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CRT Card Reader Communication Protocol

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Note: Please refer to CRT CARD COMMUNICATION PROTOCOL for card operation.

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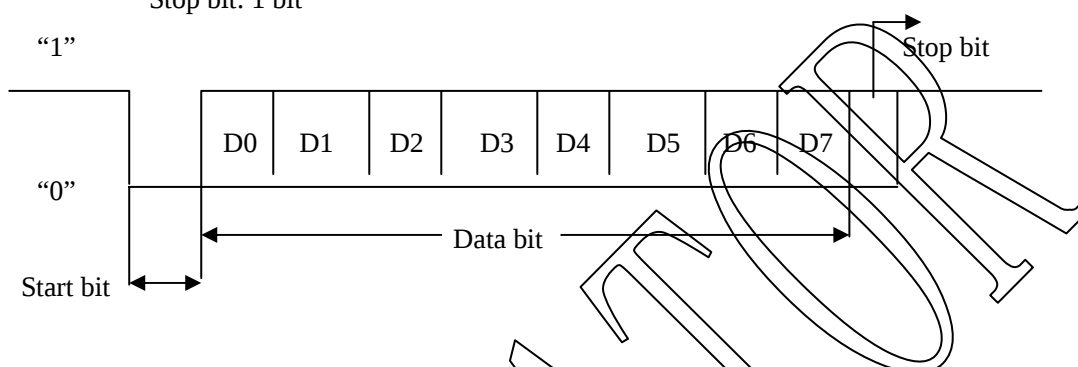
1. Communication Format

Baud rate (BPS): Defined by the Host, (default 9600BPS),
(1200/2400/4800/9600/19200/38400BPS)

Communication type: Asynchronous communication

Transmit type: Half duplex

Bit detail: Start bit: 1 bit
Data bit: 8 bit
Parity bit: None
Stop bit: 1 bit



2. Communication Control Method

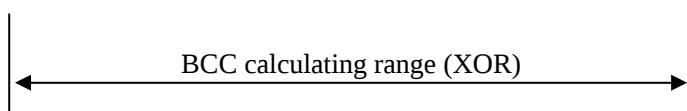
The unit, as a driven part, start working after received command from host

3. Command Character

STX (0X02)	Start character of data package
ETX (0X03)	End character of data package
ENQ (0X05)	Sending require command (host -> unit)
ACK (0X06)	Positive answer
NAK (0X15)	Negative answer
EOT (0X04)	Cancel communication

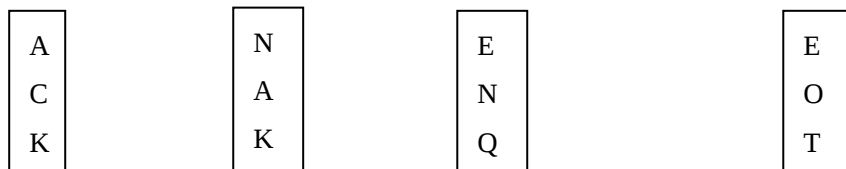
4. Communication Command Structure (Data package format of command and returned information)

STX	Command package or returned data package	ETX	BCC
-----	--	-----	-----



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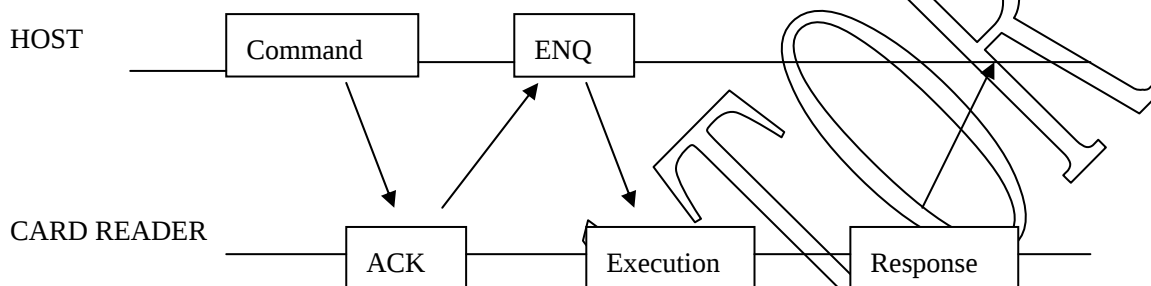
5. Control Command Structure



6. Communication Process Descriptions

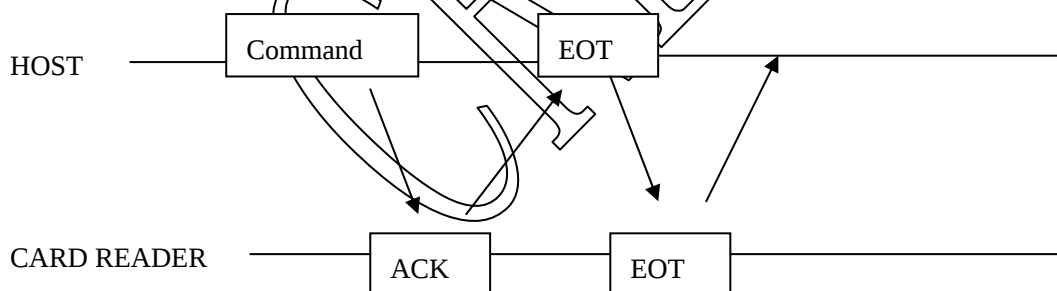
6.1 Normal communication process (command operation)

A Command operation



Host sends command, Reader receives and checks if BCC is correct. Host sends ENQ after return ACK, Reader will execute the relevant operation and return relevant operation information to host according the command.

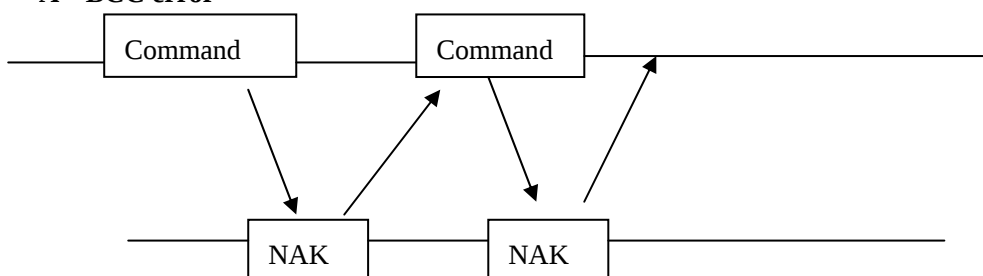
B Cancel Command operation



Host send EOT, Reader end current command status and return EOT, then waiting for Host command.

6.2 Abnormal communication process

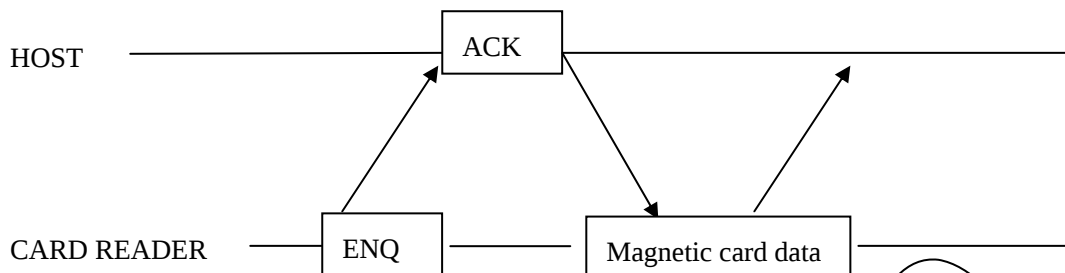
A BCC error



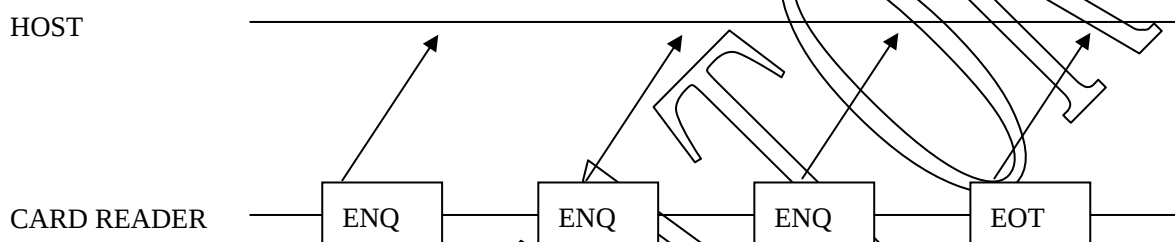
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6.3 CRT-287

6.3.1 CRT-287 magnetic card data initiative uploading Command operation. (Normal)



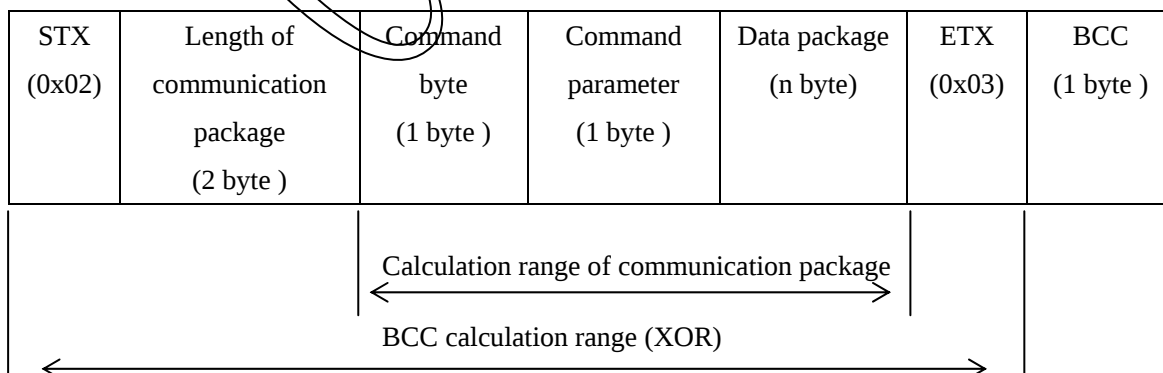
6.3.2 CRT-287 magnetic card data initiative uploading Command operation. (The host does not give the reply or can not receive the reply)



Note: When you operate on the magnetic cards, the unit will firstly connect with the host. The connecting way is : Send ENQ to host first, then the host reply ACK. If the reply is correct, the unit can send the magnetic card data package. If there is no reply or the reply is wrong, the unit will try to connect the host for two times. If there is still no connection, the unit will send EOT and end this communication.

7. Communication Operation

7.1 Send command data package format



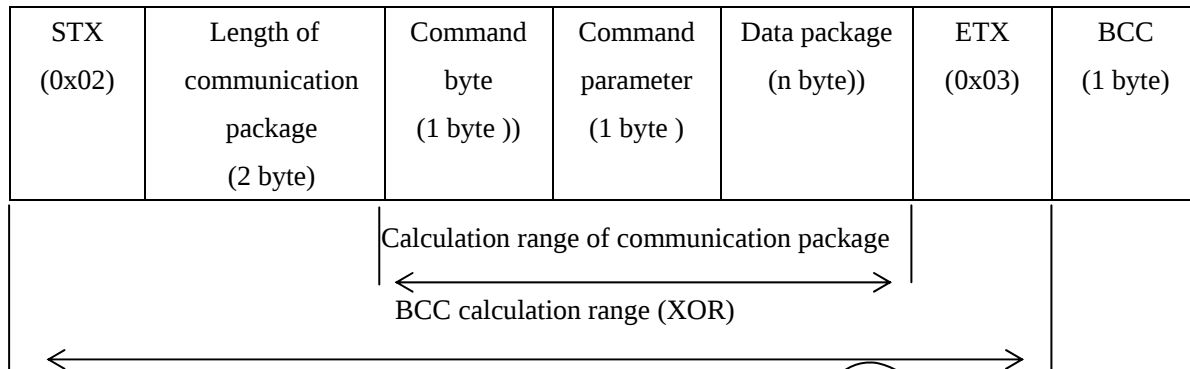
a. n byte: range of n: Max=264 byte. Min=0 byte

b. Communication package in 2 bytes transmit, former one is high byte, behind one is low byte

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7.2 Returned data package format

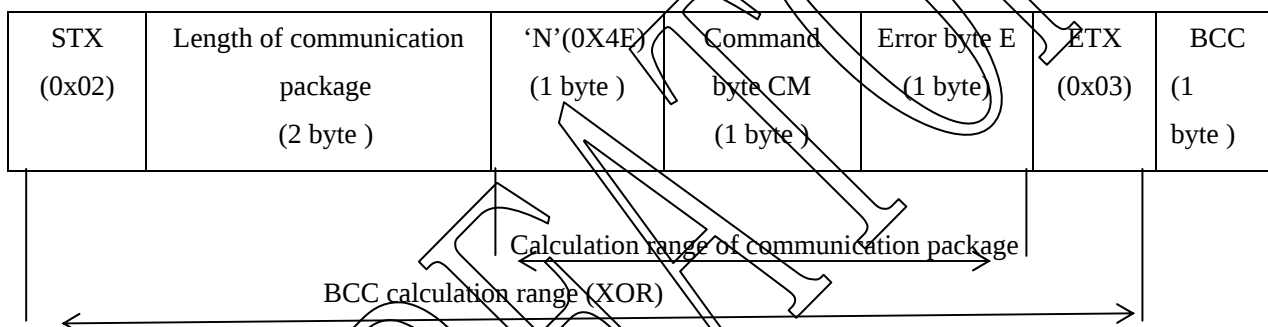
7.2.1 Normal return



a. n byte: range of n: Max=264 byte. Min=0 byte

b. Returned command byte and command parameter is the operated command byte and command parameter transmit from Host to Reader

7.2.2 Abnormal return



7.2.3 Meaning of error byte

Error byte E	Description
'0x00'	Undefined command
'0x01'	Parameter error
'0x02'	Command can not be executed
'0x04'	Command data error
'0x05'	Power supply exceeds the working condition range of the unit
'0x06'	Abnormal length cards inside the unit(for CRT-310)

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8. CRT-286/288 Operation Command List

Command	Command byte CM	Command parameter PM	Description
Reset	0x30	0x30	Reset card reader, return the software version
		0x31	Reset card reader, eject if there is a card in, return the software version
Check status	0x31	0x30	Check status of reader (To check there is card or not)
Eject card	0x32	0x30	Eject card
IC card power on/off	0x33	0x30	IC card power on
		0x31	IC card power off
Set comm. Baud rate	0x34	0x30	uart=1200bps pm=0x31 uart=2400bps, pm=0x32 uart=4800bps pm=0x33 uart=9600bps, pm=0x34 uart=19200pbs pm=0x35 uart=38400bps
*Each card operation command, see CRT Card Communication Protocol			
*CRT-288 command is totally same as CRT-286			

8.1 Reset

Host sends:

0x02	0x00	0x02	0x30	0x30 / 0x31	0x03	BCC
------	------	------	------	-------------	------	-----

Reader returns:

0x02	0x00	0x12	0x30	0x30 / 0x31	Card reader version SV	0x03	BCC
------	------	------	------	-------------	------------------------	------	-----

Card reader version: CRT286 card reader SV="CRT 286 V2.0 "

8.2 Check status

Host sends

0x02	0x00	0x02	0x31	0x30	0x03	BCC
------	------	------	------	------	------	-----

CRT286 card reader returns

0x02	0x00	0x03	0x31	0x30	Reader status byte S	0x03	BCC
------	------	------	------	------	----------------------	------	-----

S= 'N' (0X4E) no card in the reader

S= 'Y' (0X59) card in the reader

8.3 Auto testing the type of IC card:

Host sends: reader auto testing the card type, and return the card type

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0x02	0x00	0x02	0x31	0x31	0x03	BCC
------	------	------	------	------	------	-----

Reader returns:

0x02	0x00	0x04	0x31	0x31	Card type byte S1	Card type byte S2	0x03	BCC
------	------	------	------	------	-------------------	-------------------	------	-----

Card type byte:

Card type byte S1	Card type byte S2	Card type instruction
'N'	'0'	No card inside
	'1'	Unknown card type
'0'	'0'	RF card (Contactless)
'1'	'0'	CPU card (T=0)
	'1'	CPU card (T=1)
'2'	'0'	24C01 card
	'1'	24C02 card
	'2'	24C04 card
	'3'	24C08 card
	'4'	24C16 card
	'5'	24C32 card
	'6'	24C64 card
	'7'	24C128 card
'3'	'0'	SLE4442 card
	'1'	SLE4428 card
'4'	'0'	AT88S102 card
	'1'	AT88S1604 card
	'2'	AT45D041 card

8.4 Eject card

Host sends

0x02	0x00	0x02	0x32	0x30	0x03	BCC
------	------	------	------	------	------	-----

Reader returns

0x02	0x00	0x03	0x32	0x30	Operation status byte P	0x03	BCC
------	------	------	------	------	-------------------------	------	-----

P= 'Y' (0X59) success

P= 'N' (0X4E) failure

P= 'E' (0X45) no card in the reader

8.5 Power on/off to contact IC card

Host sends

0x02	0x00	0x02	0x33	0x30 / 0x31	0x03	BCC
------	------	------	------	-------------	------	-----

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Reader returns:

0x02	0x00	0x03	0x33	0x30 / 0x31	Operation status byte P	0x03	BCC
------	------	------	------	-------------	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

Operation status byte P= 'N' (0X4E) failure

Operation status byte P= 'E' (0X45) no card in

8.6 Set baud rate of comm. port

Host sends:

0x02	0x00	0x02	0x34	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x30 uart=1200bps

Pm=0x31 uart=2400pbs

Pm=0x32 uart=4800bps

Pm=0x33 uart=9600bps

Pm=0x34 uart=19200bps

Pm=0x35 uart=38400bps

Reader returns:

0x02	0x00	0x12	0x33	0x30	Operation status byte P	0x03	BCC
------	------	------	------	------	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

Operation status byte P= 'N' (0X4E) failure

Reader reset baud rate according to Host after Host received operation success information and save in EEPROM of Reader. Host need to initialize baud rate comm. port setting.

9. CRT-386 Operation Command List

Command	Command byte CM	Command parameter PM	Description
Card in control	0x2F	0x30	Permit card in
		0x31	Prohibit card in
Reset	0x30	0x30	Reset card reader, return the software version
		0x31	Reset card reader, eject if there is a card in, return the software version
Check status	0x31	0x30	Check status of reader (To check there is card or not)
Eject card	0x32	0x30	Eject card
IC card power on/off	0x33	0x30	IC card power on
		0x31	IC card power off

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Set comm. Baud rate	0x34	0x30	uart=1200bps pm=0x31 uart=2400bps, pm=0x32 uart=4800bps pm=0x33 uart=9600bps, pm=0x34 uart=19200pbs pm=0x35 uart=38400bps
*Each card operation command, see CRT Card Communication Protocol			

9.1 Reset

Host sends:

0x02	0x00	0x02	0x30	0x30 / 0x31	0x03	BCC
------	------	------	------	-------------	------	-----

Reader returns:

0x02	0x00	0x12	0x30	0x30 / 0x31	Card reader version SV	0x03	BCC
------	------	------	------	-------------	------------------------	------	-----

Card reader version: CRT386 card reader SV="CRT 386 V2.0 "

9.2 Card in control setting

Host sends:

0x02	0x00	0x02	0x2F	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x30 enable card in

Pm=0x31 forbid card in

Reader returns

0x02	0x00	0x03	0x2F	Pm	Card reader status byte S	0x03	BCC
------	------	------	------	----	---------------------------	------	-----

S= 'N' (0X4E) success

S= 'Y' (0X59) failure

The default setting is allows card in when card reader power on or after executed reset command.

9.3 Check status

Host sends

0x02	0x00	0x02	0x31	0x30	0x03	BCC
------	------	------	------	------	------	-----

CRT386 card reader return:

0x02	0x00	0x04	0x31	0x30	Card reader status byte S1	Card reader status byte S2	0x03	BCC
------	------	------	------	------	----------------------------	----------------------------	------	-----

S1=0X4F with card in the front side

S1=0X59 with card in the reader

S1=0X4E no card inside

S2=0X59 card reader allows card in

S2=0X4E card reader forbid card in

9.4 Auto testing the type of IC card:

Host sends: reader auto testing the card type, and return the card type

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0x02	0x00	0x02	0x31	0x31	0x03	BCC
------	------	------	------	------	------	-----

Reader returns:

0x02	0x00	0x04	0x31	0x31	Card type byte S1	Card type byte S2	0x03	BCC
------	------	------	------	------	-------------------	-------------------	------	-----

Card type byte:

Card type byte S1	Card type byte S2	Card type instruction
'N'	'0'	No card inside
	'1'	Unknown card type
'0'	'0'	RF card (Contactless)
'1'	'0'	CPU card (T=0)
	'1'	CPU card (T=1)
'2'	'0'	24C01 card
	'1'	24C02 card
	'2'	24C04 card
	'3'	24C08 card
	'4'	24C16 card
	'5'	24C32 card
	'6'	24C64 card
	'7'	24C128 card
'3'	'0'	SLE4442 card
	'1'	SLE4428 card
'4'	'0'	AT88S102 card
	'1'	AT88S1604 card
	'2'	AT45D041 card

9.5 Eject card

Host sends

0x02	0x00	0x02	0x32	0x30	0x03	BCC
------	------	------	------	------	------	-----

Reader returns

0x02	0x00	0x03	0x32	0x30	Operation status byte P	0x03	BCC
------	------	------	------	------	-------------------------	------	-----

P= 'Y' (0X59) success

P= 'N' (0X4E) failure

P= 'E' (0X45) no card in the reader

9.6 Power on/off to contact IC card

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Host sends

0x02	0x00	0x02	0x33	0x30 / 0x31	0x03	BCC
------	------	------	------	-------------	------	-----

Reader returns:

0x02	0x00	0x03	0x33	0x30 / 0x31	Operation status byte P	0x03	BCC
------	------	------	------	-------------	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

Operation status byte P= 'N' (0X4E) failure

Operation status byte P= 'E' (0X45) no card in

9.7 Set baud rate of comm. port

Host sends:

0x02	0x00	0x02	0x34	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x30 uart=1200bps

Pm=0x31 uart=2400pbs

Pm=0x32 uart=4800bps

Pm=0x33 uart=9600bps

Pm=0x34 uart=19200bps

Pm=0x35 uart=38400bps

Reader returns:

0x02	0x00	0x12	0x33	0x30	Operation status byte P	0x03	BCC
------	------	------	------	------	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

Operation status byte P= 'N' (0X4E) failure

Reader reset baud rate according to Host after Host received operation success information and save in EEPROM of Reader. Host need to initialize baud rate comm. port setting.

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10. CRT-310 Operation Command List

Command	Command byte CM	Command parameter PM	Description
Card stop setting	0x2E	Pm	Set the card stop position after card in and read the magnetic card
Card in enable or disable control	0x2F	Pm1,Pm2	Card in/out from front/rear side enable or disable
Reset	0x30	0x30	Reset card reader, return the software version
		0x31	Reset card reader, eject card to the front side, return the software version
		0x32	Reset card reader, eject card to the rear side, return the software version
Check status	0x31	0x2F	Check sensors status of the unit
		0x30	Check status of reader (To check there is card or not)
IC card type auto check	0x31	0x31	Check the IC card type automatically
Card move operation	0x32	0x2E	Let card inside the unit from the card hold position or inside position
		0x2F	Let card in IC card operation position from the card hold position or inside position, then do IC card R/W
		0x30	Card eject from the front side, not hold card
		0x31	Card eject from the front side, hold card
		0x32	Card eject from rear side, hold card
		0x33	Card eject from rear side, not hold card
IC card power on/off	0x33	0x30	IC card power on
		0x31	IC card power off
Set comm. Baud rate	0x34	0x30	UART=1200bps
		0x31	UART =2400bps
		0x32	UART =4800bps
		0x33	UART =9600bps,
		0x34	UART =19200pbs
		0x35	UART =38400bps
*Each card operation command, see CRT Card Communication Protocol			

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10.1 Reset

Host sends:

0x02	0x00	0x02	0x30	Pm	0x03	BCC
------	------	------	------	----	------	-----

Reader returns:

0x02	0x00	0x12	0x30	Pm	Card reader version SV	0x03	BCC
------	------	------	------	----	------------------------	------	-----

Card reader version: CRT310 card reader SV="CRT 310 V1.0"

Pm=0x30 Card reader reset, return card reader software version

Pm=0x31 Card reader reset, return card reader software version, eject card from front side and not hold card

Pm=0x32 Card reader reset, return card reader software version, eject card from rear side and not hold card

10.2 Card in or stop enable or disable control setting

10.2.1 Card in control setting

Host sends:

0x02	0x00	0x02	0x2F	Pm1	Pm2	0x03	BCC
------	------	------	------	-----	-----	------	-----

Pm1=0x31 disable card in from front side

Pm1=0x32 enable card in by magnetic signal (magnetic signal +switch available), shutter open, card in from front side

Pm1=0x33 enable card in by switch, permit shutter open, magnetic card, IC card, RF card (M1) and dual interface card in from front side

Pm1=0x34 enable card in by magnetic signal, permit some thin magnetic paper card in

Pm2=0x30 permit card in from rear side

Pm2=0x31 prohibit card in from rear side

Reader returns

0x02	0x00	0x04	0x2F	Pm1	Pm2	Card reader status byte S	0x03	BCC
------	------	------	------	-----	-----	---------------------------	------	-----

S= 'N' (0X4E) failure

S= 'Y' (0X59) success

Note: 1) Card in from front side by switch is defaulted after reader power on or execute reset, and card in from rear side is prohibited.

2) FR card (M1)means Phillips mifare 1 card., below is the same.

10.2.2 Card stop control setting (Set the card stop position after card in and read the magnetic card)

Host sends:

0x02	0x00	0x02	0x2E	Pm1	Pm2	0x03	BCC
------	------	------	------	-----	-----	------	-----

Pm=0x30 card in and stop in the front side, not hold card

Pm=0x31 card in and stop in the front side, hold card

Pm=0x32 card in and stop inside the reader, IC card contact not connect with card, FR card (M1) is ready to be R/W

Pm=0x33 card in and stop inside the reader, IC card contact connects with card, IC card and FR card(M1)

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are ready to be R/W

Pm=0x34 card in and stop in the rear side, hold card

Pm=0x35 card in and out from the rear side, not hold card

Reader returns

0x02	0x00	0x03	0x2E	Pm	Card reader status byte S	0x03	BCC
------	------	------	------	----	---------------------------	------	-----

S= 'N' (0X4E) failure

S= 'Y' (0X59) success

10.3 Check status

10.3.1 Reader status checking

Host sends

0x02	0x00	0x02	0x31	0x30	0x03	BCC
------	------	------	------	------	------	-----

Reader return:

0x02	0x00	0x05	0x31	0x30	Card reader status byte S1	Card reader status byte S2	0x03	BCC
------	------	------	------	------	----------------------------	----------------------------	------	-----

S1=0X46 with longer card in the reader (The card is longer than the standard card)

S1=0X47 with shorter card in the reader (The card is shorter than the standard card)

S1=0X48 card stop on the front side, not hold card (card is eject out of the reader from the front side)

S1=0X49 card stop on the front side, hold card

S1=0X4A card stop inside the reader

S1=0X4B card stop inside the reader, contact connect with IC card

S1=0X4C card stop on the rear side, hold card

S1=0X4D card stop on the rear side, not hold card (card is eject out of the reader from the rear side)

S1=0X4E no card in the reader

S2=0X49 card in by magnetic signal, shutter open just when it is magnetic card

S2=0X4A card in by switch, permit magnetic card, IC card, RF card (M1), dual interface card in

S2=0X4B card in by magnetic signal, permit thin magnetic card or thin magnetic paper card in

S2=0X4E prohibit card in

S3=0X4A card in from the rear side, permit magnetic card, IC card, RF card (M1), dual interface card in

S3=0X4E prohibit card in from rear side

10.3.2 Sensor status check

Host sends: Reader checks the sensor status automatically (5pcs infrared sensors status, shutter status, switch sensor status)

0x02	0x00	0x02	0x31	0x2F	0x03	BCC
------	------	------	------	------	------	-----

Reader returns:

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0x02	0x00	0x09	0x31	0x2F	PSS1	PSS2	PSS3	PSS4	PSS5	CTSW	KSW	0x03	BCC
------	------	------	------	------	------	------	------	------	------	------	-----	------	-----

PSS1-PSS5: infrared sensors status: PSS1 (2`5) =0X30 no card on the sensor position

PSS1 (2`5) =0X31 card on the sensor position

CTSW: shutter status: CTSW=0X30 shutter is close

CTSW=0X31 shutter is open

KSW: Switch sensor status: KSW=0X30 switch doesn't get the signal of card going through shutter

KSW=0X31 switch gets the signal of card going through shutter

10.4 Auto testing the type of IC card:

Host sends: reader auto testing the card type, and return the card type

0x02	0x00	0x02	0x31	0x31	0x03	BCC
------	------	------	------	------	------	-----

Reader returns:

0x02	0x00	0x04	0x31	0x31	Card type byte S1	Card type byte S2	0x03	BCC
------	------	------	------	------	-------------------	-------------------	------	-----

Card type byte:

Card type byte S1	Card type byte S2	Card type instruction
'N'	'0'	No card inside
	'1'	Unknown card type
'0'	'0'	RF card (Contactless)
	'1'	CPU card (T=0)
'1'	'0'	CPU card (T=1)
	'1'	CPU card (T=1)
'2'	'0'	24C01 card
	'1'	24C02 card
	'2'	24C04 card
	'3'	24C08 card
	'4'	24C16 card
	'5'	24C32 card
	'6'	24C64 card
	'7'	24C128 card
'3'	'0'	SLE4442 card
	'1'	SLE4428 card
'4'	'0'	AT88S102 card
	'1'	AT88S1604 card
	'2'	AT45D041 card

Note: By card type auto check, just can check some type of IC card, can not do auto check on dual interface card. Sometimes the IC card contact is not clean, which will affect the auto check.

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10.5 Card move operation

Host sends

0x02	0x00	0x02	0x32	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x2E move card inside the reader, then do RF card (M1) R/W

Pm=0x2F move card inside the reader, contact connect with IC card, then do IC card R/W

Pm=0x30 move card to the front side, not hold card

Pm=0x31 move card to the front side, hold card

Pm=0x32 move card to the rear side, hold card

Pm=0x33 move card to the rear side, not hold card

Pm=0x34 eject the abnormal card out of the reader from the rear side, to use the standard card to do normal

Operation (This command is used to clean the reader inside)

Reader returns

0x02	0x00	0x03	0x32	Pm	Operation status byte P	0x03	BCC
------	------	------	------	----	-------------------------	------	-----

P= 'Y' (0X59) success

P= 'N' (0X4E) failure

P= 'E' (0X45) no card in the reader

P= 'W' (0X57) card is not in the permitted operation position

Note: When card is not on the holding position or is not inside the reader, when execute "card in or card eject" command, will return "card is not in the operation permitted position".

10.6 Power on/off to contact IC card

Host sends

0x02	0x00	0x02	0x33	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x30 IC card power on

Pm=0x31 IC card power off

Reader returns:

0x02	0x00	0x03	0x33	Pm	Operation status byte P	0x03	BCC
------	------	------	------	----	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

P= 'N' (0X4E) failure

P= 'E' (0X45) no card in

P= 'W' (0X57) card is not in the permitted operation position

10.7 Sutter LED control

Host sends

0x02	0x00	0x02	0x46	Pm	0x03	BCC
------	------	------	------	----	------	-----

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Pm=0x30 LED on

Pm=0x31 LED off

Reader returns:

0x02	0x00	0x03	0x46	Pm	Operation status byte P	0x03	BCC
------	------	------	------	----	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

10.8 Set baud rate of comm. port

Host sends:

0x02	0x00	0x02	0x34	Pm	0x03	BCC
------	------	------	------	----	------	-----

Pm=0x30 uart=1200bps

Pm=0x31 uart=2400pbs

Pm=0x32 uart=4800bps

Pm=0x33 uart=9600bps

Pm=0x34 uart=19200bps

Pm=0x35 uart=38400bps

Reader returns:

0x02	0x00	0x12	0x33	0x30	Operation status byte P	0x03	BCC
------	------	------	------	------	-------------------------	------	-----

Operation status byte P= 'Y' (0X59) success

Operation status byte P= 'N' (0X4E) failure

Reader reset baud rate according to Host after Host received operation success information and save in EEPROM of Reader. Host need to initialize baud rate comm. port setting.