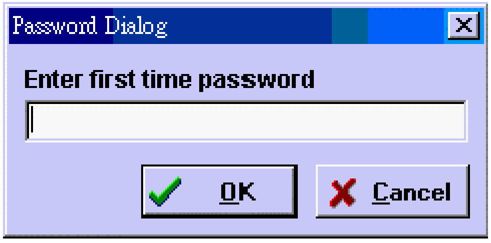

Information

Communication Error!

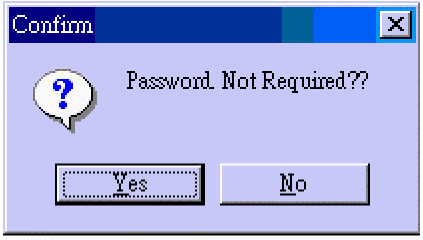
E. If "**Not Find Reader/Writer!**" appears in the information dialog box after opening the program, check to see that the DB9 connector is plugged into the correct COM port and the power cord/connector is also attached to DB9 thus lighting the green LED on the MSR206.



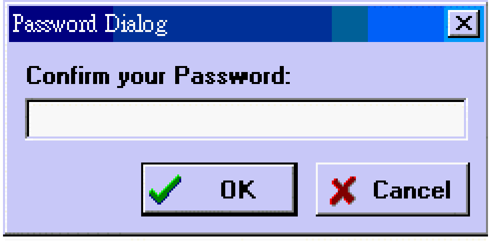
F. When the test program is first opened, a password dialog box will ask whether you wish a first time password. If yes, enter a password of one or more characters, maximum to 16 characters. And proceed to step H.



G. If a password is not required, press ESC and a dialog box will ask you to confirm that a password is not required. Click on Yes and proceed to demo program.



H. When entering a password for the first time, the system will require you to confirm the password, Click OK, after you reenter your password.

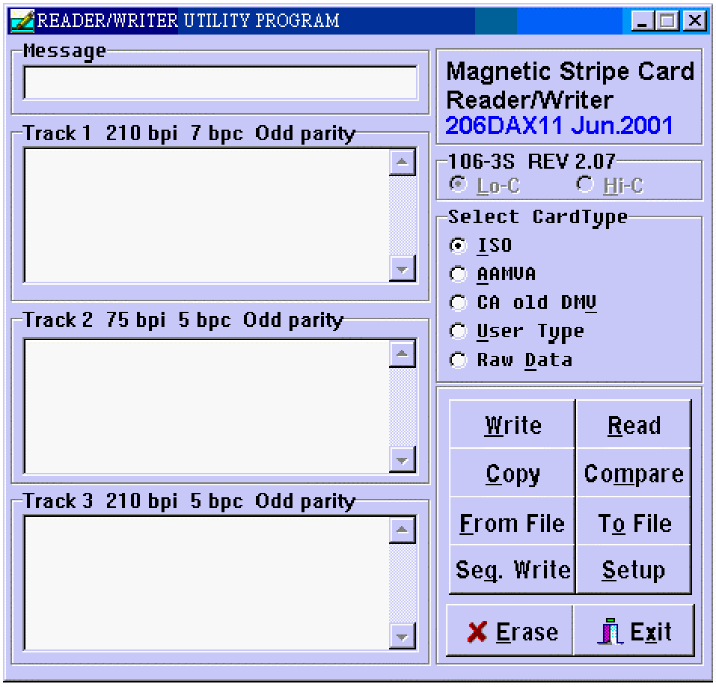


* Remember the password you entered, because if it is forgotten, you must re-install the Test Program.

* Remember, however; should you desire password protection in the future, you must re-install the program.

I. When the test program is opened, you'll see the main window of the READER/WRITER UTILITY PROGRAM.

From this main window you can activate all functions by clicking the appropriate buttons and following the on screen instructions.



READER/WRITER UTILITY PROGRAM

Message

Track 1 210 bpi 7 bpc Odd parity

Track 2 75 bpi 5 bpc Odd parity

Track 3 210 bpi 5 bpc Odd parity

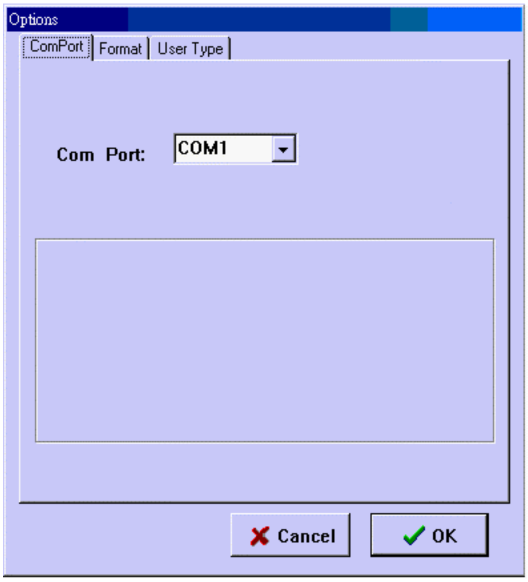
Magnetic Stripe Card Reader/Writer
206DAX11 Jun.2001

106-3S REV 2.07
● Lo-C ○ Hi-C

Select CardType
● ISO
○ AAMVA
○ CA old DMV
○ User Type
○ Raw Data

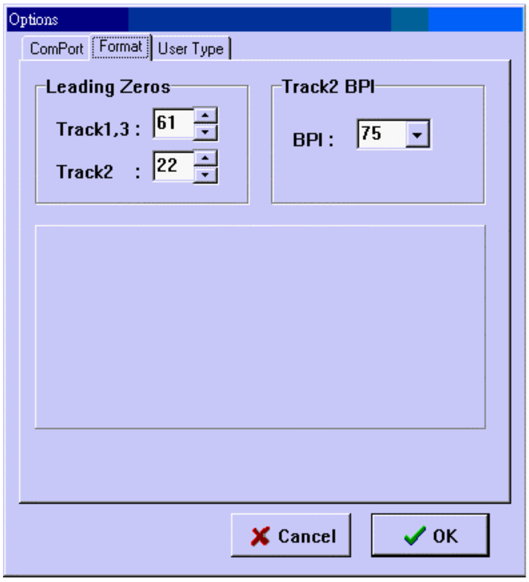
J. The test program will auto detect if a MSR206 is connected.

By clicking Setup from main window, you can change COM ports, Leading Zeros for all 3 tracks and BPI of track 2.



Options

Com Port: COM1

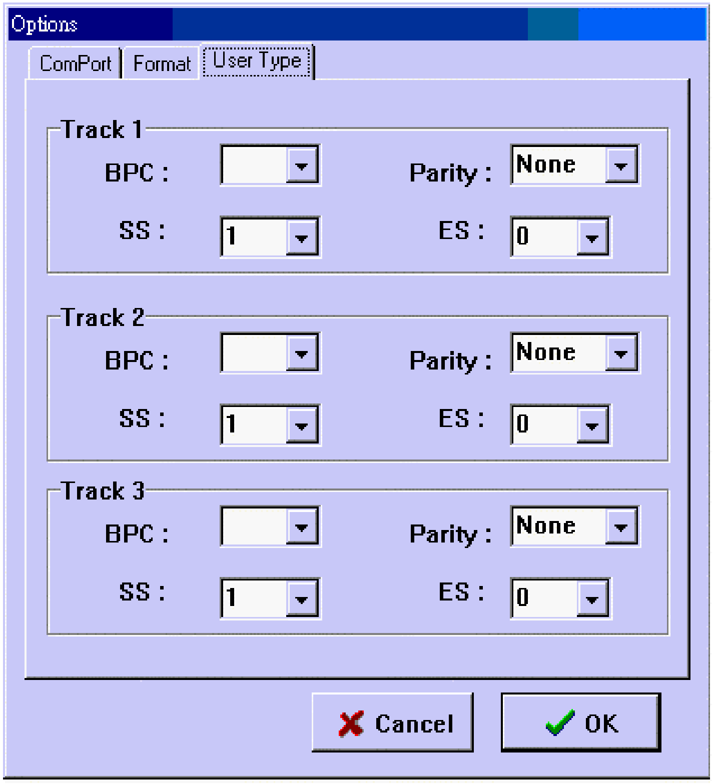


Options

Leading Zeros
Track1,3 : 61
Track2 : 22

Track2 BPI
BPI : 75

K. By choosing User Type from the main window, you can then define your user parameters by clicking Setup & selecting User Type.



Track 1
BPC :
Parity : None
SS : 1
ES : 0

Track 2
BPC :
Parity : None
SS : 1
ES : 0

Track 3
BPC :
Parity : None
SS : 1
ES : 0

Section 6 Command and response

This section gives detailed description of commands to the MSR106 and the corresponding response from MSR106.

Notional Conventions:

<ESC>	Control character named
[sname]	Special string named sname, meaning can be found in section 7. ie.[data block] [status byte] [select byte] etc.
X	Standard ANSI character

Command Description:

1. Command: **RESET**

   Command code: <ESC> a

   Hex code: 1B 61

   Response: none

   Description: This command reset the MSR106 to initial state.

2. Command: **READ**

   Command code: <ESC> r

   Hex code: 1B 72

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

   Description: This command request MSR106 to read a card swiped and respond with the data read.

3. Command: **WRITE**

   Command code: <ESC> w [data block]

   Hex code: 1B 77 [data block]

   Response: <ESC> [status byte]

   Description: This command request MSR106 to write the data block into the card swiped.

4. 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 MSR106 is up and good.

5. 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.

6. 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.

7. Command: **GREEN LED on**

   Command code: <ESC> <83>

   Hex code: 1B 83

   Response: none

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

8. 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.

9. 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.

10. 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 MSR106 is working properly
    MSR106 will not response until a card is sensed or receive a RESET command.

11. 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 MSR106 to perform a test on its on board RAM.

12. Command: Set leading zero

    Command code: <ESC> z [leading zero of track1/3][leading zero of track 2]

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

    Response: <ESC> 0 [1B] [30] set ok
    <ESC> A [1B] [41] set fail

    Description: This command is used to set how many leading zero will be write before the card data start, and the space should calculated as [leading zero] X25.4/ BPI (75or210) =mm

    Default setting of leading zero:

    S model =[3D][16]

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

    P model =[72][29]

13. Command: Check leading zero

Command code: <ESC> l

Hex code: 1B 6C

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

Description: This command is used to ask MSR106 the present setting number of leading zero.

14. 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> A [1B] [41] command select byte fail

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

*[select byte] format :

00000000: 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

15. Command: **Select BPI** (only for TK2)

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

16. Command: **Read raw data**

Command code: <ESC> m

Hex code: 1B 6D

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

Description: This command request MSR106 to read a card swipe but send without ASCII decode.

Refer to [Raw Data Block] & [Raw Data] format.

17. 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 MSR106 to write raw data block into the card swiped.

Refer to [Raw Data Block] & [Raw Data] format.

18. Command: **Get device model**

Command code: <ESC> t

Hex code: 1B 74

Response: <ESC> [Model] type

Description: This command is used to get the model number from MSR106.

There are 4 models: Model 1, 2, 3, 5 and two format standard :

P= ISO 8484 format

S= ISO 7811 format

Model	Track	P	S
MSR106-1	2	√	√
MSR106-2	2 & 3	√	√
MSR106-3	1,2 & 3	–	√
MSR106-5	1 & 2	–	√

19. Command: **Get firmware version**

Command code: <ESC> v

Hex code: <ESC> 76

Response: <ESC> [version]

Description: This command can get the firmware version of MSR106.

* [version] is a 8 bytes version number and format as (Rev.xx.xx) .

20. Command: **Set BPC**

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

Hex code: <ESC> 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.

Section 7 Data format

- [data block] format:

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

- [Card data] format:

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

Remarks:

For S model, none available and none data tracks will not output when swipe of card. [For example, when read a card with data encoded on track 2 only for MSR106-2S (track 2/3), it will transmit data like 1B 73 1B 02 [string] 1B 03 3F 1C].

For P model, none available and none data tracks will output with <ESC>+ when swipe of card. [For example, when read a bank passbook with data encoded on track 2 only for MSR106-2P (track 2/3) it will transmit data like 1B 73 1B 01 1B 2B 1B 02 [string] 1B 03 1B 2B 3F 1C].

- [status byte] format:

Status	description	HEX	ASCII
Ok	If read, write or command ok	30h	0
Error	Write or read error	31h	1
	Command format error	32h	2
	Invalid command	34h	4
	Invalid card swipe when in write mode	39h	9

Note: When [Status Byte] equal 39h means card moving error.

- [Raw Data Block] format:

	Start Field	R/W Data Field	Ending Field
Command code	<ESC> s	[Raw data]	?<FS>
Hex code	1 B 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]

The format code example below assumed to write raw data on track 1, 2 & 3 to be "11111", "22222" & "3333" respectively

[1B][6E][1B][73][[1B][73][1B][01][07][C5][68][34][1A][8D][7E][16]

[1B][02][05][4B][08][21][C4][B7][1B][03][05][6B][CE][39][E7][3F][3F][IC]

Remarks:

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

For S model, none exist and none data tracks (Lx=0) will not output data. Ex, when read a card (encoded data on track 2 only) on a MSR106-2S it will transmit data like 1B 73 1B 02 [L2][string] 1B 03 00 3F 1C

For P model, none exist and none data tracks will output with <ESC>+ Ex, when read a bank passbook (encoded data on track 2 only) on a MSR106-2P (track 2/3) it will output: 1B 73 1B 01 1B 2B 1B 02 [string] 1B 03 1B 2B 3F 1C

- [Raw Data] bit orientation:

Track 1 for 8 BPC

Read

${}^{1}B_0$	${}^{1}B_1$	${}^{1}B_2$	${}^{1}B_3$	${}^{1}B_4$	${}^{1}B_5$	${}^{1}B_6$	${}^{2}B_0$	${}^{2}B_1$	${}^{2}B_2$	${}^{2}B_3$	${}^{2}B_4$	${}^{2}B_5$	${}^{2}B_6$	${}^{3}B_0$	${}^{3}B_1$	${}^{3}B_2$	${}^{3}B_3$	${}^{3}B_4$	${}^{3}B_5$	${}^{3}B_6$	${}^{4}B_0$	${}^{4}B_1$	${}^{4}B_2$

Write

${}^{2}B_0$	${}^{1}B_6$	${}^{1}B_5$	${}^{1}B_4$	${}^{1}B_3$	${}^{1}B_2$	${}^{1}B_1$	${}^{1}B_0$	${}^{3}B_1$	${}^{3}B_0$	${}^{2}B_6$	${}^{2}B_5$	${}^{2}B_4$	${}^{2}B_3$	${}^{2}B_2$	${}^{2}B_1$	${}^{4}B_2$	${}^{4}B_1$	${}^{4}B_0$	${}^{3}B_6$	${}^{3}B_5$	${}^{3}B_4$	${}^{3}B_3$	${}^{3}B_2$

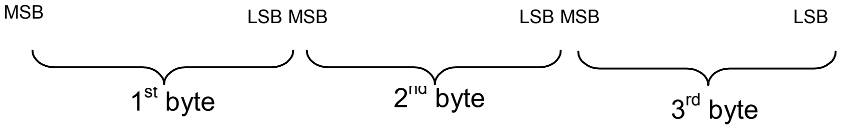
Track 2 & 3 for 8 BPC

Read

${}^{2}B_0$	${}^{1}B_6$	${}^{1}B_5$	${}^{1}B_4$	${}^{1}B_3$	${}^{1}B_2$	${}^{1}B_1$	${}^{1}B_0$	${}^{3}B_1$	${}^{3}B_0$	${}^{2}B_6$	${}^{2}B_5$	${}^{2}B_4$	${}^{2}B_3$	${}^{2}B_2$	${}^{2}B_1$	${}^{4}B_2$	${}^{4}B_1$	${}^{4}B_0$	${}^{3}B_6$	${}^{3}B_5$	${}^{3}B_4$	${}^{3}B_3$	${}^{3}B_2$

Write

${}^{2}B_2$	${}^{2}B_1$	${}^{2}B_0$	${}^{1}B_4$	${}^{1}B_3$	${}^{1}B_2$	${}^{1}B_1$	${}^{1}B_0$	${}^{4}B_0$	${}^{3}B_4$	${}^{3}B_3$	${}^{3}B_2$	${}^{3}B_1$	${}^{3}B_0$	${}^{2}B_4$	${}^{2}B_3$	${}^{5}B_3$	${}^{5}B_2$	${}^{5}B_1$	${}^{5}B_0$	${}^{4}B_4$	${}^{4}B_3$	${}^{4}B_2$	${}^{4}B_1$



Refer to 9.ADDENDUM

Section 8 Communication sequence

The examples below assumes data on track1, 2 & 3 to be 01, 23, 45 respectively

➢ 8.1 MSR 106 INITIALIZATION

HOST	Direction	MSR106
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)

➢ 8.2 WRITE DATA TO MSR 106

HOST	Direction	MSR106
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]-[3F] if error

➢ 8.3 READ DATA TO MSR106

HOST	**Direction**	**MSR106**
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][3B][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]~[3F] if error

* [XX] = HEX Code XX

Section 9 Addendum

➢ (I) WRITE DATA TO MAGNETIC CARD

The WRITE command:

Command	WRITE
Command code	<ESC> w [*data block*]
Hex code	1B 77 [*data block*]
Response	<ESC> [status byte]
Description	This command request MSR106 to write the data block into the card swiped.

[*data block*] format:

	Start Field	R/W Data Field	Ending Field
Command code	<ESC>s	**[*card data*]**	?<FS>
HEX code	1B 73	**[*card data*]**	3F 1C

[*card data*] format:

	card data
Char. code	<ESC>[01] [string] <ESC> [02] [string] <ESC> [03] [string3]
HEX code	1B 01 [string1] 1B 02 [string2] 1B 03 [string3]

As an example the following information will be write to the card:

Track1: %ABC123?

Track2: ;12345?

Track3: ;12345?

HOST	DIRECTION	MSR106/MSR206
Command code: <esc>w<ESC>s<ESC>[01]ABC123<ESC>[02]12345<ESC>[03]12345?<FS> HEX code: [1B][77][1B][73][1B][01][41][42][43][31][32][33][1B][02][31][32][33][34][35][1B][03][31][32][33][34][35][3F][1C]	(write command) ----------→	
After send command to MSR106/206	Yellow LED on, then swipe card	write data to the magnetic card
	(status ACK)	(wait until swipe card) Command ACK: <ESC><status>

		HEX code: [1B][status]
		Status = [30] no error
		Status = [31] ~ [3F] if error

➢ (II) WRITE RAW DATA TO MAGNECTIC CARD

Converting Card Data Information to Hexadecimal for the Binary Write Function

Converting track one ASCll information into HEX

					0	1	2	3
				B5	0	0	1	1
	B3	B2	B1	B0	0	1	0	1
				B4				
0	0	0	0	0	(sp)	0	2	P
1	0	0	0	1	!	1	A	Q
2	0	0	1	0	“	2	B	R
3	0	0	1	1	#	3	C	S
4	0	1	0	0	$	4	D	T
5	0	1	0	1	%	5	E	U
6	0	1	1	0	&	6	F	V
7	0	1	1	1	‘	7	G	W
8	1	0	0	0	(	8	H	X
9	1	0	0	1	)	9	I	Y
A	1	0	1	0	*	:	J	Z
B	1	0	1	1	+	;	K	[
C	1	1	0	0	`	<	L	\
D	1	1	0	1	,	=	M	]
E	1	1	1	0	.	>	N	^
F	1	1	1	1	/	?	O	_

Converting track two and three ASCll information into HEX

Data	p	B3	B2	B1	B0
0	1	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	1	0	0	1	1
4	0	0	1	0	0
5	1	0	1	0	1
6	1	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0

9	1	1	0	0	1
:	1	1	0	1	0
: (*)	0	1	0	1	1
<	1	1	1	0	0
=	0	1	1	0	1
>	0	1	1	1	0
? (*)	1	1	1	1	1

As an example the following information will be write to the card:

Track1: %ABC123?

Track2: ;12345?

Track3: ;12345?

We use three different data bits to write raw data on the cards. The procedures are listed as below:

08, 08, 08 BITS

Set each track as 08.

First of all, set BPC command: 1B, 6F, 08, 08, 08

Present the information to the card encoder, as follows:

UIC	UIC
Start Field	1B6E1B73
Track1 header	1B01
Length	08
Track1 data	C5B07814954E3E2A
Track header	1B02
Length	05
Track2 data	2B8849EAAF
Track3 header	1B03
Length	05
Track3 data	2B8849EAAF
Ending Field	3F1C

Transfer the track1 data to HEX under 08 bits:

	B0	B1	B2	B3	B4	B5	P
%	1	0	1	0	0	0	1
A	1	0	0	0	0	1	1
B	0	1	0	0	0	1	1
C	1	1	0	0	0	1	0
1	1	0	0	0	1	0	1
2	0	1	0	0	1	0	1
3	1	1	0	0	1	0	0
?	1	1	1	1	1	0	0

LRC	0	1	0	1	0	1	0

Calculate Odd Parity (P column)

If there is an Even Number of 1's in the row of data for each character, put a 1 in the P column. Other wise, put a 0 in the column.

LRC: If there is an Even Number of 1's in the column of data for each character, put a 0 in the LRC row. Other wise, put a 0 in the row. The last LRC will be considered as the parity rule of this row.

B0	B1	B2	B3	B4	B5	B6	B7	
1	0	1	0	0	0	1	1	
0	0	0	0	1	1	0	1	
0	0	0	1	1	1	1	0	
0	0	1	0	1	0	0	0	
1	0	1	0	1	0	0	1	
0	1	1	1	0	0	1	0	
0	1	1	1	1	1	0	0	
0	1	0	1	0	1	0	0	

B7	B6	B5	B4	B3	B2	B1	B0	HEX
1	1	0	0	0	1	0	1	C5
1	0	1	1	0	0	0	0	B0
0	1	1	1	1	0	0	0	78
0	0	0	1	0	1	0	0	14
1	0	0	1	0	1	0	1	95
0	1	0	0	1	1	1	0	4E
0	0	1	1	1	1	1	0	3E
0	0	1	0	1	0	1	0	2A

Transfer track 2 (track 3) data to HEX under 08 bits:

	B0	B1	B2	B3	P
;	1	1	0	1	0
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	1
4	0	0	1	0	0
5	1	0	1	0	1
?	1	1	1	1	1
LRC	1	0	1	0	1

B0	B1	B2	B3	B4	B5	B6	B7
1	1	0	1	0	1	0	0

0	0	0	1	0	0	0	1
1	0	0	1	0	0	1	0
0	1	0	1	0	1	1	1
1	1	1	1	0	1	0	1

B7	B6	B5	B4	B3	B2	B1	B0	HEX
0	0	1	0	1	0	1	1	2B
1	0	0	0	1	0	0	0	88
0	1	0	0	1	0	0	1	49
1	1	1	0	1	0	1	0	EA
1	0	1	0	1	1	1	1	AF

07, 05, 05 BITS

Set TK1, TK2 & TK3 as 07, 05, 05

1. 1b, 6F, 07, 05, 05

   First of all, set BPI command:

2. Present the information to the card encoder, as follows:

UIC	
Start Field	1B6E1B73
Track1 header	1B01
Length	09
Track1 data	456162235152131F2A
Track2 header	1B02
Length	08
Track2 data	0B01021304151F15
Track3 header	1B03
Length	08
Track3 data	0B01021304151F15
Ending Field	3F1C

Transfer the track1 data to HEX under 07 bits:

	B0	B1	B2	B3	B4	B5	P
%	1	0	1	0	0	0	1
A	1	0	0	0	0	1	1
B	0	1	0	0	0	1	1
C	1	1	0	0	0	1	0
1	1	0	0	0	1	0	1
2	0	1	0	0	1	0	1
3	1	1	0	0	1	0	0

?	1	1	1	1	1	0	0
LRC	0	1	0	1	0	1	0

Calculate Odd Parity (P column)

If there is an Even Number of 1’s in the row of data for each character, put a 1 in the P column. Other wise, put a 0 in the column.

	Add	P	B5	B4	B3	B2	B1	B0	HEX
%	0	1	0	0	0	1	0	1	45
A	0	1	1	0	0	0	0	1	61
B	0	1	1	0	0	0	1	0	62
C	0	0	1	0	0	0	1	1	23
1	0	1	0	1	0	0	0	1	51
2	0	1	0	1	0	0	1	0	52
3	0	0	0	1	0	0	1	1	13
?	0	0	0	1	1	1	1	1	1F
LRC	0	0	1	0	1	0	1	0	2A

HEX

	B3	B2	B1	B0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
A	1	0	1	0
B	1	0	1	1
C	1	1	0	0
D	1	1	0	1
E	1	1	1	0
F	1	1	1	1

Transfer track 2 (track 3) data to HEX under 05 bits:

	B0	B1	B2	B3	P
;	1	1	0	1	0
1	1	0	0	0	0
2	0	1	0	0	0

3	1	1	0	0	1
4	0	0	1	0	0
5	1	0	1	0	1
?	1	1	1	1	1
LRC	1	0	1	0	1

	Add 0	Add 0	Add 0	P	B3	B2	B1	B0	HEX
;	0	0	0	0	1	0	1	1	0B
1	0	0	0	0	0	0	0	1	01
2	0	0	0	0	0	0	1	0	02
3	0	0	0	1	0	0	1	1	13
4	0	0	0	0	0	1	0	0	04
5	0	0	0	1	0	1	0	1	15
?	0	0	0	1	1	1	1	1	1F
LRC	0	0	0	1	0	1	0	1	15

<u>06, 05, 06 BITS</u>

1. Set TK1, TK2 & TK3 as 06, 05, 06

   First of all, set BPI command:

   1b, 6F, 06, 05, 06

2. Present the information to the card encoder, as follows:

UIC	
Start Field	1B6E1B73
Track1 header	1B01
Length	09
Track1 data	052122231112131F2A
Track2 header	1B02
Length	08
Track2 data	0B01021304151F15
Track3 header	1B03
Length	08
Track3 data	0101020304051F1F
Ending Field	3F1C

Transfer track1 data to HEX under 06 bits:

	B0	B1	B2	B3	B4	B5
%	1	0	1	0	0	0
A	1	0	0	0	0	1
B	0	1	0	0	0	1

C	1	1	0	0	0	1
1	1	0	0	0	1	0
2	0	1	0	0	1	0
3	1	1	0	0	1	0
?	1	1	1	1	1	0
LRC	0	1	0	1	0	1

	Add 0	Add 0	B5	B4	B3	B2	B1	B0	HEX
%	0	0	0	0	0	1	0	1	05
A	0	0	1	0	0	0	0	1	21
B	0	0	1	0	0	0	1	0	22
C	0	0	1	0	0	0	1	1	23
1	0	0	0	1	0	0	0	1	11
2	0	0	0	1	0	0	1	0	12
3	0	0	0	1	0	0	1	1	13
?	0	0	0	1	1	1	1	1	1F
LRC	0	0	1	0	1	0	1	0	2A

Transfer track 2 data to HEX under 05 bits:

	B0	B1	B2	B3	P
;	1	1	0	1	0
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	1
4	0	0	1	0	0
5	1	0	1	0	1
?	1	1	1	1	1
LRC	1	0	1	0	1

	Add 0	Add 0	Add 0	P	B3	B2	B1	B0	HEX
;	0	0	0	0	1	0	1	1	0B
1	0	0	0	0	0	0	0	1	01
2	0	0	0	0	0	0	1	0	02
3	0	0	0	1	0	0	1	1	13
4	0	0	0	0	0	1	0	0	04
5	0	0	0	1	0	1	0	1	15
?	0	0	0	1	1	1	1	1	1F
LRC	0	0	0	1	0	1	0	1	15

Transfer track 3 data to HEX under 06 bits:

	B0	B1	B2	B3	B4	B5
!	1	0	0	0	0	0
1	1	0	0	0	0	0
2	0	1	0	0	0	0
3	1	1	0	0	0	0
4	0	0	1	0	0	0
5	1	0	1	0	0	0
?	1	1	1	1	1	0
LRC	1	1	1	1	1	0

	Add 0	Add 0	B5	B4	B3	B2	B1	B0	HEX
!	0	0	0	0	0	0	0	1	01
1	0	0	0	0	0	0	0	1	01
2	0	0	0	0	0	0	1	0	02
3	0	0	0	0	0	0	1	1	03
4	0	0	0	0	0	1	0	0	04
5	0	0	0	0	0	1	0	1	05
?	0	0	0	1	1	1	1	1	1F
LRC	0	0	0	1	1	1	1	1	1F