



DOC. NO.

**MAGNETIC IC CARD
READER/WRITER**

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SPECIFICATION

MAGNETIC READER/WRITER & IC READER/WRITER

Model : TCM-R110A-0P



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9-1 STANDARD DIMENSION40



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0. Model

Management of History

Version	Date	Contents	Change	Remark
0.1	2018.09.12	- Release		



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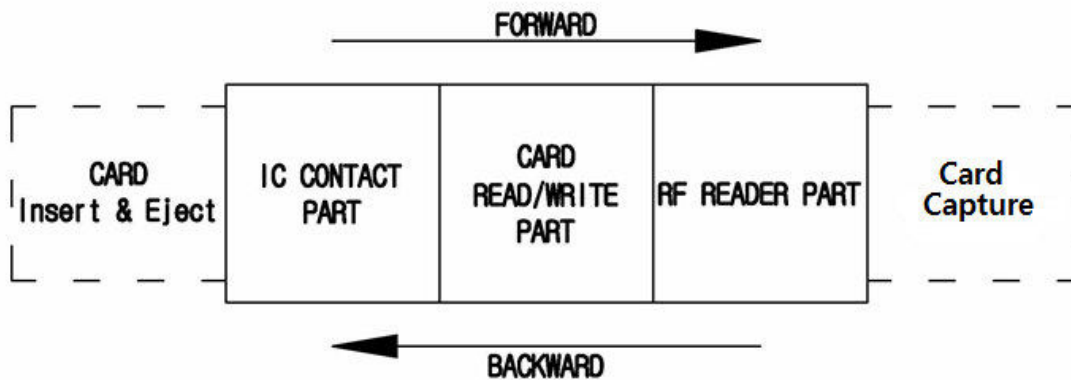
1. SUMMARY

This product is MOTORIZED MS/IC CARD READER/WRITER.

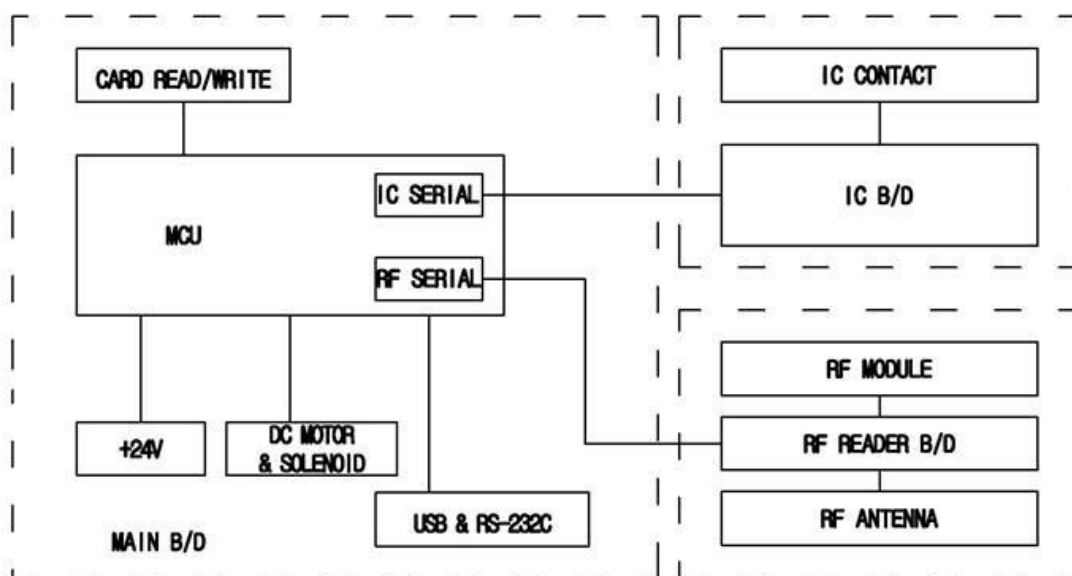
This has been designed to meet ISO 7810, ISO 7811(MSRW), and ISO 7816(IC CARD) standard. And IC part acquired certification of EMV2000 Ver.4.0.

2. Construction

2.1 Flow



2.2. Summarized System Construction





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3. General Specification

CARD FORMAT	ISO 7810
MS	ISO 7811 (TRACK1, TRACK2, TRACK3) Read & Write Capable Hico/Loco Capable F2F Reading Method
IC	ISO/IEC 7816 EMV2000 ver.4.0 Contact Landing Type SAM1, 2(option)
RF	ISO 14443-A Type, ISO 14443-B Type, Mifare, 15693
FEED SPEED	MS Read : 450mm/sec \pm 10% Card Transport : 560mm/sec(typ.)
MS HEAD TRACK WIDTH	Read Track Width : 1.0 mm Write Track Width : 3.0 mm
SHUTTER	Default : Sensor Only MS Pre-Head
Life	MS : 40,000,000 passes (1,000 passes/card maximum) IC : 1,000,000 contact landing times
Reliability	- MS Error Rate : Less than 1/1,000 cycles. (condition : at indoor. card feed : 1 cycle/10sec) - IC Error Rate : Less than 1/10,000 times. (condition : 1 times = 1 try + 2 retries) - MTBF : More than 100,000 hours.
INTERFACE	RS-232C (option - USB 2.0 Full Speed)
POWER	+24Vdc \pm 10%, 2A +5Vdc \pm 10% Ripple : 24V DC : 200m Vp-p ~ 240m Vp-p Backup Power : Capacitor 0.1F or More.
WEIGHT	1.66kg
DEMENSION	212(L) x 76(H) x 108(W)
ENVIRONMENT CONDITION	Operating Temperature : 5 ~ 50 Operating Humidity : 20 ~ 80RH Storage Temperature : -20 ~ 70 Storage Humidity : 20 ~ 80 RH



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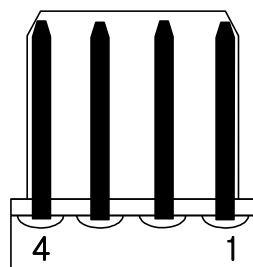
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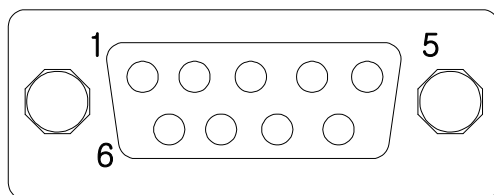
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4. HW INTERFACE**4-1. POWER CONNECTOR(PWR1) : MOLEX, 5046-04**

Pin No.	Signal Name	Function
1	24 V	+24 VDC
2	GND	Ground
3	GND	Ground
4	BPS	Back-up Power Supply

**Top View****4-2. RS-232 CONNECTOR(S_CON1) : CONNFLY ELECTRONICS CO.LTD, DS1037**

Pin No.	Signal Name	Function
1	CD	Data Carrier Detect, Optional Spec
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready, Optional Spec
5	GND	Signal Ground
6	DSR	Data Set Ready, Optional Spec
7	RTS	Ready To Send, Optional Spec
8	CTS	Clear To Send, Optional Spec
9	NC	Not Used





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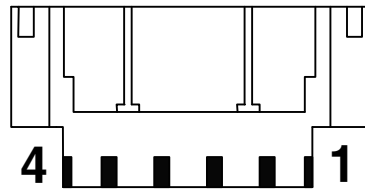
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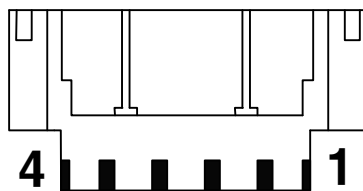
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4-3 RS-232 CONNECTOR(S_CON2) : YEON-HO Electron 12505WR-04A00, Optional Spec

Pin No.	Signal Name	Function
1	5 V	+5 VDC
2	TXD	Transmit Data
3	RXD	Receive Data
4	GND	Signal Ground

**12505WR-04A00
Top View****4-4 IFM BOARD INTERFACE CONNECTOR(IC1) : YEON-HO Electron 12505WR-04A00**

Pin No.	Signal Name	Function
1	5 V	+5 VDC
2	TXD	Transmit Data
3	RXD	Receive Data
4	GND	Signal Ground

**12505WR-04A00
Top View**



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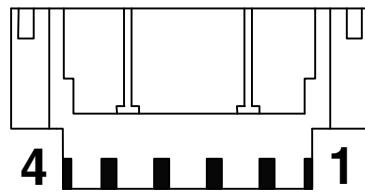
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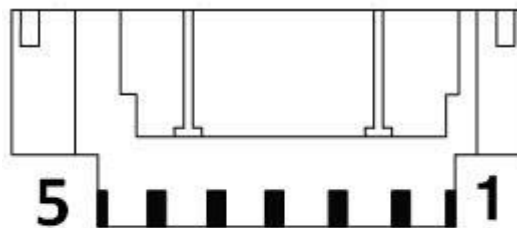
4-5 RF BOARD INTERFACE CONNECTOR(RF1) : YEON-HO Electron 12505WR-04A00, Optional Spec

Pin No.	Signal Name	Function
1	5 V	+5 VDC
2	TXD	Transmit Data
3	RXD	Receive Data
4	GND	Signal Ground

**12505WR-04A00
Top View**

4-6. ANTI-PHISING CONNECTOR(SPR1) : YEON-HO Electron 12505WR-05A00

Pin No.	Signal Name	Function
1	5 V	+5 VDC
2	SIG	Anti-phising operate check signal
3	SIG	Anti-phising solenoid power on signal
4	GND	Signal Ground
5	24V	+24 VDC

**12505WR-05A00
Top View**



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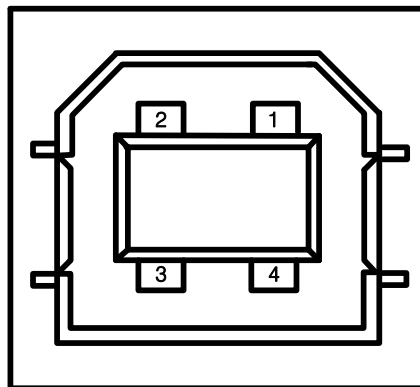
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4-7. USB CONNECTOR(U_CON1) : USB-B TYPE CONNECTOR, Optional Spec

Pin No.	Signal Name	Function
1	USB_VCC	USB POWER
2	D+	USB DATA + Signal
3	D-	USB DATA - Signal
4	GND	Ground

< "B" TYPE USB CONNECTOR >





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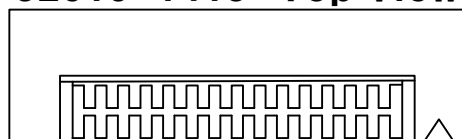
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4-8. MS HEAD CONNECTOR(MSRW1) : MOLEX, 52610-1471

Pin No.	Signal Name	Function
1	GND	Ground
2	GND	Ground
3	TR3WRnn	TRACK3 Write(-)
4	TR3RDn	TRACK3 Read(-)
5	TR3WRpp	TRACK3 Write(+)
6	TR3RDp	TRACK3 Read(+)
7	TR2WRnn	TRACK2 Write(-)
8	TR2RDn	TRACK2 Read(-)
9	TR2WRpp	TRACK2 Write(+)
10	TR2RDp	TRACK2 Read(+)
11	TR1WRnn	TRACK1 Write(-)
12	TR1RDn	TRACK1 Read(-)
13	TR1WRpp	TRACK1 Write(+)
14	TR1RDp	TRACK1 Read(+)

52610-1415 Top View**14****1**



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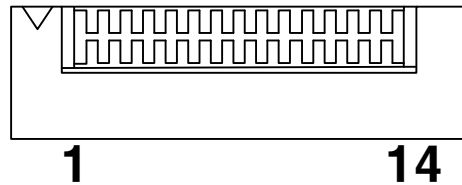
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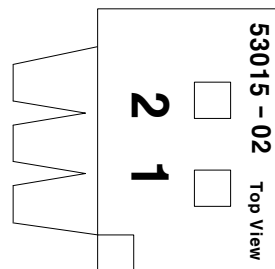
4-9. PATH SENSOR CONNECTOR(PS1) : MOLEX, 52610-1471

Pin No.	Signal Name	Function
1	VCC	+5Vdc
2	SEN1_VCC	Sensor1 LED Current
3	SEN2_VCC	Sensor2 LED Current
4	SEN3_VCC	Sensor3 LED Current
5	SEN4_VCC	Sensor4 LED Current
6	SEN5_VCC	Sensor5 LED Current
7	SEN1_SIG	Sensor1 signal
8	SEN2_SIG	Sensor2 signal
9	SEN3_SIG	Sensor3 signal
10	SEN4_SIG	Sensor4 signal
11	SEN5_SIG	Sensor5 signal
12	GND	Ground
13	NC	Not Connect
14	NC	Not Connect

52610-1415 Top View

4-10. DC Motor CONNECTOR(VEM1) : YEON-HO, 20017WR-02

Pin No.	Signal Name	Function
1	MOTOR_A	Motor Signal
2	MOTOR_B	Motor Signal





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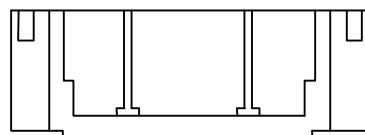
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4-11. DC MOTOR ENCODER CONNECTOR(VEE1) : YEON-HO Electron 12505WR-04A00

Pin No.	Signal Name	Function
1	LED_VCC	Sensor LED Current
2	GND	Signal Ground
3	5 V	+5 VDC
4	ENCODER_A	Encoder Signal

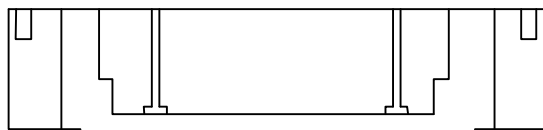


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**12505WR-04A00
Top View**

4-12. EM MOTER CONNECTOR(EMM1) : YEON-HO Electron 12505WS-07A00, Optional Spec

Pin No.	Signal Name	Function
1	MOTOR_A	Motor Signal
2	MOTOR_B	Motor Signal
3	ENCODER_B	Encoder Signal
4	ENCODER_A	Encoder Signal
5	5 V	+5 VDC
6	GND	Ground
7	LED_VCC	Sensor LED Current



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12505WR-07A00 Top View



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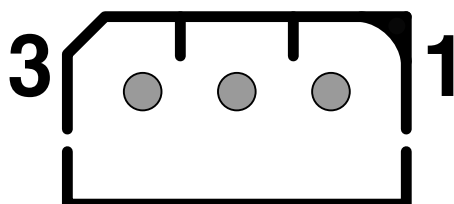
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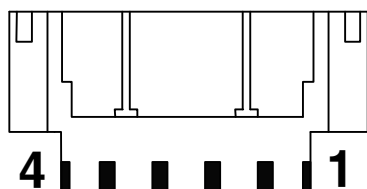
4-13. Actuator IC Control Signal Connector(ICS1) : MOLEX, 5268-03

Pin No.	Signal Name	Function
1	SOL_RETURN	SOLENOID Return
2	SOL_COMMON	SOLENOID Common Terminal
3	SOL_ABSORB	SOLENOID Working



4-14. IC OPERATION CHECK SENSOR CONNECTOR(IOC1, IOC2) : YEON-HO Electron 12505WR-04A00

Pin No.	Signal Name	Function
1	SIG	Sensor signal
2	5 V	+5 VDC
3	GND	Signal Ground
4	LED_VCC	Sensor LED Current

**12505WR-04A00
Top View**



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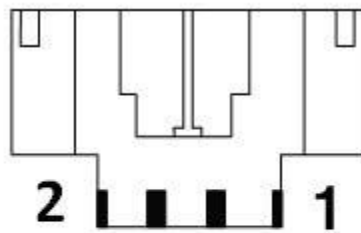
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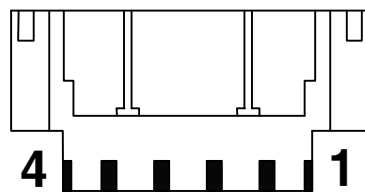
4-15. IC DETECT CHECK CONNECTOR (ICD1) : YEON-HO Electron 12505WR-02A00_Optional Spec

Pin No.	Signal Name	Function
1	SIG	Sensor signal
2	SIG	Sensor signal

**12505WR-02A00****Top View**

4-16. SHUTTER CHECK SENSOR CONNECTOR(HSC1) : YEON-HO Electron 12505WR-04A00, Optional Spec

Pin No.	Signal Name	Function
1	LED_VCC	Sensor LED Current
2	GND	Signal Ground
3	5 V	+5 VDC
4	ENCODER_A	Encoder Signal

**12505WR-04A00****Top View**



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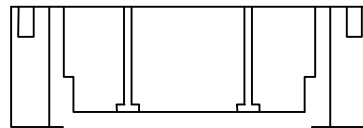
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4-17. CARD WIDTH CHECK SENSOR CONNECTOR(HCW1) : YEON-HO Electron 12505WR-04A00, Optional Spec

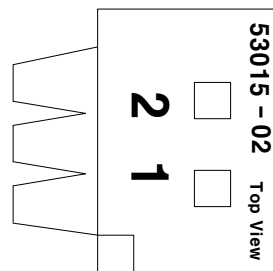
Pin No.	Signal Name	Function
1	LED_VCC	Sensor LED Current
2	GND	Signal Ground
3	5 V	+5 VDC
4	ENCODER_A	Encoder Signal



12505WR-04A00
Top View

4-18. Shutter Solenoid CONNECTOR(SS1) : YEON-HO Electron, 20017WR-02

Pin No.	Signal Name	Function
1	SIG	Solenoid ON signal
2	GND	Ground





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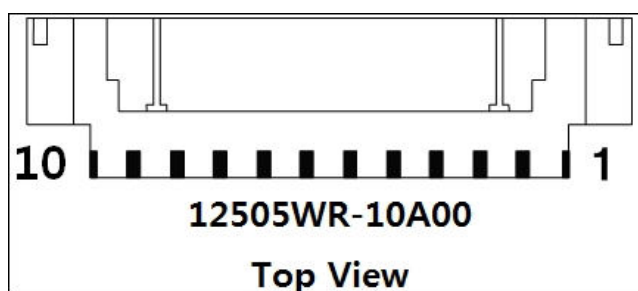
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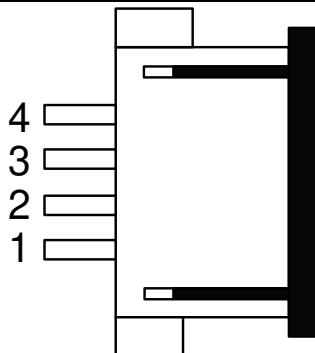
4-19. SHUTTER SENSOR CONNECTOR(FSH1) : YEON-HO Electron, 12505WR-10A00

Pin No.	Signal Name	Function
1	5 V	+5 VDC
2	SIG	Card Width Check Signal
3	SIG	Shutter Check Signal
4	GND	Ground
5	SIG	IC Card Detect Signal
6	SIG	Pre Head TRP Signal
7	SIG	Pre Head TRN Signal
8	GND	Ground
9	SIG	Anti-Skimming operate check signal
10	SIG	Anti-Skimming power on signal



4-20. PRE HEAD SENSOR(PHD1) : YEON-HO Electron, 10027HR-04C, Optional Spec

Pin No.	Signal Name	Function
1	GND	Ground
2	PRE_HEAD1	PRE HEAD Signal1
3	PRE_HEAD2	PRE HEAD Signal2
4	GND	Ground





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4-21. DIP SWITCH (MODE1) and Working TABLE : KSD05S



<Working TABLE>

No.	1	2	3	4	5	Function
1	Off	Off	Off	Off	X	Shutter Mode ,38400BPS
2	On	Off	Off	Off	X	Non-Shutter Mode,38400BPS
3	Off	On	Off	Off	X	9600BPS
4	Off	Off	On	Off	X	19200BPS
5	Off	On	On	Off	X	*default boardrate
6	Off	Off	Off	On	X	57600BPS
7	Off	On	Off	On	X	115200BPS
8	Off	Off	On	On	X	*default boardrate
9	Off	On	On	On	X	*default boardrate
10					X	
11					X	
12					X	
13					X	
14					X	
15						

*default boardrate : 38400pps



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5. Communication Control Method & Configuration

5.1. Transmission Control Method

Command / Response method : MCRW executes a particular operation according to the command from Host, and reports the results of the execution to Host.

5.2. Transmission Control Characters

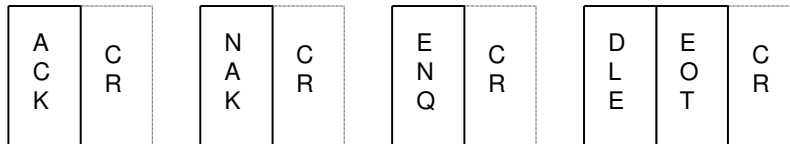
STX (02h)	Indicate start of text.
ETX (03h)	Indicate end of text.
ENQ (05h)	Request to send response.
ACK (06h)	Send positive response.
NAK (15h)	Send negative response.
DLE EOT (10h 04h)	Clear the line and reset MSR
CR (0Dh)	Carriage return.

5.3. Text Configuration

(1) Command / Response



(2) Control Characters



1) BCC does not include STX and calculated by EXCLUSIVE OR in BCC range.

5.4. Cancel of Command

Whenever receiving ' DLE EOT (10h 04h) ' characters, MCRW stops the current execution right away, sends ' DLE EOT ' and waits for the next command. If ' DLE EOT ' is received during the transmission of response, MCRW returns to command receive mode after the completion of the transmission.



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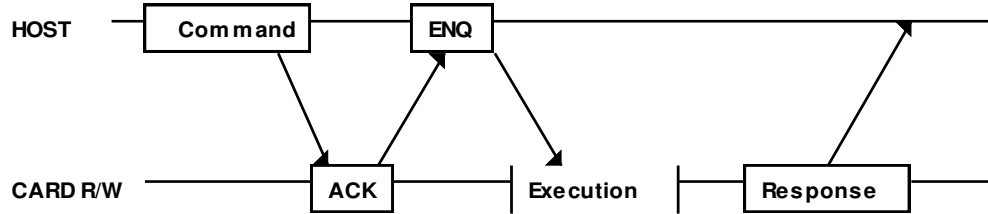
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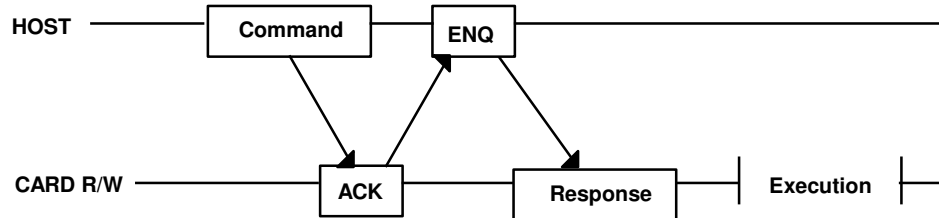
6. COMMUNICATION PROTOCOL SEQUENCE

6.1. Regular Operations

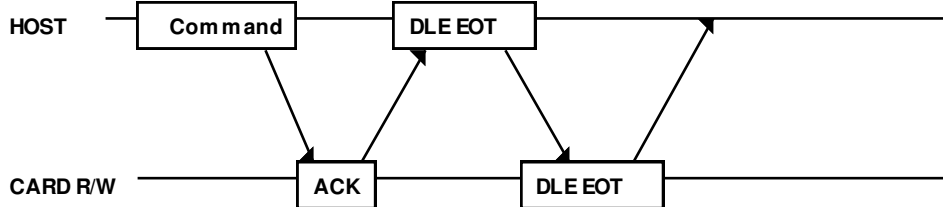
6.1.1. Commands



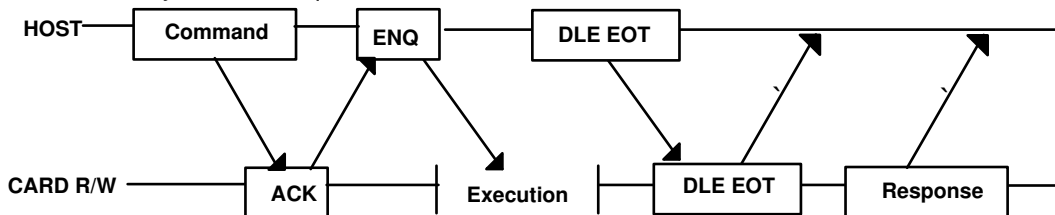
* Card Ready Command Sequence



6.1.2. Cancel of Command (DLE EOT)



* Card Ready Cancel Sequence





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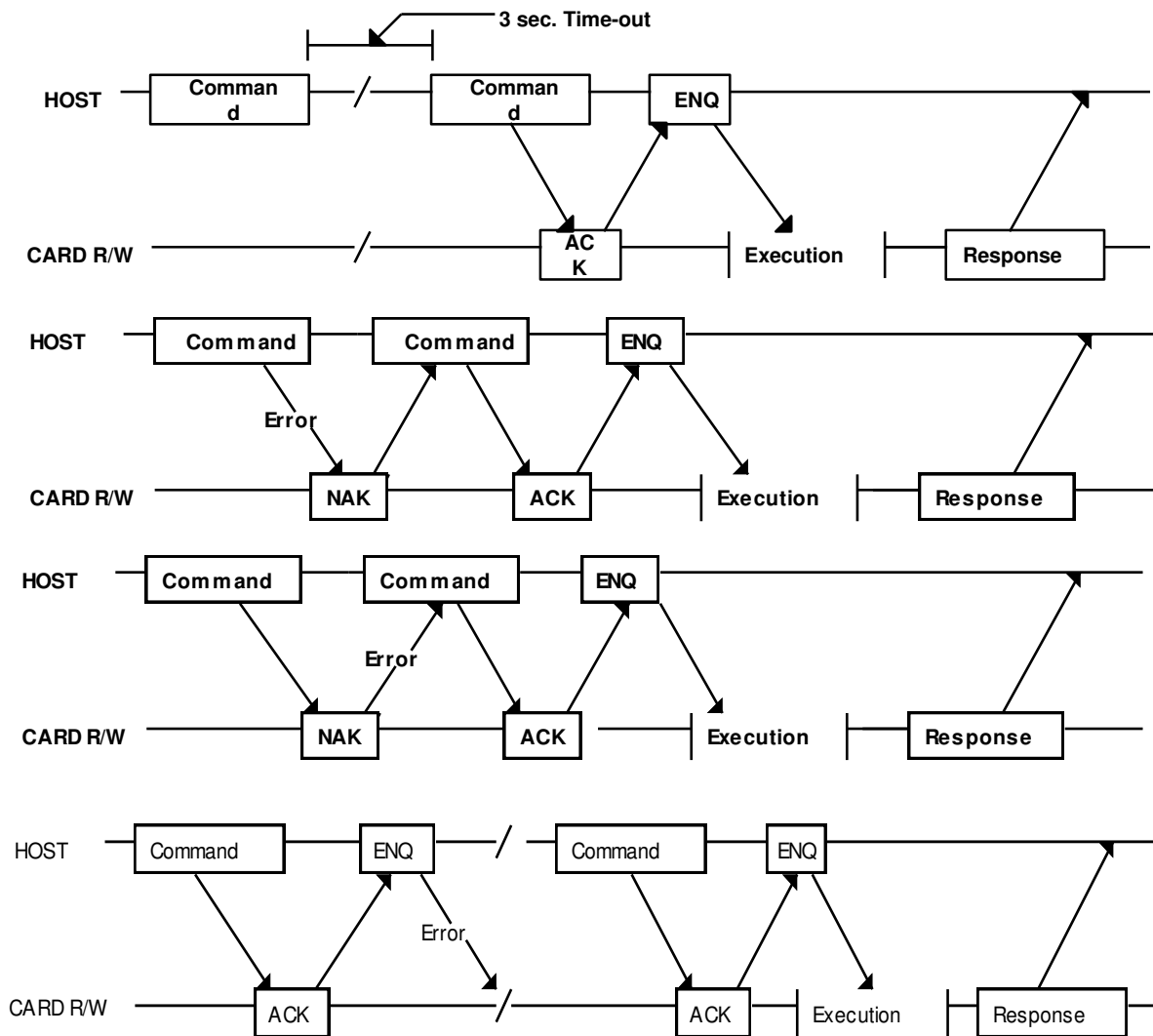
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6.2. Irregular Operations (Communications Errors)

6.2.1. Commands





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7. COMMUNICATION PROTOCOL DESCRIPTIONS**7.1. Format Details****7.1.1. Command Format**

'C' (43h)	cm	pm	Data
-------------	----	----	------

7.1.2. Positive Response Format

'P' (50h)	cm	pm	st1*	st0*	Data
-------------	----	----	------	------	------

* Status Code Byte. See Section 7.3 for the status code table.

7.1.3. Negative Response Format

'N' (4Eh)	cm	pm	e1*	e0*
-------------	----	----	-----	-----

* Error Code Byte. See Section 7.4 for the error code table.

7.2. Command Parameter Code List

Command	cm	pm	Description*
INITIALIZE	30h	30h	Initialize MCRW and eject the card if a card is inside MCRW
		31h	Initialize MCRW and capture the card if a card is inside MCRW
		32h	Initialize MCRW and retain the card if a card is inside MCRW
		33h	If card is inside MCRW, does not move the card
		34h	Same as 30H. And Retract counter will work
		35h	Same as 31H. And Retract counter will work
		36h	Same as 32H. And Retract counter will work
STATUS REQUEST	31h	30h	Report the presence and the position of a card
		31h	Report the presence and the position of a card in detail
ENTRY	32h	30h	Front accept the Card (Does not refer to Pre-Head or Chip Sensor)
		31h	Front accept the MS Card (Pre-Head detects)
		32h	Front accept the IC Card and contact solenoid (Does not refer to Pre-Head or Chip Sensor)
		33h	Front accept the IC Card (Chip Sensor detects)
		34h	Front accept the MS and IC Card (Pre-Head and Chip Sensor detects)
		35h	Front accept the RF Card (Does not refer to Pre-Head or Chip Sensor)
		3Dh	Front accept the MS or IC Card (Pre-Head or Chip Sensor detects)
		40h	Front accept the Card (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)
		41h	Front accept the MS Card (Pre-Head detects) (Anti Skimming Feeding)
		42h	Front accept the IC Card and contact solenoid (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)
		43h	Front accept the IC Card (Chip Sensor detects) (Anti Skimming Feeding)
		44h	Front accept the MS and IC Card (Pre-Head and Chip Sensor detects) (Anti Skimming Feeding)
		45h	Front accept the RF Card (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)
		4Dh	Front accept the MS or IC Card (Pre-Head or Chip Sensor detects) (Anti Skimming Feeding)
50h	Rear accept the Card (Option)		
CARD CARRY	33h	30h	Eject the card to the front



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		31h	Capture the card to the back
RETRIEVE	34h	30h	Retrieve card, which is in Gate position
MAGNETIC CARD READ	36h	30h	Move card without reading (for cleaning purpose)
		31h	Read ISO 1 and transmit data
		32h	Read ISO 2 and transmit data
		33h	Read ISO 3 and transmit data
		35h	Read all tracks (ISO1,2,3)and transmit data
		36h	Clear the read/write buffer memory
MAGNETIC CARD WRITE	37h	30h	Set the mode for write operation (Write type) (Default Lo-Co Write)
		31h	Write ISO 1(Depending to the Write type)
		32h	Write ISO 2(Depending to the Write type)
		33h	Write ISO 3(Depending to the Write type)
		36h	Write ISO 1(Hi-Co)
		37h	Write ISO 2(Hi-Co)
		38h	Write ISO 3(Hi-Co)
		39h	Write ISO 1(Lo-Co)
		3Ah	Write ISO 2(Lo-Co)
		3Bh	Write ISO 3(Lo-Co)
		51h	Write ISO 1 (Data Save)
		52h	Write ISO 2 (Data Save)
		53h	Write ISO 3 (Data Save)
		5Ah	Save Data Write(Depending to the Write type)
5Bh	Save Data Write Hi-Co(ISO1,2,3)		
5Ch	Save Data Write Lo-Co(ISO1,2,3)		
ENABLE / DISABLE	3Ah	30h	Accept non-encoded cards (e.g., cleaning card)
		31h	Disable card entry
		32h	Enable with referring Pre-head
		33h	Enable with referring chip sensor
		34h	Enable with referring Pre-head and chip sensor
		3Dh	Enable with referring Pre-head or chip sensor
RETRY	3Eh	30h	Set retry count to 0
		31h	Set retry count to 1
		32h	Set retry count to 2
		33h	Set retry count to 3
		34h	Set retry count to 4 (Default)
IC CONTACT	40h	30h	Move card to IC contact position and contact IC solenoid.
		32h	Release IC solenoid.
GET REVISION	41h	30h	MCRW F/W Version
		31h	MCRW F/W Version
		32h	IFM Module Version(Optional)
		33h	RF Module Version(Optional)
		39h	MCRW Serial Number(Optional)
RETRACT Counter	43h	30h	Retract Counter Read.
		31h	Retract Counter Set.
IC CARD or SAM CONTROL	49h	30h	IC power on(Cold Reset) (EMV or ISO-7816 mode)
		31h	IC power off
		32h	IC Status



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		33h	Data transmit to and from the IC card (T=0 Communication)
		34h	Data transmit to and from the IC card (T=1 Communication)
		38h	IC warm reset IC card
		39h	Data transmit to and from the IC card (Automatic Communication)
		3Ah	IC power on (Cold Reset) (EMV mode)
		40h	SAM1 power on (Cold Reset) (EMV or ISO-7816 mode)
		41h	SAM1 power off
		42h	SAM1 Status
		43h	Data transmit to and from the SAM1 (T=0 Communication)
		44h	Data transmit to and from the SAM1 (T=1 Communication)
		48h	IC warm reset SAM1
		49h	Data transmit to and from the SAM1 (Automatic Communication)
		4Ah	SAM1 power on (Cold Reset) (EMV mode)
RF CARD CONTROL	50h	30h	Data transmit to and from the RF Card(internal) (Option)
		31h	Data transmit to and from the RF Card(external)(Option)

* See Section 8. for more information

7.3. Status Code List

st1	st0	Description
30h	30h	No Card Detected (including gate)
30h	31h	Card at gate
30h	32h	Card inside MCRW (transport)



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7.4. Error Code List

e1	e0	Description
30h	30h	Command unidentified
30h	31h	Parameter incorrect
30h	32h	Command cannot be executed
30h	34h	Command data error
30h	35h	Time error (For entry)
30h	36h	Card error (Irregular)
30h	37h	IFM(ICC Interface Module) Timeout(no response)
31h	30h	Card jammed
31h	31h	Shutter error
31h	32h	IC card not exist(IC card is not or it is mute)
31h	33h	IC card Invalid ATR
31h	36h	Card position moved
31h	37h	Card jammed on retrieve
31h	38h	Card jammed on IC card contact
31h	39h	IC card communication error (T=0)
32h	30h	Write error
32h	31h	Read error - Pre-amble error
32h	32h	Read error - Post-amble error
32h	33h	Read error - LRC error
32h	34h	Read error - Parity error
32h	35h	Read error - Blank track
32h	37h	Card entry disabled
32h	38h	PH4 Sensing Error
33h	30h	Power down
33h	31h	Shutter Open Error
34h	30h	Not Support Protocol
34h	31h	IC card communication error (T=1)
34h	32h	IFM data receive error
34h	33h	IC card Parity error
34h	34h	IC card Missing
34h	35h	IC card Over Circuit
34h	36h	IC card Power up error
34h	37h	IC solenoid error
34h	38h	IC card other error
36h	30h	Command Cancel
36h	31h	Entry Position Error(Warning)
36h	32h	Card no input
36h	35h	Not inside Card
36h	36h	Card Compulsion Eject Error
36h	37h	Retract Count Full Error
37h	30h	Write Jitter Error
37h	31h	Write Data verify Error



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7.5. IC Error Code List

Status codes returned by the card are listed in the following table:

Status Code	Description
30h 30h	The command is not supported or not allowed.
30h 31h	Wrong command length.
30h 32h	The reader detects an excessive current. The card is powered off.
30h 33h	The reader detects a defective voltage. The card is powered off.
30h 35h	The slot number is invalid (it must be set to 0 to 4).
30h 37h, 30h 38h, 30h 39h	The byte displayed is invalid.
0Ah,15h	The byte displayed is invalid.
3Ah 32h	The card is short-circuiting. The card is powered off.
3Ah 33h	The ATR is too long (the number of bytes is greater than 33).
3Bh 30h	The reader is in EMV mode and the T=1 message sent by the card is too long. The buffer is limited to 254 bytes under the T=1 protocol.
3Bh 3Bh	The reader has encountered a protocol error in the EMV mode (for example, erroneous first byte of the ATR, bad checksum (TCK) character, parity error, timeout during reception of the ATR, ATR is not EMV-compliant).
3Bh 3Dh	Card protocol error during a T=1 exchange.
3Bh 3Eh	The APDU command length is wrong.
38h 33h	A buffer overflow occurred during card data reception.
3Fh 34h	Wrong procedure byte received during a T=0 exchange.
3Fh 37h	The checksum byte (TCK) of the ATR is invalid (reader in PC/SC – ISO mode).
3Fh 38h	The first byte (TS) of the ATR is invalid (reader in PC/SC - ISO mode).
3Fh 3Ch	The reader receives a data from the card while it sends data to the card.
3Fh 3Dh	Parity error during a microprocessor exchange.
3Fh 3Eh	The card is not present or it is mute.



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8. COMMUNICATION DETAILS**8.1. INITIALIZE (cm = 30h)**

On power up, MCRW needs to be initialized with INITIALIZE command in order to receive commands from HOST, execute them, and send the results. INITIALIZE command initializes the MCRW with the parameters provided and sets the MCRW to the default settings.

8.1.1. Command

'C'	30h	pm	33h*	32h*	34h*	30h*	Fm	Pd	Wv	Sh	Ds	Ty	Cp
-----	-----	----	------	------	------	------	----	----	----	----	----	----	----

* Mandatory sequence for future use.

pm: Specifies the ejection of a card inside MCRW (Initialization only)

30h	Eject the card to front
31h	Eject (capture) the card to back
32h	Retain the card (in transport)
33h	If card is inside MCRW, does not move the card
34h	Same as 30H. And Retract counter will work
35h	Same as 31H. And Retract counter will work
36h	Same as 32H. And Retract counter will work

Fm: Specifies the command format.(33h Default)

	CR	BCC
30h	No	No
31h	Yes	No
32h	No	Yes
33h	Yes	Yes

Pd: Specifies the card-eject at power down.

30h	MCRW ejects the card. (Default)
31h	MCRW ejects the card except Write mode.
32h	MCRW does not eject the card in any case.
33h	If the card is not taken by the customer for 30 seconds after MCRW operation has been completed, then capture the card.

Wv: Specifies the operation of MCRW at power down during executing WRITE command.

30h	MCRW stops the operation.
31h	MCRW continues the operation.

Sh: Specifies the shutter open/close test when MCRW is initialized.

30h	Shutter open/close to be tested.
31h	Shutter open/close not to be tested.

Ds: No function, 30h : Default

Ty: Specifies the response format for type recognizing codes.

30h	No type recognizing code in the response.
31h	Type recognizing codes (5 bytes) in the response.

Cp: No function, 30h : Default



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8.1.2. Positive Response

'P'	30h	Pm	st1	st0	Type code*
-----	-----	----	-----	-----	------------

* Only when Ty is set to 31h. (Status Code Byte(st1,st0). See Section 7.3. for the status code table.)

Type code(5 bytes)

I*	II*	III*	IC**	32H
----	-----	------	------	-----

* I for ISO Track I, II for ISO Track 2, and III for ISO Track 3

30h	N/A
31h	Read Only
32h	Read / Write

** IC (Support IC CARD)

30h	N/A
31h	IC card able

8.1.3. Negative Response

'N'	30h	pm	e1	e0
-----	-----	----	----	----

(Error Code Byte (e1, e0). See Section 7.4 for the error code table.)

8.2. STATUS REQUEST (cm = 31h)

STATUS REQUEST command is sent to know if a card is inside MCRW and the position of it. MCRW always sends two byte status report (st1 & st0) and one or two byte status report (se1 & se0) is added depending on pm.

8.2.1. Command

'C'	31h	pm
-----	-----	----

8.2.2. Positive Response

'P'	31h	pm	st1	st0	se1	se0	Se2
-----	-----	----	-----	-----	-----	-----	-----

pm: Specifies the response format (se0, se1, se2)

30h	se not included
31h	se included

se0,se1,se2 exist if only pm = 31h.

Details of se byte:

se1	0	1	0	0	b3	b2	b1	b0
se0	0	1	0	0	b5	b7	b9	b6
se2	0	1	0	0	0	0	b8	b4

b0	PH1	1: Card detected	0: Card not detected
b1	PH2	1: Card detected	0: Card not detected
b2	PH3	1: Card detected	0: Card not detected
b3	PH4	1: Card detected	0: Card not detected
b6	SW1	1: Shutter open.	0: Shutter is closed.
b9	SW2	1: Card detected	0: Card not detected
b7	Pre-Head	1: Magnetic flux detected	0: Magnetic flux not detected
b5	IC Card	1: IC card sensing	0: IC card no detected



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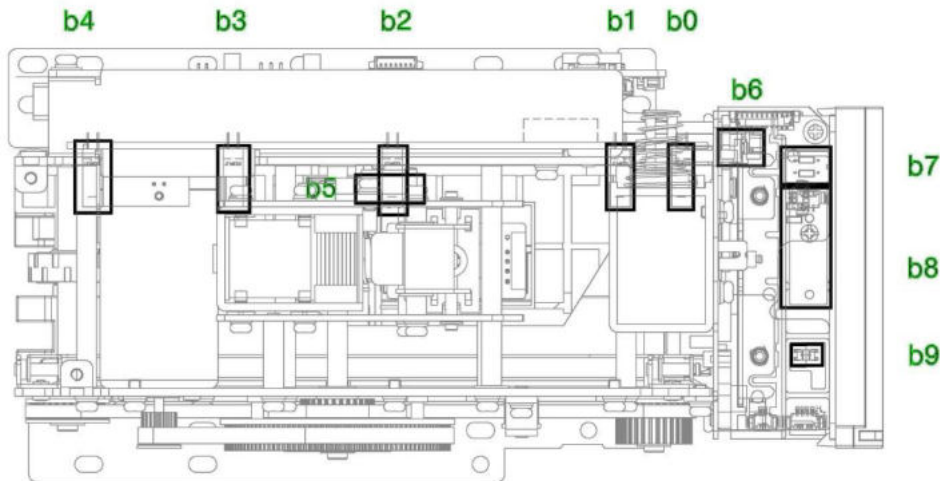
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b4	PH5	1: Card detected	0: Card not detected
b8	ICD	1: IC Metal Detected	0: IC Metal not Detected

8.2.3. Sensor position



8.2.4. Negative Response

'N'	31h	pm	e1	e0
-----	-----	----	----	----

8.3. ENTRY (cm = 32h)

ENTRY command accepts the IC card or magnetic card depending on pm. This command does not allow MCRW to send response to HOST until MCRW completes to carry the card inside MCRW (except Rear Entry command). Send DLE + EOT from HOST in order to cancel this command. If MCRW cannot move the card on the way of carrying it, MCRW sends jam error to HOST.

8.3.1. Command

'C'	32h	pm
-----	-----	----

8.3.2. Positive Response

'P'	32h	pm	st1	st0
-----	-----	----	-----	-----

8.3.3. Negative Response

'N'	32h	pm	e1	e0
-----	-----	----	----	----

pm: Specifies the entry card

30h	Front accept the Card (Does not refer to Pre-Head or Chip Sensor)
31h	Front accept the MS Card (Pre-Head detects)
32h	Front accept the IC Card (Does not refer to Pre-Head or Chip Sensor)
33h	Front accept the IC Card (Chip Sensor detects)
34h	Front accept the MS and IC Card (Pre-Head and Chip Sensor detects)
35h	Front accept the RF Card (Does not refer to Pre-Head or Chip Sensor)
3Dh	Front accept the MS or IC Card (Pre-Head or Chip Sensor detects)
40h	Front accept the Card (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)



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41h	Front accept the MS Card (Pre-Head detects) (Anti Skimming Feeding)
42h	Front accept the IC Card (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)
43h	Front accept the IC Card (Chip Sensor detects) (Anti Skimming Feeding)
44h	Front accept the MS and IC Card (Pre-Head and Chip Sensor detects) (Anti Skimming Feeding)
45h	Front accept the RF Card (Does not refer to Pre-Head or Chip Sensor) (Anti Skimming Feeding)
4Dh	Front accept the MS or IC Card (Pre-Head or Chip Sensor detects) (Anti Skimming Feeding)
50h	Rear accept the Card (Option)

8.4. CARD CARRY (cm = 33h)

CARD CARRY command moves the card to front or to back depending on pm. When a card is ejected to front, its one end remains in between rollers so that MCRW could retrieve it unless the card is removed.

8.4.1. Command

'C'	33h	Pm
-----	-----	----

8.4.2. Positive Response

'P'	33h	Pm	st1	st0
-----	-----	----	-----	-----

8.4.3. Negative Response

'N'	33h	Pm	e1	e0
-----	-----	----	----	----

pm: Specifies the eject direction

30h	To front
31h	To back (Capture)

8.5. RETRIEVE (cm = 34h)

RETRIEVE command retrieves the ejected card that is not removed. Move the card (which is stay at gate position) into the MCRW.

8.5.1. Command

'C'	34h	30h
-----	-----	-----

8.5.2. Positive Response

'P'	34h	30h	st1	st0
-----	-----	-----	-----	-----

8.5.3. Negative Response

'N'	34h	30h	e1	e0
-----	-----	-----	----	----



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8.6. MAGNETIC CARD READ (cm = 36h)

READ command reads the card and sends the data to HOST. STX, ETX, and LRC will not be sent to HOST. When read error occur, MCRW retries to read the card depending on RETRY count set by RETRY command. In case of a single track read, if a read error happens, a negative response will be sent to HOST, but in case of all track read, a positive response will be sent to HOST with the error code in the place of corresponding track data.

8.6.1. Command

'C'	36h	Pm
-----	-----	----

8.6.2. Positive Response for one track read

'P'	36h	Pm	st1	st0	Data
-----	-----	----	-----	-----	------

for all track read(ISO1,2,3)

'P'	36h	Pm	st1	st0	Data1	00h	Data2	00h	Data3	00h	Data4
-----	-----	----	-----	-----	-------	-----	-------	-----	-------	-----	-------

8.6.3. Negative Response

'N'	36h	Pm	e1	e0
-----	-----	----	----	----

pm: Specifies the track to read.

30h	Move card without reading (for cleaning purpose)
31h	Read ISO 1 and transmit data
32h	Read ISO 2 and transmit data
33h	Read ISO 3 and transmit data
35h	Read all tracks (ISO1,2,3)and transmit data
36h	Clear the read/write buffer memory

Error Code for All Track Read(pm = 35h)

e1	e0	Description
45h	31h	Pre-amble error
45h	32h	Post-amble error
45h	33h	LRC error
45h	34h	Parity error
45h	35h	Blank track



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8.7. MAGNETIC CARD WRITE (cm = 37h)

WRITE command writes data on the track specified by pm. Data should not include STX, ETX, and LRC.

8.7.1. Command

'C'	37h	Pm	Data
-----	-----	----	------

for all track Write

'C'	37h	Pm	11h	Data1	12h	Data2	13h	Data3
-----	-----	----	-----	-------	-----	-------	-----	-------

Ex) 1,2,3 Track = 1track data 31h, 2track data 32h, 3track data 33h

→ 11h 31h 12h 32h 13h 33h

2,3 Track = 2track data 32h, 3track data 33h

→ 11h 12h 32h 13h 33h

8.7.2. Positive Response

'P'	37h	Pm	st1	st0
-----	-----	----	-----	-----

8.7.3. Negative Response

'N'	37h	Pm	e1	e0
-----	-----	----	----	----

pm: Specifies the track to write.

30h	Set the mode for write operation (Write type) (Default Auto-Write) Data: 30h(Lo-Co), 31h(Hi-Co), 32h(Auto)
31h	Write ISO 1(Depending to the Write type)
32h	Write ISO 2(Depending to the Write type)
33h	Write ISO 3(Depending to the Write type)
36h	Write ISO 1(Hi-Co)
37h	Write ISO 2(Hi-Co)
38h	Write ISO 3(Hi-Co)
39h	Write ISO 1(Lo-Co)
3Ah	Write ISO 2(Lo-Co)
3Bh	Write ISO 3(Lo-Co)
51h	Write ISO 1 (Data Save)
52h	Write ISO 2 (Data Save)
53h	Write ISO 3 (Data Save)
5Ah	Save Data Write(Depending to the Write type)
5Bh	Save Data Write Hi-Co(ISO1,2,3)
5Ch	Save Data Write Lo-Co(ISO1,2,3)

- Auto Write Lo-Co → Hi-Co
- When writing Lo-Co mode(0x30) with Hi-Co Card, the data on written track cannot be guaranteed.
- When writing Hi-Co mode(0x31) with Lo-Co Card, the data on written track cannot be guaranteed.
- If non-encoded Hi-Co card is written with Auto mode, the data on written track cannot be guaranteed.



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8.8. ENABLE / DISABLE (cm = 3Ah)

ENABLE/DISABLE command control accept/inhibit the card entry. MCRW immediately sends the response to this command. MCRW status should be recognized by Status request command form HOST. Choose Enable/Disable or Entry command according to customer's control system.

8.8.1. Command

'C'	3Ah	pm
-----	-----	----

8.8.2. Positive Response

'P'	3Ah	pm	st1	st0
-----	-----	----	-----	-----

8.8.3. Negative Response

'N'	3Ah	pm	e1	e0
-----	-----	----	----	----

pm: Enable or disable the ENTRY .

30h	Accept non-encoded card (for cleaning card)
31h	Disable card ENTRY
32h	Enable with referring Pre-head
33h	Enable with referring chip sensor
34h	Enable with referring Pre-head and chip sensor
3Dh	Enable with referring Pre-head or chip sensor



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8.9. Anti-Skimming Set(cm = 3Ah pm = 58h)**Control jitter anti-skimming operation at the Card Entry(3xh) or Eject(Default anti-skimming Disable).****H/W anti-skimming operation(method of magnetic field generators) at the Card Entry(4xh) is not affected by this parameter.(default : h/w anti-skimming auto mode. 카드 삽입 시 동작, 카드 제거 시 비동작)****8.9.1. Command**

'C'	3Ah	58h	Data
-----	-----	-----	------

8.9.2. Positive Response

'P'	3Ah	58h	st1	st0
-----	-----	-----	-----	-----

8.9.3. Negative Response

'N'	3Ah	58h	e1	e0
-----	-----	-----	----	----

Data :-

30h	Anti-Skimming Disable
31h	Type0 Anti-Skimming Enable(method of jitter generators)
32h	Type1 Anti-Skimming Enable(method of jitter generators)
33h	Type2 Anti-Skimming Enable(method of jitter generators)
34h	Type3 Anti-Skimming Enable(method of jitter generators)
35h	Type4 Anti-Skimming Enable(method of jitter generators)
36h	Type5 Anti-Skimming Enable(method of jitter generators)
37h	Type6 Anti-Skimming Enable(method of jitter generators)
38h	Type7 Anti-Skimming Enable(method of jitter generators)
39h	Type8 Anti-Skimming Enable(method of jitter generators)
40h	H/W Anti-Skimming operation Disable
41h	H/W Anti-Skimming operation Enable(manual mode : 카드가 내부에 없으면 항상 실행)
42h	H/W Anti-Skimming operation Enable(auto mode : 카드가 투입구에 있을때만 동작)
48h	H/W Anti-Skimming operation test. (If no magnetic field is generated, error returns a 03h)
30h-30h	Z-Entry Disable
30h-31h	Z-Entry Enable



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8.10. RETRY (cm = 3Eh)

RETRY command sets the number of retries when a read error occurs.

8.10.1. Command

'C'	3Eh	pm
-----	-----	----

8.10.2. Positive Response

'P'	3Eh	pm	st1	st0
-----	-----	----	-----	-----

8.10.3. Negative Response

'N'	3Eh	pm	e1	e0
-----	-----	----	----	----

pm: Number of retries

30h	0
31h	1
32h	2
33h	3
34h	4 (Default)

8.11. IC CONTACT

It is the command for IC contact or release.

8.11.1. Command

'C'	40h	Pm
-----	-----	----

8.11.2. Positive Response

'P'	40h	Pm	st1	st0
-----	-----	----	-----	-----

8.11.3. Negative Response

'N'	40h	Pm	e1	e0
-----	-----	----	----	----

pm:

30h	Carry the card to IC contact position and set the IC contact solenoid.
32h	Release the IC contact solenoid.



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8.12. GET REVISION (cm = 41h)

8.12.1. Command

'C'	41h	pm
-----	-----	----

8.12.2. Positive Response

'P'	41h	pm	st1	st0	Data
-----	-----	----	-----	-----	------

8.12.3. Negative Response

'N'	41h	pm	e1	e0
-----	-----	----	----	----

pm

30h	MCRW F/W Version
31h	MCRW F/W Version
32h	IFM Module Version
33h	RF Module Version(Optional)
39h	Get MCRW Unique Serial Number(Optional) (24 bytes)

8.13. Retract Counter Command (cm = 43h)

8.13.1. Retract Counter Read Command

'C'	43h	30h
-----	-----	-----

8.13.2. Positive Response

'P'	43h	30h	st1	st0	ct1	ct0
-----	-----	-----	-----	-----	-----	-----

8.13.3. Negative Response

'N'	43h	30h	e1	e0
-----	-----	-----	----	----

ct: Retract Counter Value(00<= ct <= 99)

Ex) Counter Value "90" -> ct1 = 39H, ct0= 30H

8.13.4. Retract Counter Set Command

'C'	43h	31h	ct1	ct0
-----	-----	-----	-----	-----

8.13.5. Positive Response

'P'	43h	31h	st1	st0
-----	-----	-----	-----	-----

8.13.6. Negative Response

'N'	43h	31h	e1	e0
-----	-----	-----	----	----

Value range is 00 ~ 99.

Ex) In case of setting "00" in Retract counter. -> ct1 =30H, ct0=30H



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8.14. IC Card or SAM Control (cm = 49h)

IC POWER command is for power on/off to communicate with the IC or SAM card.

8.14.1. Command

'C'	49h	pm	*Vcc
-----	-----	----	------

8.14.2. Positive Response

'P'	49h	pm	st1	st0	Data
-----	-----	----	-----	-----	------

8.14.3. Negative Response

'N'	49h	pm	e1	e0	**IC Error Code List
-----	-----	----	----	----	----------------------

pm: Specifies the IC or SAM card power on/of, data transmit.

30h	IC power on(Cold Reset) (EMV or ISO-7816 mode) Depending to the Vcc option. (In case there is no Vcc word, it will have 33h as default value(ISO-7816))
31h	IC power off
32h	IC Status
33h	Data transmit to and from the IC card (T=0 Communication)
34h	Data transmit to and from the IC card (T=1 Communication)
38h	IC warm reset IC card
39h	Data transmit to and from the IC card (Automatic Communication)
3Ah	IC power on (Cold Reset) (EMV mode)
40h	SAM1 power on(Cold Reset) (EMV or ISO-7816 mode) Depending to the Vcc option. (In case there is no Vcc word, it will have 33h as default value(ISO-7816))
41h	SAM1 power off
42h	SAM1 Status
43h	Data transmit to and from the SAM1 card (T=0 Communication)
44h	Data transmit to and from the SAM1 card (T=1 Communication)
48h	SAM1 warm reset.
49h	Data transmit to and from the SAM1 card (Automatic Communication)
4Ah	SAM1 power on (Cold Reset) (EMV mode)
50h	SAM2 power on(Cold Reset) (EMV or ISO-7816 mode) Depending to the Vcc option. (In case there is no Vcc word, it will have 33h as default value(ISO-7816))
51h	SAM2 power off
52h	SAM2 Status
53h	Data transmit to and from the SAM2 card (T=0 Communication)
54h	Data transmit to and from the SAM2 card (T=1 Communication)
58h	SAM2 warm reset.
59h	Data transmit to and from the SAM2 card (Automatic Communication)
5Ah	SAM2 power on (Cold Reset) (EMV mode)

*Vcc option :

30h	Supplies with 5V to VCC and activates with the EMV.
33h	Supplies with 5V to VCC and activates with the ISO-7816-3.



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35h	Supplies with 3V to VCC and activates with the ISO-7816-3. After ATR reception, IFM supplies voltage to VCC in accordance with the value of ATR(VCC 3V then 5V). (IC Card only)
36h	Supplies with 5V to VCC and activates with the ISO-7816-3. After ATR reception, IFM supplies voltage to VCC in accordance with the value of ATR(VCC 5V then 3V). (IC Card only)
38h	Activates ICC according to ISO-7816-3. After ATR reception, VCC is supplied in order of 5V, 3V, and 1.8V. (IC Card only)

**** IC Error Code List**

*When IC card error occur, IFM send error response to HOST more detail.
(See 7.5. IC Error Code List)*

Pm: 32h, 42h, 52h

Positive Response Data :

30h 30h	IC Card Power On and Online
30h 31h	IC Card Power Off
30h 32h	IC Card not present

Negative Response Data : (See 7.5. IC Error Code List)

8.15. RF CARD CONTROL (cm = 50h)

RF CARD CONTROL command is for communication with the RF card.

8.15.1. Command

'C'	50h	Pm	Data*
-----	-----	----	-------

* Hexa value (2 X n bytes)

8.15.2. Positive Response

'P'	50h	Pm	st1	st0	Data*
-----	-----	----	-----	-----	-------

* Hex value

8.15.3. Negative Response

'N'	50h	Pm	e1	e0
-----	-----	----	----	----

pm: specify the commands

30h	Data transmit to and from the RF Card (internal)
31h	Data transmit to and from the RF Card (external)



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9. DIMENSION 9-1 STANDARD DIMENSION

