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Revision Log

Version	Revision Time	Content
1.0	2010.01.10	First Release

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1. Transmission / Control Specification

- 1) Baud rate: 9,600/19200/38400/57600 BPS
- 2) Transmission method: Half duplex, Support multi-unit communication (16 units max)
- 3) Synchronous method: Asynchronous

Start bit	D0	D1	D2	D3	D4	D5	D6	D7	Stop sbit
-----------	----	----	----	----	----	----	----	----	-----------

Start bit: 1 bit

Data length: 8bit

Check bit: none

Stop bit: 1 bit

Character Code: ASCII 8 bit code

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2. Transmission Control Method and Characters

CRT-571 executes particular operation according to text (command) received from HOST then reports result of execution to HOST..

Character reference

ACK (06H)

Acknowledge

NAK (15H)

Negative acknow

EOT (04H)

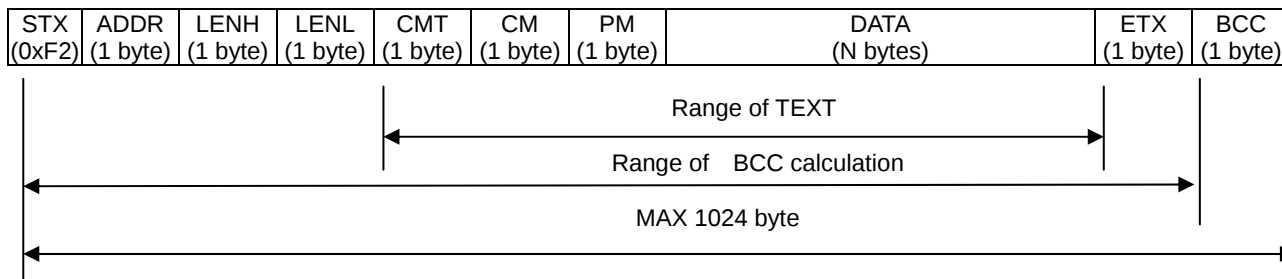
Clear the line

CREATOR

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3. Transmission Format and Characters

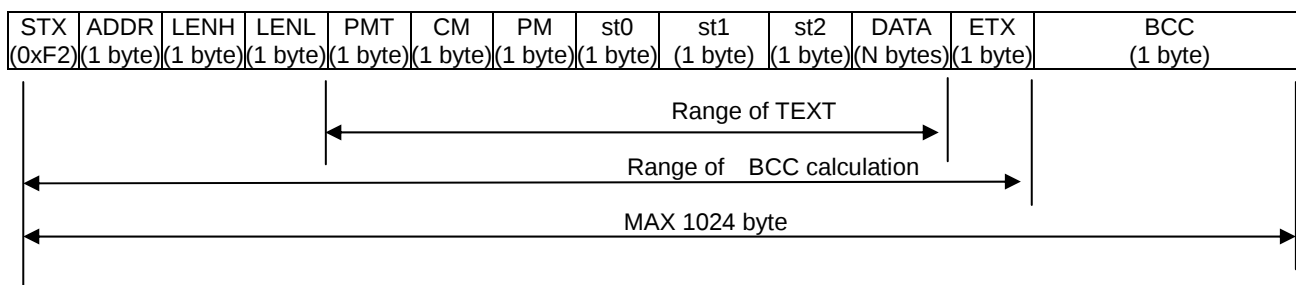
3.1 Command format and characters



Code	Meaning
STX (F2H)	Representing the start of text in a command or a response.
ADDR	Representing the address of CRT-571
LENH(1 byte)	Length of high byte of text
LENL(1 byte)	Length of low byte of text
CMT	Command head ('C' , 43H)
CM	Specify as command.
PM	Command parameter
DATA	Transmission data (N byte, N=0~512)
ETX (03H)	End of text
BCC	CRC Parity

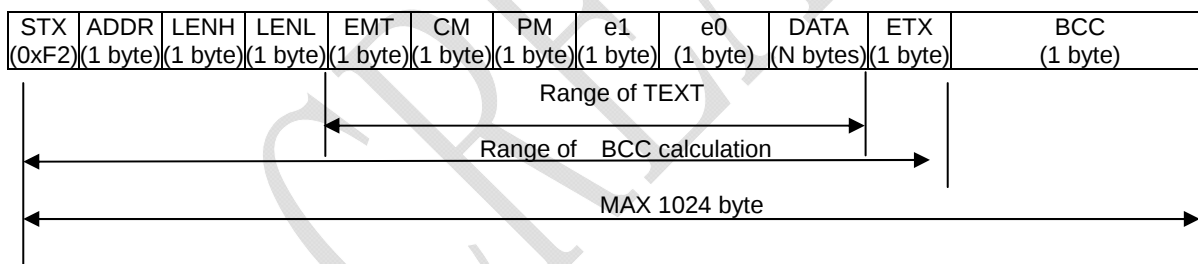
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3.2 Successful responsive package format and character



Code	Meaning
STX (F2H)	Representing the start of text in a command or a response.
ADDR	Representing the address of CRT-571
LENH(1 byte)	Length of high byte of text
LENL(1 byte)	Length of low byte of text
PMT	Return command head ('P' , 50H)
CM	Specify as command.
PM	Command parameter
st0,st1,st2	Status code
DATA	Transmission data (N byte, N=0~512)
ETX (03H)	End of text
BCC (1 byte)	CRC Parity

3.3 Failed responsive package format and character



Code	Meaning
STX (F2H)	Representing the start of text in a command or a response.
ADDR	Representing the address of CRT-571
LENH(1 byte)	Length of high byte of text
LENL(1 byte)	Length of low byte of text
EMT	Return command head ('N' , 4EH)
CM	Specify as command.
e1,e0	Status code
PM	Command parameter
DATA	Transmission data (N byte, N=0~512)
ETX (03H)	End of text
BCC (1 byte)	CRC Parity

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4. Address According to Multi-Device Communication

ADDR: Address word for each device in multi-device communication

Address	Character
0#	00H
1#	01H
2#	02H
3#	03H
4#	04H
5#	05H
6#	06H
7#	07H
8#	08H
9#	09H
10#	0AH
11#	0BH
12#	0CH
13#	0DH
14#	0EH
15#	0FH

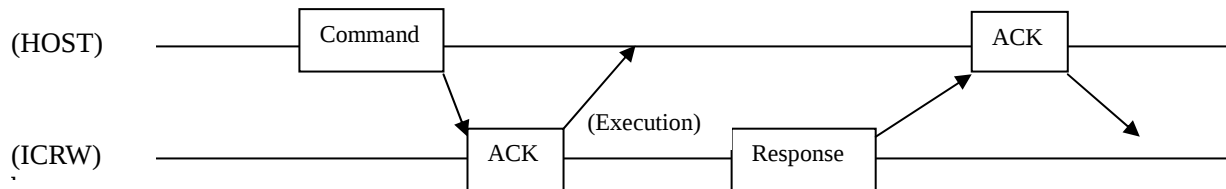
Notes:

Default address is 15#. Each device has unique address.

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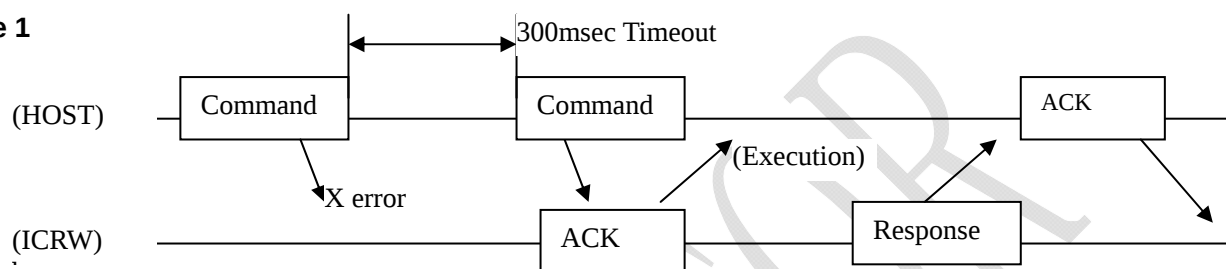
5. Communication Method

5.1 Ordinary operation

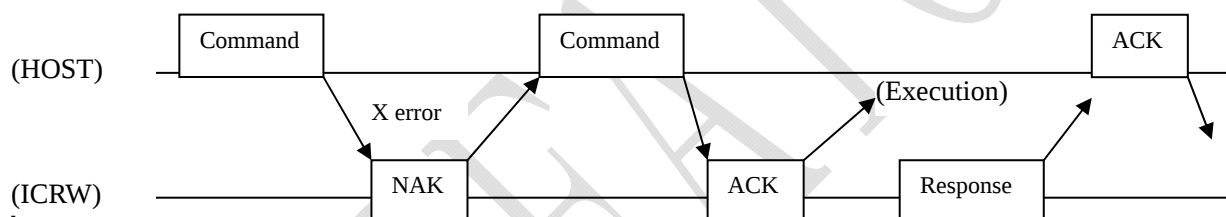


5.2 Irregular operation and back-up

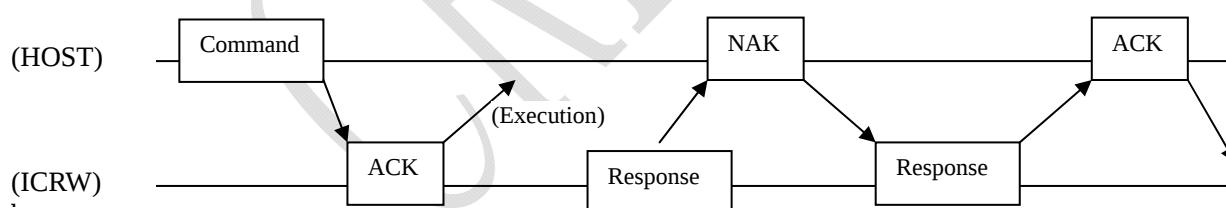
Case 1



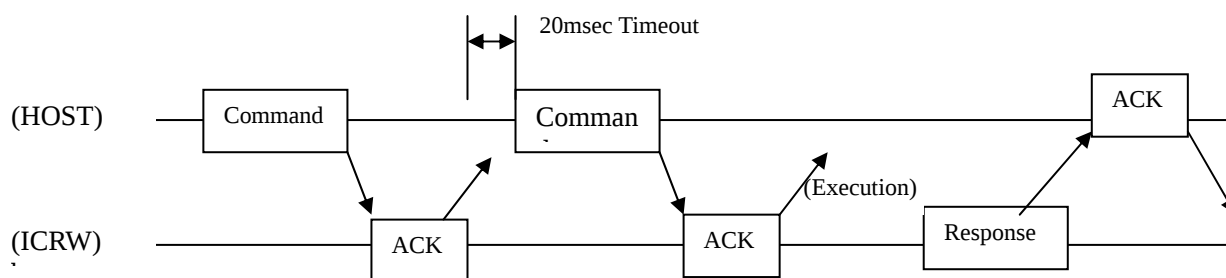
Case 2



Case 3

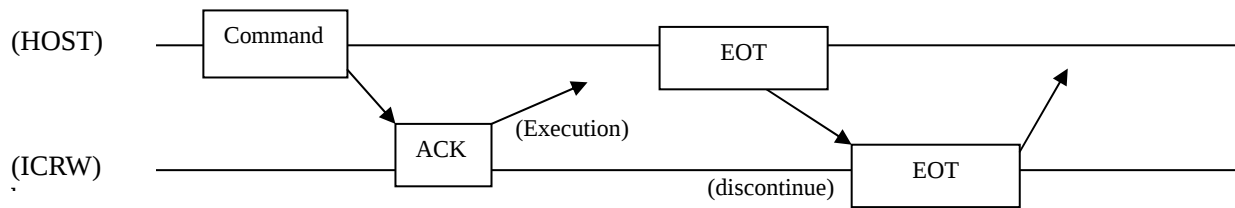


Case 4

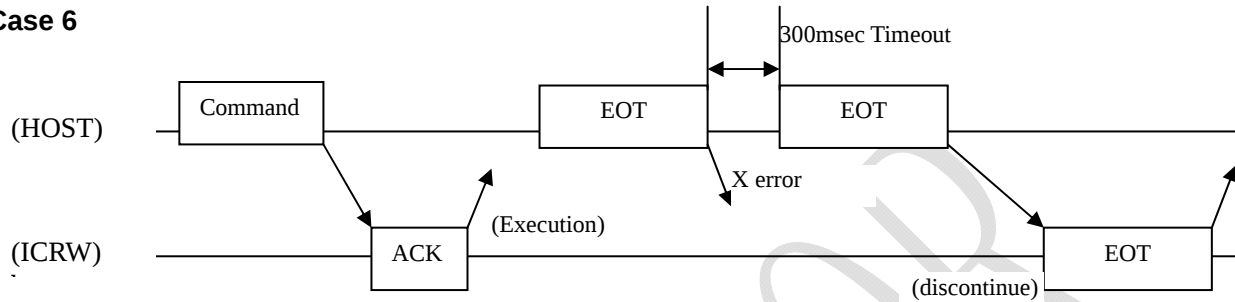


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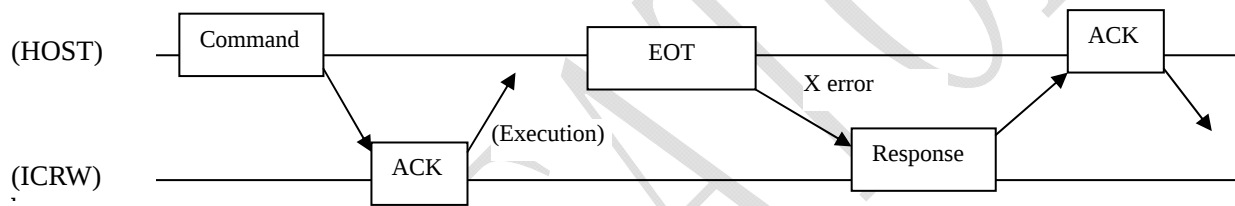
Case 5



Case 6



Case 7



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6. Command List

Chapter	Command	Function	CM	PM	description
9.1	INITIALIZE	Initialize CRT-571	30H	30H	If card is inside, move card to cardholding position
				31H	If card is inside, capture card error card bin
				33H	If card is inside, does not move the card.
				34H	Same as 30H and retract counter will work.
				35H	Same as 31H and retract counter will work.
				37H	Same as 33H and retract counter will work.
9.2	STATUS REQUEST	Inquire status	31H	30H	Report CRT-571 status
				31H	Report sensor status
9.3	CARD MOVE	Card movement	32H	30H	Move card to card holding positon
				31H	Move card to IC card position
				32H	Move card to RF card position
				33H	Move card to error card bin
				39H	Move card to gate
9.4	CARD ENTRY	From output gate	33H	30H	Enable card entry from output gate
				31H	Disable card entry from ouput gate
9.5	CARD TYPE	ICCard/RFCard TypeCheck	50H	30H	Autocheck ICCardType
				31H	Autocheck RFCardType
9.6	CPUCARD CONTROL	CPU Card Applicatio Opertion	51H	30H	CPUCard cold reset
				31H	CPUCard power down
				32H	CPUCard status check
				33H	T=0 CPUCard APDU data exchange
				34H	T=1 CPUCard APDU data exchange
				38H	CPUCard hot reset
				39H	Auto distinguish T=0/T=1 CPUCard APDU data exchange
9.7	SAM CARD CONTROL	SAMCard Application Operation	52H	30H	SAMCard cold reset
				31H	SAMCard down power
				32H	SAMCard status check
				33H	T=0 SAMCard APDU data exchange
				34H	T=1 SAMCardAPDU data exchange
				38H	SAMCard hot reset
				39H	Auto distinguish T=0/T=1 SAMCardAPDU data exchange
				40H	Choose SAMCard stand
9.8	SLE4442/4428CARD CONTROL		53H	30H	SLE4442/4428Card reset
				31H	SLE4442/4428Card power down
				32H	Browse SLE4442/4428Card status
				33H	Operate SLE4442Card
				34H	Operate SLE4428Card

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9.9	IC MEMORY CARD	24C01—24C256C ard Operation	54H	30H	ICCard reset
				31H	ICCard down power
				32H	Check ICCard status
				33H	Read ICCard
				34H	Write ICCard
9.10	RFCARD CONTROL (13.56 MHZ)	Mifare standard card Type A & B T=CL protocol operation	60H	30H	RF Card startup
				31H	RF Card down power
				32H	RF Card operation status check
				33H	Mifare standard Card read/write
				34H	Type A standard T=CLCard APDU data exchange
				35H	Type B standard T=CLCard APDU data exchange
9.11	Card SERIAL NUMBER		A2H	39H	RF Card enable/disable
				30H	Read Card Serial number
9.12	Read CARD CONFIG		A3H	30H	Read Card configuration information
9.13	READ CRT-571 VERSION		A4H	30H	Read Card software version information
9.14	RECYCLE BIN COUNTER		A5H	30H	Read number of counter of Card error card bin
				31H	Initiate card error card bin counter

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7. Card Status Code (st0,st1,st2)

st0	Content
"0"	No Card in CRT-571
"1"	One Card in gate
"2"	One Card on RF/IC Card Position

st1	Content
"0"	No Card in stacker
"1"	Few Card in stacker
"2"	Enough Cards in card box

st2	Content
"0"	Error card bin not full
"1"	Error card bin full

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8. e1, e0 Error Code Table

e1,e0	Content
"00"	Reception of Undefined Command
"01"	Command Parameter Error
"02"	Command Sequence Error
"03"	Out of Hardware Support Command
"04"	Command Data Error
"05"	IC Card Contact Not Release
"06"--"09"	
"10"	Card Jam
"11"	
"12"	sensor error
"13"	Too Long-Card
"14"	Too Short-Card
"15"--"39"	
"40"	Disability of Recycling card
"41"	Magnet of IC Card Error
"42"	
"43"	Disable To Move Card To IC Card Position
"44"	
"45"	Manually Move Card
"46"	
"47"	
"48"	
"49"	
"50"	Received Card Counter Overflow
"51"	Motor error
"52"--"59"	
"60"	Short Circuit of IC Card Supply Power
"61"	Activation of Card False
"62"	Command Out Of IC Card Support
"63"	
"64"	
"65"	Disability of IC Card
"66"	Command Out Of IC Current Card Support
"67"	IC Card Transmission Error
"68"	IC Card Transmission Overtime
"69"	CPU/SAM Non-Compliance To EMV Standard
"A0"	Empty-Stacker
"A1"	Full-Stacker
"A2"--"A9"	
"B0"	Not Reset

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9. Command Specification

9.1 Reset (Initialization)

Command (TXET):

"C"	30H	Pm
-----	-----	----

Positive response (TXET):

"P"	30H	Pm	st0	st1	st2	Rev_type
-----	-----	----	-----	-----	-----	----------

Negative response (TEXT):

"N"	30H	Pm	e1	e0
-----	-----	----	----	----

This is to set the operation conditions for SCT and to initialize CRT-571.

When it execute at first time, ICRW will auto check and judge HOST BAUD Rate.

CRT-571 is initialized in Disable mode that card is not accepted by this command.

CRT-571 is in prohibited status and return software version information.

Pm: Command parameter

If there is no card in CRT-571, engine will rotate slightly to clear up card in stacker.

If there are cards in CRT-571, the disposal is show as below:

30H: Move the card to Gate portion

31H: Capture card to reject-stacker

33H: If card is inside CRT-571, does not move the card.

34H: Same as pm=30H, and Retract counter will work.

35H: Same as pm=31H, and Retract counter will work

37H: Same as pm=33H, and Retract counter will work

Rev_type: software version, "CRT-571-V1.00"

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9.2 Status Request Command

Command

"C"	31H	Pm
-----	-----	----

Positive response

"P"	31H	Pm	st0	st1	st2	Sensor(10 byte)
-----	-----	----	-----	-----	-----	--------------------

Negative response

"N"	31H	Pm	e1	e0
-----	-----	----	----	----

pm=30H : Report current status of st0, st1, st2.

pm=31H : Response is returned in form of Sensor, with the status information obtained.

The locations of sensor are referred to appearance drawing.

Sensor	status
S1	30H No Card
	31H Have Card
S2	30H No Card
	31H Have Card
S3	30H No Card
	31H Have Card
S4	30H No Card
	31H Have Card
S5 (reserved)	
S6	30H No Card
	31H Have Card
S7	30H No Card
	31H Have Card
S8	30H No Card
	31H Have Card
S9	30H No Card
	31H Have Card
S10	30H No Card
	31H Have Card

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9.3 Carry Card Command:

Command

"C"	32H	Pm
-----	-----	----

Positive response

"P"	32H	Pm	st0	st1	st2
-----	-----	----	-----	-----	-----

Negative response

"N"	32H	Pm	e1	e0
-----	-----	----	----	----

Pm=30H Move card to holding card position

Pm=31H Move card to IC Card position

Pm=32H Move card to RF Card position

Pm=33H Capture card to error card bin

Pm=39H Move card to the gate

If card can not move to specified position, CRT-571 will return Card jam error

Note: When execute Capture card command, if error card bin is full, CRT-571 will return error card bin error.

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9.4 Entry Command

Command

"C"	33H	Pm
-----	-----	----

Positive response

"P"	33H	Pm	st0	st1	st2
-----	-----	----	-----	-----	-----

Negative response

"N"	33H	Pm	e1	e0
-----	-----	----	----	----

After set card input from gate available, if insert card from gate, CRT-571 will carry the card to RF Card operation position.

Pm=30H Enable card input from gate

Pm=31H Disable card input from gate

Note: Execute reset command, CRT-571 will disable card input from gate

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9.5 Auto-Check ICCard/RFCard Type:

9.5.1 Auto-Check ICCard Type:

Command

"C"	50H	30H
-----	-----	-----

Positive response

"P"	50H	30H	st0	st1	st2	Card_type
-----	-----	-----	-----	-----	-----	-----------

Negative response

"N"	50H	30H	e1	e0
-----	-----	-----	----	----

Auto-Check type of IC Card, and carry card to IC Card position, Auto Check IC Card Type, Return Card_type information.

Cart_type(2 byte)		Specification
'0'	'0'	Unknown IC Card Type
'1'	'0'	T=0 CPU Card
	'1'	T=1 CPU Card
'2'	'0'	SLE4442 Card
	'1'	SLE4428 Card
'3'	'0'	AT24C01 Card
	'1'	AT24C02 Card
	'2'	AT24C04 Card
	'3'	AT24C08 Card
	'4'	AT24C16 Card
	'5'	AT24C32 Card
	'6'	AT24C64 Card
	'7'	AT24C128 Card
	'8'	AT24C256 Card

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9.5.2 Auto-Check RF Card Type:

Command

"C"	50H	31H
-----	-----	-----

Positive response

"P"	50H	31H	st0	st1	st2	Card_type
-----	-----	-----	-----	-----	-----	-----------

Negative response

"N"	50H	31H	e1	e0
-----	-----	-----	----	----

Auto-Check type of RF card, carry card to RF card position , Auto-Check RF Card Type, Return Card_type information

Cart_type(2 byte)		Specification
'0'	'0'	UnknowRFCardType
'1'	'0'	Mifare one S50Card
	'1'	Mifare one S70Card
	'2'	Mifare one ULCard
'2'	'0'	Type A CPUCard
'3'	'0'	Type B CPUCard

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9.6 CPUCard Operation

9.6.1 CPUCard Reset

Command

"C"	51H	30H	Vcc
-----	-----	-----	-----

Positive response

"P"	51H	30H	st0	st1	st2	Type	ATR
-----	-----	-----	-----	-----	-----	------	-----

Negative response

"N"	51H	30H	e1	e0	ATR
-----	-----	-----	----	----	-----

To cold reset IC card. The ICRW supplies power (VCC) and clock (CLK) , return ATR.

Vcc=30H: CRT-571 supplies with +5V to VCC and activates in line with the EMV2000 ver4.0.

Vcc=33H: CRT-571 supplies with +5V to VCC and activates in line with the ISO/IEC7816-3.

Vcc=35H: CRT-571 supplies with +3V to VCC and activates in line with the ISO/IEC7816-3.

In case there is no Vcc word, it will have 30H as default value.

If ATR is not compliance to EMV, return e1,e0= "69"

Notes : There will be error and return ATR & Type when reset in line with EMV return

Type: CPU Card protocol Type

=30H T=0 protocol CPUCard

=31H T=1 protocol CPUCard

Formate of ATR

TS	TO	TA1	TB1	...	TCK
----	----	-----	-----	-----	-----

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9.6.2 Deactivate CPU Command

Command

"C"	51H	31H
-----	-----	-----

Positive response

"P"	51H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	51H	31H	e1	e0
-----	-----	-----	----	----

This deactivates CPU card.

9.6.3 Inquire CPU Card Status:

Command

"C"	51H	32H
-----	-----	-----

Positive response

"P"	51H	32H	st0	st1	st2	Sti
-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	51H	32H	e1	e0
-----	-----	-----	----	----

ICRW tells the status of IC card with sti.

St i=30H Card not activated

=31H Card have activated, current CPU Card working frequency is 3.57 MHZ

=32H Card have activated, current CPU Card working frequency is 7.16 MHZ

If ICCard power error, return e1,e0= "60" .

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		Date	2010/1/10
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9.6.4 CPU Card Communication T=0

Command

"C"	51H	33H	C-APDU
-----	-----	-----	--------

Positive response

"P"	51H	33H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	51H	33H	e1	e0
-----	-----	-----	----	----

This exchanges data between CPU card by protocol T=0

C-APDU from HOST is range from 4 byte to 261 byte

CLA	INS	P1	P2	LC	Data1		Le
-----	-----	----	----	----	-------	-------	----

R-APDU to HOST is range from 2 byte to 258 byte

Data1		Data(n)	Sw1	Sw0
-------	-------	---------	-----	-----

An error "60" is returned when a power failure is detected.

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

Note: If you want to more about T=0 APDU format. Please refer to ISO/IEC7816-3 and COS command

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	25/68

9.6.5 CPU Card Communication T=1

Command

"C"	51H	34H	C-APDU
-----	-----	-----	--------

Positive response

"P"	51H	34H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	51H	34H	e1	e0
-----	-----	-----	----	----

This exchanges data between CPU card by protocol T=1

CRT-571 should following T=1 protocol to combine C-APDU as I-block and send it to CPU card. CPU card should return R-APDU to HOST

C-APDU

CLA	INS	P1	P2	Lc	Data1	...	Data(Lc)	Le
-----	-----	----	----	----	-------	-----	----------	----

I-block

NAD	PCB	LEN	CLA	INS	P1	P2	Lc	Data1	...	Data(Lc)	Le	EDC
Head block			Information block									End block

CRT-571 returns "R-APDU" data to HOST

I-block

Head block			Information block									End block
NAD	PCB	LEN	CLA	INS	P1	P2	Lc	Data1	...	Data(Lc)	Le	EDC

R-APDU

CLA	INS	P1	P2	Lc	Data1	...	Data(Lc)	Le
-----	-----	----	----	----	-------	-----	----------	----

An error "60" is returned when a power failure is detected.

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

Note: If you want to more about T=0 APDU format. Please refer to ISO/IEC7816-3 and COS command

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	26/68

9.6.6 CPU Warm Reset

Command

"C"	51H	38H
-----	-----	-----

Positive response

"P"	51H	38H	st0	st1	st2	Type	ATR
-----	-----	-----	-----	-----	-----	------	-----

Negative response

"N"	51H	38H	e1	e0
-----	-----	-----	----	----

Keeping the status of the IC contact activated, then returns response upon receiving "ATR" again.

Type: CPU Card communication protocol

=30H T=0 Protocol

=31H T=1 Protocol

9.6.7 T=1, T=0 CPU Card Protocol Automatic Communication

Command

"C"	51H	39H	C-APDU
-----	-----	-----	--------

Positive response

"P"	51H	39H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	51H	39H	e1	e0
-----	-----	-----	----	----

Protocol is recognized automatically. Set Data to "C-APDU". CRT-571 returns "R-APDU" data to HOST.

An error "60" is returned when a power failure is detected.

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	27/68

9.7 SAM(Secure Application Module) Control Command

9.7.1 Active SAM Command

Command

"C"	52H	30H	Vcc
-----	-----	-----	-----

Positive response

"P"	52H	30H	st0	st1	st2	Type	ATR
-----	-----	-----	-----	-----	-----	------	-----

Negative response

"N"	52H	30H	e1	e0	ATR
-----	-----	-----	----	----	-----

The CRT-571 supplies power (VCC) and clock (CLK), then reset (RST) release.

Type: SAM protocol type

=30H T=0 protocol

=31H T=1 protocol

ATR(Answer To Reset) format:

TS	TO	TA1	TB1	...	TCK
----	----	-----	-----	-----	-----

Vcc=30H: ICRW supplies with +5V to VCC and activates in line with the EMV2000 ver4.0.

Vcc=33H: ICRW supplies with +5V to VCC and activates in line with the ISO/IEC7816-3.

Vcc=35H: ICRW supplies with +3V to VCC and activates in line with the ISO/IEC7816-3.

Incase there is no Vcc, it will have 30H as default value

If ATR is not compliance to EMV, return e1,e0= "69"

Notes : There will be error and return ATR & Type when reset in line with EMV return

When a power failure is recognized while a power supply is supplied to the card, error code "60" is returned.

9.7.2 Deactivate SAM Command

Command

"C"	52H	31H
-----	-----	-----

Positive response

"P"	52H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	52H	31H	e1	e0
-----	-----	-----	----	----

This deactivates SAM

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
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9.7.3 Inquire SAM Status Command

Command

"C"	52H	32H
-----	-----	-----

Positive response

"P"	52H	32H	st0	st1	st2	Sti	Stj
-----	-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	52H	32H	e1	e0
-----	-----	-----	----	----

CRT-571 return the status of SAM with sti. stj

Sti =30H SAM is deactivated

Sti =31H SAM is activated, working frequency is 3.57 MHZ

Sti =32H SAM is activated, working frequency is 7.16 MHZ

Stj =30H First SAM card connector

Stj =31H Second SAM card connector (Optional)

Stj =32H Third SAM card connector (Optional)

Stj =33H Fourth SAM card connector(Optional)

Stj =34H Fifth SAM card connector(Optional)

An error "60" is returned when a power failure is detected.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	29/68

9.7.4 SAM Communication T=0

Command

"C"	52H	33H	C-APDU
-----	-----	-----	--------

Positive response

"P"	52H	33H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	52H	33H	e1	e0
-----	-----	-----	----	----

This exchanges data between SAM by protocol T=0

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

Note: If you want to more about T=0 APDU format. Please refer to ISO/IEC7816-3 and COS command

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	30/68

9.7.5 SAM Communication T=1

Command

"C"	52H	34H	C-APDU
-----	-----	-----	--------

Positive response

"P"	52H	34H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	52H	44H	e1	e0
-----	-----	-----	----	----

This exchange data between SAM by protocol T=1

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

Note: If you want to more about T=1 APDU format. Please refer to ISO/IEC7816-3 and COS command

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	31/68

9.7.6 SAM Warm Reset

Command

"C"	52H	38H
-----	-----	-----

Positive response

"P"	52H	38H	st0	st1	st2	Type	ATR
-----	-----	-----	-----	-----	-----	------	-----

Negative response

"N"	52H	38H	e1	e0
-----	-----	-----	----	----

Keeping the status of the SAM activated, then returns response upon receiving.

Type: SAM protocol type

=30H T=0 Protocol

=31H T=1 Protocol

9.7.7 Auto-Check SAM Card T=0/T=1 Protocol

Command

"C"	52H	39H	C-APDU
-----	-----	-----	--------

Positive response

"P"	52H	39H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	52H	39H	e1	e0
-----	-----	-----	----	----

If protocol type of IC card is not T=0, error code "62" is sent.

If ICC does not respond within Working Wait Time, CRT-571 deactivates an IC card and error code "63" is sent.

If any other protocol error occurs, CRT-571 deactivates an IC card and error code "64" is sent.

If HOST tries to communicate before an IC card activation, error code "65" is sent.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
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9.7.8 Select SAM

Command

"C"	52H	40H	SAMn
-----	-----	-----	------

Positive response

"P"	52H	40H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	52H	40H	e1	e0
-----	-----	-----	----	----

HOST can select SAM 1,2,3,4 or 5.

Sel = 30H: SAM 1.

Sel = 31H: SAM 2. (option)

Sel = 32H: SAM 3. (option)

Sel = 33H: SAM 4. (option)

Sel = 34H: SAM 5. (option)

SAM command is effective only in the module selection.

When Initialize command is executed, SAM 1 will be selected.

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		Date	2010/1/10
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9.8 SLE4442/4428 Control

9.8.1 SLE4442/4428 Reset

Command

"C"	53H	30H
-----	-----	-----

Positive response

"P"	53H	30H	st0	st1	st2	ATR(4 byte)
-----	-----	-----	-----	-----	-----	-------------

Negative response

"N"	54H	30H	e1	e0
-----	-----	-----	----	----

The CRT-571 supplies power (VCC) and clock (CLK), then reset (RST) release. After reset, return ATR.

ATR: SLE4442 Card ATR= "A2H, 13H, 10H, 91H"

SLE4442 Card ATR= "92H, 23H, 10H, 91H"

9.8.2 Deactivate SLE4442/4428

Command

"C"	53H	31H
-----	-----	-----

Positive response

"P"	53H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	53H	31H	e1	e0
-----	-----	-----	----	----

The CRT-571 stop supplying power (VCC) and clock (CLK), then reset (RST) release.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
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9.8.3 Inquire status of SLE4442/4428

Command

"C"	53H	32H
-----	-----	-----

Positive response

"P"	53H	32H	st0	st1	st2	Sti
-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	54H	32H	e1	e0
-----	-----	-----	----	----

CRT-571 tell the status of SLE4442/4428 with Sti after the command successfully execute.

Sti= 30H	SLE4442/4428	Deactivated
Sti= 31H	SLE4442	Activated
Sti= 32H	SLE4428	Activated

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	35/68

9.8.4 SLE4442 Control

These functions are specified by a command data form like C-APDU which format is based on T=0 standard.

In this case, CRT-571 recognizes the meaning of the command data, and execute the treatment related to the card by controlling hardware.

After the command was executed properly, CRT-571 returns a positive response with response data 9000H like from the IC card. When an error occurs during the communication with SLE4442, CRT-571 returns a positive response with status information in response data "sw1+sw2" which is base on ISO/IEC 7816-3

Sw1	Sw2	Specification
90H	00H	Success
6FH	00H	Fail
6FH	01H	Key Validation error
6FH	02H	Key Validation error and Lock
67H	00H	Address overflow
6BH	00H	Operation length overflow

9.8.4.1. Data read from main memory on SLE4442

Command

"C"	53H	33H	00H	B0 H	00H	abH	cdH
-----	-----	-----	-----	---------	-----	-----	-----

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to read data in the main memory

cd H : the length of bytes of data to read

CRT-571 reads data from the main memory of SLE4442, and transmits data on cdH bytes from the address abH.

The capacity of the main memory is 256 bytes.

All the contents of the main memory can be read with the following command.

ex). "CR3"+00B0000000

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		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
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9.8.4.2. Data read from protection memory on SLE4442

Command

"C"	53H	33H	00H	B0 H	01H	abH	cdH
-----	-----	-----	-----	---------	-----	-----	-----

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to read data in the main memory

cd H : the length of bytes of data to read

CRT-571 handles the data of all 32bits in the protection memory as the data on 4bytes.

The contents (32bit) of the protection memory can be read with the following command.

ex). "CR3"+00B0010004

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	37/68

9.8.4.3 Data read from security memory on SLE4442

Command

"C"	53H	33H	00H	B0 H	02H	abH	cdH	efH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to read data in the main memory

cd H : the length of bytes of data to read

CRT-571 handles the data of all 32bits in the security memory as the data on 4bytes.

The contents (32bit) of the security memory can be read with the following command.

ex). "CR3"+00B0020004

9.8.4.4 Data write to main memory on SLE4442

Command

"C"	53H	33H	00H	D0 H	00H	abH	cdH	efH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to write data in the main memory

cd H : the length of bytes of data to write

ef H : the data to write first (cd H bytes)

Before write to main memory, the validation of key is must..

The capacity of the main memory is 256 bytes. The byte number "00" of data to write means 256bytes.

The example that data are written in the whole area of the main memory is shown in the following.

ex). "CR3"+ 00D0000000 + Write Data (256byte)

After command execution, CRT-571 returns response with 9000H or sw1+sw2 as the result.

If the addressed data on main memory is protected by the protect status, Data is not allow.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	38/68

9.8.4.5 Data write to protection memory on SLE4442

Command

"C"	53H	33H	00H	D0 H	01H	abH	cdH	efH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to write data in the main memory
 cd H : the length of bytes of data to write
 ef H : the data to write first (cd H bytes)

Before write to the memory, the validation of key is must..

The address of the main memory that the protection is possible is 1Fh from 00h. Each protection condition of the protectable main memory can be controlled with 4byte (32bits) in the protection memory. For example, if bit0 of the protection memory byte0 is '1', data on the address 00H of the main memory are protected.

The content of protect status can not be change once setting protection.

For exampe: write 20H data to 10H address and set up protection

Ex). "CR3"+00D001100120

After command execution, CRT-571 returns with 9000H or sw1+sw2 as the result.

ICRW reads data first from the main memory, and it is compared with the value that it was received.

When this is wrong, writing isn't begun.

Protection condition can be set up at one time in the data which continued in the main memory.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	39/68

9.8.4.5 Data write to security memory on SLE4442

Command

"C"	53H	33H	00H	D0 H	02H	abH	cdH	efH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes:

- ab H : the start address to write data in the main memory
- cd H : the length of bytes of data to write
- ef H : the data to write first (cd H bytes)

After a password check is finished normally, the Reference-Data area of 3byte can be changed. All 32bits are handled as 4bytes. How to change the Reference-Data is as the following.

ex). "CR3"+ 00D0020103123456

After command execution, ICRW returns response with 9000H or sw1+sw2 as the result.

Notes: Better not ot writ, because the Error-counter is always allowed to write and easily make a failure. Error-Counter is controlled when password is checked.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	40/68

9.8.4.6 Verification data present to SLE4428

Command

"C"	53H	33H	00H	20H	03H	01H	03H	efH...
-----	-----	-----	-----	-----	-----	-----	-----	--------

Positive response

"P"	53H	33H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	33H	e1	e0
-----	-----	-----	----	----

Notes : ef H : the data to compare (3bytes)

Before changing data, password must be check

Because this function should be made effective, the issue of the next command is necessary.

Ex). "CR3"+0020030103xxxxxx (xxxxxx : security code 3bytes)

Card will verify password between card and command.

A user must know password at least when a user wants to rewrite the data on SLE4442 card.

Error-Counter can be reset in the zero if password is given to SLE4442 card properly if the value of Error-Counter is 2 or less.

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	41/68

9.8.5 SLE4428 Control

These functions are specified by a command data form like C-APDU which format is based on T=0 standard.

In this case, CRT-571 recognizes the meaning of the command data, and execute the treatment related to the card by controlling hardware.

After the command was executed properly, CRT-571 returns a positive response with response data 9000H like from the IC card. When an error occurs during the communication with SLE4442, CRT-571 returns a positive response with status information in response data "sw1+sw2" which is base on ISO/IEC 7816-3

Sw1	Sw2	Specification
90H	00H	Success
6FH	00H	Fail
6FH	01H	Key Validation error
6FH	02H	Key Validation error and Lock
6BH	00H	Address overflow
67H	00H	Operation length overflow

9.8.5.1 Data Reading of main-memory of SLE4428

Command

"C"	53H	34H	00H	B0 H	0aH	bcH	deH
-----	-----	-----	-----	---------	-----	-----	-----

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: abc H : the start address to read data in the main memory

de H : the number of bytes of data to read

CRT-571 read data from main memory of SLE4428 through abcH and deH

The capacity of the main memory is 1024bytes.

De="00"

Data to read means 256bytes.

The head part of the main memory can be read with the following command.

ex). "CR4"+00B0000000

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
		Page	42/68

9.8.5.2 Reading of protection-bit of SLE4428

Command

"C"	53H	34H	00H	B0 H	10H	abH	cdH
-----	-----	-----	-----	---------	-----	-----	-----

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: ab H : the start address to read the image of protection data of the main memory

cd H : the number of bytes of data to read

The protection conditions of 1024bytes of main-memory are changed into the data on 1024bits, and it is read.

1024bits is equivalent to 128bytes. (1024 = 128 x 8)

Data to read first become protection information to address (000H-007H) of main-memory in the case of abH=00H.

The contents of the whole protection image can be read with the following command.

ex). "CR4"+00B0100080

CRT-571 read protection-bit of SLE4428 according to abH

	Communication Protocol	Model No.	CRT-571
		Date	2010/1/10
	Card Issuing Machine	Ver.	1.01
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9.8.5.3 Data writing to main-memory of SLE4428

Command

"C"	53H	34H	00H	D0H	0aH	bcH	deH	fgH...
-----	-----	-----	-----	-----	-----	-----	-----	--------

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: abc H : the start address to write data in the main memory

de H : the number of bytes of data to write

fg H : the data to write first (de H bytes)

CRT-571 writes data in the main memory. CRT-571 returns a result after written data are checked.

Before doing this operation, password check must be done

The capacity of the main memory is 1024 bytes.

The example that data are written in from the address 100H is shown in the following.

ex). "CR4"+ 00D0010000 + Write Data (256byte)

After command execution, ICRW returns response with 9000H or sw1+sw2 as the result.

If the addressed data on main memory is protected, the write operation is not available.

9.8.5.4 Data writing to main-memory of SLE4428 with protecting

Command

"C"	53H	34H	00H	D0H	1aH	bcH	deH	fgH...
				H				

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: abc H : the start address to write data in the main memory

de H : the number of bytes of data to write

fg H : the data to write first (de H bytes)

CRT-571 writes data in the main memory. CRT-571 returns a result after written data are checked.

Before doing this operation, password check must be done

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9.8.5.5 Written with protection-bit

Command

"C"	53H	34H	00H	D0 H	2aH	bcH	deH	fgH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: abc H : the start address to write data in the main memory

de H : the number of bytes of data to write

fg H : the data to write first (de H bytes)

Before doing this operation that writing data with protection-bit, password check must be done

After command execution, ICRW returns response with 9000H or sw1+sw2 as the result.

CRT-571 reads data first from the main memory, and it is compared with the value that it was received.

When this is wrong, writing isn't begun. Protection condition can be set up at a time in the data which continued in the main memory.

9.8.5.6 Verification of password present to SLE4428

Command

"C"	53H	34H	00H	20H	00H	00H	02H	efH...
-----	-----	-----	-----	-----	-----	-----	-----	--------

Positive response

"P"	53H	34H	st0	st1	st2	data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	53H	34H	e1	e0
-----	-----	-----	----	----

Notes: ef H : the data to compare (2bytes)

Before changing data, Password must be checked properly with SLE4428.

Because this function should be made effective, the issue of the next command is necessary.

ex). "CR4"+ 0020000002xxxx (xxxx : security code 2bytes)

The presented data are compared with internal data in SLE4428 card itself.

User should know the password of cad if they want to change the data in SLE4442, Error-Counter can be reset in the zero from 7 or less than 7. when error-counter is reset as zero, lock the card.

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9.9 I2C Memory Card Control Command

9.9.1 Activate I2C memory card

Command

"C"	54H	30H	Wrd	Vcc
-----	-----	-----	-----	-----

Positive response

"P"	54H	30H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	54H	30H	e1	e0
-----	-----	-----	----	----

To activate (24C01,24C02,24C04,24C08,24C16,24C32,24C64,24C128,24C256) card

CRT-571 supplies a power supply (Vcc), Clock(CLK), Reset(RST).

Including:

Wrd set I2C type

Wrd =30 H To activate(24C01,24C02,24C04,24C08,24C16,24C32,24C64,24C128,24C256) card

Wrd =31 H To activate 24C01card

Wrd =32 H To activate 24C02 card

Wrd =33 H To activate 24C04 card

Wrd =34 H To activate 24C08 card

Wrd =35 H To activate 24C16 card

Wrd =36 H To activate 24C32 card

Wrd =37 H To activate 24C64 card

Wrd =38 H To activate 24C128 card

Wrd =39 H To activate 24C256 card

Vcc choose voltage to card

Vcc=30H 5V

Vcc=31H 3V

Vcc is optional parameter, no Set parameter in command is equal to Set=30H

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9.9.2 Deactivate I2C memory card

Command

"C"	54H	31H
-----	-----	-----

Positive response

"P"	54H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	54H	31H	e1	e0
-----	-----	-----	----	----

CRT-571 stop supplying a power supply (Vcc), Clock(CLK), Reset(RST).

CREATOR

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9.9.3 Inquire Status of I2C memory card

Command

"C"	54H	32H
-----	-----	-----

Positive response

"P"	54H	32H	st0	st1	st2	Sti
-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	54H	32H	e1	e0
-----	-----	-----	----	----

This command is used to inquire status of I2C card and return status by Sti.

Sti meanings:

Sti=30 H	No I2C be activated
Sti=31 H	Activated 24C01
Sti=32 H	Activated 24C02
Sti=33 H	Activated 24C04
Sti=34 H	Activated 24C08
Sti=35 H	Activated 24C16
Sti=36 H	Activated 24C32
Sti=37 H	Activated 24C64
Sti=38 H	Activated 24C128
Sti=39 H	Activated 24C256

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9.9.4 I2C Control

These functions are specified by a command data form like C-APDU which format is based on T=0 standard.

In this case, CRT-571 recognizes the meaning of the command data, and execute the treatment related to the card by controlling hardware.

After the command was executed properly, CRT-571 returns a positive response with response data 9000H like from the IC card. When an error occurs during the communication with I2C, CRT-571 returns a positive response with status information in response data "sw1+sw2" which is base on ISO/IEC 7816-3

Sw1	Sw2	Specification
90H	00H	Success
6FH	00H	Fail
6BH	00H	Address overflow
67H	00H	Operation length overflow

Write/Read I2C and Address scope is showed below:

Card_type	ab,cd
24C01	0000H ~ 007FH
24C02	0000H ~ 00FFH
24C04	0000H ~ 01FFH
24C08	0000H ~ 03FFH
24C16	0000H ~ 07FFH
24C32	0000H ~ 0FFFH
24C64	0000H ~ 1FFFH
24C128	0000H ~ 3FFFH
24C256	0000H ~ 7FFFH

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9.9.4.1 Read data from I2C

Command

"C"	54H	33H	00H	B0 H	abH	cdH	efH
-----	-----	-----	-----	---------	-----	-----	-----

Positive response

"P"	54H	33H	st0	st1	st2	Data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	54H	33H	e1	e0
-----	-----	-----	----	----

Value:

ab H : The upper address of head address which begins to read data

cd H : The lower address of head address which begins to read data

ef H : The number of bytes of data to read

CRT-571 read efH length and return to HOST according to address specified by abH, cdH. The length of efH can not be surpass the length of I2C address up limit.

When the following command is transmitted, data can be read from the I2C memory card.

ex). "CU3"+00B000000

9.9.4.2 Write data to I2C

Command

"C"	54H	34H	00H	D0 H	abH	cdH	efH	ghH...
-----	-----	-----	-----	---------	-----	-----	-----	--------

Positive response

"P"	54H	34H	st0	st1	st2	Data
-----	-----	-----	-----	-----	-----	------

Negative response

"N"	54H	34H	e1	e0
-----	-----	-----	----	----

This command is recognized as follows.

ab H : The upper address of head address which begins to write data

cd H : The lower address of head address which begins to write data

ef H : The number of bytes of data to write

gh H : the data to write first (the head data of the data on ef H bytes)

CRT-571 read efH length and return to HOST according to address specified by abH, cdH. The length of efH can not be surpass the length of I2C address up limit.

The example which data on 8bytes are written into I2C

ex). "CU3"+ 00D0000008 + Write Data (8bytes)

After command execution, ICRW returns response with 9000H or sw1+sw2 as the result.

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9.10 Contactless IC card Operation

9.10.1 Activated contactless IC card

Command

"C"	60H	30H	Set1	Set2
-----	-----	-----	------	------

(1) Mifare One Card Positive Response

"P"	60H	30H	st0	st1	st2	Rtype	ATQA	UID_len	UID_data	SAK
-----	-----	-----	-----	-----	-----	-------	------	---------	----------	-----

Mifare One Card Negative Response

"N"	60H	30H	e1	e0	Rtype	ATQA	UID_len	UID_data	SAK
-----	-----	-----	----	----	-------	------	---------	----------	-----

(2) 14443 Type A Card Positive Response

"P"	60H	30H	st0	st1	st2	Rtype	ATQA	UID_len	UID_data	SAK	ATS
-----	-----	-----	-----	-----	-----	-------	------	---------	----------	-----	-----

14443 Type A Card Negative Response

"N"	60H	30H	e1	e0	Rtype	ATQA	UID_len	UID_data	SAK	ATS
-----	-----	-----	----	----	-------	------	---------	----------	-----	-----

(3) 14443 Type B Card Positive Response

"P"	60H	30H	st0	st1	st2	Rtype	ATQB
-----	-----	-----	-----	-----	-----	-------	------

14443 Type B Card Negative Response

"N"	60H	30H	e1	e0	Rtype	ATQB
-----	-----	-----	----	----	-------	------

Activate RFID card

CRT-571 support activated IEC/ISO14443 Type A and IEC/ISO 14443 Type B

The process is show as below:

- 1).Mifare one card:
 1. Request A(REQ A) / Answer Request A (ATQ A).
 2. Anticollision
 3. Select(SEL) / Unique Identifier(UID) & Select Acknowledge(SAK)

When Mifare card successfully activate, CRT-571return:

ATQA(2 byte), UID_data (4—10 byte) and SAK(1 byte).

- 2).ISO/IEC 14443 Type A:
 1. Request A(REQ A) / Answer Request A (ATQ A).
 2. Anticollision
 3. Select(SEL) / Unique Identifier(UID) & Select Acknowledge(SAK)
 4. Request for answer to select (RATS) / Answer to Select(ATS)

Protocol and parameter selection request(PPSR) / PPS start(PPSS)

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When ISO/IEC 14443 Type A card successfully activated, CRT-571 return:

Mifare card return value increase (ATS(1-254 byte) and protocol parameter (1 byte))

- 3).ISO/IEC 14443 Type B:
1. Request B(REQ B) / Answer Request B (ATQ B).
 2. Attribute(A TTRIB) / Answer to ATTRIB

When ISO/IEC 14443 Type B card successfully activated, CRT-571 return ATQB 12 byte(including following information):

50H, PUPI(4 byte) , App.data(4 byte), Protocol info(3 byte)

Notes:

Set1,Set2 set sequence of operation for different type of protocol

Valid value: 41H ('A'= Type A), 42H('B'= Type B), 30H('0'= Do not use)

Ex1: Set1= 'A', Set2 = 'B' (default)

Activate sequence: Type A protocol (first sequence), Type B protocol (second sequence)

Ex2: Set1= 'B', Set2 = 'A'

Activate sequence: Type B protocol (first sequence), Type A protocol (second sequence)

Ex3: Set1= 'A', Set2 = '0'

Activate sequence: Type A protocol (first sequence), Type B protocol (Deactivated)

Ex4: Set1= 'B', Set2 = '0',

Activate sequence: Type B protocol (first sequence), Type A protocol (Deactivated)

Rtype: Protocol

= 41H ('A') In line with ISO/IEC 14443 Type A protocol

= 42H ('B') In line with ISO/IEC 14443 Type B protocol

= 4DH ('M') In line with Philips Mifare one card protocol

When Rtype=4DH('M')

ATQA= 0044H Mifare Ultralight Card

ATQA= 0004H Mifare S50 1K Card

ATQA= 0002H Mifare S70 4K Card

Mifare one, ISO/IEC 14443 Type A return UID (The length of UID_data)

UID_len=4 The length of UID_data is 4 byte

UID_len=7 The length of UID_data is 7 byte

UID_len=10 The length of UID_data is10 byte

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9.10.1 Deactivate RFID card

Command

"C"	60H	31H
-----	-----	-----

Positive response

"P"	60H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	60H	31H	e1	e0
-----	-----	-----	----	----

Deactivate RFIN card and Output signal to antenna is closed.

9.10.2 Inquire status of RFID card

Command

"C"	60H	32H
-----	-----	-----

Positive response

"P"	60H	32H	st0	st1	st2	sti	stj
-----	-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	60H	32H	e1	e0
-----	-----	-----	----	----

Inquire status of RFID sti,stj:

sti	stj	Specification
'0'	'0'	Deactivated RF
'1'	'0'	Mifare one S50 card
	'1'	Mifare one S70 card
	'2'	Mifare one UL card
'2'	'0'	Type A CPU card
'3'	'0'	Type B CPU card

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9.10.3 Mifare 1 card control

These functions are specified by a command data form like C-APDU which format is based on T=0 standard.

In this case, CRT-571 recognizes the meaning of the command data, and execute the treatment related to the card by controlling hardware.

After the command was executed properly, CRT-571 returns a positive response with response data 9000H like from the IC card. When an error occurs during the communication with Mifare 1 card CRT-571 returns a positive response with status information in response data "sw1+sw2" which is base on ISO/IEC 7816-3.

Sw1	Sw2	Specification
90H	00H	Success
6FH	00H	Fail
6BH	00H	Address overflow
67H	00H	Operation length overflow

9.10.4 Key verification

Command

"C"	60H	33H	00H	20H	ks	sn	lc	pdata
-----	-----	-----	-----	-----	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Download key to CRT-571 and verify the key directly

ks(1byte): key select (Key A=00H, Key B=01H)

sn(1byte): sector number (S50 card sn=00H-0FH, S70 card sn=00H-27H)

lc(1byte): password length lc=06H

pdata(6 byte): password data

rdata(2 byte): return data(positive response with data 9000H, and negative response with " sw1+sw2")

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9.10.4.3 Modify sector key (KEY A)

Command

"C"	60H	33H	00H	D5H	00H	sn	lc	pdata
-----	-----	-----	-----	-----	-----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Modify sector key (key A)

This command only can modify KEY A, and modify KEY B as "0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF" in the meantime modify control words as "0xFF, 0x07, 0x80, 0x69" (ex-work default)

Use block command to modify Key A, Key B control word

sn(1byte): sector number (S50 card sn=00H-0FH, S70 card sn=00H-27H)

lc(1byte): password length lc=06H

pdata: password data 6 byte.

rdata(2 byte): return data

(positive response with data 9000H, and negative response with " sw1+sw2")

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9.10.4.4 Download password to EEPROM

Command

"C"	60H	33H	00H	D0H	ks	sn	lc	pdata
-----	-----	-----	-----	-----	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Read key from EEPROM of RF module and verify the sector key

EEPROM can preserve 32 groups of key data

ks(1byte):	key select	(Key A=00H, Key B=01H)
sn (1byte):	sector number	(sn=00H-0FH)
lc(1byte):	password length	lc=06H
pdata(6 byte):	password data	
rdata(2 byte):	return data	
	positive response	sw1+sw2=9000H.
	negative response	sw1+sw2=6F00H

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9.10.4.4 Read sector data

Command

"C"	60H	33H	00H	B0H	sn	bn	le
-----	-----	-----	-----	-----	----	----	----

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Read block and sequence blocks from RF card

sn(1 byte): sector number

bn(1 byte): block number

le(1 byte): block number (le=01H read one block, le=03H read three blocks)

rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes:

1. Ultralight Card only have one block in one sector, every block have 4 byte data. S50, S70 have 16 byte data in one block.

2. Ultralight Card, Mifare 1k (S50), Mifare 1k (S70) card range of capacity is shown as below:

Ultralight Card: sn=00H-0FH, bn=00H, le=01H-0FH

Mifare 1k(S50): sn=00H-0FH, bn=00H-03H, le=01H-04H

Mifare 1k(S70): sn=00H-20H, bn=00H-03H, le=01H-04H

sn=21H-27H, bn=00H-0FH, le=01H-10H (S70 card last 8 sector have 16 blocks)

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9.10.4.5 Write sector data

Command

"C"	60H	33H	00H	D1H	sn	bn	lc	wdata
-----	-----	-----	-----	-----	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Read block and sequence blocks from RF card

sn(1 byte): sector number
 bn(1 byte): block number
 lc(1 byte): block number
 wdata: block to write (n byte)
 rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes:

1. Ultralight Card only have one block in one sector, every block have 4 byte data. S50,S70 have 16 byte data in one block
2. Ultralight Card, Mifare 1k(S50), Mifare 1k (S70) card range of capacity is shown as below:
 Ultralight Card: sn=00H-0FH, bn=00H-03H,lc=01H-03H
 Mifare 1k(S50): sn=00H-0FH, bn=00H-03H,lc=01H-03H
 Mifare 1k(S70): sn=00H-20H, bn=00H-03H,lc=01H-03H
 sn=21H-27H, bn=00H-0FH, lc=01H-0FH
 (S70 card last 8 sector have 16 blocks)
3. S50,S70 card last block of each sector is control sector to preserve Key A, read/write control words, Key B.

Cautions: Do not write last block and CRT-571 also will prohibit to write last block.

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9.10.4.6 Initialization

Command

"C"	60H	33H	00H	D2H	sn	bn	lc	wdata
-----	-----	-----	-----	-----	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Initialization operation to RF card

sn(1 byte): sector number

bn(1 byte): block number

lc(1byte): length lc=04H

wdata: data (4 byte)

rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes: Mifare 1k(S50), Mifare 1k (S70) card operation sector

(Sector can not be out of range and last block can not be operated)

Mifare 1k(S50): sn=00H-0FH, bn=00H-03H,

Mifare 1k(S70): sn=00H-20H, bn=00H-03H,

sn=20H-27H, bn=00H-0EH,

(S70 card last 8 sector have 16 blocks)

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9.10.4.7 Read value

Command

"C"	60H	33H	00H	B1H	sn	bn
-----	-----	-----	-----	-----	----	----

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Read value operations to RF card

sn(1 byte): sector number

bn(1 byte): block number

rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes: Mifare 1k(S50), Mifare 1k (S70) card operation sector

(Sector can not be out of range and last block can not be operated)

Mifare 1k(S50): sn=00H-0FH, bn=00H-03H,

Mifare 1k(S70): sn=00H-20H, bn=00H-03H,

sn=20H-27H, bn=00H-0EH,

(S70 card last 8 sector have 16 blocks)

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9.10.4.8 Increment

Command

"C"	60H	33H	00H	D3 H	sn	bn	lc	wdata
-----	-----	-----	-----	---------	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Increment operation to RF card

sn(1 byte): sector number

bn(1 byte): block number

lc(1byte): increment length lc=04H

wdata: increment data (4 byte)

rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes: Mifare 1k(S50), Mifare 1k (S70) card operation sector

(Sector can not be out of range and last block can not be operated)

Mifare 1k(S50): sn=00H-0FH, bn=00H-03H,

Mifare 1k(S70): sn=00H-20H, bn=00H-03H,

sn=20H-27H, bn=00H-0EH,

(S70 card last 8 sector have 16 blocks)

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9.10.4.9 Decrement

Command

"C"	60H	33H	00H	D4 H	sn	bn	lc	wdata
-----	-----	-----	-----	---------	----	----	----	-------

Positive response

"P"	60H	33H	st0	st1	st2	rdata
-----	-----	-----	-----	-----	-----	-------

Negative response

"N"	60H	33H	e1	e0
-----	-----	-----	----	----

Decrement operation to RF sector

sn(1 byte): sector number

bn(1 byte): block number

lc(1byte): Decrement length lc=04H

wdata: Decrement data(4 byte)

rdata(2 byte): return data

(positive response with data 9000H, and negative response with "sw1+sw2")

Notes: Mifare 1k(S50), Mifare 1k (S70) card operation sector

(Sector can not be out of range and last block can not be operated)

Mifare 1k(S50): sn=00H-0FH, bn=00H-03H,

Mifare 1k(S70): sn=00H-20H, bn=00H-03H,

sn=20H-27H, bn=00H-0EH,

(S70 card last 8 sector have 16 blocks)

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9.10.3 Type A RF card communication

Command

"C"	60H	34H	C-APDU
-----	-----	-----	--------

Positive response

"P"	60H	34H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	60H	34H	e1	e0
-----	-----	-----	----	----

This exchanges data between RF card by protocol RF Type A T=CL according to ISO/IEC 14443-4

Notes: The max. length of C-APDU is 261 byte, the max. length of R-APDU is 258 byte.

	Communication Protocol	Model No.	CRT-571
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9.10.4 Type B Rfcard communication

Command

"C"	60H	35H	C-APDU
-----	-----	-----	--------

Positive response

"P"	60H	35H	st0	st1	st2	R-APDU
-----	-----	-----	-----	-----	-----	--------

Negative response

"N"	60H	35H	e1	e0
-----	-----	-----	----	----

This exchanges data between RF card by protocol RF Type B T=CL according to ISO/IEC 14443-4

Notes: The max. length of C-APDU is 261 byte, the max. length of R-APDU is 258 byte.

	Communication Protocol	Model No.	CRT-571
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9.11 Read Serial Number of CRT-571

9.11.1 Read serial number

Command

"C"	A2H	30H
-----	-----	-----

Positive response

"P"	A2H	30H	st0	st1	st2	len	ICRW_SN
-----	-----	-----	-----	-----	-----	-----	---------

Negative response

"N"	A2H	30H	e1	e0
-----	-----	-----	----	----

RF Sleep / wake-up operation

Set=30H Sleep operation

Set=31H Wake-up operation

Len: read length of CRT-571serial number (0byte-18byte)

ICRW_SN: CRT-571 serial number

9.11.2 Write Serial Number of CRT-571

Omitted

	Communication Protocol	Model No.	CRT-571
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9.11.3 Read CRT-571 configuration

Command

"C"	A3H	30H
-----	-----	-----

Positive response

"P"	A3H	30H	st0	st1	st2	ICRW_Config
-----	-----	-----	-----	-----	-----	-------------

Negative response

"N"	A3H	30H	e1	e0
-----	-----	-----	----	----

CRT-571 configuration specification:

Name	Value	Description
S1		CRT Reader Type option
	"7"	S1 ="7"
S2/S3/S4 (3 Byte)		User Code option
	"V10"	CRT version
	"XXX"	
S5		Card r/w type option
	"0"	
	"I"	IC card r/w
	"C"	RF card r/w
	"E"	IC + RF card r/w
S6		Interface type option
	"R"	RS-232Interface type
S7		IC card write type
	"0"	
	"1"	
	"2"	
S8		RF card write type
	"0"	
	"1"	
	"2"	
S9		SAM option
	"0"	Not SAM
	"1"	SAM 1
	"2"	SAM 2
	"3"	SAM 3
	"4"	SAM 4
	"5"	SAM 5
S10	"0"	
	"1"	

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9.11.4 Read CRT-571 version information

Command

"C"	A4H	Pm
-----	-----	----

Positive response

"P"	A4H	30H	st0	st1	st2	Rev
-----	-----	-----	-----	-----	-----	-----

Negative response

"N"	A4H	30H	e1	e0
-----	-----	-----	----	----

Read CRT-571 version information.

Pm=30H Read machine software information

Ex: Rev ="C571_V1.00_A_090910"

Pm=31H Read IC Card software information

Ex: Rev ="ICCARD_V10_A_090910"

Pm=32H Read RF Card software information

Ex: Rev ="RFCARD_V10_A_090910"

9.12. Error-card Bin Counter Control

9.14.1 Read error-card bin counter

Command

"C"	A5H	30H
-----	-----	-----

Positive response

"P"	A5H	30H	st0	st1	st2	Count(3 byte)
-----	-----	-----	-----	-----	-----	---------------

Negative response

"N"	A5H	30H	e1	e0
-----	-----	-----	----	----

After reset error-card bin counter. Capture on card, counter one plus

Count= "000" ~ "999"

Counter overflow will return machine status (e1,e0= "50")

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9.14.2 Set initial value of error-card bin

Command

"C"	A5H	31H	Count(3 byte)
-----	-----	-----	---------------

Positive response

"P"	A5H	31H	st0	st1	st2
-----	-----	-----	-----	-----	-----

Negative response

"N"	A5H	31H	e1	e0
-----	-----	-----	----	----

Set initial value of error-card bin.

Count= "000" ~ "999"

Count value range (0-999)

CREATOR