MSR213V SERIES

Magnetic Stripe Card Reader

USB Interface

Programmer's Manual

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- Specifications for FCC Class B, CE Class B
- BSMI (Bureau of Standards, Metrology and Inspection, Taiwan)

NOTE: 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.

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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 MSR213V. 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 MSR213V, 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.

Table of Contents

Section 1. General Description

This section presents general information about the basic characters of the MSR213V.

Features

The MSR213V provides the following features:

1	Light weight: 120g
2	Compact size: 100L*34W*26H (mm)
3	Low power consumption
4	Read magnetic stripe cards that conform to ISO and JIS standard
5	Read high and low coercivity magnetic stripes
6	Bi-directional card swipe and read capability
7	Single, dual, or triple track versions allow for reading all types of magnetic cards, including credit cards and drivers licenses.
8	LED and Buzzer indicators indicate card status
9	Firmware Upgradeable

Application

This Magnetic Stripe Reader, MSR213V, is designed to read high or low coercive magnetic cards. It can simultaneously decode/verify up to 3 tracks of data. This product communicates with a host computer or other terminal using a standard USB (Virtual COM) interface. Because of the transmitting protocol of MSR213V is more precise, it is suitable for using in financial industry.

Function

Self Test

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

Note: If LED indicator is off after power on, the problem may caused by internal ROM failed or EEPROM failed, please contact your supplier for follow up service.

Transmitting Data Block of Tracks

Each track could be divided into 1 to 3 blocks for transmission and each block can be set as different card types and character numbers. If the set data is different from the data after swiping, the reader will transmit completed data without limitation. The configuration setting commands contain an explanation of setting blocks.

Part Number Description

The brief configurations of MSR213V part number are shown as follows:
MSR213V-12 Dual track 1&2
MSR213V-23 Dual track 2&3
MSR213V-33 Triple track 1&2&3

Note: Optional configuration is available.

Section 2. Configurations

This section shows the dimensions and setup for the MSR213V.

Dimensions of MSR213V

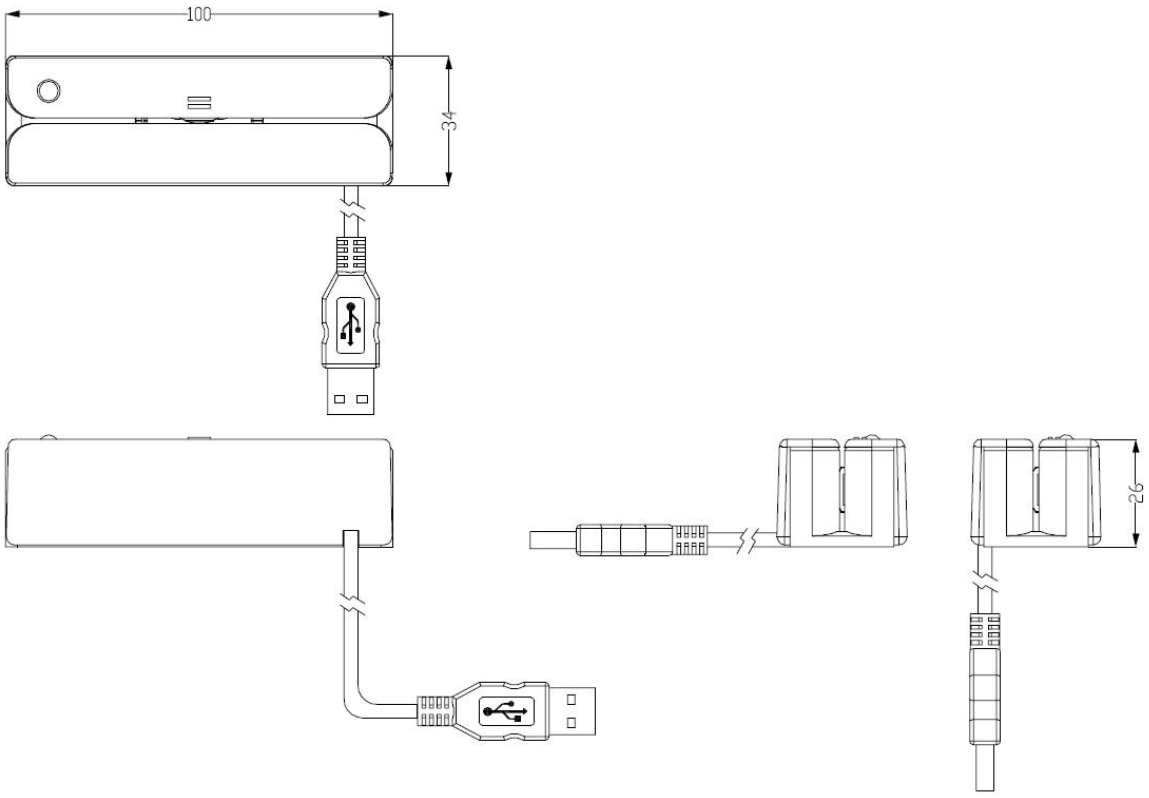

Figure 2-1. Dimensions of MSR213V

Installation

1. Insert USB connector to a free USB port on the PC system.
2. The first time Windows will prompt you to install a device driver for the device.
3. After the USB driver is installed, the LED of MSR213V will turn green indicating that the device is ready to use.

For MSR213V USB driver, please contact UIC local representative or sales office.

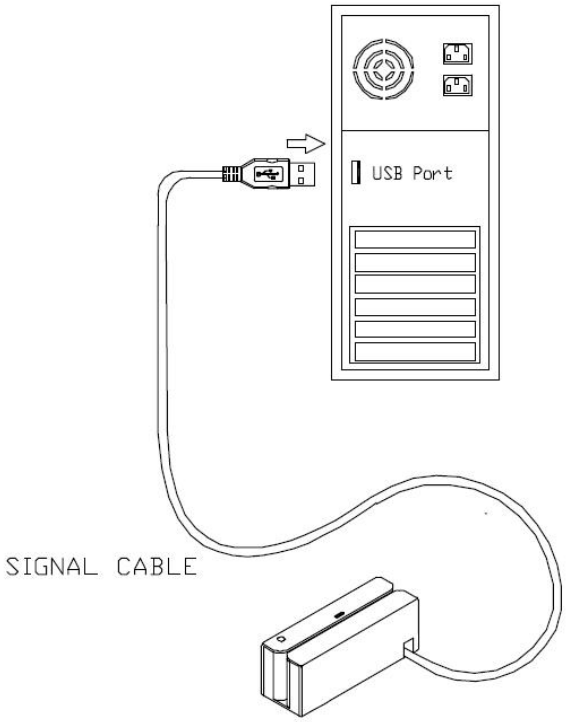

Figure 2-2. Installing MSR213V

Section 3. Technical Specifications

Magnetic Card Specifications

Card Type

ISO standard card (ISO 7810 and 7811)
CA old DMV
AAMVA
JIS II(if JIS read head present)
Read high or low coercivity magnetic stripes (300-4000oe)

Thickness

0.76mm ± 0.08mm

Card Format

Track 1 & 3: 210 bpi
Track 2: 75/210 bpi

Card Operation Speed

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

Notes

* 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.

Mechanical Specifications

Body Material
ABS 94V-0

Cover and Cable Color
IBM 43-4208 pearl white or black (optional)

Dimension
Length: 100mm
Width: 34mm
Height: 26mm

Weight
Approx. 120g

Interface Cable Length
1.7 m

Magnetic Head Life
Min. 1M swipes

Electrical Specifications

Power Required
+5VDC, +/-5%

Power Consumption
35mA Max in normal operation

Communication
Compatible with USB specification Revision 2.0

Ripple
50mVp-p Max

Dielectric Strength
250VDC for 1 minute

Insulation Resistance
10MΩ min. at 250VDC

Environmental Specifications

Temperature
Operating: -10 to 55°C
Storage: -40 to 70°C

Humidity
Operating: 5 to 95% RH
Storage: 5 to 95% RH

Section 4. Reader Operation

This section describes the LED indication and card reading.

LED Indication

The LED indicator will be either off, amber, red and green in the normal mode. When the device is not powered, the LED will be off. The LED will turn green and buzzer beeps one only if the device is attached and enumerated.

When a card is being swiped, the LED will turn off awhile or until the swipe is accomplished. If there is no error occurred, the LED will turn green and buzzer beeps once. If the LED turns amber and buzzer beeps twice, there is probability some data unrecognizable or it is not a triple track card. If no data is recognized, the LED will turn red and buzzer beeps three times. When the LED becomes green from red, the device will be ready to read the next card.

Card Reading

To exhibit the card reading capabilities, any serial communication program that can transmit and receive serial data such as "Microsoft HyperTerminal" can be used.

Section 5. USB Communication Specifications

This section describes the information for connecting to USB(Virtual COM) devices.

Identification Information

Vendor ID: 6352h
Product ID: 213Dh

USB Connector Termination Assignment

Contact Number	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	GND	Black
Shell	Shield	Drain Wire

Communication

The interface receives and transmits serial bit stream at voltage levels compatible with the USB specification.
Before using the reader, users shall install Virtual COM port driver. The driver allows the host to recognize and communicate with reader as a COM port regardless the under-layer hardware connection between the host and the reader. After driver installed and the USB cable is connected, the reader looks like a real serial port communicating with the host.

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 6. 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.

Example of Protocol 0

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

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>.

Protocol 1 format

Preceding Protocol Code	Data	Terminal Protocol Code
<STX>	<MESSAGE>	<ETX><BCC>

where STX=02Hex and ETX=03Hex.

Example of Protocol 1

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

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>.

Protocol 2 formats and users could choose one of the items.

Item	Preceding Protocol Code	Data	Terminal Protocol Code
1	<SOH><ADDRESS><00Hex><COUNT>	<MESSAGE>	<BCC>
2	<SOH><ADDRESS><00Hex><00Hex>	<MESSAGE>	<EOT><BCC>

where SOH=01Hex and EOT=04Hex.

The <ADDRESS> field shall be set into zero.

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.

Example of Protocol 2

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

	01h 00h 00h 01h 5Eh 5Eh	Reader ACK

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) or hardware "handshake"(if enabled in EEPROM configuration) by controlling the CTS line.

Transmission Format

Data output format in Self-ARM mode

PPC	TK1 prefix	TK1 Data	TK1 suffix	TPC	
PPC	Separator	TK2 prefix	TK2 Data	TK2 suffix	TPC
PPC	Separator	TK3 prefix	TK3 Data	TK3 suffix	TPC

Read data for command

Read tk1 data for command

PPC	TK1 prefix	TK1 Data	TK1 suffix	TPC

Read tk2 data for command

PPC	TK2 prefix	TK2 Data	TK2 suffix	TPC

Read tk3 data for command

PPC	TK3 prefix	TK3 Data	TK3 suffix	TPC

Notes:

PPC is preceding protocol code and **TPC** is terminal protocol code. These are only valid in Protocol 1 and 2.

The *prefix* and *suffix* of each track and *separator* are optional. These can be set or disabled by Configuration commands.

TKx Data: *SS*(optional) Track Data *ES*(optional) *LRC*(optional)

Section 6. Command and Response

This section describes the commands and responses available for the MSR213V series. Each item includes the ASCII, hexadecimal codes and comments paragraph. The comments paragraph provides an explanation of the command. 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, EOT(optional) and BCC must be added to all transmissions.

Command - Host to Reader

P (50h) – Ready to Read

Comments

1	Clear buffers
2	Transmit "ACK"
3	Expect for 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" <$>, LED control commands, and "DEL" (7Fh). All other commands will result in an "Invalid Command" response.

p (70h) – Ready to Read

Comments

This is similar to the 'P' command, except an extra response '(' is reported when a media is detected through the read head. A ')' response is reported when media detect goes inactive.

Q (51h) – Transmit Standard Data, Track 1

R (52h) – Transmit Standard Data, Track 2

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 **Response – Reader to Host** later in this section)

U (55h) – Transmit Customized Data, Track 1

V (56h) – Transmit Customized Data, Track 2

W (57h) – Transmit 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 data to the read buffer for the specified track, based upon the "number of bits" character.

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

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

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.

% (25h) – Retransmit

Comments

Request to retransmit the previous valid command except the "Ready to Read", "Pause Transmit", "Resume Transmit", "Warm Reset", and "Abort" commands.

Note: Z (or z) won't be retransmitted.

(23h) – Configuration Request

Comments

Transmit a byte, which represents 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	0

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

L (4Ch) – Green LED On

l (6Ch) – Green LED Off

M (4Dh) – Red LED On

m (6Dh) – Red LED Off

Comments

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

((28h) – Green LED Flash

) (29h) – Red 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".

Z (5Ah) – One Long Beep

z (7Ah) – One Short Beep

Comments

1	The buzzer beeps a long (approx. 0.5mSec)/short (approx. 0.2mSec) beep.
2	Transmit "ACK".

DC3 (13h) – Pause Transmit

Comments

Stop transmitting data.

DC1 (11h) – Resume Transmit

Comments

Resume transmission of data.

T (54h) – Card Type Report

Comments

Transmit a byte, which represents the swiping card type.

1(31H)	CA old DMV
2(32H)	AAMVA
3(33H)	ISO
4(34H)	JIS II
6(36H)	Trade Show Card
0(30H)	No data(sending 'T' command just right before any card swipe)

ESC (1Bh) – Abort

Comments

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

9 (39h) – Version Report

Comments

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

For example, '21V0161K 04-Dec-2009'

DEL (7Fh) – Warm Reset

Comments

Abort all current actions and cause the device to execute all initialization functions(the 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.

$ (24h) – Reader Status Request

Comments

Transmit one byte representing the reader status as follows:

Bit	0	1
1 & 0	00:Green LED off 01:Green LED on 10:Green LED flash	
3 & 2	00:Red LED off 01:Red LED on 10:Red LED flash	
4	Buzzer disable	Buzzer enable
5	No magstripe data	Magstripe data available
6	Not Ready to Read	Ready to Read
7	Always = 0	

Response - Reader to Host

^ (5Eh) – ACK

Comments

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

+ (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".

* (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

? (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(approximately 2mSec)
4	Message more than maximum character allowed

! (21h) – Invalid Command

Comments

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

: (3Ah) – Power On Report

Comments

The interface has completed its initialization cycle.

~ (7Eh) – Cannot Execute

Comments

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

Section 7. Configuration Commands

This section describes the internal configuration commands available for the MSR213V. 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".

NOTE: The hardware related configuration commands need to do warm reset before becoming effective.

COMMAND FORM:

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

RESPONSE:

<PPC><Data><TPC>

Where:

PPC is preceding protocol code and **TPC** is terminal protocol code. These are only valid in Protocol 1 and 2.

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)

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

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

x is an ASCII number (1-3)

x	Command Form (Hex)	Protocol Setting

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

BZx (42h 5Ah x) - Buzzer Enable/Disable

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

Note: No matter buzzer is enabled or not, the reader still can accept Z or z commands to let it beep.

Command Form (Hex)	Buzzer
09h 00h 03h 42h 5Ah 44h 56h	Disable
09h 00h 03h 42h 5Ah 45h 57h	Enable(default)

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

x is an ASCII number (0-7)

x	Command Form (Hex)	Transmit Track(s)
0	09h 00h 03h 54h 4Bh 30h 25h	Disable all
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)

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)

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	<0Dh>

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

p1 *data* (70h 31h *data*) - Set Track 1 Prefix Code

p2 *data* (70h 32h *data*) - Set Track 2 Prefix Code

p3 *data* (70h 33h *data*) - Set Track 3 Prefix Code

s1 *data* (73h 31h *data*) - Set Track 1 Suffix Code

s2 *data* (73h 32h *data*) - Set Track 2 Suffix Code

s3 *data* (73h 33h *data*) - Set Track 3 Suffix Code

1	Prefix/Suffix can be set as 1-6 characters
2	If first character = 00h, prefix/suffix code of track(s) will not be sent. It means this function is disabled.(default)

Command Form (Hex)	EXAMPLES
09h 00h 03h 70h 31h 00h 4Bh	Disable TK1 Prefix Code
09h 00h 03h 70h 31h 0Ah 41h	One character(0Ah) of TK1 Prefix Code

09h 00h 05h 70h 31h 54h 4Bh 41h 13h	Three characters(54h 4Bh 41h) of TK1 Prefix Code
09h 00h 08h 73h 33h 4Dh 53h 52h 32h 31h 33h 3Dh	Six characters('MSR213') of TK3 Suffix Code

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 II
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

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

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

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

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

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 1Eh 1Ch	CA old DMV 06-30

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 16-48

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

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

DF<00> (44h 46h 00h) - Default Setting

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

The major default settings are listed as follows:

1	9600 baud rate	2	8 bits non parity
3	Send SS/ES	4	LRC not send
5	CTS disable	6	RTS disable
7	Buzzer enable	8	Without JIS read head
9	Power on in protocol 0	10	Transmit TK1, TK2 and TK3
11	Self-Arm Mode enable	12	Reader address = 00h

RE<00> (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

Note: Bit 0-5 are reserved.

Byte 4 in EEPROM

Bit 7	Bit 6	Protocol	Bit 5	CTS Status	Bit 4	RTS Status	Bit 3	MSR100 output format	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 transmit data	1	Enable	*	*	1	Transmit Tk1
1	1	2	*	*	*	*	*	*	*	0	*	Not Transmit Tk2
*	*	*	*	*	*	*	*	*	*	1	*	Transmit Tk2
*	*	*	*	*	*	*	*	*	0	*	*	Not Transmit Tk3
*	*	*	*	*	*	*	*	*	1	*	*	Transmit Tk3

Note1: If never set 'PC' command then bit 6 and bit 7 are 00, it means protocol 0.

Note2: Bit 4 & 5 are reserved.

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
*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*

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 does 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
Note: Each byte in byte 43-78 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: Bytes 46, 50, 54, 58, 62, 66, 70, 74, and 78 are not used.

Byte 79-84 in EEPROM: Reserved.

Byte 85 in EEPROM: Raw Data Output Mode Setting.
bit0 = 1 is enabled and bit0 = 0 is disabled.(bit1-7 is 0)

Byte 86-98 in EEPROM: Reserved.

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.

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.

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 43-78 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".

RE4 (52h 45h 34h) - Read Serial Number

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

This is used to get the device's serial number.(refer to 'SN' Command)

Note: In the case of RE4 command, the device transforms the serial number from hexadecimal code into ASCII code per byte, and sends it out.

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

This command is only effective in self-arm mode and protocol 0. Once enabled, the reader could not change to host-polled mode or other protocol settings without turning off this function.

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

Single track	<STX><SS><SINGLE TRACK DATA><ES><LRC><ETX>
Dual track	<STX><SS><FIRST TRACK DATA><ES><LRC><DLE> <STX><SS><SECOND TRACK DATA><ES><LRC><ETX>
Triple track	<STX><SS><TRACK 1 DATA><ES><LRC><DLE> <STX><SS><TRACK 2 DATA><ES><LRC><DLE> <STX><SS><TRACK 3 DATA><ES><LRC><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.

Note1: Only following commands are valid while "MSR100 output format" is enabled:
'9', '<7Fh>', 'DF<00h>', 'LCx', 'Sdx', 'RE<00h>', 'RE1', 'RE2', 'RE3', and 'RE4'.

Note2: If read error or no data, then output nothing.

SN *data* (53h 4Eh *data*) - Write serial number

1	Serial number can be set as 1-7 characters and if no character sent, it will return to default.
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)
09h 00h 09h 53h 4Eh 31h 32h 33h 34h 35h 36h 37h 2Dh	Seven characters: 31h 32h 33h 34h 35h 36h 37h

RDx (52h 44h x) - Raw Data Output Mode Enable/Disable

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

Command Form (Hex)	Raw Data Output Mode
09h 00h 03h 52h 44h 44h 58h	Disable(default)
09h 00h 03h 52h 44h 45h 59h	Enable

This command is only effective in self-arm mode and protocol 0. Once enabled, the reader could not change to host-polled mode or other protocol settings without turning off this function.
The raw data output mode setting could be viewed from byte 85 in EEPROM via sending command 'RE<00h>'.

When Raw Data Output mode is enabled, the output data format is as below:

Single Track	<01H or 02H or 03H>Prefix<Raw Data>Suffix<CR>
Dual Track	<01H or 02H>Prefix<Raw Data>Suffix<CR>
	<02H or 03H>Prefix<Raw Data>Suffix<CR>
Triple Track	<01H>Prefix<Raw Data>Suffix<CR> <02H>Prefix<Raw Data>Suffix<CR> <03H>Prefix<Raw Data>Suffix<CR>

Remarks:

Prefix/Suffix codes are optional, CR = CARRAGE RETURN.

When Raw Data Output mode is disabled, the output data format restores to previous setting.

Note1: Only following commands are valid while "Raw Data Output mode" is enabled: '%', '#', '9', '$', 'Q', 'R', 'S', "LED control commands", 'Z', 'z', '<7Fh>', 'TKx', "Tracks Prefix/Suffix Code", 'DF<00h>', 'RE<00h>', 'RE1', 'RE2', 'RE3', 'RE4', 'SN', and 'RDx'.

Note2: It will output nothing while read no data.