MSR112A
Programmer's Manual

Magnetic Stripe Card Reader

- RS-232 Interface -

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—Specification for FCC Class B
—Specification for UL/CUL
—Specification for CE Class B, CISPR 22 Class B
—Product Certificate by Taiwan BSMI (Bureau of Standards, Metrology and Inspection)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/ TV technician for help.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

WARNING

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

WARRANTY

This product is served under one-year warranty to the original purchaser. Within the warranty period, merchandise found to be defective would be repaired or replaced. This warranty applies to the products only under the normal use of the original purchaser, and in no circumstances covers incidental or consequential damages through consumers' misuse or modification of the products.

PREFACE

This manual provides detailed information relating to the overall operational, electrical, mechanical, environmental and functional aspects of the MSR112A. This document should be read and understood prior to initial operation of the product.

For ease of installation and programming use, we have addressed everything from its attractive features to its various configurations.
When designing the MSR112A, we selected what we feel are the most useful features and functions. If in some cases you find that your specific needs differ from our existing products, we welcome your comments and suggestions. Custom-designed models are also available.
If further questions do arise, please call for technical support, our FAE will assist you in any way we can.

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Section 1 General Description

This section presents general information about the basic characters of the MSR112A Series.

1.1 Features

The MSR112A provides the following features:

1	Compact size: 100L x 34W x 28H (mm)
2	Low power consumption
3	Single, dual, or triple track versions allow to reading ISO, AAMVA, DMV and JIS II cards.
4	No extra power supply is needed
5	Programmable data output

1.2 Application

This Magnetic Stripe Reader is design to read high or low coercive magnetic cards. It can decode/verify up to 3 tracks of data simultaneously. This product communicates with a host computer or other terminal using a standard RS-232 interface. Because of the transmitting protocol of MSR112A is more precise, it is suitable for using in financial industry.

1.3 Function

1.3.1 Self Test

Whenever the reader experiences a reset cycle, a self-test is performed. The reader will respond with ":" and the LED will turn green if the entire test is successful. Otherwise, no response will be generated.

1.3.2 Reading

The reader can read magnetic data form any available track encoded per ISO 7810, 7811, AAMVA, CA old DMV, JIS. The host can request the read data from the reader with commands.

For details and examples of commands and responses, refer to **section 4**.

1.3.3 Reading Customized Data

The interface can read customized encoded magnetic data. Data integrity is not verified when reading customized data. Customized data is not formatted into ASCII characters prior to transmission to the host.

1.3.4 Self – Arm Mode

The default reader configuration is the "Self-Arm Mode", which allows the magstripe functions to run automatically, reporting magstripe activity to the host without instruction from the host.

In the Self-Arm Mode, the reader also can accept commands from host. However, the reader can be configured to only "Host Polled Mode" by disabling Self-Arm Mode. The "Host Polled Mode" allows the magstripe functions to run by commands.

1.3.5 Transmitting Data Block of Tracks

Each track could divide into 1-3 channels (blocks) for transmission. For example, user could set "Channel A" of track1 format as: ISO standard card track1 15^{th}-30^{th} characters.

If the set data is different from the data after swiping, the reader will transmit completed data without limitation. The commands of setting channels are shown in **section 5**.

1.4 Part Number Description

The brief configuration of MSR112A part number are shown as below:

MSR112A-12 Dual track 1&2

MSR112A-23 Dual track 2&3

MSR112A-33 Triple track 1&2&3

Note:

Optional configuration is available.

Section 2 Configurations

This section shows the dimensions, accessories and setup for the MSR112A.

2.1 Dimensions of MSR112A

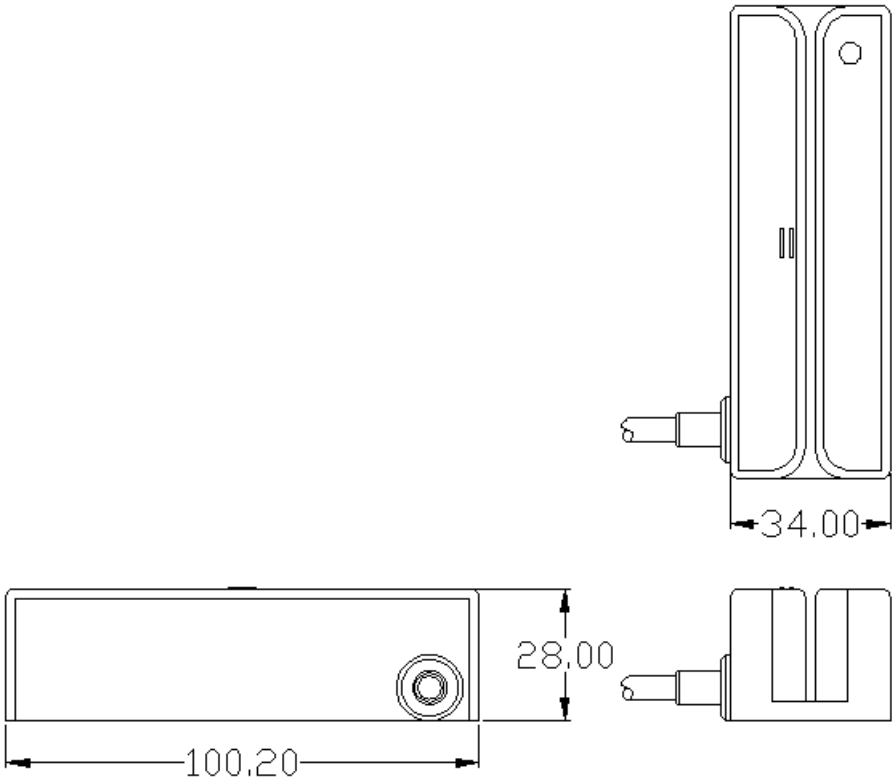

Figure 2-1 Dimensions of MSR112A

2.2 Accessories of MSR112A

The following accessories should be supplied along with MSR112A. Make sure all the following accessories are contained in your package.

Interface cable (DB9 male connector, 1.5M)
Programmer's manual or simple manual

2.3 Installation

Connect PC and MSR112A as below:

1. Power off your PC system.

2. Connect the DB9 cable to a free serial port.
3. Power on your PC system.

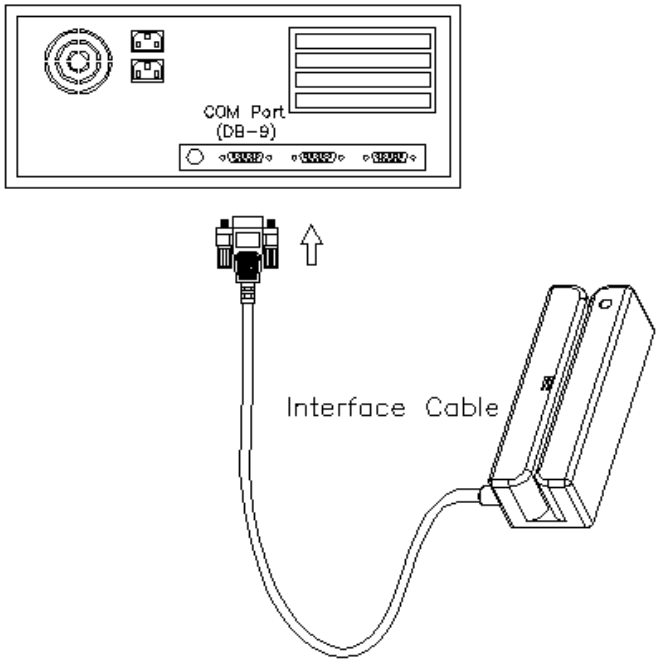

Figure 2-2 Installation

Section 3 Technical Specifications

3.1 Magnetic Card Specifications

3.1.1 Card Type

ISO standard card

CA old DMV

AAMVA

JIS

Read high or low coercivity magnetic stripes (300-4000oe)

Read triple track 7 BPC & 210 BPI cards

3.1.2 Thickness

0.76mm ± 0.08mm

3.1.3 Card Format

Track 1 & 3: 210 bpi

Track 2: 75/210 bpi

JIS II: 210 bpi

Note:

The card data output sequence for Model J2 is ISO track 2 prior to JIS II.

The card data output sequence for Model J3 is ISO track 1 & 2 prior to JIS II.

3.1.4 Card Operation Speed

Test Card	Speed (IPS)
ISO standard card	5-55
* Jitter	5-50
** Low Amplitude	5-50

Table 3-1 Card Operation Speed

Note:

*Jitter card: Reliable reading of magnetic stripes encoded with bit cell length variations within ±15% of normal as defined by ISO 7811.

**Low amplitude:

Reliable reading of magnetic stripes encoded at 60% or more of the encoding amplitude as defined by ISO 7811.

3.2 Mechanical Specifications

3.2.1 Body Material

ABS 94V-0

3.2.2 Cover and Cable Color

IBM 43-4208 pearl white

3.2.3 Dimension

Length: 100mm

Width: 34mm

Height: 28mm

3.2.4 Magnetic Head Life

500K Min., 1M optional

3.3 Electrical Specifications

3.3.1 Power Required

3.3VDC

3.3.2 Power Consumption

5.5mA in idle mode; 6.5mA in operating mode

3.3.3 Communication

Standard RS232 signal levels

3.4 Environmental Specifications

3.4.1 Temperature

Operating: -10-55°C

Storage: -30-70°C

3.4.2 Humidity

Operating: 15-90% (non condensing)

Storage: 10-90% (non condensing)

3.5 Pin Assignment

DB9	Signal	Direction	PCB-J1	Signal
4	DTR (+5V)	→ Data Terminal Ready	1[1]	Power input (+5V)
6	DSR	(Reserved)	2	DSR
8	CTS	(Reserved)	3	CTS
3	TxD	→ Serial data from host	4	RxD
7	RTS (+5V)	→ Request to Send	5[2]	Power input (+5V)
2	RxD	← Serial data to host	6	TxD
	Shield		7	Shield
5	GND		8	GND

Table 3-2 Pin Assignment

3.6 Communication

3.6.1 Synchronization

The interface receives and transmits serial asynchronous data at voltage levels compatible with the RS232 specification.

3.6.2 Signal

Logic 1 = -3 volts to –15 volts

Logic 0 = +3 volts to +15 volts

3.6.3 Baud Rate

9600 default (optional: 1200/2400/4800/19200)

[1] This pins provides power to MSR112A
[2] This pins provides power to MSR112A

3.6.4 Transmission Protocol

The user may select from three different protocols: Protocol 0, 1, and 2.

Upon reset, the reader sends the power-on response ":", depending upon the configuration setting. The reader then configures itself to the protocol of the first command from the host. From this point on, the protocol is unchangeable until a reset occurs.

Protocol 0

In Protocol 0, all characters are transmitted and received using exactly the characters listed in section 4. There are no headers and Block Check Characters (BCC). Protocol 0 presumes no transmission errors. If the host detects an error, it may request a retransmission.

Host Command	Reader Response	Comment
P		Ready to read
	^	Reader ACK

Table 3-3 Example for Protocol 0

Protocol 1

In Protocol 1, all messages are preceded by the ASCII character <STX> and terminated with the ASCII character <ETX>, followed by a one byte <BCC>. <BCC> is an XOR of the 7 data bits, excluding parity, of each character in the entire message, including <STX>.

Format:

<STX><MESSAGE><ETX><BCC>

where STX=02Hex and ETX=03Hex.

Host Command	Reader Response	Comment
02h 50h 03h 51h		Ready to read
	02h 5Eh 03h 5Fh	Reader ACK

Table 3-4 Example for Protocol 1

Protocol 2

In Protocol 2, all messages are preceded by the ASCII character <SOH>, followed by a one byte reader address, one byte character count and terminated with a one byte <BCC>.

The <BCC> is an XOR of the characters (8 bits) in the entire message, including <SOH>.

Format:
<SOH><ADDRESS><00Hex><COUNT><MESSAGE><BCC> or
<SOH><ADDRESS><00Hex><00Hex><MESSAGE><EOT><BCC>
where STX=02Hex and ETX=03Hex.

Host Command	Reader Response	Comment
01h 00h 00h 01h 50h 50h		Ready to read
	01h 00h 00h 01h 5Eh 5Eh	Reader ACK

Table 3-5 Example for Protocol 2

The <ADDRESS> field is for a multi-reader system. This function is not currently supported. The recommended value for this field is NULL (00Hex), however, any value will work.

If the value of <COUNT> fields are zero, an <EOT>, followed by the <BCC>, completes the message. The reader may, at its option, use NULL for COUNT when transmitting.

For Protocols 1 and 2, if the reader detects an error in an incoming transmission, it will respond with a "Communications Error" message. If the host detects a transmission error, it may request a retransmission. Both protocols enforce a 100mSec timeout between characters.

For all Protocols, the host may, at any time, stop/start the reader transmission by using software "handshake" (DC3/DC1).

3.6.5 Transmission Format

Data output format (Self-ARM mode)

Protocol code[3]	TK1 prefix	TK1 data[4]	TK1 suffix	EOT	BCC	
Protocol code	Separator	TK2 prefix	TK2 data	TK2 suffix	EOT	BCC
Protocol code	Separator	TK3 prefix	TK3 data	TK3 suffix	EOT	BCC

Read data for command

Read TK1 data for command

Protocol code	TK1 prefix	TK1 data	TK1 suffix	EOT	BCC

Read TK2 data for command

Protocol code	TK2 prefix	TK2 data	TK2 suffix	EOT	BCC

Read TK3 data for command

Protocol code	TK3 prefix	TK3 data	TK3 suffix	EOT	BCC

[3] The data fields for Protocol code, EOT, BCC are based on the protocol setting. For protocol 0, no data output is in these fields.

[4] TKx Data: SS (option) track data ES (option) LRC (option)

Section 4 Commands and Responses

This section describes the commands and responses available for the MSR112A series.

Each item includes the ASCII, hexadecimal codes and comments paragraph. The comments paragraph provides an explanation of the command. The letter 'x' indicates a variable and the letter 'h' is an abbreviation of 'hexadecimal'.

All readers are capable of communicating in 3 protocols: 0, 1 and 2. If protocol 0 is selected, all commands and responses are as listed in this section.

If protocol 1 is selected, the characters STX, ETX and BCC must be added to all transmissions. If protocol 2 is selected, the characters SOH, ADDRESS, COUNT and BCC must be added to all transmissions.

4.1 Command — Host to Reader

4.1.1 P (50h) — Ready to Read

Comments

1	Clear buffers
2	Transmit "ACK"
3	Expect card swipe
4	Transmit "ACK" after card swipe

After an "Ready to Read" command is received and acknowledged, the only valid commands that will be accepted for execution are: "Abort" <ESC>, "Status" <$>.

When the reader is ready for "Read on Insert", the "ACK" after card swipe will be transmitted after the rear sensor is activated. For read on reverse swipe, the "ACK" after card swipe will be transmitted after the front sensor is de-activated.

4.1.2 p (70h) — Ready to Read

Comments

Same as '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, and response ">" when no magstripe.

4.1.3 Q (51h) — Transmit Standard Data, Track 1

4.1.4 R (52h) — Transmit Standard Data, Track 2

4.1.5 S (53h) — Transmit Standard Data, Track 3

Comments

1	Process data in the read buffer for the specified track according to ISO, AAMVA and DVM format.
2	Transmit data in ASCII.
3	If error is detected, transmit proper error response "*". If no data transmit "+". (Refer to **Responses - Reader to Host** later in this section).

4.1.6 U (55h) — Transmit Customize Data, Track 1

4.1.7 V (56h) — Transmit Customize Data, Track 2

4.1.8 W (57h) — Transmit Customize Data, Track 3

Comments

1	To request customized data with no "nulls" allowed, use the two bytes command: "transmit customized data" command, followed by an ASCII number (3-8), which specifies the number of bits per customized character.
2	Process data to the read buffer for the specified track, based upon the "number of bits" character.

4.1.9 u (75h) — Transmit Reverse Customized Data, Track 1

4.1.10 v (76h) — Transmit Reverse Customized Data, Track 2

4.1.11 w (77h) — Transmit Reverse Customized Data, Track 3

Comments

1	To request customized data with no "nulls" allowed, use the two bytes command: "transmit customized data" command, followed by an ASCII number (3-8), which specifies the number of bits per customized character.
2	Process reversed-bit data (result of reverse swipe) to the read buffer for the specified track, based upon the "number of bits" character.

4.1.12 % (25h) — Retransmit

Comments

Request to retransmit the previous valid command except "P" and "p" commands.

4.1.13 # (23h) — Retransmit

Comments

Transmit a byte, which represent configuration of the interface as follows:

Bit 0	Track 1 read capability
Bit 1	Track 2 read capability
Bit 2	Track 3 read capability
Bit 3	0
Bit 4	0
Bit 5	1
Bit 6	1
Bit 7	Parity (protocol 0 and 1 only), 0 (protocol 2)

Table 4-1 Interface Configuration

Where "1" bit means "capable of…" and "0" bit means "not capable of… ".

4.1.14 L (4Ch) — Green LED On

4.1.15 l (6Ch) — Green LED On

Comments

1	Turn green/red LED on/off, as specified.
2	Transmit "ACK".

4.1.16 ((28h) — Green LED Flash

Comments

1	Begin flashing the specified LED on and off (approximately 250mSec On and 250mSec Off). Continues flashing until changed by another LED command or by continued interrupt mode operation.
2	Transmit "ACK".

4.1.17 DC3 (13h) — Pause Transmit

Comments

Stop transmitting data.

4.1.18 DC1 (11h) — Resume Transmit

Comments

Resume transmission of data.

4.1.19 T (54h) — Card Type Report

Comments

Transmit a byte, which represent the swiping card type.

1 (31h)	CA old DMV
2 (32h)	AAMVA
3 (33h)	ISO
4 (34h)	JIS
6 (36h)	Trade Show Card
0 (30h)	No data (sending T command just right after power on)

4.1.20 ESC (1Bh) — Abort

Comments

1	Abort command is issued after the first character of double character "read" command has been issued.
2	Abort command is issued after the reader has responded to command "P" or "p". (Reader would be waiting for card swipe to read).
3	No response to "Abort" command if the reader just power on and no command is received before.

4.1.21 9 (39h) — Version Report

Comments

Transmit a string that includes the version number (8-digit) and its date (mmddyy).

4.1.22 DEL (7Fh) — Warm Reset

Comments

Abort all current actions and cause the device to execute all initialization functions (device will respond exactly as it would for a "power on" cycle).

Note:

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

4.1.23 $ (24h) — Reader Status Request

Comments

Transmit one byte representing the reader status as follows:

Bit	0	1
0 & 1	00:Green LED off 01:Green LED on 10:Green LED flash	
2 & 3	(Reserved)	
4	(Reserved)	
5	No magstripe data	Magstripe data available
6	Not ready to read	Ready to read
7	Parity for protocols 0 &1	Not used for protocol 2

Table 4-2 Reader Status

4.1.24 ENQ (05h) — Connective Enquiry

Comments

Request the reader replies the <06h> if the connection is alive.

4.2 Response — Reader to Host

4.2.1 ^ (5Eh) — ACK

Comments

Last command has been completed without an error condition, and ready for the next command.

4.2.2 + (2Bh) — No Data

Comments

If host gets the response from reader, it may mean one of following:

1	In case of a "standard format" read command, this response "+" means "no start sentinel (SS) found".
2	In case of a "read error" command, this response "+" means "no history of a previous read error".

4.2.3 * (2Ah) — Error

Comments

If host gets the response from reader, it may mean one of following:

1	No end sentinel (ES).
2	Parity error.
3	LRC error.

4.2.4 ? (3Fh) — Communication Error

Comments

If host gets the response from reader, it may mean one of following:

1	Bad parity.
2	Wrong BCC.
3	Receive character time-out.
4	Message more than maximum character allowed.

4.2.5 ! (21h) — Invalid Command

Comments

Command issued by the host was not recognized or won't accept.

4.2.6 : (3Ah) — Power On Report

Comments

The interface has completed its initialization cycle.

4.2.7 ~ (7Eh) — Cannot Execute

Comments

Read or encode command cannot be executed due to lack of hardware in the device.

Section 5 Configuration Commands

This section describes the internal configuration commands available for the MSR112A.

Each item provides the ASCII, hexadecimal code and an explanation of the command. The letter "x" indicates a variable and the letter "h" is an abbreviation of "hexadecimal".

5.1 Command Form

<09Hex><ADDRESS><command counter Hex><COMMAND><BCC>

Note:
Command Length is in hex value.

5.1.1 BRx (42h 52h x) — Set Baud Rate

x is an ASCII number (0-4)

ASCII	Command Form (Hex)	Baud Rate
0	09h 00h 03h 42h 52h 30h 2Ah	1200
1	09h 00h 03h 42h 52h 31h 2Bh	2400
2	09h 00h 03h 42h 52h 32h 28h	4800
3	09h 00h 03h 42h 52h 33h 29h	9600 (default)
4	09h 00h 03h 42h 52h 34h 2Eh	19200

Table 5-1 Baud Rate Setting

5.1.2 PTx (50h 54h x) — Set Bit & Parity

x is an ASCII number (0-4)

ASCII	Command Form (Hex)	Bit & Parity
0	09h 00h 03h 50h 54h 30h 3Eh	7 EVEN
1	09h 00h 03h 50h 54h 31h 3Fh	7 ODD
2	09h 00h 03h 50h 54h 32h 3Ch	7 MARK (logic 1)
3	09h 00h 03h 50h 54h 33h 3Dh	7 SPACE (logic 0)
4	09h 00h 03h 50h 54h 34h 3Ah	8 NONE (default)

Table 5-2 Bit & Parity Setting

5.1.3 ESx (45h 53h x) — ES & SS Send Enable/Disable

x = E (45h enable) or D (44h disable)

Command Form (Hex)	ES & SS Sending
09h 00h 03h 45h 53h 44h 58h	Disable
09h 00h 03h 45h 53h 45h 59h	Enable (default)

Table 5-3 ES & SS Send Enable/Disable

5.1.4 LCx (4Ch 43h x) — LRC Send Enable/Disable

x = E (45h enable) or D (44h disable)

Command Form (Hex)	LRC Sending
09h 00h 03h 4Ch 43h 44h 41h	Disable (default)
09h 00h 03h 4Ch 43h 45h 40h	Enable

Table 5-4 LRC Send Enable/Disable

5.1.5 PCx (50h 43h x) — Set Protocol of Power On Report

x is an ASCII number (1-3)

ASCII	Command Form (Hex)	Protocol
1	09h 00h 03h 50h 43h 31h 28h	Protocol 0 (default)
2	09h 00h 03h 50h 43h 32h 2Bh	Protocol 1
3	09h 00h 03h 50h 43h 33h 2Ah	Protocol 2

Table 5-5 Protocol Setting

5.1.6 TKx (54h 4Bh x) — Set Transmitting Data Tracks

x is an ASCII number (1-7)

ASCII	Command Form (Hex)	Transmit Tracks
1	09h 00h 03h 54h 4Bh 31h 24h	Track 1
2	09h 00h 03h 54h 4Bh 32h 27h	Track 2
3	09h 00h 03h 54h 4Bh 33h 26h	Track 1 & 2
4	09h 00h 03h 54h 4Bh 34h 21h	Track 3
5	09h 00h 03h 54h 4Bh 35h 20h	Track 1 & 3
6	09h 00h 03h 54h 4Bh 36h 23h	Track 2 & 3
7	09h 00h 03h 54h 4Bh 37h 22h	Track 1, 2 & 3 (default)

Table 5-6 Transmit Tracks Setting

5.1.7 AAx (41h 41h x) — Set Address

1	x is a binary byte (00h-0Fh)
2	Set address 00h: <09h 00h 03h 41h 41h 00h 0Ah>

5.1.8 SAx (53h 41h x) — Self-Arm Mode Enable/Disable

x = E (45h enable) or D (44h disable)

Command Form (Hex)	Self-Arm Mode
09h 00h 03h 53h 41h 44h 5Ch	Disable
09h 00h 03h 53h 41h 45h 5Dh	Enable (default)

Table 5-7 Self-Arm Mode Setting

5.1.9 SPx (53h 50h x) — Set Track Separator

1	x = Hex Code
2	x = 00h means do not send separator code

Command Form (Hex)	Track Separator
09h 00h 03h 53h 50h 00h 09h	Disable (default)
09h 00h 03h 53h 50h 0Dh 04h	Enable

Table 5-8 Track Separator Setting

5.1.10 JHx (4Ah 48h x) — Set JIS Read Head

x = E (45h enable) or D (44h disable)

Command Form (Hex)	JIS Read Head
09h 00h 03h 4Ah 48h 44h 4Ch	Without (default)
09h 00h 03h 4Ah 48h 45h 4Dh	With

Table 5-9 JIS Read Head Setting

5.1.11 p1 data (70h 31h data) — Set Track 1 Prefix Code

1	Prefix can be set as 1-6 characters
2	If first character = 00h, prefix code of track 1 will not be send. It means this function is disabling.

Command Form (Hex)	Track 1 Prefix Code
09h 00h 03h 70h 31h 00h 4Bh	Disable (default)
Example of Track 1 Prefix Code Setting	
09h 00h 00h 70h 31h 0Ah 42h	One character: 0Ah
09h 00h 05h 70h 31h 54h 4Bh 01h 53h	Five characters: 70h 31h 54h 4Bh 01h 53h

Table 5-10 Set Track 1 Prefix Code

5.1.12 p2 data (70h 32h data) — Set Track 2 Prefix Code

1	Prefix can be set as 1-6 characters
2	If first character = 00h, prefix code of track 2 will not be send. It means this function is disabling.

Command Form (Hex)	Track 2 Prefix Code
09h 00h 03h 70h 32h 00h 48h	Disable (default)
Example of Track 2 Prefix Code Setting	
09h 00h 00h 70h 32h 0Bh 40h	One character: 0Bh
09h 00h 05h 70h 32h 54h 4Bh 02h 53h	Five characters: 70h 32h 54h 4Bh 02h

Table 5-11 Set Track 2 Prefix Code

5.1.13 p3 data (70h 33h data) — Set Track 3 Prefix Code

1	Prefix can be set as 1-6 characters
2	If first character = 00h, prefix code of track 3 will not be send. It means this function is disabling.

Command Form (Hex)	Track 3 Prefix Code
09h 00h 03h 70h 33h 00h 49h	Disable (default)
Example of Track 3 Prefix Code Setting	
09h 00h 00h 70h 33h 0Ch 46h	One character: 0Ch
09h 00h 05h 70h 33h 54h 4Bh 03h 53h	Five characters: 70h 33h 54h 4Bh 03h

Table 5-12 Set Track 3 Prefix Code

5.1.14 s1 data (73h 31h data) — Set Track 1 Suffix Code

1	Suffix can be set as 1-6 characters
2	If first character = 00h, suffix code of track 1 will not be send. It means this function is disabling.

Command Form (Hex)	Track 1 Suffix Code
09h 00h 03h 73h 31h 00h 48h	Disable (default)
Example of Track 1 Suffix Code Setting	
09h 00h 03h 73h 31h 06h 4Eh	One character: 06h

Table 5-13 Set Track 1 Suffix Code

5.1.15 s2 data (73h 32h data) — Set Track 2 Suffix Code

1	Suffix can be set as 1-6 characters
2	If first character = 00h, suffix code of track 2 will not be send. It means this function is disabling.

Command Form (Hex)	Track 2 Suffix Code
09h 00h 03h 73h 32h 00h 4Bh	Disable (default)
Example of Track 2 Suffix Code Setting	
09h 00h 03h 73h 32h 06h 4Dh	One character: 06h

Table 5-14 Set Track 2 Suffix Code

5.1.16 s3 data (73h 33h data) — Set Track 3 Suffix Code

1	Suffix can be set as 1-6 characters
2	If first character = 00h, suffix code of track 3 will not be send. It means this function is disabling.

Command Form (Hex)	Track 3 Suffix Code
09h 00h 03h 73h 33h 00h 4Ah	Disable (default)
Example of Track 3 Suffix Code Setting	
09h 00h 03h 73h 33h 06h 4Ch	One character: 06h

Table 5-15 Set Track 3 Suffix Code

5.1.17 K1A type start end (4Bh 31h 41h type start end) — Set Transmitting Data Block, Channel A of Track 1

Where **type** means card type, **start** means start address of transmitting data, and **end** means end address of transmitting data.

1 (31h)	CA old DMV
2 (32h)	AAMVA
3 (33h)	ISO
4 (34h)	JIS
6 (36h)	Trade Show
O (4Fh)	any type

Command Form (Hex)	Data Block Channel A, TK1
09h 00h 06h 4Bh 31h 41h 00h 00h 00h 34h	Disable (default)
Example of Track 1 Data Block Channel A Setting	
09h 00h 06h 4Bh 31h 41h 33h 06h 20h 21h	ISO 6-32

Table 5-16 Data Block Channel A, TK1

5.1.18 K1B type start end (4Bh 31h 42h type start end)
— Set Transmitting Data Block, Channel B of Track 1

Command Form (Hex)	Data Block Channel B, TK1
09h 00h 06h 4Bh 31h 42h 00h 00h 00h 37h	Disable (default)
Example of Track 1 Data Block Channel B Setting	
09h 00h 06h 4Bh 31h 42h 33h 26h 30h 12h	ISO 38-48

Table 5-17 Data Block Channel B, TK1

5.1.19 K1C type start end (4Bh 31h 43h type start end)
— Set Transmitting Data Block, Channel C of Track 1

Command Form (Hex)	Data Block Channel C, TK1
09h 00h 06h 4Bh 31h 43h 00h 00h 00h 36h	Disable (default)
Example of Track 1 Data Block Channel C Setting	
09h 00h 06h 4Bh 31h 43h 33h 36h 40h 73h	ISO 54-64

Table 5-18 Data Block Channel C, TK1

5.1.20 K2A type start end (4Bh 32h 41h type start end)
— Set Transmitting Data Block, Channel A of Track 2

Command Form (Hex)	Data Block Channel A, TK2
09h 00h 06h 4Bh 32h 41h 00h 00h 00h 37h	Disable (default)
Example of Track 2 Data Block Channel A Setting	
09h 00h 06h 4Bh 32h 41h 32h 0Ah 16h 19h	AAMVA 10-22

Table 5-19 Data Block Channel A, TK2

5.1.21 K2B type start end (4Bh 32h 42h type start end)

— Set Transmitting Data Block, Channel B of Track 2

Command Form (Hex)	Data Block Channel B, TK2
09h 00h 06h 4Bh 32h 42h 00h 00h 00h 34h	Disable (default)
Example of Track 2 Data Block Channel B Setting	
09h 00h 06h 4Bh 32h 42h 33h 0Ah 1Ah 55h	ISO 10-26

Table 5-20 Data Block Channel B, TK2

5.1.22 K2C type start end (4Bh 32h 43h type start end)

— Set Transmitting Data Block, Channel C of Track 2

Command Form (Hex)	Data Block Channel C, TK2
09h 00h 06h 4Bh 32h 43h 00h 00h 00h 35h	Disable (default)
Example of Track 2 Data Block Channel C Setting	
09h 00h 06h 4Bh 32h 43h 31h 06h 20h 22h	CA old DMV 06-32

Table 5-21 Data Block Channel C, TK2

5.1.23 K3A type start end (4Bh 33h 41h type start end)

— Set Transmitting Data Block, Channel A of Track 3

Command Form (Hex)	Data Block Channel A, TK3
09h 00h 06h 4Bh 33h 41h 00h 00h 00h 36h	Disable (default)
Example of Track 3 Data Block Channel A Setting	
09h 00h 06h 4Bh 33h 41h 4Fh 10h 30h 59h	Any type 16-49

Table 5-22 Data Block Channel A, TK3

5.1.24 K3B type start end (4Bh 33h 42h type start end)

— Set Transmitting Data Block, Channel B of Track 3

Command Form (Hex)	Data Block Channel B, TK3
09h 00h 06h 4Bh 33h 42h 00h 00h 00h 35h	Disable (default)
Example of Track 3 Data Block Channel B Setting	
09h 00h 06h 4Bh 33h 42h 33h 11h 34h 23h	ISO 17-52

Table 5-23 Data Block Channel B, TK3

5.1.25 K3C type start end (4Bh 33h 43h type start end) — Set Transmitting Data Block, Channel C of Track 3

Command Form (Hex)	Data Block Channel C, TK3
09h 00h 06h 4Bh 33h 43h 00h 00h 00h 34h	Disable (default)
Example of Track 3 Data Block Channel C Setting	
09h 00h 06h 4Bh 33h 43h 32h 06h 40h 40h	AAMVA 06-64

Table 5-24 Data Block Channel C, TK3

5.1.26 DF0 (44h 46h 00h) — Default Setting

Command Form: <09h 00h 03h 44h 46h 00h 08h>

Default setting is as below:

1	9600 baud rate	2	8 bits non parity
3	Send SS/ES	4	LRC not send
5	Self-Arm Mode enable	6	Without JIS read head
7	Power on in protocol 0	8	Transmit TK1, TK2 and TK3
9	Read address = 00h	10	MSR100 format disable

5.1.27 RE0 (52h 45h 00h) — Read EEPROM Data

Command Form: <09h 00h 03h 52h 45h 00h 1Dh>

1	The reader's setting status is recorded in EEPROM. 98 bytes total.
2	The symbol "*" in this paragraph indicates "do not care".

Byte1 and 2 in EEPROM are 00h, 13h separately. They are identical characters.

Byte 3 in EEPROM

Bit 7	SS&ES Status	Bit 6	LRC Status	Bit 5	Bit 4	Bit 3	Bit & Parity	Bit 2	Bit 1	Bit 0	Baud Rate Status
0	Not Send	0	Send	0	0	0	7 even	0	0	0	1200
1	Send	1	Not Send	0	0	1	7 odd	0	0	1	2400
*	*	*	*	0	1	0	7 mark	0	1	0	4800
*	*	*	*	0	1	1	7 space	0	1	1	9600
*	*	*	*	1	0	0	8 none	1	0	0	19200

Table 5-25 Byte 3 of EEPROM Status

Byte 4 in EEPROM

Bit 7	Bit 6	Protocol	Bit 5	CTS Status	Bit 4	RTS Status	Bit 3	MSR100 Output Mode	Bit 2	Bit 1	Bit 0	Transmitting Data Track
0	1	0	0	Ignore	0	Always low	0	Disable	*	*	0	Not Transmit TK1
1	0	1	1	Consider	1	Low when transmitting data	1	Enable	*	*	1	Transmit TK1
1	1	2	*	*	*	*	*	*	*	0	*	Not Transmit TK2
*	*	*	*	*	*	*	*	*	*	1	*	Transmit TK2
*	*	*	*	*	*	*	*	*	0	*	*	Not Transmit TK3
*	*	*	*	*	*	*	*	*	1	*	*	Transmit TK3

Table 5-26 Byte 4 of EEPROM Status

Note:

If never set "PC" command then bit 6 and bit 7 are 00, it means protocol 0.

Byte 5 in EEPROM

Bit 7	Bit 6	Bit 5	Bit 4	Address (Hex Code)	Bit 3	JIS Read Head	Bit 2	Self-Arm Mode	Bit 1	Bit 0	Buzzer
*	*	*	*	*	0	Without	0	Disable	*	0	Disable
*	*	*	*	*	1	With	1	Enable	*	1	Enable
*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*

Table 5-27 Byte 5 of EEPROM Status

Byte 6 in EEPROM: Track Separator Setting
Hex code "00h" means do not transmit this byte.

Byte 7-12 in EEPROM: Track 1 Prefix Code Setting
Byte 13-18 in EEPROM: Track 2 Prefix Code Setting
Byte 19-24 in EEPROM: Track 3 Prefix Code Setting
Byte 25-30 in EEPROM: Track 1 Suffix Code Setting
Byte 31-36 in EEPROM: Track 2 Suffix Code Setting
Byte 37-42 in EEPROM: Track 3 Suffix Code Setting
Note:
Each byte in byte 7-42 is Hex code. When one of the byte is "00h" the device do not transmit data from this byte to the end byte of the block.

Byte 43-45 in EEPROM: Channel A of Track 1 Setting
Byte 47-49 in EEPROM: Channel B of Track 1 Setting
Byte 51-53 in EEPROM: Channel C of Track 1 Setting
Byte 55-57 in EEPROM: Channel A of Track 2 Setting
Byte 59-61 in EEPROM: Channel B of Track 2 Setting
Byte 63-65 in EEPROM: Channel C of Track 2 Setting
Byte 67-69 in EEPROM: Channel A of Track 3 Setting
Byte 71-73 in EEPROM: Channel B of Track 3 Setting
Byte 75-77 in EEPROM: Channel C of Track 3 Setting
Byte 78-98 in EEPROM: Reserved.
Note:
Each byte in byte 43-77 is Hex code. The first byte of each block represents card type. The second byte of each block represents the start address of transmitting data. The third byte of each block represents the end address of transmitting data.

Note:

Byte 46, 50, 54, 58, 62, 66, 70, 74 are not used.

5.1.28 RE1 (52h 45h 31h) — Read Configuration Status

Command Form: <09h 00h 03h 52h 45h 31h 2Ch>

This is used to send byte 3-6 data of EEPROM to host.

5.1.29 RE2 (52h 45h 32h) — Read Prefix & Suffix Setting Status of Tracks

Command Form: <09h 00h 03h 52h 45h 32h 2Fh >

This is used to send byte 7-42 data of EEPROM to host.

5.1.30 RE3 (52h 45h 33h) — Read Channel Setting Status of Tracks

Command Form: <09h 00h 03h 52h 45h 33h 2Eh>

This is used to send byte 43-77 data of EEPROM to host.

Note:

In the case of RE1, RE2, RE3 command, the device transforms the EEPROM data from hexadecimal code into ASCII code, and send it out. For example, if the EEPROM data is "2Ah" the host will receive "32h 41h". Hence, executing these 3 commands, the host will serially transform each 2 bits of received data into hexadecimal code.

5.1.31 RE4 (52h 45h 34h) — Read Serial Number

Command Form: <09h 00h 03h 52h 45h 34h 29h>

This is used to send byte 100-107 data of EEPROM to host.

Note:

In the case of RE4 command, the device transforms the EEPROM data from hexadecimal code into ASCII code per byte, and sends it out.

5.1.32 Sdx (53h 64h x) — MSR100 Output Format Enable/Disable

x = E (45h enable) or D (44h disable)

Command Form (Hex)	MSR100 Output Format
09h 00h 03h 53h 64h 44h 79h	Disable (default)
09h 00h 03h 53h 64h 45h 78h	Enable

Table 5-28 MSR100 Output Format Setting

This command is only effective in self-arm mode and protocol 0.

When MSR100 output format is enabled, the output data format is as below:

Single Track	<STX><SS><SINGLE TRACK DATA><ES><LRC (optional)><ETX>
Dual Track	<STX><SS><FIRST TRACK DATA><ES><LRC (optional)><DLE> <STX><SS><SECOND TRACK DATA><ES><LRC (optional)><ETX>
Triple Track	<STX><SS><TRACK 1 DATA><ES><LRC (optional)><DLE> <STX><SS><TRACK 2 DATA><ES><LRC (optional)><DLE> <STX><SS><TRACK 3 DATA><ES><LRC (optional)><ETX>

Remarks:

SS = START SENTINEL

TRACK1= "%" (ISO, DMV & AAMVA)

TRACK2= ";" (ISO, DMV & AAMVA)

TRACK3= ";" (ISO) "%" (AAMVA) "!" (CA old DMV)

ES = END SENTINEL

TRACK1, 2 & 3= "?" (ISO, CA old DMV & AAMVA)

STX = START TEXT, ETX = END TEXT, DLE = DATA LINK ESCAPE, LRC = CHECKSUM (optional).

When MSR100 output format is disabled, the output data format restores to previous setting.

Note:

Only following commands are valid while MSR100 output format is enabled:

BRx, DF0, and LCx.

5.1.33 SN data (53h 4Eh x) — Write Serial Number

1	Serial number can be set as 0-7 characters
2	The character in hex is valid from 20 to 7E.

Command Form (Hex)	Serial Number Code
09h 00h 02h 53h 4Eh 16h	0000000 (7 zeros, default)
Example of Serial Number Setting	
09h 00h 03h 53h 4Eh 0Ah 1Dh	One character: 0Ah
09h 00h 09h 53h 4Eh 31h 32h 33h 34h 35h 36h 37h 2Dh	Seven characters: 31h 32h 33h 34h 35h 36h 37h

Table 5-29 Write Serial Number

Note:

Before sending SN command, if the LED is blinking, it may let LED keep either on or off still during the SN is in the process of writing.