SEKONIC

OPTICAL
MARK READER SR-430
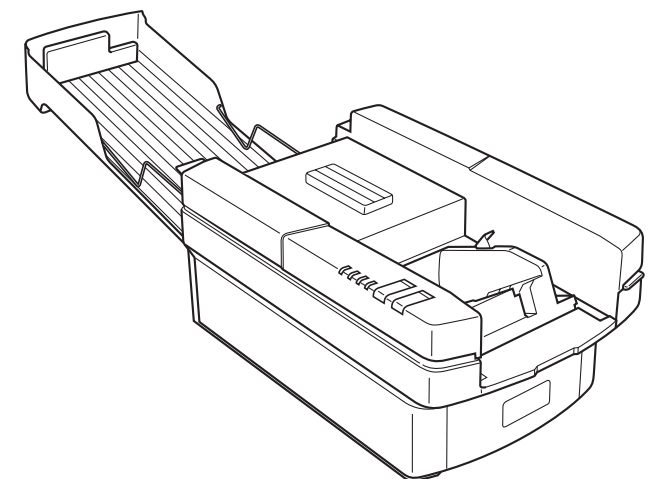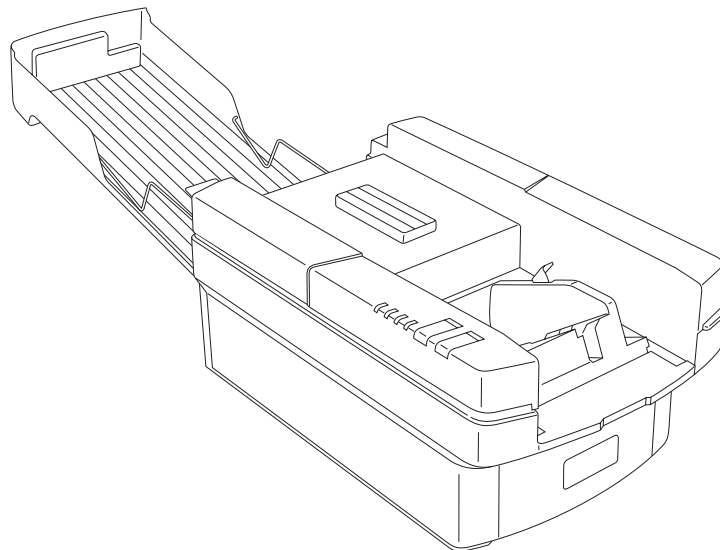
Operating manual

SEKONIC CORPORATION

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C43497510-00

Introduction

Thank you very much for purchasing our product.

Before using this product, be sure to thoroughly read this manual so that you can use it properly.

Notice

Microsoft Visual Basic is a registered trademark of Microsoft Corporation.

This product must not be reproduced or modified without permission from SEKONIC.

Before Usage

Make sure that the following are contained in the package immediately after unpacking the product.

1. Main unit

2. Power code

3. Operation manual

4. Stopper plate

5. Cards

    1) 12-line standard-sized check cards   (5)

    2) 15-line postcard-sized check cards   (5)

    3) Paper feeding roller protection card   (1)

6. CD-ROM

Warranty

This product will be warranted without any charge for one year after delivery.

In case of a failure occurring during this period, we repair it for free if it is judged to be related to our responsibility. In this case, we temporarily keep the failed product to repair it. For details, contact the shop at which you have purchased it.

In case that the free warranty period has expired or the failure is related to your responsibility or has resulted from a worn part, we will repair it with charge.

The scope of this warranty is limited to this product and its accessories. Note that SEKONIC will not be responsible for any financial damage, lost profit or claim from a third party resulting from operation of this product.

 Safety Precautions

This "Safety Precautions" page lists various symbols for ensuring safety operation of this product so as to prevent users, other people or properties from being damaged.

Thoroughly read these precautions and understand the meanings of the symbols before proceeding to the main text of this manual.

 Warning

Improper operation by neglecting this instruction may result in death or serious injury.

 Caution

Improper operation by neglecting this instruction may result in personal or property damage.

	Neglecting this instruction may generate smoke or a fire.
	Neglecting this instruction may cause an electric shock.
	Indicates a prohibited action.
	Indicates that disassembly or modification is prohibited.
	Instructs that the power code must be removed from the outlet for safety operation.
	Instructs that the part must be grounded for safety operation.

⚠ Warning

A fire or an electric shock may result if this product continues to be used with strange smell or sound.
In this case, immediately turn the power switch off and then remove the power code from the outlet. After making sure that smoke generation has stopped, ask the sales shop for repair.
Never attempt to repair by yourself since it may cause serious danger.

Do not modify or disassemble this device. Otherwise, it may cause a fire or an electric shock.
Do not remove the cover from this device. Otherwise, it may cause an electric shock. Ask the sales shop for internal check, adjustment or repair.
Pay enough attention to the above instructions. Otherwise, a fire or an electric shock may occur.

Precautions on device
·Do not use it with other supply voltage than the specified one.
·Do not install it in a place subject to liquid like water or oil, steam, moisture or dust.
·Do not insert or drop any metal, foreign matter like combustibles, etc from the port.
·Do not place a container with chemicals or water or a small metal piece near the device.

Do not cover the vent hole. Otherwise, heat is contained inside, resulting in a fire.

If the device should be dropped or the cover broken, immediately turn the power switch off and remove the power code from the outlet. Then, contact the sales shop.

If a foreign matter should enter inside, immediately turn the power switch off and remove the power code from the outlet. Then, contact the sales shop.
If the device continues to be used with a foreign matter inside, a fire or an electric shock may occur.
If water or other foreign matter should enter inside, immediately turn the power switch off and remove the power code from the outlet. Then, contact the sales shop. If the device continues to be used with water or other foreign matter inside, a fire or an electric shock may occur.

⚠ Caution

Be sure to ground the main unit with a ground cable. Otherwise, an electric shock may occur.

When connecting or disconnecting the ground cable, be sure to remove the power code from the outlet. Otherwise, an electric shock may occur.

Do not place the device in an unstable location. Otherwise, it may fall, resulting in an injury.

When opening or closing the upper part of the main unit, do not place your hand on the paper feeding surface. Otherwise, the finger may be caught, resulting in an injury.
When placing your hand on the paper feeding surface of the main unit, be careful not to allow your finger to be caught or hit.

When maintaining the device, be sure to remove the power code from the outlet for your safety.
When the device is not in use for long periods, remove the power code from the outlet for safety.

Before moving the device, be sure to remove the power code from the outlet. If the cable is damaged, a fire or an electric shock may result.

Do not connect or disconnect the power code or connection plug with a wet hand.
Otherwise, a fire or an electric shock may result.

Do not put a heavy substance on the device.
Otherwise, it may fall, resulting in an injury.

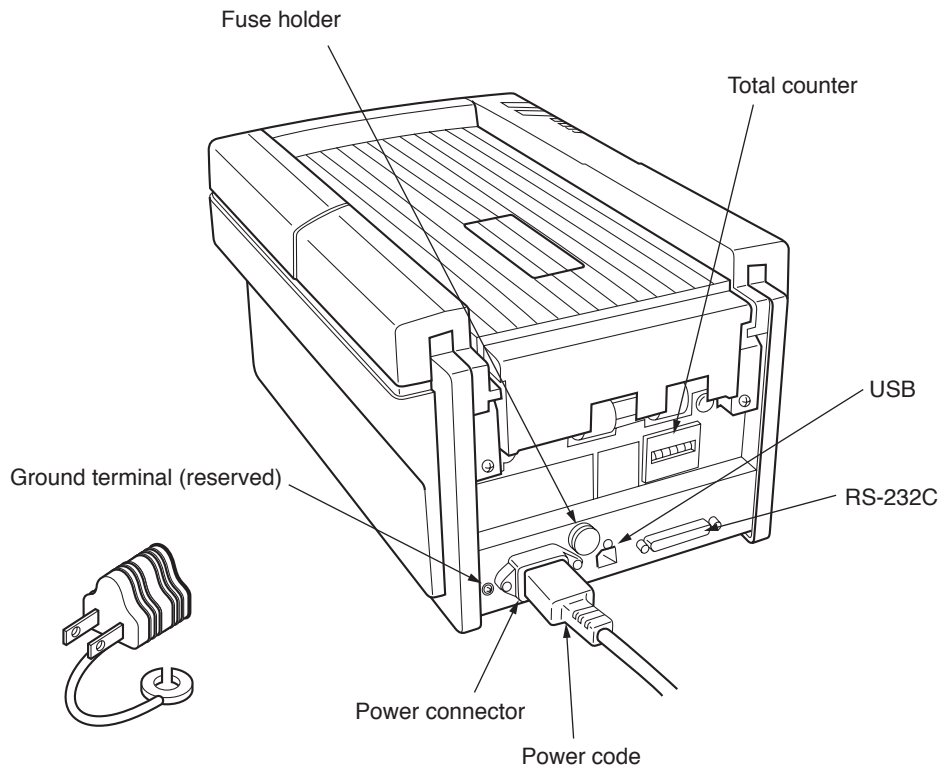## Table of Contents

Table of Contents

1. Precautions on Usage

Handle the device with the following in mind so as to enable the functions of it to be fully utilized.

(1) Before usage, make sure that the power connector is firmly connected to an outlet. Avoid connecting or disconnecting the connector during operation or while the power switch is turned on.
(It may result in a failure.)

(2) Since the card reading part is equipped with an optical lens, never insert a screwdriver or the like.
(Otherwise, reading may be disabled.)
If card feeding is disabled due to clogged dust or the like in the card feeder, open the top cover to remove it. (Refer to "11. Cleaning".)

(3) Allow an interval of at least 5 seconds between turning the power switch on and off.
(Otherwise, a failure may result.)

(4) Be sure to ground the device so as to prevent noise or static electricity from damaging the device.
Also, do not touch the metallic part of the device during card feeding operation.
If the device is used without being grounded or the metallic part is touched, malfunction or an electric shock may result.

(5) Do not place the device in a place subject to direct sunlight or near a heater. Also be careful not to allow sudden temperature change, moisture, dust or excessive shock around the device.
(Otherwise, a failure like wrong paper feeding, reading or operation may occur.)

(6) When the device is not in use for long periods, insert the paper feeding roller protection card between the paper feeding roller and the separation pad to prevent the roller material from deteriorating.

(7) If the paper feeding roller becomes soiled with powder from card paper or pencil, the roller and the card may slip.
In order to prevent it, clean the paper feeding roller at proper intervals. (Refer to "11. Cleaning".)

(8) If the exterior of the device is soiled, slightly wipes with soft cloth wetted with water or neutral detergent. Note that wiping with cloth wetted with volatile chemicals like benzine or thinner may cause deforming or decoloring.

2. Names of Each Part

Clear switch

TEST LED (yellow)

Feed switch

ERROR LED (red)

Power switch

READY LED (green)

POWER LED (orange)

Fuse holder

Total counter

USB

Ground terminal (reserved)

RS-232C

Power connector

Power code

Side guard

Card stopper

Stacker

Lock lever

Top cover

Guide lock lever

Side guide

Guide wire

Rotary switch (SW2)　　DIP switch (DIPSW)

Rotary switch (SW1)　　　　　　　　Rotary switch (SW3)

Card detection sensor　　Separation pad　　　Paper feeding roller
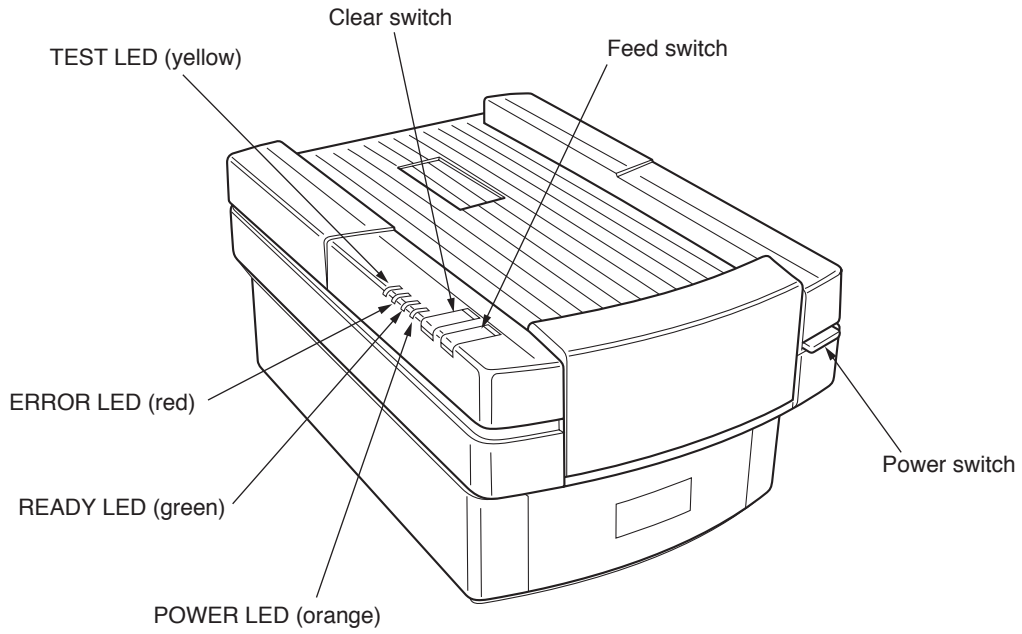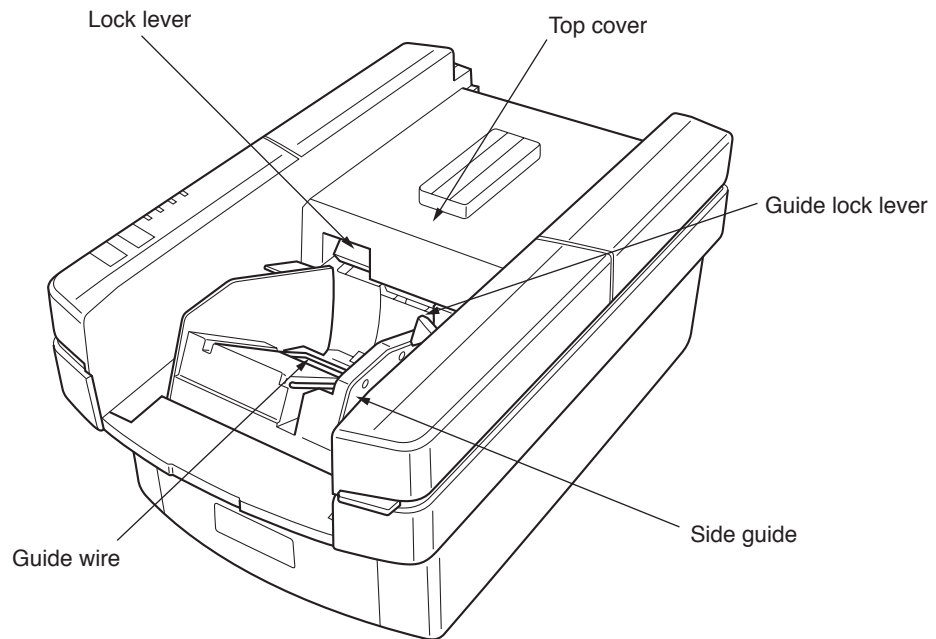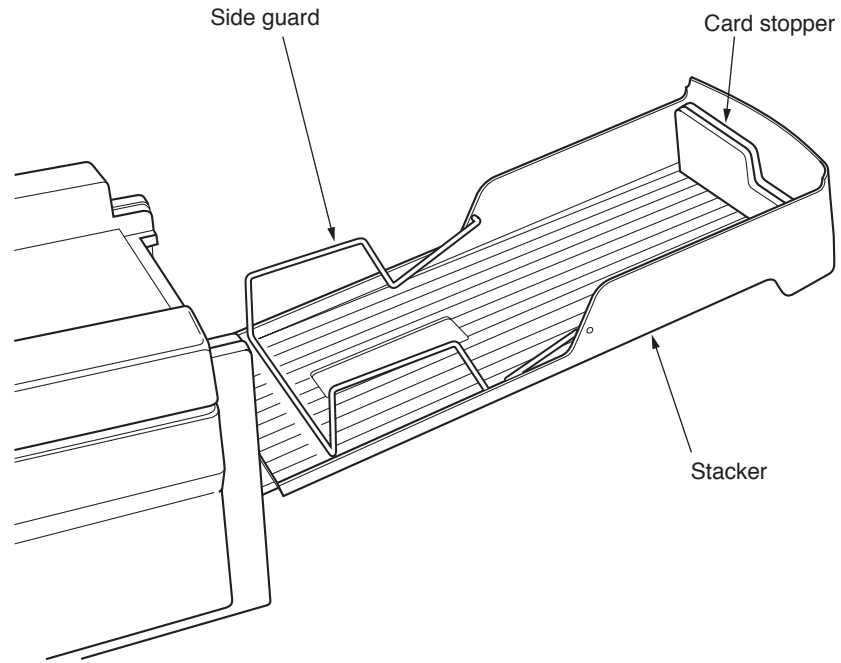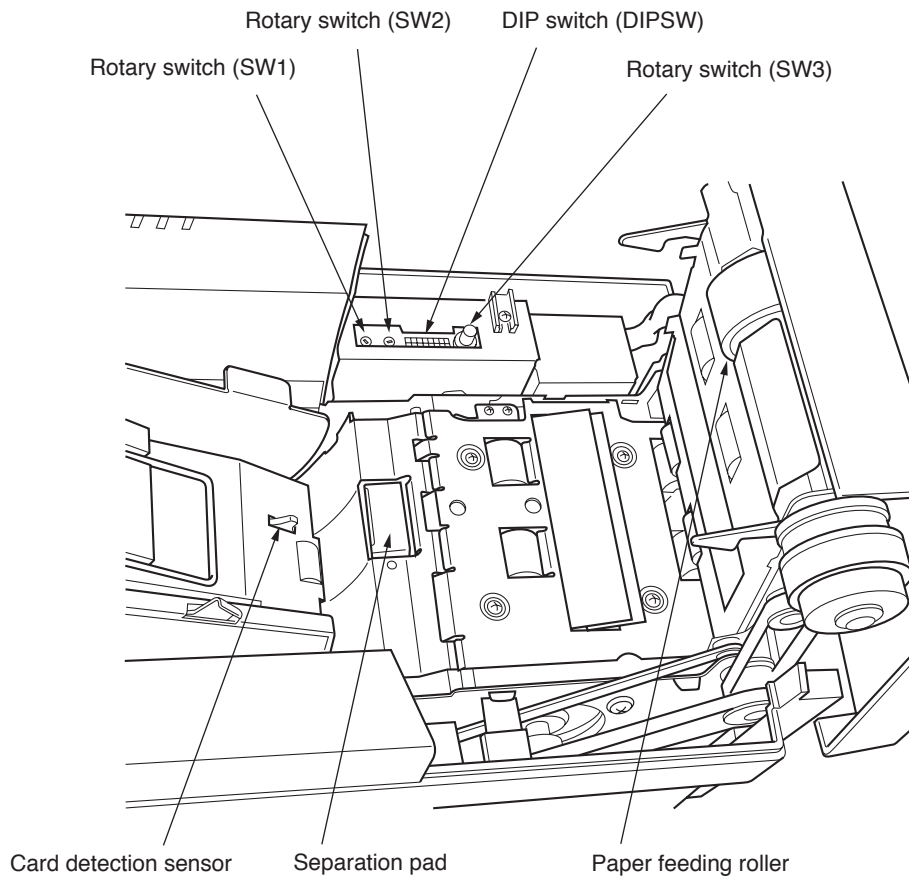
3. Specifications

1.	Available cards	Card size: Standard-sized card, postcard-sized card, long-sized card Paper type: OCR paper. Paper ream weight: (70)* 90kg to 135kg (basic weight: (83.8g/m^2) 104.7g/m^2 to 157.0g/m^2) (thickness: (0.11mm) 0.13mm to 0.19mm) The 70kg paper is available to standard size only.
2.	Mark line number	Standard-sized card: Data = 12 lines, timing = 1 line Postcard-sized card: Data = 15 lines, timing = 1 line
3.	Mark column	140 columns max. (specified by program)
4.	Reading method	Direct-under type, timing control type, mark-to-mark type
5.	Marking	Near-infrared light specifications: Pencil mark (HB), OCR marker [infrared visible light specifications: The above + ball-point pen]
6.	Reading wavelength:	Near-infrared light specifications: 940nm [infrared visible light specifications: 660nm]
7.	Card feeding rate	Approx. 256 sheets/min (AC 115V/50Hz, machine feeding rate using standard-sized cards at room temperature)
8.	Hopper capacity	200 sheets max. (paper of ream weight of 110kg (basis weight of 127.9g/m^2), standard-sized card)
9.	Error check	Four types of errors can be judged (jam, timing mark, card empty and double-feeding errors)
10.	Self-check	The card detection sensor is to be checked.
11.	Serial Interface	Serial EIA RS-232C-based, asynchronous, half-duplex, data transfer rate = 2,400 to 38,400bps (variable) variable data format
12.	USB interface	USB 2.0 full-speed Virtual COM Port Device (same specification as 11.Serial interface)
13.	Power supply	Supply voltage = AC 115V, Frequency = 60Hz Current = Approx. 0.6A (during motor rotation) Approx. 0.1A (in standby mode) Supply voltage = AC 220V, Frequency = 50/60Hz Current = Approx. 0.3A (during motor rotation) Approx. 0.1A (in standby mode)
14.	Operating environments	Room temperature = 5 to 35C° Relative humidity = 40 to 80% RH (no dew condensation)
15.	Overall dimensions	360 (L) x 222 (W) x 171 (H) (mm) (Length in operation: 695 mm)
16.	Weight	Main unit = Approx. 6kg

[ ] is option

4. Installing the USB Driver

The USB driver must be installed to use this product over a USB interface connection. If using this product over a RS-232C connection, the driver does not need to be installed, and the procedures in this chapter are not necessary.

4-A Before Installation

To use a USB interface connection, load the supplied CD-ROM, and install the driver by following the installation procedure in this chapter.

Be sure to install the USB driver before inserting the SR-430 into the computer's USB port. The driver cannot be installed properly if the SR-430 is inserted into the USB port first.

Notes

- If you accidentally connect the SR-430 before performing the installation, delete the falsely-identified driver from "Add or Remove Programs".
- To install the driver, you must log in as a user with administrator privileges.

Operating Environment

Software	USB driver
OS	Windows2000 *1
	WindowsXP *2
	WindowsVista *3
PC	Computer with USB interface in standard configuration *4

*1　Professional Edition SP4 or later

*2　Home/Professional Edition SP2 or later

*3　Home Basic/Home Premium/Business/Ultimate

*4　• The OS must be preinstalled.

- The software may not work for certain computer models and configurations.
- Operation is not guaranteed for systems with an upgraded OS, add-on USB interface, self-built computers, built-to-order computers, and in emulator environments (such as VirtualPC).
- Operation is not guaranteed for connections that pass through a USB hub.
- A drive capable of reading CD-ROMs is required for installing the software.

4-B Installation Procedure (*The screens in the explanations below use Windows XP.)

(1) Check that the SR-430 is not connected.

(2) Start Windows, load the "driver CD", and run the installer program "sr430usbInstaller.exe" on the CD.
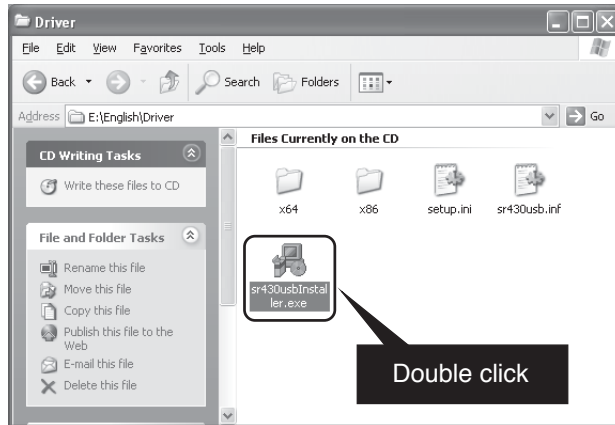
(3) Click the "Install" button.
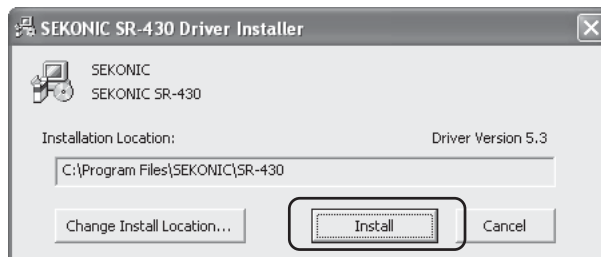
(4) Click "Continue Anyway". After installation is completed, the program will ask you to restart the computer for certain environments. Click "Yes" to restart the computer.
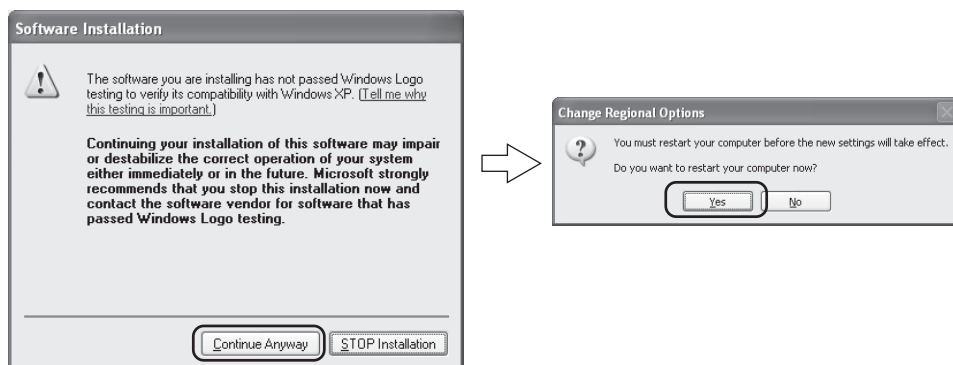
(5) After the computer is restarted, turn on the power for the SR-430, and connect it to the computer's USB port.

1) Turn on the power

2) Connect to the PC using a USB cable
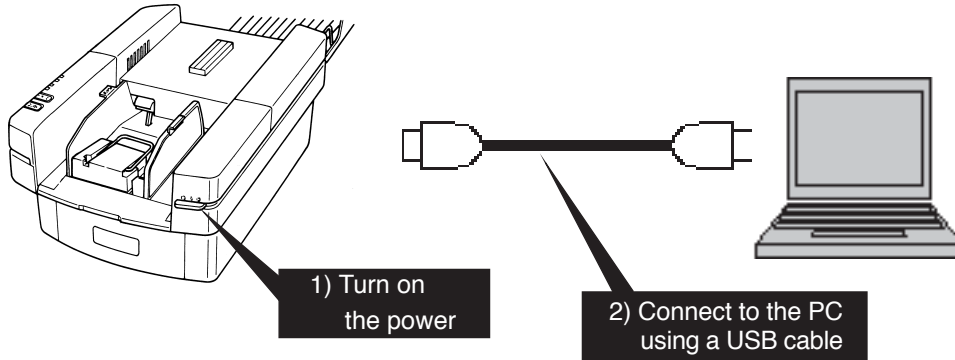
(6) The Found New Hardware Wizard is started.

In response to "Can Windows connect to Windows Update to search for software", select "No, not this time".

(7) In response to "What do you want the wizard to do", select "Install from a list or specific location (Advanced)".
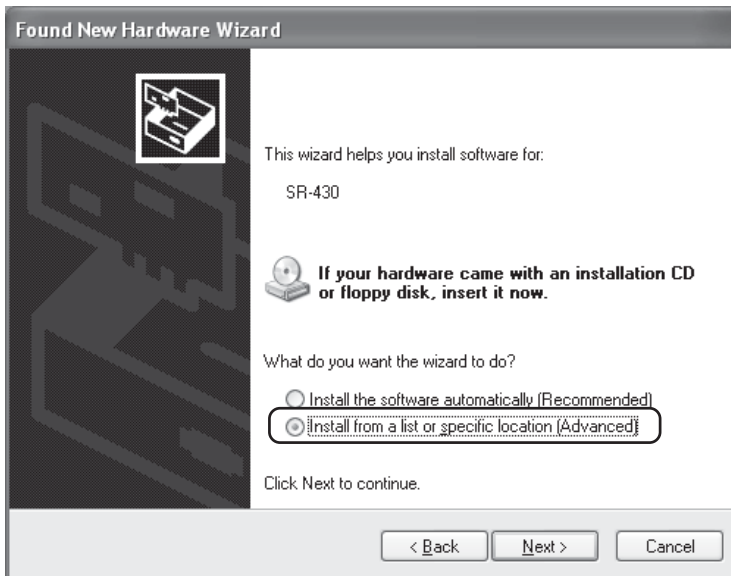
(8) Select "Search for the best driver in these locations", insert a check mark for "Include this location in the search", and click the Browse button and select the "C:\Program Files\SEKONIC \SR-430" folder.
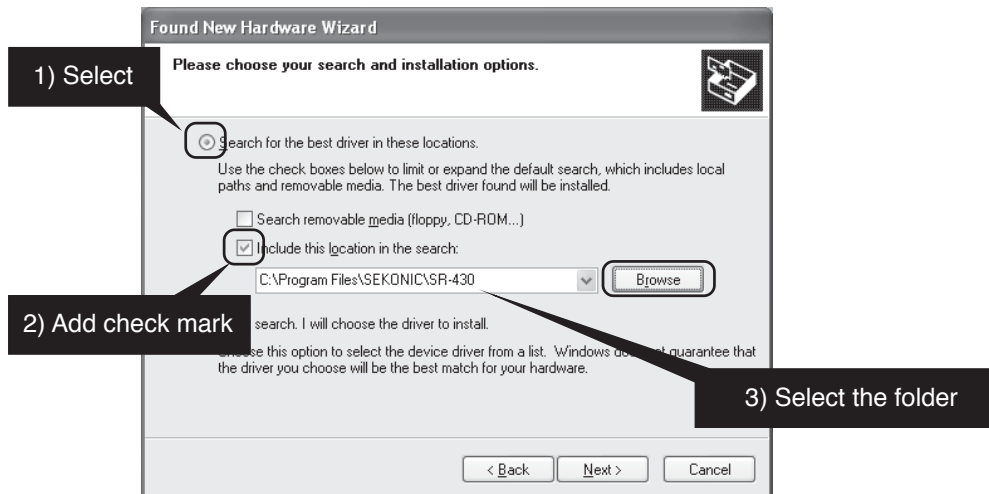
(9) Click "Continue Anyway".
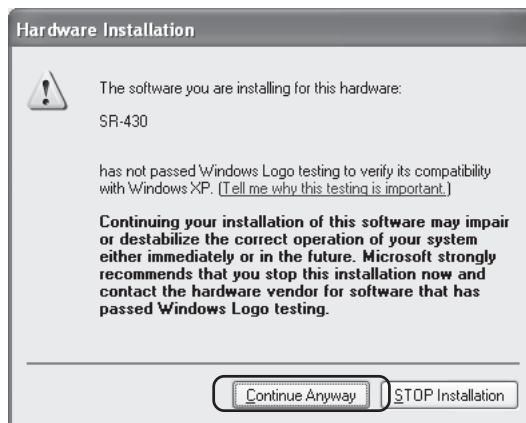
(10) Click "Finish" to complete the installation.

4-C Checking the Assigned Port

The COM port must be designated when using this software. After installing the USB driver, follow the procedure below to check the port number assigned when using the USB interface.

(1) Right-click My Computer on the Desktop to open a pop-up menu, and click Properties.
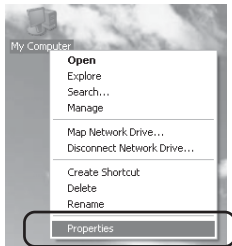
(2) Select the "Hardware" tab, and click the Device Manager.
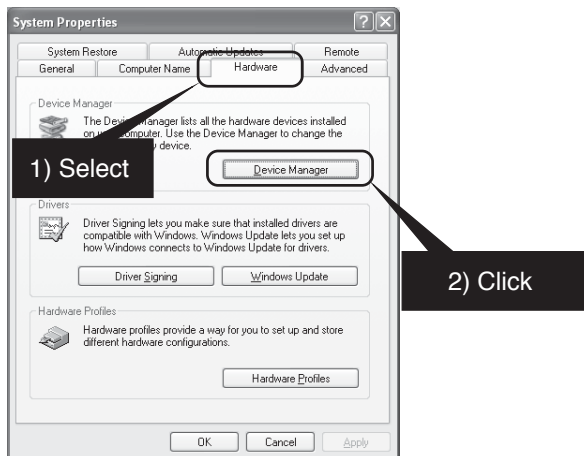
(3) Click Ports, and check the assigned port in parentheses for the "SR-430" entry.
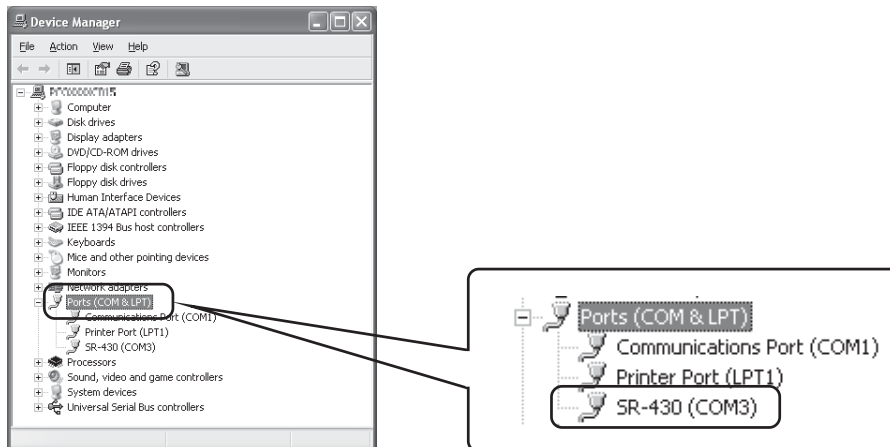
4-D Troubleshooting for Communication Errors

-1 Changing the Assigned Port

The assigned port can be changed if the port number assigned to the SR-430 cannot be recognized by the software or when you want to use a specific port. The procedure for changing the port is described below.

(1) Right-click the "SR-430" entry from the Device Manager screen (see section 4-C), and then click Properties from the pop-up menu.
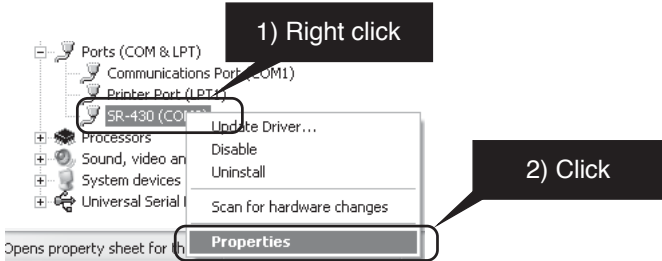
(2) Select the "Port Settings" tab, and then click Advanced.
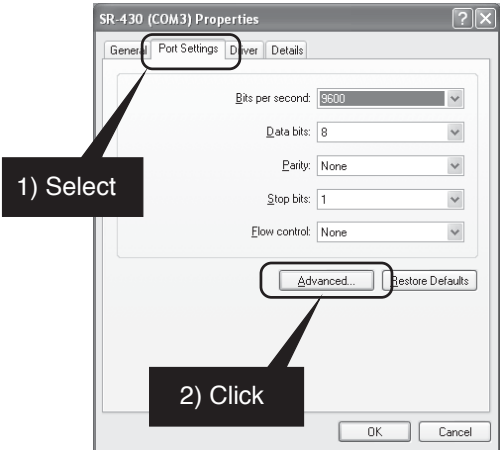
(3) At "COM Port Number", select the port number that you want to change to.
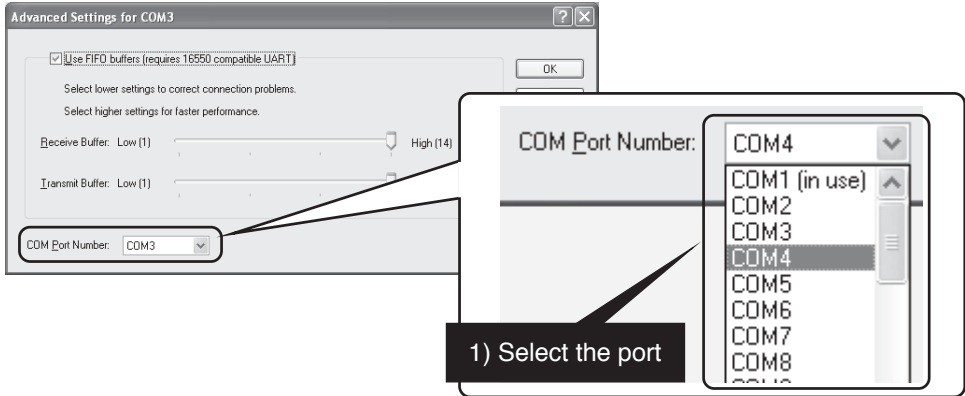
4-E Uninstall Procedure

From the "Control Panel", go to "Add or Remove Programs", click the Change/Remove button, and uninstall by following the instructions.
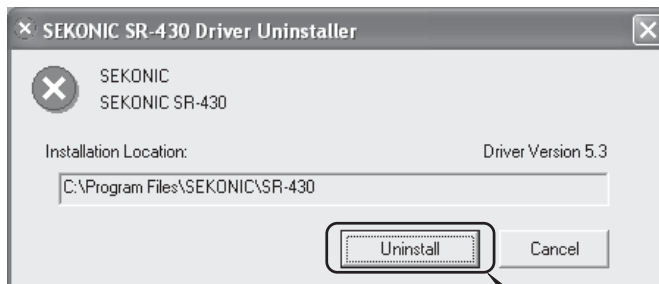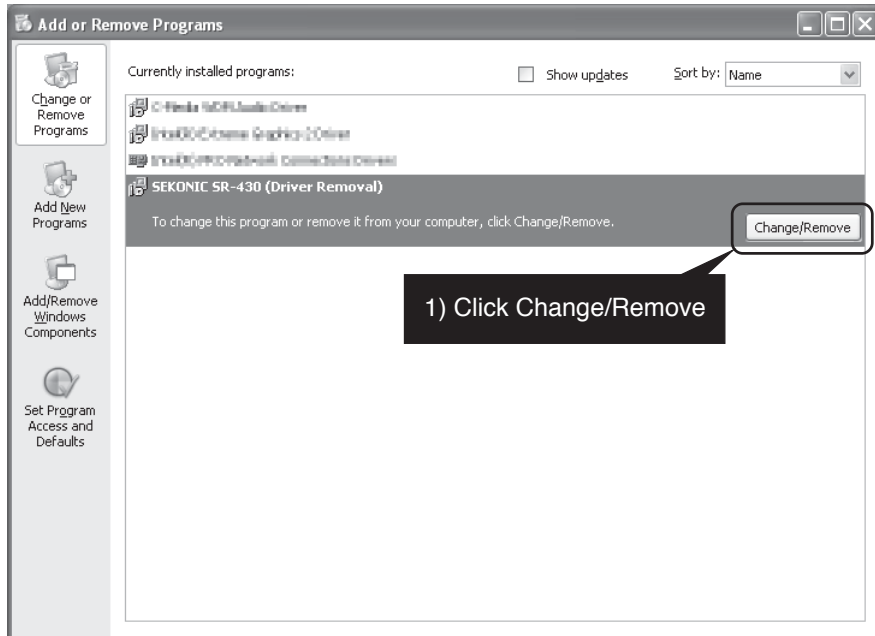
5. Operation

5-A Preparation

Install the device and open the stacker. Set the card stopper at an appropriate position for the card size to be used and raise the side guard at the specified position. (Make sure that the card stopper has not been set inside out.)

During this operation, be careful not to allow bright light to directly enter the card ejector or hopper.

Open the stacker.

Raise the side guard.

A

Set the card stopper like this.

B

C

Card stopper and card size
Position A: Long-sized card
Position B: Standard-sized card
Position C: Postcard-sized card
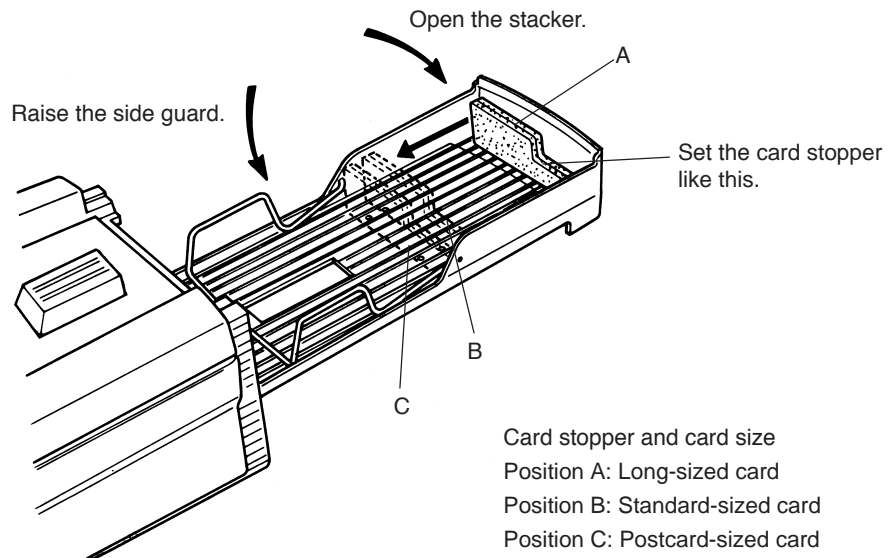
When using long-sized cards it is recommended to use the stopper plate so as to prevent paper from coming out of the stacker.

Setting method: Engage the angled hole on the stopper plate with the protrusion at the center of the top cover and firmly set it so that it is not disengaged even after you take off the hands.

(Be careful that the front and rear surfaces are set properly.)

Stopper plate
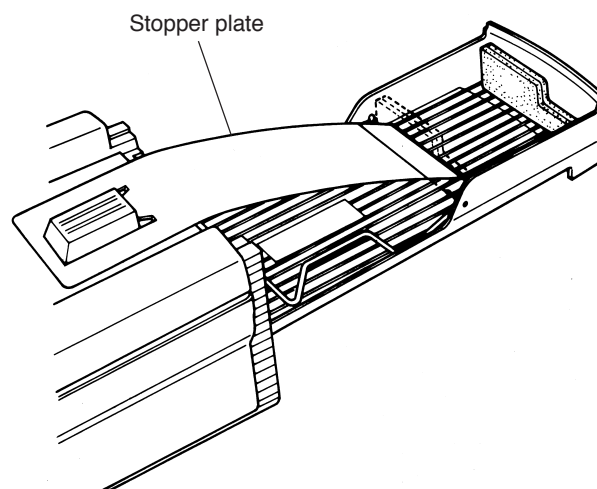
5-B Functions and Operating Method of Operation Panel

The operation panel is equipped with the following two switches and four LEDs (lamps):

(1) Functions of switches

FEED : Pressing this switch feeds one card.

CLEAR : Clears an error, if any.

The hardware or cover open error, however, cannot be cleared.

(2) Meanings of LED display

TEST (yellow) : Comes on in the test mode.

ERROR (red) : Comes on when an error occurs.

READY (green) : Comes on when communication is enabled.

POWER (orange) : Comes on when the power is turned on.

Operation panel
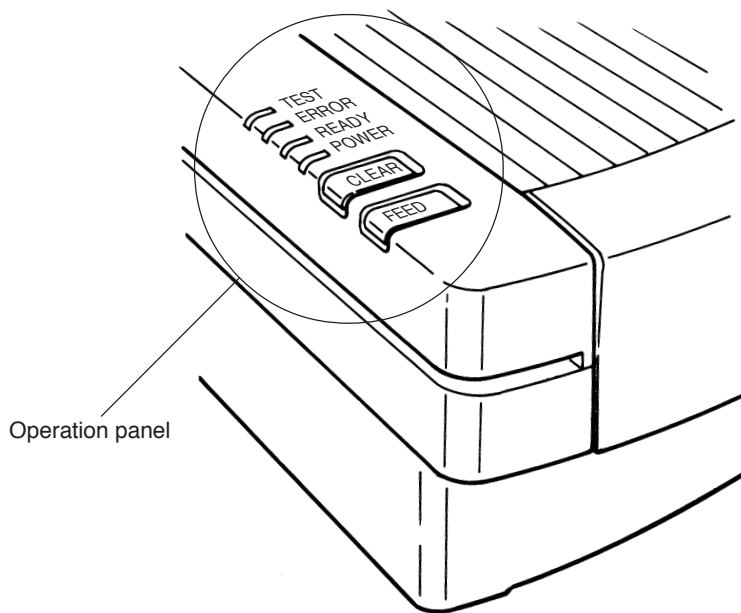
5-C   Setting Cards

(1)   Pressing the [PUSH] button on the left of the hopper generates a "clicking" sound to lock the hopper at the card setting position. Pressing the [PUSH] button again unlocks the hopper to raise it. Do not unlock it by pressing the card.

(2)   Set cards while the hopper is lowered at the setting position. Set them with the marked surfaces facing upward and the timing mark sides facing left.
At this time, well-align the cards. Pay particular attention to the ends of the cards since a paper feeding error may occur unless they are well-aligned.

(3)   Press the side guide hard to the cards so that no clearance is allowed between them. Otherwise, a reading error may occur.
When moving the side guide, keep pressing the guide lock lever (green). The side guide is fixed when the lever is released.

(4)   For the maximum card number settable onto the hopper, refer to the side guide index.
Note that setting too many cards on it may result in a paper feeding error or misreading.

(5)   When using long-sized cards, raise the side guide toward the external side of the guide wire.

Pressing once: Locks the hopper.
         twice: Unlocks the hopper.

How to move side guide

Slide it right and left while keep
pressing the guide lock lever (green).

Guide wire

Side guide index
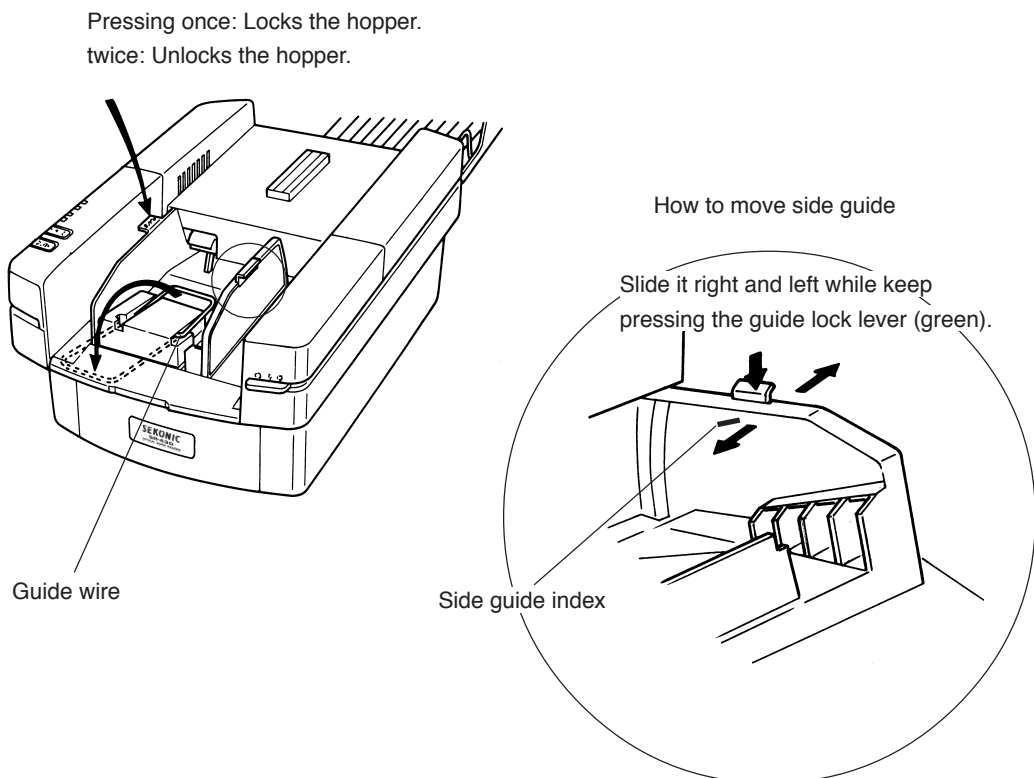
Notes

1. Carefully handle cards so that they will not be bent or damaged. Otherwise, a paper feeding or reading error may occur.

2. When adding cards, lower the hopper and be sure to reset cards. Otherwise, a paper feeding error may occur.

(6) Setting double-feeding detection function

The device is equipped with a function to issue a double-feeding (DF) error.

A transmission-type sensor is used for detection and double-feeding is judged based on a difference in the amounts of light transmitted due to a difference in card thickness.

Before using the device, match the thickness of cards to be used and the paper ream weight setting of SW3.

The settings of SW3 are as follows:

(If DF is detected in the SR-307 or SR-305 <SR-305S> mode, it is assumed to be a jam error, outputting an error code.)

Position	1	2 3 4 5 6
DF sensitivity	DF not judged	Thin ⟵⟶ Thick

"　" refers to the initial setting.

Note   Please set position between 1and 6.

The deveice will not work correctly, In case of set other position from following.

Set position and paper ream weight (standard　)

Position	Paper ream weight (basis weight)
2	72kg (83.8g/m^2)
3	90kg (104.7g/m^2)
4	110kg (127.9g/m^2)
5	135kg (157.0g/m^2)
6	(160kg)

Please set additional one step more larger volume when DF error occurred in a paper feeding.

Rotary switch (SW3): Sets paper ream weight.
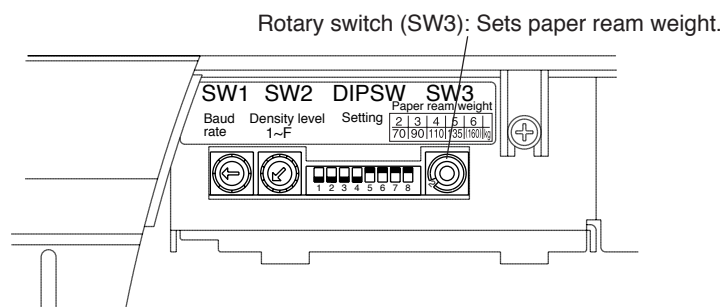
(7) Handling cards

1) Do not use any card in one of the following states:
Soiled or damaged card, card to which dust or a foreign matter adheres, curled card or folded card (folded in two, four, etc.)

2) Storage of cards
Avoid storing cards in a place subject to sudden environmental change. Pay sufficient attention to moisture and keep them in a cabinet or the like. Do not leave them in a dusty place like near a window.

3) Before using new cards to test card feeding, be sure to loosen each card apart as shown in the figure below so as to prevent double-feeding due to cards not completely separated.

OK

NG
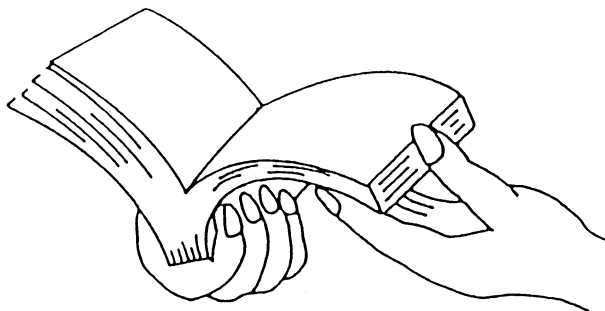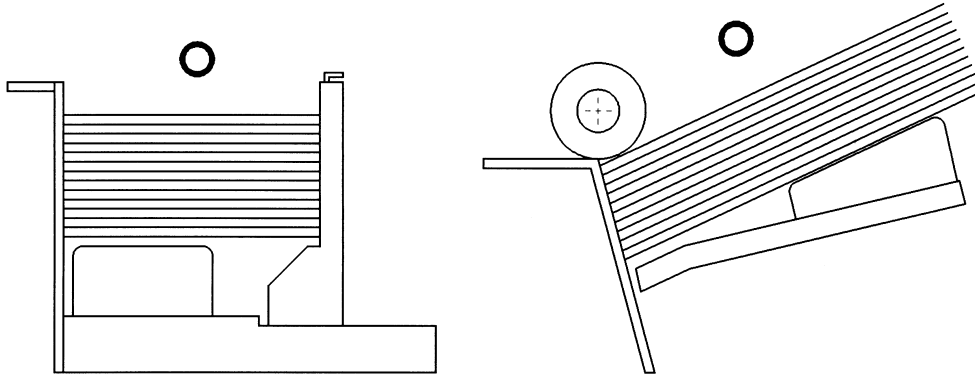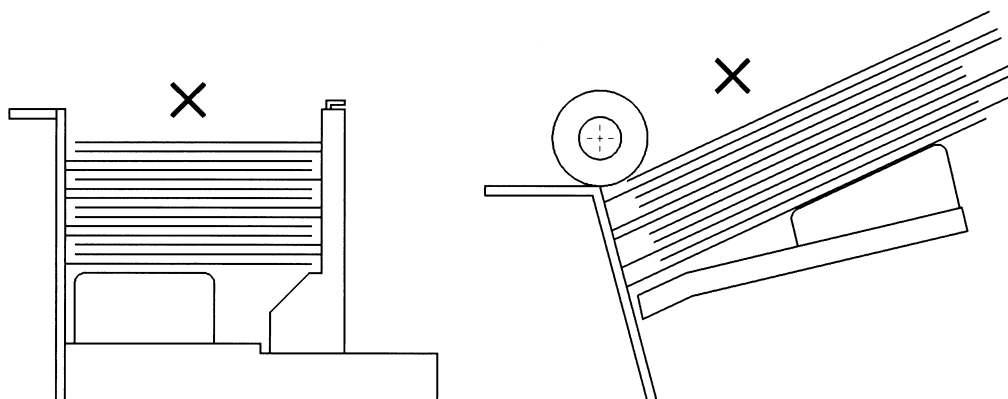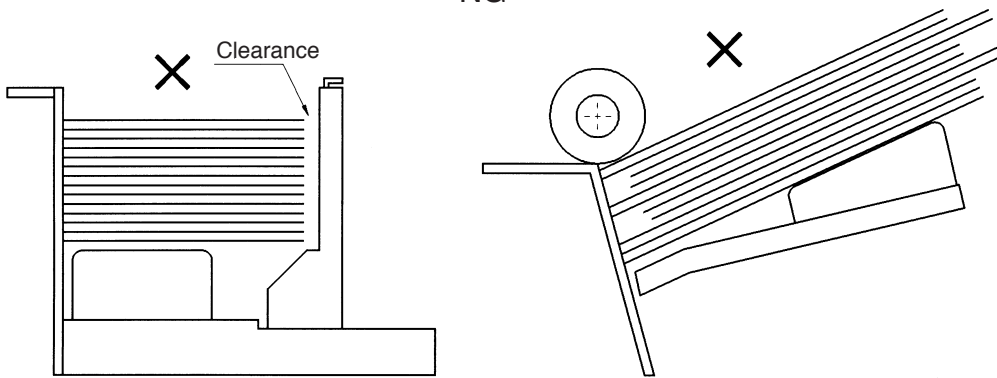
Clearance

No clearance, but cards are not aligned.

5-D   Power Connection and Operation Test

(1)   Connect the power code after turning the power switch off.

(2)   Turning the power switch on turns the "POWER" LED (orange) on to sound a buzzer.
This turns the device in the ready status for commands from the host computer.
If the "ERROR" LED (red) comes on or a buzzer continuously sounds, turn the power switch off
and refer to "5-F Troubleshooting".

(3)   Pressing the "Feed" switch once feeds one card.
Keep pressing it continuously feeds cards.

5-E   Test Mode

Test mode: Checks reading. For checking, use a specified check card.

(1)   Turning the power switch on while pressing the "Feed" switch sounds a buzzer and calls the test
mode, turning all LEDs on.

(2)   Pressing the "Feed" switch once continuously feeds cards. During this continuous feeding, a
buzzer goes off if a reading error occurs.

(3)   Keep pressing the "Feed" switch stops card feeding.

(4)   In order to exit from the test mode, turn the power off and on again.

Note
The check card to be used must be changed as follows depending on the setting of DIP
SW6:
DIP SW6 = OFF : Timing direct-under-type, 12-line, standard-sized card
            ON   : Timing control-type, 15-line, postcard-sized card
            (With this setting, the mark-to-mark-type or direct-under-type selected by DIP
            SW5 is neglected.)

5-F   Troubleshooting

(1)   Error display

Contents of error	Error type (HEX error code)	Action	
Internal error	Hardware error (70H to 76H)	Turn the power off once and on again. If the device is not restored, contact the sales shop.	Reset the error by pressing the "Clear" switch to reboot the device.
Card jamming	Card jam (31H or 32H)	Remove cards by referring to 5-F-(2).	
- Card slips to prevent feeding. - Card is attempted to be fed with the hopper being lowered.	Card feeding error (33H)		
More than one card are fed at a time.	DF error (36H)	Check the card conditions.	
Timing mark read fails.	Timing mark error (40H)	Available timing marks are three or less or no timing mark is detected. Check cards.	
Communication line error between host computer and device - Overrun error - Parity error - Framing error	Communication error (51H)	Make sure that the communication-related settings are proper.	
Invalid command or parameter is entered.	Command or parameter error (50H)	Enter a valid command or parameter.	
No card available in hopper.	Card empty (42H)	Set cards in the hopper.	
Top cover is open.	Cover open (44H)	Close the top cover.	

(2) Action when a card jam or feeding error occurs

Follow the procedure below when a card jam or feeding error occurs.

Procedure

1)   Lower the hopper to open the top cover.

2)   Manually remove the jammed card(s).

3)   After removing, make sure that no torn piece of paper is left.

4)   Slowly lower the top cover toward you until it is locked.

(Make sure it is locked, otherwise, a feeding error may occur.)

This turns the "ERROR" LED (red) off.

5)   If the "ERROR" LED (red) is still on, repeat steps 3) and 4) again.

6)   Correct the error appropriately by referring to the following causes for a card jam or feeding error.

Cause	Reference section for troubleshooting
Card deforming or breaking, foreign matter adhered	1) and 2) in "(7) Handling cards" in 5-C.
Soiled roller	"(1) Cleaning of rollers"" in "11. Cleaning".

(3) Action when the device does not function

If the device should malfunction, correct it by referring to the following actions for each symptom.

Symptom	Action
• The power cannot be turned on.	Make sure that the power code is properly connected.
• The "ERROR"LED (red) comes on after turning the power on.	Refer to 5-F-(1).
• Reading is disabled.	• Make sure that the side guide is properly set. If the clearance between the side guide and cards is wide, cards are not fed properly, resulting in a reading error. • Aren't cards deformed? • Aren't cards set in the opposite direction (left-side right, upside down, etc.)? • Check operation of the device through self-check using the attached check card.
• The program malfunctions.	• Make sure that the cable is not disconnected. • Make sure that the communication-related settings are proper.

6. Connection to Computer

SR-430 is available to connect either RS-232C or USB to the Computer.

The Computer is recognized USB interface, In case of both of cable connected to Computer.

Connection status	USB	RS-232C
Only USB is connected.	Available	N/A
Only RS-232C is connected.	N/A	Available
USB & RS-232C are connected.	Available	N/A

Connect the device to a computer by referring to the following procedure.

(1) Connection to Interface cable

This deveice is able to connect USB interface or RS-232C interface.

Please choose a cable which much as interface connector.

* RS-232C is needed to straight cable for connect between SR-430 and Computer.

Please set the following settings even if you use either USB initerface or RS232-C initerface.

(2) Setting data transfer rate

Set the same data transfer rate (baud rate) to this device and the computer. The device is set at 9,600bps by default. Before switching turning SW1, be sure to turn the power of the device off. When setting the baud rate of the computer, refer to its operation manual.

The baud rate is set using 0 to 4 of SW1.

(* refers to the default setting)

Switch position	Baud rate
0	2,400
1	4,800
2	9,600
3	19,200
4	38,400

(5 to 9 are not used)

SW1: Sets baud rate.

(3) Setting data format

Set the same data format to this device and the computer. The DIP switches are set as shown in the table below by default. Before changing the settings of the DIP switches, be sure to turn the power of the device off. When setting the data format of the computer, refer to its operation manual.
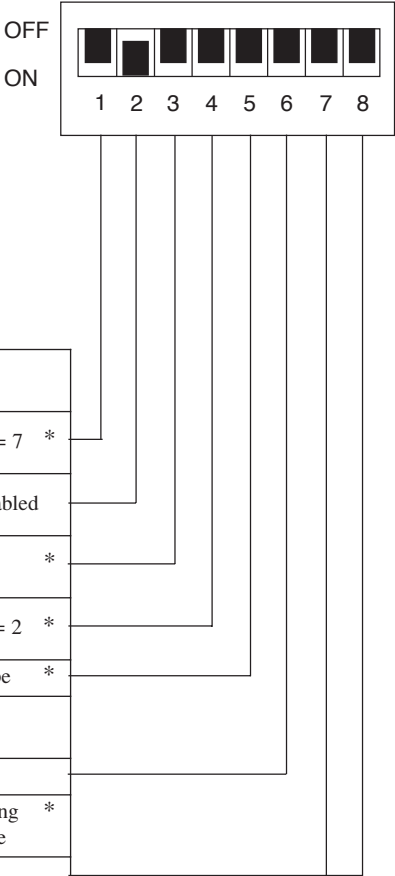
#1 DIP switch function: Set the device as follows:

(* refers to the default settings)

DIP SW No.	Meaning	ON	OFF
1	Sets Communication data format.	Data bit length = 8	Data bit length = 7 *
2	Sets Communication data format.	Parity check disabled *	Parity check enabled
3	Sets Communication data format.	Odd parity	Even parity *
4	Sets Communication data format.	Stop bit length = 1	Stop bit length = 2 *
5	Read timing	Mark-to-mark type	Direct-under type *
6	Changes line compatible code in E mode	0123 : ; < = >	987 XYABC
	Lines to read	15	12
	Card used in test mode	Postcard-sized, timing control type	Card-sized, timing direct-under type *
7,8 (note)	Operation mode	7	8
	SR-430 * (SR-410 compatible)	OFF	OFF
	SR-307 compatible	ON	OFF
	SR-305 compatible SR-305S compatible	OFF	ON
	Not used	ON	ON

Note:

Note that the reading sensitivity is graded in eight levels in the compatible mode.

(4) Communication control method

This device has the following two unreceivable states. In these states, set the communication timing by the host computer.

1. Due to half-duplex communication, data reception is disabled while the device is sending data.

2. Data reception is disabled while the device is executing a command or the internal communication buffer is full.

   The device notifies this state using an RS signal.

(5) Control line level

CS: The device sends data when this signal is at the high level.

RS: The device outputs low-level RSs in the unreceivable state.

DR: The device outputs high-level DRs while the power is turned on.

Signal level

High: +3V to +12V

Low: -3V to -12V

The following signals are only available to use RS-232C connection.

(6) Signal name and pin connection

Signal	External computer		Signal direction	This device	
	Signal	Pin		Pin	Signal
(GND)	FG	1	———	1	FG
(Data to send)	SD	2	⟶	2	RD
(Data to receive)	RD	3	⟵	3	SD
(Request to Send)	RS	4	⟶	4	CS
(Clear to Send)	CS	5	⟵	5	RS
(Data set Ready)	DR	6	⟵	6	DR
(Signal GND)	GND	7	———	7	GND

7. How to Enter Mark

(1) Dimensions of mark   : Width = 3.5 to 5.0mm

                                            Thickness = 0.4mm or moe

(2) Writing implements   : Pencil of HB or softer, OCR marker, mechanical pencil

                                            (infrared visible light specifications: The above + ball-point pen)

(3) Density   : PCS = 0.7 min. (*1)

(4) Typical entries

OK   NG

×
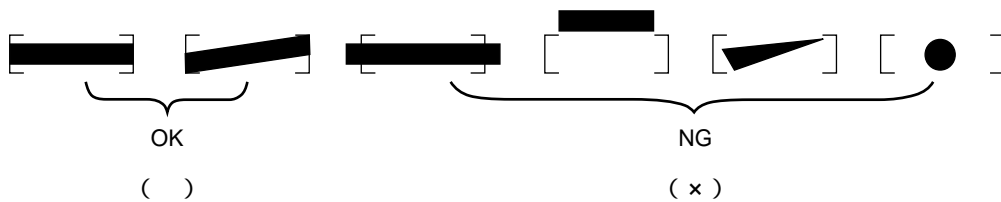
Note:

When using a mechanical pencil, be sure to enter a mark with enough density.

(*1)

PCS = Printed Contrast Signal

It refers to the contrast in reflectance of a printed mark, symbol or letter against the non-printed part of paper. It is calculated as follows:

PCS = (white reflectance - black reflectance)/white reflectance

8. Adjusting Reading Sensitivity

Although the mark reading sensitivity of this device is set at level 4 by default, it can be changed so as not to read stains as marks when particularly stained cards are read.

(1) Open the top cover of the device to turn SW2.

In SR-430 (SR-410 compatible) mode

Turn SW2 to level 1 to maximize the reading sensitivity.

Turn SW2 to level 0 to minimize the reading sensitivity.

IN SR-307/SR-305 (SR-305S) compatible mode

Turn SW2 to level 1 to maximize the reading sensitivity.

Turn SW2 to level 8 to minimize the reading sensitivity.

For SW2, use level 1 to 8 and do not use level 0, 9 to F.

(2) When adjusting the sensitivity, enter marks with different densities (line width or thickness) on mark cards to test reading. Then, check and adjust entered marks and the reading sensitivity level using SW2.

(3) Functions of SW2

SR-430 (SR-410 compatible) mode

SR-307/SR-305 compatible mode

Position	1 2 3 4 5 6 7 8 9 A B C D E F O
Sensitivity	High ← Reading sensitivity → Low

Note

Position	1 2 3 4 5 6 7 8
Sensitivity	High ← Reading sensitivity → Low

"*" refers to the default setting.

Reference detection density data of each level differs between the SR-430 (SR-410 compatible) and SR-307/SR-305 (SR-305S) compatible modes.

SW2: Adjusts sensitivity.
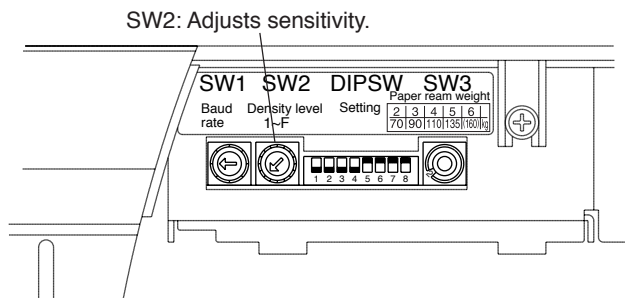
9. Control Commands

This device operates according to command signals sent from the host computer. Control commands and data are all sent and received in ASCII codes.

9-A Initialize Commands

The following commands are used to change the status of the device immediately after the power is turned on:

-1   Kinds of Initialize Commands

Command	Format	Explanation
DL	DLE DL	Sets the reading density.
DD	DC3 DD	Sets the difference in the reading density.
T	DLE T	Sets the timing format.
DC3	DC3 DC3 L	Selects the 12-line or 15-line output. Specifies the lines to be read in the E, EA, ED or ES mode.
DC4	DC4	Sets separator codes and others.
CAN	CAN CR	Resets the device.

-2   DLE DL Command (Reading Sensitivity Setting Command)

[Explanation]

This command is for setting the reading sensitivity level.

16 levels corresponding to density levels 1 to 16 can be set.

For example, a mark of density level 2 or more is read when "02" is set.

The setting of the rotary switch is enabled when the power is turned on while software is prioritized when a DL command is used.

This setting is not stored after the power is turned off.

* This applies to when the CAN command is executed.

In the SR-307 compatible mode, the density levels are 1 to 8.

[Format]

 DLE   D   L   N1 N2   CR
(10H)   (44H)   (4CH)   (0DH)
   N1N2: 2-byte ASCII code

9.Control Commands

-3   DC3 DD Command (Reading Density Difference Setting Command)

[Explanation]

This command is for setting the density difference allowable from the darkest mark in the CA and EA modes.

After setting the difference, marks thinner than the setting are cancelled and those in the allowable range are all output.

The density difference is set at "01" by default. In this case, mark data of the darkest density are output.

This setting is not stored after the power is turned off.

* This applies to when the CAN command is executed.

Notes 1. Relationship with the sensitivity level setting

When there is one mark, the existence is judged according to the set sensitivity level.

When there are more than one mark, the density differences are compared among those at the set level or more and marks under the set level are cancelled.

2. When there are more than one mark at the same density level, more than one pieces of data are also output.

e.g.1.   When the density level is set at 2 and there are marks of density 6, 4 and 3

If the density difference of 3 is specified, the mark under the density level of 3 (6 - 3 = 3) is cancelled and two pieces of data of density 6 and 4 are judged to exist and output.

e.g.2.   When the density level is set at 4 and there are marks of density 8, 5, 4 and 3

If the density difference of 3 is specified, the mark under the density level of 4, namely, the mark of density 3, is first cancelled due to the sensitivity level setting and then the marks under the density level of 5 (8 - 3 = 5) are cancelled. Thus, data of density 8 is judged to exist and output.

[Format]

DC3	D	D	N1 N2	CR
(13H)	(44H)	(44H)		(0DH)

N1N2: 2-byte ASCII code

-4 DLE T Command (Timing Format Setting Command)

[Explanation]

This command is for setting mark read timing (timing mark type). If the DIP switch setting has not been changed, the setting by this command is not required when the power is turned on.

When the T command is executed, the set value remains unchanged unless the device is reset or the power is turned off.

When using the timing control type, be sure to set the read timing by this command.

-4-1 In SR-430 (SR-410 compatible) mode

[Format]

Host Computer						This device
DLE	T	CR	STX	N	CR ⟶	Receive
(10H)	(55H)	(0DH)	(02H)		(0DH)	

* N: Specifies the format (1-byte ASCII numerical code between 1 and 5)

N	Mark read timing format
1	Timing control type
2	Direct-under type
3	Not used
4	Mark-to-mark type (end or blank space not to be read)
5	Mark-to-mark type (end or blank space to be read)

N values determine the mark read areas in the formats shown in the table below:

Setting method of timing control type

Specifying the timing control type with N = 1 when specifying the T command sets the read area at three times of the timing mark.

[Format]

DLE	T	CR	STX	1	CR
(10H)	(55H)	(0DH)	(02H)	(31H)	(0DH)

Descriptions of each read timing format ("R" refers to the read area)

[Descriptions of each control type]

1. Timing control type

R = d x m
m = Specified multiple (fixed at 3)
d = Timing mark width

2. Direct-under type

3. Mark-to-mark type

   (front end or blank space not to be read)

R   1st column

4. Mark-to-mark type

   (front end or blank space to be read)

Approx. 2.5mm
R   1st column
R   2nd column

-4-2   In SR-307 compatible mode

[Format]

Host Computer   This device

| DLE | T | CR | N | CR | ⟶ Receive |
| (10H) | (55H) | (0DH) | | (0DH) | |

* N is the 1-byte ASCII numerical code indicating the reading method.

   N values determine the mark read areas in the formats shown in the table below:

N	Mark read timing format
0	Mark-to-mark type
1	Timing mark direct-under type
2	Timing control type (read multiple = 3 times)

-4-3   In SR-305 (SR-305S) compatible mode

[Format]

Host Computer   This device

| DLE | T | CR | N | CR | ⟶ Receive |
| (10H) | (55H) | (0DH) | | (0DH) | |
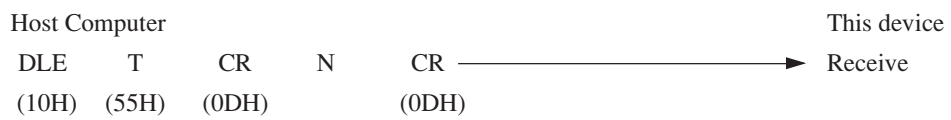
* Specifies the timing control type.

   N is the 1-byte ASCII numerical code indicating the reading method.

Descriptions of each read timing format ("R" refers to the read area)

[Descriptions of each control type]

1. Timing control type

R = d x m
m = Specified multiple (fixed at 3)
d = Timing mark width

2. Direct-under type

3. Mark-to-mark type
(front end or blank space to be read)

Approx. 2.5mm

1st column

2nd column
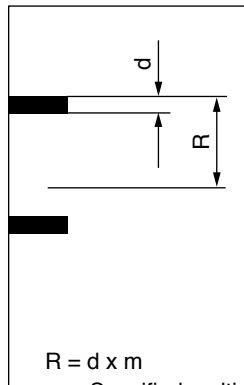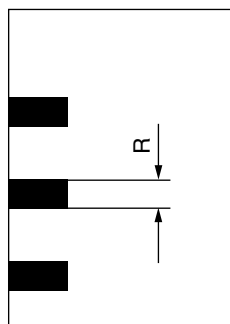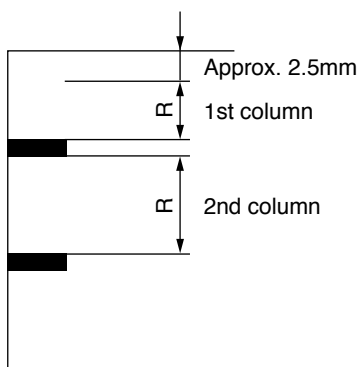
-5   DC3 Command (Read Line Specify Command)

[Explanation]

This command is for specifying the number of lines of data to be read. When the DC3 command is executed, the set value remains until the device is reset or the power is turned off.

When the power is turned on or the device is reset, the number of lines will become the value set to the DIP switch, and when the DC3 command is executed, the priority will be given to the software.

[Format]

  DC3   N1 N2   CR

 (13H)   (0DH)

The value of N1N2 determines the number of lines of data to be read.

N1N2 = 12 : Data is read assuming the number of lines as 12.

N1N2 = 15 : Data is read assuming the number of lines as 15.

(The modes in which the 15-line format is available are C, CA, D, E, EA, ED, ES and F modes.)

-6   DC3 L Command (Read Line Area Setting Command)

[Explanation]

This command is executed together with any of data read commands such as E, EA, ED and ES. This command is for specifying the read area of each line and the range of line whose density is compared. The setting of this command is not stored.

The initial value after the power is turned on is set for each column (as 12 lines or 15 lines).

Note :

          When executed together with any of the E, EA, ED or ES command, this command can specify square areas.

[Format]

  DC3   L   N1 N2   M1 M2   CR

 (13H) (4CH)   (0DH)

The values of N1N2 and M1M2 determine the range of lines to be read.

N1N2 : Read starting line counted from the timing mark side.

M1M2 : Number of lines to be read.

Note:

Although the E, EA, ED or ES command also follows the DC3 command, it does not follow the DC3 command once the DC3 L command is used.

-7 DC4 Command (STX, ETX Setting Command)

[Explanation]

This command is for determining the ETX code following data output from the device and the recognizing method of received data.

When the DC4 command is executed, the set value remains until the device is reset or the power is turned off.

[Format]

DC4	S1	S2	S3	CR
(14H)				(0DH)

The values of S1 determine the statuses of the ETX code, etc.

$S1 = 0$: Initializes the device. (This value erases $S1 = 7$ data stored in the memory.)
          Does not add the ETX (CR) code. (S2 and S3 are not necessary.)

$S1 = 1$: Adds CR as the ETX (CR) code. (S2 and S3 are not necessary.)

$S1 = 2$: Adds the code specified by S2 as the ETX code. (S3 is not necessary.)

$S1 = 3$: Adds the STX code. This value adds the code specified by S2 as the STX code.
          CR is added as ETX. (S3 is not necessary.)

$S1 = 4$: Adds the STX and ETX codes. This value adds the code specified by S2 as the ETX code
          and the code specified by S3 as the STX code.

$S1 = 5$: The device neglects the codes specified by S2 or S3 as data at the time of reception (S3
          can be omitted.)
          Codes which are used in commands are not neglected.
          Codes up to 6 bytes can repeatedly be specified (2-byte codes only in the 307 compatible
          mode) .
          All settable character codes are shown on the next page. All other codes cause command
          errors.

$S1 = 6$: Not used.

$S1 = 7$: Stores the set STX and ETX codes. The set values remain even after the power is turned
          on or the CAN command is executed. (S2 and S3 are not necessary.)

Note :

Only S1=0, 1, 2 and 5 are effective in the SR-307 mode.

Contents of separators added for each mode

- SR-430 (SR-410 compatible) mode

Command

S1		ENQ	ENQ T	C	E	EA
0					CR	CR
1	CR	CR	CR	CR	CR CR	CR CR
2	ETX	ETX	ETX	ETX	CR ETX	CR ETX
3	STX CR	STX CR	STX CR	STX CR	STX CR CR	STX CR CR
4	STX ETX	STX ETX	STX ETX	STX ETX	STX CR ETX	STX CR ETX

	ED	ES	CAN
0	CR	CR CR	ACK
1	CR CR	CR CR CR	ACK
2	CR ETX	CR CR ETX	ACK
3	STX CR CR	STX CR CR CR	ACK
4	STX CR ETX	STX CR CR ETX	ACK

"   ": Data output from the device

- SR-307 compatible mode

		ENQ	ENQ T	ENQ S	A	B
0						
1	CR	CR	CR	CR	CR	CR
2	ETX	ETX	ETX	ETX	ETX	ETX
3	STX CR	STX CR	STX CR	STX CR	STX CR	STX CR
4	STX ETX	STX ETX	STX ETX	STX ETX	STX ETX	STX ETX

	C	CA	D	E	EA	ED
0				CR	CR	CR
1	CR	CR	CR	CR	CR	CR
2	ETX	ETX	ETX	ETX	ETX	ETX
3	STX CR	STX CR	STX CR	STX CR	STX CR	STX CR
4	STX ETX	STX ETX	STX ETX	STX ETX	STX ETX	STX ETX

	ES	F	G	H	I	J
0	CR CR					
1	CR CR	CR	CR	CR	CR	CR
2	ETX ETX	ETX	ETX	ETX	ETX	ETX
3	STX CR CR	STX CR	STX CR	STX CR	STX CR	STX CR
4	STX ETX ETX	STX ETX	STX ETX	STX ETX	STX ETX	STX ETX

	K	L	CAN
0			ACK
1	CR	CR	ACK
2	ETX	ETX	ACK
3	STX CR	STX CR	ACK
4	STX ETX	STX ETX	ACK

Character codes settable when S1 = 5

Lower 4 bit \ Upper 4 bit	0	1	2	3	4	5
0						
1	SH					
2		D2	”			
3	EX					
4	ET					
5		NK				
6	AK	SN				
7	BL	EB	'			
8	BS					
9	HT	EM				
A	LF	SB				
B	HM	EC				
C	CL		,			
D						
E	SO		.			
F	SI					

-8　CAN Command (Reset Command)

[Explanation]

This command is used as the reset command. (This command initializes the device.) After this command is executed, the device is reset internally and returns the ACK code (06H). At the time, the "READY" LED (green) and "ERROR" LED (red) blink. The host computer must be designed to transmit the next command after receiving this code.

Separators like STX and ETX can be added by the DC4 command (only in the SR-430 (SR-410 compatible) mode).

[Format]

```
Host Computer                              This device

 CAN    CR    ────────────────────►  Receive
(18H)  (0DH)

              ◄────────────────────  Reply
                    ACK
                   (06H)
```
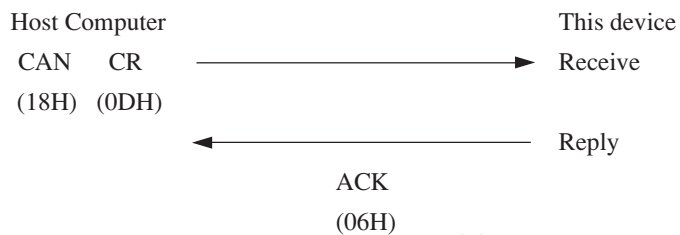
9-B Card Feed Commands

-1 ? Command (Card Feed Command)

[Explanation]

When this command is transmitted, the device sends one card only and reads it. After reading the card, the device outputs an error status code and waits for a command from the host computer.

Separators like STX and ETX can be added using the DC4 command.

[Format]

Host Computer   This device

   ?   CR   ——————————————▶   Receive

 (3FH)   (0DH)

    Receive   ◀——————————————   Error status output

                           E

          E: 1-byte error status (for the meaning, refer to the error status code table)

-2 Error Status Code Table

-2-1 SR-430 (SR-410 compatible) mode

Code	HEX	Explanation
0	30H	Normal
1	31H	Internal jam error (during card feeding)
2	32H	Cards remain inside the device.
3	33H	Card feed error (S2 cannot be turned on)
4	34H	Not used.
5	35H	Not used.
6	36H	DF error (only when a DF check is set) (Double-feeding has occurred.)
@	40H	Timing mark error (only 3 or less timing marks detected)
A	41H	Not used.
B	42H	Card empty
C	43H	Not used.
D	44H	Cover open
P	50H	An invalid command or parameter has been input.
Q	51H	Communication error
p	70H	Hardware error of the main unit * If a hardware error should occur, turn the power off once and reboot the device. If the device is not restored, contact the sales shop.
q	71H	
s	73H	
t	74H	
u	75H	
v	76H	

-2-2   SR-307 compatible mode

Code	HEX	Explanation
0	30H	Cards have been sent normally.
1	31H	Not used.
2	32H	Jam error (cards have not been sent normally.)
3	33H	Not used.
4	34H	Timing mark error (only 3 or less timing marks detected.)
5	35H	Card empty (There is no card in the card hopper.)

A jam error (32H) is assumed for the DF error.

9-C   Device Control Setting Commands
-1   DC3 B Command (Buzzer Control Command)

[Explanation]

This command is for setting whether to sound a buzzer when no card exists or an error occurs.

The initial value after the power is turned on is set to flash the red LED three times and then turn the light off without sounding a buzzer when no card exists (N = 0).

[Format]

Host Computer

  DC3   B   N   CR

 (13H)   (42H)   (0DH)

The value of N determines the setting.

N = 0: The red LED flashes three times without sounding a buzzer when no card exists.

N = 1: The red LED does not come on but a buzzer goes off when no card exists.

N = 2: The red LED flashes three times without sounding a buzzer for all types of errors.

When no card exists

	N = 0	N = 1	N = 2
Buzzer	Not goes off.	Goes off.	Not goes off.
LED	Comes off after flashing 3 times.	Not comes on.	Comes off after flashing 3 times.

When an error occurs

	N = 0	N = 1	N = 2
Buzzer	Goes off.	Goes off.	Not goes off.
LED	Comes on.	Comes on.	Flashes 3 times.

10. Data Transfer Mode

10-A   Data Transfer Commands

The following commands are used to transfer data read from one card to the host computer:

-1   Types of data transfer commands

Mode	Explanation
A	Outputs the number at a mark when the mark is detected on the 9 to 0 lines in one column, or outputs a space when no mark or more than 2 marks are detected. The data is output as an ASCII code. The X and Y lines are neglected.
B	Outputs data in one specified column in the A mode format.
C	Divides one column in units of 4 lines and outputs the ASCII codes of 0 to F regarding the data as hexadecimal numbers.
CA	Outputs the darkest mark in the C mode only as data.
D	Outputs data of one specified column in the C mode format.
E	Outputs ASCII codes corresponding to marked line positions.
EA	Outputs the darkest mark in the E mode only as data.
ED	Adds 1-byte density data after mark data in the E mode.
ES	Outputs mark and density data separately in the ED mode.
F	Outputs data of one specified column in the E mode format.
G	Reads EBCDIC-based punched-hole codes of one column and converts the codes into ASCII codes to output them.
H	Outputs data of one specified column in the G mode format.

Modes marked "*" are for density-related commands.

Note:

The A, B, CA, D, F, G and H modes are available in the 307 compatible mode only.

10-B　A Mode(1-byte Fixed Output Command)

[Explanation]

This command is for outputting the number at a mark when a mark is detected on the 9 to 0 lines in one column or outputs a space when no mark or more than two marks are detected. This device neglects marks and prints on the X and Y lines and outputs data as a 1-byte fixed length ASCII code for one column.

Separators like STX and ETX can be added using the DC4 command.

Note:

This mode is enabled only with the 12-line format setting.

Example

ASCII output data for the following marks
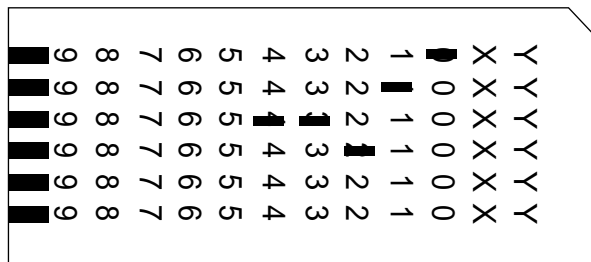
	1st column	2nd column	3rd column	4th column — — — —
Output data　ASCII code	0	1	SP	2　— — — —
HEX code	30H	31H	20H	32H　— — — —

[Format]
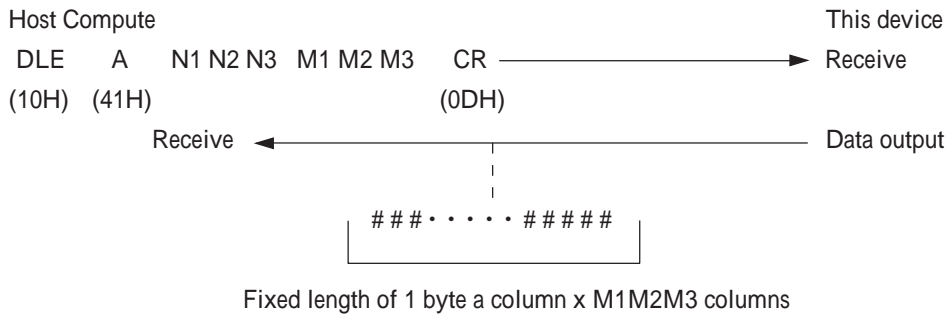
```
Host Compute                                          This device
 DLE    A   N1 N2 N3  M1 M2 M3   CR  ──────────────▶  Receive
(10H)  (41H)                   (0DH)
          Receive  ◀──────────────────────────────   Data output

                         ### #####

      Fixed length of 1 byte a column x M1M2M3 columns
```

N1N2N3 : 3-byte ASCII code indicating read start column number
　　　　　(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read
　　　　　(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-C C Mode (Fixed Length Output Command)

[Explanation]

One column is divided in units of four lines. Existence of a mark on each line is indicated by "1" and non-existence is indicated by "0." The 4-bit unit is regarded as a 4-digit hexadecimal number, and the ASCII codes from 0 to F are output.

Data are of fixed length of 3 bytes a column.

(A 15-line postcard-sized card is a fixed length of 4 bytes a column. The 16th line, however, is always "0" as a dummy line.)

Separators like STX and ETX can be added using the DC4 command.

Example

ASCII output data for the following marks in one column
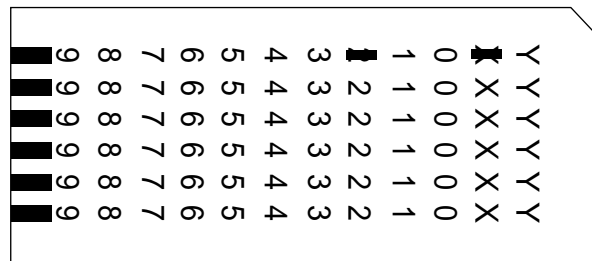
Number of lines	1 2 3 4	5 6 7 8	9 10 11 12
One column	0 0 0 0	0 0 0 1	0 0 1 0
Output data ASCII code	0	1	2
HEX code	30H	31H	32H

[Format]

Host Computer					This device
DLE (10H)	C (43H)	N1 N2 N3 M1 M2 M3	CR (0DH)	———————▶	Receive
	Receive	◀———————			Data output

#

Fixed length of 3 (4) bytes a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number
          (Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read
          (Example) 50 columns = 050 (30H, 35H, 30H)

Note :

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-D   CA Mode (Fixed Length Output Command for Automatic Density Distinction)

[Explanation]

The data format is the same as the one in the C mode.

This command is for automatically distinguishing mark density for one column. When there are several marks, it cancels light-colored marks of larger density difference than the set difference and outputs marks of smaller density difference than the set difference. Since the density difference is set at 01 by default, the darkest mark data is output in this case. Density difference between a dark mark and the next darker mark to be canceled can be set using the DC3 DD command.

Separators like STX and ETX can be added using the DC4 command.

Note: Relationship with sensitivity level setting

When there is only one mark, the existence of a mark is distinguished according to the preset sensitivity level.

When there are several marks, density differences are compared among marks of density more than the preset sensitivity level.

Marks of density less than the preset sensitivity level are canceled.

Note:

When there are several marks of the same density level, data is also output in a plural form.

[Format]

Host Computer   This device
DLE   C   A   N1 N2 N3   M1 M2 M3   CR ─────────────▶ Receive
(10H)   (43H)   (41H)   (0DH)
                    Receive ◀───────────────────────── Data output

#####

Fixed length of 3 (4) bytes a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number
(Example) From the 3rd column = 003 (30H, 30H, 33H)
M1M2M3 : 3-byte ASCII code indicating number of columns to be read
(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-E   E Mode (Variable Length Output Command)

[Explanation]

This command is for returning ASCII codes corresponding to marked line positions. Data are of a variable length corresponding to the number of marks. CR codes are added at break points between columns.

When no mark is detected in a column, "a space + CR" is output.

The correspondence between line positions and ASCII codes can be set in two ways as shown in the tables below by turning DIP SW6 on and off.

Separators like STX and ETX can be added using the DC4 command.

DIP SW6 = OFF

Line	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Code	9	8	7	6	5	4	3	2	1	O	X	Y	A	B	C

DIP SW6 = ON

Line	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Code	O	1	2	3	4	5	6	7	8	9					

[Format]

Host Computer   This device

DLE   E   N1 N2 N3 M1 M2 M3   CR   ─────────────▶   Receive
(10H) (45H)   (0DH)

        Receive ◀────────────────────────── Data output

            # CR # CR   # CR # CR

Data of X+1 bytes a column x M1M2M3 columns

X + 1: Variable length data of number of marks + 1-byte "CR"

N1N2N3 : 3-byte ASCII code indicating read start column number.
          (Example) From the 3rd column = 003 (30H, 30H, 33H)
M1M2M3 : 3-byte ASCII code indicating number of columns to be read.
          (Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-F   E A Mode (Variable Length Output Command for Automatic Density Distinction)

[Explanation]

The data format is the same as the one in the E mode.

This command is for automatically distinguishing mark density for one column. When there are several marks, it cancels light-colored marks of larger density difference than the set difference and outputs marks of smaller density difference than the set difference. Since the density difference is set at 01 by default, the darkest mark data is output in this case. Density difference between a dark mark and the next darker mark to be canceled can be set using the DC3 DD command.

Separators like STX and ETX can be added using the DC4 command.

Note: Relationship with sensitivity level setting

When there is only one mark, the existence of a mark is distinguished according to the preset sensitivity level.
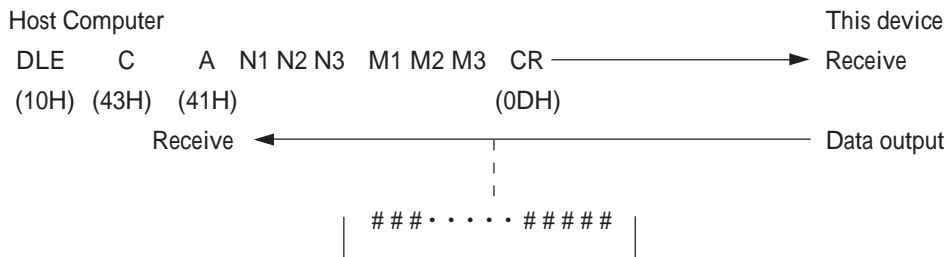
When there are several marks, density differences are compared among marks of density more than the preset sensitivity level.

Marks of density less than the preset sensitivity level are canceled.

Note: When there are several marks of the same density level, data is also output in a plural form.

[Format]

Host Computer   This device

DLE   E   A   N1 N2 N3 M1 M2 M3 CR ──────────▶ Receive

(10H)   (45H) (41H)   (0DH)

Receive ◀──────────────────────── Data output

CR # CR   # CR # CR

Data of X+1 bytes a column x M1M2M3 columns

X + 1: 1-byte variable length data of number of marks + "CR"

N1N2N3: 3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3: 3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note: N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

[Example]

| 9 | 8 | 7 | 6 | ← Mark position |

· · · · · · · ← Mark

(10)   (2)   (6)   (7)   ← Reading density
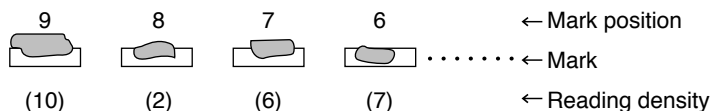
When reading sensitivity = 3 and density difference = 4

Marks of reading sensitivity 3 or less are cancelled and the set density of 4 is subtracted from the maximum density.

In this example, the density setting of 4 is subtracted from the maximum reading density of 10.

Accordingly, marks of reading density 6 (10 - 4 = 6) or less are cancelled.

This outputs data at mark positions 9 and 6.

10-G ED Mode (Variable Length Output Command with Density Data)

[Explanation]

The data format is the same as the one in the E mode.

One byte indicating density data is added after each mark data to output it in two byte units.

Separators like STX and ETX can be added using the DC4 command.
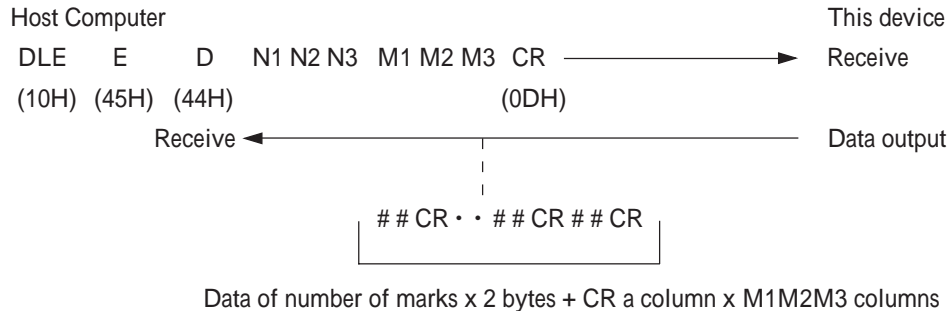
[Format]

```
Host Computer                                                This device
 DLE    E      D     N1 N2 N3  M1 M2 M3  CR ──────────────▶  Receive
(10H)  (45H)  (44H)                      (0DH)
              Receive ◀──────────────────│──────────────  Data output
                                         ┆
                            ##CR     ##CR ##CR
```

Data of number of marks x 2 bytes + CR a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number.
          (Example) From the 3rd column = 003 (30H, 30H, 33H)
M1M2M3 : 3-byte ASCII code indicating number of columns to be read.
          (Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

A column without a mark is handled as space CR (20H, 0DH).

[Example]

When there are a mark of density level 2 at position 9 and one of density level 3 at position 1, data of one column to be sent from the device is as follows:

```
HEX code   :   (39H)   (32H)    (31H)   (33H)    (0DH)
Data       :    9       2        1       3        CR
                Mark    Density  Mark    Density
```

Density information output data

Density level	:	1	2		10	11	12	13	14	15	16
Output data	:	1	2								
ASCII code	:	31H	32H		3AH	3BH	3CH	3DH	3EH	3FH	40H

* In the order of ASCII code

In the SR-307 compatible mode, the density levels of 1 to 8 are output.

1O-H   E S Mode (Variable Length Output Command by Density and Mark Data)

[Explanation]

The data format is the same as the one in the E mode.

This command is for outputting mark and density data separately.

The density data format is also the same as the one in the ED mode.

Separators like STX and ETX can be added using the DC4 command.

[Format]

Host Computer   This device

DLE   E   S   N1 N2 N3   M1 M2 M3   CR ————————→   Receive
(10H) (45H) (53H)   (0DH)

Receive ←——————————————————— Data output

CR % CR   # CR % CR
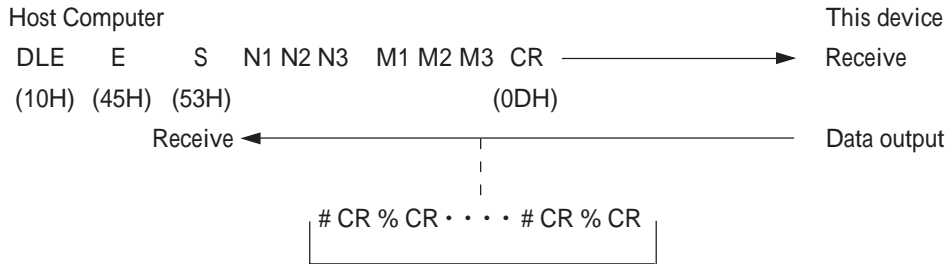
Data of number of marks + CR + number of marks + CR a column x M1M2M3 columns

(mark data)   (density data)

N1N2N3 :3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 :3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

A column without a murk is handled as space CR space CR (20H, 0DH, 20H and 0D).

[Example]

When there are a mark of density level 2 at position 9 and one of density level 3 at position 1, data of one column to be sent from the device is as follows:

HEX code   :   (39H)   (31H)   (0DH)   (32H)   (33H)   (0DH)
Data   :   9   1   CR   2   3   CR
                   (Mark data)   (Density data)

Density information output data

Density level	:	1	2		10	11	12	13	14	15	16
Output data	:	1	2								
ASCII code	:	31H	32H		3AH	3BH	3CH	3DH	3EH	3FH	40H

* In the order of ASCII code

In the SR-307 compatible mode, the density levels of 1 to 8 are output.

10-I   G Mode (EBCDIC Code Convert and Output Command)

[Explanation]

This command is for reading EBCDIC-based punched hole codes of one column and converting the codes into 1-byte ASCII codes to output them.

This device outputs a space when a mark position does not agree with the EBCDIC code or when no mark is detected.

Separators like STX and ETX can be added using the DC4 command.

[Format]

Host Computer   This device

DLE   G   N1 N2 N3   M1 M2 M3   CR ──────────────▶   Receive

(10H)   (47H)   (0DH)

Receive ◀────────────────────   Data output

########

Fixed length of 1 byte a column x M1M2M3 columns

N1N2N3 : 3-byte ASCII code indicating read start column number.

(Example) From the 3rd column = 003 (30H, 30H, 33H)

M1M2M3 : 3-byte ASCII code indicating number of columns to be read.

(Example) 50 columns = 050 (30H, 35H, 30H)

Note:

N1N2N3 and M1M2M3 cannot be omitted as 6-byte fixed length data.

10-J   B Mode

[Explanation]

This command is for outputting data in one specified column in the A mode format after indicating a certain column.

[Format]

```
 DLE     B     CR     NI N2      CR
(10H)  (42H)  (0DH)            (0DH)
```

N1N2 .... Specifies a certain column.

10-K   D Mode

[Explanation]

This command is for outputting data in one specified column in the C mode format after indicating a certain column.

[Format]

```
DLE      D      CR     NI N2      CR
(10H)  (44H)  (0DH)            (0DH)
```

N1N2 .... Specifies a certain column.

10-L   F Mode

[Explanation]

This command is for outputting data in one specified column in the E mode format after indicating a certain column.

[Format]

```
DLE      F      CR     NI N2      CR
(10H)  (46H)  (0DH)            (0DH)
```

N1N2 .... Specifies a certain column.

10-M   Other Commands

-1   ENQ Command (Error Status Output Command)

[Explanation]

This command is for outputting the status after card feeding.

The data are of 1-byte fixed length ASCII codes.

Separators like STX and ETX can be added using the DC4 command.

[Format]

Host Computer   This device

ENQ   CR ————————————————————▶ Receive

(05H)   (0DH)

　　　　Receive ◀———————————————————— Data output

```
                              |
                              |
                              |
                            ┌───┐
                            │ # │
                            └───┘
```
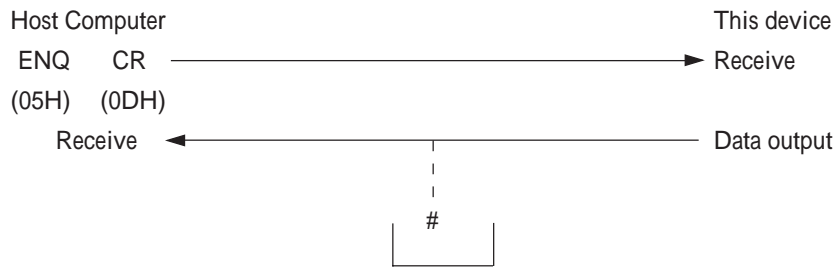
Error status

For error statuses, see 8-B-2.

-2 Timing Mark Count Check Commands

ENQ T Command (Read Area Count Output Command)

[Explanation]

This command is for returning the number of read timing marks.

Whether a certain record has a different timing mark count or not can be checked by checking the number of timing marks after the card feed command (? command) is issued.

The data are of 3-byte fixed length ASCII codes.

Separators like STX and ETX can be added using the DC4 command.

[Format]

Host Computer   This device

ENQ   T   CR ──────────────────────► Receive

(05H) (54H) (0DH)

     Receive ◄────────────────────── Data output

                       # # #

              Number of timing marks

Example

When the number of timing marks is "64", "064" data is output.

Note:

In the case of the mark-to-mark type, the contents of data vary for each mode.

SR-430 (SR-410 compatible) mode : Number of read areas

SR-307 compatible mode : Number of timing marks
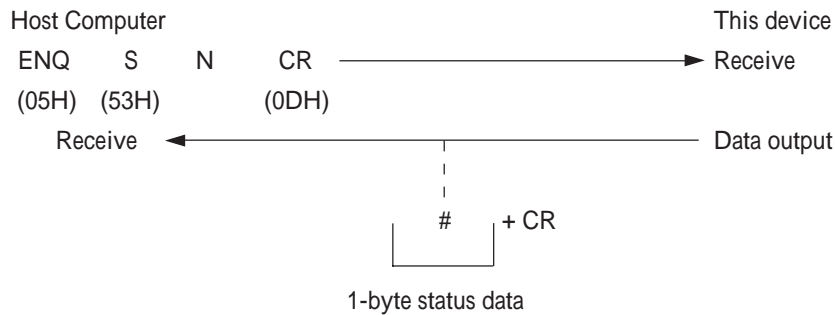
-3   Sensor Status Check Commands

ENQ S Command (Sensor Status Inquiry Command)

[Explanation]

This command is for returning the present status of the card sensor. (The existence of a card at each sensor position can be detected using this command.)
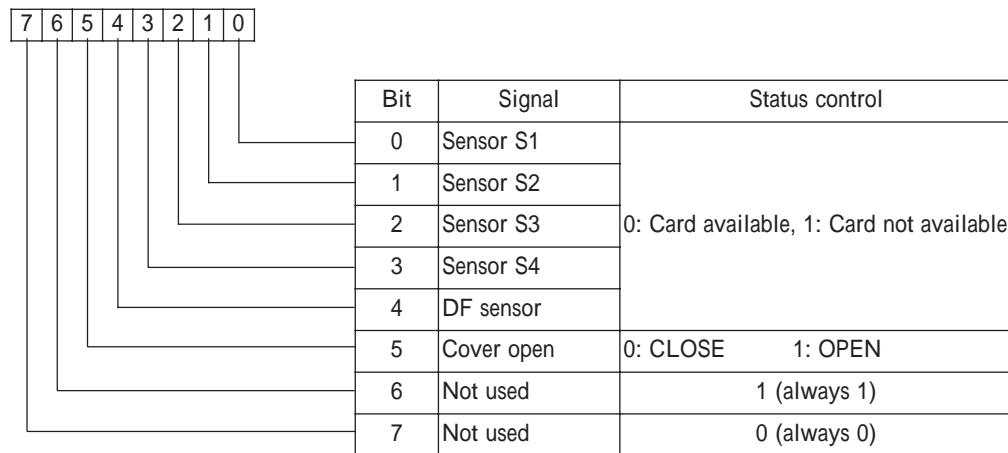
The data is of a form of 1-byte ASCII numeric code + CR. "1" is returned when a card is detected or "0" when no card is detected.

[Format]

```
Host Computer                                            This device
 ENQ      S     N      CR  ─────────────────────────►  Receive
(05H)   (53H)         (0DH)

      Receive  ◄──────────────────────────────────    Data output
                                    ┆
                                    ┆
                              ┌──┐
                              │ # │ + CR
                              └──┘
                         1-byte status data
```

N is a 1-byte ASCII code indicating the sensor number. 1-byte data indicating the status of each sensor by bit is returned when N is 0 or the status of a specified sensor when N is not 0.

When N = 0

```
┌─┬─┬─┬─┬─┬─┬─┬─┐
│7│6│5│4│3│2│1│0│
└─┴─┴─┴─┴─┴─┴─┴─┘
```

Bit	Signal	Status control
0	Sensor S1	
1	Sensor S2	
2	Sensor S3	0: Card available, 1: Card not available
3	Sensor S4	
4	DF sensor	
5	Cover open	0: CLOSE 1: OPEN
6	Not used	1 (always 1)
7	Not used	0 (always 0)

When N ≠ 0: The sensor is turned on when status data = 1 or off when status data = 0

N = 1 (31H): Sensor S1
2 (32H): Sensor S2
3 (33H): Sensor S3
4 (34H): Sensor S4
5 (35H): DF sensor
6 (36H): Cover open
(0: Close, 1: Open)

① Roles of sensors

Sensor S1 : Located at the card hopper and detects that cards have been set.

Sensor S2 : Located at the card feeding port and detects that card feeding has started.
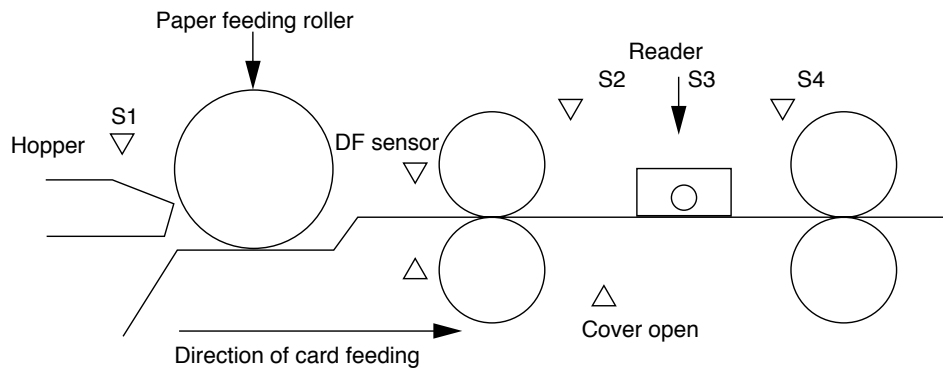
Sensor S3 : Located at the reader and reads data.

Sensor S4 : Located at the card ejector and detects that cards have been ejected.

DF sensor : Located between S1 and S2 and detects double-feeding.

Cover open : Detects whether the top cover is open or not.

② Sensor position

10-N   SR-305 Compatible Command

[Explanation]

The SR-305 (SR-305S) type is equipped with data transfer modes of A, B, C, D, E, F, G and H, which are also available for this device.

For details, refer to the SR-305 operation manual.

11. Cleaning and Time of change of parts
11-A Cleaning

Clean the rollers, reading lens and sensors since various malfunctions are caused if they are stained.

(1) Cleaning of rollers

After feeding 5,000 sheets or paper or a large amount of cards or using carbon paper, wipe the rollers by softly pressing clean cloth slightly wetted with disinfectant alcohol (ethanol) to them.

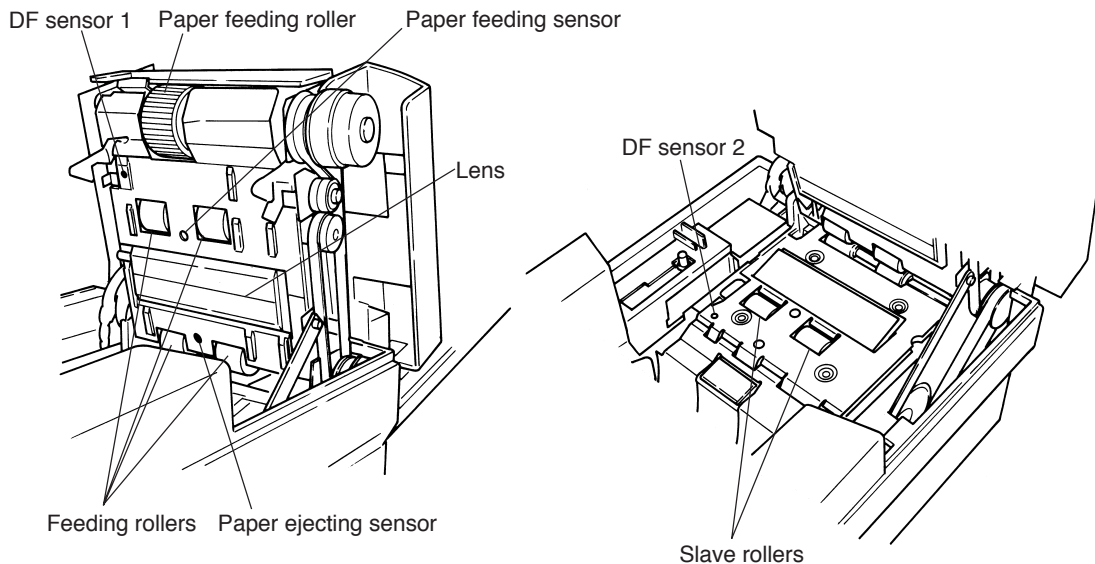If the rollers are stained, the stains may rub off to cards or malfunction may occur.

(2) Cleaning of read lens

Wipe the lens on the reader by softly pressing clean cloth slightly wetted with disinfectant alcohol (ethanol) to it (once a month or in every 5,000-sheet feeding).

If the read lens is stained, a reading error may occur.

(3) Cleaning of various sensors

Wipe the sensors by softly pressing clean cloth slightly wetted with disinfectant alcohol (ethanol) to it (once a month or in every 5,000-sheet feeding).

If the sensors are stained (with paper power, etc.), a detection error may occur.

DF sensor 1   Paper feeding roller   Paper feeding sensor

DF sensor 2

Lens

Feeding rollers   Paper ejecting sensor

Slave rollers

(4) Cleaning procedure
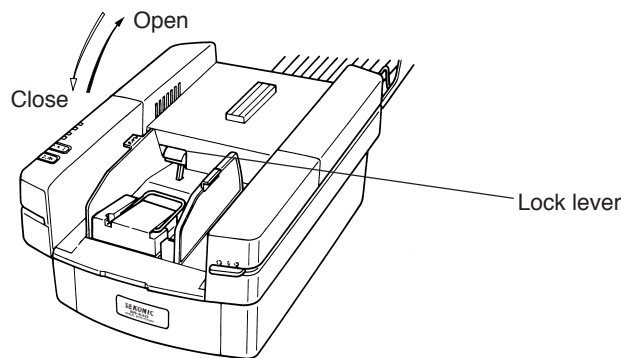
    1) Turn the power off and remove the power code from the outlet.

    2) Lower the hopper and open the top cover.

Opening method

    (1) Raise the lock lever toward you to unlock the cover.

    (2) Pressing up the top cover away from you automatically holds the cover.

    3) Clean the internal parts.

    4) Close the top cover.

Closing method

Slowly lower the cover toward you until it is locked.

(5) When the device is not in use for long periods, insert the paper feeding roller protection card between the paper feeding roller and the separation pad to prevent the roller material from deteriorating.

11-B Time of change of parts

Spare or consumption parts are required to be regularly changed in order to use this device safely and comfortably.

Please make contact with the dealer or distributor when they will become a time to be changed.

Part name	Time of change (Number of counter)
Paper feeding roller	200,000
Separation pad	200,000
Mylar (two kinds)	100,000
Double feeding prevention pad	200,000

* A change of the above parts depends on condition of the device.

12. External Views

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SEKONIC
SR-430
OPTICAL MARK READER

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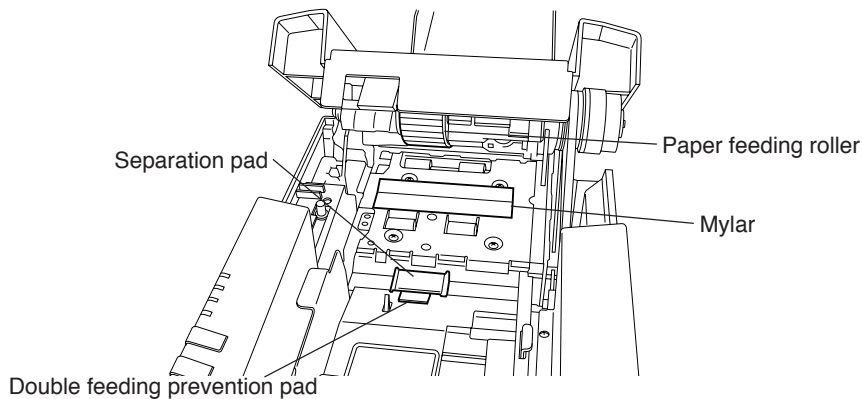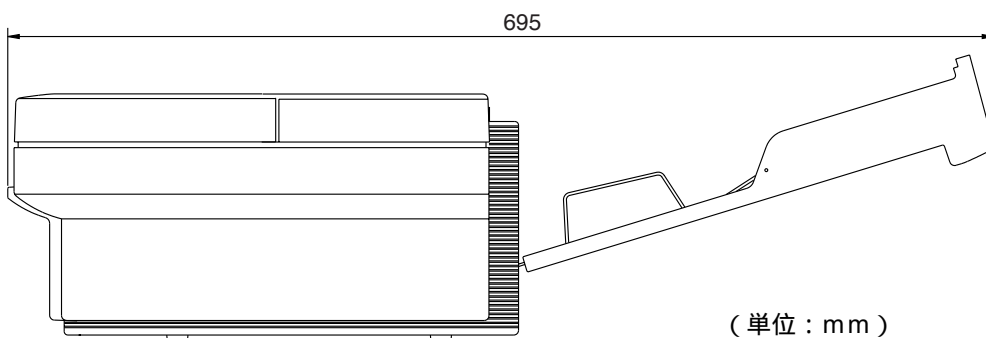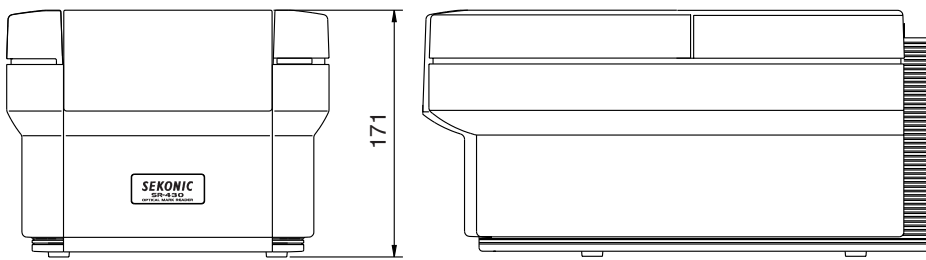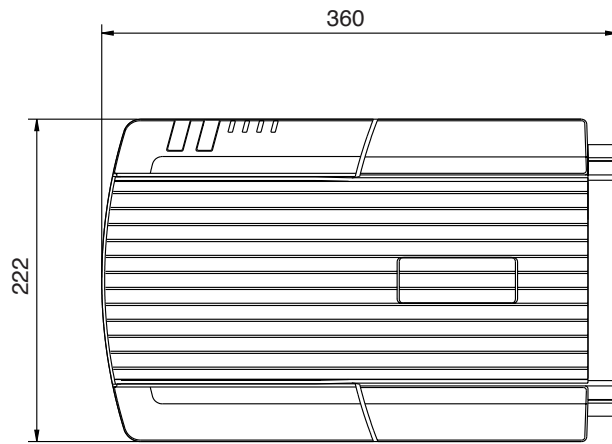
13.　Appendix

13-A　Reference for card creation

(1)　Overall dimensions of card

	Width	Length
Standard-sized card	82.55mm	187.32mm
Postcard-sized card	105mm	148mm
Long-sized card	82.55mm	304.8mm
Card of other size	82.55　110.0mm	150　304.8mm

For details of dimensions of cards, refer to the reference drawing in 12-A-(6).

Direction of fiber

Width

Timing mark

Length (longer side)
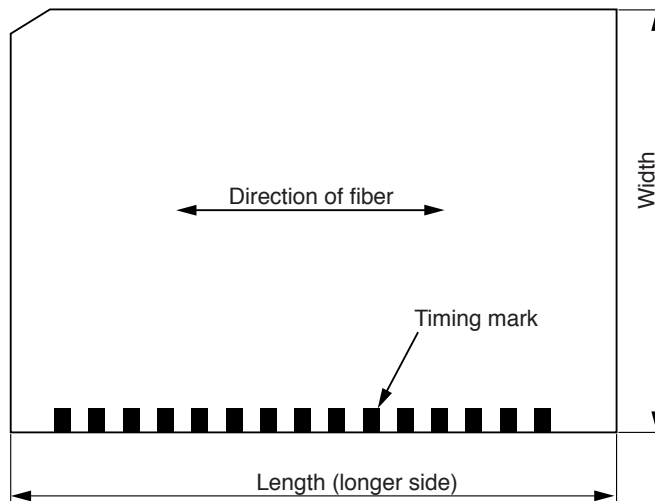
Note: When using carbon paper, design the device so as not to allow the pasting position to overlap the end of the card feeding direction.

(2)　Print ink

Be sure to use print ink satisfying the following reflectance characteristics:

1) Timing mark : Non-reflectance ink (black) of PCS = 0.9 ± 0.05

2) Unreadable information in marked area: Drop-out color (*1) of PCS = 0.15 or lower

3) Direction of fiber : Parallels the longer side of paper (direction of card feeding).

4) PCS measurement wavelength : 940nm for the near infrared light specifications (660nm for the infrared visible light specifications)

Note 1: Drop-out color

Refers to a color which is not read by optical mark read elements due to being converted to the same signals as "blank" parts although visible as various colors to human eyes.

(3) Printing of timing mark

	Direct-under type		Control type	Mark-to-mark type
	Standard-sized card	Card of other size		
Timing mark width (W)	1.0 ± 0.05mm	1.0 ~ 10mm	0.89 ± 0.05mm	1.0 ± 0.05mm
Timing mark length (L)	3.0 ± 0.1mm			
Timing mark pitch (P)	2.21mm	2.5mm min.	4.23mm min.	2.5mm min.
Blank between timing marks (D)	1.5mm	1.5mm min.	Timing mark width × 2+1.5mm min.	1.5 ~ 30.0mm
Number of timing marks	Four points min.			
Reference drawing in 12-A-(6)				

* For postcard-sized cards, use the timing mark control type.

(4) Mark entry frame (fixed value for standard-sized card)

    a. Dimensions (rectangle)   : Height (V) = 0.8 to 1.5mm

                                    Should be less, however, than the timing mark width (W).

                                      : Length (H): 3.5 to 4.3mm

    b. Print color   : Use a drop-out color and set the PCS value at 0.15 or lower.
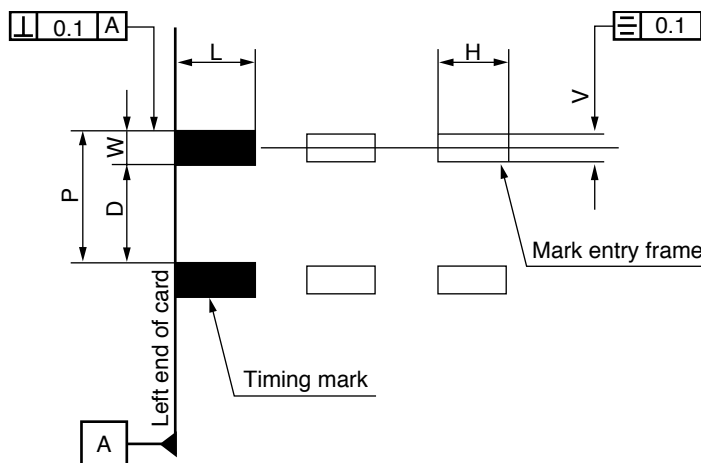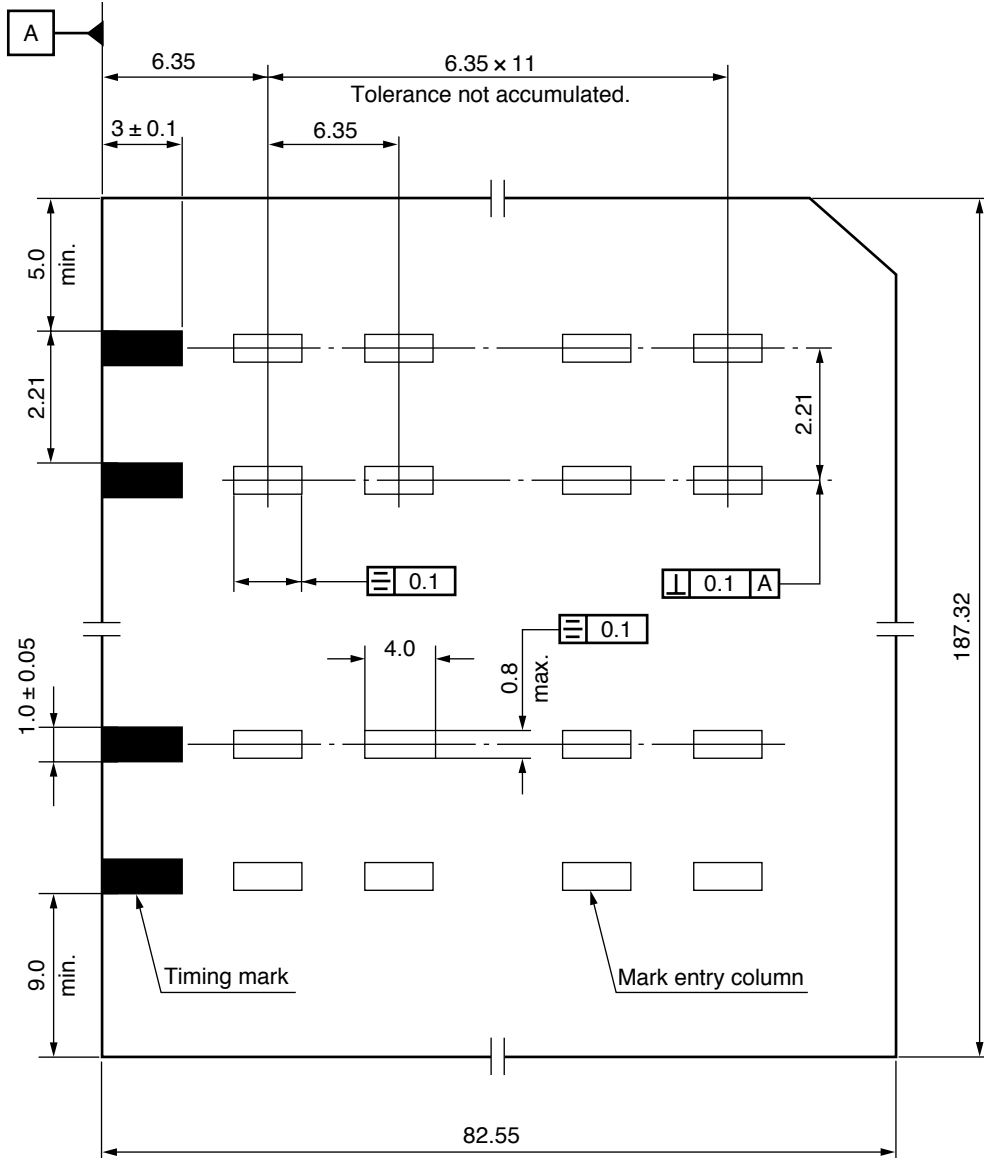

(5) Corner-cut

When cutting one corner of cards for reference to align cards, cut the opposite side from the paper feed reference surface (timing mark side) by 5mm or less.

(6)   Reference Drawings

(1) Timing mark direct-under type (standard-sized card)

A

6.35

6.35× 11

Tolerance not accumulated.

3± 0.1

6.35

5.0 min.

2.21

2.21

187.32

□ 0.1

⊥ 0.1 A

1.0± 0.05

□ 0.1

4.0

0.8 max.

9.0 min.

Timing mark

Mark entry column

82.55

General tolerance±0.20

Unit: mm

Allowable range of overall dimensions

82.47

82.73

187.20

187.45

-58-

(2) Timing mark direct-under type

General tolerance±0.20

Unit: mm

(3) Timing mark control type

General tolerance±0.20

Unit: mm
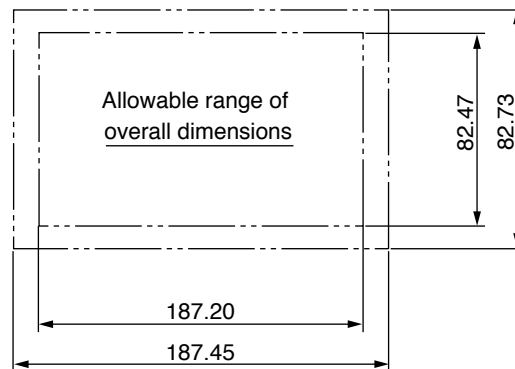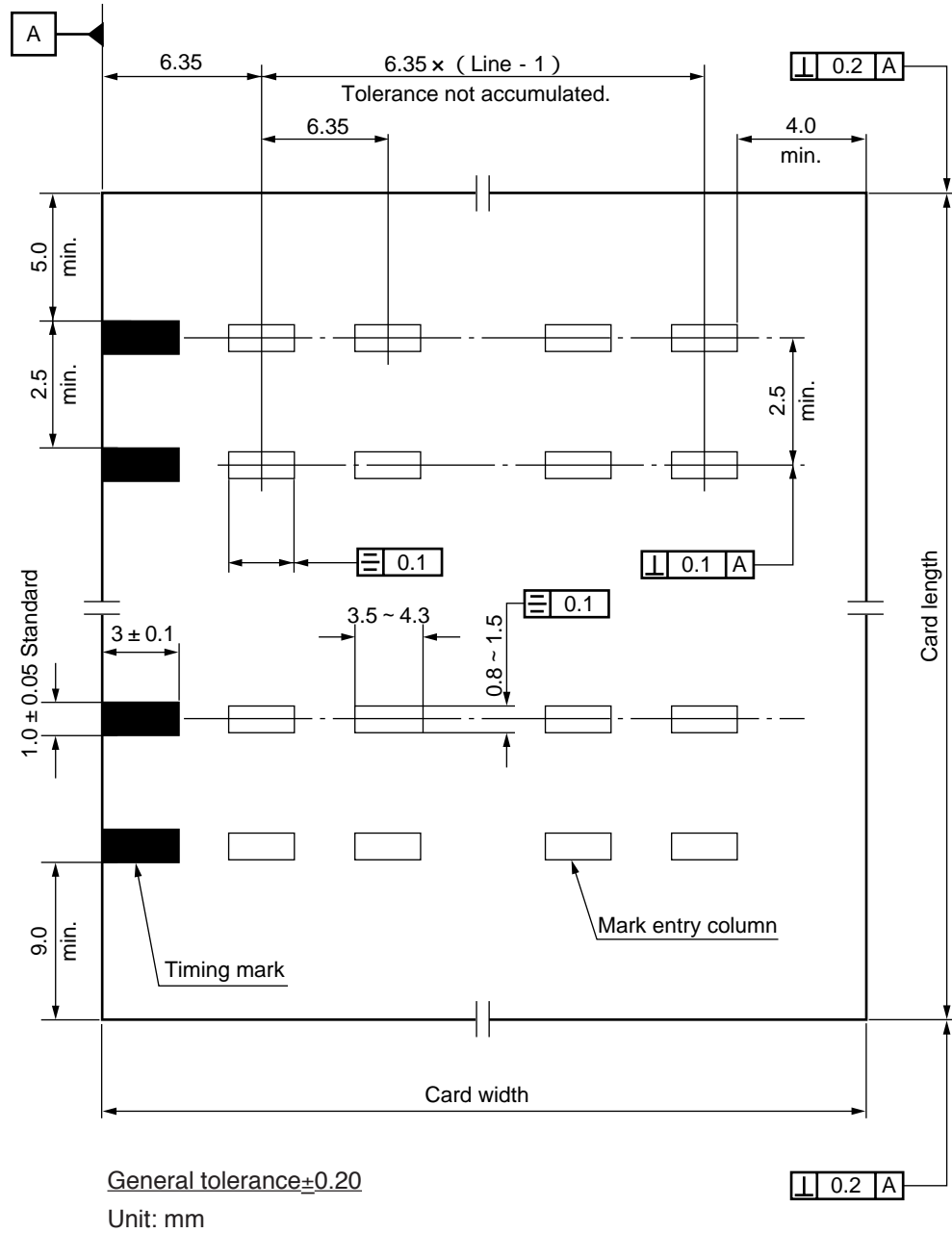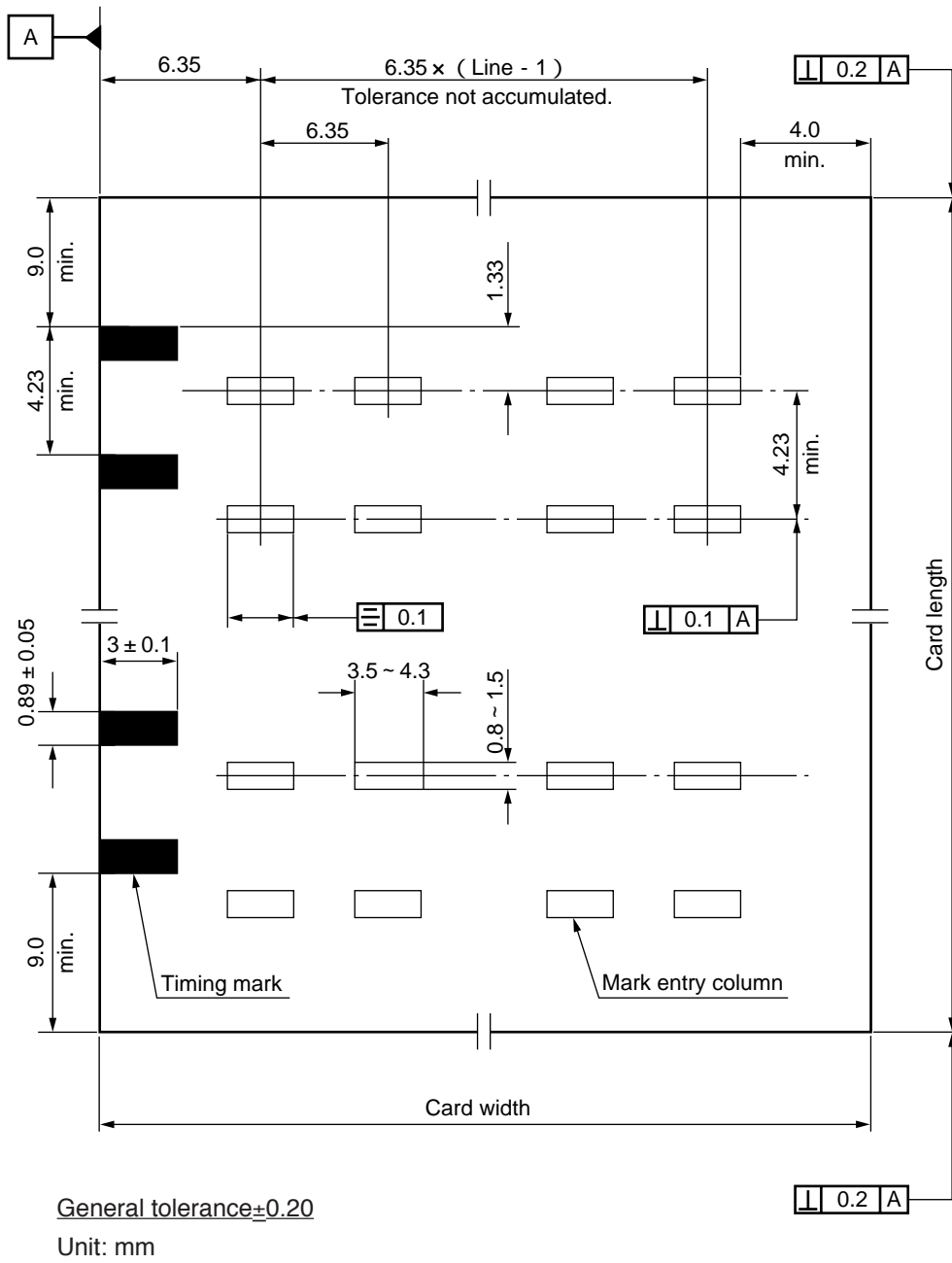
(4) Timing mark-to-mark type

General tolerance±0.20

Unit: mm
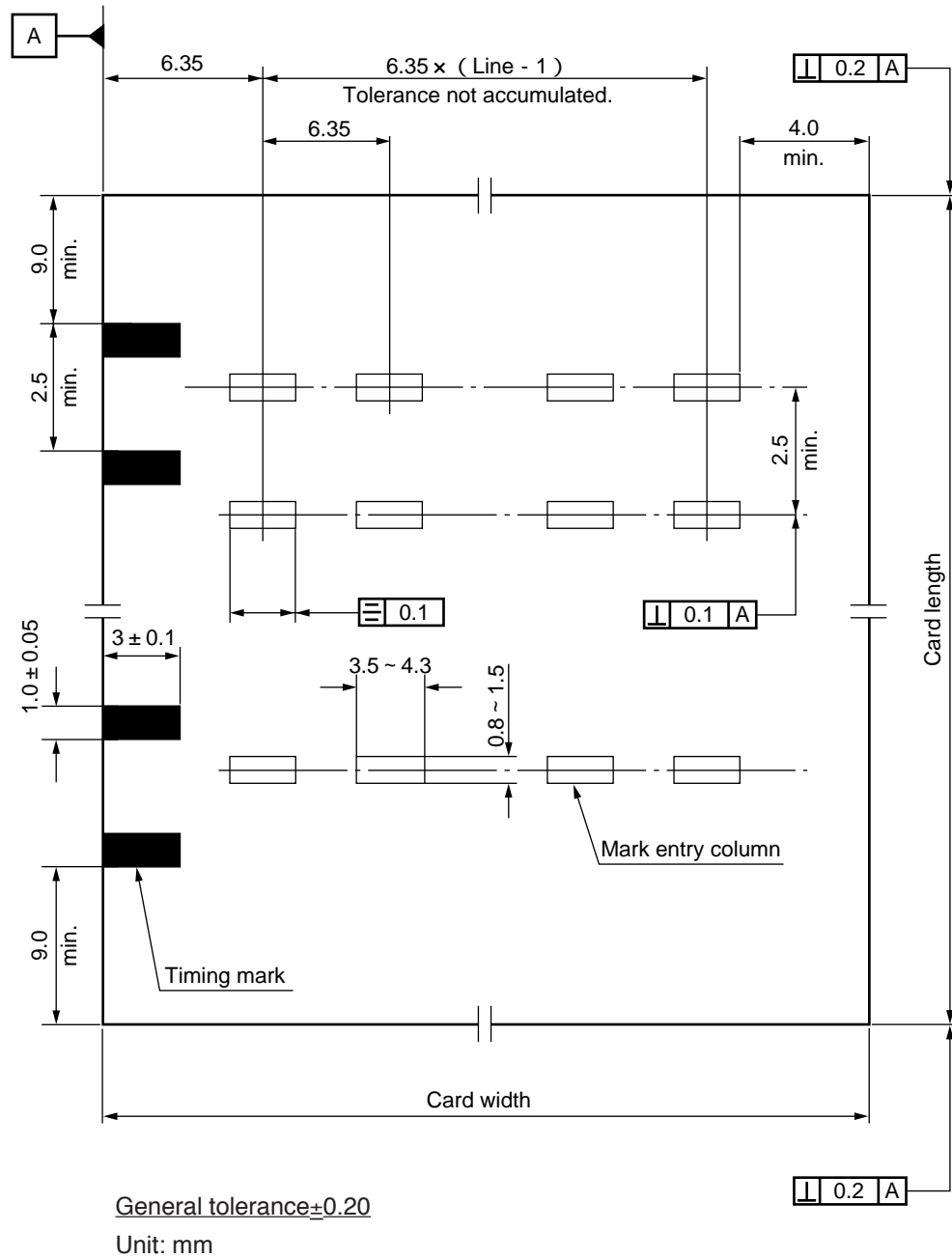
13-B   Code Tables

(1)   ASCII code

Upper bit → / ↓ Lower bit		0 000	1 001	2 010	3 011	4 100	5 101	6 110	7 111
0	0000	NUL	DLE	SP	0		P		p
1	0001	SOH	DC1		1	A	Q	a	q
2	0010	STX	DC2	"	2	B	R	b	r
3	0011	ETX	DC3		3	C	S	c	s
4	0100	EOT	DC4		4	D	T	d	t
5	0101	ENQ	NAK		5	E	U	e	u
6	0110	ACK	SYN		6	F	V	f	v
7	0111	BEL	ETB	'	7	G	W	g	w
8	1000	BS	CAN		8	H	X	h	x
9	1001	HT	EM		9	I	Y	i	y
A	1010	LF	SUB			J	Z	j	z
B	1011	VT	ESC			K		k	
C	1100	FF	FS			L		l	
D	1101	CR	GS			M		m	
E	1110	SO	RS	.		N		n	
F	1111	SI	US			O		o	DEL

(2)   ASCII/decimal notation correspondence table

Code	ASCII hexadecimal number	Decimal notation	Code	ASCII hexadecimal number	Decimal notation
ENQ	05H	5	E	45H	69
CR	0DH	13	F	46H	70
DEL	10H	16	G	47H	71
DC1	11H	17	H	48H	72
DC2	12H	18	I	49H	73
DC3	13H	19	J	4AH	74
DC4	14H	20	K	4BH	75
Space	20H	32	L	4CH	76
0	30H	48	M	4DH	77
1	31H	49	N	4EH	78
2	32H	50	O	4FH	79
3	33H	51	P	50H	80
4	34H	52	Q	51H	81
5	35H	53	R	52H	82
6	36H	54	S	53H	83
7	37H	55	T	54H	84
8	38H	56	U	55H	85
9	39H	57	V	56H	86
A	41H	65	W	57H	87
B	42H	66	X	58H	88
C	43H	67	Y	59H	89
D	44H	68	Z	5AH	90

(3) EBCDIC punch code/ASCII code correspondence table

Character	Punched hole position	ASCII code	Character	Punched hole position	ASCII code
Space	None	20H		8 6 Y	2BH
	Y	26H		8 6 X	3BH
	X	2DH		8 6 0	3EH
	X Y	5EH	"	8 7	22H
	1 0	2FH		8 7 0	3FH
0	0	30H		3 0 Y	2BH
1	1	31H	A	1 Y	41H
2	2	32H	B	2 Y	42H
3	3	33H	C	3 Y	43H
4	4	34H	D	4 Y	44H
5	5	35H	E	5 Y	45H
6	6	36H	F	6 Y	46H
7	7	37H	G	7 Y	47H
8	8	38H	H	8 Y	48H
9	9	39H	I	9 Y	49H
	7 6	26H	J	1 X	4AH
	8 2	3AH	K	2 X	4BH
	8 2 Y	24H	L	3 X	4CH
	8 2 X	21H	M	4 X	4DH
	8 3	23H	N	5 X	4EH
.	8 3 Y	2EH	O	6 X	4FH
	8 3 X	24H	P	7 X	50H
,	8 3 0	2CH	Q	8 X	51H
	8 4	40H	R	9 X	52H
	8 4 Y	3CH	S	2 0	53H
	8 4 X	2AH	T	3 0	54H
	8 4 0	25H	U	4 0	55H
'	8 5	27H	V	5 0	56H
	8 5 Y	28H	W	6 0	57H
	8 5 X	29H	X	7 0	58H
	8 5 0	5FH	Y	8 0	59H
	8 6	3DH	Z	9 0	5AH

13-C Typical sample program

**Sample program using Microsoft Visual Basic**

(Sample program is contained in the accessony CD-ROM)

This sample program is designed to open and close a communication line, transmit data and control how to receive data of a fixed or variable length. Refer to this program for programming.

Before executing a program, attach "Command Button", "Text Box" and "MSComm" to your form.

Note: Please use "MScomm" comporment which upon "Microsoft Visual Basic 6.0".

We do not apply communication of custom control software whidh made by other third party.

Design screen	Execution screen

Text Box

MS Comm   Command Button

<Typical program>
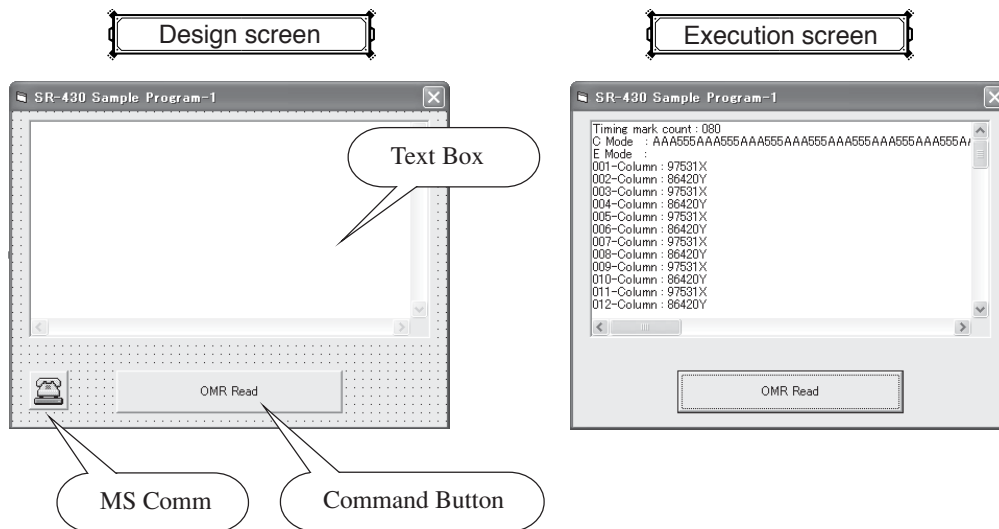
```
Private Sub Form_Load()
      Screen.MousePointer = 11                 ' Change mouse pointer to sandglass.


' >>>>>  Initialize communication line  <<<<<
      MSComm1.Handshaking = comRTS            ' Set handshake method (RS-CS control).
      MSComm1.RTSEnable = True                ' RS signal = High (receivable)
      MSComm1.CommPort = 4                    ' Set communication port (COM4).<<Change to using port.
      MSComm1.Settings = "38400,n,7,2"        ' Set communication conditions.
      MSComm1.PortOpen = True                 ' Open communication line.
      MSComm1.InBufferCount = 0               ' Clear receive buffer.
      MSComm1.OutBufferCount = 0              ' Clear send buffer.

      Screen.MousePointer = 0                 ' Initialize mouse pointer.
End Sub

Private Sub Command1_Click()
      Dim Response        As String
      Dim TMCount         As String
      Dim CMode           As String
      Dim EMode()         As String
      Dim ReciveCnt       As Integer
```

```
' >>>>> Check device communication <<<<<
    If MSComm1.DSRHolding = False Then                    ' Check communication.
        MsgBox   "The device is not turned on"+ Chr(&HD) + _
                    "or no communication cable is connected. !!", 16, "SR-430 Sample Program-1"
        Screen.MousePointer = 0
        Exit Sub
    End If
    If MSComm1.CTSHolding = False Then                    ' Check device communication state.
        MsgBox   "The device is not in the receivable state. !!", 16, "SR-430 Sample Program-1"
        Screen.MousePointer = 0
        Exit Sub
    End If


' >>>>> Initialize <<<<<
    MSComm1.Output = Chr(&H18) + Chr(&HD)                 ' Send initialize command.
    Do                                                    ' Wait until 1 byte is received.
        DoEvents
    Loop Until MSComm1.InBufferCount = 1
    Response = MSComm1.Input                              ' Receive initialize response.
    If Response <> Chr(&H6) Then
        MsgBox "Initialization fails !!"
        Screen.MousePointer = 0
        Exit Sub
    End If

    MSComm1.Output = Chr(&H13) + "12" + Chr(&HD)          ' Send read line specify command (12 lines.)
    MSComm1.Output = Chr(&H10) + "T" + Chr(&HD)           ' Send timing format specify command
                                                          (direct-under type).
    MSComm1.Output = Chr(&H2) + "2" + Chr(&HD)

' >>>>> Read card <<<<<
    MSComm1.Output = "?" + Chr(&HD)                       ' Send card read command.
    ReciveCnt = 1                                         ' Set number of bytes of read status to re
                                                          ceive.
    Do                                                    ' Wait until read status is received.
        DoEvents
    Loop Until MSComm1.InBufferCount = ReciveCnt
    Response = MSComm1.Input                              ' Receive read status.
    If Response <> "0" Then                               ' Check read status.
        MsgBox   "Error occurs!!" + Chr(&HD) ±
                    "Read status = " + Response
        Screen.MousePointer = 0
        Exit Sub
    End If
```

```
' >>>>>  Read timing mark count  <<<<<
    MSComm1.Output = Chr(&H5) + "T" + Chr(&HD)          ' Send timing mark count read command.
    Do                                                  ' Wait until timing mark count is received.
        DoEvents
    Loop Until MSComm1.InBufferCount = 3
    TMCount = MSComm1.Input                             ' Receive timing mark count.
    Text1.Text = "Timing mark count : " + TMCount + Chr(&HD) + Chr(&HA)
                                                        ' Display timing mark count.
' >>>>>  Read C mode (read fixed length data)  <<<<<
    MSComm1.Output = Chr(&H10) + "C001" + TMCount + Chr(&HD)
                                                        ' Send C mode read command.
    Do                                                  ' Wait until C mode data is received.
        DoEvents
    Loop Unti1 MSComm1.InBufferCount = 3* Val(TMCount)  ' Keep looping until "3 * timing mark
                                                          count" is received
                                                        ' since one column corresponds to 3 bytes.
    CMode = MSComm1.Input                               ' Receive C mode data.
    Text1.Text = Text1.Text + "C  Mode : " + CMode + Chr(&HD) + Chr(&HA)
                                                        ' Display C mode data.
' >>>>>  Read E mode (read variable length data)  <<<<<
    ReDim EMode(Val(TMCount)) As String                ' Secure area.
    Dim DataLength       As Integer

    Text1.Text = Text1.Text + "E  Mode : " + Chr(&HD) + Chr(&HA)
    MSComm1.Output = Chr(&H10) + "E001" + TMCount + Chr(&HD)
                                                        ' Send E mode read command.
    ReciveCnt = 0
    Response = " "
    Do                                                  ' Wait until E mode data is received.
        DoEvents
        Response = Response + MSComm1.Input             ' Receive E mode data.
        DataLength = InStr(Response, Chr(&HD))          ' Extract received data for each column.
        If DataLength <> 0 Then
            EMode(ReciveCnt) = Left(Response, DataLength)
            Text1.Text =Text1.Text+Format(ReciveCnt+1,"000")+"-Column:"+EMode(ReciveCnt)+Chr
            (&HA)
            Response = Mid(Response, DataLength + 1)
            ReciveCnt = ReciveCnt + 1
        End If
    Loop Until ReciveCnt = Val(TMCount)
    Screen.MousePointer = 0                             ' Initialize mouse pointer.
End Sub
Private Sub Form_Unload(Cancel As Integer)
    MSComm1.PortOpen = False                            ' Close communication line.
    End                                                 ' Finish program.
End Sub
```
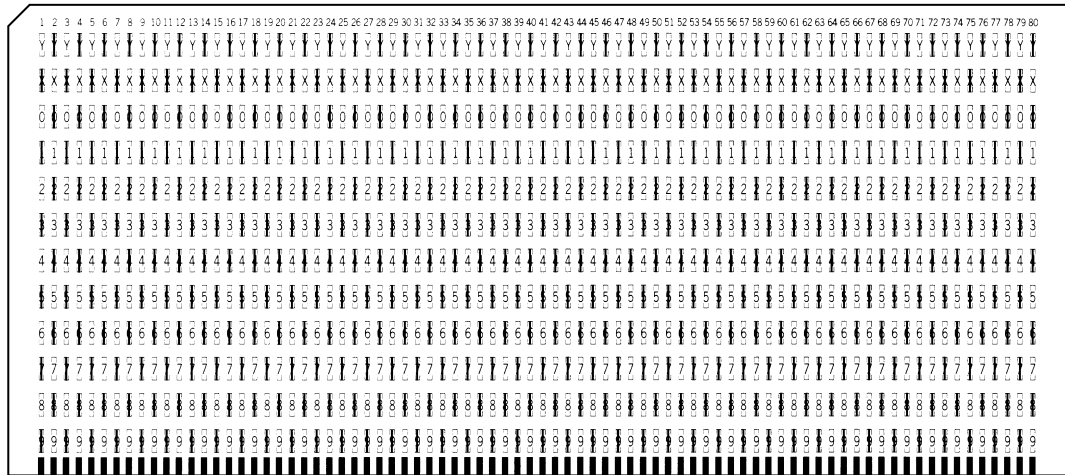
13-D Check card

12-line standard-sized check card

15-line postcard-sized check card