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# **Card Collecting Machine for RF card (CCM-4600)**

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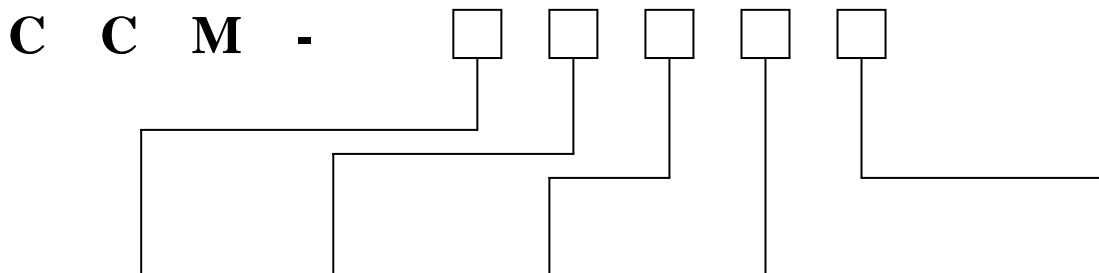
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REVISION HISTORY

No	DATE	DESCRIPTION	REV	PAGE	F/W Name
1	2005.02.17	Preliminary Version	X1	45	
2	2005.04.08	Revision	A	49	
3	2006.11.03	Modified the model name information in the SPEC	B	49	

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## MODEL NAME INFORMATION



Interface Type	Function	MS / IC / RF	Track	Option	Capacity
RS - 232C	4: Dual cartridge collector machine	0 : - 1 : MS Only 2 : MS & IC-Contact 3 : MS & RF 4 : MS & IC & RF 5 : IC-Contact Only 6 : RF Only 7 : IC & RF	0 : Without magnetic 1 : ISO 1 Track 2 : ISO 2 Track 3 : ISO 3 Track 4 : ISO 1,2 Track 5 : ISO 1,3 Track 6 : ISO 2,3 Track 7 : ISO 1,2,3 Track	0: Without bezel 1: LOW-CO Short bezel 2: HI-CO Short bezel 3: LOW-CO & Shutter 4: HI-CO & Shutter 5: Shutter	A : 600 마  B : 1000 마   Card standard: 0.76T

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## **OVERVIEW**

CCM-4600 model is set of card collecting machine for RF card. This model can be used for RF card conforming to the MIFARE and ISO-14443.

This model has the following advantages:

1. Remove the latency due to the user-based card exchange, by collecting 1000 PCS(0.76mm card) at a time.
2. Use the different type of card using two cartridges.

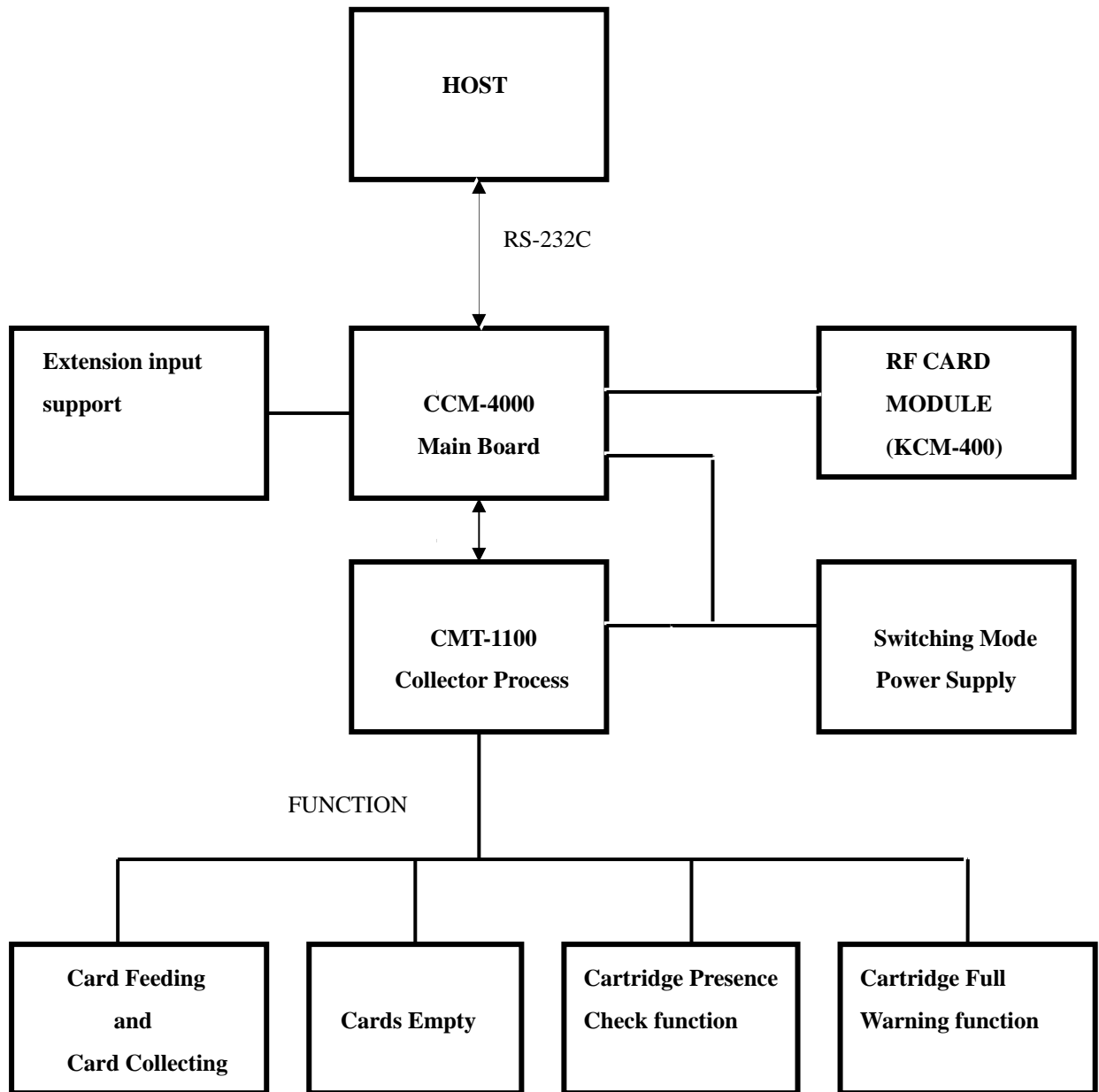
As an automatic collecting machine, this model can be used in collecting most types of card area.

Main applications:

1. Automatic Card Collecting Equipment
2. Parking Equipments
3. Highway Toll Collection System
4. Mass Card Issuing System
5. Access Control System and etc.

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**SYSTEM BLOCK DIAGRAM**



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## **SPECIFICATION**

### ◆ Configuration of CCM-4600

This is Card Collecting Machine that RF card data to read and write through the RS-232C.

1. Cartridge
  - Collecting capability up to 500 PCS cards.
2. Card collecting unit (CMT-1100)
  - This unit is feeding and collecting with each of 500 PCS cards, total 1000 PCS cards.
3. Main control module
  - This module is control to Card Collecting Machine.
4. RF Card module (KCM-400)
  - This module interface RF card interface
5. SMPS
  - AC 110~220V Free voltage, 50~60Hz, 3A

### ◆ Main functions

- Card collecting time: about 2sec from entrance to stacker.
- Cartridge Full warning function
- Cartridge Presence check function
- Cards Empty

### ◆ Basic functions

	Spec	Remark
Dimension	287mm(W) x 302mm(L) x 562mm(H)	
Weight	90Kg	
Input power	AC 110~220V (FREE VOLTAGE)	
Card Feeding Speed	510mm/Sec ±10%	

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◆ *Communication Method*

Asynchronous, Half duplex.

Baud Rate : 9600 – 38400Bps , Default : 38400Bps

Start Bit : 1Bit

Data Length : 8Bit

Parity : None

Stop Bit : 1Bit

◆ *Environment Requirements*

Operating Locus : in door use Only

Ambient Temperature

Storage : -20 °C to 70 °C(No functional error to be found in 12 hours after returning to normal environment)

Operating : 5 °C to 50°C

Ambient Relative Humidity

Storage : 0% to 95% RH(No functional error to be found in 12 hours after returning to normal environment)

Operating : 5 % 90% RH(No Condensation)

Vibration

: Amplitude 2mm, 10 to 50 Hz in X, Y, Z directions for 30min, 2G or less

Shock Endurance

: 30G, 11ms

Life Time : More than 500,000 card pass

Error Rate : Less than 3/1000 cycle(Test Card : KYT Standard)

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## **RF CARD PROCESS**

The RF module supports most of RF cards conforming with the ISO14443-3 Type A (MIFARE Card) with 8 Kbytes memory.

◆ *Processing time* : Once Block

Command	Parameter	Time (mSec)		Note
		Type	Max	
Card Read	1 Block	50		Without card moving
Card Write	1 Block	50		Without card moving, With Verify
Card Decrement	1 Block	80		Without card moving
Card Increment	1 Block	80		Without Card moving

◆ *Operating Frequency*

Operating Frequency : 13.56 MHz

Data Transfer Baud : Baud rate 106Kbaud

◆ *Operating range of the Antenna*

Guar. Operating range : All distances in the range of 0 ... 50 mm from the antenna board.

Typical operating range : 0 ... 45 mm

◆ *Power Consumption*

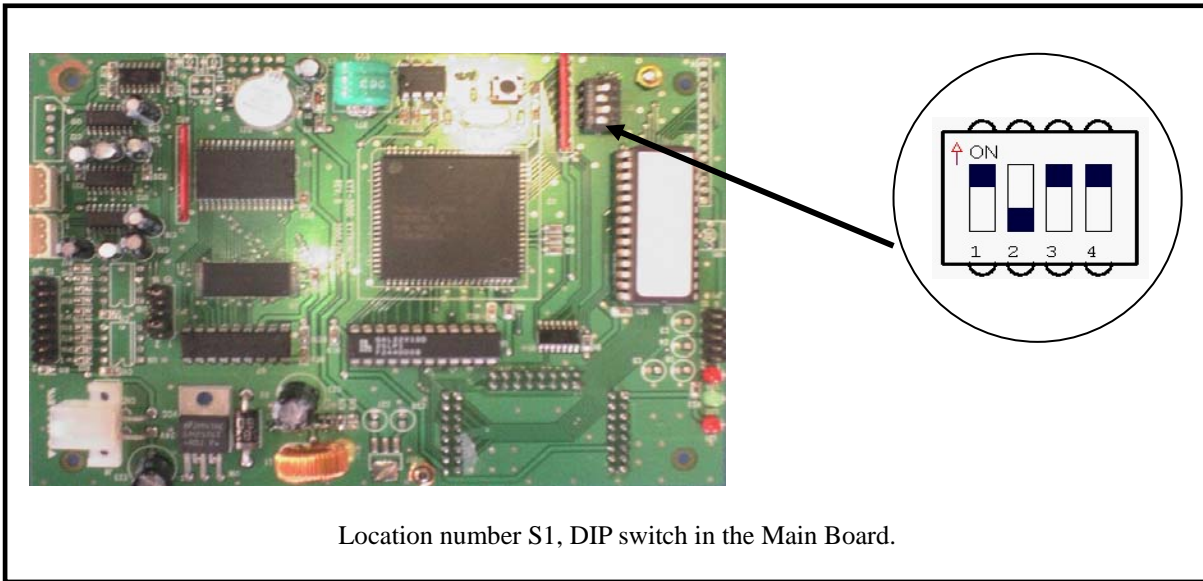
Supply Voltage	Operating Voltage	Operating Current	
		Typical	Max
+ 5V	+5V +-5%	100mA	150mA



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### DIP switch setting

- To provide basic operation and function setting of terminal, DIP(Dual In type Package ) switch in the main board has selection of main program and function of communication speed setting.



PIN NO.1 is select collecting program.

STATE	DESCRIPTION	REMARK
ON	Select main program to collecting program.	Default
OFF	Select main program to issuing program.	

PIN NO.2 is not use.

PIN NO.3 and PIN NO.4 use setting of communication speed in the terminal.

PIN NO.3	PIN NO.4	COMMUNICATION SPEED(BPS)	REMARK
OFF	OFF	9600 BPS	
ON	OFF	19200 BPS	
OFF	ON	38400 BPS	
ON	ON	38400 BPS	Default

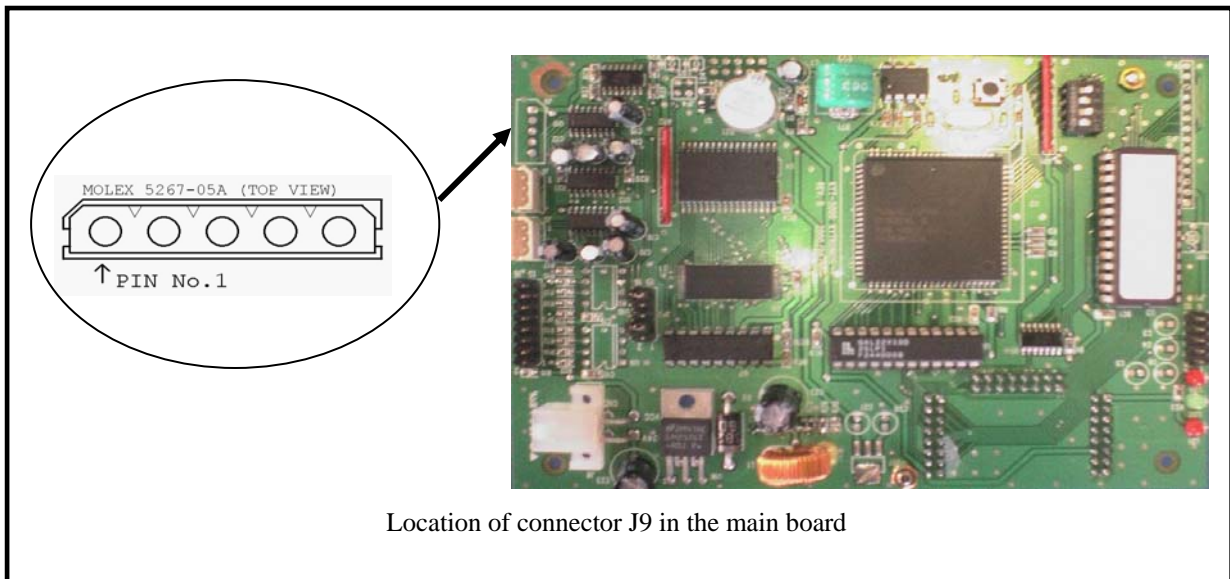
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### Extension Input port

- Extension input port support to check external input signal level in the terminal, input data can check through the command “C17”.

- The terminal use J9 connector that support to extension I/O port. This connector use the connector 5267-05A (MOLEX).

- **Caution:** Each of input connected internal 10K pull-up resistor.



### Connector name J9 PIN arrangement and description

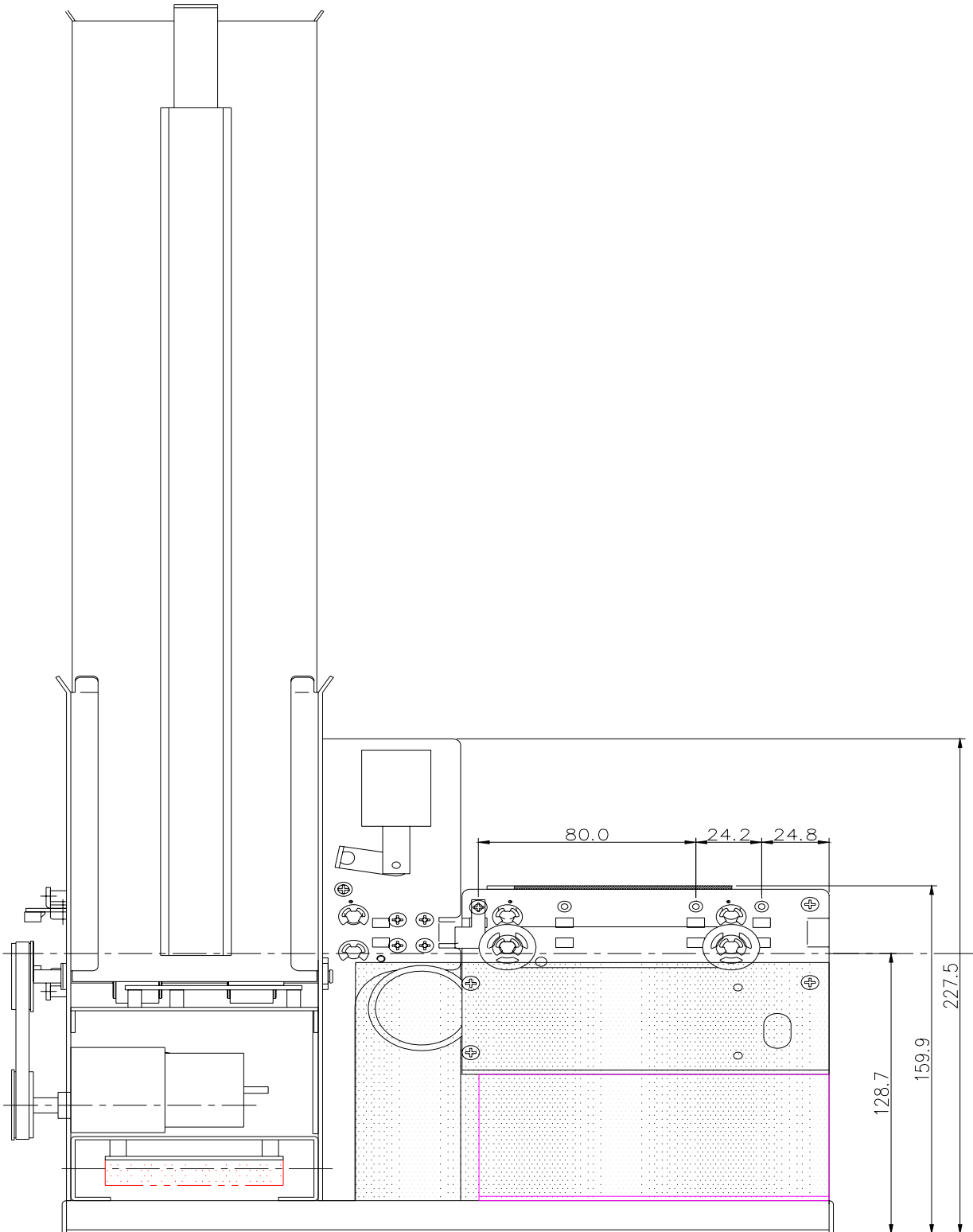
NO.	DESCRIPTION	REMARK
1	VCC	DC +5V
2	OUTPUT PORT	Not use
3	INPUT PORT1	
4	INPUT PORT2	
5	GROUND	

### Input voltage range setting

SYMBOL	MIN	MAX	UNIT
VIL	0	0.4	V
VIH	3.0	5.25	V

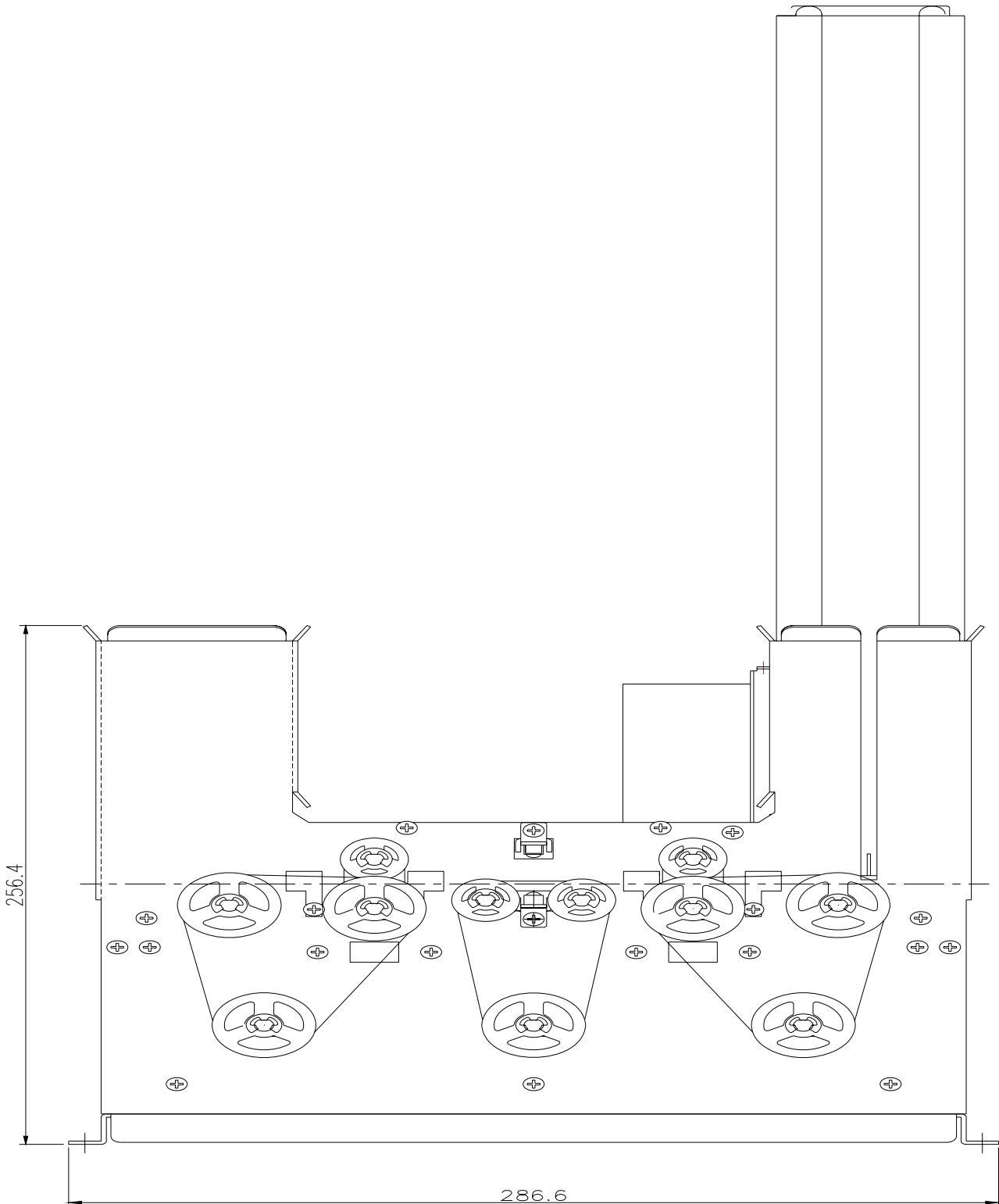
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**Mechanical dimension**



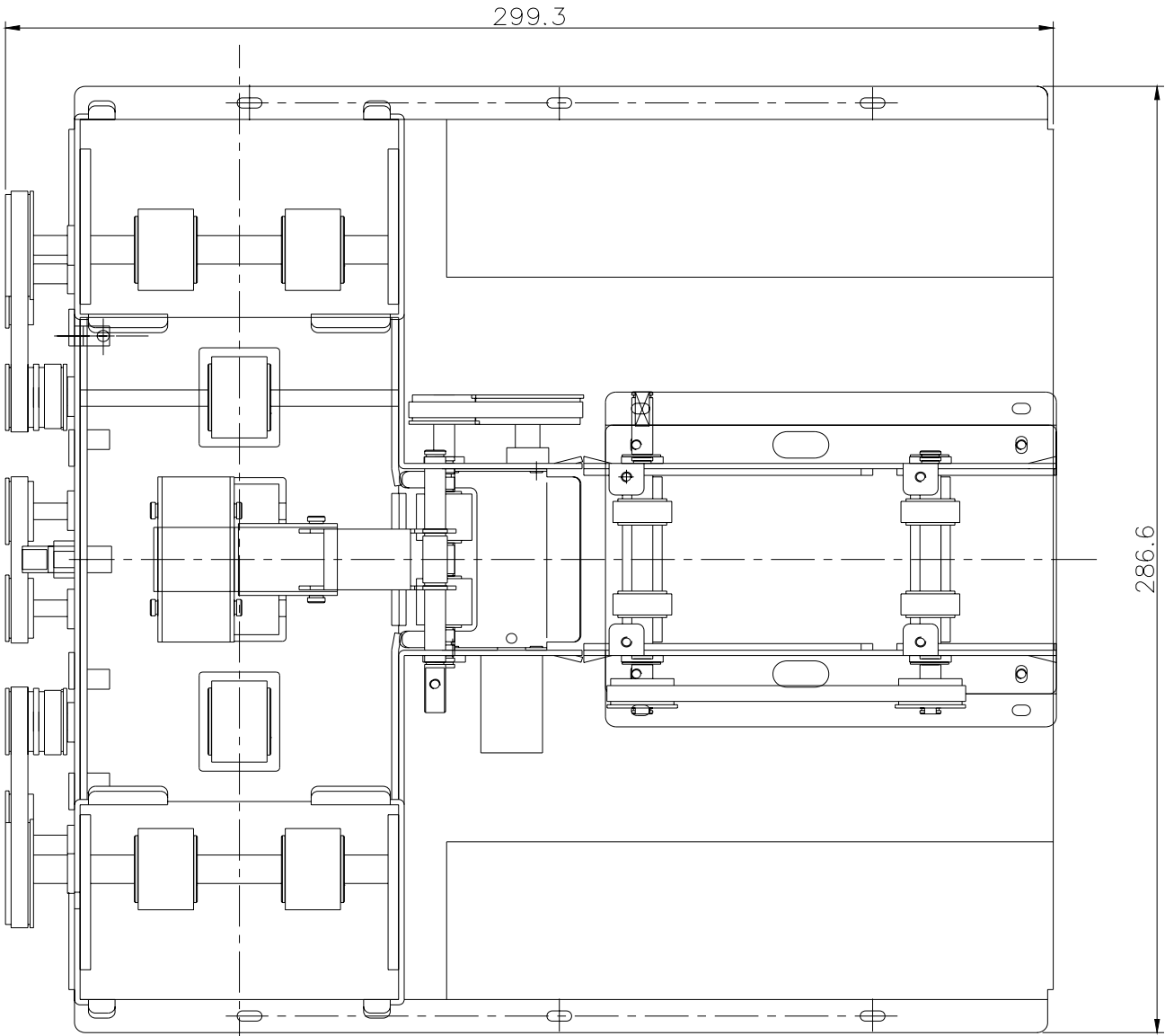
**<Front view>**

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**<Side View>**

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**<Top View>**

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## **Communication Protocol version 0.1**

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## COMMUNICATION INTERFACE

### ◆ *Communication Method*

Asynchronous, Half duplex.

Baud Rate : 9600 – 38400Bps , Default : 38400Bps

Start Bit : 1Bit

Data Length : 8Bit

Parity : None

Stop Bit : 1Bit

### ◆ *Communication Protocol Format*

#### *1 Command Frame Format.*

SOH	Null	Length	STX	CMD	DATA	ETX	BCC
-----	------	--------	-----	-----	------	-----	-----

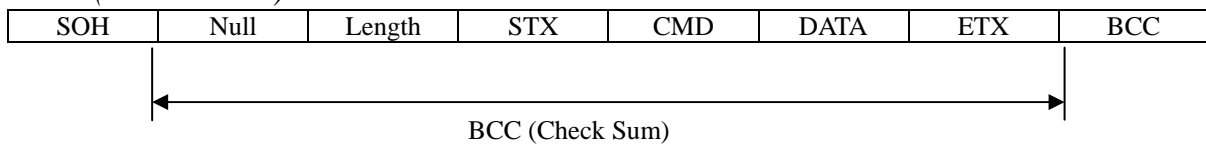
#### *2 Positive Response Frame Format*

SOH	Null	Length	STX	CMD	GOOD	0x01	DATA	ETX	BCC
-----	------	--------	-----	-----	------	------	------	-----	-----

#### *3 Negative Response Frame Format*

SOH	Null	Length	STX	CMD	E-Code	0x00	ETX	BCC
-----	------	--------	-----	-----	--------	------	-----	-----

#### *4 BCC (Check Sum)*



Command Frame BCC = Null ^ Length ^ STX ^ CMD ^ DATA ^ ETX.

Positive Response BCC = Null ^ Length ^ STX ^ CMD ^ GOOD ^ 0x01 ^ DATA ^ ETX.

Negative Response BCC = Null ^ Length ^ STX ^ CMD ^ E-Code ^ ETX.

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### 5. Explanatory note of technical words

Name	Detail
Null	Reserved. Always 0x00.
Length	Data Length from the CMD to DATA.
CMD	Instruction Code (3 Bytes)
GOOD	Normal Execution : 0x0000 (2 Bytes)
E-Code	Command Failed: Refer to "Error Code" (2 Bytes)
BCC	Check Sum.

<Length>, <E-Code>

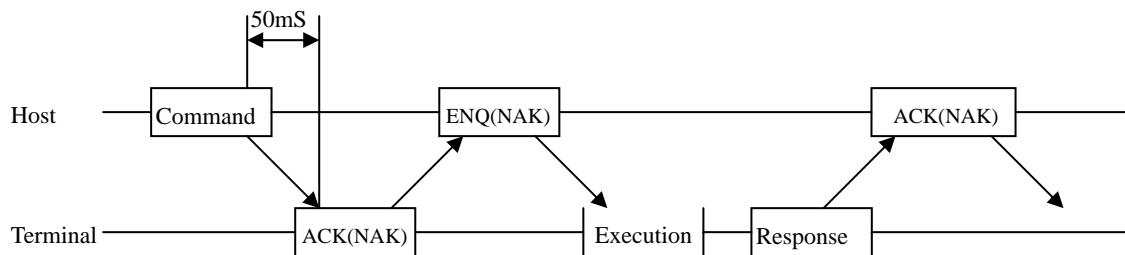
High Byte	Low Byte
-----------	----------

### 6. Control Characters

Name	Hex Value	Detail
SOH	0x01	Start of Header
STX	0x02	Start of Text
ETX	0x03	End of Text
ENQ	0x05	Enquiry
ACK	0x06	Positive Acknowledge
NAK	0x15	Negative Acknowledge
CAN	0x18	Cancel

## 7 COMMUNICATION SEQUENCE / TIMING

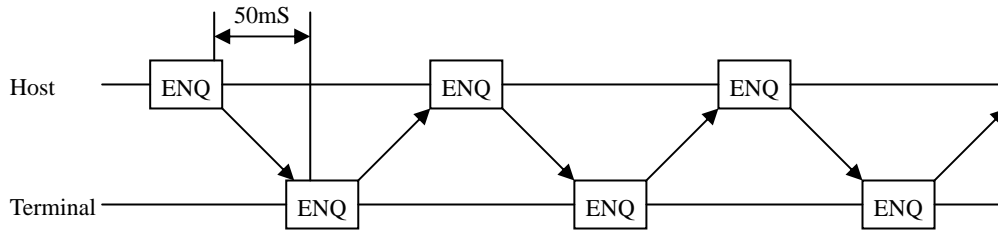
### 7.1 Command



### 7.2 Inquiry

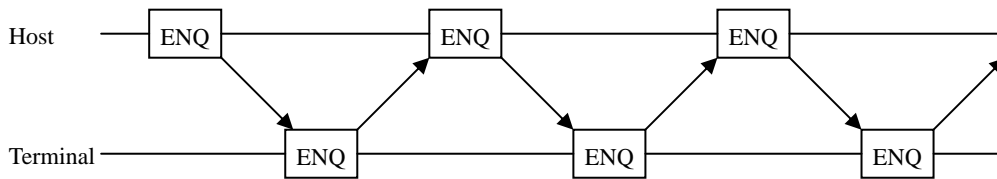
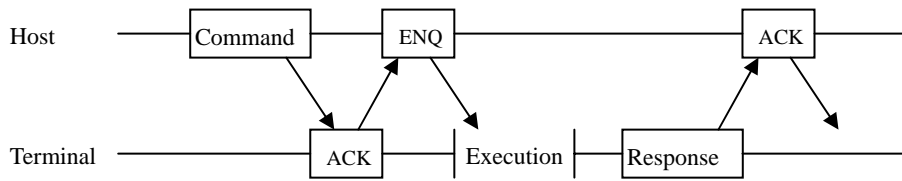


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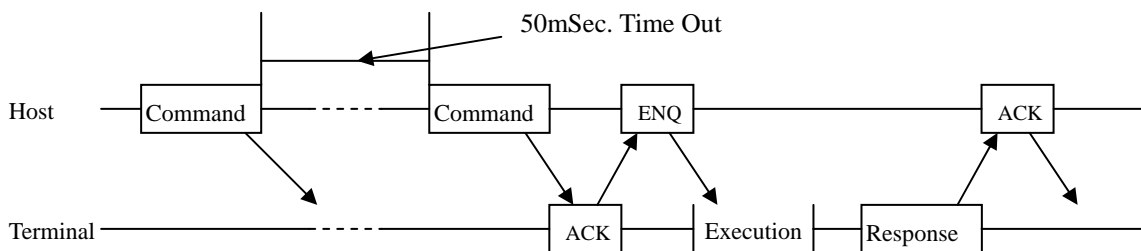


### 7.3 Sequence

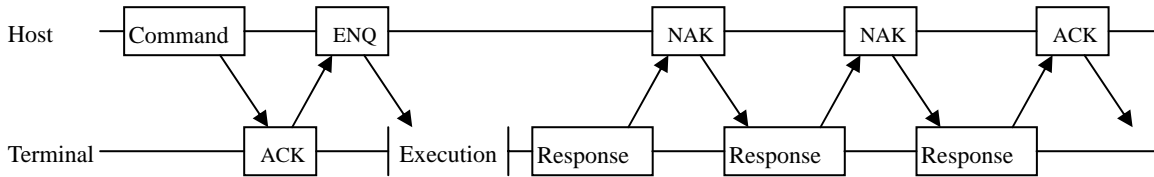
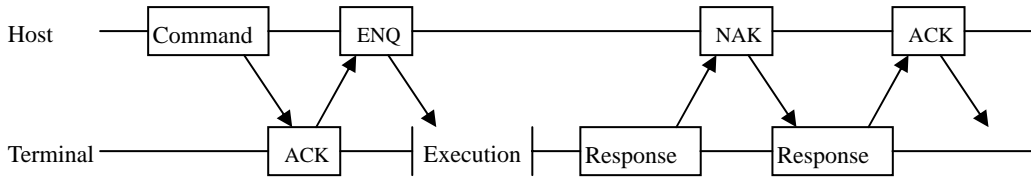
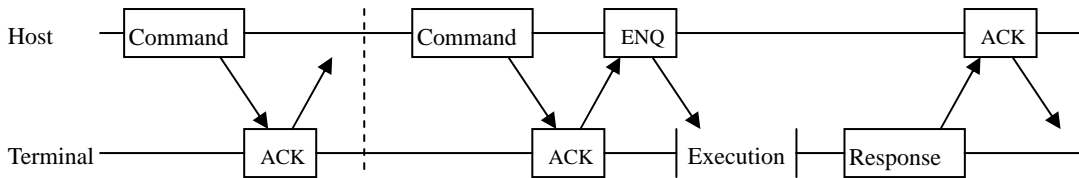
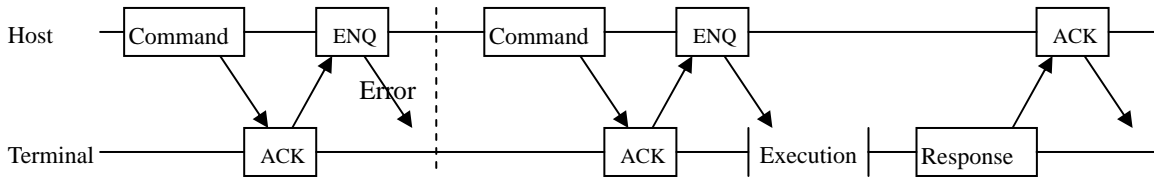
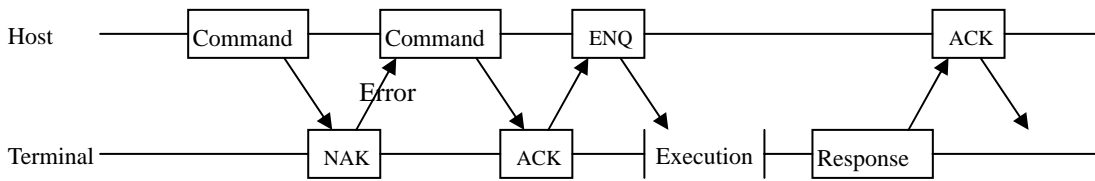
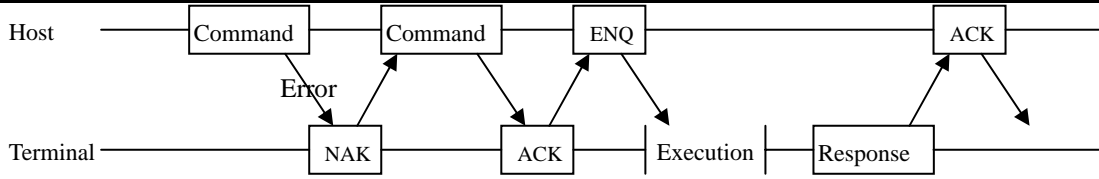
#### 7.3.1 General



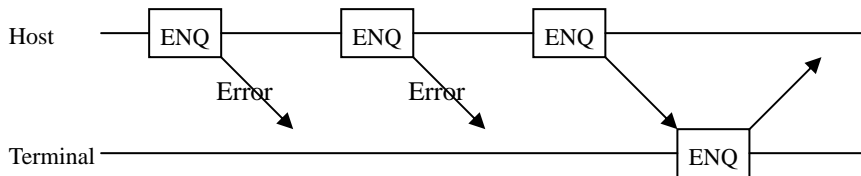
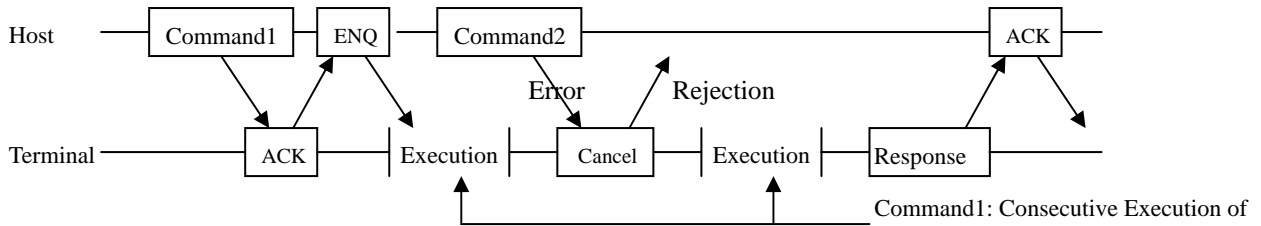
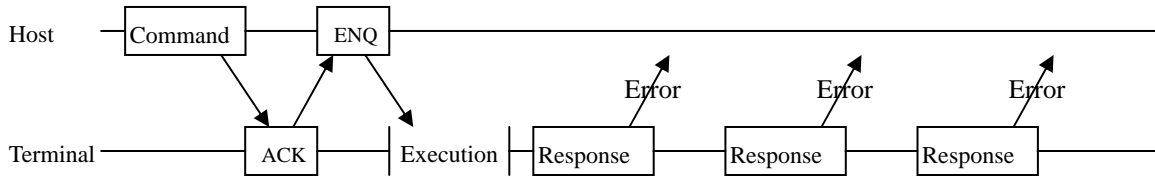
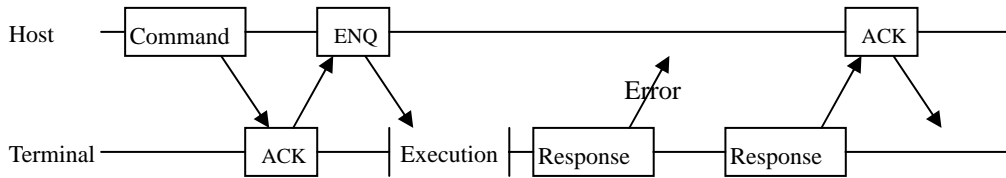
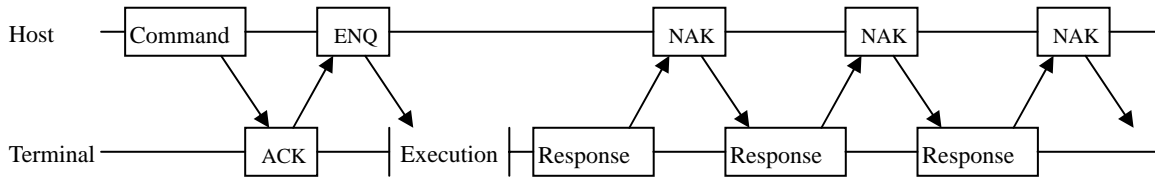
#### 7.3.2 Error1



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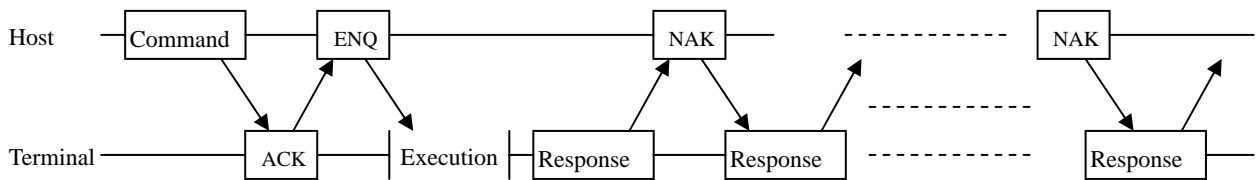
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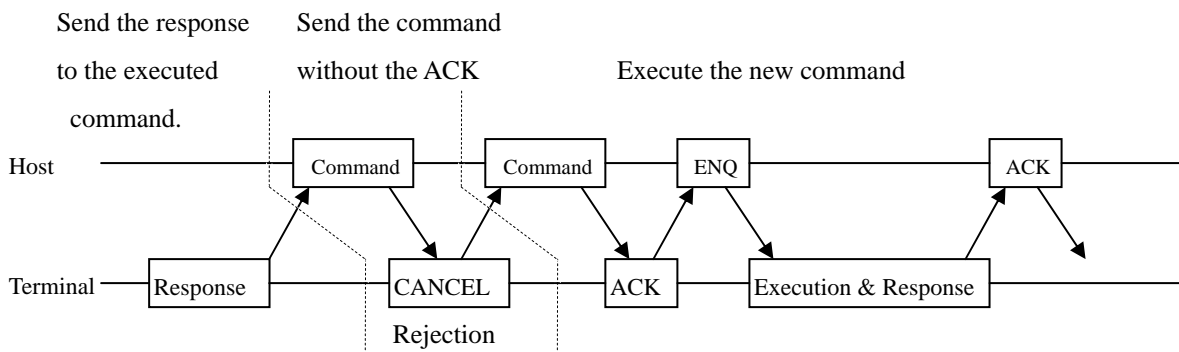
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### 7.3.3 Error2

- When received the NAK packet consecutively.



- When the Host sends the command without the ACK packet.



The terminal should ignore the command received before it sends the ACK packet, send the CANCEL packet. The second command will be treated as the ACK packet and executed with no ACK.

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## COMMAND DETAIL

### ◆ *Command List*

	Item	Cm0	Cm1	Cm2	Detail	Note
COMMON	STATUS	'C'	'1'	'1'	Get Model	
		'C'	'1'	'2'	Get Firmware Version	
		'C'	'1'	'3'	Get Stacker	
		'C'	'1'	'4'	Get Status List	
		'C'	'1'	'6'	Get Card Position	
		'C'	'1'	'7'	Get Status of Input port	
	SETTING	'C'	'2'	'1'	Set RTC IC	Check
		'C'	'2'	'4'	Set Retry Count	
		'C'	'2'	'5'	Set Buzz On/Off Control.	
		'C'	'2'	'6'	Set Baud Rate	
		'C'	'4'	'0'	Set User Buzz	Check
	MOVE	'C'	'3'	'2'	Card Move to	
'C'		'3'	'3'	Card Eject to	Forward	
'C'		'3'	'9'	Card Move to Stacker		
RF CARD	READ / WRITE	'R'	'3'	'1'	Read RF card data in block range	
		'R'	'3'	'2'	Write RF card data in block range	
		'R'	'3'	'3'	Read RF card without checking sensor	
		'R'	'3'	'4'	Write RF card without checking sensor	
		'R'	'3'	'6'	Read RF card data in sector range	
		'R'	'3'	'7'	Write RF card data in sector range	
	BALANCE	'R'	'4'	'1'	Increases balance in RF card	
		'R'	'4'	'2'	Decreases Decrement	
		'R'	'4'	'3'	Increases balance without checking sensor	
		'R'	'4'	'4'	Decreases balance without checking sensor	
	SECRET KEY CHANGE	'R'	'5'	'3'	Select 'Secret Key Index'	
		'R'	'5'	'4'	Change RF Card 'Secret Key' to other key	
		'R'	'7'	'1'	Make "Secret Keys down load" started	
		'R'	'7'	'2'	Change 'Secret Key' to other key	
	RF DETECT	'R'	'6'	'1'	Check RF card in antenna area	
		'R'	'6'	'2'	Check RF card without checking sensor	

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### ◆ *Common*

These commands include the terminal setting and the card movement related commands.

The 'STATUS' commands provide the function to check the current terminal status and the errors occurred during the command execution.

The 'SETTING' commands consist of commands for setting the terminal and these commands is easy to use because the same command can use for both setting and checking the terminal.

The 'MOVE' commands consist of commands used commonly like the card eject and capture command.

#### **Commands Set:**

Item	Cm0	Cm1	Cm2	Detail	Note
STATUS	'C'	'1'	'1'	Get Model	
	'C'	'1'	'2'	Get Firmware Version	
	'C'	'1'	'3'	Get Stacker	
	'C'	'1'	'4'	Get Status List	
	'C'	'1'	'6'	Get Card Position	
	'C'	'1'	'7'	Get Status of Input port	
SETTING	'C'	'2'	'1'	Set RTC IC	Check
	'C'	'2'	'4'	Set Retry Count	
	'C'	'2'	'5'	Set Buzz On/Off Cont.	
	'C'	'2'	'6'	Set Baud Rate	
	'C'	'4'	'0'	Set User Buzz	Check
MOVE	'C'	'3'	'2'	Card Move in feeder.	
	'C'	'3'	'3'	Card Eject	Forward
	'C'	'3'	'9'	Card Move to Stacker	

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## 1 STATUS / SETTING

### 1.1 "C11" : It is to check out Model number of Terminal

#### ☞ Command Format

SOH	Null	Length	STX	"C11"	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	"C11"	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	"C11"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Model No
30 Byte (ASCII)

### 1.2 "C12" : It is to check out Firmware Version of Terminal

#### ☞ Command Format

SOH	Null	Length	STX	"C12"	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	"C12"	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	"C12"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Version
30 Byte (ASCII)

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### 1.3 “C13” : It is check out status of Stacker of Terminal

#### ☞ Command Format

SOH	Null	Length	STX	“C13”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	“C13”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“C13”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Stacker 1	Stacker 2
1Byte (Hex)	1Byte (Hex)

#### ☞ Data Variable

<Stacker1>

Code	Status
0x01	Stacker #1 Good
0x03	Stacker #1 Empty
0x04	Stacker #1 Full
0x05	Stacker #1 No Cartridge

<Stacker2>

Code	Status
0x01	Stacker #2 Good
0x03	Stacker #2 Empty
0x04	Stacker #2 Full
0x05	Stacker #2 No Cartridge

### 1.4 “C14” : It is to check out current Status of Terminal

#### ☞ Command Format

SOH	Null	Length	STX	“C14”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	“C14”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“C14”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Error Code (1)	---	Error Code (N)
High Byte	Low Byte	
2Byte		



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**Note**

You can identify the stacker status, motor status, card status (jamming) and communication status through the Error Code in the response data structure.

**1.5 “C16” : The card is check by existent location.**

**Command Format**

SOH	Null	Length	STX	“C16”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

**Positive Response Format**

SOH	Null	Length	STX	“C16”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

**Negative Response Format**

SOH	Null	Length	STX	“C16”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

**Response Data Structure**

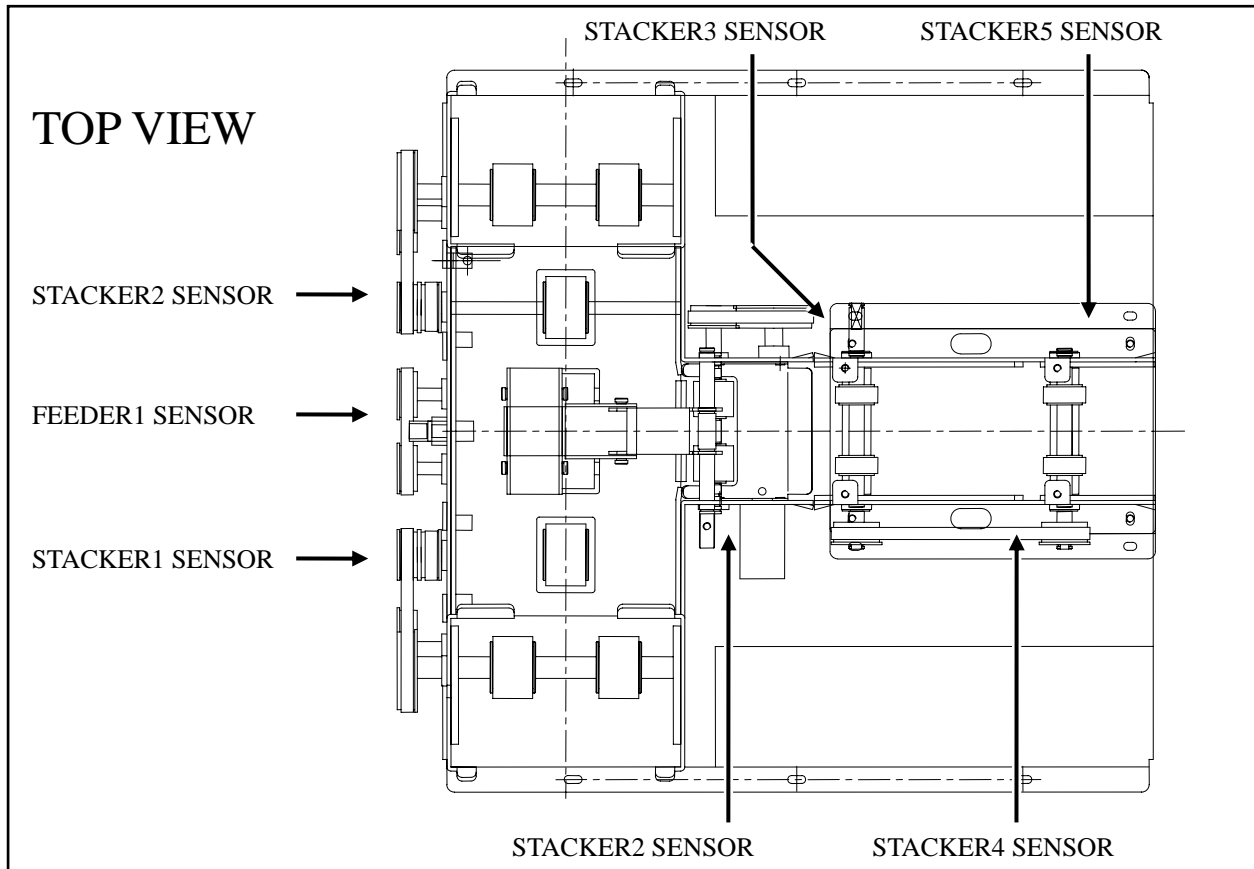
Card Position
1Byte (Hex)

**Data Variable**

<Card Position>

Code	Sensor	Detail
0x01	STK1	The card is locate STACKER1 sensor
0x02	STK2	The card is locate STACKER2 sensor
0x04	SEN1	The card is locate FEEDER1 sensor
0x08	SEN2	The card is locate FEEDER2 sensor
0x10	SEN3	The card is locate FEEDER3 sensor
0x20	SEN4	The card is locate FEEDER4 sensor
0x40	SEN5	The card is locate FEEDER5 sensor

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#### 1.6 “C17” : It is to get status of input port in connector ‘J9’

##### Command Format

SOH	Null	Length	STX	“C17”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

##### Positive Response Format

SOH	Null	Length	STX	“C17”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

##### Negative Response Format

SOH	Null	Length	STX	“C17”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

##### Response Data Structure

In-port1	In-port2
1Byte (Hex)	1Byte (Hex)

##### Data Variable

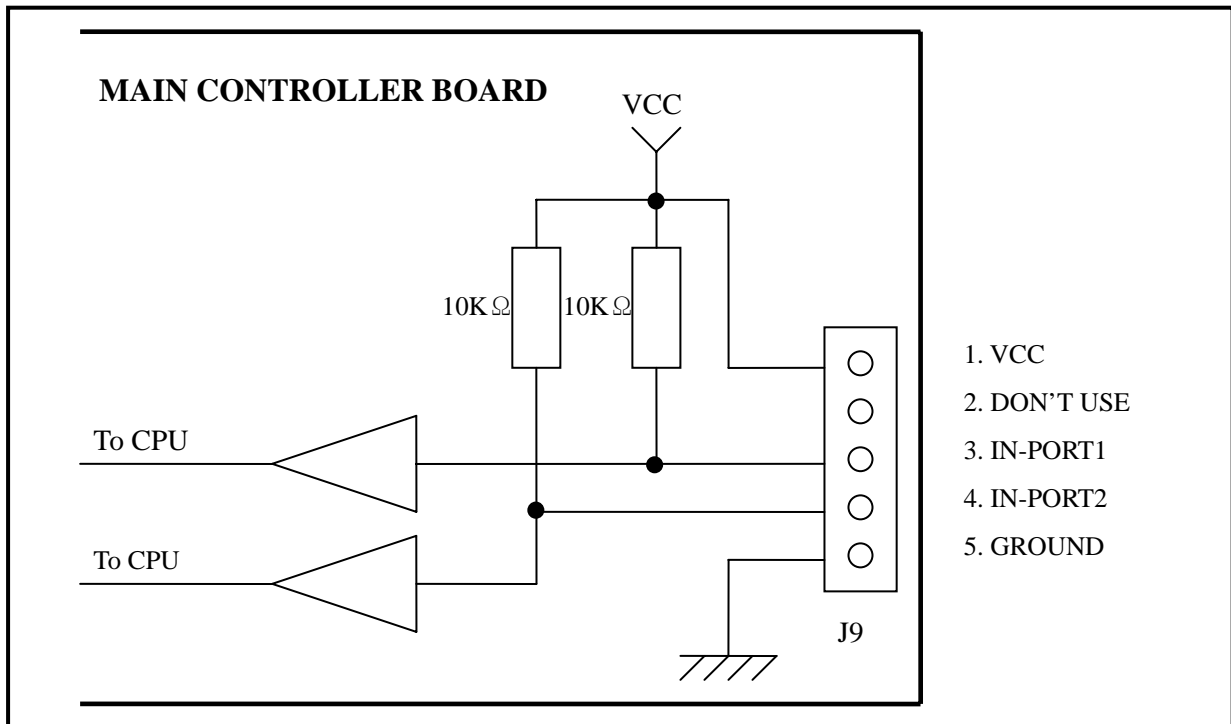
<In-port1, In-port2>

Input Level	Logical Level	Response Data
Ground	Low	0x00
VCC	High	0x01

##### Note

In-port1 and In-port2 are connected to VCC via an internal pull-up 10KΩ resistor

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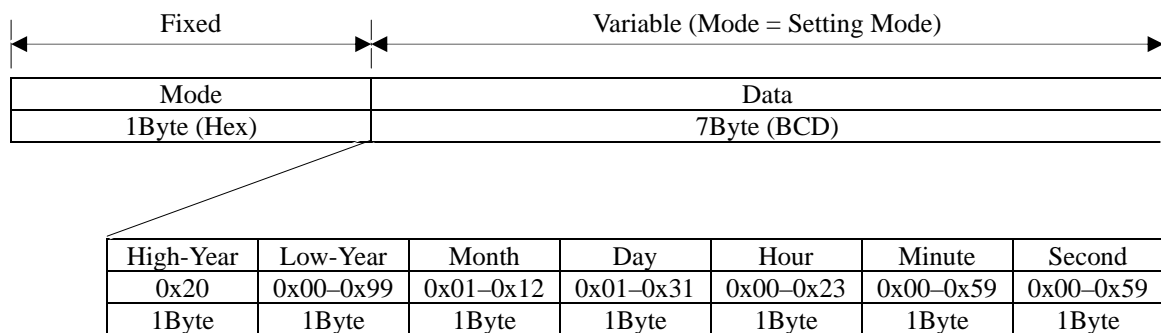
## 2 SETTING

2.1 “C21” : It is to set or to check ‘RTC IC’.

☞ Command Format

SOH	Null	Length	STX	“C21”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure



☞ Positive Response Format

SOH	Null	Length	STX	“C21”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

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☞ Negative Response Format

SOH	Null	Length	STX	“C21”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Variable (Mode = Check Mode)						
High-Year	Low-Year	Month	Day	Hour	Minute	Second
0x20	0x00-0x99	0x01-0x12	0x01-0x31	0x00-0x23	0x00-0x59	0x00-0x59
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte
BCD						

☞ Data Variable

<Mode>

Code	Mode	Detail
0x01	‘Setting Mode’	Set ‘RTC IC’
0x02	‘Check Mode’	Check ‘RTC IC’

☞ Note

‘Day’ is changeable due to the value of ‘Month’.

2.2 “C24” : It is to set or to check ‘Retry Count’.

☞ Command Format

SOH	Null	Length	STX	“C24”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Fixed		Variable (Mode = Setting Mode)	
Mode	Retry Count		
1Byte (Hex)	1Byte (Hex)		

☞ Positive Response Format

SOH	Null	Length	STX	“C24”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C24”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Variable (Mode = Check Mode)	
Retry Count	
1Byte (Hex)	

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☞ Data Variable

<Mode>

Code	Mode	Detail
0x01	'Setting Mode'	Set 'Retry Count'
0x02	'Check Mode'	Check 'Retry Count'

<Retry Count>

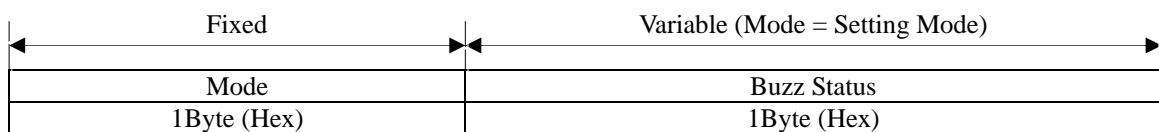
Code	Setting	Detail	Note
0x00	NON	Do not retry	
0x01	Once	Execute the instruction again.	
0x02	Twice	Retry it twice	
0x03	Three times	Retry it three times	Default
0x04	Four times	Retry it four times	
0x05	Five times	Retry it five times	

### 2.3 "C25" : It is to set or to check 'Buzz Control'.

☞ Command Format

SOH	Null	Length	STX	"C25"	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure



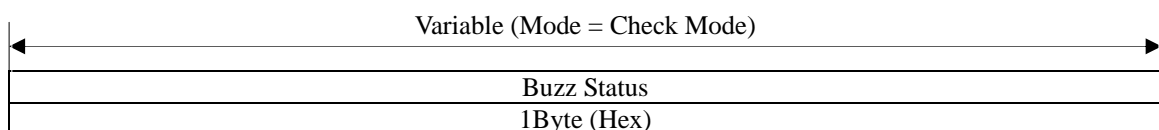
☞ Positive Response Format

SOH	Null	Length	STX	"C25"	GOOD	'1'	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	"C25"	E-Code	'0'	ETX	Bcc
-----	------	--------	-----	-------	--------	-----	-----	-----

☞ Response Data Structure



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☞ Data Variable

<Mode>

Code	Mode	Detail
0x01	'Setting Mode'	Set 'Buzz Control'
0x02	'Check Mode'	Check 'Buzz Control'

<Buzz Status>

Code	Setting	Detail	Note
0x01	Buzz Off	Buzz Off	
0x02	Buzz On	Buzz On	Default

☞ Note

## 2.4 "C26" : It is to change 'Baud Rate'.

☞ Command Format

SOH	Null	Length	STX	"C26"	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Baud Rate
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	"C26"	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	"C26"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

☞ Data Variable

<Baud Rate>

Code	Setting	Detail	Note
0x01	9600Bps	Set Baud Rate to be 9600Bps	
0x02	19200Bps	Set Baud Rate to be 19200Bps	
0x03	38400Bps	Set Baud Rate to be 38400Bps	

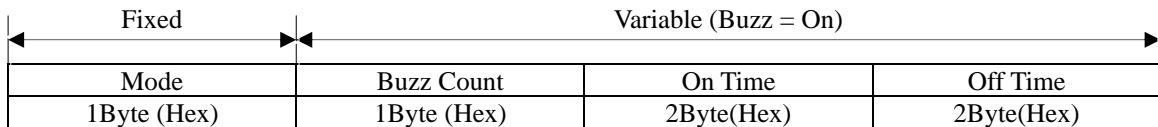
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2.5 “C40” : The BUZZ is operate by internal terminal.

☞ Command Format

SOH	Null	Length	STX	“C40”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure



☞ Positive Response Format

SOH	Null	Length	STX	“C40”	GOOD	‘1’	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C40”	E-Code	‘0’	ETX	Bcc
-----	------	--------	-----	-------	--------	-----	-----	-----

☞ Data Variable

<Mode>

Code	Buzz	Detail
0x01	On	Set Buzz ON
0x02	Off	Set Buzz OFF

<Buzz Count>

Code	Buzz Count	Detail	Note
0x00	Continuous	Buzz continuous occur.	Default
0x01	1	Buzz one time occur.	Note
0x02	2	Buzz two times occur.	Note
---	---	---	---
0x64	100	Buzz hundred times occur.	Note

<On Time/Off Time>

Code	Range	Detail	Note
On Time	100 – 10000	Buzz sound active time	mSec
Off Time	100 – 10000	Buzz sound non active time.	mSec

<On Time>, <Off Time>

High Byte	Low Byte
-----------	----------

☞ Note

If set ‘Buzz one time occur’, after the terminal is Buzz one time occur, return to ‘Buzz Off’ state.

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### 3 MOVE

#### 3.1 “C32” : It is take card to Card Reader / Writer Module

☞ Command Format

SOH	Null	Length	STX	“C32”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Module
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“C32”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C32”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Data Variable

<Module>

Code	Setting	Detail
0x03	RF	Card transport to RF Module

#### 3.2 “C33” : It is to dispense out card to the front.

☞ Command Format

SOH	Null	Length	STX	“C33”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“C33”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C33”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----



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3.3 “C39” : It is to take a card from Stacker and to move it to Card Reader / Writer Module.

☞ Command Format

SOH	Null	Length	STX	“C39”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Stacker
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“C39”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C39”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Data Variable

<Stacker>

Code	Setting	Detail
0x01	Stacker 1	Select Stacker 1
0x02	Stacker 2	Select Stacker 2
0x03	Auto	Select Stacker automatically

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## ◆ RF CARD

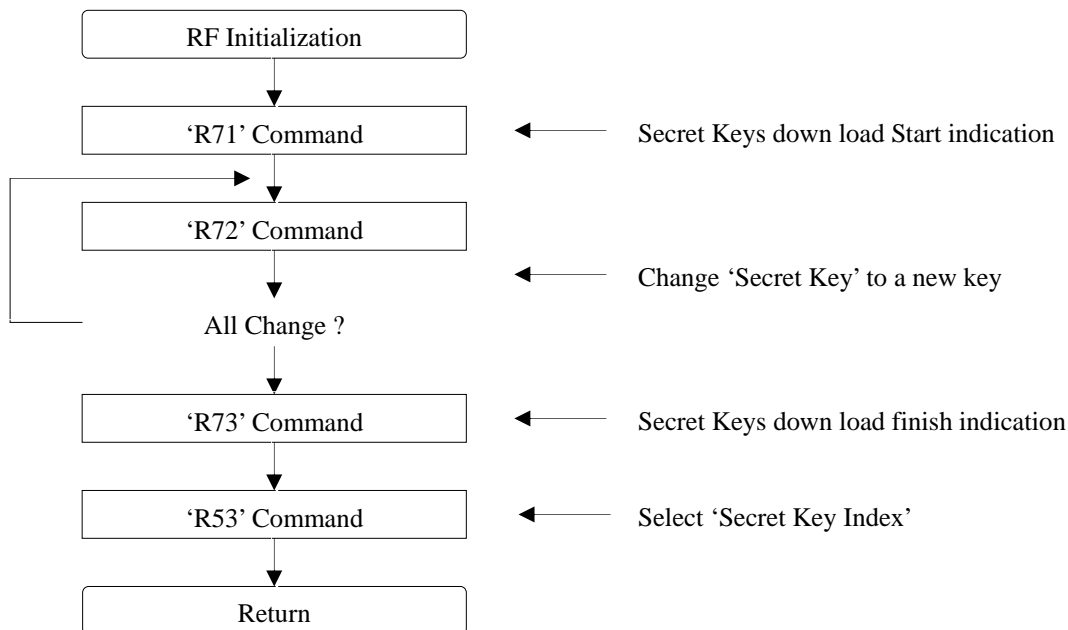
This section describes the commands that can use at the 'RF CARD'.

The RF Module of his model supports only the MIFARE card.

Item	Cm0	Cm1	Cm2	Detail	Note
RF CARD READ /WRITE	'R'	'3'	'1'	Read RF card data in block range	
	'R'	'3'	'2'	Write RF card data in block range	
	'R'	'3'	'3'	Read RF card without checking sensor	
	'R'	'3'	'4'	Write RF card without checking sensor	
	'R'	'3'	'6'	Read RF card data in sector range	
	'R'	'3'	'7'	Write RF card data in sector range	
BALANCE	'R'	'4'	'1'	Increases balance in RF card	
	'R'	'4'	'2'	Decreases Decrement	
	'R'	'4'	'3'	Increases balance without checking sensor	
	'R'	'4'	'4'	Decreases balance without checking sensor	
CHANGE SECRET KEY	'R'	'5'	'3'	Select 'Secret Key Index'	
	'R'	'5'	'4'	Change RF Card 'Secret Key' to other key	
	'R'	'7'	'1'	Make "Secret Keys down load" started	
	'R'	'7'	'2'	Change 'Secret Key' to other key	
	'R'	'7'	'3'	Make "Secret Keys down load" finished	
RF DETECT	'R'	'6'	'1'	Check RF card in antenna area	
	'R'	'6'	'2'	Check RF card without checking sensor	

To use the RF card, you need to initialize at first.

- Setting and updating of the secret key and secret key index.



RF Module Initialization

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Memory Architecture(map) of the RF card: 8Kbit

Sector	Block	Size	Detail	Note
Sector 0	Block 0	16Byte	RF Card Information	Can't use
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
Sector 1	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
Sector 2	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
---	---	---	---	---
Sector 15	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		

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## 1 RF CARD READ / WRITE

### 1.1 "R31" : Read RF card data & Secret Key in block range

#### ☞ Command Format

SOH	Null	Length	STX	"R31"	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

#### ☞ Command Data Structure

Sector	Block
0x00 – 0x0f	0x00 – 0x03
1Byte (Hex)	1Byte (Hex)

#### ☞ Positive Response Format

SOH	Null	Length	STX	"R31"	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	"R31"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Sector	Block	Read Data
1Byte (Hex)	1Byte (Hex)	16 Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

### 1.2 "R32" : Write RF card data in block range

#### ☞ Command Format

SOH	Null	Length	STX	"R32"	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

#### ☞ Command Data Structure

Sector	Block	Write Data
0x00 – 0x0f	0x00 – 0x02	0x00 – 0xff
1Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

#### ☞ Positive Response Format

SOH	Null	Length	STX	"R32"	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	"R32"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

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1.3 “R33” : Read RF card data without checking sensors and moving.

☞ Command Format

SOH	Null	Length	STX	“R33”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block
0x00 – 0x0f	0x00 – 0x03
1Byte (Hex)	1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R33”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R33”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Sector	Block	Read Data
1Byte (Hex)	1Byte (Hex)	16 Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

1.2 “R34” : Write RF card data without checking sensors and moving.

☞ Command Format

SOH	Null	Length	STX	“R34”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block	Write Data
0x00 – 0x0f	0x00 – 0x02	0x00 – 0xff
1Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

☞ Positive Response Format

SOH	Null	Length	STX	“R34”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R34”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

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### 1.5 “R36” : Read RF card data in sector range

#### ☞ Command Format

SOH	Null	Length	STX	“R36”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

#### ☞ Command Data Structure

Sector
0x00 – 0x0f
1Byte (Hex)

#### ☞ Positive Response Format

SOH	Null	Length	STX	“R36”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“R36”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Response Data Structure

Sector	0x00	Read Data (Block#0)	0x01	Read Data (Block#1)	0x02	Read Data (Block#2)
1Byte (Hex)	1Byte (Hex)	16Byte	1Byte (Hex)	16Byte	1Byte (Hex)	16Byte

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

### 1.6 “R37” : Write RF card data in sector range (except Sector 0)

#### ☞ Command Format

SOH	Null	Length	STX	“R37”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

#### ☞ Command Data Structure

Sector	Write Data
0x01 – 0x0f	0x00 – 0xff
1Byte (Hex)	51Byte (Hex)

0x00	Write Data (Block#0)	0x01	Write Data (Block#1)	0x02	Write Data (Block#2)
1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

#### ☞ Positive Response Format

SOH	Null	Length	STX	“R37”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“R37”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

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## 2 BALANCE

2.1 “R41” : Increment the balance of card to the specified amount.

### Command Format

SOH	Null	Length	STX	“R41”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

### Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

### Positive Response Format

SOH	Null	Length	STX	“R41”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

### Negative Response Format

SOH	Null	Length	STX	“R41”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

### Note

The balance should be written in the Electronic Purse format in the card.

2.1 “R42” : Decrement the balance of card to the specified amount..

### Command Format

SOH	Null	Length	STX	“R42”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

### Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

### Positive Response Format

SOH	Null	Length	STX	“R42”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

### Negative Response Format

SOH	Null	Length	STX	“R42”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

### Note

The balance should be written in the Electronic Purse format in the card.

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2.3 “R43” : Increment the balance of card to the specified amount without checking sensors and moving.

☞ Command Format

SOH	Null	Length	STX	“R41”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

☞ Positive Response Format

SOH	Null	Length	STX	“R43”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R43”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

The balance should be written in the Electronic Purse format in the card.

2.4 “R44” : Decrement the balance of card to the specified amount without checking sensors and moving.

☞ Command Format

SOH	Null	Length	STX	“R44”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

☞ Positive Response Format

SOH	Null	Length	STX	“R44”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R44”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

The balance should be written in the Electronic Purse format in the card.



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### 3 SECRET KEY

#### 3.1 “R53” : Select ‘Secret Key Index’

##### ☞ Command Format

SOH	Null	Length	STX	“R53”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

##### ☞ Command Data Structure

Index
0x01 – 0x02
1Byte (Hex)

##### ☞ Positive Response Format

SOH	Null	Length	STX	“R53”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

##### ☞ Negative Response Format

SOH	Null	Length	STX	“R53”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

##### ☞ Data Variable

<Index>

Code	Setting	Detail
0x01	KEY A	Select ‘Secret Key A’
0x02	KEY B	Select ‘Secret Key B’

#### 3.4 “R54” : Change RF card ‘Secret Key’ to other key

##### ☞ Command Format

SOH	Null	Length	STX	“R54”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

##### ☞ Command Data Structure

Sector	KEY A	Access	KEY B
0x00 – 0x0f	0x00 – 0xff	0x00 – 0xff	0x00 – 0xff
1Byte (Hex)	6Byte (Hex)	4Byte (Hex)	6Byte (Hex)

##### ☞ Positive Response Format

SOH	Null	Length	STX	“R54”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

##### ☞ Negative Response Format

SOH	Null	Length	STX	“R54”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

##### ☞ Warning

If you use this command incorrectly, it couldn't be authenticated from the card.

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### 3.3 “R71” : make “Secret Key down load” started

#### ☞ Command Format

SOH	Null	Length	STX	“R71”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	“R71”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“R71”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

### 3.4 “R72” : Change ‘Secret Key’ to other(new) key

#### ☞ Command Format

SOH	Null	Length	STX	“R72”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

#### ☞ Command Data Structure

Key Set	Sector	KEY A	KEY B
0x01 – 0x03	0x00 – 0x10	0x00 – 0xff	0x00 – 0xff
1Byte (Hex)	1Byte (Hex)	6Byte (Hex)	6Byte (Hex)

#### ☞ Positive Response Format

SOH	Null	Length	STX	“R72”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“R72”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Data Variable

<Sector>

Sector	KEY A
0x00 – 0x0f	Sector
0x10	All Sector

#### ☞ Note

You have to make ‘R71’ command operated earlier.

### 3.3 “R73” : make “Secret Key down load” finished

#### ☞ Command Format

SOH	Null	Length	STX	“R73”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### ☞ Positive Response Format

SOH	Null	Length	STX	“R73”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

#### ☞ Negative Response Format

SOH	Null	Length	STX	“R73”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### ☞ Note

Indicate “Secret Key down load” finished

Terminal saves the keys changed by “R72” into the FLASH MEMORY.

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## 4 RF DETECT

### 4.1 "R61" : RF card detect in antenna area

#### Command Format

SOH	Null	Length	STX	"R61"	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### Positive Response Format

SOH	Null	Length	STX	"R61"	GOOD	DATA	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### Negative Response Format

SOH	Null	Length	STX	"R61"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### Response Data Structure

Serial Number
Hex Code
4Byte

#### Note

If the RF card is detected, this command send the serial number to host. But, it doesn't authenticate the Secret Key of the RF card.

### 4.2 "R62" : RF card detect in antenna area without checking sensors and moving.

#### Command Format

SOH	Null	Length	STX	"R62"	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

#### Positive Response Format

SOH	Null	Length	STX	"R62"	GOOD	DATA	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

#### Negative Response Format

SOH	Null	Length	STX	"R62"	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

#### Response Data Structure

Serial Number
Hex Code
4Byte

#### Note

If the RF card is detected, this command send the serial number to host. But, it doesn't authenticate the Secret Key of the RF card.

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## ERROR DETAIL

### <GOOD>

Code : 0x0000

Description: Normal Execution

Procedures: None

### <NOT\_DEFINE\_COMMAND>

Code : 0x2001

Description : Using the command that does not defined in this model.

Action : Use the valid command in this model.

### <NOT\_USE\_COMMAND>

Code : 0x2002

Description : Not available command in this model.

Action : Use the valid command in this model.

### <COMM\_FRAME\_ERROR>

Code : 0x2003

Description : Sending the command that has the invalid communication frame.

Action : Check the data format and the corresponding module specification.

### <CARD\_JAM>

Code : 0x2004

Description : When the card is jammed.

Action : Remove the jammed card.

### <NO\_CARD>

Code : 0x2005

Description : No cards.

Action : Insert the card.

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<CARD\_PRESENT>

Code : 0x2006

Description : When the card exists already in the terminal.

Action : Eject the card.

<BUSY>

Code : 0x2007

Description : When the terminal is running or busy.

Action : Wait until the previous operation is completed.

<RTC\_ERROR>

Code : 0x2008

Description : Unavailable Real Time Clock IC.

Action : Change the main control board

<DISPENSER\_ERROR>

Code : 0x2100

Description : Not Applicable Dispenser.

Action : Reset the terminal and exchange the dispenser..

<DISPENSER\_COMM\_ERROR>

Code : 0x2101

Description : Dispenser communication error

Action : Check the communication line and reset the terminal.

<STACKER1\_ERROR>

Code : 0x2102

Description : The first STACKER ERROR

Action : Be sure that the card is loaded at the first stacker.

<STACKER2\_ERROR>

Code : 0x2103

Description: The second STACKER ERROR

Action : Be sure that the card is loaded at the second stacker.

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<ALL\_EMPTY>

Code : 0x2104

Description : No cards at both the first and second stacker.

Action : Load the card in the stacker.

<STACKER1\_EMPTY>

Code : 0x2105

Description : No card at the first stacker.

Action : Load the card at the first stacker.

<STACKER2\_EMPTY>

Code : 0x2106

Description : No card at the second stacker.

Action : Load the card at the second stacker.

<STACKER1\_WARNING>

Code : 0x2107

Description : Too few cards in the first stacker.

Action : Load the card at the first stacker.

<STACKER2\_WARNING>

Code : 0x2108

Description : Too few cards in the second stacker.

Action : Load the card at the second stacker.

<ERROR\_BIN\_FULL>

Code : 0x2109

Description : Too many cards in the 'CAPTURE BOX'.

Action : Keep the capture box empty.

<CARTRIDGE1\_FULL>

Code : 0x2111

Description : Card full in the cartridge of first stacker.

Action : Change the cartridge at the first stacker.

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<CARTRIDGE2\_FULL>

Code : 0x2112

Description : Card full in the cartridge of second stacker.

Action : Change the cartridge at the second stacker.

<STACKER1\_NO\_CARTRIDGE>

Code : 0x2113

Description : No cartridge in the first stacker.

Action : Insert the cartridge in the first stacker.

<STACKER2\_NO\_CARTRIDGE>

Code : 0x2114

Description : No cartridge in the second stacker.

Action : Insert the cartridge in the second stacker.

<CARTRIDGE\_ALL\_NO>

Code : 0x2115

Description : No cartridge in both the first and second stacker.

Action : Insert the cartridge in the stacker.

<RF\_ERROR>

Code : 0x2300

Description : Unavailable RF module.

Action : Change the RF MODULE

<RF\_COMM\_ERROR>

Code : 0x2301

Description : Communication error at the RF Module.

Action : Check the connection socket

<RF\_AUTHEN\_ERROR>

Code : 0x2302

Description : Authentication Error at the RF Module.

Action : Change the 'SECRET KEY'

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<RF\_WRITE\_ERROR>

Code : 0x2303

Description : Error while the terminal writes at the RF Card.

Action : Be sure that the card exists in the detection range.

<RF\_READ\_ERROR>

Code : 0x2304

Description : Error while the terminal reads at the RF Card.

Action: Be sure that the card exists in the detection range.

<RF\_DETECT\_ERROR>

Error Code : 0x2305

Description : No RF Card.

Action : Insert the RF Card into the terminal.

<RF\_VALUE\_ERROR>

Code : 0x2306

Description : Error while the value increases(or decreases) at the RF Card.

Action: Be sure that the card exists in the detection range.

<KEY\_DOWNLOAD\_ERROR>

Code : 0x2310

Description : "Secret Key Download" command sequence error

Action : Check "R71", "R72" and "R73" command in SPEC.

<FLASH\_ERROR>

Code : 0x2400

Description : Unavailable FLASH memory ic.

Action : Change the main control board



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## Precautions

1. Check if the card exists in stacker. Otherwise, it may not issue the card.
  
2. Check the communication line
  - 1) Communication Port, Baud, Parity, and Data Bit, etc.
  - 2) The COM2 port is not available just now.