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# Interface Specification

MODEL : ECDM-200  
REV. : 1.1  
DATE : 2006. 05. 06

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## Revision History

Ver.	DATE	Item		Name
		Title	Details	
1.0	2006.03.31	Released		H. H. SO
1.1	2006.05.06	Reset response	Add Reset response Add Error Code	H. H. SO
1.2	2007.01.25	Max Dispensing Description Changed (Ch. 3.4)	Recommendation 60 Notes → 100 Notes Dispensing Available	H. H. SO

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## 1. PREFACE

The document is related to the communication protocol of ECDM-200, which is made by Puloon Technology. Communication interface, message protocol and testing program are included.

## 2. COMMUNICATION INTEREFACE

ECDM-200 supports the serial interface based on RS-232C with upper level device. The series of the texts, which are transferred to counterpart, are called “Message”. The message from upper level device to cash dispenser will be called “Command” and the message from cash dispenser to upper level will be called “Response”.

### 2.1 MESSAGE TRANSMISSION

Cash dispenser is operated by the command from upper level device (host) and sends the response for that. When cash dispenser receives a command, the response should be sent before the next command is received. If a command sends during the processing the response, cash dispenser would not react and respond to the command at all. Also cash dispenser doesn't give any response before a command is arrived.


When a message (command or response) has been sent, a response is sent to indicate whether the message has been successfully received.

- ACK (0x06): to indicate that message has been accepted.
- NAK (0x15): to indicate that the message has been rejected and that the message should be resent.

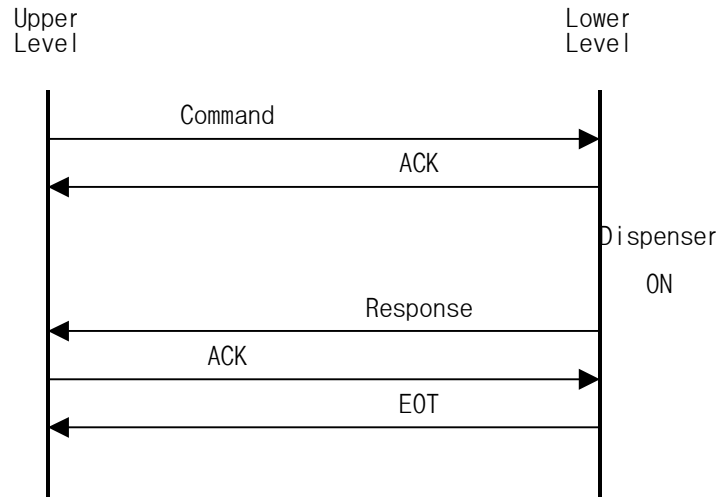
The re-sending of one message will be tried up to 3 times and, in case all of the trials fail, the message will be canceled and new transmission mode be ready. All the texts except ACK would be considered as NAK. (Exceptionally. EOT (0x04) is the newly sent character set from upper level and it is recognized as EOT which enables to be ready for new communication transferring mode.)

Every message has Block Check Character (BCC), which shows whether the message is normal or abnormal. Therefore, in case of right BCC, the message is known as normal state (Sending ACK). Otherwise, NAK is sent and notice the failure of message transmission.

The character set of EOT is used in the head and the end of the message. If it is not located on BCC Check, all the transmission order is ignored and new communication mode is set up.

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The basic order in message is displayed like below.



## 2.2 TRANSMISSION CHARACTERISTICS


Transmission method is half duplex mode (HDM). When the dispenser is operated, the message from upper level is ignored. The major transmitted characters are like below.

Transmission Rate	9600 bps
Character Length	8 bits
Parity bits	None
Stop bits	1 stop bit

In case of transmission, physical handshake is not used. Only RXD and TXD defined in RS-232C specification is observed.

## 2.3 MAIN TIMING

Timing	Min.	Max.
Delay to send ACK after Command	0	50
Timeout for waiting for ACK	500	550
Delay to send Response after Command	0	60 sec

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### 3. MESSAGE PROTOCOL

Message protocol is dependent on Command and Response of message and has a little difference up to the function with specific format.

#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD		Command Code
PARA		Command PARAMeter (Variable Length)
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP		Command Code
PARA		Response PARAMeter (Variable Length)
ETX	0x03	End of Text
BCC		Block Check Character


BCC can be gotten through Exclusive-OR (XOR) from the start of each message to ETX except BCC.

#### 3.1 RESET

The reset will cause the dispenser reset by software. Therefore, there is no response for this command.

#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD	0x44	Reset Command
ETX	0x03	End of Text
BCC	0x71	Block Check Character

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(Cf.) When RESET is transmitted, it would take 2 seconds for dispenser to initialize all status. Therefore, the next command would be sent after the initialization.

Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x44	SENSOR DIAGNOSTICS Command Code (CMD)
ERROR	0x30	Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.2 STATUS


This command shows the current sensor status and the configuration of cassette in the top position.

Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD	0x50	Status Command
ETX	0x03	End of Text
BCC		Block Check Character

Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x50	Status Command
ERROR		Error Status for Operation
DISP0		Status for Dispenser
DISP1		Status for Dispenser
STAT1		Status of Cassette in Top Pick Position
TYPE1	0x30 or 0x31	Type of Cassette in Top Pick Position - 0x30: Cassette is removed. - 0x31: Cassette exists.
OPAC1	Value +0x20	Thickness Reference Value of Bills in Cassette in Top Pick Position

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LENG1	Value +0x20	Length Reference Value of Bills in Cassette in Top Pick Position
STAT2		Status of Cassette in Second Top Pick Position
TYPE2	0x30 or 0x32	Type of Cassette in the Second Top Pick Position - 0x30: Cassette is removed. - 0x32: Cassette exists.
OPAC2	Value +0x20	Thickness Reference Value of Bills in Cassette in the Second Top Pick Position
LENG2	Value +0x20	Length Reference Value of Bills in Cassette in the Second Top Pick Position
STAT3		Status of Cassette in Third Top Pick Position
TYPE3	0x30 or 0x33	Type of Cassette in the Third Top Pick Position - 0x30: Cassette is removed. - 0x33: Cassette exists.
OPAC3	Value +0x20	Thickness Reference Value of Bills in Cassette in the Third Top Pick Position
LENG3	Value +0x20	Length Reference Value of Bills in Cassette in the Third Top Pick Position
STAT4		Status of Cassette in Bottom Pick Position
TYPE4	0x30 or 0x34	Type of Cassette in Bottom Pick Position - 0x30: Cassette is removed. - 0x34: Cassette exists.
OPAC4	Value +0x20	Thickness Reference Value of Bills in Cassette in Bottom Pick Position
LENG4	Value +0x20	Length Reference Value of Bills in Cassette in Bottom Pick Position
ETX	0x03	End of Text
BCC		Block Check Character

DISP0 Description

<b>bit</b>	<b>Meaning</b>
0	Sensor DIV-L is Blocked and Off.
1	Sensor DIV-R is Blocked and Off.
2	Sensor EJT is Blocked and Off.
3	Sensor EXT is Blocked and Off.
4	Sensor RJT is Blocked and Off.
5	Sensor SOL is Blocked and Off.
6	Always 1
7	Always 0

DISP1 Description



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bit	Meaning
0	Sensor RVST-L is Blocked and Off.
1	Sensor RVST-R is Blocked and Off.
2	Always 0
3	Always 0
4	Always 0
5	Always 0
6	Always 1
7	Always 0

#### STAT1 to 4 Description

bit	Meaning
0	Sensor CHK-L is Blocked and Off.
1	Sensor CHK-R is Blocked and Off.
2	Cassette exists in the position.
3	Cassette is under Near-end Status.
4	Sensor CB is Blocked and Off.
5	Always 0
6	Always 1
7	Always 0


### 3.3 PURGE

PURGE will cause the dispenser to purge the transport of all bills from four cassettes and to move the bills in the path to the reject tray. This command will not be required for normal operation. However, in case of abnormal termination such as sudden power-off by external cause, the command will be useful to remove the notes. A successful PURGE operation will move any bills in the transport to the reject tray but if the note would be left in the EXIT area, it may be dispensed.

PURGE will perform the repetitive routine of FORWARD/BACKWARD FEED itself and cause the damage of notes. It will not recover errors completely by JAM or already terminated DISP (dispense) command. Therefore, it is recommended to use carefully.

#### Command Format


Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD	0x51	PURGE Command
ETX	0x03	End of Text

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BCC		Block Check Character
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Response Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x51	PURGE Command (CMD)
ERROR		Error Status for Operation
MISS	0x30	RESERVED
EXIT1	Count +0x20	Number of Items Dispensed from Top Pick Module
REJECT1	Count +0x20	Number of Items Reject Event from Top Pick Module
TYPE1	0x30 ~0x34	Type of Cassette in Top Pick Position - 0x30: Cassette is removed. - 0x31: Cassette exists.
EXIT2	Count +0x20	Number of Items Dispensed from the Second Top Pick Module
REJECT2	Count +0x20	Number of Items Reject Event from the Second Top Pick Module
TYPE2	0x30 ~0x34	Type of Cassette in the Second Top Pick Position - 0x30: Cassette is removed. - 0x32: Cassette exists.
EXIT3	Count +0x20	Number of Items Dispensed from the Third Top Pick Module
REJECT3	Count +0x20	Number of Items Reject Event from the Third Top Pick Module
TYPE3	0x30 ~0x34	Type of Cassette in the Third Top Pick Position - 0x30: Cassette is removed. - 0x33: Cassette exists.
EXIT4	Count +0x20	Number of Items Dispensed from Bottom Pick Module
REJECT4	Count +0x20	Number of Items Reject Event from Bottom Pick Module
TYPE4	0x30 ~0x34	Type of Cassette in Bottom Pick Position - 0x30: Cassette is removed. - 0x34: Cassette exists.
ETX	0x03	End of Text
BCC		Block Check Character

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### 3.4 DISPENSE (Multi-Cassette Dispense)

The command will cause to dispenser the requested number of notes from the requested cassette. It will check thickness and length of notes, which are individually referred to the specified OPACITY and LENGTH, and then decide whether the notes are dispensed or rejected. During the process, other parameters such as the required distance between notes and the skew of notes will give influence on dispensing and rejecting.


The maximum dispensing number for one transaction is 100 sheets available and more than 100 notes will cause Parameter Error.

#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD	0x52	DISPENSE Command
QTY1	0x20~	The number of bills to be dispensed from Top Cassette + 0x20
QTY2	0x20~	The number of bills to be dispensed from the Second Top Cassette + 0x20
QTY3	0x20~	The number of bills to be dispensed from the Third Top Cassette + 0x20
QTY4	0x20~	The number of bills to be dispensed from Bottom Cassette + 0x20
TO1	0x20, 0x1C	If TIMEOUT value is not used, then 0x20. Else if it is used, the value is 0x1C. Default Status: Fixed as 0x20
TO2	0x20, 0x30 ~0x39	If TIMEOUT value is not used, then 0x20. Else if it is used, the value is 0x30~39. Default Status: Fixed as 0x20
RSV	0x20	Reserved (9 bytes)
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communication ID
STX	0x02	Start of Text
RSP	0x52	DISPENSE Command


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ERROR		Error Status for Operation
MISS	0x30	RESERVED
EXIT1	Count +0x20	Number of Items Dispensed from the Top Cassette.
REJECT1	Count +0x20	Number of Reject Events from the Top Cassette
TYPE1	0x30 ~0x34	The Cassette Type Installed in the Top Cassette. - 0x30: Cassette is removed. - 0x31: Cassette exists.
EXIT2	Count +0x20	Number of Items Dispensed from the Second Top Cassette.
REJECT2	Count +0x20	Number of Reject Events from the Second Top Cassette
TYPE2	0x30 ~0x34	The Cassette Type Installed in the Second Top Cassette. - 0x30: Cassette is removed. - 0x32: Cassette exists.
EXIT3	Count +0x20	Number of Items Dispensed from the Third Top Cassette.
REJECT3	Count +0x20	Number of Reject Events from the Third Top Cassette
TYPE3	0x30 ~0x34	The Cassette Type Installed in the Third Cassette. - 0x30: Cassette is removed. - 0x33: Cassette exists.
EXIT4	Count +0x20	Number of Items Dispensed from the Bottom Cassette.
REJECT4	Count +0x20	Number of Reject Events from the Bottom Cassette.
TYPE4	0x30 ~0x34	The Cassette Type Installed in the Bottom Cassette. - 0x30: Cassette is removed. - 0x34: Cassette exists.
RSV	0x20	Reserved (9bytes)
ETX	0x03	End of Text
BCC		Block Check Character

### 3.5 TEST DISPENSE

The command will cause to reject the specified number of notes from the cassette to the reject tray. All the specified notes will move into the reject tray.

The requested dispensing number of notes at maximum should not be over 100 sheets.


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#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communication ID
STX	0x02	Start of Text
CMD	0x53	TEST DISPENSE Command
QTY1	0x20~	The number of bills to be dispensed from Top cassette + 0x20
QTY2	0x20~	The number of bills to be dispensed from the Second Top Cassette + 0x20
QTY3	0x20~	The number of bills to be dispensed from the Third Top Cassette
QTY4	0x20~	The number of bills to be dispensed from Bottom Cassette + 0x20
TO1	0x20, 0x1C	If TIMEOUT value is not used, then 0x20. Else if it is used, the value is 0x1C. Default Status: Fixed as 0x20
TO2	0x20, 0x30 ~0x39	If TIMEOUT value is not used, then 0x20. Else if it is used, the value is 0x30~39. Default Status: Fixed as 0x20
RSV	0x20	Reserved (9 bytes)
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x53	TEST DISPENSE Command
ERROR		Error Status for Operation
MISS	0x30	RESERVED
EXIT1	Count +0x20	Number of Items Dispensed from the Top cassette.
REJECT1	Count +0x20	Number of Reject Events from the Top Pick Module
TYPE1	0x30 ~0x34	The Cassette Type Installed in the Top Pick Module. - 0x30: Cassette is removed. - 0x31: Cassette exists.
EXIT2	Count +0x20	Number of Items Dispensed from the Second Top cassette.
REJECT2	Count +0x20	Number of Reject Events from the Second Top Pick Module.

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TYPE2	0x30 ~0x34	The Cassette Type Installed in the Second Top Pick Module. - 0x30: Cassette is removed. - 0x32: Cassette exists.
EXIT3	Count +0x20	Number of Items Dispensed from the Third Top cassette.
REJECT3	Count +0x20	Number of Reject Events from the Third Top Pick Module
TYPE3	0x30 ~0x34	The Cassette Type Installed in the Third Pick Module. - 0x30: Cassette is removed. - 0x33: Cassette exists.
EXIT4	Count +0x20	Number of Items Dispensed from the Bottom Cassette.
REJECT4	Count +0x20	Number of Reject Events from the Bottom Pick Module
TYPE4	0x30 ~0x34	The Cassette Type Installed in the Bottom Pick Module. - 0x30: Cassette is removed. - 0x34: Cassette exists.
RSV	0x20	Reserved (9bytes)
ETX	0x03	End of Text
BCC		Block Check Character

### 3.6 LAST STATUS


The command will request to resend the results to the last operation commands such as PURGE, DISPENSE and TEST DISPENSE. Therefore, it is effective only when the prior operation was performed.

#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x55	Last Status Command
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format


Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text

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RSP	0x55	Last Status Command
LAST CMD		Prior Operation Command Code
ERROR		Error Status for Operation
MISS	0x30	RESERVED
EXIT1	Count +0x20	Number of Items Dispensed from the Top Cassette.
REJECT1	Count +0x20	Number of Reject Events from the Top Pick Module
TYPE1	0x30 ~0x34	The Cassette Type Installed in the Top Pick Module. - 0x30: Cassette is removed. - 0x31: Cassette exists.
EXIT2	Count +0x20	Number of Items Dispensed from the Second Top Cassette.
REJECT2	Count +0x20	Number of Reject Events from the Second Top Pick Module
TYPE2	0x30 ~0x34	The Cassette Type Installed in the Second Top Pick Module. - 0x30: Cassette is removed. - 0x32: Cassette exists.
EXIT3	Count +0x20	Number of Items Dispensed from the Third Top Cassette.
REJECT3	Count +0x20	Number of Reject Events from the Third Top Pick Module
TYPE3	0x30 ~0x34	The Cassette Type Installed in the Third Pick Module. - 0x30: Cassette is removed. - 0x33: Cassette exists.
EXIT4	Count +0x20	Number of Items Dispensed from the Bottom Cassette.
REJECT4	Count +0x20	Number of Reject Events from the Bottom Pick Module
TYPE4	0x30 ~0x34	The Cassette Type Installed in the Bottom Pick Module. - 0x30: Cassette is removed. - 0x34: Cassette exists.
RSV		Reserved (9bytes)
ETX	0x03	End of Text
BCC		Block Check Character

### 3.7 SENSOR DIAGNOSTICS

The command will cause to dispense 5 notes from the designated cassette as if “TEST DISPENSE” will do. The notes are moved to reject tray and the measured OPACITY, LENGTH and SOLENOID TIME of the last note is returned.

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#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x58	SENSOR DIAGNOSTICS Command
POS	0x31~ 0x34	The Designated Cassette for Dispensing (0x31: Top, ... 0x34: Bottom)
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x58	SENSOR DIAGNOSTICS Command Code (CMD)
ERROR		Error Status for Operation
OPAC.	Value +0x20	OPACITY of the Last Picked Bill
LENG.	Count +0x20	LENGTH of the Last Picked Bill
DIVERT	Time +0x20	The Solenoid Operation Time for the Diverter Enable (Unit: ms)
REJECT	0x20~	Number of Reject Event
ETX	0x03	End of Text
BCC		Block Check Character


### 3.8 SET BILL OPACITIES

The command is used to save the reference value in order to detect double notes. Each opacity value can be saved from 0x00 to 0xFF. The value, 0x00 means to maintain current data. When the data is changed, it will be saved in the memory of EEPROM and then efficient for the next transaction. In case of power on/off, the value continues to be used. However, when the electricity trouble causes the saved data damaged (wrong check sum on EEPROM), the criterion is set to initial value again. Therefore, it is recommended for user to check the value of the saved value of OPACITY when it is turned on.

#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission



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ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x5A	SET BULL OPACITIES Command
OPAC1_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in top cassette
OPAC1_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in top cassette
OPAC2_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in second top cassette
OPAC2_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in second top cassette
OPAC3_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in third top cassette
OPAC3_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in third top cassette
OPAC4_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in bottom cassette
OPAC4_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in bottom cassette
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format


<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5A	SET BILL OPACITIES Code (CMD)
ERROR		Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.9 GET BILL OPACITIES

The command will get the OPACITY data from each cassette.

#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID

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STX	0x02	Start of Text
CMD	0x5B	GET BILL OPACITIES Command
ETX	0x03	End of Text
BCC		Block Check Character

Response Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5B	GET BILL OPACITIES Command Code (CMD)
ERROR		Error Status for Operation
OPAC1_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in top cassette
OPAC1_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in top cassette
OPAC2_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in second top cassette
OPAC2_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in second top cassette
OPAC3_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in third top cassette
OPAC3_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in third top cassette
OPAC4_HIGH	0x30~ 0x3F	The high hexadecimal digit for the opacity of bills in bottom cassette
OPAC4_LOW	0x30~ 0x3F	The low hexadecimal digit for the opacity of bills in bottom cassette
ETX	0x03	End of Text
BCC		Block Check Character

### 3.10 SET BILL DISPENSE ORDER

The command will define the bill dispense order from multi-cassettes. The default order is to pick bills from top cassette first, then second cassette and so on. The invalid assignment of PARAMeter will cause an error and not be saved. When the data is changed, it will be saved in the memory of EEPROM and then efficient for the next transaction. In case of power on/off, the value continues to be used. However, when the electricity trouble causes the saved data damaged (wrong check sum on EEPROM), the criterion is set to initial value again. Therefore, it is recommended for user to check the value of the saved bill dispenser order when it is turned on.

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#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x5C	SET BILL DISPENSE ORDER Command
ORDER1	0x31~ 0x34	The cassette location (type) that is first to be picked up
ORDER2	0x31~ 0x34	The cassette location (type) that is second to be picked up
ORDER3	0x31~ 0x34	The cassette location (type) that is third to be picked up
ORDER4	0x31~ 0x34	The cassette location (type) that is last to be picked up
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format


<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5C	SET BILL DISPENSE ORDER Command Code (CMD)
ERROR		Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.11 GET BILL DISPENSE ORDER

The command will get the bill dispense order data.

#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x5D	GET BILL DISPENSE ORDER Command
ETX	0x03	End of Text
BCC		Block Check Character

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#### Response Format


<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5C	GET BILL DISPENSE ORDER Command (CMD)
ERROR		Error Status for Operation
ORDER1	0x31~ 0x34	The cassette location (type) that is first to be picked up
ORDER2	0x31~ 0x34	The cassette location (type) that is second to be picked up
ORDER3	0x31~ 0x34	The cassette location (type) that is third to be picked up
ORDER4	0x31~ 0x34	The cassette location (type) that is last to be picked up
ETX	0x03	End of Text
BCC		Block Check Character

### 3.12 SET BILL LENGTHS

The command is used to save the reference value in order to detect double notes. Each length value can be saved from 0x00 to 0xFF. The value, 0x00 means to maintain current data. When the data is changed, it will be saved in the memory of EEPROM and then efficient for the next transaction. In case of power on/off, the value continues to be used. However, when the electricity trouble causes the saved data damaged (wrong check sum on EEPROM), the criterion is set to initial value again. Therefore, it is recommended for user to check the value of the saved value of LENGTH when it is turned on.

#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x5E	SET BILL LENGTHS Command
LENG1_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in top cassette
LENG1_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in top cassette
LENG2_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in second top cassette

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LENG2_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in second top cassette
LENG3_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in third top cassette
LENG3_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in third top cassette
LENG4_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in bottom cassette
LENG4_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in bottom cassette
ETX	0x03	End of Text
BCC		Block Check Character

Response Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5E	SET BILL LENGTHS Command Code (CMD)
ERROR		Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.13 GET BILL LENGTHS


The command gets to saved length data for each cassette.

Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x5F	GET BILL LENGTHS Command
ETX	0x03	End of Text
BCC		Block Check Character

Response Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header

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ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x5B	GET BILL LENGTHS Command Code (CMD)
ERROR		Error Status for Operation
LENG1_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in top cassette
LENG1_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in top cassette
LENG2_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in second top cassette
LENG2_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in second top cassette
LENG3_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in third top cassette
LENG3_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in third top cassette
LENG4_HIGH	0x30~ 0x3F	The high hexadecimal digit for the length of bills in bottom cassette
LENG4_LOW	0x30~ 0x3F	The low hexadecimal digit for the length of bills in bottom cassette
ETX	0x03	End of Text
BCC		Block Check Character

### 3.15 Go Loader


The command duplicates and calls Flash Write Loader from RAM area. For the Flash Write, the command should be done with the highest priority.

#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x72	Load Command
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text

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RSP	0x72	GOLOADER Command Code(CMD)
ERROR	0x20	Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.16 Program Write


The command writes data on Flash ROM and transmits 64 bytes of sequential starting addresses and data onto the Parameter.

Program Write repeats to write on all the Write Area.

Write Area : 0x0000 ~ 0x9FFF

#### Command Format

<b>Name</b>	<b>Code</b>	<b>Description</b>
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x73	Program Write Command
Start Address0	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble among the 1 <sup>st</sup> Starting Address byte
Start Address1	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble among the 1 <sup>st</sup> Starting Address byte
Start Address2	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble among the 2 <sup>nd</sup> Starting Address byte
Start Address3	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble among the 2 <sup>nd</sup> Starting Address byte
PARA0	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble among the transmitted data 0
PARA1	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble among the transmitted data 0
⋮	⋮	⋮
PARA126	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble among the transmitted data 63
PARA127	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble among the transmitted data 63
ETX	0x03	End of Text
BCC		Block Check Character

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#### Response Format

Name	Code	Description
SOH	0x01	Start of Header
ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x73	PROGRAM WRITE Command Code(CMD)
ERROR		Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

### 3.17 Program Verify

The command verifies the operation of writing on FlashROM. The data of Check Sum are written transmitted on Parameters.

Then, the reset of system is required to complete the downloading of the program.


#### Command Format

Name	Code	Description
EOT	0x04	Start of Transmission
ID	0x30	Communications ID
STX	0x02	Start of Text
CMD	0x74	Verify Command
PARA0	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble of the 1 <sup>st</sup> Check Sum byte (The hexadecimal digit from the 1 <sup>st</sup> 4 bits among Check Sum bytes)
PARA1	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble of the 1 <sup>st</sup> Check Sum byte (The hexadecimal digit from the 2 <sup>nd</sup> 4 bits among Check Sum bytes)
PARA2	0x30 ~0x3F	The hexadecimal digit of the 1 <sup>st</sup> nibble of the 2 <sup>nd</sup> Check Sum byte (The hexadecimal digit from the 3 <sup>rd</sup> 4 bits among Check Sum bytes)
PARA3	0x30 ~0x3F	The hexadecimal digit of the 2 <sup>nd</sup> nibble of the 2 <sup>nd</sup> Check Sum byte (The hexadecimal digit from the 4 <sup>th</sup> 4 bits among Check Sum bytes)
ETX	0x03	End of Text
BCC		Block Check Character

#### Response Format

Name	Code	Description
SOH	0x01	Start of Header




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ID	0x30	Communications ID
STX	0x02	Start of Text
RSP	0x74	Verify Code(CMD)
ERROR		Error Status for Operation
ETX	0x03	End of Text
BCC		Block Check Character

#### 4. ERROR CODES

The error code in response can be calculated by the below code digit adding to 0x20.

<b>CODE</b>	<b>Description</b>
0x01	Banknote Pick Up Error
0x02	TimeOut on the path between CHK Sensor and RVDT Start Sensor
0x03	TimeOut on the path between DIV Sensor and EJT Sensor
0x04	TimeOut on the path between EJT Sensor and EXIT Sensor
0x05	A note Staying at EXT Sensor
0x06	Ejecting the note suspected as rejected
0x07	Abnormal note management (Flow Processing Error Inside)
0x08	Abnormal note management (Flow Processing Error Inside)
0x09	Jamming on EJT Sensor
0x0A	Jamming on EXT Sensor
0x0B	Detecting notes on the path before start of pick-up
0x0C	Dispensing too many notes for one transaction (Default limit: 120 notes including all the rejected)
0x0D	Rejecting too many notes for one transaction (Default limit: 20 notes)
0x0E	Abnormal termination during purge execution
0x20	Detecting sensor trouble or abnormal material before start
0x21	Detecting sensor trouble or abnormal material before start
0x22	Detecting trouble of solenoid operation before dispense
0x23	Detecting trouble in motor or slit sensor before dispense
0x24	Detecting no cassette0 requested to dispense banknotes
0x25	Detecting Near-end status in the cassette requested to dispense (When Near-end detection mode is turned on)
0x26	Detecting no reject tray before start or for operation
0x27	Failed to calibrate sensors
0x28	Jamming or sensor failure in the Cash Cassette
0x29	More banknotes than the requested are dispensed.
0x2A	TimeOut on the path between RVDT Start Sensor and DIV Sensor
0x2B	Dispensing is not terminated within 90 seconds.

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0x2C	Detecting no cassette1 requested to dispense banknotes
0x30	Recognizing abnormal Command
0x31	Recognizing abnormal Parameters on the command
0x32	Not to give Verify command on Reset after downloading program
0x33	Failure of writing on program area
0x34	Failure of Verify