# Interface Specification

MODEL       : ECDM-200

REV.         : 1.1

DATE        : 2006. 05. 06

**PULOON Technology Inc.**

# 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 | H. H. SO |
| | | | Add Error Code | |
| 1.2 | 2007.01.25 | Max Dispensing Description Changed (Ch. 3.4) | Recommendation 60 Notes → 100 Notes Dispensing Available | H. H. SO |

# Contents

## 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.

The basic order in message is displayed like below.
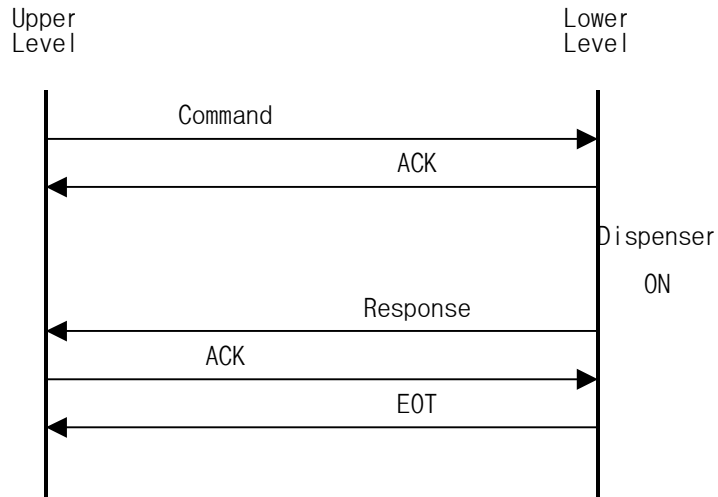


## 2.2 TRANSMISSION CHARACTERISTICS

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 |

## 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 |

(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 <br> - 0x30: Cassette is removed. <br> - 0x31: Cassette exists. |
| OPAC1 | Value +0x20 | Thickness Reference Value of Bills in Cassette in Top Pick Position |

| 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<br>- 0x30: Cassette is removed.<br>- 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<br>- 0x30: Cassette is removed.<br>- 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<br>- 0x30: Cassette is removed.<br>- 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

| bit | Meaning |
|---|---|
| 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

| 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 postion. |
| 3 | Cassette is under Near-end Status. |
| 4 | Senser 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 |

| BCC | | Block Check Character |
|---|---|---|

Response Format

| Name | Code | Description |
|---|---|---|
| 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<br>- 0x30: Cassette is removed.<br>- 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<br>- 0x30: Cassette is removed.<br>- 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<br>- 0x30: Cassette is removed.<br>- 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<br>- 0x30: Cassette is removed.<br>- 0x34: Cassette exists. |
| ETX | 0x03 | End of Text |
| BCC | | Block Check Character |

### 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 |

| 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.

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. |

| TYPE2 | 0x30 ~0x34 | The Cassette Type Installed in the Second Top Pick Module.<br>- 0x30: Cassette is removed.<br>- 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.<br>- 0x30: Cassette is removed.<br>- 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.<br>- 0x30: Cassette is removed.<br>- 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 |

| 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.

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 |

| 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

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| EOT | 0x04 | Start of Transmission |
| ID | 0x30 | Communications ID |

| STX | 0x02 | Start of Text |
|---|---|---|
| CMD | 0x5B | GET BILL OPACITIES 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 | 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.

Command Format

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| 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 |

Response Format

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| 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 |

| 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

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| 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

| Name | Code | Description |
|---|---|---|
| SOH | 0x01 | Start of Header |

| 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

| Name | Code | Description |
|---|---|---|
| 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

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

| 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

| Name | Code | Description |
|---|---|---|
| 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$^{st}$ nibble among the 1$^{st}$ Starting Address byte |
| Start Address1 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble among the 1$^{st}$ Starting Address byte |
| Start Address2 | 0x30 ~0x3F | The hexadecimal digit of the 1$^{st}$ nibble among the 2$^{nd}$ Starting Address byte |
| Start Address3 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble among the 2$^{nd}$ Starting Address byte |
| PARA0 | 0x30 ~0x3F | The hexadecimal digit of the 1$^{st}$ nibble among the transmitted data 0 |
| PARA1 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble among the transmitted data 0 |
| ⋮ | ⋮ | ⋮ |
| PARA126 | 0x30 ~0x3F | The hexadecimal digit of the 1$^{st}$ nibble among the transmitted data 63 |
| PARA127 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble among the transmitted data 63 |
| 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 | 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$^{st}$ nibble of the 1$^{st}$ Check Sum byte (The hexadecimal digit from the 1$^{st}$ 4 bits among Check Sum bytes) |
| PARA1 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble of the 1$^{st}$ Check Sum byte (The hexadecimal digit from the 2$^{nd}$ 4 bits among Check Sum bytes |
| PARA2 | 0x30 ~0x3F | The hexadecimal digit of the 1$^{st}$ nibble of the 2$^{nd}$ Check Sum byte (The hexadecimal digit from the 3$^{rd}$ 4 bits among Check Sum bytes |
| PARA3 | 0x30 ~0x3F | The hexadecimal digit of the 2$^{nd}$ nibble of the 2$^{nd}$ Check Sum byte (The hexadecimal digit from the 4$^{th}$ 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 |

| 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.

| CODE | Description |
|---|---|
| 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 dispensered. |
| 0x2A | TimeOut on the path between RVDT Start Sensor and DIV Sensor |
| 0x2B | Dispensing is not terminated within 90 seconds. |

| 0x2C | Detecting no cassette1 requested to dispense banknotes |
|---|---|
| 0x30 | Recogniging 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 |