

IBM 5400-006 Printer Setup Instruction and Operator's Guide

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Changes are made occasionally to the information herein; any such changes will be reported in subsequent revisions or Technical Newsletters.

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Safety Instructions

This instruction manual describes safety instructions for safe, correct use of the product. Please keep it in a handy place for reference as required.

Icons

In this instruction manual and on safety instruction labels on the product, icons are used for correct use without causing danger to yourself and other people and for preventing damage to other properties. The icons used and their meanings are as follows:

| | |
|---|---|
|  DANGER: | This icon indicates a danger of death or serious injury if the product is handled incorrectly by ignoring the corresponding instruction. |
|  CAUTION: | This icon indicates a danger of personal injury or physical damage if the product is handled incorrectly by ignoring the corresponding instruction. |

Indication by Danger/Caution Labels

If there is a label showing an instruction in black characters on a yellow base either outside or inside of the product, it is a danger or caution label. Always observe the indicated instruction.

If there are any instructions indicated by a danger or caution label (on the product for example) aside from the instructions in this manual, always observe the instructions indicated on the label.

 **DANGER:**

- Do not open a cover not described in the operator's guide. It is dangerous because a live portion applied with a high voltage exists in side the cover.
- Do not modify this product as it might cause a fire or shock hazard.
- Do not apply any voltage other than the indicated supply voltage as it might cause a fire or shock hazard.
- Neither use any cord other than the power cord supplied with the product nor use the supplied cord for other than this product as it might cause a fire or shock hazard.
- Do not scratch, damage or process the power cord. If a heavy thing is placed on it or if it is stretched or bent forcibly, the power cord might be damaged to cause a fire or shock hazard.

 **DANGER:**

- Cable Installation and Removal Procedures

Electrical current from the power cord is hazardous. To avoid shock hazard, connect and disconnect cables as follows when installing or moving this product.

– To connect:

1. Turn everything to Off.
2. Connect the interface cable.
3. Attach the power cord to outlet.
4. Set the device to On.

– To disconnect:

1. Turn everything to Off.
2. Remove the power cord from outlet.
3. Remove the all cables from device.

 **CAUTION:**

- When disconnecting the power plug, do not pull the power cord. The cord might be damaged and cause a fire or shock hazard. (Always hold the plug portion and pull it for disconnection.)
- Refer to “Environmental Conditions” described in this manual for the operating environment.
- Do not install the product in a humid or dusty place as it might cause a fire or shock hazard.
- Do not stop up the ventilation hole of the product. Otherwise, the inside of the product might be heated abnormally to cause a fire.

Preface

This manual describes the installation and operation procedures of the IBM 5400 Printer. This manual is intended for operators and personnel in charge of installation.

Composition of Manual

This manual contains following:

Chapter 1, "Installation" provides the procedure required for installation of the IBM 5400-006 printer and the test method for checking if the IBM 5400 works normally.

Chapter 2, "Operation" describes names and functions of controls and lamps of the IBM 5400 and basic operating instructions.

Chapter 3, "Problem Determination Procedure" describes how to handle problems occurring in the IBM 5400-006 printer.

Chapter 4, "IBM 5400-006 Features" describes the features of the IBM 5400-006 printer divided between system and parallel port.

Chapter 5, "Installation Planning and Site Preparation" describes what is necessary for planning the installation of the IBM 5400-006 printer.

Appendixes contain the following:

- Appendix A, Forms Design
- Appendix B, IBM 5400 System Configuration
- Appendix C, Control Codes
- Appendix D, ESC/P-C Mode and ESC/PC Control Modes
- Appendix E, DC 12V Outlet

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Chapter 1. Installation

1.1 Before Installation

Before installing the IBM 5400-006 printer, check and execute the following items:

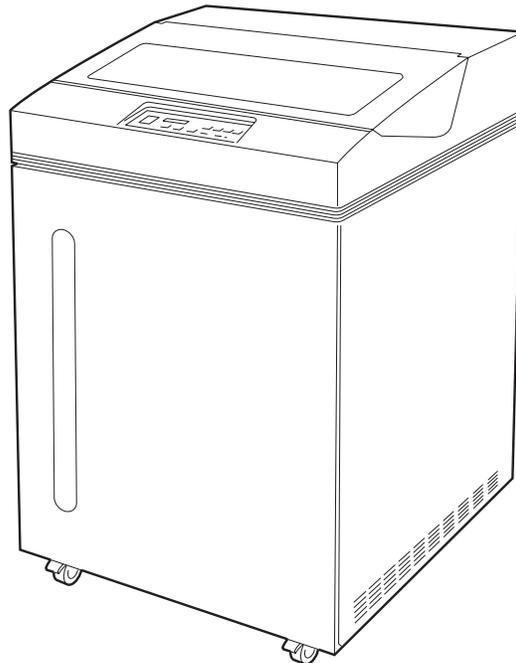
- Check if the environment of the installation site and power supply meet the conditions defined in Chapter 5, "Installation Planning and Site Preparation" on page 5-1.



Note: To avoid careless electric shock, do not connect the power cord to an outlet unless instructed. To connect and disconnect a communication cable, remove the power cord from the outlet.

- The customer is assumed to prepare the forms for testing the IBM 5400 Printer (15" wide continuous form). For details of the forms, refer to Appendix A, "Forms Design."
- An interface cable is required to connect the IBM 5400-006 printer to the host system. The customer is assumed to prepare the interface cable.
- Check if all parts are duly supplied. If any items are missing or damaged, call your IBM marketing representative. Accessories are included in the IBM 5400-006 printer package.

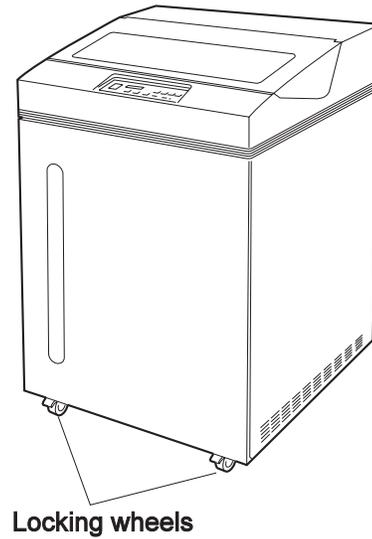
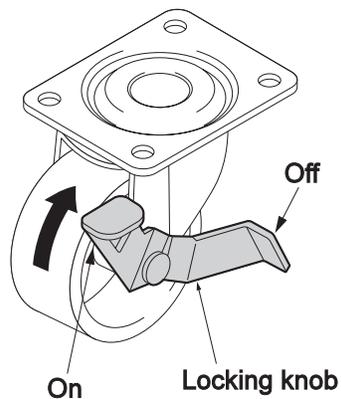
IBM 5400-006 Printer



Moving the IBM 5400-006 Printer

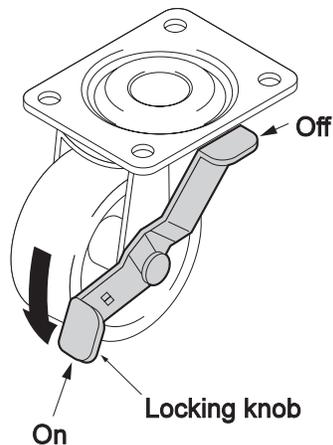
- Before moving the IBM 5400-006 printer, unlock the two wheels in the front. Then, push the printer to the desired location with the help of two or more persons.

Note: If the printer is moved with the wheels locked, the floor and the wheels might be damaged.



- Set the printer in the desired location. Lock the wheels at the front to stabilize the printer.

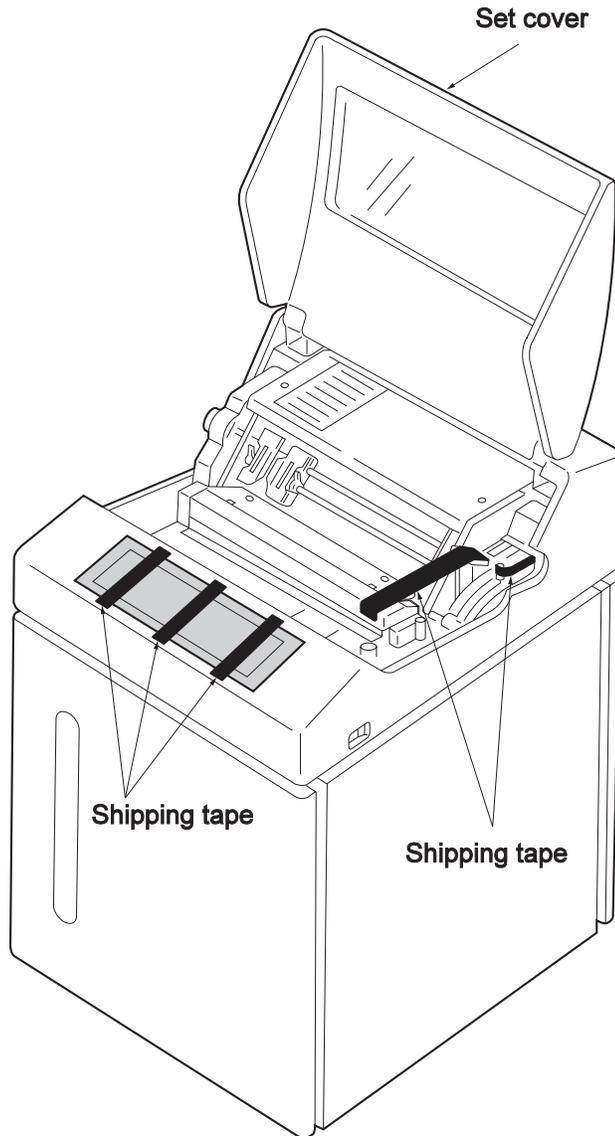
Note: Set the printer on a horizontal and flat floor. Make sure that the wheels are not tangled with the cable or the cords.



1.2 Setting up the IBM 5400-006 Printer

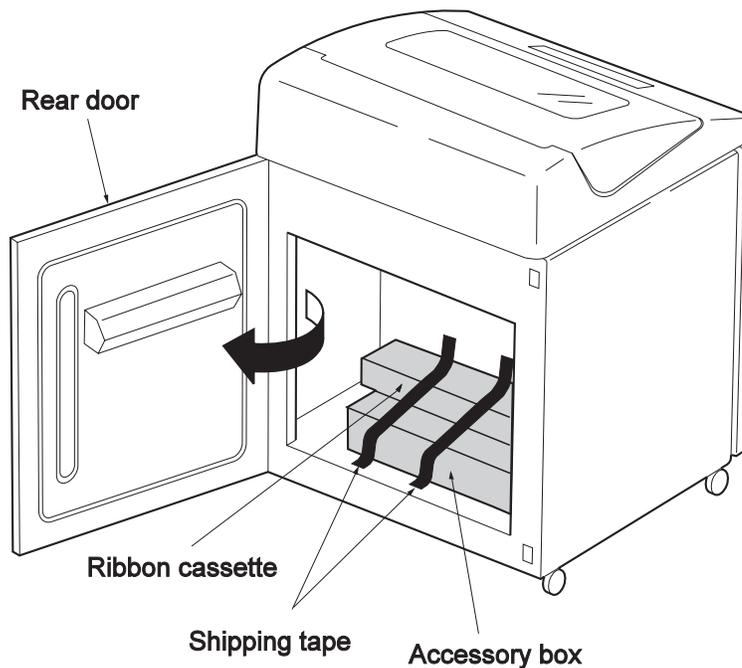
1.2.1 Peeling off all Shipping Tape and Confirming Accessories

- 1 Open the set cover and peel off all shipping tape. Close the set cover.



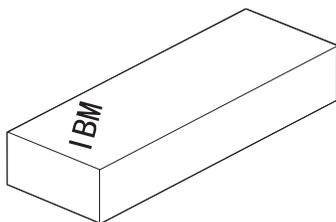
Peeling off all Shipping Tape and Confirming Accessories

- 2** Open the rear door. Peel off the shipping tape fixing the ribbon cassette and the accessory box.

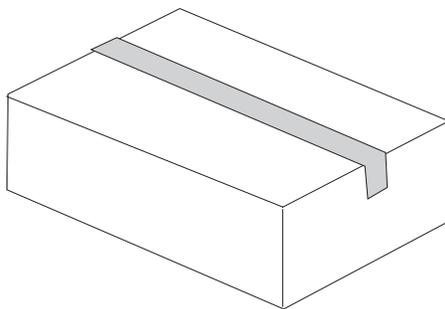


- 3** Make sure that the following items are provided.

- Ribbon Cassette



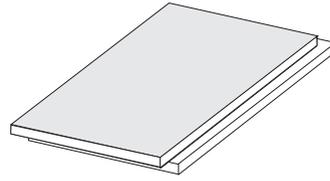
- Accessory Box



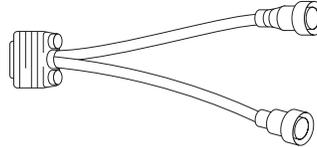
Peeling off all Shipping Tape and Confirming Accessories

4 Make sure the following items are provided in the accessory box,

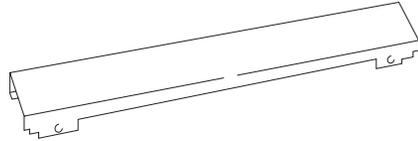
- Setup Instruction and Operator's Guide (this book)
- Maintenance Information Manual



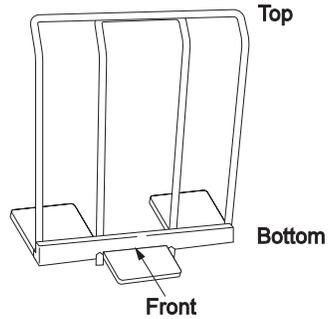
- V Cable



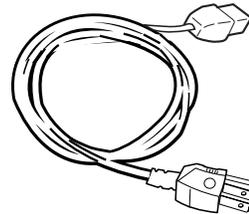
- Curl Corrector



- Rear Fence

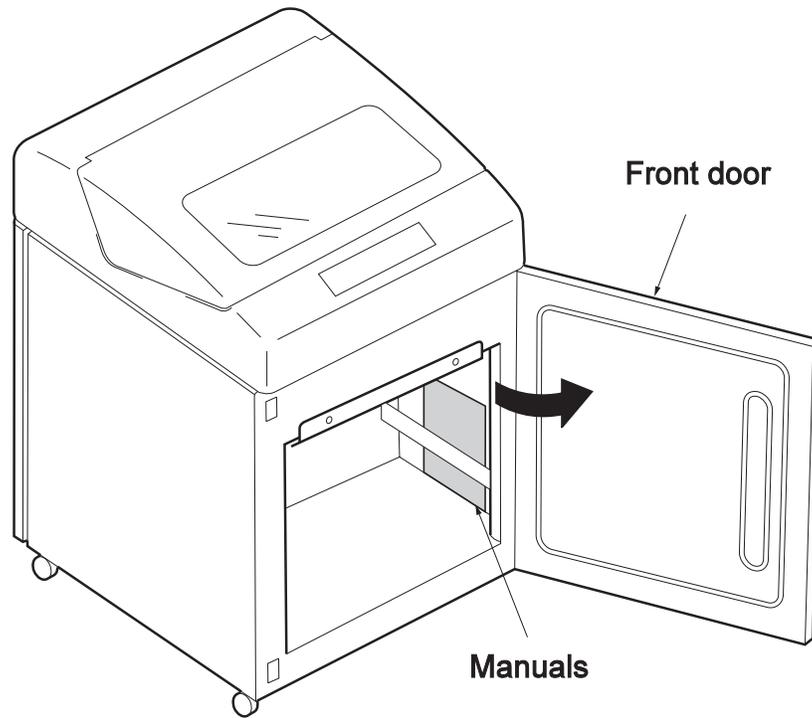


- Power Cord



Peeling off all Shipping Tape and Confirming Accessories

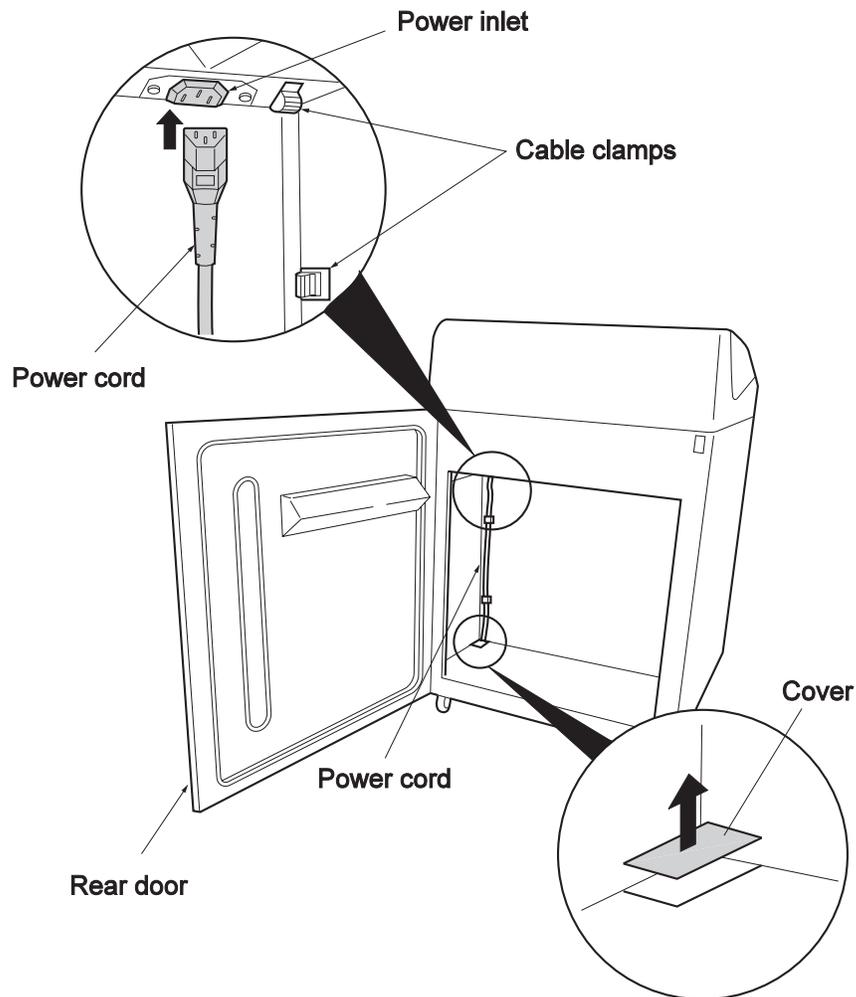
- 5 Open the front door of the printer and insert the two manuals.



1.2.2 Setting the Power Cord

- 1** Open the rear door.
- 2** Take the cover off of the hole in the back left part of the stacker. Push the cover from below with your hand to take it out. (This cover is not used again.)
- 3** Insert the power cord plug into the power connector on the top left of the stacker and thread the power cord through the hole in the bottom. Then, fix the cable with the three cable clamps.

Note: Pull the power cord out from the hole in the left of the stacker outside the printer with the shortest length. If the power cord is loose inside the stacker, it may cause a stacker jam.



Note:

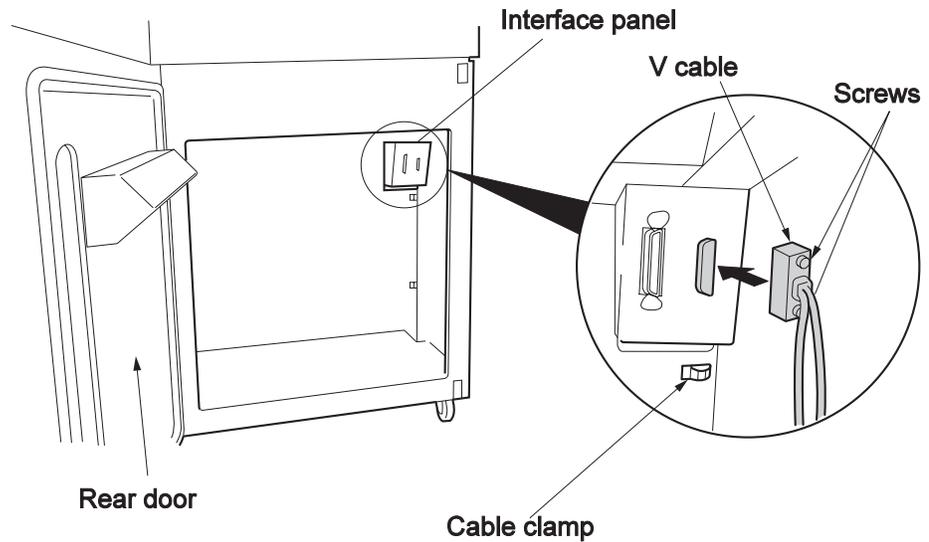
Use a power plug with three prongs. Do not plug a three-prong power cord into a two-prong power plug. This might cause poor printing.

Setting the V-cable

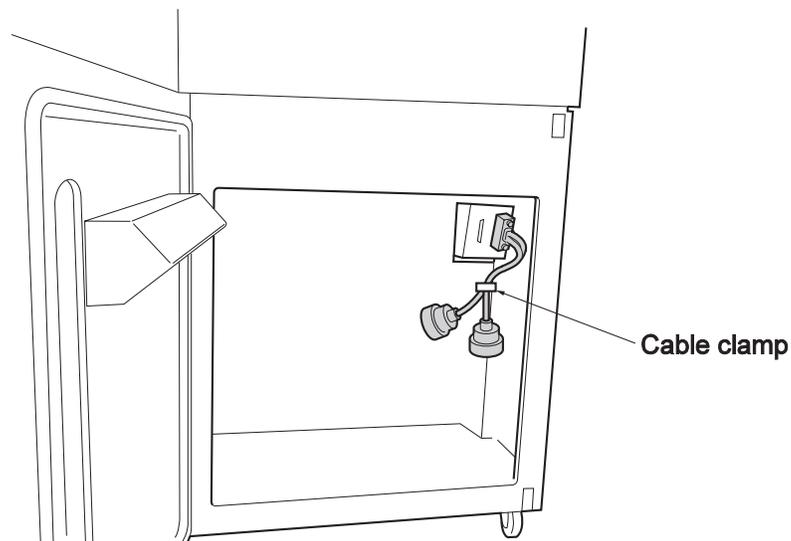
1.2.3 Setting the V cable

If you are using the parallel port to connect to a PC, refer to 1.2.4, "Setting the Form Guide" on page 1-9.

- 1** Open the rear door.
- 2** Connect the V-cable to interface panel. Fasten the two screws of the V-cable.



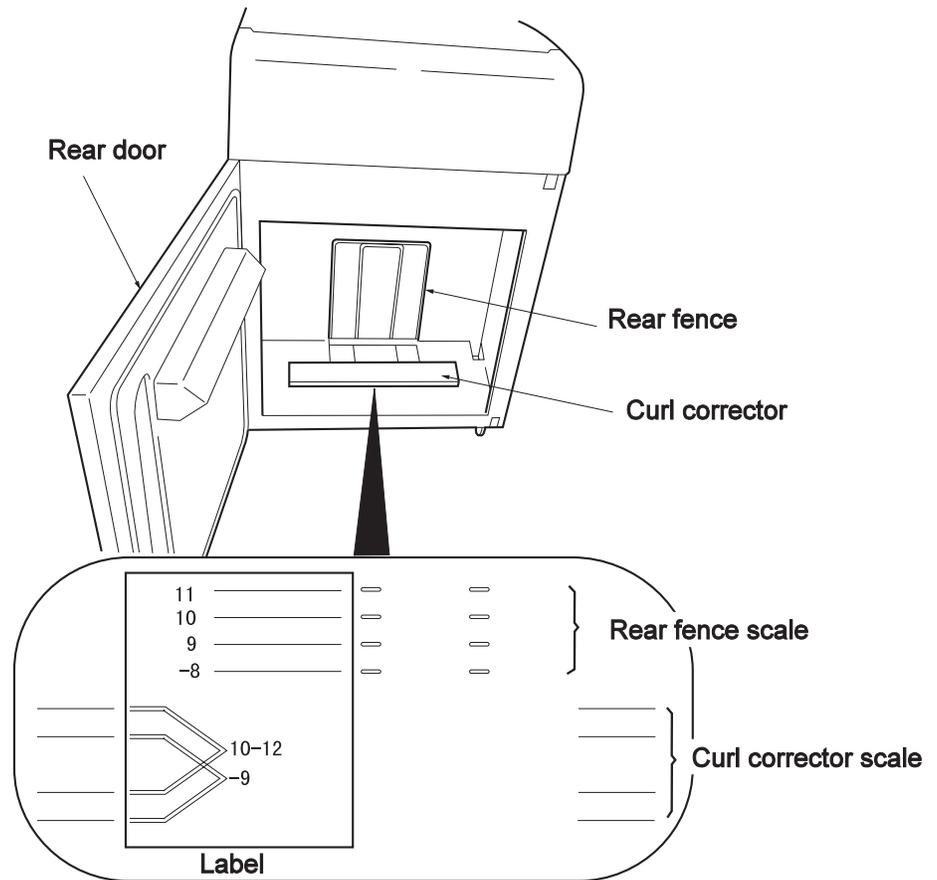
- 3** Fix the V-cable to the stacker using the cable clamp below the interface panel.



1.2.4 Setting the Form Guide

Set the rear fence and curl corrector for a continuous form 15" wide and 11" long used for test printing.

- 1** Open the rear door.
- 2** Set the rear fence at scale position "11", referring to the figure.
- 3** Set the curl corrector at scale position "10" to "12".



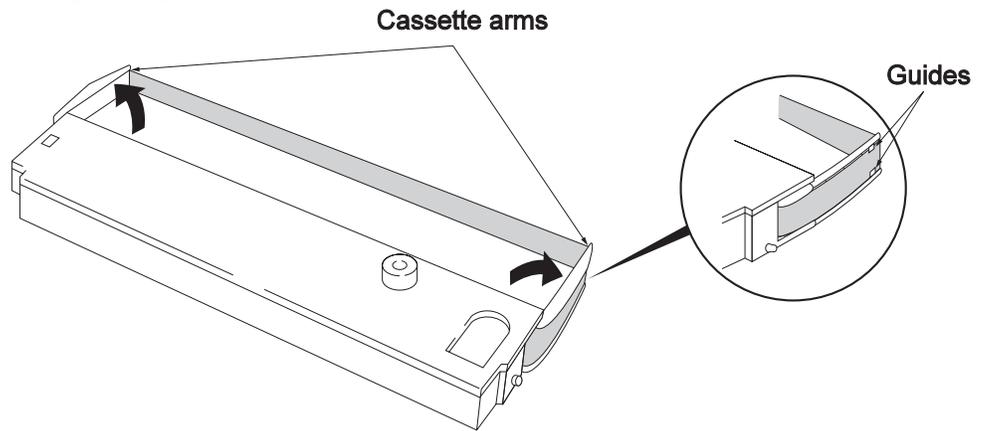
- 4** Close the rear door.

Setting the Ribbon Cassette

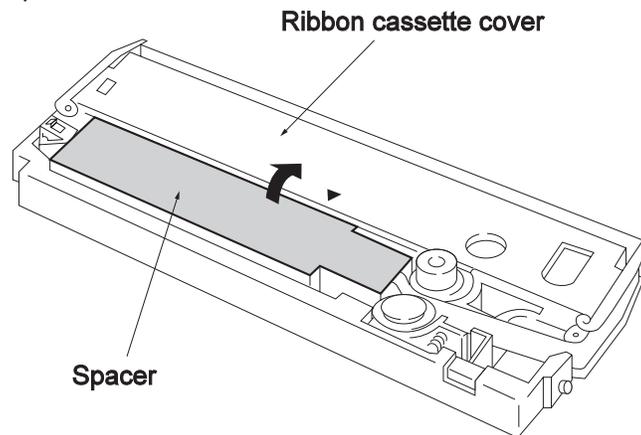
1.2.5 Setting the Ribbon Cassette

First, set the ribbon cassette itself.

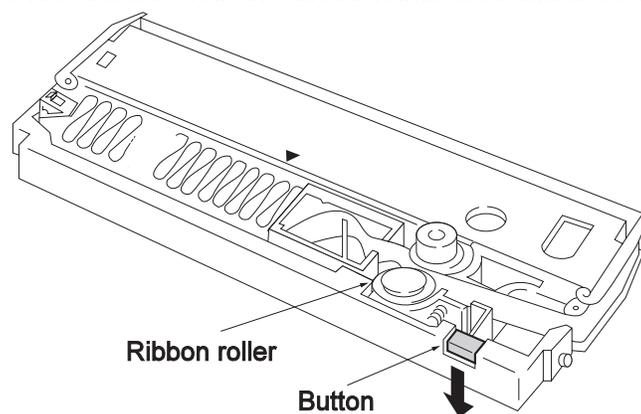
- 1** Take the ribbon cassette out of the box. Open the cassette arms on the left and right in the arrow direction. Then, make sure that the ribbon passes through the guides.



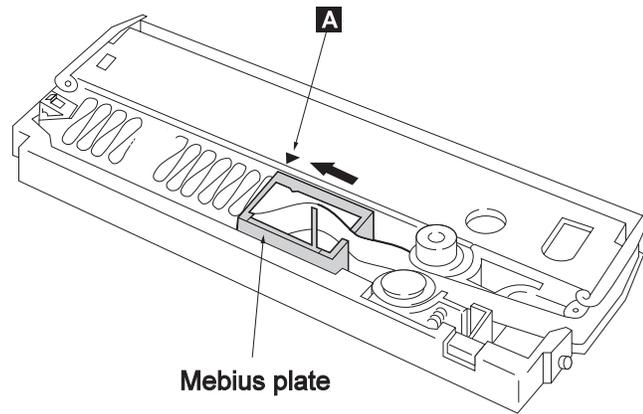
- 2** Open the ribbon cassette cover in the direction indicated. Remove the paper spacer.



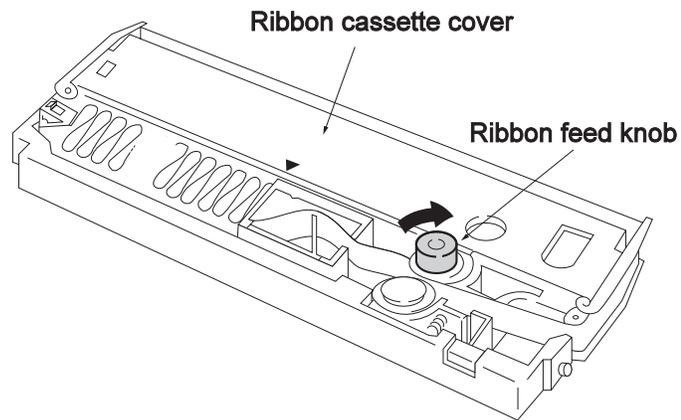
- 3** Press the button in the direction indicated and close the ribbon roller.



- 4** Align the mebius plate to the mark indicated by **A**.



- 5** Turn the ribbon feed knob clockwise to tighten the ribbon.

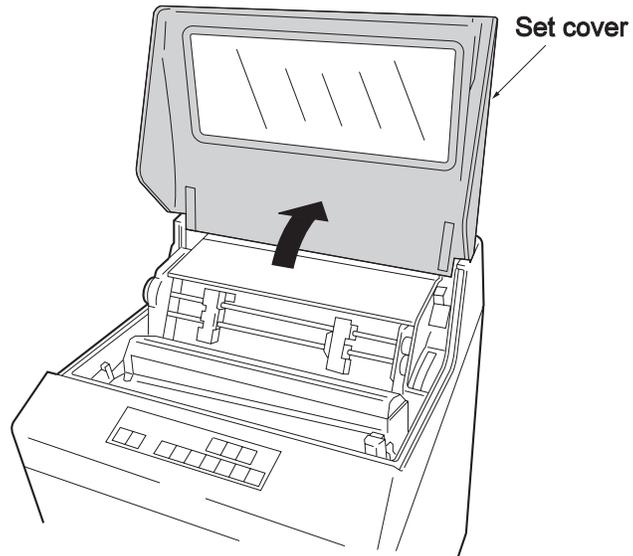


- 6** Close the ribbon cassette cover.

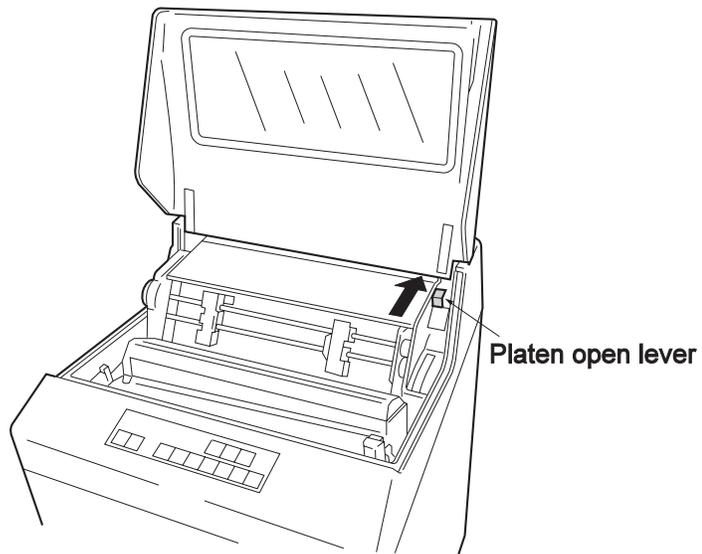
The ribbon cassette setting has been then completed. Next, set the ribbon cassette into the printer.

Setting the Ribbon Cassette

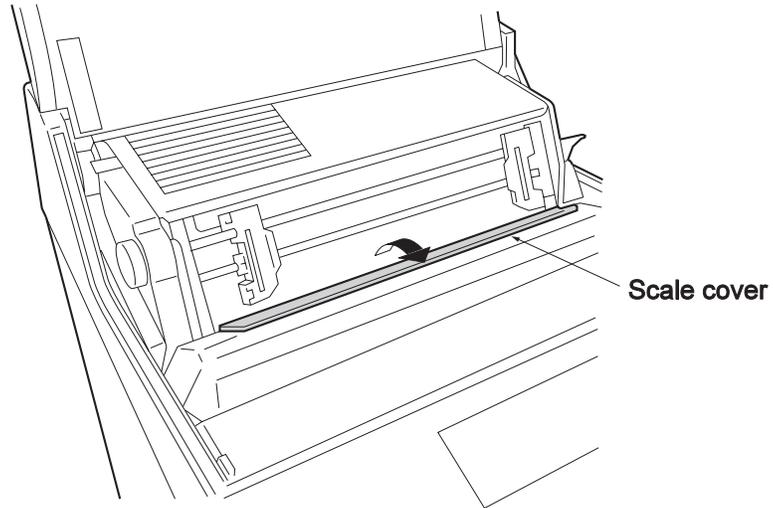
7 Open the set cover.



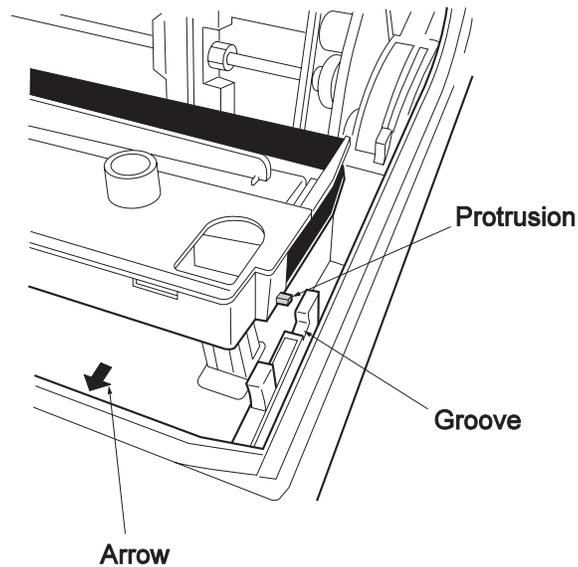
8 Push the platen open lever backward to release the platen.



- 9** Open the scale cover in the direction of the arrow.

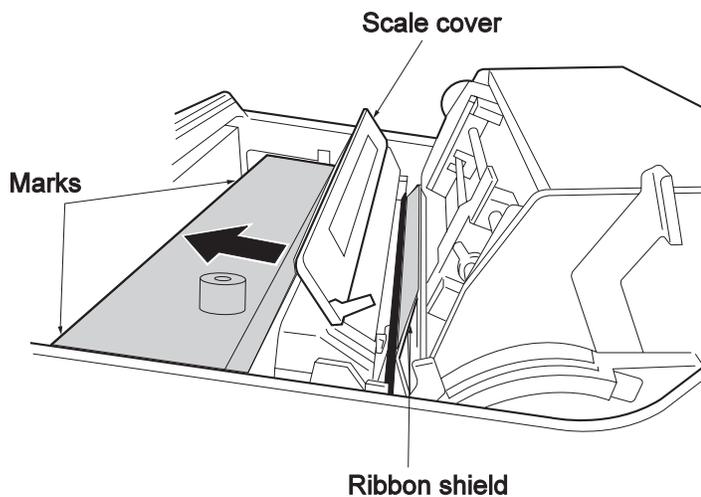


- 10** Insert the protrusions on the left and right of the ribbon cassette into the grooves respectively. Then, make sure that the arrow mark shown in the figure is on the left and right.



Setting the Ribbon Cassette

- 11** Pull the ribbon cassette toward you to lock it. Then, make sure of the following two points:
- The ribbon is set in the front of the ribbon shield (thin metallic plate with holes).
 - The arrow marks on the left and right are hidden.



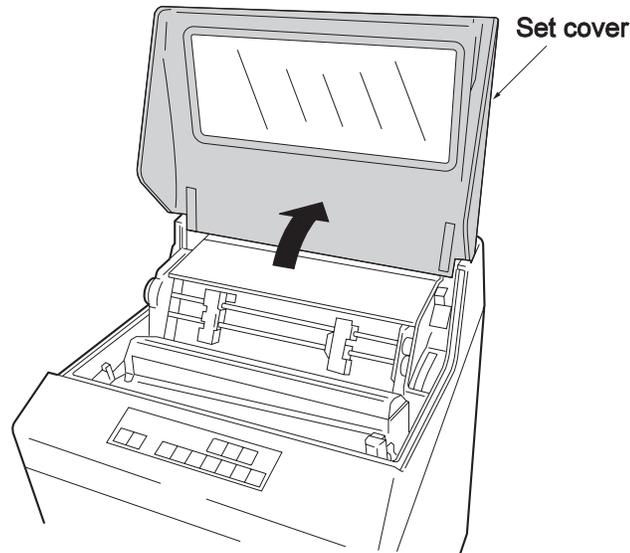
- 12** Close the scale cover.
- 13** Pull the platen lever toward you and close the platen.
- 14** Close the set cover.

The ribbon cassette setting has been then completed.

1.2.6 Setting the Test Form

This section explains how to set the form for all print span tests for the IBM 5400-006 printer. Make sure to use a 15" wide and 11" long continuous form.

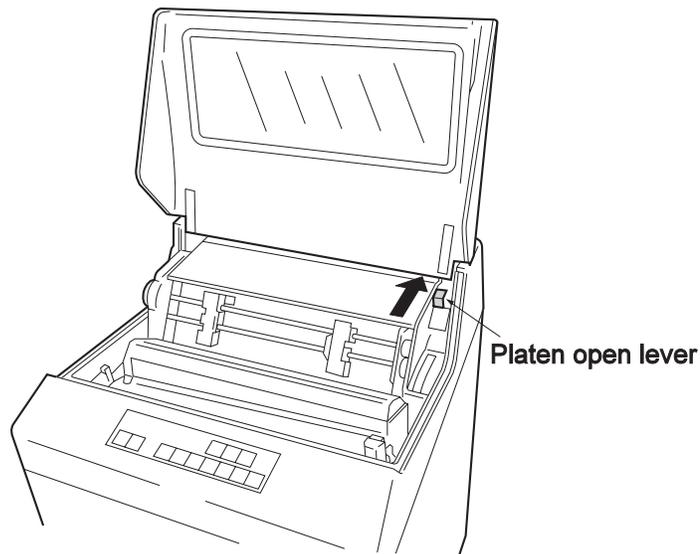
- 1** Open the set cover.



- 2** Push the platen open lever backward to release the platen.

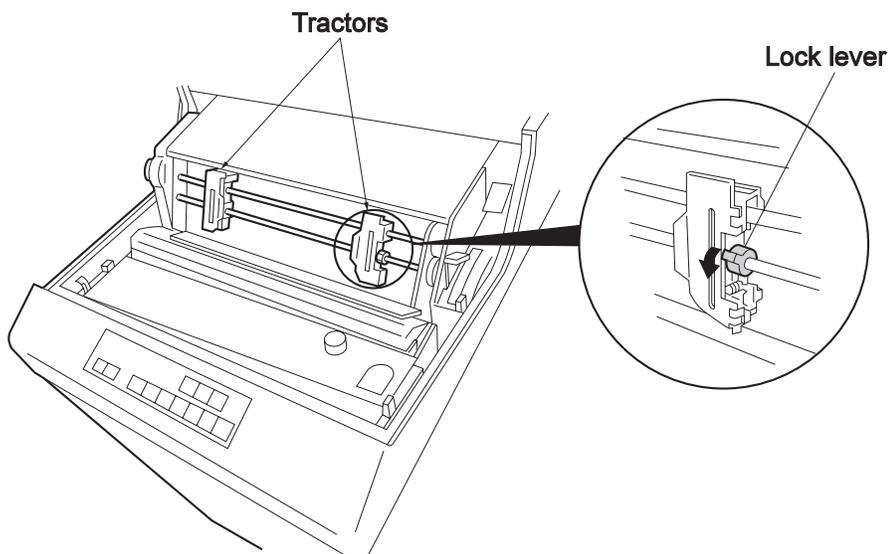
Notes:

- If the form is set without the platen being released, the form edges are damaged, possibly causing form jam or other problems.
- While pressing the platen open lever to the right, press it backward as the platen remains released. The platen is set into the all release status. When setting the form, do not set the platen to the all release status. This causes form edges to slip out.

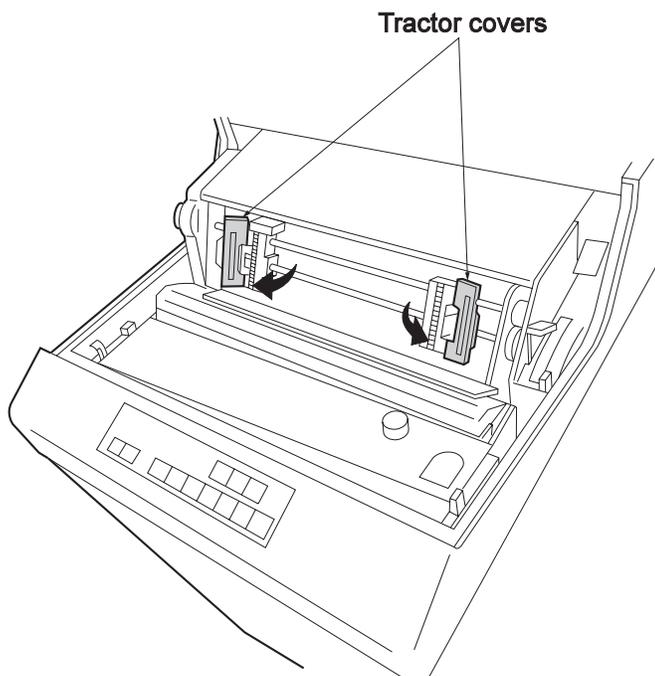


Setting the Test Form

- 3** Turn the lock levers adjacent to the left and right tractors toward you to unlock the tractors. The tractors can move leftward and rightward. Move the left and right tractors to determine the positions to meet the form width.

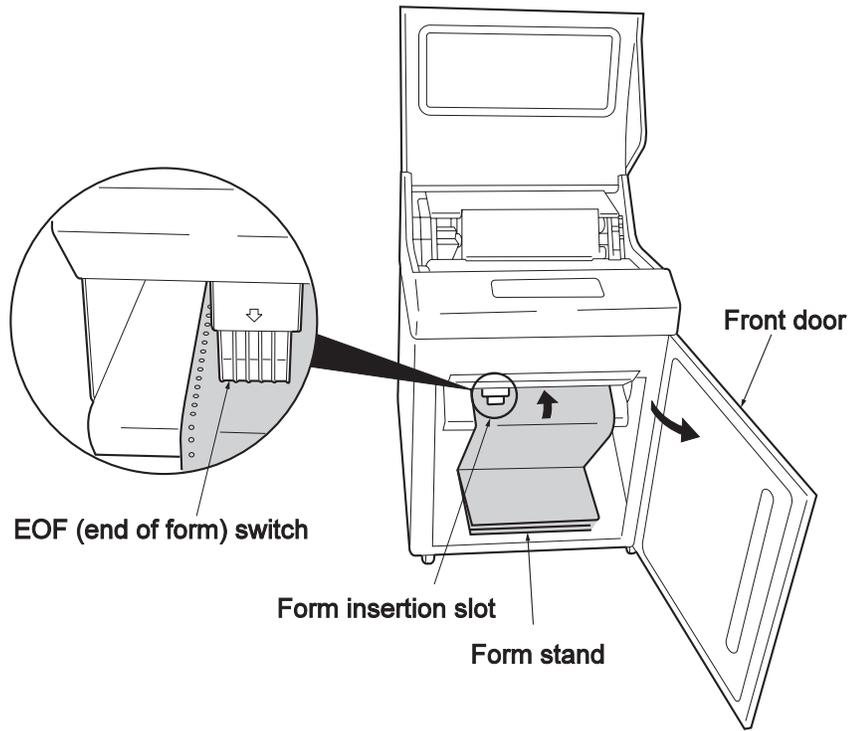


- 4** Open the tractor covers.

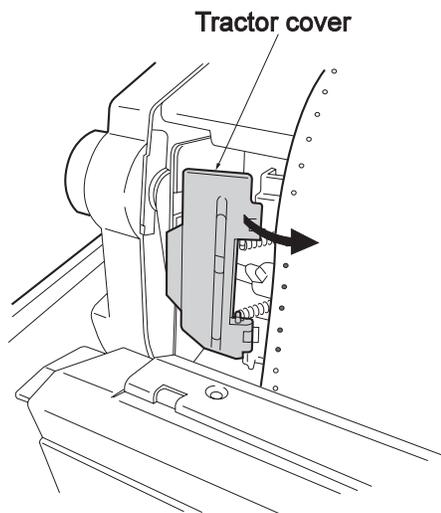


- 5** Open the front door and set the test form into the form stand. Insert the form into the form insertion slot and push it up to the height of the left and right tractors. If it is difficult to push up, do this while moving the form to the right and left.

Note: Set the test form into the form stand so that the left edge of the form is located to the left of the EOF (end of form) switch.

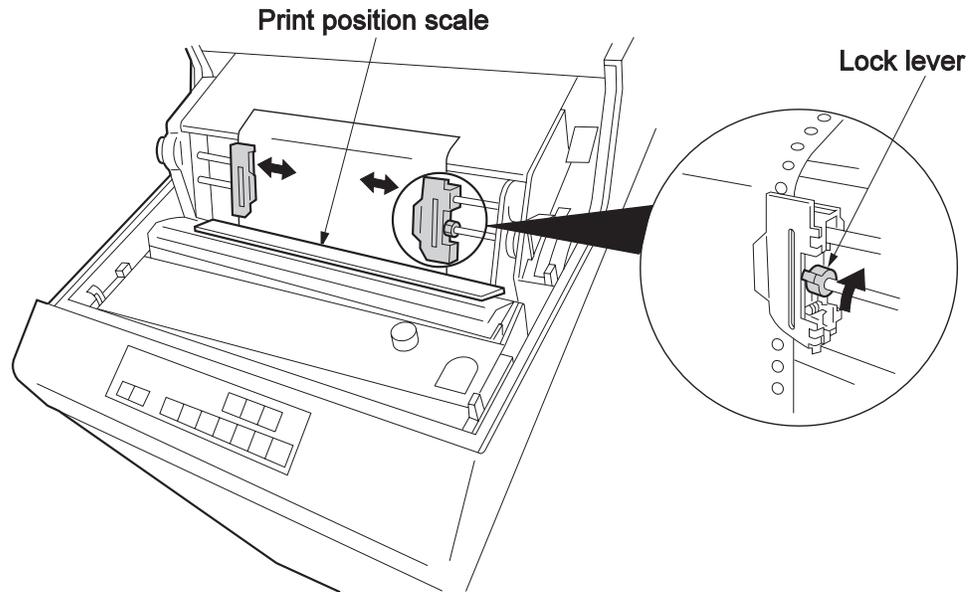


- 6** Fit the tractor holes on both sides of the form to the pins of left and right tractors. Close the left and right tractor covers.



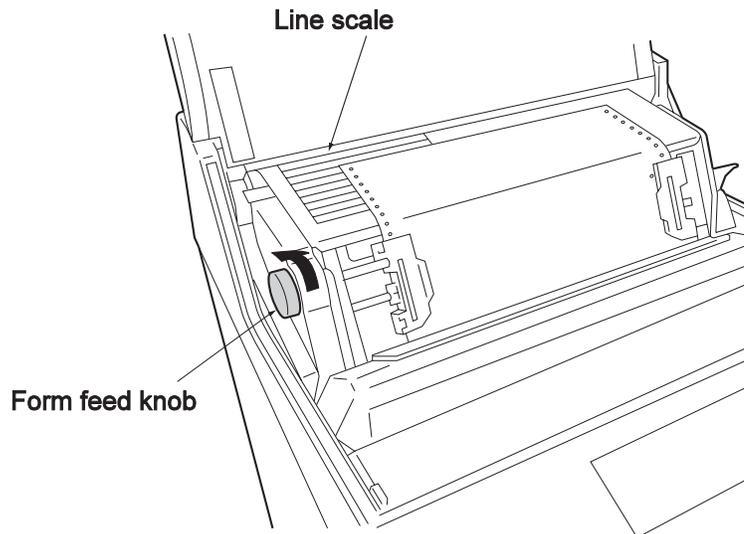
Setting the Test Form

- 7 Moving the tractors, position the form so that the print position scale (1-136) is located within the form width. Push both lock levers backward to lock them. Make sure not to loosen the form.



- 8 Turn the Form Feed knob and adjust the form perforation to the line scale according to the form length (in this example, "11").

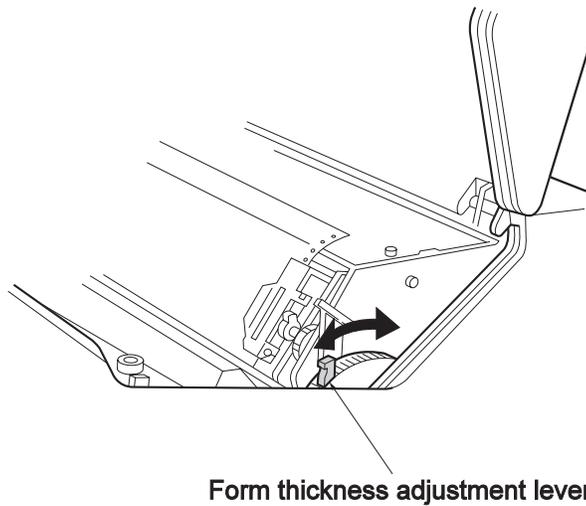
Note: Make sure that the platen is not in the all release status. (See Note b in step 2 on page 1-15.)



9 Adjust the Form Thickness Adjustment lever position according to the form.

Note: For single forms (high quality form) of 55kg ream, set the lever position to the “1”. For other forms, set the appropriate lever position according to the table below. (See 2.9.1, “Adjusting the Print Pressure” on page 2-47.)

| Form type (Form weight per ream) | | Lever position |
|-------------------------------------|--------------|----------------|
| 1P | 55kg ~ 70kg | 1 ~ 2 |
| | 90kg ~ 135kg | 2 ~ 3 |
| 2P | 30kg ~ 45kg | 1 ~ 2 |
| 3P | 30kg ~ 45kg | 2 ~ 3 |
| 4P | 30kg ~ 34kg | 3 ~ 4 |
| 5P | 30kg ~ 34kg | 3 ~ 5 |
| 6P | 30kg ~ 34kg | 4 ~ 6 |
| 7P | 30kg ~ 34kg | 4 ~ 6 |
| 8P | 30kg ~ 34kg | 5 ~ 7 |



10 Pull the platen toward yourself to close the platen.

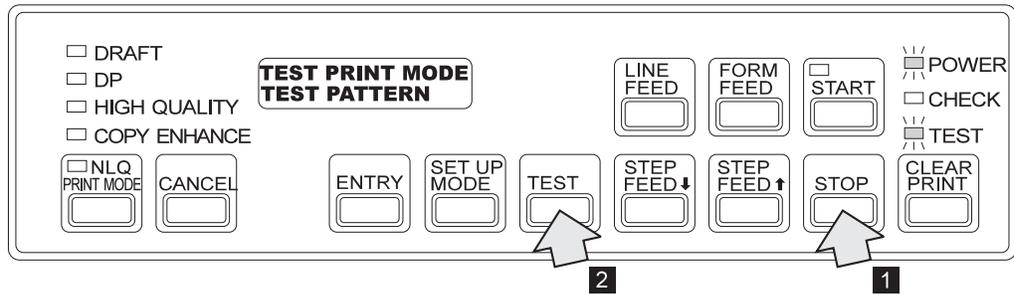
11 Close the set cover and the front door.

You have finished setting the test form.

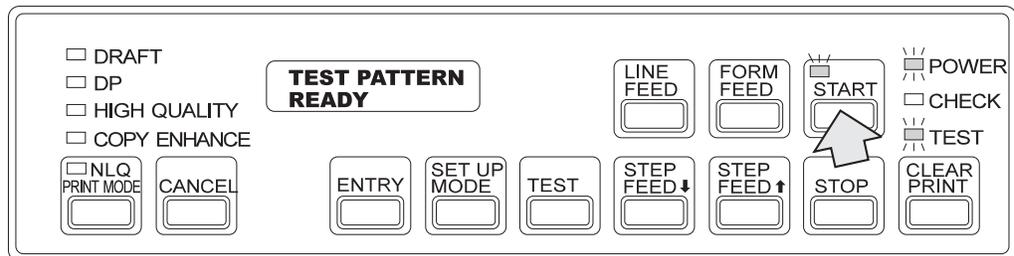
1.2.7 Testing the IBM 5400-006 Printer

Test printing with the following procedures. Use a 15" wide form.

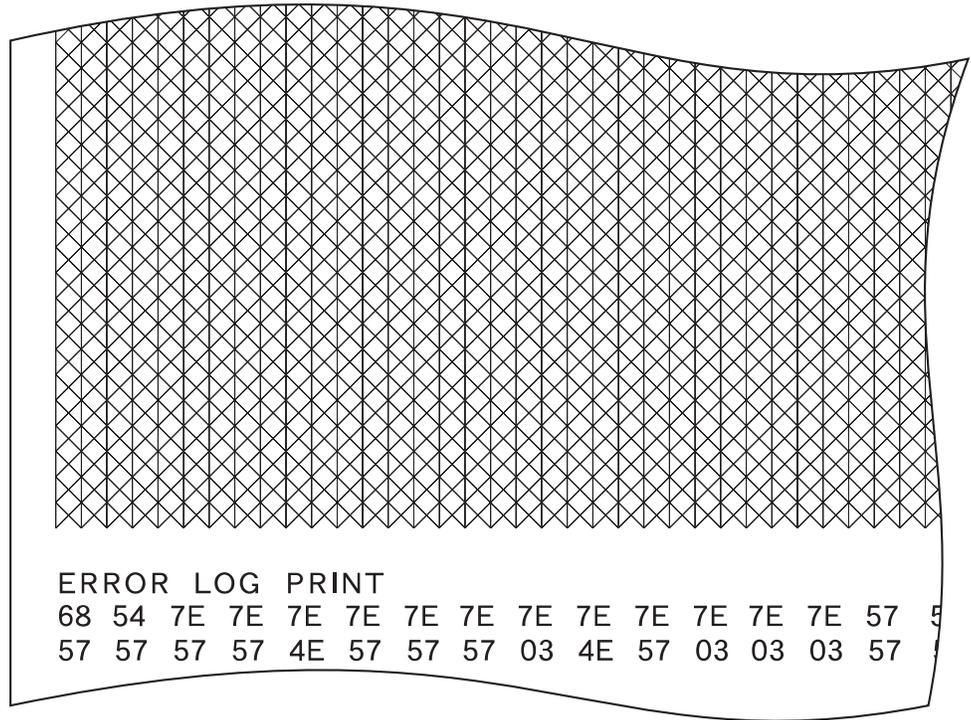
- 1** Connect the power cord to the outlet and set the power switch to the | side. The power is turned on. See 2.3.1, "Powering On" on page 2-9.
- 2** Press **Stop** and then press **Test**. The test lamp lights and the following message is displayed on the LCD:



- 3** Press **Start**. The Start lamp lights and test printing starts.



A pattern similar to the following is printed. Printing stops when the pattern is printed.



- 4** Press **Form Feed** or **Line Feed** to feed the form to a position where it can be cut off easily. Open the set cover and cut off the form at the perforation.
- 5** Open the rear door and take out the printed forms. Check their quality.
- 6** Close the rear door.
- 7** Press **Stop**, then **Cancel** to exit the print test mode.

The print test is finished.

Note: All characters can be printed in the print test. To print all characters according to the currently selected emulation mode, after step 2 press **Step Feed Up** or **Step Feed Down** to show **ALL CHARACTER** in the lower part of the message. Then press Start to print all the characters.

Go to 1.3, Connecting to the Host System.

1.3 Connecting to the Host System

Procedures are different for connecting to an AS/400 system and connecting to a PC. The default format is for connecting to an AS/400 system. To connect to a PC, see 1-26.

The IBM 5400-006 printer has a DC outlet on the interface panel. The DC outlet can be used for a LAN adapter connected to the parallel port. For more information, see Appendix E, "DC 12V Outlet" on page E-1.



Before carrying out the following the procedures, read "Safety Instructions" on page iii.

1.3.1 Connecting to an AS/400 System

Set the IBM 5400-006 printer address and connect the interface cable.

Interface Cable

The interface cable is sold separately.
For more information, see 5.1.4, "Cables" on page 5-3.

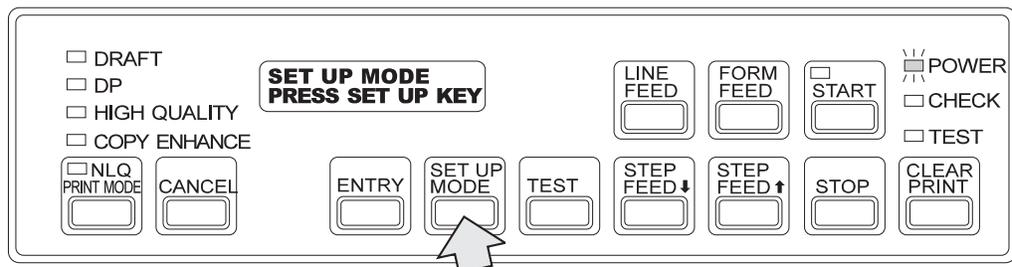
Setting the Address

Set the address using a value from 0 to 6.

Ask the host system manager for the value. The default is 0.

1 Connect the power cord to an outlet and set the power switch to the (|) side. Power comes on . (See 2.3.1, "Powering On" on page 2-9.)

2 Press **Set Up Mode**. The following message is displayed:

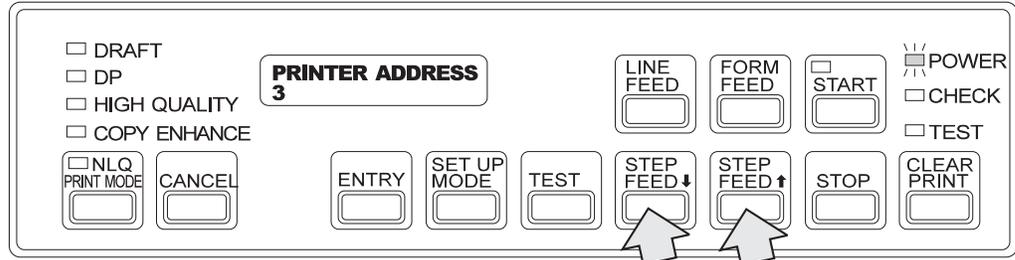


3 Continue pressing **Set Up Mode** until the following message is displayed.

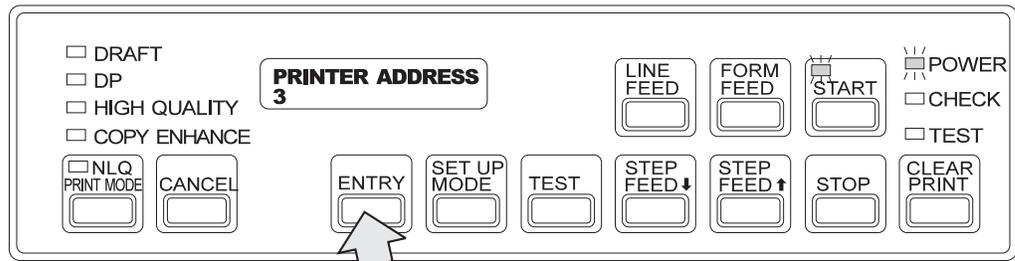


If the message goes too far, press **Line Feed** until it returns.

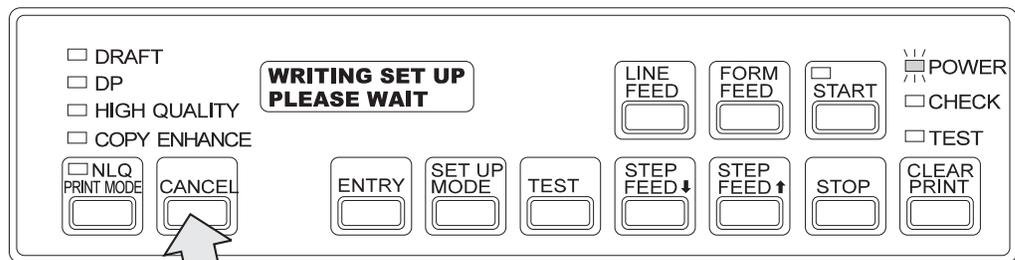
4 Press **Step Feed Up** or **Step Feed Down** to select the address value at the bottom of the LCD. In the following example, 3 is selected.



5 After selecting the printer address, press **Entry**. The Start lamp lights.



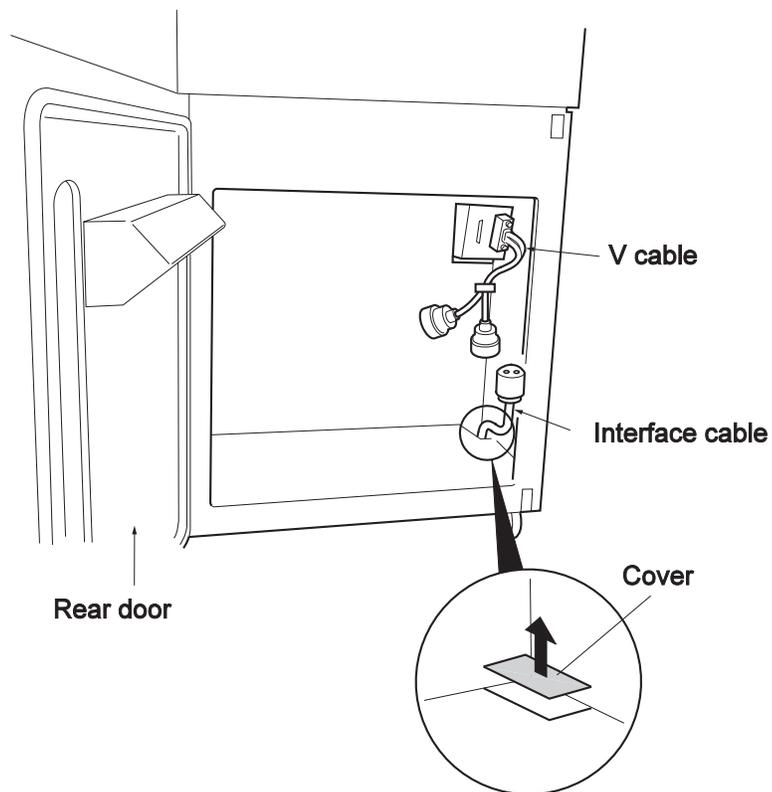
6 Press **Cancel**.



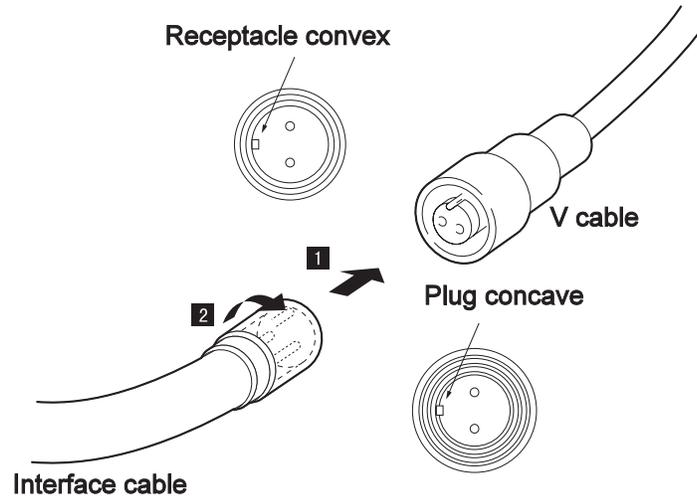
When formatting is finished, the IBM 5400-006 printer returns to the status set just after the power is turned on. Wait a moment. (See 2.3.1, "Powering On" on page 2-9.)

Connecting the Interface Cable

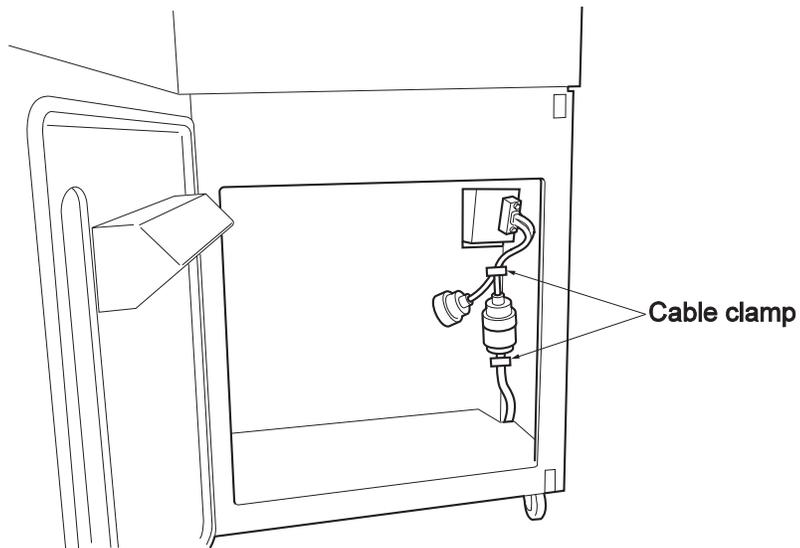
- 1** Set the power switch to the O side and disconnect the power cord from the outlet.
- 2** Open the rear door.
- 3** Connect the interface cable to the V-cable.
 - a. Pass the interface cable through the hole on the right of the stacker. Take the cover off of the hole in the back right part of the stacker. Push the cover from below with your hand to take it out. (This cover is not used again.)
 - b. Pass the interface cable through the hole.



- c. Insert the interface cable plug into one of the V-cable receptacles. **1**
(Connect the concave and convex plugs securely.)
- d. The plug can be screwed inside. Fasten this screw in the direction of the arrow shown in the figure to lock the plug to the receptacle.



- 4** Fix the interface cable with the cable clamp.



- 5** Close the rear door.

Connection to the AS/400 system is complete.

To change the direction that the front or rear door closes, see 2.11, "Changing the Door Direction."

Connecting to the Host System

1.3.2 Connecting to a PC (Using a Parallel Port)

The default format is for connecting to an AS/400 system. After setting the interface port format item to a parallel port, connect the interface cable.

Interface Cable (Printer Cable)

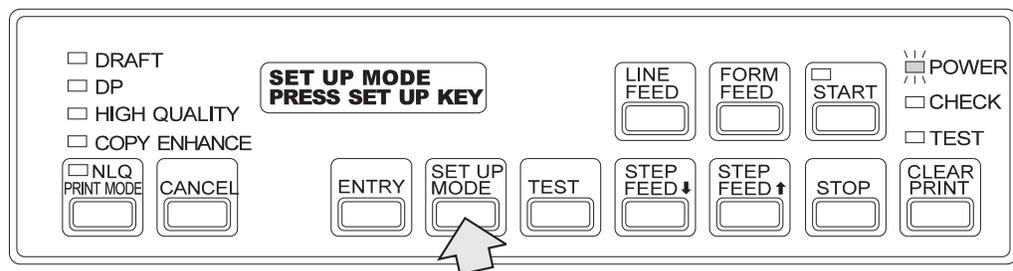
- Printer cable is sold separately
 - ID# 81X7875 (2.4 m)
 - ID# 09F5544 (5.0 m)
- The printer cable has 36 pins on the printer side and 25 pins on the system side. A 36 ~ 36 pin cable cannot be used.

Interface Port Settings

Change the printer connection to PC.

- 1** Connect the power cord to the outlet and set the Power switch to the (I) side. The power turns on. (See 2.3.1, "Powering On" on page 2-9.)

- 2** Press **Set Up Mode**. The following message is displayed:

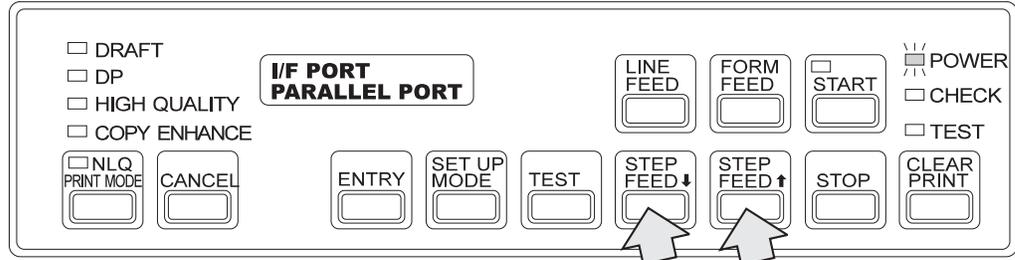


- 3** Press **Set Up Mode** again. The following message is displayed:

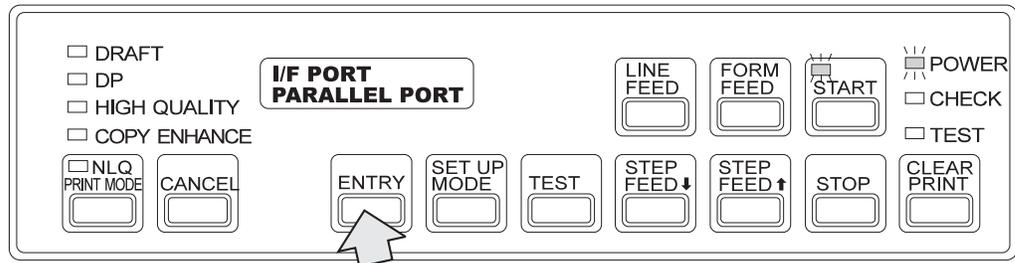
Interface Port
System Port

If the message goes too far, press **Line Feed** until it returns.

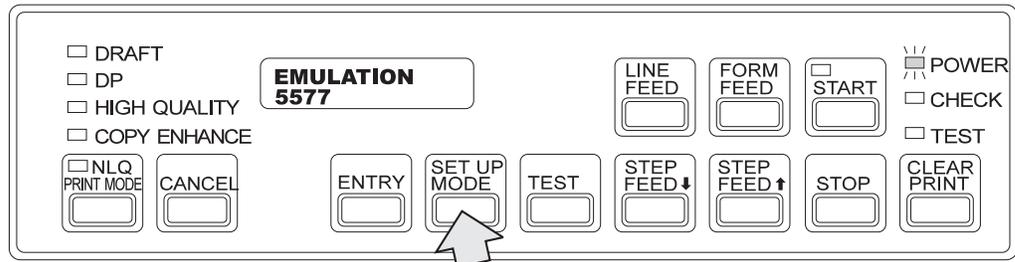
4 Press **Step Feed Up** or **Step Feed Down** to change the message at the bottom to **Parallel Port**.



5 Press **Entry**.



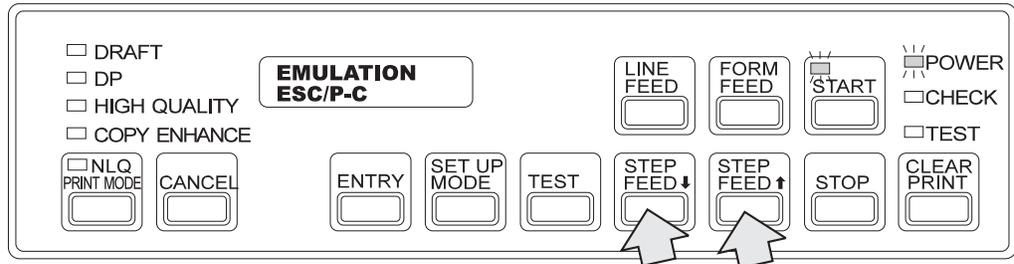
6 Upon connection to the PC, press **Set Up Mode** to display **Emulation**.



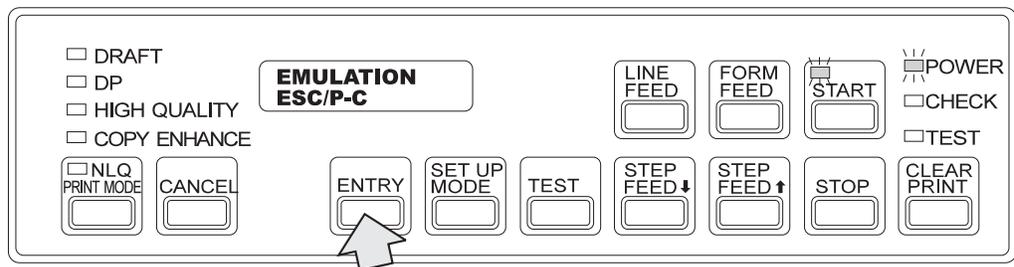
Note: The default is Emulation 5577.

Connecting to the Host System

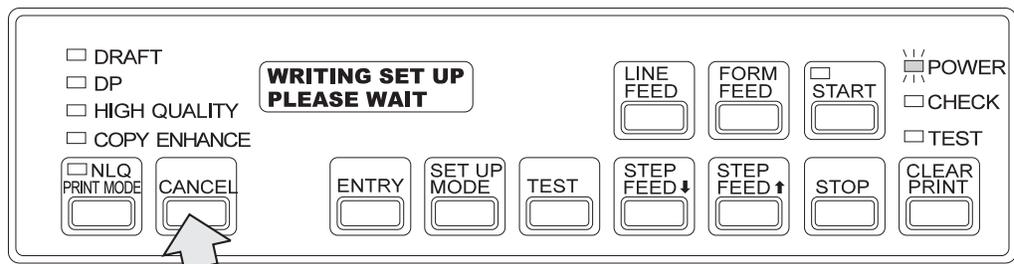
7 Press **Step Feed Up** or **Step Feed Down** to select the emulation mode you want to use. ESC/P-C is selected in the following example:



8 Press **Entry**.



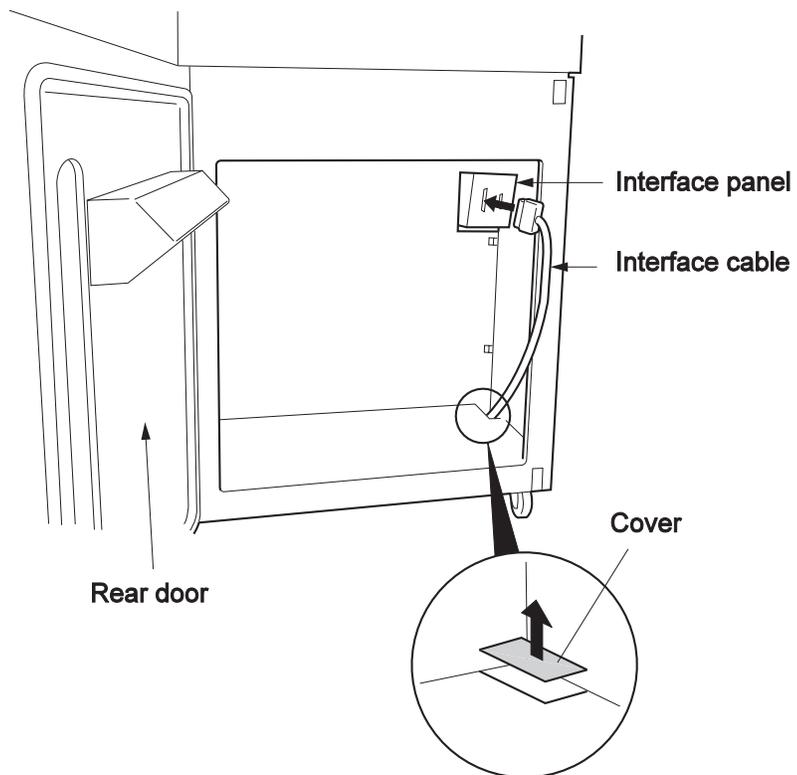
9 Press **Cancel**. The following message is displayed:



When formatting is finished, the IBM 5400-006 printer returns to the status set just after the power is turned on. Wait a moment. (See 2.3.1, "Powering On" on page 2-9.)

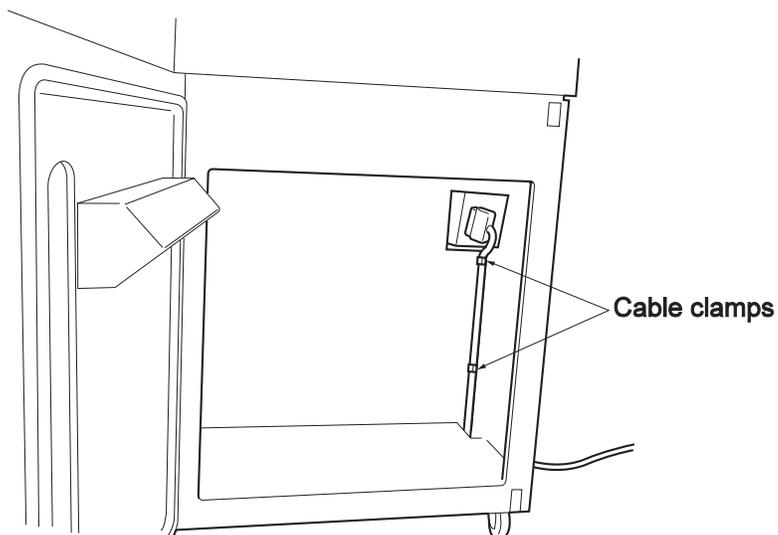
Connecting the Interface Cable

- 1** Set the Power switch to the O side and disconnect the power cord from the outlet.
- 2** Open the rear door.
- 3** Remove the cover from the back right of the stacker. Push from the bottom to remove it. (This cover is not used again.)
- 4** Pass the interface cable through the hole on the right of the stacker and connect it to the left connector on the interface panel.



Connecting to the Host System

- 5** Fix the interface cable to the stacker with the cable clamps in the back right.



- 6** Close the rear door.

You have finished connecting the IBM 5400-006 printer to a PC.

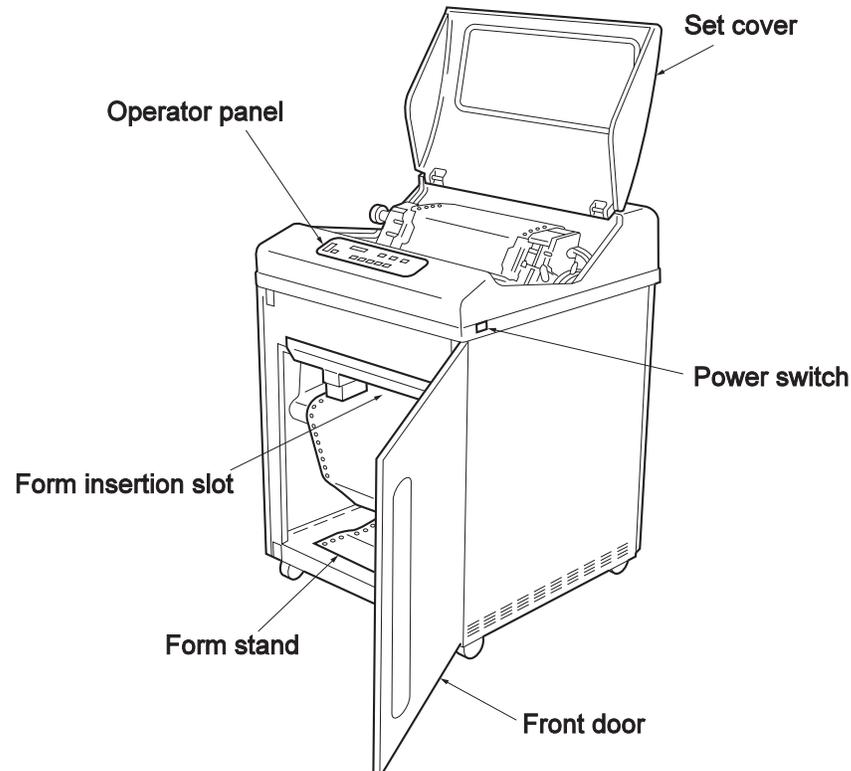
To change the direction that the front or rear door closes, see 2.11, "Changing the Door Direction."

Chapter 2. Operation

2.1 Names and Functions

Names and functions of the IBM 5400-006 printer are shown below:

2.1.1 Front View



Power Switch

Set the power switch to the (I) to turn the power on. When the IBM 5400-006 printer power is turned on, the power lamp lights and self-diagnosis starts.

- **Connected to an AS/400 System:** Depending on the initialization, the printer enters **Not Ready** or **Ready** mode. The default is **Not Ready**. For more information about initialization, see 2.12, "Initializing the Printer" on page 2-65. If the printer is in **Not Ready** mode, press **Start** on the operator panel. The **Start** light comes on and printing is enabled.
- **Connected to a PC:** The print light comes on and printing is enabled.
- Set the power switch to the O side. The power light turns off.

Operator Panel

Used to perform the printing and set a mode. This panel consists of 12 switches, 9 indicator lamps, and an LCD. (For details of each switch and lamp function, refer to 2.1.5, "Operator Panel" on page 2-5)

Names and Functions

Set Cover

When setting forms and replacing ribbons, raise the set cover upward to open it.

Front Door

In the front view, the front door is opened rightward; however, its open-close direction can be changed depending on environment of the installation place. For details, refer to 2.11, "Changing the Door Direction."

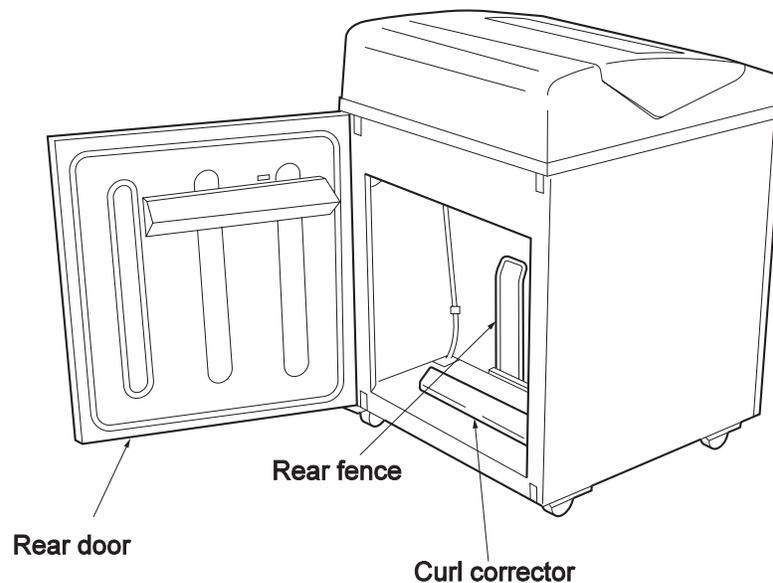
Form Stand

Forms are placed here. Take forms out of the box before placing them here.

Form Insertion Slot

Insert forms from this slot and set them in the tractors.

2.1.2 Rear View



Rear Door

Both the rear door and the front door can be changed to open in different directions. See 2.11, "Changing the Door Direction."

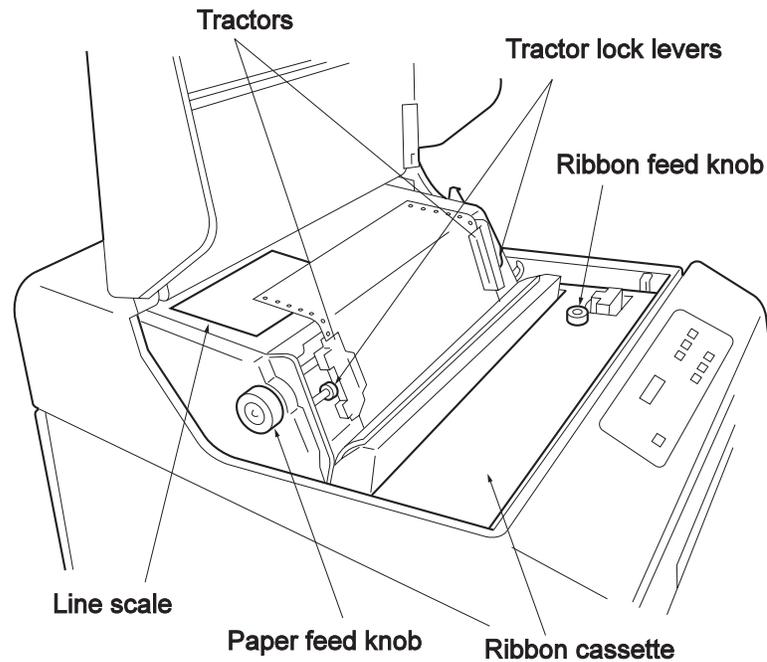
Curl Corrector

Adjusts the position of forms according to their length so that printed forms are folded correctly.

Rear Fence

Adjusts the position of forms according to their length along with the curl corrector.

2.1.3 Printer Mechanism (Left View)



Line Scale

Adjusts the head line position (first printing line) according to the length of forms when determining the vertical position of forms. For details, see 2.9.2, "Adjusting the Vertical Position" on page 2-49.

Form Feed Knob

Used to manually feed forms.

Tractors

A mechanism to feed paper. Pull the tractor lock lever toward you to move the tractors rightward and leftward.

Tractor Lock Lever

When moving the tractors leftward and rightward to match the form width, turn this lever toward you to unlock it.

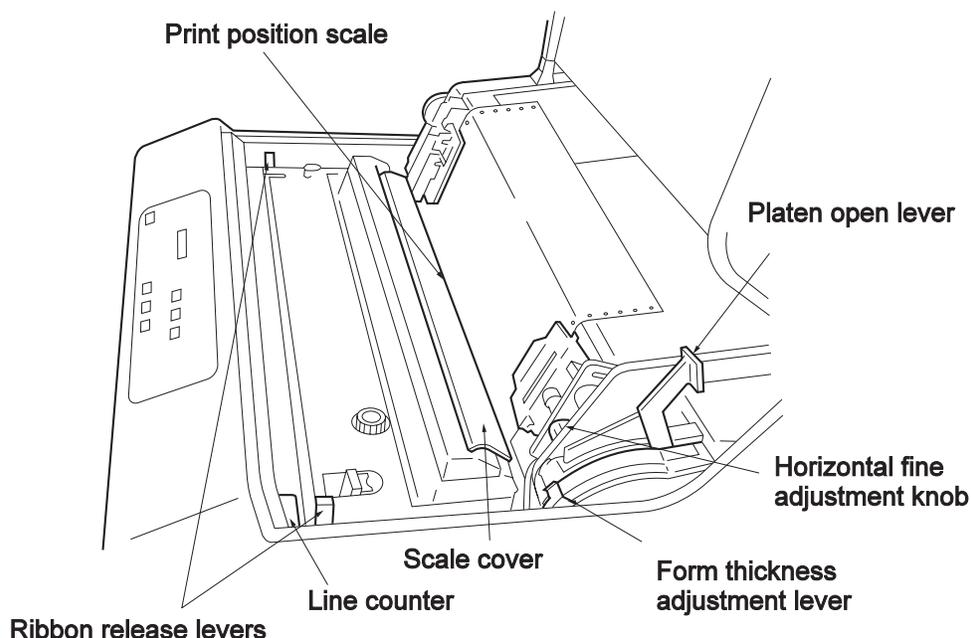
Ribbon Feed Knob

To manually feed the ink ribbon, turn the knob clockwise. Do not turn the knob counterclockwise.

Ribbon Cassette

Contains the ink ribbon. Use only IBM-recommended ink ribbons. For part number, see 2.2.1, "Consumables" on page 2-8.

2.1.4 Printer Mechanism (Right View)



Print Position Scale

Use this scale when adjusting the horizontal position of forms. The first character is printed at 1 on the scale. For details on adjustment, see 2.9.3, "Adjusting the Horizontal Position" on page 2-50.

Scale Cover

If this cover is open, the printer errors error status.

Ribbon Release Lever

Used when replacing the ribbon cassette. Push this back to release the ribbon cassette.

Line Counter

Counts the number of printed lines. If the vertical character size is 24 dots, this counter is incremented by 1 in 100 line units.

Platen Open Lever

To set the form or replace the ribbon, release the platen by pushing the lever backward. To lock and close the platen, pull the lever forward.

Note: Pressing the lever backward places the platen in the release status. To place the platen in all release status, press the lever backward while pressing it rightward. Set the all release status only when removing form jam or when Otherwise, do not place the platen in all release status.

Horizontal Fine Adjustment Knob

Used to fine adjust the form leftward and rightward. The range of adjustment is about 5 mm.

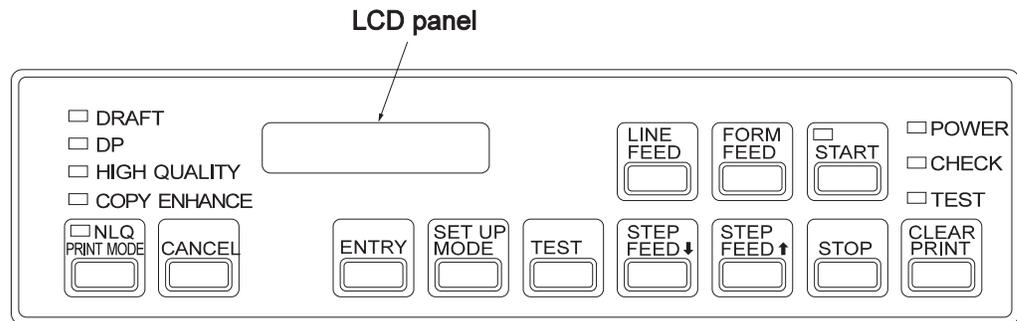
Form Thickness Adjustment Lever

Used to set the clearance between the print head and the platen according to the thickness of the form.

Adjust this lever according to form thickness. For details, see 2.9.1, "Adjusting the Print Pressure" on page 2-47.

2.1.5 Operator Panel

The operator panel has 12 switches, 9 indicator lamps, and an LCD. The indicator lamps are indicated by □.



The functions of the switches, indicator lamps, and the LCD on the operator panel are as follows:

Switches

| Switch Name | Function |
|-------------|---|
| Start | Puts the IBM 5400-006 printer in ready status. The Start lamp lights and the printer is ready to print. This switch functions only when the IBM 5400-006 printer is in the not ready status and no errors are detected. |
| Form Feed | Feeds the form to the first line position of the next page. Note: When connected to an AS/400 system, the length of the form must be set by an application program. If this is not set, a 1/6 inch length form is fed. |
| Line Feed | Feeds the form one line at a time. To continuously feed the form, press continually. Note: When connected to an AS/400 system, the standard line spacing is 6 LPI (4.2 mm). However, this can be changed by an application program. |
| Clear Print | If printable data remains in the print buffer and printing is terminated or stops, the remaining data can be printed by pressing this. If there is no data to be printed, No Data is displayed on the LCD. Also used to print only one line when preprinting or adjusting the printing position. |

Names and Functions

| Switch Name | Function |
|--------------|--|
| Stop | <p>Sets the printer in not ready status. If this is pressed during printing, the current line is printed before the printer is set in not ready status.</p> <p>Use this to stop an the alarm that sounds when an error occurs.</p> <p>To enable printing again, press Start.</p> <p>Note: All switches, including the power and stop switches function only when the printer is in not ready status (after Stop is pressed).</p> |
| Step Feed Up | <p>Feeds the form forward about 0.14 mm (1/180 inch). To feed the form continuously, hold the switch down. In either case, the line number remains unchanged. Also used for initializing.</p> |
| Step Feed Up | <p>Feeds the form backward about 0.14 mm (1/180 inch). Also used for initializing.</p> |
| Test | <p>Tests the function and quality of the IBM 5400-006 printer.</p> <p>Press Test. TEST PRINT MODE is displayed on the LCD. The stored test print pattern is printed.</p> <p>To exit the test mode, press Cancel.</p> |
| Set Up Mode | <p>Used to initialize the printer. For details, see 2.12, "Initializing the Printer" on page 2-65.</p> |
| Entry | <p>Used to determine the writing of the initial values set by Set Up Mode.</p> <p>Pressing Entry and Cancel resets the ribbon life counter. See 2.8, "Replacing the Ribbon" on page 2-33.</p> |
| Cancel | <p>Procedures for AS/400 connection and PC connection differ.</p> <ul style="list-style-type: none"> • Connected to an AS/400 System: Press Cancel to cancel a print request and erase data in the data buffer. Also used to exit test mode or initializing. • Connected to a PC: Press Cancel to cancel a print request. <p>Note: Whether data is erased depends on the application. If the application does not erase the data, the data is not affected by pressing Cancel.</p> |
| Print Mode | <p>Used to change the print mode. See 2.5, "Changing the Print Mode" on page 2-13.</p> |

Lamps

| Lamp Name | Function |
|-------------------|---|
| Power Lamp | Appears when the printer is on and turns off when the printer is off. |
| Check Lamp | Lights if a message is displayed on the LCD and an alarm sounds. This lamp lights if: <ul style="list-style-type: none"> operator intervention is required due to EOF. an error occurs in the IBM 5400-006 printer. an error occurs in the host program. |
| Test | Lights on if Test is pressed to enter test mode. |
| Start Lamp | Lights when the IBM 5400-006 printer is ready to print. Lights off if an error occurs or if Stop is pressed. After an error is corrected or Start is pressed, the start lamp lights on again. |
| Draft Lamp | Lights on when the draft mode is selected. |
| DP Lamp | Lights on when the DP mode is selected. |
| High Quality Lamp | Lights on when the high quality mode is selected. |
| Copy Enhance Lamp | Lights on when the copy enhance mode is selected. |
| NLQ Lamp | Lights when the NLQ mode is selected. |

LCD

Displays status codes or error messages in alphanumeric characters.

2.2 Check before Operating

The following must be observed when operating the IBM 5400-006 printer.

- Do not place anything on the set cover. Keep the set cover closed during printing.
- Make sure to adjust the form adjustment level to the thickness of the form you are using. See 2.9.1, "Adjusting the Print Pressure" on page 2-47.
- Do not use forms with punched-out paper from sprocket hole.
- When setting the form or replacing the ribbon, make sure the ribbon feed has stopped.
- Check the ribbon before starting daily operation. See 2.7, "Checking the Ribbon" on page 2-31.
- Be sure to power off the printer and disconnect the power cord before cleaning or inspecting the printer.

2.2.1 Consumables

To prevent paper or ribbon jams, remember the following:

Form

Use only specified forms. The IBM 5400-006 printer can print up to eight sheets of multipart form. For details, see Appendix A, "Forms Design."

Note: In the copy enhance mode, up to eight sheets can be printed. In the NLQ mode, up to five sheets can be printed.

Ribbon

Use ribbon cassette (part number 84G5349) and refill ribbon (part number 09F4041) recommended by IBM.

Precautions on Storing Consumables

- The printing form should be stored in an environment equivalent to that of the IBM 5400-006 printer installation site as far as possible. If the printing form is stored in another place, place the form to the environment of the printer 1 to 2 hours before starting to print.

The optimum environment as a storing place is about 20 °C in temperature and 40 - 60% in relative humidity. If forms stored in a humid place are used, the forms are softened due to the humidity and might cause a jam.

- Use the ribbon within 6 months of purchase.

To prevent drying and deterioration of the ink, avoid storing the ribbon in places with high temperature and low humidity. If the ribbon is stored in places with high temperature and the low humidity or it is stored for too long time, the ink may become uneven or dried, and print quality is not guaranteed.

2.3 Powering On and Off

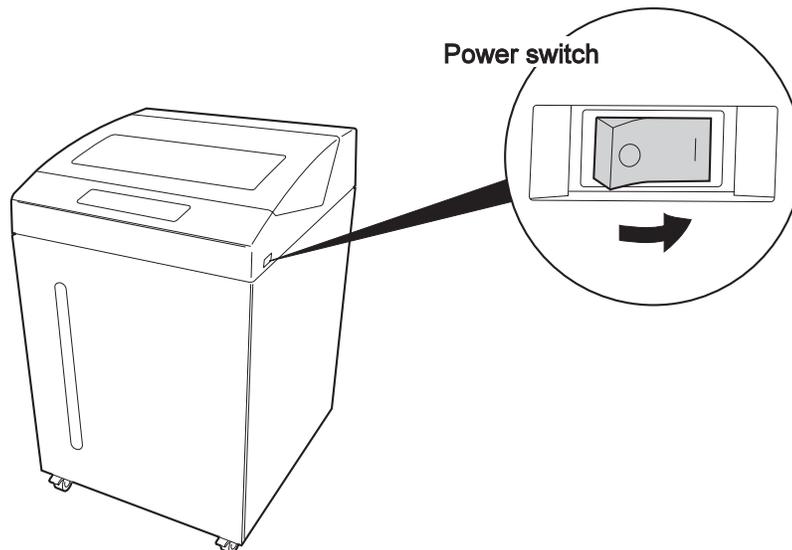
Power on and off procedures are as follows:

Cautions when powering on and off

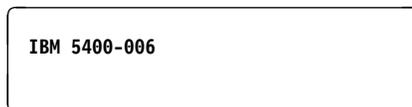
- Do not turn the power off during printing. Wait five seconds or more to power on after powering off.

2.3.1 Powering On

- 1 Turn the **Power** switch to | . The printer automatically starts self-diagnosis.



The LCD changes as shown below:



2 When the self-diagnosis ends:

- **Connected to an AS/400 system:**

Depending on the initialization, one of the following messages is displayed:

NOT READY

READY

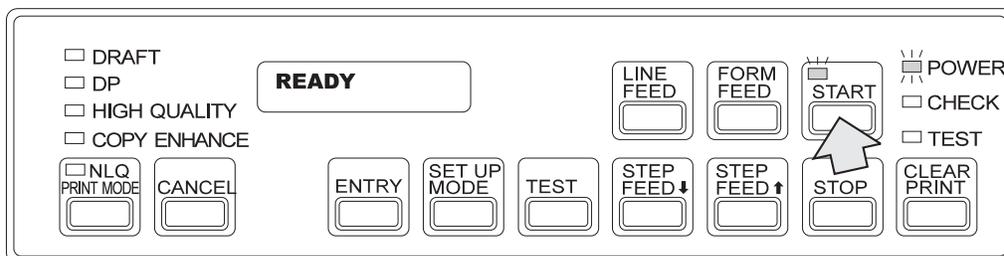
If NOT READY is shown, continue to step 3.

- **Connected to a PC:**

The following message is displayed; printing is enabled.

READY

3 If NOT READY is displayed, press **Start**. The start light turns on. READY is displayed in the LCD and printing is enabled.

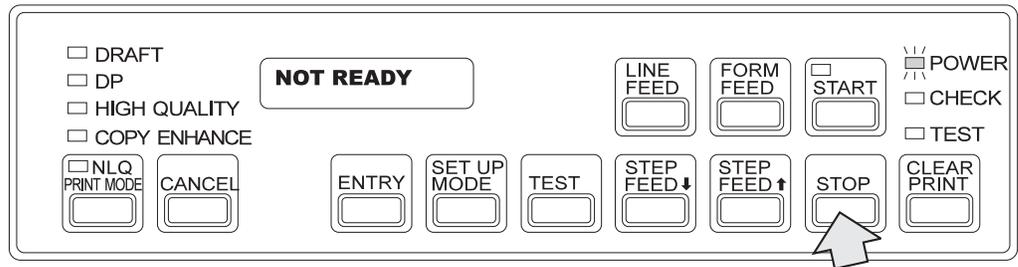


Notes:

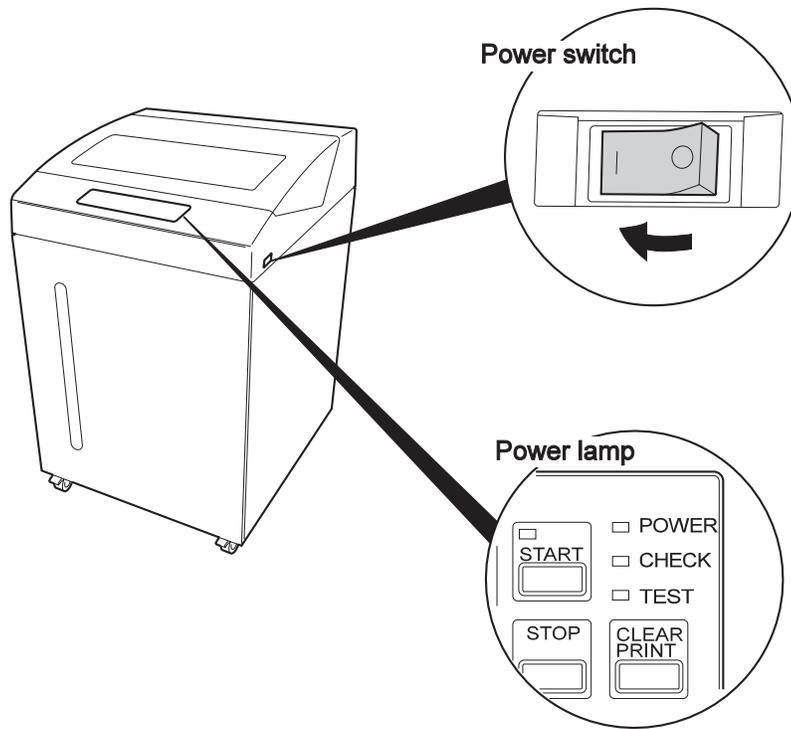
1. After powering on the printer, check the form position before printing.
2. If the Check lamp lights on or a message other than the above is displayed, see Chapter 3, "Problem Determination Procedure."
3. **Connected to an AS/400 system:** Start is not set to the ready status if the printer is not connected to host system.

2.3.2 Powering Off

1 Press **Stop** to turn off the start lamp.



2 Set the power switch to the O side and make sure the power lamp turns off.



2.4 Starting and Stopping Printing

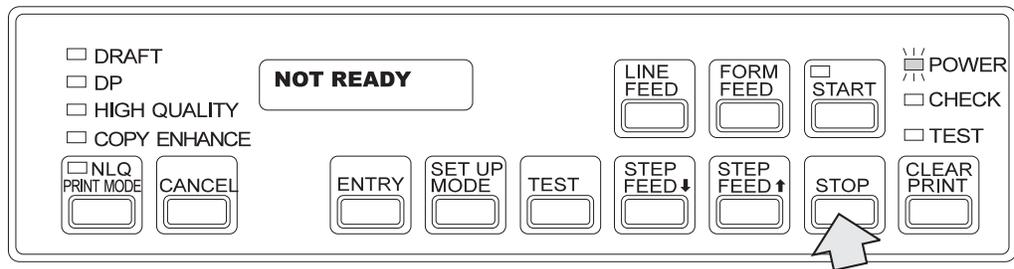
The IBM 5400-006 printer must be in not ready status before you perform test printing, cancel printing, change print modes, initialization, or replace the form or ribbon. If the Start lamp is on, other switches are not enabled. Press **Stop** to enable the other switches.

2.4.1 Stopping and Restarting Printing

To stop printing, press **Stop**.

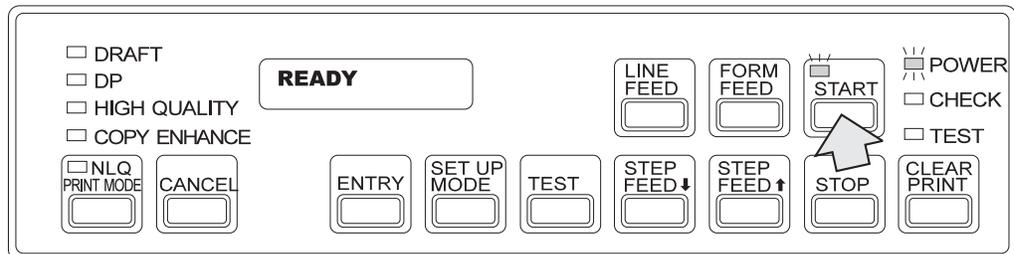
After the current page is printed, the Start lamp turns off to indicate that the printer is in the not ready status. You can also press **Stop** to turn off the alarm.

If an error message is displayed in the LCD, see: Chapter 3, "Problem Determination Procedure."



To continue printing, press **Start**.

If the start lamp does not turn on after you press **Start**, the cause of the printing interruption might not have been resolved. Resolve the problem according to Chapter 3, "Problem Determination Procedure."



2.5 Changing the Print Mode

The IBM 5400-006 printer has eight types of print modes. Select the appropriate mode according to your application. The table below lists the highest quality speed in each mode.

| Print Mode | Meaning | Printing Speed (Max.) |
|-----------------------------|---|-------------------------|
| NLQ | Normal speed mode (24 x 24 dots) | 360 LPM (Notes 2 and 3) |
| Copy enhance | Copy enhance mode (24 x 24 dots) | Note 4 |
| High quality | High quality mode (24 x 24 dots) | 180 LPM |
| DP | DP (data processing) mode (24 x 16 dots: Draft characters) Note 1 | 500 LPM |
| Draft | Draft mode (24 x 12 dots: Draft characters) Note 1 | 600 LPM |
| Copy enhance + high quality | Copy enhance + high quality mode (24 x 24 dots) | |
| Copy enhance + DP | Copy enhance + DP print mode (24 x 16 dots: Draft characters) Note 1 | |
| Copy enhance + draft | Copy enhance + draft mode (24 x 12 dots: Draft characters) Note 1 | |

Notes:

1. In the DP and draft print modes, draft characters are used as the font. The draft characters mean a font that eliminates the number of dots horizontally. The size of the printed characters is the same as that of the ordinary speed print.
2. LPM = Lines per Minute; indicates the number of lines printed per minute.
3. The printer is set to NLQ print mode at shipment.
4. The five copy enhance modes can be set when initializing the printer.
 - Level 1
 - Level 2
 - Level 3
 - Level 4
 - Level 5

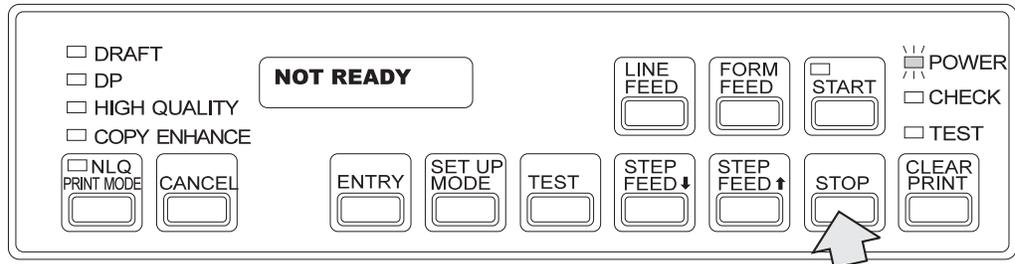
The two following methods are available for changing the print mode:

- Using the print mode switch on the operator panel
- Changing the initial value

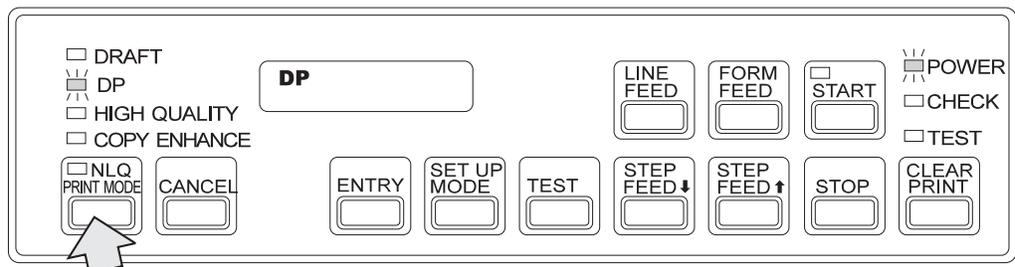
2.5.1 Changing the Print Mode

Use this to change the print mode temporarily.

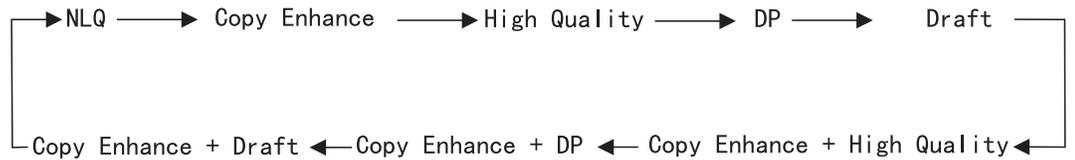
- 1 Press **Stop** to set the printer in the not ready status.



- 2 Press **Print Mode**.

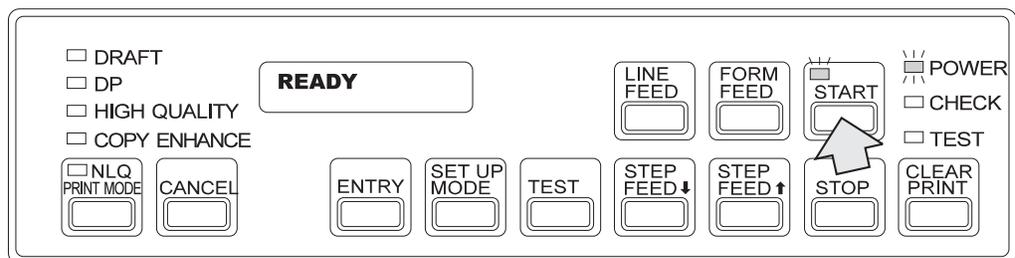


Each time **Print Mode** is pressed, the print mode changes as follows:



The corresponding print mode lamp lights up. For example, if DP mode is currently set, the DP lamp lights up. If the Copy Enhance + DP mode is set, the Copy Enhance and the DP lamps light up.

- 3 After selecting the print mode, press **Start**. The Start lamp lights up.



Note: If you do not save these settings, they are erased when you power off the printer. When you power on the printer again, the settings specified in the set up mode are set. To save your settings and use them again, change the initialization.

2.5.2 Changing the Initialization

Change the print mode like other initial settings. See: 2.12, "Initializing the Printer."

2.5.3 Print Modes

The print modes have the following features:

NLQ Mode

- The 24 x 24 dot mode is used.
- Same as the NLQ mode for the 5407/5417/5427 printers.
- Printing speed is 360 LPM.
- The NLQ lamp lights up when this mode is set.
- This mode is set at shipment.

Copy Enhance Mode

- Use when printing up to eight multipart form sheets.
- The 24 x 24 dot character font mode is used.
- The Copy Enhance lamp lights up when this mode is set.

This mode is further divided into five modes (3 for multi-form printing and 2 for uneven forms). These modes can be set during initialization. The factory set default is Level 2.

3 Multi-part Form Modes

Level 1: Printing is enhanced. Print speed is the same as NLQ mode, 360 LPM. However, printing might become slower than 360 LPM depending on the print pattern.

Level 2: This mode is the same as the copy enhance mode of the 5417 printer. Copy darkness is the same as Level 1. Print speed is 180 LPM, half of NLQ mode. Characters are darker than NLQ mode. This mode is the setting at shipment.

Level 3: This mode prints double strike in Level 1. Copy becomes 1 sheet darker than Level 1 and Level 2. Print speed is 180 LPM, half of NLQ mode. However, printing might become slower than 180 LPM depending on the print pattern. This mode prints darker than NLQ mode.

2 Uneven Form Modes

Level 4 (Uneven Form): This mode is for printing on forms that are inconsistent in thickness such as forms on packages for delivery companies. As with Level 1, printing is enhanced. Printing speed is 310 LPM, slower than NLQ mode. However, printing might become slower than 310 LPM depending on the print pattern.

Level 5 (Uneven Forms Strong): This mode prints double strike in the uneven forms mode (Level 4). Printing becomes 1 sheet stronger than Level 4. Printing speed is 155 LPM, half of Level 4. However, printing might become slower than 155 LPM depending on the print pattern. This mode prints darker than NLQ mode.

Note

- When printing on uneven forms, use the Uneven Forms mode. Using NLQ mode to print on uneven forms might damage the printer.
- Up to 3 sheets of uneven forms can be printed.

High quality mode

- Used to print more clearly than the NLQ mode.
- Used for bar code and OCR printing.
- Character font is 24 x 24 dots and speed is 180 LPM.
- The High Quality lamp lights up when this mode is selected.

DP mode

- Used to print more quickly than the NLQ mode.
- Draft characters are printed in 24 x 16 dots (eliminated horizontally)
- Character size is the same as the NLQ mode, 24 x 24 dots, not like the 5237/5427 DP character font.
- Print speed is 500 LPM.
- The DP lamp lights up when this mode is selected.

Draft mode

- Used to print more quickly than the DP mode.
- Character font is 24 x 12 dots (eliminated horizontally) draft characters.
- Character size is the same as the NLQ mode, 24 x 24 dots, not like the 5327/5427 DP character font.
- Printing speed is 600 LPM.
- The Draft lamp lights up when this mode is selected.

Copy enhance + high quality mode

- Used to print more clearly than NLQ mode on six to eight sheets of multipart form.
- Character font is 24 x 24 dots.
- Printing speed is half of copy enhance mode. If Level 4 (Uneven Form) is selected, printing speed is 155 LPM. If Level 5 (Uneven Form: Strong) is selected, printing speed is 76 LPM.
- The Copy Enhance lamp and the High Quality lamps light up when this mode is selected.

Copy enhance + DP mode

- Used to print 6 to 8 multipart forms in DP mode.
- Character font is 24 x 16 dots, but characters are deeper and bolder than in the DP mode.
- The character size is the same as the 24 x 24 dots of the NLQ mode.
- Printing speed is 500 LPM.

Note: If level 2 or level 3 are set in the copy enhance mode, printing speed is 250 LPM. If Level 4 (Uneven Form) is set, printing speed is 420 LPM. If Level 5 (Uneven Form: Strong) is set, printing speed is 248 LPM.

- The copy enhance lamp and the DP lamp light up when this mode is selected.

Copy enhance + Draft mode

- Used to print 6 to 8 multipart forms in the draft mode.
- Character font is 24 x 24 dots, but characters are deeper and bolder than draft mode.
- The character size is the same as the 24 x 24 dots of the NLQ mode.
- Printing speed is 600 LPM.

Note: If Level 2 or Level 3 are set in the copy enhance mode, printing speed is 300 LPM. If Level 4 (Uneven Form) is set, printing speed is 495 LPM. If Level 5 (Uneven Form: Strong) is set, printing speed is 248 LPM.

- The Copy Enhance lamp and the Draft lamps light up when this mode is selected.

Note: For more than six multipart sheets, only back carbon papers can be used.

Print Mode Speeds by Print Mode (Max.)

| Print mode | NLQ print mode | High quality | DP | Draft |
|------------|----------------|--------------|---------|---------|
| | 360 LPM | 180 LPM | 500 LPM | 600 LPM |

| Copy enhance mode | Copy enhance only | Copy enhance + High quality | Copy enhance + DP | Copy enhance + draft |
|-------------------|-------------------|-----------------------------|-------------------|----------------------|
| Level 1* | 360 LPM | 180 LPM | 500 LPM | 600 LPM |
| Level 2 | 180 LPM | 90 LPM | 250 LPM | 300 LPM |
| Level 3* | 180 LPM | 90 LPM | 250 LPM | 300 LPM |
| Level 4* | 310 LPM | 155 LPM | 420 LPM | 495 LPM |
| Level 5* | 155 LPM | 76 LPM | 210 LPM | 248 LPM |

Note: This shows the maximum values. Depending on the printing pattern and host system, values might vary.

Modes marked with an asterisk are more easily influenced by the printing pattern.

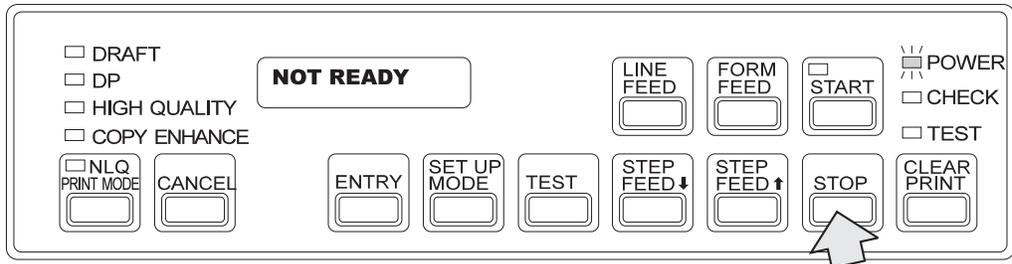
2.6 Unloading and Setting the Printing Form

2.6.1 Unloading the Printing Form

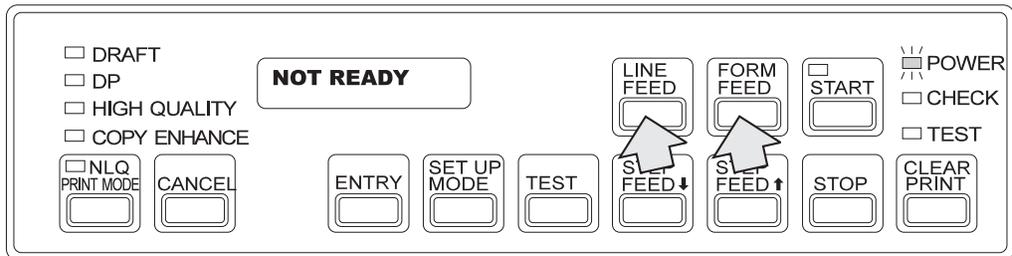
Unload the printing form using the following procedure:

Note: At EOF (End of Form), write down the line scale position nearest the perforation on the form. This is necessary for setting a new form.

1 Press **Stop** to put the printer in not ready status.

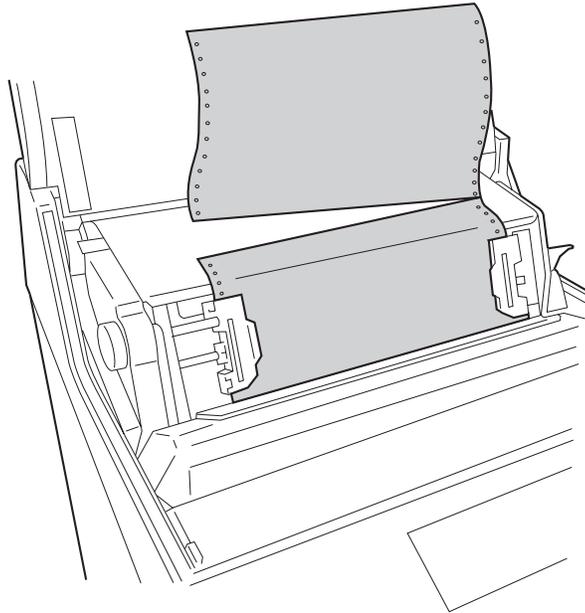


2 Press **Line Feed** or **Form Feed** to feed the form to the position where it is easy to cut. (The form feed knob can also be used.)



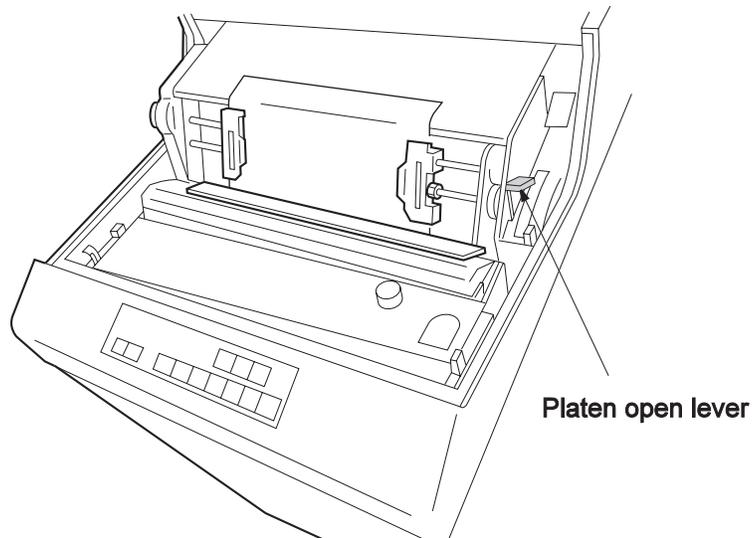
At EOF (End of Form), feed the remaining forms to the stacker and go to 9.

- 3** Open the set cover and cut off the form at the perforation.



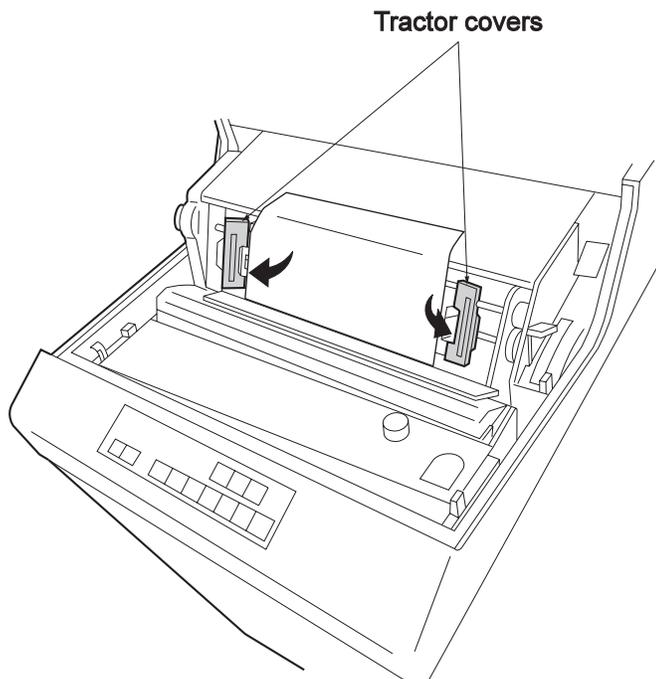
To unload the form without replacing it, go to 9.

- 4** Release the platen lever by pushing the platen lever backward.

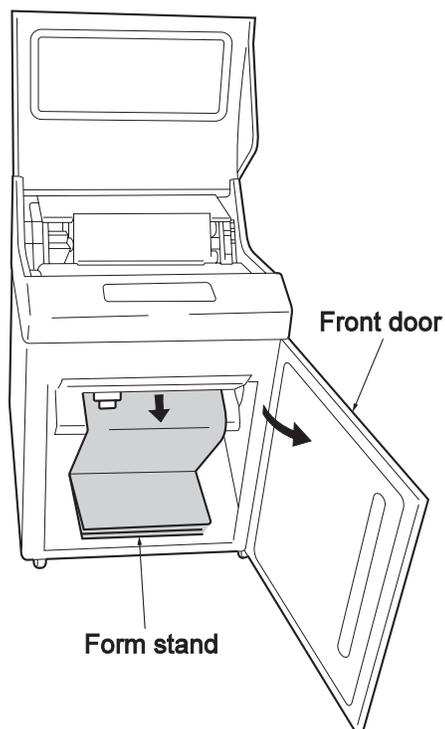


Unloading and Setting the Printing Form

- 5 Open the tractor covers and release the sprocket holes on both sides of forms from the left and right tractor pins.

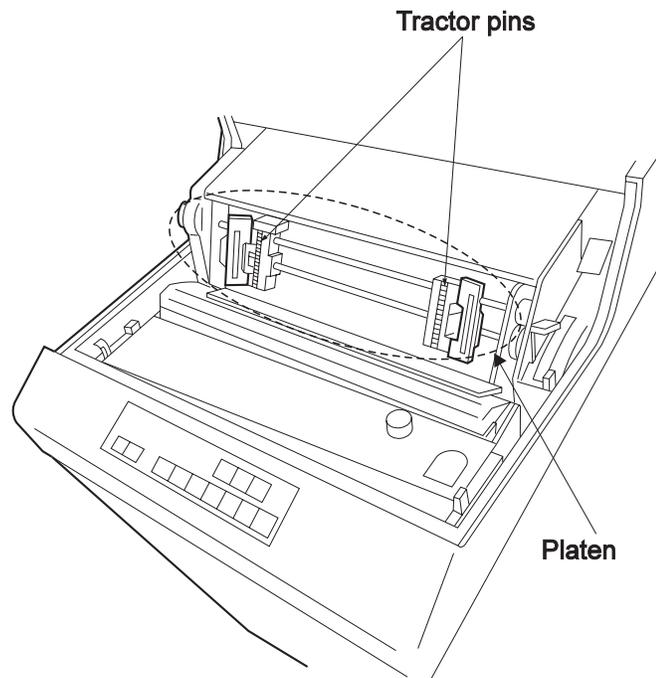


- 6 Open the front door. Pull the form down from the form insertion slot to unload it. Make sure that form does not catch on the thin metal plate on the outside of the ribbon. If form dust has accumulated on the form stand, remove it with a vacuum cleaner.



- 7 Close the front door.

- 8** Clean the form path (platen, left and right tractor pins) with a brush or gauze.



- 9** Open the rear door and take the printed form out of the stacker. If form dust has accumulated on the stacker, remove it with a vacuum cleaner.
- 10** Close the set cover and the rear door.

The form has been unloaded.

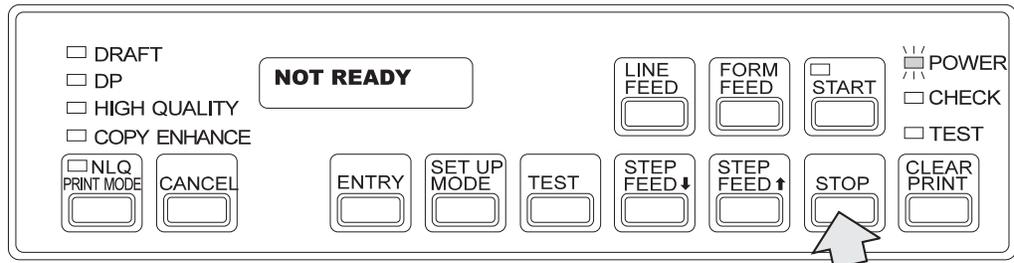
Unloading and Setting the Printing Form

2.6.2 Setting the Printing Form

Set the printing form using the following procedures. For details, see: Appendix A, "Forms Design."

If the power is off, go to 2.

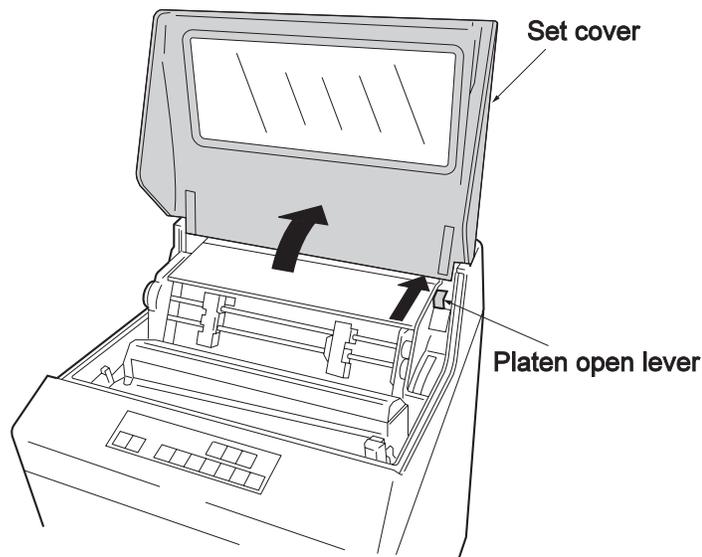
1 Press **Stop**. The Start lamp turns off.



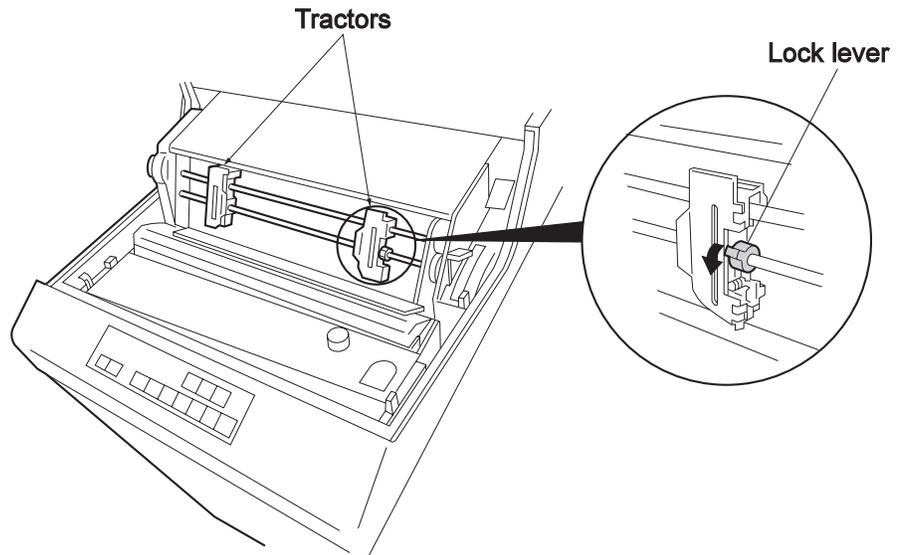
2 Open the set cover and push the platen open lever backward to release the platen.

Notes:

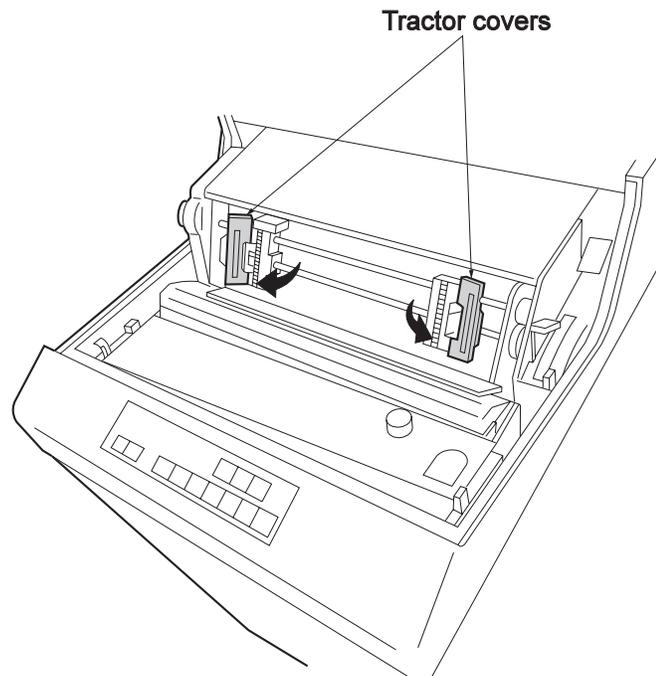
- a. If you set the form without opening the platen, the form edges will be damaged, causing form jam and other problems.
- b. If you push the platen open lever rightward (open) then backward, it remains in the all release status. However, when setting the form, do not set the platen in the all release status, which causes form edges to slip out.



- 3** Pull the left and right tractors forward to unlock them. The tractors can be moved left and right. Move them to match the form width.

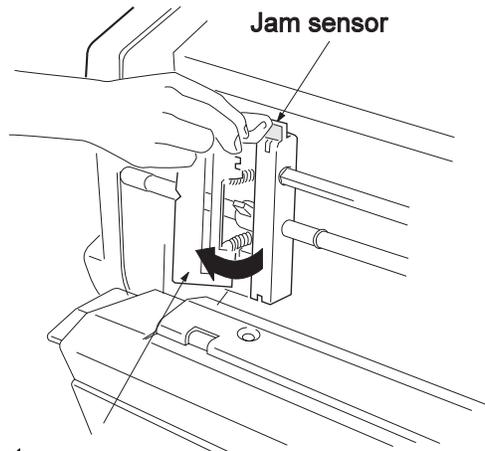


- 4** Open the tractor covers.



Unloading and Setting the Printing Form

- 5** Make sure that the jam sensor on the left tractor is clean. If it is dirty, clean it with a soft cloth. (See 3.3, “Form Jam Recovery” on page 3-5.)

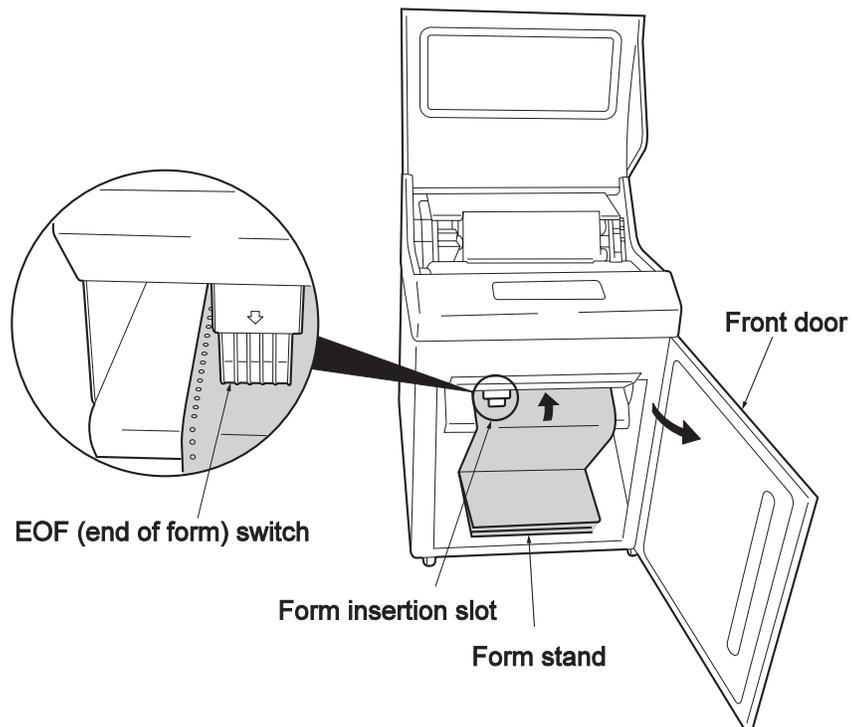


Tractor cover

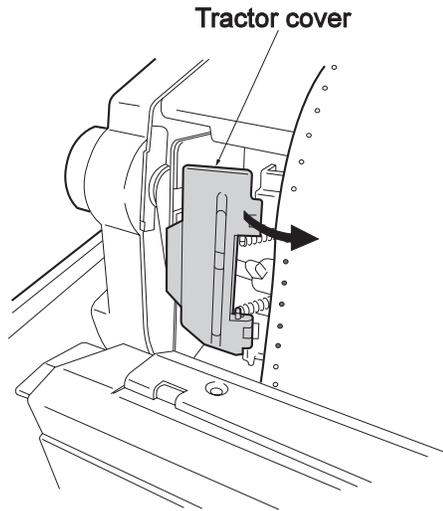
- 6** Open the front door load a new form from the form stand. Insert the form into the form insertion slot and push it up to the height of the left and right tractors.

Notes

- Take the form out of the box before placing it in the form stand. Leaving it in the box might cause a paper jam.
- Set the form so that the left edge of the form is located to the left of the EOF (End of Form) switch label.

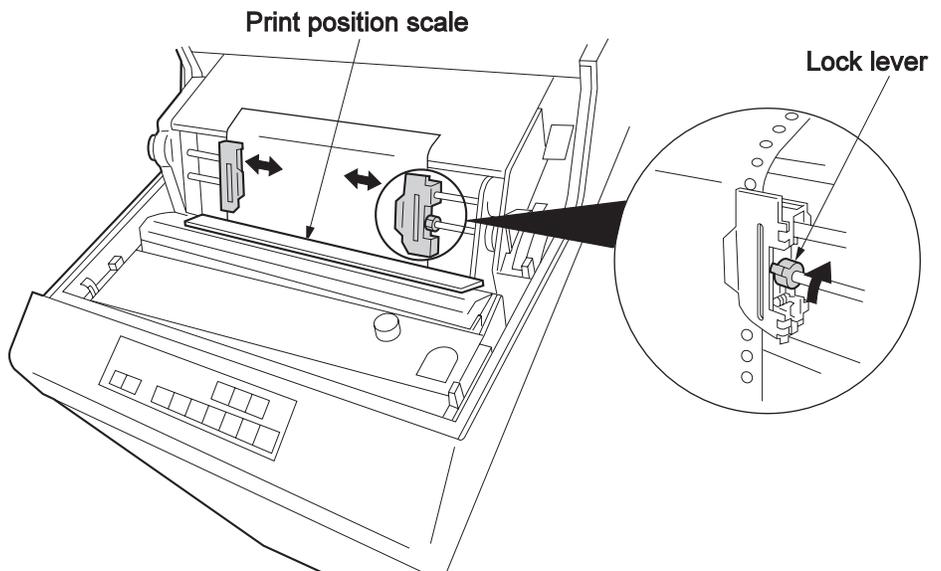


- 7** Fit the tractor holes on both sides of the form to the left and right tractor pins. Close the tractor covers.



- 8** Determine the form position by moving the tractors leftward and rightward based on the print position scale (1 - 136). Push both lock levers backward. Make sure not to slacken the form.

Note: The first character is printed on the 1 position on the scale.



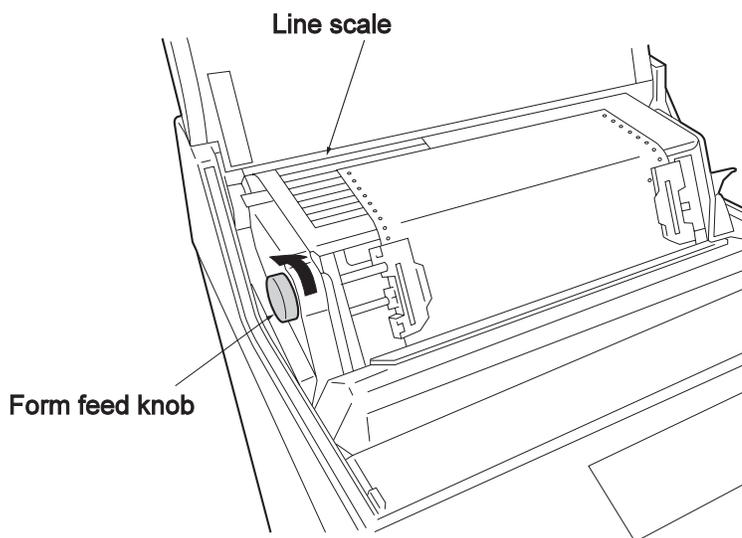
Unloading and Setting the Printing Form

- 9** Turn the form feed knob and adjust the top edge of the line scale according to the form length.

Note

Make sure the platen open lever is not in the all release status. If it is in the all release status, the form edge will slip out.

| Form Length | Adjustment Position |
|--------------------|---------------------|
| 8 inches (203 mm) | 8 |
| 9 inches (229 mm) | 9 |
| 10 inches (254 mm) | 10 |
| 11 inches (279 mm) | 11 |
| 12 inches (304 mm) | 12 |

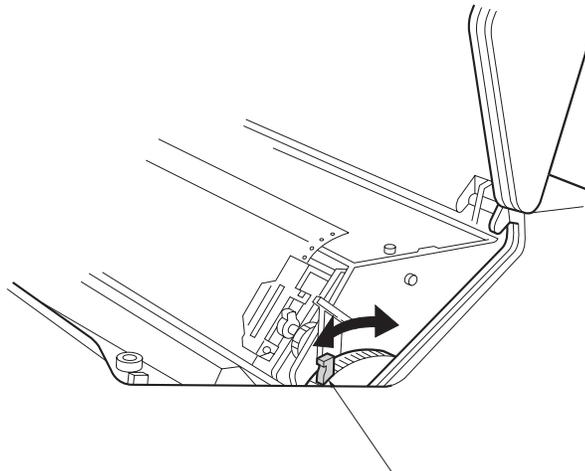


Note: At EOF (End of form), adjust the perforation of the new form to the new line scale position that was recorded according to 2.6.1, "Unloading the Printing Form" on page 2-18, step 1.

10 Adjust the form thickness with the lever according to the form.

Note: For a 55kg single form (high quality form) ream, set the lever position to 1. For other forms, set the appropriate lever position according to the table below. (Refer to 2.9.1, “Adjusting the Print Pressure” on page 2-47.)

| Form Type | | Lever Set Position |
|-----------|--------------|--------------------|
| 1P | 55kg ~ 70kg | 1 ~ 2 |
| | 90kg ~ 135kg | 2 ~ 3 |
| 2P | 30kg ~ 45kg | 1 ~ 2 |
| 3P | 30kg ~ 45kg | 2 ~ 3 |
| 4P | 30kg ~ 34kg | 3 ~ 4 |
| 5P | 30kg ~ 34kg | 3 ~ 5 |
| 6P | 30kg ~ 34kg | 4 ~ 6 |
| 7P | 30kg ~ 34kg | 4 ~ 6 |
| 8P | 30kg ~ 34kg | 5 ~ 7 |



Form thickness adjustment lever

Other Adjustments

When the form is replaced, the following adjustments must be made:

- Adjustment of vertical position
- Adjustment of horizontal position
- Adjustment of form tension

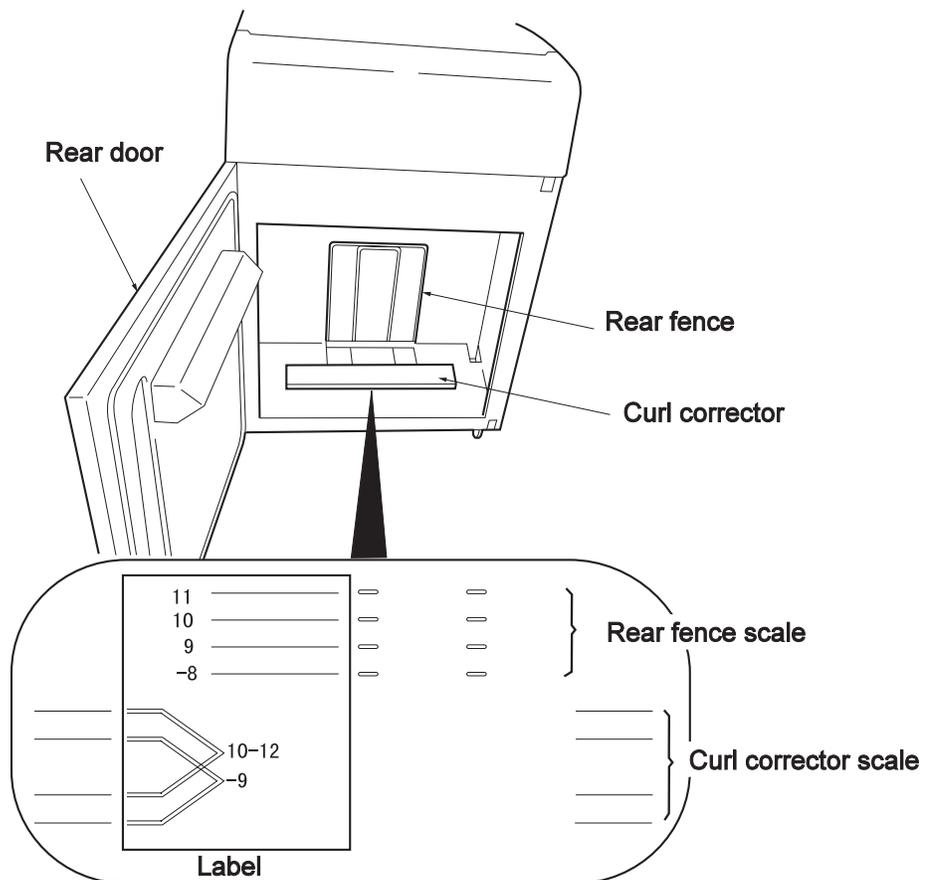
For details on these adjustments, see 2.9, “Making Adjustments.”

Unloading and Setting the Printing Form

- 11** Pull the platen open lever toward you to close the platen.
- 12** Close the set cover and the front door.
- 13** Open the rear door. Place the rear fence and the curl corrector at the specified positions according to the page length of the forms used.

| Rear Fence Position | |
|---------------------|-------------------------------|
| Form Length | Adjustment Position |
| 8 inches or less | 8 |
| 9 inches | 9 |
| 10 inches | 10 |
| 11 inches | 11 |
| 12 inches | - (use without rear fence) |

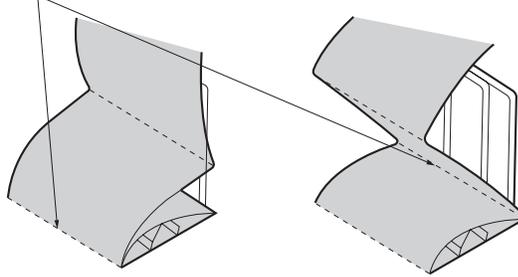
| Curl Corrector Position | |
|-------------------------|---------------------|
| Form Length | Adjustment Position |
| 9 inches or less | 9 or less |
| 10~12 inches | 10~12 |



Notes:

- a. When printing starts, fold the first used form along the perforated line into the stacker. (See figure below.)

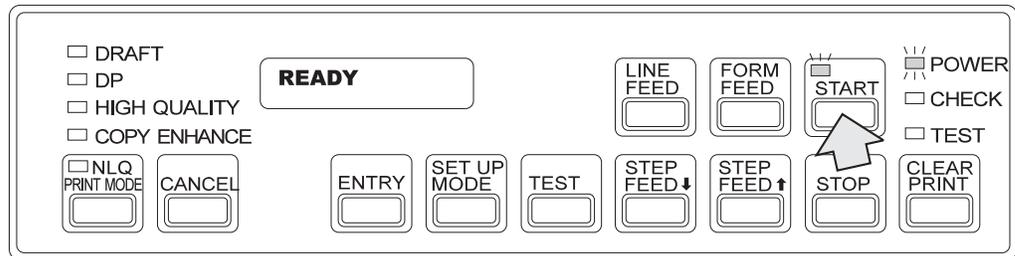
Perforated line



- b. Forms absorb water in high humidity (especially multipart forms) and folding becomes weak. This makes the stacker jam easily. To avoid paper jams, take the printed forms out of the stacker frequently.

14 Close the rear door.

15 Press **Start**. If the Start lamp lights up, printing can start.

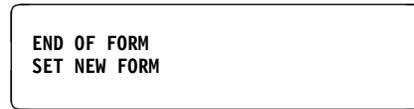


The form has been set.

Unloading and Setting the Printing Form

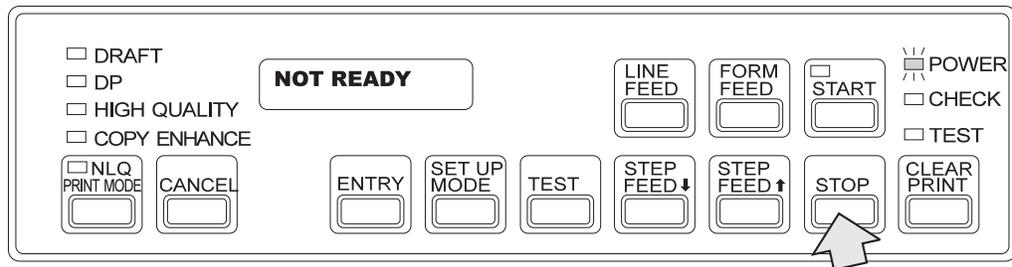
2.6.3 At EOF

At EOF, an alarm sounds and the following message is displayed:

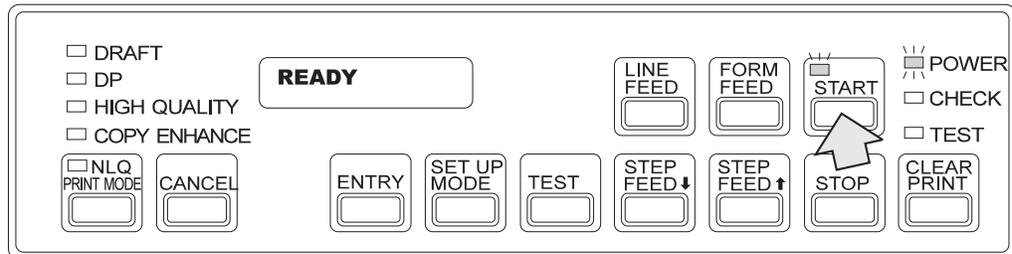


At least one page or more remain. To print up to the next page, do the following:

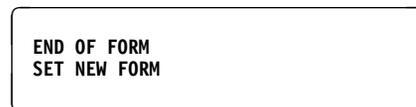
1 Press **Stop**. The alarm stops and the Check lamp turns off.



2 Press **Start**. The Start lamp lights up and printing starts again.



Note: After the page has been fully printed, the alarm sounds and the following message is displayed on the LCD:



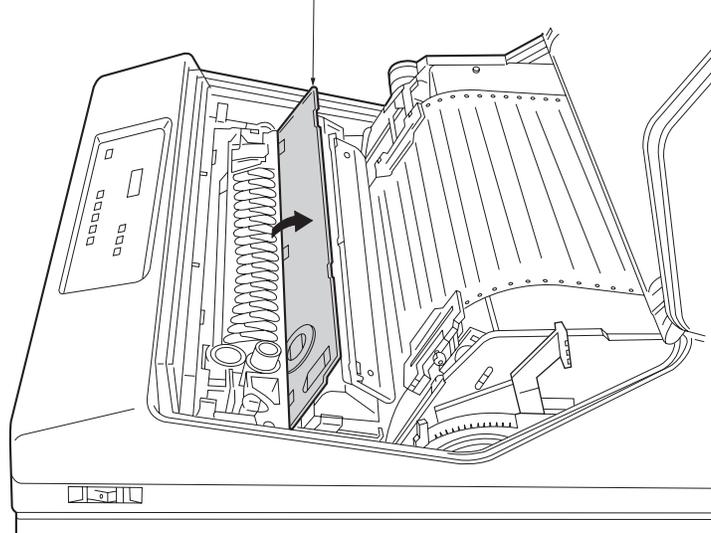
Even if paper remains, the subsequent pages cannot be printed.

2.7 Checking the Ribbon

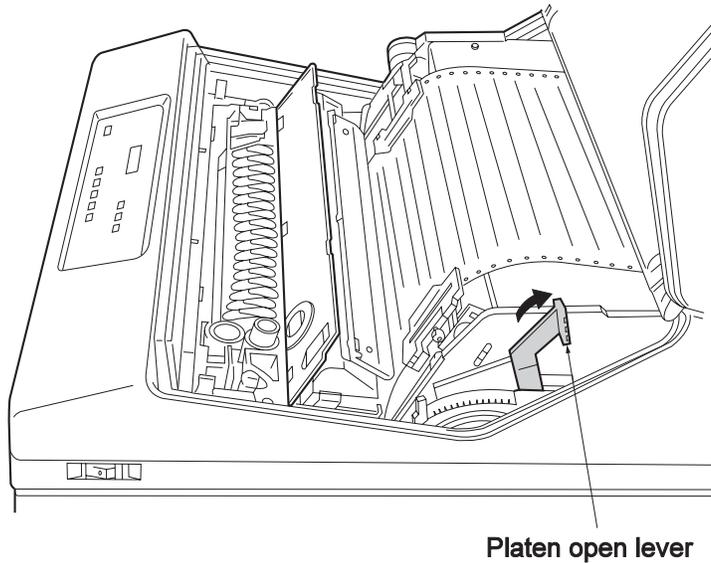
Check the ribbon before starting daily operation. Use the following procedure:

- 1** Make sure that the power is off.
- 2** Open the set cover.
- 3** Open the ribbon cassette cover.

Ribbon cassette cover

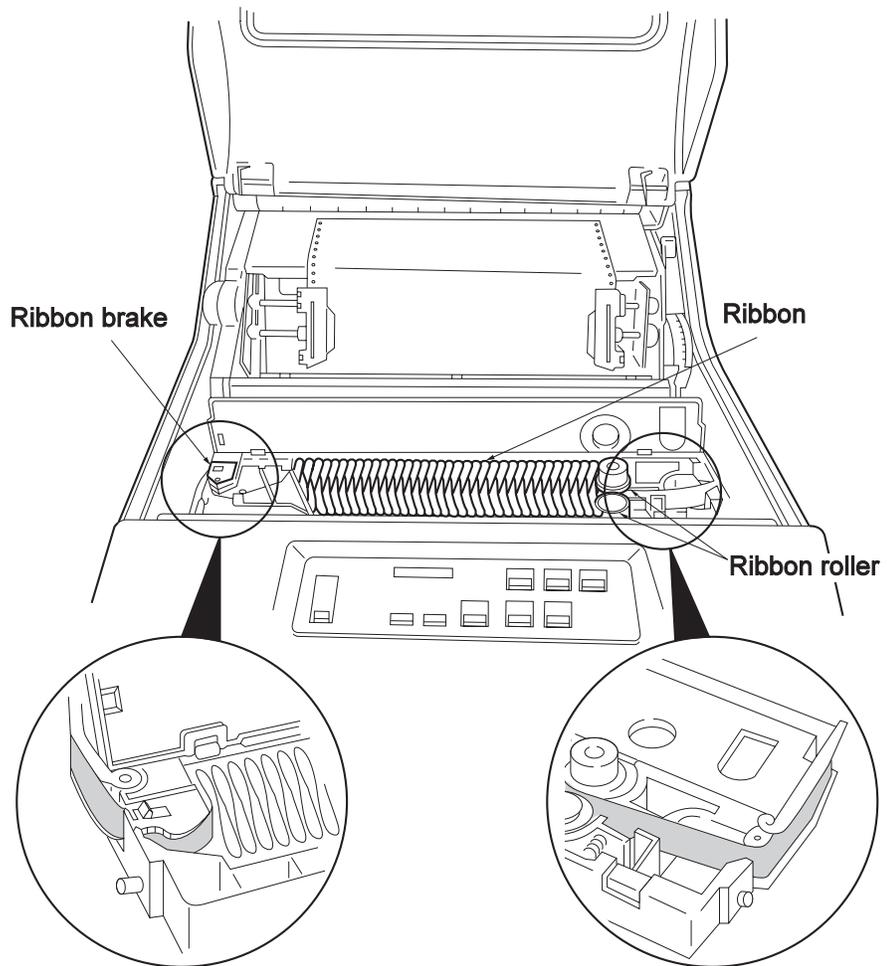


- 4** Push the platen open lever backward to open the platen.



Checking the Ribbon

5 Make sure that the ribbon is not torn or twisted and is on the ribbon path.



- If the ribbon is bent, slackened, or twisted around the roller, put it back on the ribbon path.
- If the ribbon is sticking out of the ribbon brake, tighten it. If the ribbon is sticking out at all, it might slip during printing, causing a jam.
- If the ribbon is torn or old, go to 2.8, "Replacing the Ribbon" on page 2-33.

6 After checking the ribbon, close the ribbon cassette cover.

7 Pull the platen open lever toward you and close the platen.

8 Close the set cover.

You have finished checking the ribbon.

2.8 Replacing the Ribbon

Replace the ribbon immediately in any of the following cases:

- print becomes faint.
- the ribbon is old and tattered.
- the ribbon is torn or damaged.
- the ribbon life message is displayed.

The IBM 5400-006 printer counts characters printed and displays a message when the ribbon life is up.

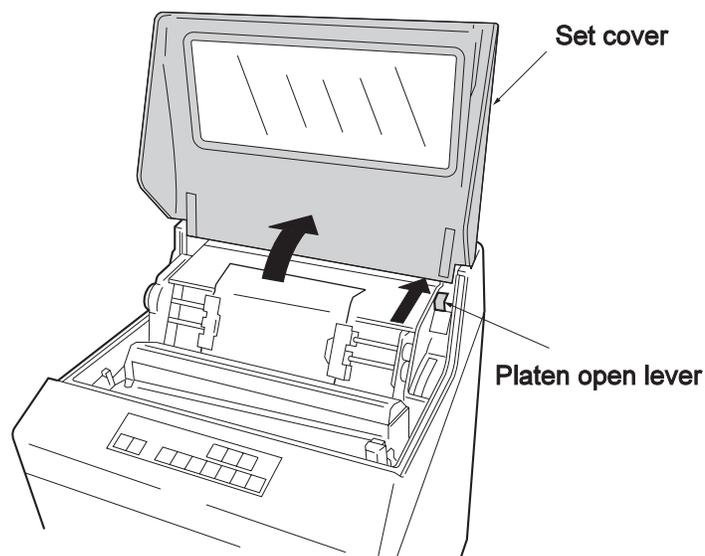
There are two ways of replacing the ribbon for the IBM 5400-006 printer, replacing the whole ribbon cassette or replacing only the ribbon with a refill. To replace only the ribbon, see 2.8.3, "Refilling the Ribbon" on page 2-40.

Note: Your hands might get dirty when you are replacing the ribbon. Wear gloves to keep your hands clean.

2.8.1 Removing the Ribbon Cassette

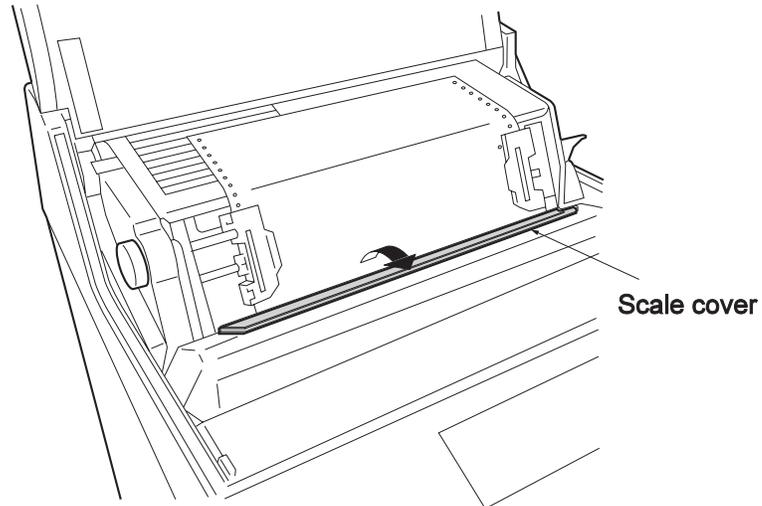
If the power is off, start from step 3.

- 1** Press **Stop**. The Start lamps turns off.
- 2** Turn the power switch off.
- 3** Open the set cover and push the platen open lever backward to open the platen.

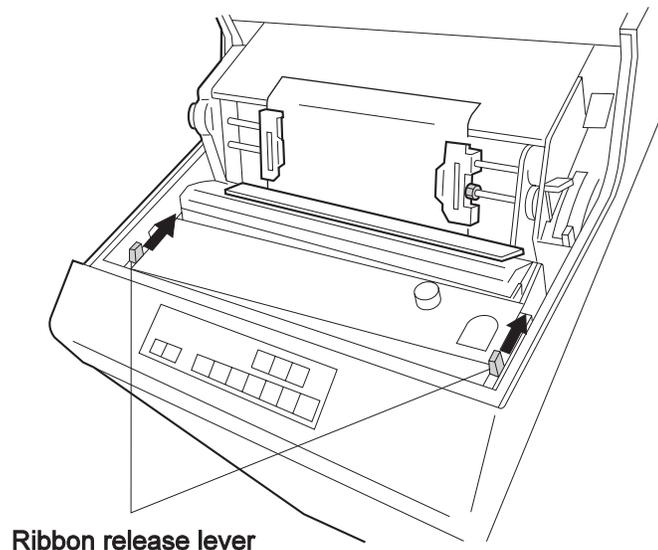


Replacing the Ribbon

- 4** Open the scale cover.



- 5** Push the ribbon release levers in the direction of the arrow and remove the ribbon cassette by pulling it upward.



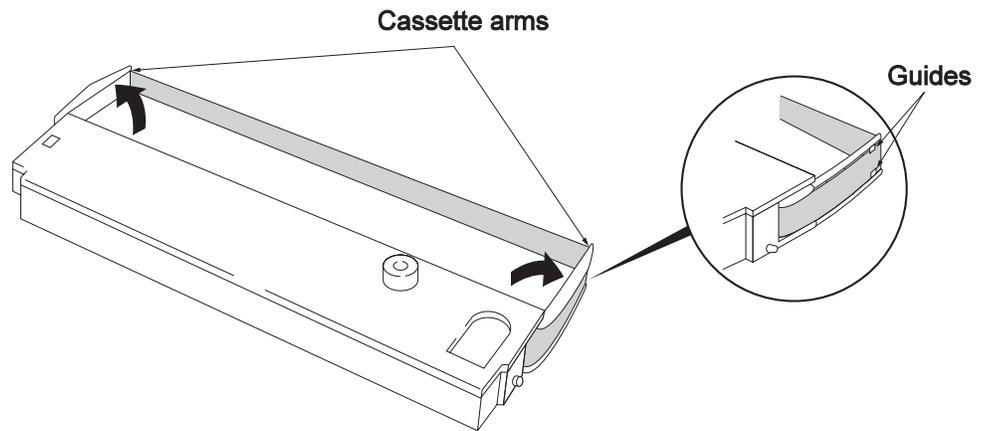
You have finished removing the ribbon cassette.

2.8.2 Setting and Mounting the Ribbon Cassette

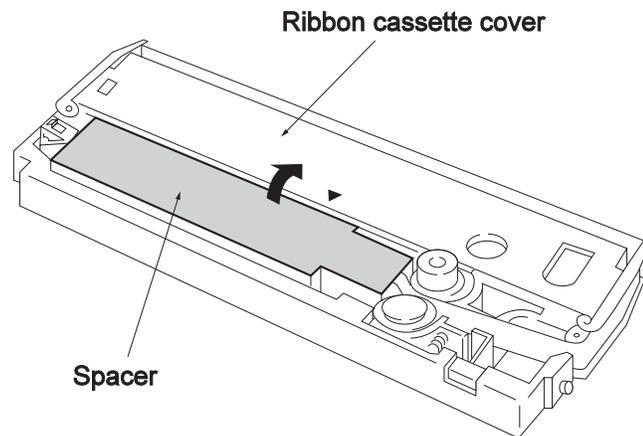
Set the ribbon cassette itself before mounting it on the IBM 5400-006 printer. If you have already set the ribbon, go to "Mounting the Ribbon Cassette" on page 2-37.

Setting the Ribbon Cassette

- 1 Open the left and right cassette arms in the direction of the arrows. Make sure the ribbon passes through the cassette arm guides.

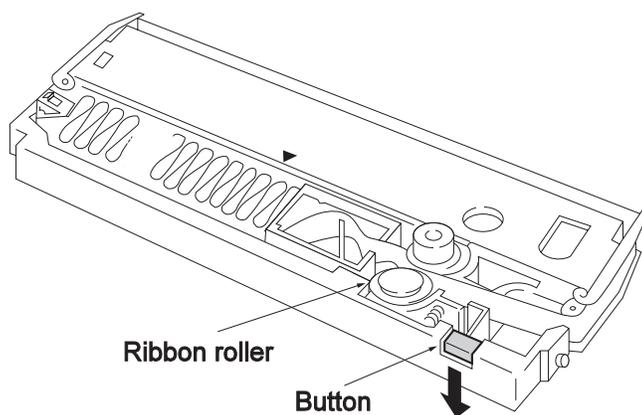


- 2 Open the ribbon cassette cover and remove the spacer in the direction of the arrow.

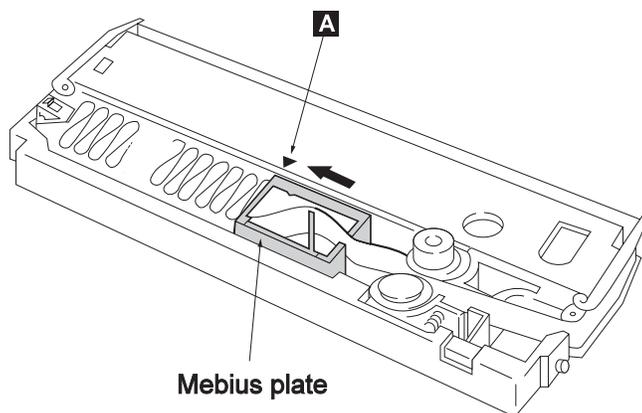


Replacing the Ribbon

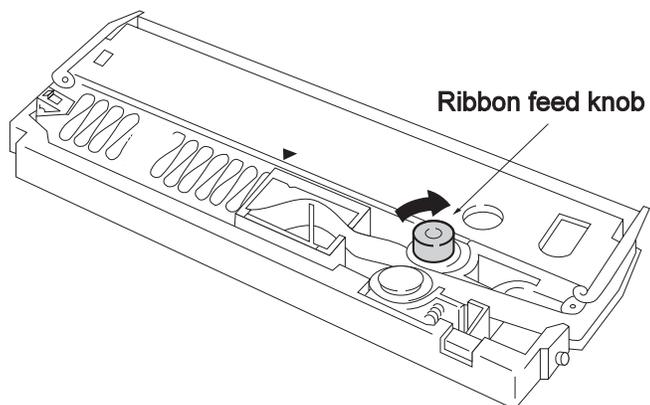
- 3** Push the button in the direction of the arrow to close the ribbon roller.



- 4** Align the mebius plate with the position indicated by **A**.



- 5** Turn the ribbon feed knob clockwise to take up ribbon slack.

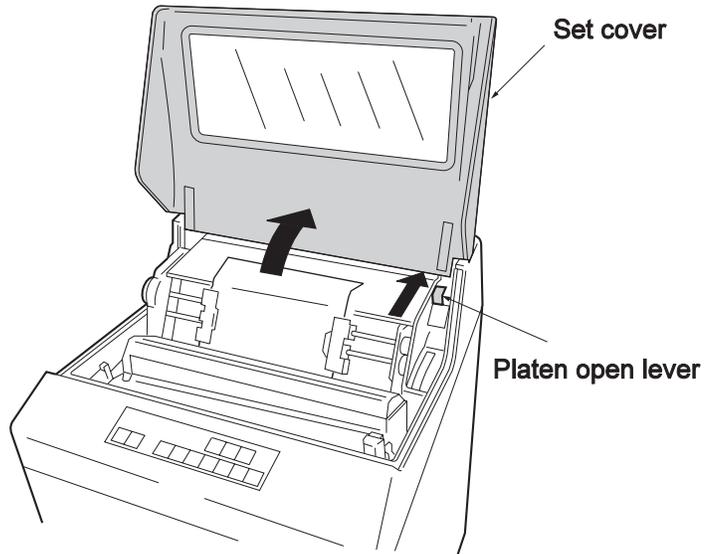


- 6** Close the ribbon cassette cover.

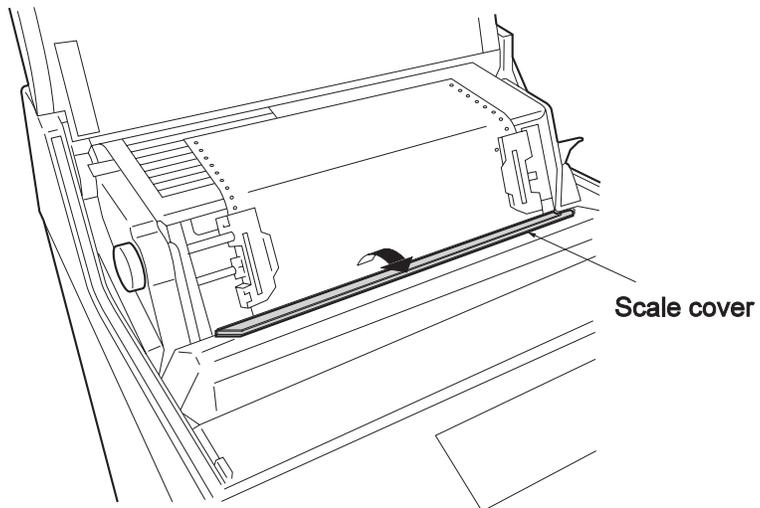
The ribbon cassette has been set. Now mount the ribbon cassette on the IBM 5400-006 printer

Mounting the Ribbon Cassette

- 1** Turn off the power.
- 2** Open the set cover and push the platen open lever backward to open the platen.

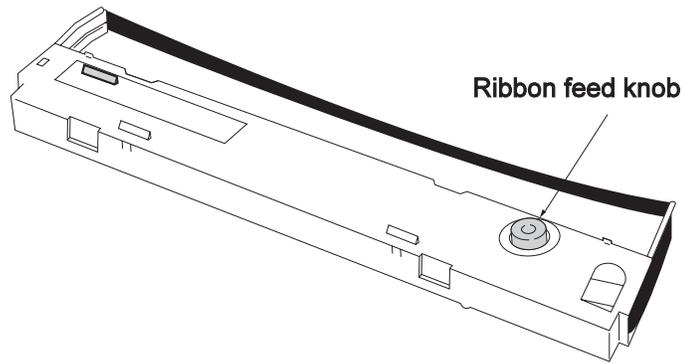


- 3** Open the scale cover in the direction of the arrow.

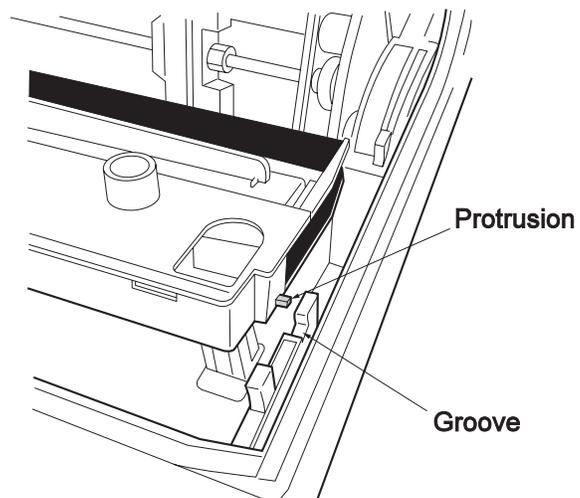


Replacing the Ribbon

- 4** Turn the ribbon feed knob clockwise to take up ribbon slack.

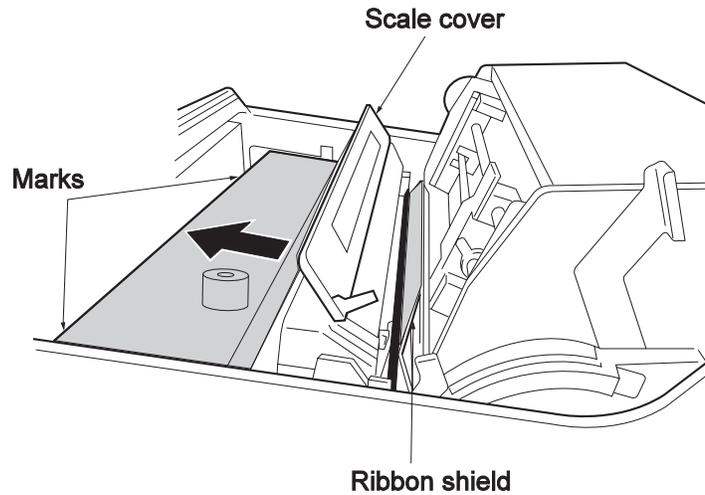


- 5** Insert the protrusions on the left and right of the ribbon cassette into the respective grooves.



6 Pull the ribbon cassette toward you to lock it. Then make sure of the following:

- The ribbon is set in front of the ribbon shield (thin metallic plate with holes).
- The arrow marks on the left and right are hidden.



7 Close the scale cover.

8 Pull the platen open lever toward you to close the platen.

9 Close the set cover.

After setting the new ribbon cassette, reset the ribbon life counter by holding down **Entry** and pressing **Cancel**.

You have finished setting and mounting the ribbon cassette.

Replacing the Ribbon

2.8.3 Refilling the Ribbon

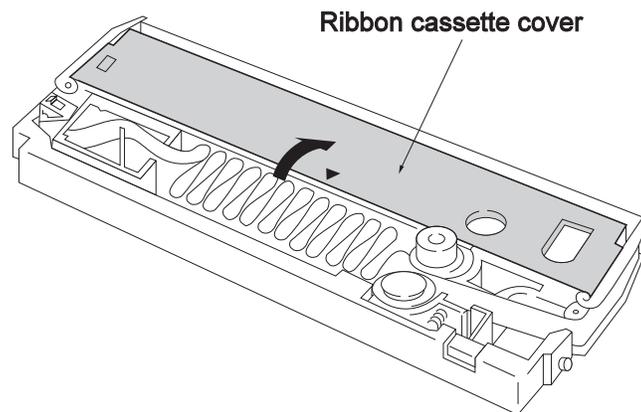
Use part number 09F4041.

Note

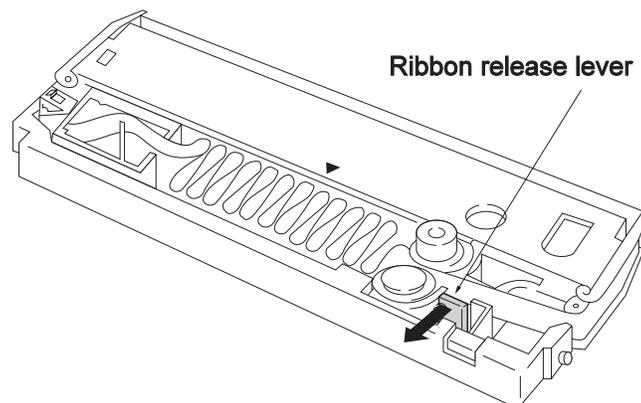
- If you touch the ribbon, your hand might be stained with ink. Wear gloves to keep your hands clean.
- The ribbon can be replaced in the same ribbon cassette up to 10 times. If the same ribbon cassette is used repeatedly, ribbon jams or printing problems (thin printing) might result. See the check label for the number of ribbon replacements.

1 Remove the ribbon cassette. Refer to 2.8.1, "Removing the Ribbon Cassette" on page 2-33.

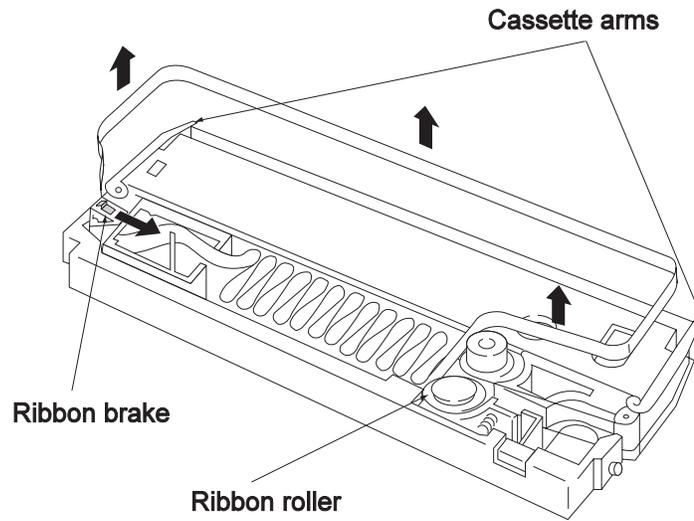
2 Open the ribbon cassette cover in the direction of the arrow.



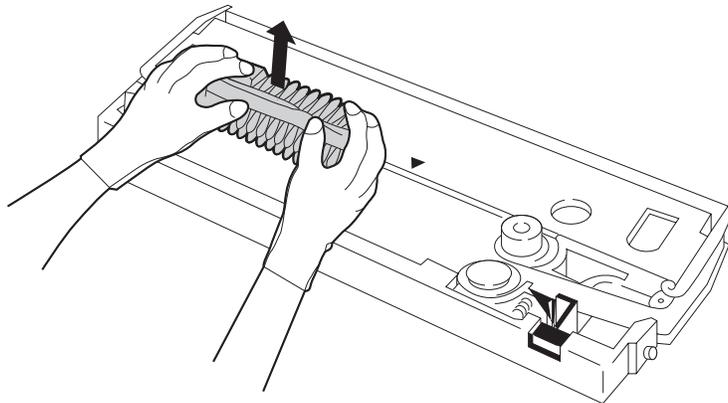
3 Pull the ribbon release lever toward you to open the ribbon rollers.



- 4** Carefully remove the ribbon from the roller and the left and right cassette arms.
- 5** While pushing the ribbon brake in the direction of the arrow, remove the ribbon.

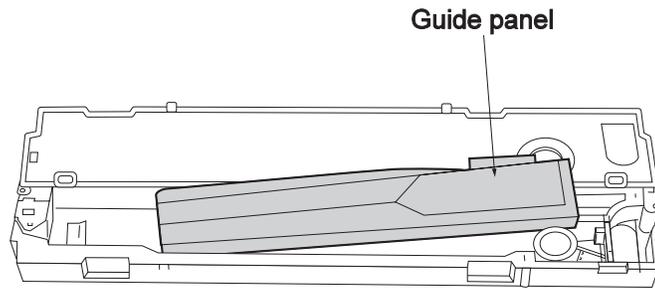


- 6** Take the ribbon out of the ribbon cassette. Put the used ribbon in the empty ribbon box.

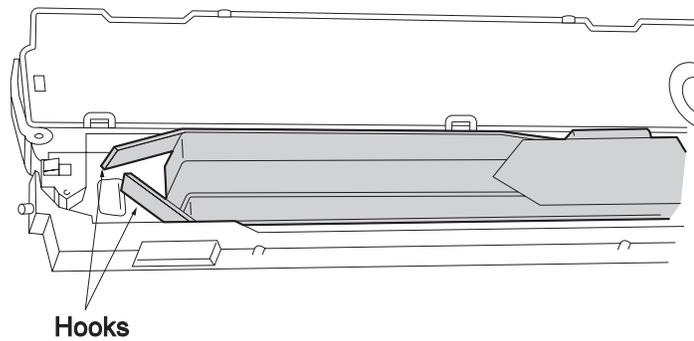


Replacing the Ribbon

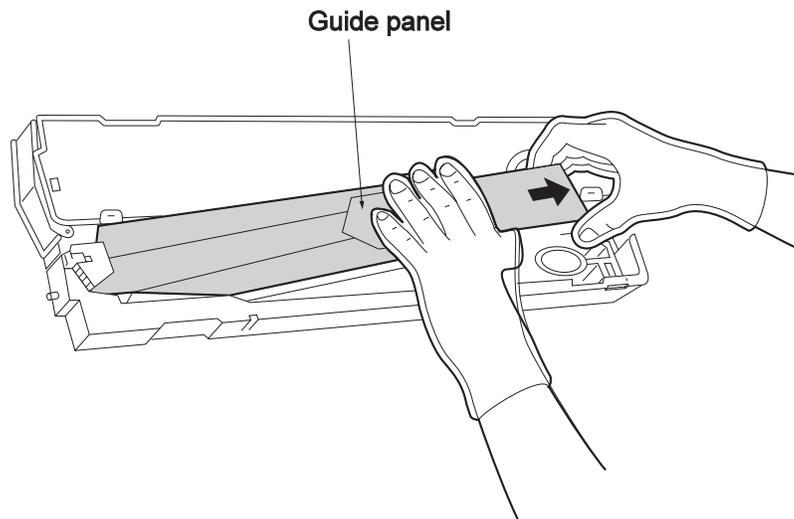
- 7** Remove the set cover of the ribbon refill. Put the ribbon refill in the ribbon cassette so that the guide panel is set on the right.



- 8** Remove the hooks on the left of the inside box of the ribbon refill.



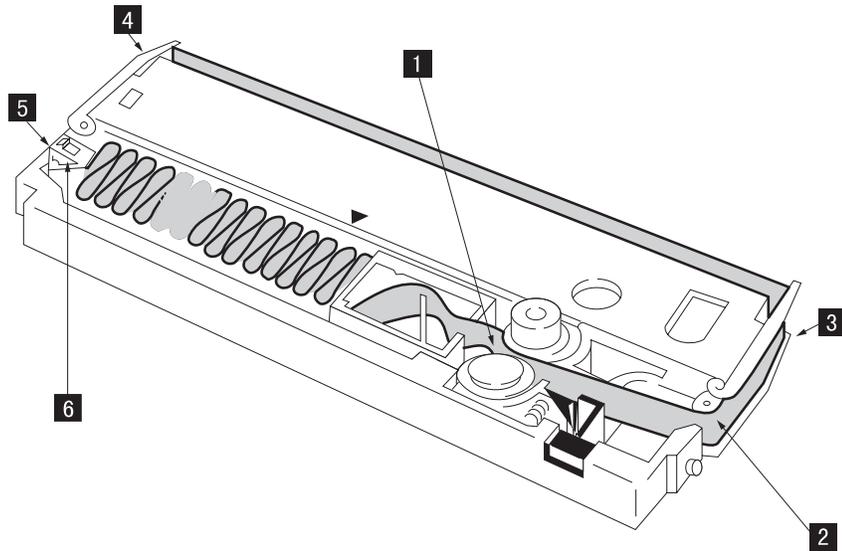
- 9** While holding the guide panel of the ribbon refill, pull the inside box in the direction of the arrow.



10 Thread the ribbon through **1** to **6** in order. For details, see the next page.

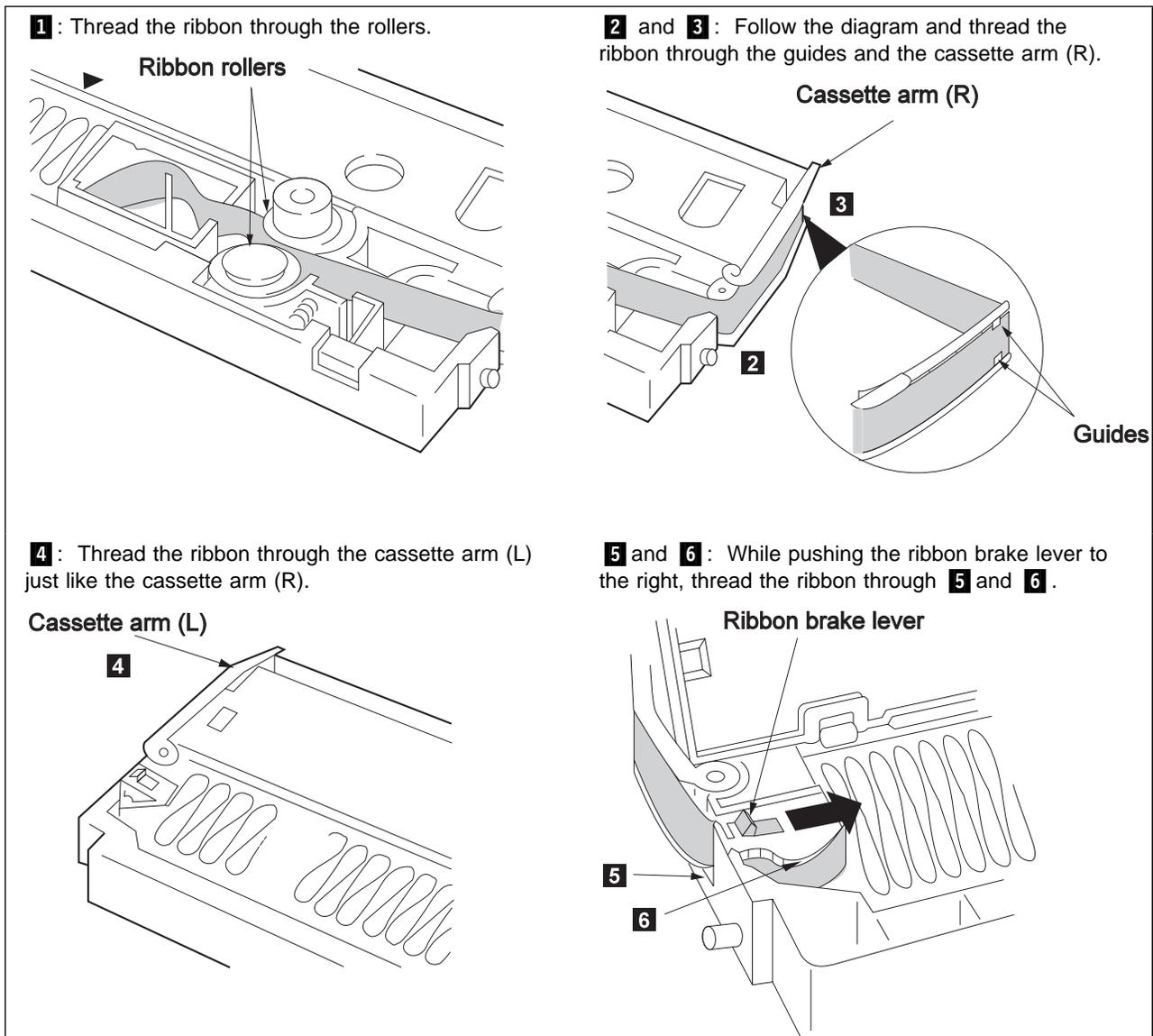
Note

- If the ribbon falls down, do not continue threading it.
- Do not twist the ribbon.

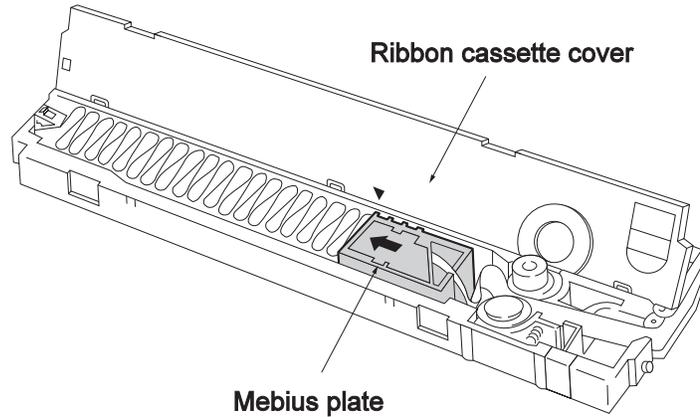


Replacing the Ribbon

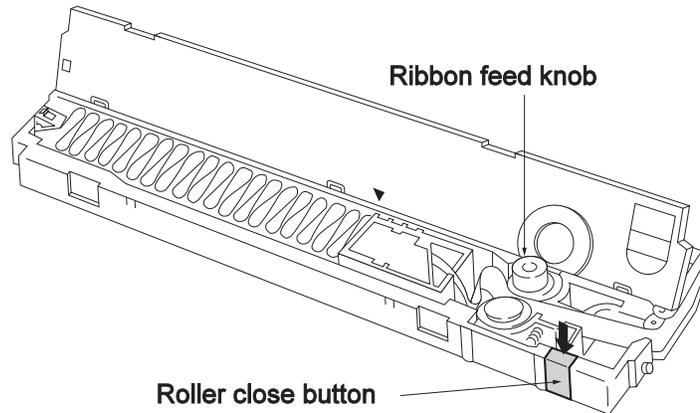
This page shows how to thread the ribbon through locations **1** through **6**.



- 11** Align the left of the mebius plate to the mark on the ribbon cassette cover. If part of the ribbon falls down, fix it.



- 12** Press the roller close button to close the roller.



- 13** Turn the ribbon feed knob clockwise to take up the ribbon slack.

Check Points

Make sure that:

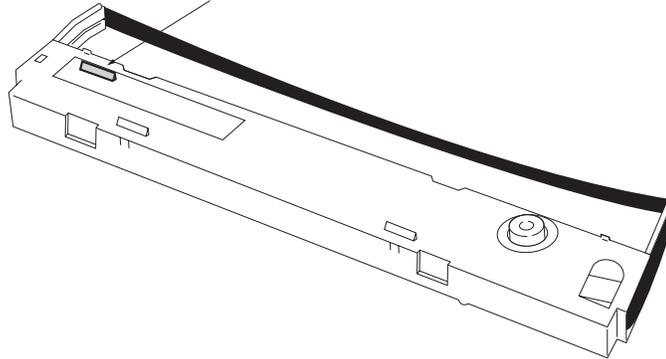
- the ribbon runs normally through the ribbon paths, **1** through **6**, and is restored in the ribbon cassette.
- no ribbon has fallen down in the ribbon cassette.
- the ribbon does not slacken through the ribbon paths **1** through **6**.

- 14** Close the ribbon cassette cover.

Replacing the Ribbon

- 15** Erase one of the numbers on the check label.

Ribbon Replacement Check Label



After setting a ribbon cassette, set the ribbon life counter by holding down **Entry** and pressing **Cancel**.

You are finished refilling the ribbon.

To set the ribbon cassette, see 2.8.2, "Setting and Mounting the Ribbon Cassette" on page 2-35.

2.9 Making Adjustments

It is necessary to adjust the IBM 5400-006 printer before operation or after the form is replaced.

This section describes the following adjustments:

- Print pressure
- Vertical position
- Horizontal position
- Form tension

If you adjust the printer with the power on, make sure the printer is in not ready status.

Note

If you open the platen open lever to check printing while printing is in progress, the form might slacken, causing printing problems when printing is resumed.

2.9.1 Adjusting the Print Pressure

Use the form thickness adjustment lever to adjust the print pressure. (See the next page.)

Refer to the following table when adjusting the form thickness adjustment lever.

Note

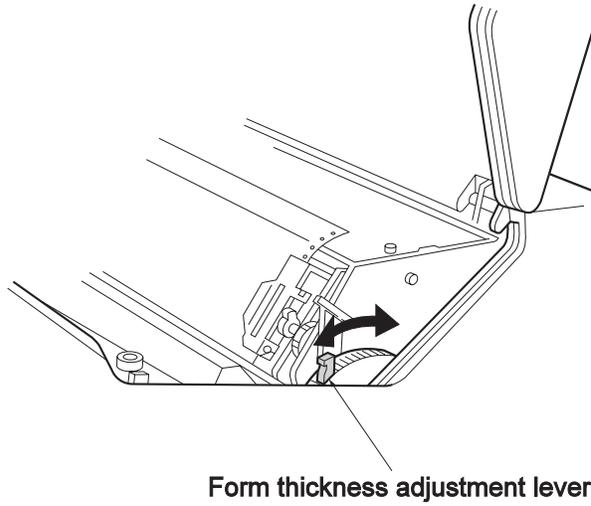
This table indicates the standard. To determine the appropriate position for best print quality, see 2.10, "Test Printing" on page 2-54.

| Form Type | | Lever Set Position |
|-----------|--------------|--------------------|
| 1P | 55kg ~ 70kg | 1 ~ 2 |
| | 90kg ~ 135kg | 2 ~ 3 |
| 2P | 30kg ~ 45kg | 1 ~ 2 |
| 3P | 30kg ~ 45kg | 2 ~ 3 |
| 4P | 30kg ~ 34kg | 3 ~ 4 |
| 5P | 30kg ~ 34kg | 3 ~ 5 |
| 6P | 30kg ~ 34kg | 4 ~ 6 |
| 7P | 30kg ~ 34kg | 4 ~ 6 |
| 8P | 30kg ~ 34kg | 5 ~ 7 |

Making Adjustments

Caution

If you are using thick paper and the lever is set to an extremely low position, printer trouble might be caused in addition to paper or ribbon jam.



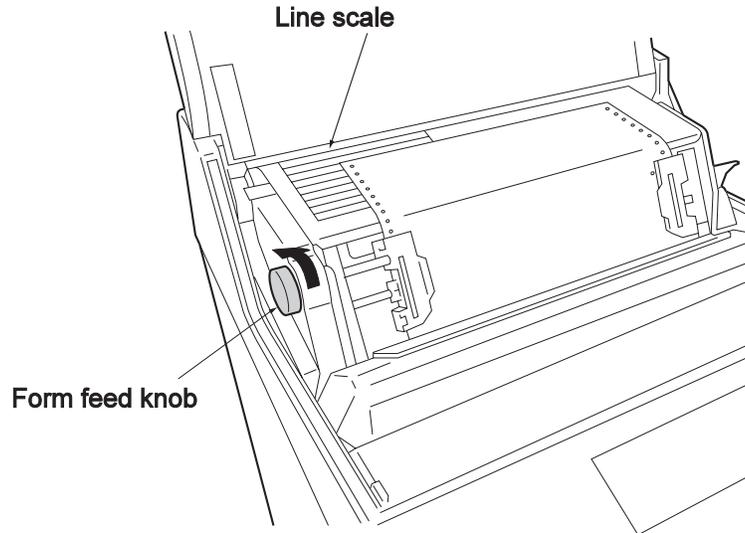
2.9.2 Adjusting the Vertical Position

Adjust the vertical position of the form by doing the following:

1 Press **Stop**. The Start lamp turns off.

2 Open the set cover. Turn the form feed knob to adjust the first line of printing.

Note: To feed the forms backward with the form feed knob, press the platen open lever backward to open the platen.



3 Use **Step Feed Up** and **Step Feed Down** for fine adjustment.

- Each time you press one of the step feed switches, the form moves about 0.14 mm (1/180 inch).
- To continuously feed the form, hold down **Form Feed Up**.

Note: If the form is fed backward using Form Feed Down, the form slackens.

To eliminate slack:

- a. Push the platen open lever backward, open the front door, and pull the form from the bottom.
- b. Return the platen open lever to the original position and close the front door.

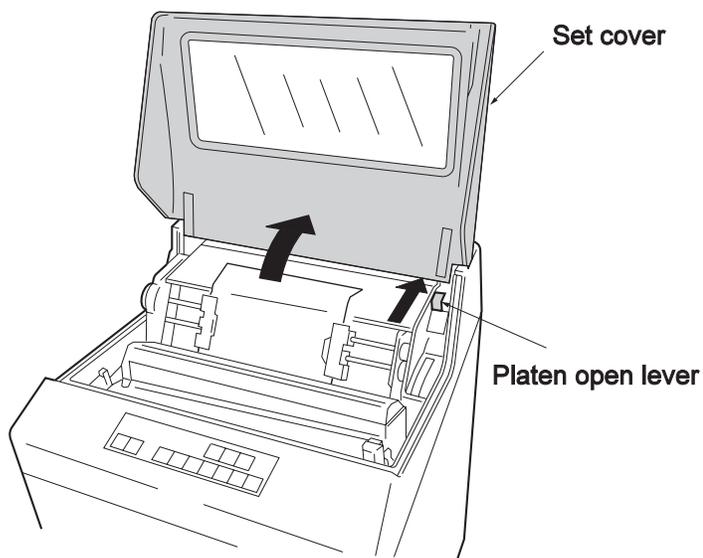
4 Close the set cover.

2.9.3 Adjusting the Horizontal Position

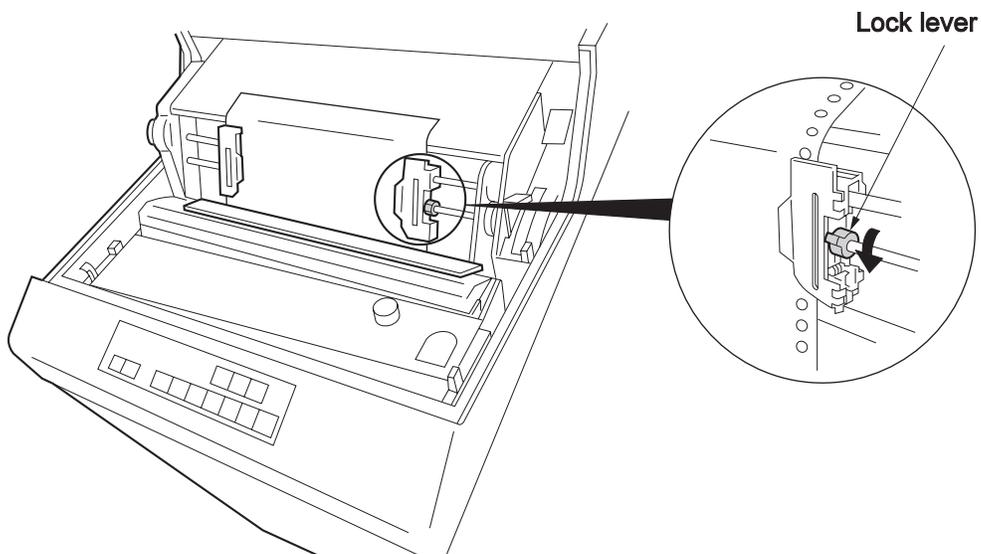
To adjust the horizontal position of the form, do the following:

Note: If the horizontal position has been changed by a large amount, open the front door and adjust the horizontal position at the form stand to match that of the tractors. Failure to do this might result in a paper jam.

- 1** Press **Stop**. The Start lamp turns off.
- 2** Open the set cover and push the platen open lever backward to open the platen.



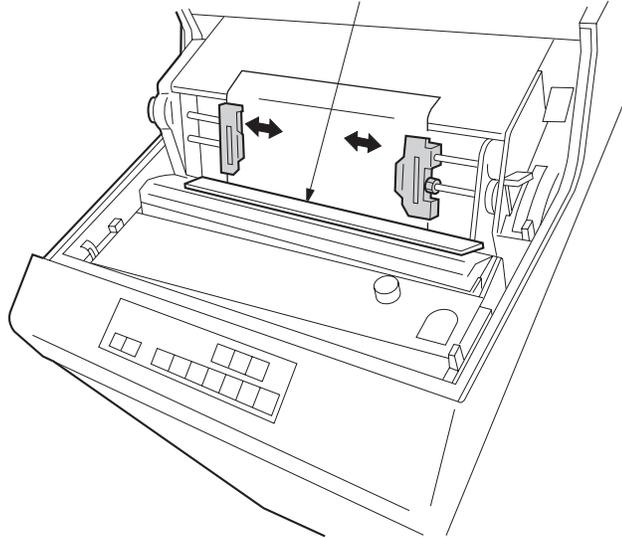
- 3** Pull the left and right tractor lock levers toward you to unlock the tractors.



4 Adjust the position of the tractors by displacing the form and the tractors.

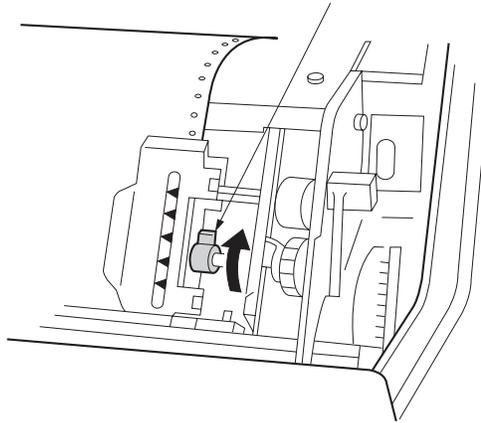
Note: Refer to the print position scale for the form position adjustment. The first character is printed at the 1.

Print position scale



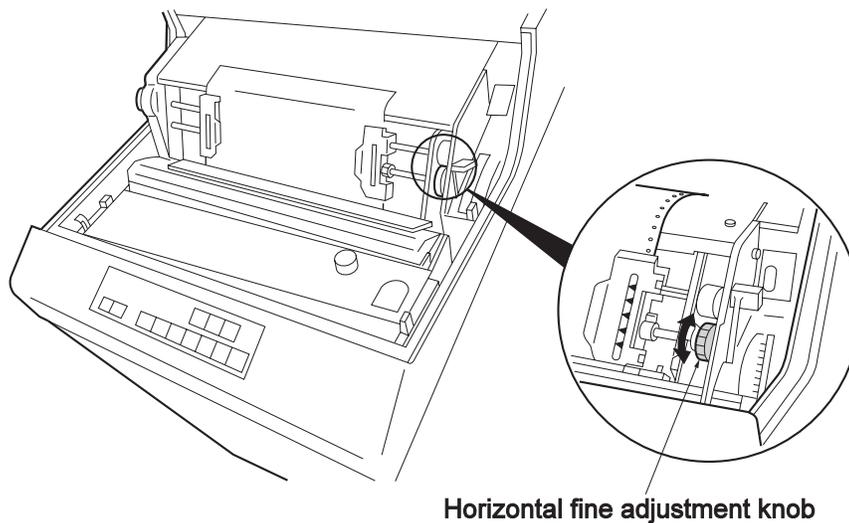
5 Secure the tractors with the left and right lock levers.

Lock lever

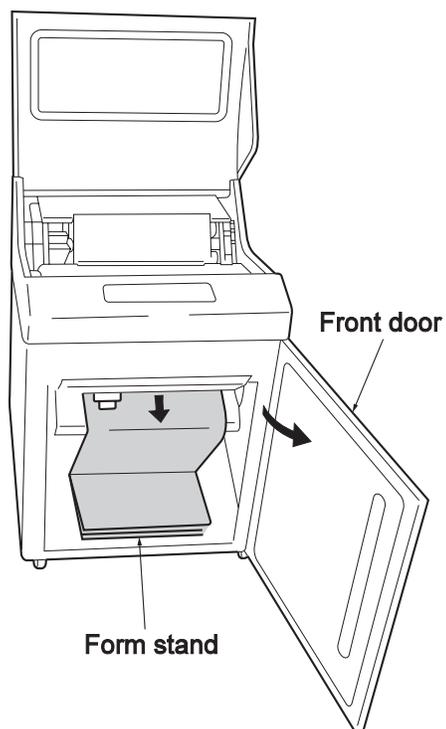


Making Adjustments

- 6** Turn the horizontal fine adjustment knob to make adjustments of up to about 5 mm.



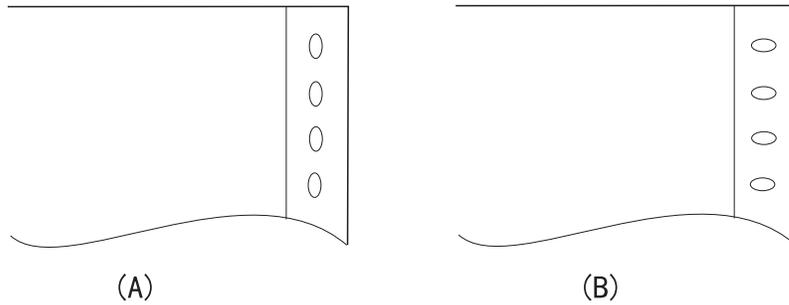
- 7** Open the front door. Pull out the form in the direction of the arrow to eliminate slack.



- 8** After completing form adjustment, pull the platen open lever to close the platen and close the set cover.

2.9.4 Adjusting Form Tension

To judge if the form tension is optimum, check the shape of the tractor holes of printed form. Check if the tractor holes are similar to (A) or (B) below.



(A) If the tractor holes are broadened vertically, the vertical tension is too strong. Increase the form thickness adjustment lever one gradation.

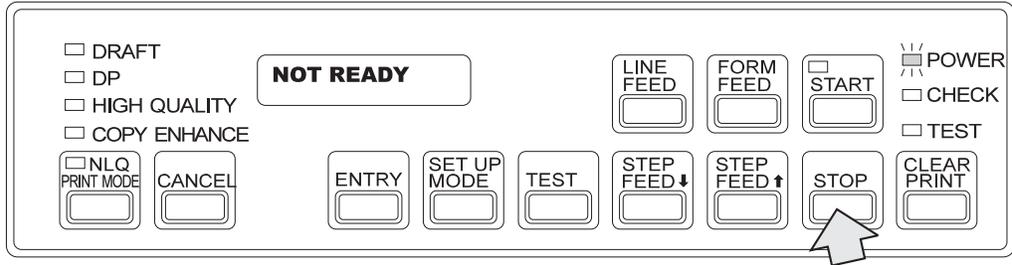
(B) If the tractor holes are broadened horizontally, the horizontal tension is too strong. Unlock the right tractor and weaken the form tension slightly.

If the tractor holes are not broadened and the form is not slackened, the form tension is correct.

2.10 Test Printing

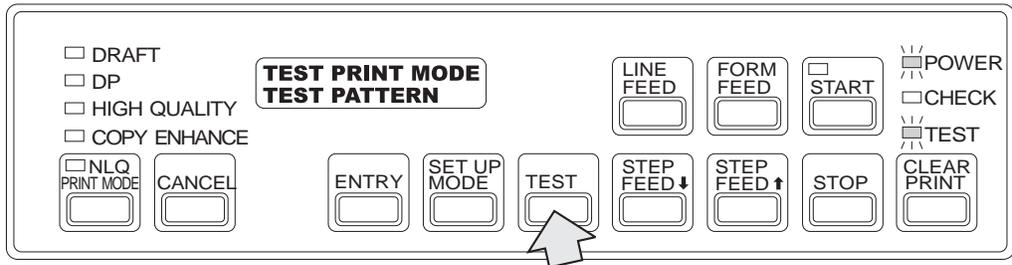
Run a printing test after installing the printer, before starting operation, or if print quality is poor. To run a print test, do the following:

- 1** If the Start lamp is on, press **Stop**. The Start lamp turns off.

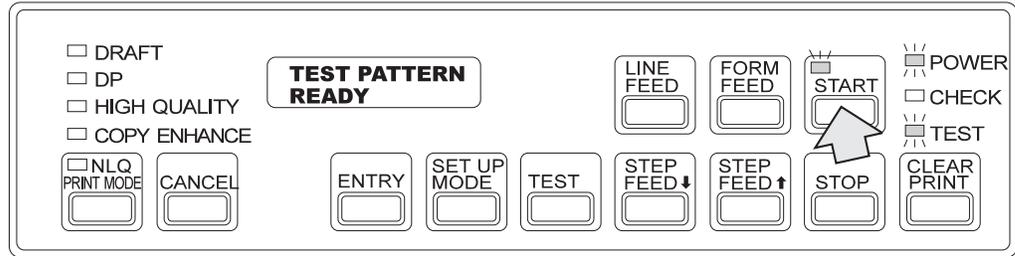


- 2** Make sure that the printing form width is 15 inches. If a narrower form is set, replace it with a 15 inch form. See (2.6, "Unloading and Setting the Printing Form.")

- 3** Press **Test**. The Test lamp lights up and the following message is displayed on the LCD.

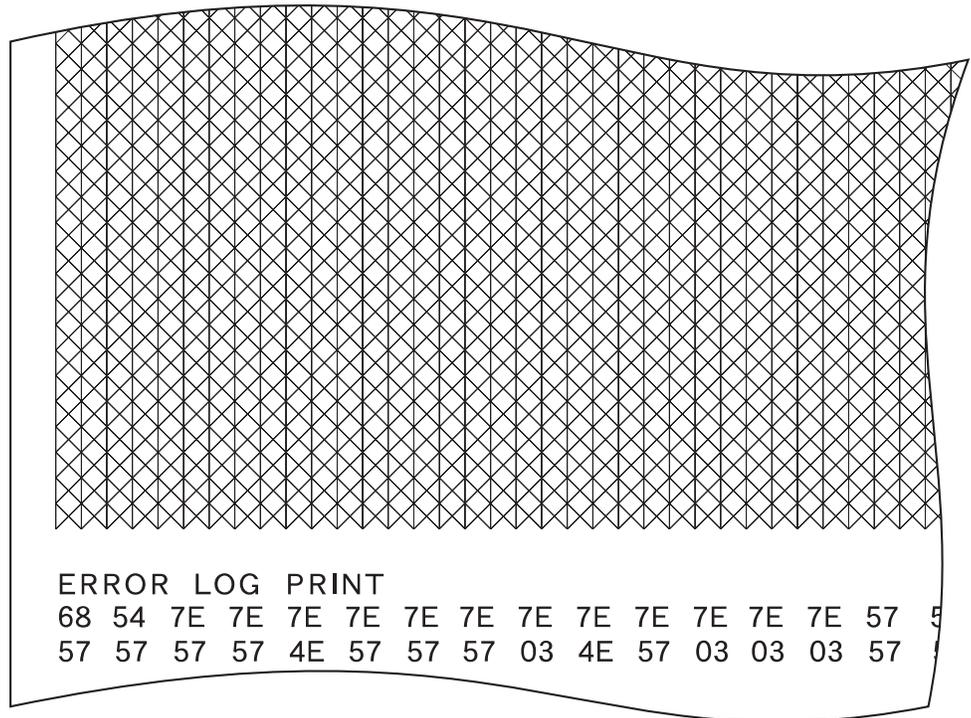


4 Press **Start**. The Start lamp lights up and a test pattern is printed.



Note: The test automatically stops after one page of 11 inch (279 mm) form is printed. To stop printing halfway, press **Stop**. If you stop printing halfway, the first line position is then displaced.

5 Check the print quality with the following test pattern. If print quality is poor, see Chapter 3, "Problem Determination Procedure."



6 Hold down **Stop** and press **Cancel** to stop the test.

Note: All characters can be printed in the print test. To print all characters according to the currently selected emulation mode, after step 3 press **STEP FEED UP** or **STEP FEED DOWN** to show ALL CHARACTER in the lower part of the message. Then press Start to print all the characters.

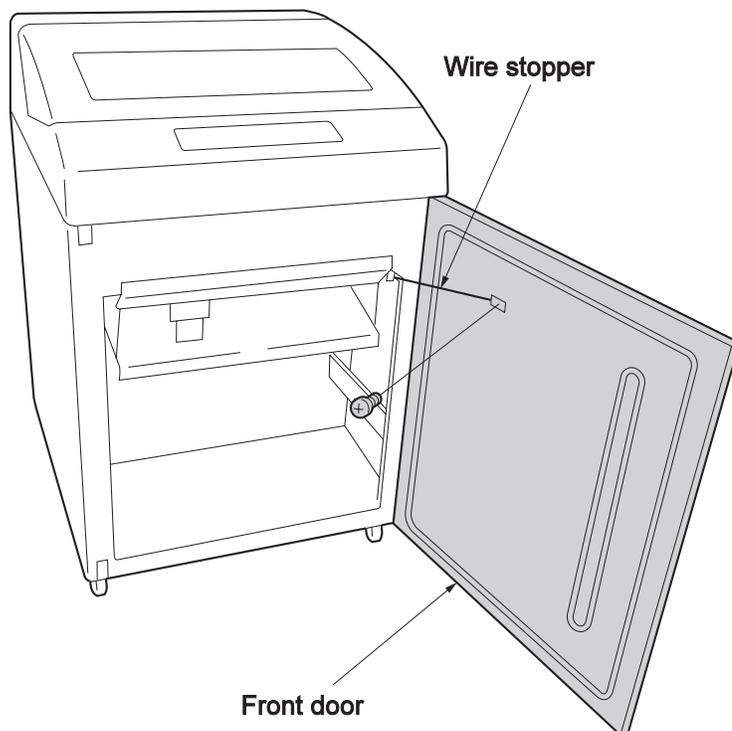
2.11 Changing the Door Direction

You can change the direction that the front and back doors open by replacing the hinges.

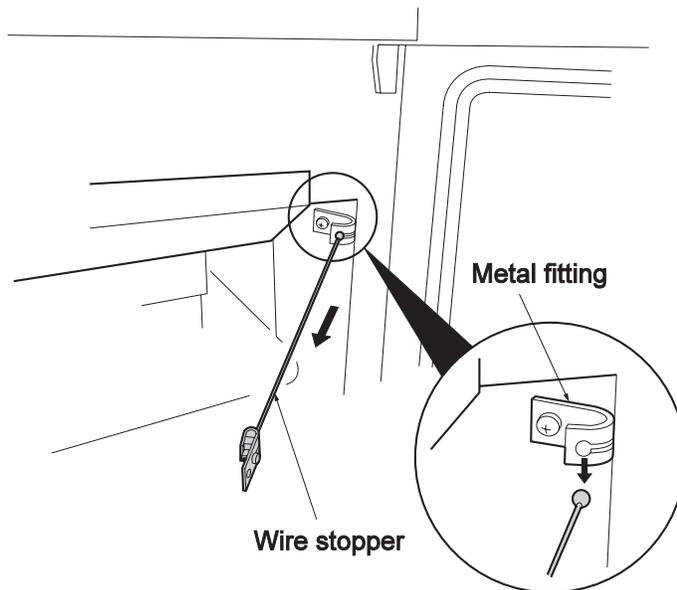
Note: Use a Phillips screwdriver (#2). Do not lose the screws.

2.11.1 Changing the Front Door

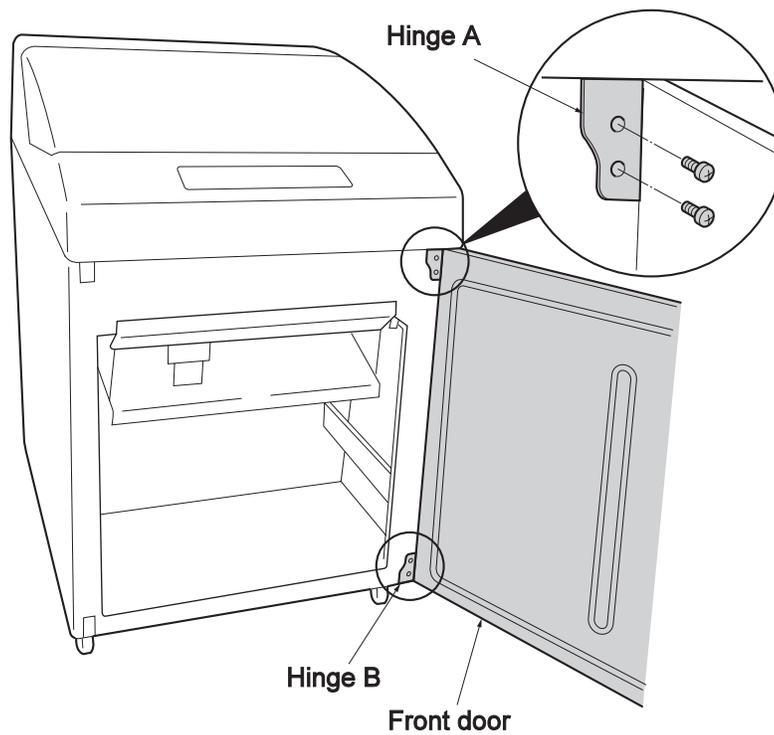
- 1** Turn off the power.
- 2** Open the front door.
- 3** Remove the two screws and remove the two metal fittings fixing the wire stopper.



- 4** As shown below, remove the wire stopper from the metal fittings.



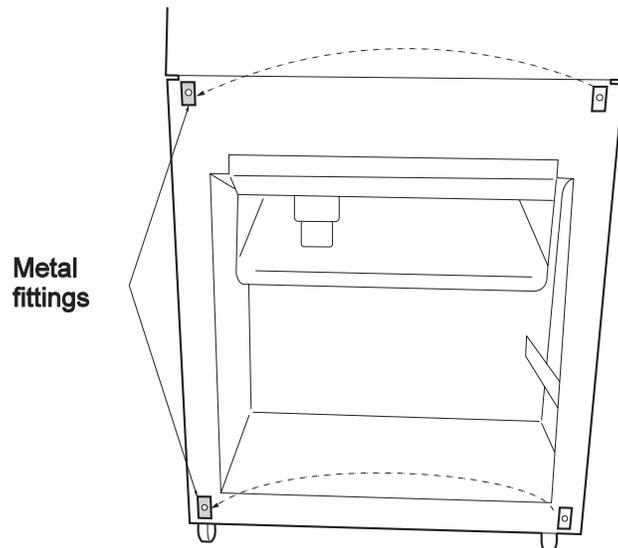
- 5** Holding the front door open, remove the two screws, the hinge A, and the front door.



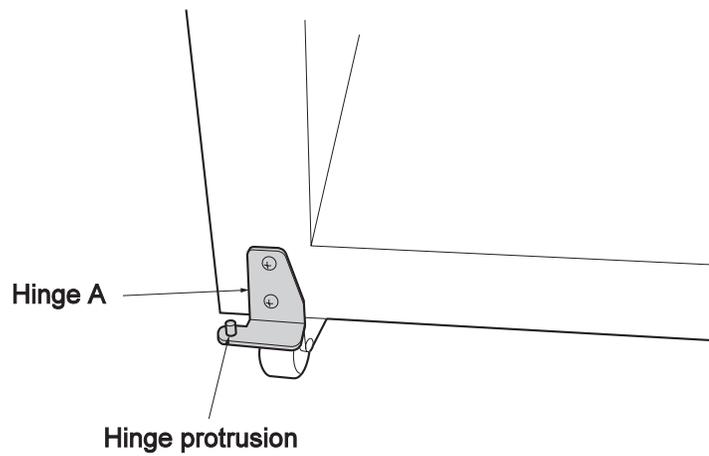
- 6** Remove hinge B following the same procedure.

Changing the Door Direction

- 7 Remove the metal fittings for the magnets and attach them to the opposite side.

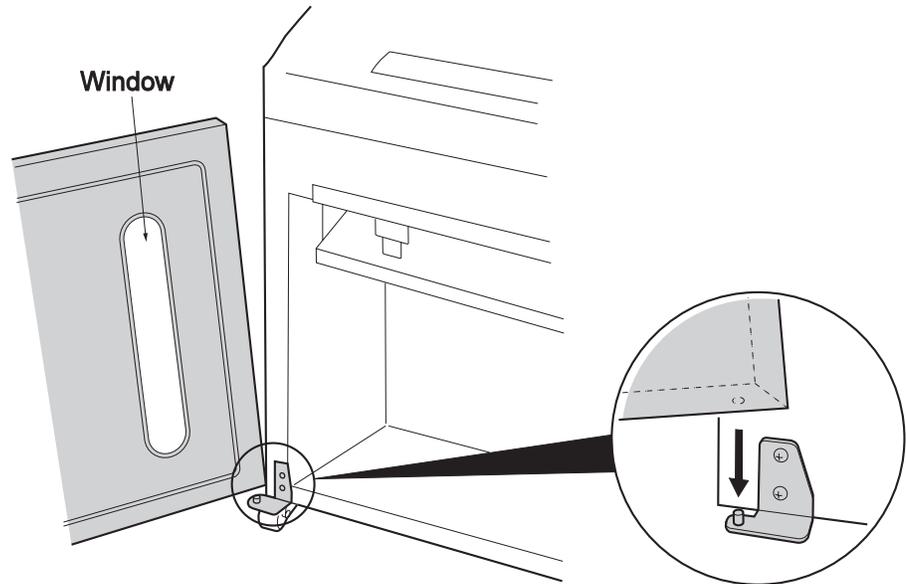


- 8 Fix hinge A to the lower side with two screws. Make sure that the protrusion of the hinge is on the left side.

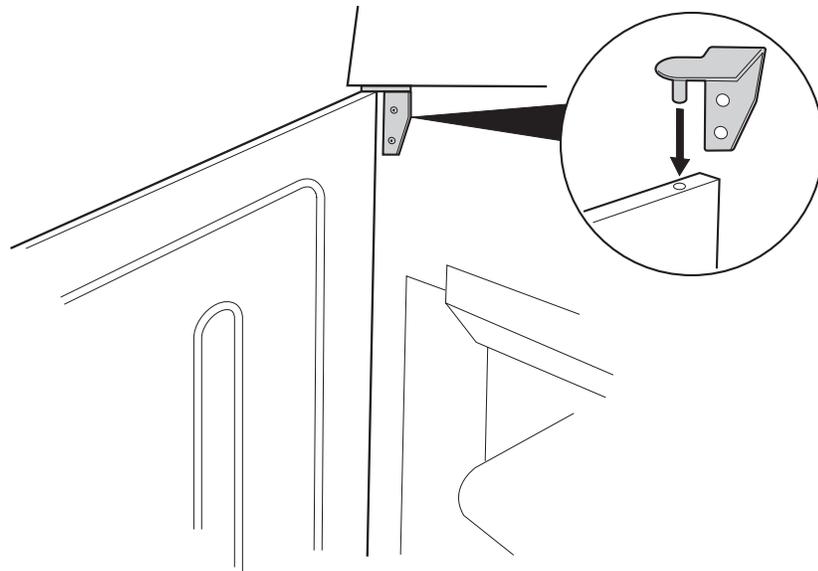


- 9** Insert the hinge protrusion in the hole at the bottom of the door.

Note: Set the front door so that the window is on the left when the door is closed.

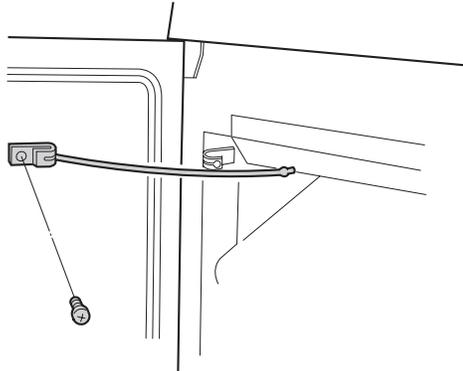


- 10** Insert the protrusion of hinge B in the hole at the top of the door and fix the hinge with two screws.

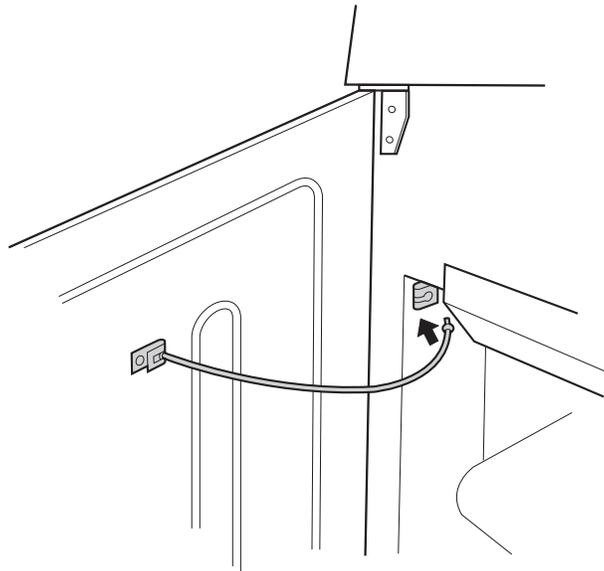


Changing the Door Direction

- 11** Fix the metal fittings and wire stopper, removed in the previous steps, to the opposite side with screws.



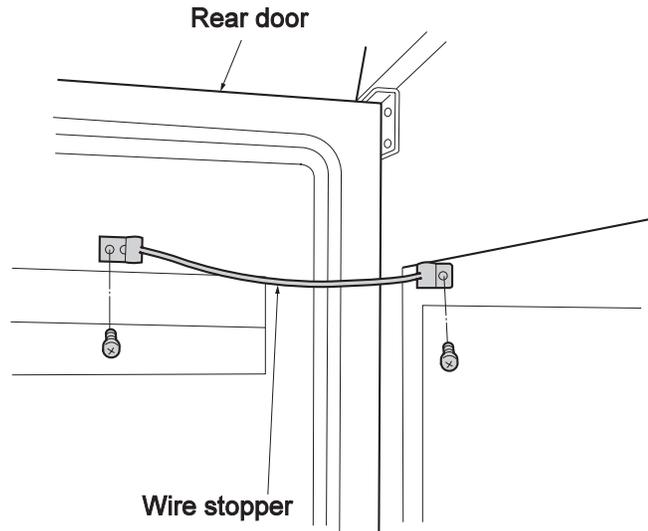
- 12** Insert the edge of the wire stopper to the hole of the metal fittings.



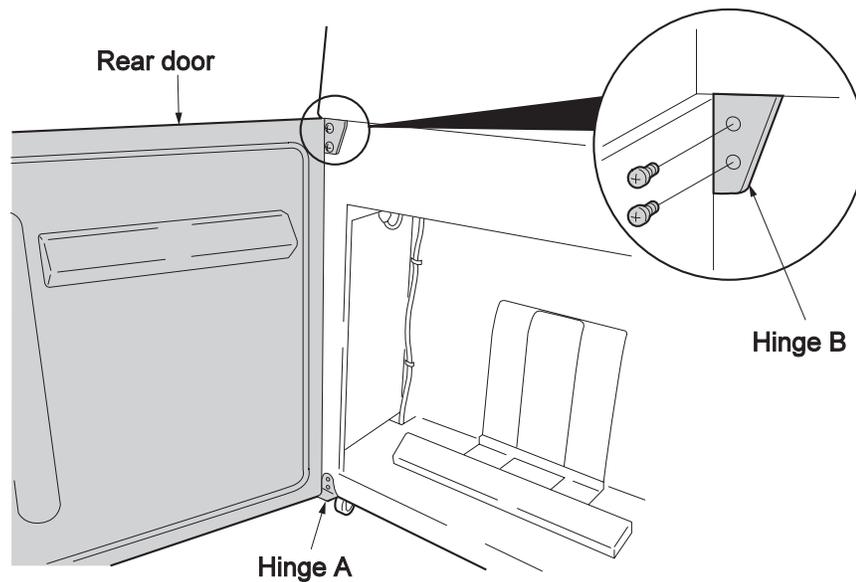
You have finished changing the direction of the front door. Make sure that the door can be opened and closed smoothly. If not, adjust the hinge position.

2.11.2 Changing the Rear Door

- 1** Turn off the power.
- 2** Open the rear door.
- 3** Remove the two screws and remove the two metal fittings fixing the wire stopper.



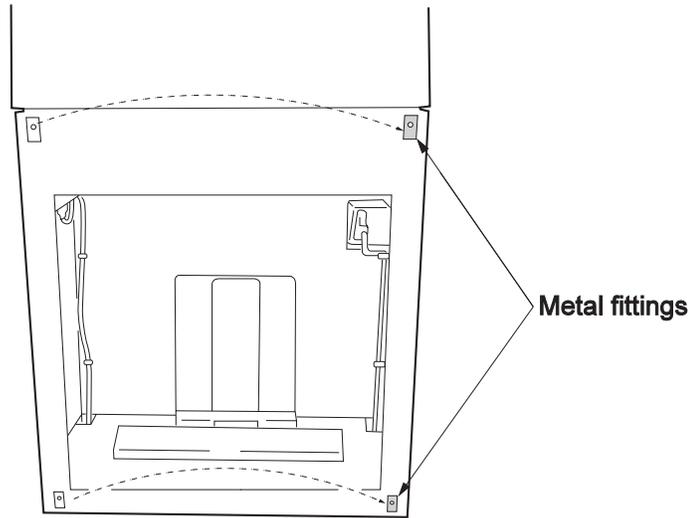
- 4** Holding the rear door, remove the two screws that hold hinge B. Then, remove the rear door.



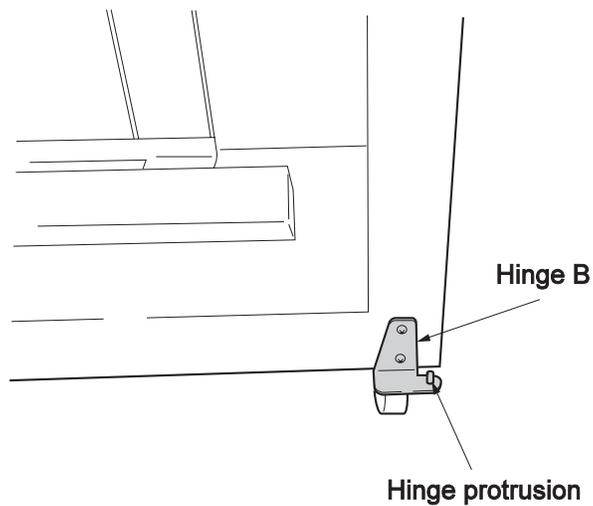
- 5** Remove the two screws from hinge A.

Changing the Door Direction

- 6** Remove the metal fittings for the magnets and attach them to the opposite side.

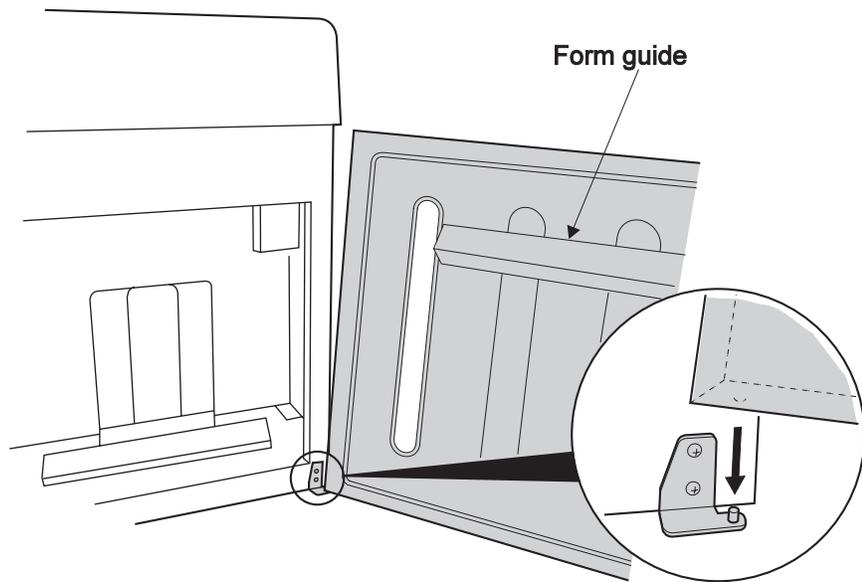


- 7** Fix hinge B to the opposite side with two screws. Make sure the protrusion of the hinge is on the right side.

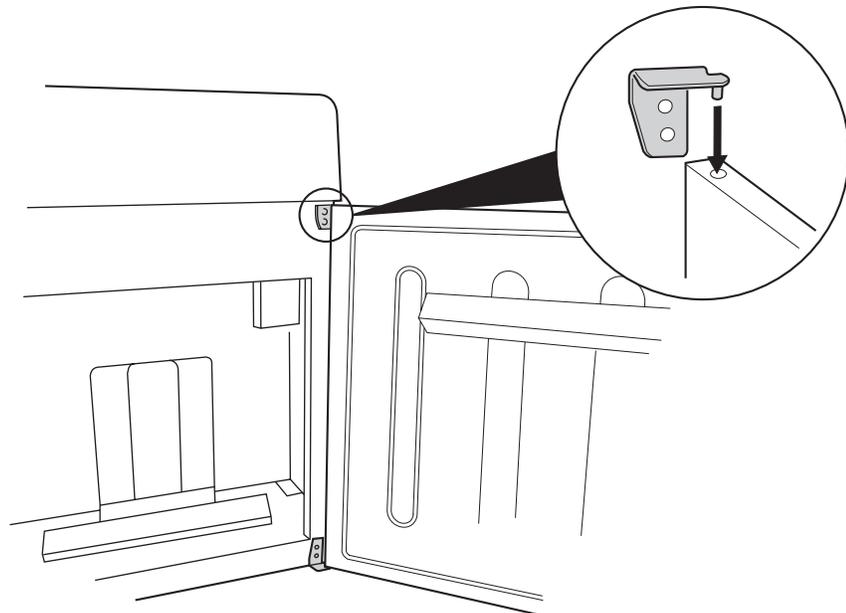


8 Insert the protrusion of hinge B in the hole on the rear door.

Note: Make sure the form guide is on the top of the rear door.

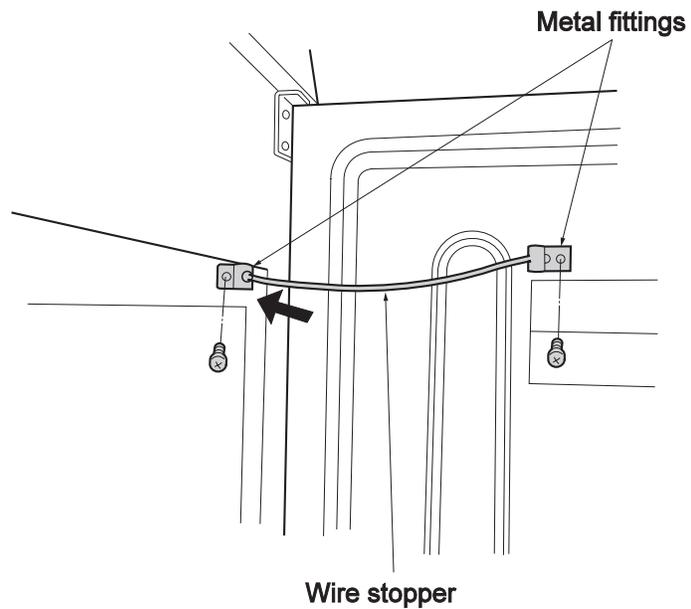


9 Insert the protrusion of hinge A in the rear door and fix the hinge with two screws.



Changing the Door Direction

- 10** Fix the metal fittings with the screws. Then, fix the wire stopper in the metal fittings.



You have finished changing the direction of the rear door. Make sure that the door can be opened and closed smoothly. If not, adjust the hinge position.

2.12 Initializing the Printer

The IBM 5400-006 printer can be initialized by using the **Set Up Mode** and **Entry** switches.

2.12.1 Switches used for Initialization and Their Functions

The following lists the switches used for initialization.

| Switch | Function |
|-----------------------|--|
| Set Up Mode | <ul style="list-style-type: none"> Enter initialization mode. Select initial item. <p>Each time you press this switch, the initial set item is displayed in order of the table of initial set items.</p> |
| Step Feed Up | <ul style="list-style-type: none"> Select the initial value. <p>Each time you press this switch, the initial value is displayed in order of the table of initial set items.</p> |
| Step Feed Down | <ul style="list-style-type: none"> Select the initial value. <p>Each time you press this switch, the initial value is displayed in reverse order of the table of initial set items.</p> |
| Entry | <ul style="list-style-type: none"> Writes the initial value of the currently displayed initial set item. However, writing does not occur at this time. |
| Cancel | <ul style="list-style-type: none"> Ends initialization. If initial values are changed, writes the value set in the IBM 5400-006 printer memory. While writing, "WRITING SET UP PLEASE WAIT" is displayed on the LCD. <p>Note: If writing is selected by pressing Entry, the IBM 5400-006 printer begins a self-test after the initial values are written in the memory. If writing is not selected, the printer returns to the settings before Set Up Mode was pressed.</p> |
| Line Feed | <ul style="list-style-type: none"> Select the initial set item. <p>Each time you press this switch, the initial value is displayed in reverse order of the table of initial set items.</p> |

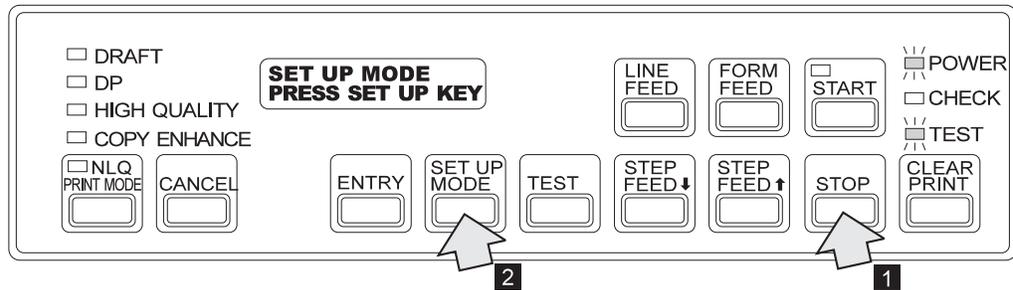
2.12.2 Initialization Procedure Example

Initialization procedures are described below.

The following is an example of how to change the print mode from NLQ to DP.

Note: For an explanation of the switches used for initialization and their functions, see 2.12.1, "Switches used for Initialization and Their Functions" on page 2-65.

1 Press **Stop** **1**, then **Set Up Mode** **2**. The following message is displayed:



Press **Set Up Mode** again. Initialization begins.

On the LCD, the upper row indicates the initial set item and the lower row indicates the initial value.

- To change the initial set item, press **Set Up Mode**. If you press **Line Feed**, the preceding initial set item is displayed on the LCD.
- To change the initial value, press **Step Feed Up** or **Step Feed Down**.

2 Press **Set Up Mode** to select the item you want to change.

Each time you press **Set Up Mode**, the initial item displayed on the upper row on the LCD changes. To change the print mode, press **Set Up Mode** until "PRINT MODE" is displayed in the LCD.

An initial value is already set. In this example, the value is NLQ print mode. The following message is displayed on the LCD:

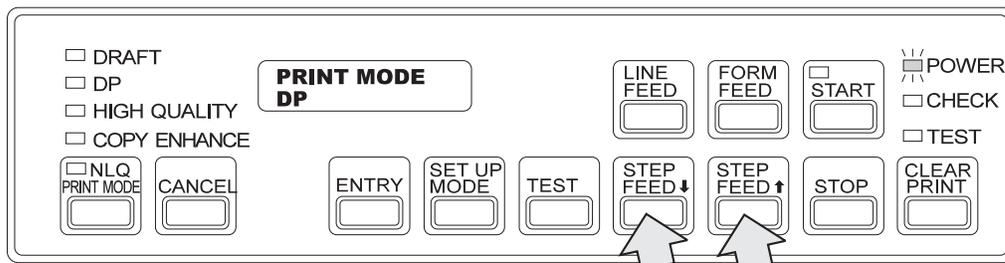


Note: For details on the initial set item displayed on the LCD, see 2.12.3, "Initial Set Items" on page 2-68.

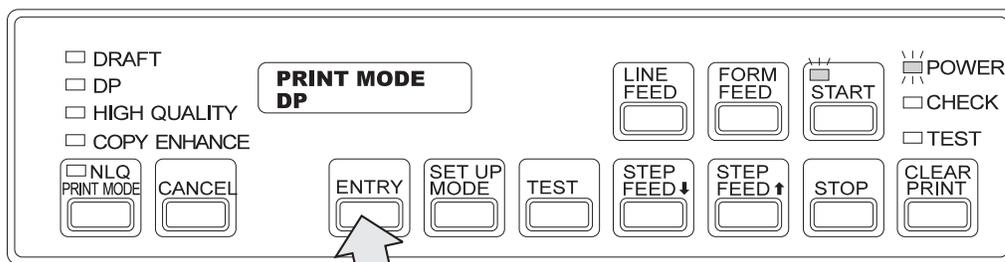
3 Press **Step Feed Up** or **Step Feed Down** to display the initial set value.

Each time you press **Step Feed Up** or **Step Feed Down**, the initial value on the lower row of the LCD changes. To set the DP mode, press **Step Feed Up** or **Step Feed Down** until "DP MODE" is displayed on the LCD.

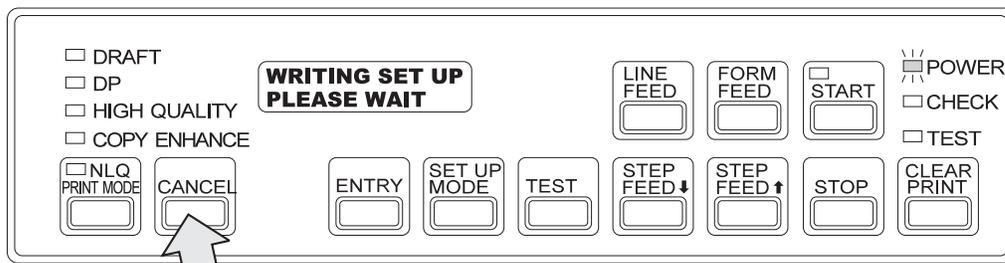
Note: For details about the initial values displayed on the LCD, see 2.12.3, "Initial Set Items" on page 2-68.



4 Match the initial set item with the initial value and press **Entry**. The initial value is written to the IBM 5400-006 printer memory and the Start lamp lights up.



5 To write the changes into the printer memory, press **Cancel**. The following message is displayed in the LCD.



After the initialization is complete, the IBM 5400-006 printer returns to the status set just after the power was turned on. (See 2.3.1, "Powering On" on page 2-9.)

Initializing the Printer

2.12.3 Initial Set Items

At the beginning of initialization, the common interface set items are displayed.

- If Parallel Port is selected, the parallel port common items are shown and the printer proceeds to the common items selected in the emulation mode set items.
- If System Port is selected, the printer proceeds to the system port set items.

The following table shows the initial set items; underscored items show settings at shipment:

Common Items

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|------------------|-----------|-------------------------------------|-------------------------------------|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 1 | Interface Port | Interface | Parallel Port <u>System Port</u> | Parallel Port <u>System Port</u> |

Parallel Port Common Items

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|------------------|------------------------------|---|---|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 2 | Emulation | Emulation | <u>5577</u> ESC/P-C Mode | <u>5577 mode</u> ESC/P-C mode |
| 3 | FORM LENGTH | Form Length (Page Length) | 3 inches 3 2/3 inches 4 inches 4.5 inches 5 inches 5.5 inches 5 2/3 inches 6 inches 7 inches 8 inches 8.5 inches 9 inches 10 inches <u>11 inches</u> 12 inches 14 inches | 3 inches 3 2/3 inches 4 inches 4.5 inches 5 inches 5.5 inches 5 2/3 inches 6 inches 7 inches 8 inches 8.5 inches 9 inches 10 inches <u>11 inches</u> 12 inches 14 inches |
| 4 | LINE PITCH | Line Feed Depth | 2 LPI 3 LPI 4 LPI 5 LPI <u>6 LPI</u> 7.5 LPI 8 LPI | 2 lpi 3 lpi 4 lpi 5 lpi <u>6 lpi</u> 7.5 lpi 8 lpi |
| 5 | PRINT MODE | Print Mode Setting | <u>NLQ PRINT MODE</u> COPY ENHANCE HIGH QUALITY DP DRAFT COPY ENHANCE + HIGH QUALITY COPY ENHANCE + DP COPY ENHANCE + DRAFT | <u>NLQ Print Mode</u> Copy Enhance Mode High Quality Mode DP Mode Draft Mode Copy Enhance + High Quality Mode Copy Enhance + DP Mode Copy Enhance + Draft Mode |

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|------------------|----------------------------------|--|---|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 6 | MPP | Maximum Printing Width | MAX 8 INCH MAX 13.2 INCH MAX 13.6 INCH | Maximum 8 inches Maximum 13.2 inches Maximum 13.6 inches |
| 7 | BUZZER | Alarm Volume | ON (CONTINUOUS) ON (INTERMITTENT) OFF | Continuous Intermittent Off |
| 8 | SKIP PERFORATION | Skip Perforation | OFF ON | Off On |
| 9 | UNI-DIR. COMMAND | Uni-direction Printing Accept | EFFECTIVE IGNORE | Accept Command Refuse Command |
| 10 | Ribbon pre-alarm | Ribbon Counter | 50% - - 100% - - 200% | 50% - At 10% intervals - 100% - - 200% |
| 11 | COPY ENHANCE | Copy Enhance | LEVEL 1 LEVEL 2 LEVEL 3 LEVEL 4 LEVEL 5 | Level 1 Level 2 Level 3 Level 4 Level 5 |

5577 Mode Items

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|-------------------|-------------------------------|---|--|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 12 | SBSC FONT | Alphanumeric Character Set | SONG (12CPI) SONG (10CPI) SONG (8 LPI) GOTHIC OCR-B CONDENSE COURIER ELITE DP GOTHIC | SONG (12 cpi) SONG (10 cpi) SONG (8 LPI) GOTHIC OCR-B CONDENSE (18 cpi) COURIER ELITE DP GOTHIC |
| 13 | FONT ROTATION | Font Rotation | HORIZONTAL VERTICAL | Horizontal Vertical |
| 14 | OVERLAP AREA | Overlap Area | ERASE WRITE Overwrite | ERASE WRITE Overwrite |
| 15 | IMAGE WRAP | Image wrap | ON OFF | Wrap Do not wrap |
| 16 | LEVEL E OPERATION | Level E Operation | SET RESET | Level E Set Level E Reset |
| 17 | CODE PAGE | Code Page | 938 948 | 938 948 |
| 18 | GRID LINE PRINT | Grid Line Print | 5577-F01 5577-F02 | 5577-F01 5577-F02 |
| 19 | OCR-B STYLE | OCR-B Style | 5327/5427 Style 1 Style 3 | 5327/5427 Style 1 Style 3 |

Initializing the Printer

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|------------------|-----------------|---|---|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 20 | CPI | Character Pitch | 10CPI 12CPI 13.3CPI 15CPI PC Command | 10 cpi 12 cpi 13.3 cpi 15 cpi PC Command |

ESC/P-C Mode Items

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|-------------------------|-----------------------------|--|---|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 21 | CHARACTER PITCH | Character Pitch | 10 CPI 12 CPI 15 CPI 17.1 CPI 20 CPI PROPORTIONAL | 10 cpi 12 cpi 15 cpi 17.1 cpi 20 cpi PROPORTIONAL |
| 22 | INT'L. CHR SET | International Character Set | USA FRANCE GERMANY UK DENMARK 1 SWEDEN ITALY SPAIN 1 JAPAN NORWAY DENMARK 2 SPAIN 2 LATIN AMERICA KOREA LEGAL | USA France Germany England Denmark Sweden Italy Spain Japan Norway Denmark II Spain II Latin America Korea Legal |
| 23 | AUTOMATIC LF | Automatic Line Feed | OFF ON | Off On |
| 24 | AUTO FEED XT | Auto feed XT | DISABLE ENABLE | Disable Enable |
| 25 | CHARACTER MODE (Taiwan) | Character Mode | ENGLISH CHINESE 10/5 CHINESE 10.6 CHINESE 13.3/6.7 CHINESE 15/7.5 | English Chinese 10/5 Chinese 10/6 Chinese 13.3/6.7 Chinese 15/7.5 |
| 26 | CODE PAGE | Code Page | IBM 5550 NS TCA BIG-5 | Code Page IBM 5550 Code Page NS Code Page Big-5 |

System Port Items

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|--------------------|--|--|--|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 1 | Model (Taiwan) | CHINESE DBCS Chinese DBCS | TRADITIONAL SIMPLIFIED | Traditional Simplified |
| 2 | PRINT MODE | Print Mode | NLQ COPY ENHANCE HIGH QUALITY DP DRAFT COPY ENHANCE + HIGH QUALITY COPY ENHANCE + DP COPY ENHANCE + DRAFT | NLQ Mode Copy Enhance Mode High Quality Mode DP Mode Draft Mode Copy Enhance + High Quality Mode Copy Enhance + DP Mode Copy Enhance + Draft Mode |
| 3 | NATIVE SBCS | English Lower Case Font Style | MINCHO (12CPI) MINCHO (10CPI) MINCHO (8 LPI) GOTHIC OCR-B VERTICLE WRITING CONDENSE COURIER ELITE | Mincho 12 cpi Mincho 10 cpi Minch 18 lpi Gothic OCR-B Vertical writing Condensed Printing (18 cpi) Courier Elite |
| 4 | ENGLISH SBCS FONT | Alphanumeric Character Set | MINCHO (12 CPI) MINCHO (10 CPI) MINCHO (8 LPI) GOTHIC OCR-B VERTICAL WRITING CONDENSE COURIER ELITE | 12 cpi Mincho 10 cpi Mincho 8 lpi printing Mincho Gothic OCR-B 1-byte characters for vertical writing Condense character set (18 cpi) Courier Elite |
| 5 | SBCS FONT SET | Alphanumeric Character Set | NATIVE SBCS FONT ENGLISH SBSC FONT | English Lower Case English Lower Case |
| 6 | CHINESE CODE TABLE | SIMPLIFIED CHINESE CODE TABLE SET | GB GBK | GB GBK |
| 7 | Buzzer | Alarm Setting | ON(CONTINUOUS) ON(INTERMITTENT) OFF | Continuous Intermittent Off |
| 8 | SI/SO ENLARGE | SI/SO Character Enlargement Process | ENLARGE NOT ENLARGE | Enlarge Do Not Enlarge |
| 9 | POR POSITION AD. | Power on Position Adjustment | OFF 6 LPI (6 dot) 4 LPI (21 dot) 3 LPI (36 dot) 2 LPI (66 dot) | Do not adjust Set to 6 lpi Set to 4 lpi Set to 3 lpi Set to 2 lpi |
| 10 | PRINTER ADDRESS | Printer Address | 0 1 2 3 4 5 6 | Address 0 1 2 3 4 5 6 |

Initializing the Printer

| LCD (Upper Row) | | | LCD (Lower Row) | |
|-----------------|------------------|------------------|--|--|
| Item No. | Initial Set Item | Meaning | Initial Value | Meaning |
| 11 | Ribbon pre-alarm | Ribbon Counter | 50% - - 100% - - 200% | 50% - 10% - 100% - - 200% |
| 12 | COPY ENHANCE | Double Strike | LEVEL 1 LEVEL 2 LEVEL 3 LEVEL 4 LEVEL 5 | Level 1 Level 2 Level 3 Level 4 Level 5 |
| 13 | OCR-B FONT STYLE | OCR-B font style | 5327/5427 style 1 Style 3 | 5327/5427 style 1 Style 3 |
| 14 | POR AUTO SELECT | Power On State | DISABLE ENABLE | Printing Off Printing On |

The following explains the initial set items in order.

Common Items

1.Interface Port: Specify whether you want to connect to a parallel port or to a system.

Parallel Port: Used when connecting to a PC.

System Port: Used when connecting to an IBM AS/400.

Parallel Port Common Items

2.Emulation: Sets the control code used by the printer.

5577 Mode: The same code as the IBM 5577 is used. This mode is usually used.

ESC/P-C Mode:

ESC/P-C Emulation mode. If you use this mode, you must install the ESC/P-C printer driver. For more information, see your operating system manual.

3.Form Length: Selects the length of the form for one form header. The selectable values are a between 3 inches (76mm) and 15 inches (356 mm).

Note: Match the application form length with the print form length.

4.Form feed depth Selects the length of form fed by one line feed operation. If the set value is 6 lpi, the form is fed 1/6 inch (4.2 mm) at a time.

5.Print Mode: Select the printing speed and printing mode.

NLQ: Prints at normal printing speed.

Copy Enhance:

Used to enhance copy capability. Set to darken characters on a form.

High Quality:

Used to print quality of a ruled line in one direction.

DP Mode: Used to print at a higher speed than NLQ. Print quality might be poorer than NLQ. In applications where print quality must be considered, check printing in advance.

Draft: Used to print at a higher speed than DP. Print quality might be poorer than DP. In applications where print quality must be considered, check printing in advance.

Copy Enhance + High Quality:

Used when Copy Enhance and high quality are required.

Copy Enhance + DP:

Used when Copy Enhance and high speed DP are required.

Copy Enhance + Draft:

Used when Copy Enhance and high speed (draft) are required.

For more information, see 2.5.3, "Print Modes" on page 2-15.

Initializing the Printer

6.Maximum Printing Width Selects maximum horizontal printable area on one line.

Note: Printing at 13.6 inches (345 mm) can only be performed if supported by the software.

7.Buzzer: Selects whether the buzzer sounds continuously or intermittently when a paper or ribbon jam occurs or when the platen is released.

8.Skip Perforation: Selects whether or not perforations are skipped.

Note: When skipping perforations, set the default page length to the form length that is used.

This function causes the form to skip from the bottom of a page to the top of the next page. The amount skipped is 0.5 inch (12.7 mm) or 1.0 inch (25.4 mm).

If the function is selected, the printable vertical length of the form becomes shorter, but printing over the perforations can be avoided while printing on continuous pages without format feed (form feed) control code.

Note: Printing over the perforations might cause printing problems.

9.Uni-direction printing: Selects whether the printer accepts the uni-direction printing control code. If "IGNORE" is selected, the printer can only print in the uni-direction mode, regardless of the software used.

10. Ribbon Pre-alarm: Number of printings until "REPLACE RIBBON" is displayed.

Changes the number of printings between 50% and 200% at intervals of 10% until "REPLACE RIBBON" is displayed.

11.Copy Enhance: Used to enhance copy capability. Set to darken characters on a form. For more information, see 2-15.

5577 Mode Items

12.SBCS Font: Selects a font from nine types of fonts.

13.Font Rotate: The IBM 5400-006 printer can print vertical characters.

14.Overlap Area: If you have selected a line pitch of 8 lpi (narrower than 7.5 lpi), specify a character image overlap process. Selecting "ERASE WRITE" deletes upper areas of character images, and selecting "OVERWRITE" prints images laid over those on the upper line.

14.Image Wrap: Allows you to determine whether the image data exceeding the maximum print position is printed on the next line after automatic insertion of a line feed or if it is discarded.

15.Level E Function: If your software is not compatible with the level E function, cancel the level E function. In most cases, select "SET".

17.Code Page: Selects whether to use code 938 or 948.

17.Grid Line Print: Select "5577-F01".

18.OCR-B Style: Use style 1.

20.Character pitch Specify whether to use the PC CPI or choose from 10/12/13.3/15CPI. The character pitch of half the characters specified CPI are alphanumeric.

ESC/P-C Items

- 20.Character Pitch** Six kinds of SBCS character pitch are available. This setting is not effective for DBCS characters.
- 21.International Character Set:** Selects one of the international character sets and one legal character set.
- 22.Automatic Line Feed:** If the setting is "ON", receiving CR code, line feed is automatic.
- 23.AUTO FEED XT:** Specifies whether to refer to the AUTO FEED XT interface signal.

System Port Items

- 1.CHINESE DBCD:** Traditional Chinese mode can be used interchangeably with Simplified Chinese mode.
- 2.Print Mode:** Select the printing speed and printing mode.
- NLQ: Prints at normal printing speed.
- Copy Enhance:
Used to enhance copy capability. Set to darken characters on a form.
- High Quality:
Used to print quality of a ruled line in one direction.
- DP Mode: Used to print at a higher speed than NLQ. Print quality might be poorer than NLQ. In applications where print quality must be considered, check printing in advance.
- Draft: Used to print at a higher speed than DP. Print quality might be poorer than DP. In applications where print quality must be considered, check printing in advance.
- Copy Enhance + High Quality:
Used when copy enhance and high quality are required.
- Copy Enhance + DP:
Used when copy enhance and high speed are required.
- Copy Enhance + Draft:
Used when copy enhance and draft are required.
- For more information, see 2.5.3, "Print Modes" on page 2-15.
- 3.NATIVE SBCS Font:** NATIVE SBCS character set. 9 different fonts are available.
- 4.ENGLISH SBCS Font:** Alphanumeric character set. 9 different fonts are available.
- 5.CHINESE DBCS:** Selects whether to use SIMPLIFIED CHINESE DBCS CODE GB or GBK. This setting is no effective for traditional Chinese set.
- 6.SBCS Font Set:** Specify whether to use Native SBCS Font or English SBCS.
- 7.Buzzer:** Selects whether the buzzer sounds continuously or intermittently when a paper or ribbon jam occurs or when the platen is released.
- 8.SI/SO ENLARGE:** Specify whether to use SI/SO character enlargement.

Initializing the Printer

9. POR POSITION AD:

Specify the power on position adjustment.

10. Printer Address: Specify an address for the printer from 0 to 6. See the host system operator or administrator for the value.

11. Ribbon Pre-alarm: Number of printings until "REPLACE RIBBON" is displayed.

Changes the number of printings between 50% and 200% at intervals of 10% until "REPLACE RIBBON" is displayed.

12. Copy Enhance: Used to enhance copy capability. Set to darken characters on a form. For more information, see 2-15.

13. OCR-B Style: Select the OCR-B style

14. Power On State: Specify whether to disable or enable printing at power on.

If Enable is set, the following occurs:

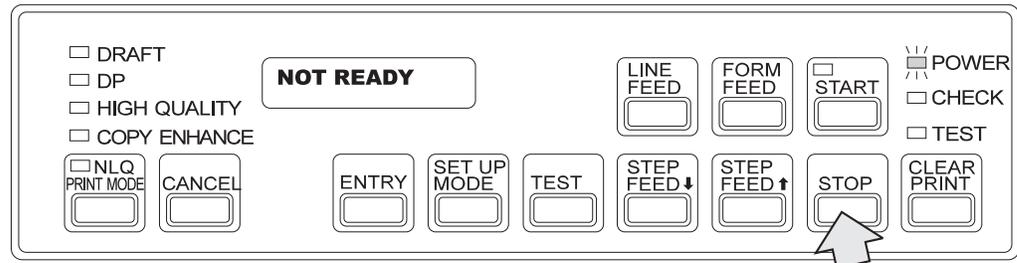
- If the Print switch is pushed before a connection is made with the AS/400, printing is automatically enabled when the connection is made.
- If the printer is in the Print mode and loses connection with the AS/400, it automatically enters the Print mode when it is reconnected.

2.13 Host Trace Printing

The host trace is used to check data to the printer from the host application. Data and commands sent from the host are printed in hexadecimal notation.

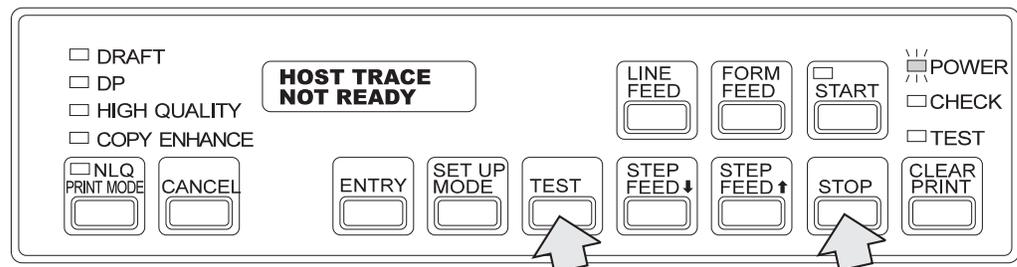
Enter Host Trace Mode

- 1 If the Start lamp is on, press **Stop** to turn it off.

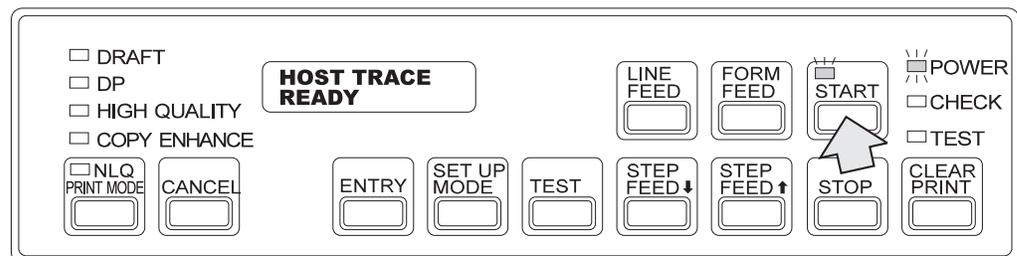


- 2 Make sure that the width of the set form is 15 inches. If a different form is set, replace it with 15 a inch form. (See 2.6, "Unloading and Setting the Printing Form" on page 2-18.)

- 3 While pressing **Stop**, press **Test**.



- 4 Press **Start**. The Start lamp lights and the printer can receive host trace data.



- 5 To end host trace, press **Stop** and then **Cancel**. The printer returns to the status set just after the power was turned on.

2.14 Relocating the IBM 5400-006 Printer

To relocate the IBM 5400-006 printer, do the following:

Note: For details, refer to Chapter 1.

- 1** Turn the power switch off.
- 2** Disconnect the power plug from the outlet.
- 3** Disconnect the interface cable.
- 4** Unlock all wheels.
- 5** If you are relocating the printer within the office, move it to the desired location at this time.

If you are relocating it out of the office, do the following:

- 6** Remove the print form. (See 2.6.1, "Unloading the Printing Form" on page 2-18.)
- 7** Fix the curl corrector and the rear fence with tape inside the rear door.
- 8** If you are transporting the printer over a long distance, do the following:
 - Fix the ribbon cassette cover with drafting tape.
 - Push the for thickness adjustment lever backward and fix it with drafting tape.
 - After closing the platen open lever, fix it with drafting tape.
 - Fix the tractors with drafting tape.

After completing the above, pack the printer. For details on packing the printer, consult your IBM marketing representative.

You have finished preparing the printer for relocation.

To install the printer after relocation, see Chapter 1, "Installation"

Chapter 3. Problem Determination Procedure

This chapter describes how to handle problems that might occur in the IBM 5400-006 printer.

3.1 Problem Determination

Some problems can be corrected by simple operations. If a problem occurs, read this chapter and attempt to determine and resolve the problem before calling your IBM service representative.

- Power does not come on.
 - Turn the **Power** switch off, wait five seconds, and turn it on again.
 - Insert the plug tightly into the outlet.
 - Check the outlet.
- Nothing is printed or it is printed incorrectly.
 - Make sure the interface cable is connected correctly. Use only an IBM-approved interface cable.
 - Check the initial settings.
 - Make sure that you are using a power plug with three prongs. Do not plug a three-prong power cord into a two-prong power plug.
- A message is displayed.
 - See 3.2, “Messages and Actions ” on page 3-2.
- Print quality is poor.
 - Adjust the form thickness lever position according to 2.9.1, “Adjusting the Print Pressure” on page 2-47.
 - Check the tractor position so that the form is not too tight or too slack.
 - If the print becomes extremely faint at the mid-line position, replace the ribbon according to 2.8, “Replacing the Ribbon” on page 2-33.
 - If the print becomes faint at a specific digit or some lines and the value of the line counter exceeds 100,000, refer to 3.5, “Inspecting the Platen and Changing Strike Position” on page 3-11.

If the problem cannot be solved by any of the above operations, call your IBM service representative.

3.2 Messages and Actions

If a message (including an error code) is displayed on the LCD, take the corresponding action. If the problem cannot be solved by taking the action, call your IBM service representative.

Notes:

1. To turn off an alarm tone caused by an error, press **Stop**.
2. For messages displayed during initialization, which differ from the messages below, see 2.12, "Initializing the Printer" on page 2-65.

3.2.1 Message List

| Message | Meaning and action taken by the operator |
|------------------------------|---|
| IBM 5400-006 TEST XX | <p>Meaning: The printer is conducting a self-test (See 2.3, "Powering On and Off" on page 2-9.)</p> <p>Operator Action: If this message does not change within one minute of turning on the printer, power off the printer and power it on again.</p> |
| READY | <p>Meaning: The printer is ready to print.</p> |
| READY RECEIVE DATA | <p>Meaning: The printer is receiving data.</p> <p>Operator Action: Wait a moment.</p> |
| NOT READY XXX.XX | <p>Meaning: The printer is in the not ready status. (The ROM version is displayed in the XXX.XX.)</p> <p>Operator Action: To set the printer in the ready status, press Start.</p> |
| NOT READY NO DATA | <p>Meaning: CLEAR PRINT was pressed but no data was in the printer to be printed.</p> <p>Operator Action: To clear the display, press CLEAR PRINT again.</p> |
| NOT READY RECEIVE DATA | <p>Meaning: Data from the PC remains.</p> <p>Operator Action: To print the data, press CLEAR PRINT.</p> |
| (Only if connected to a PC) | |
| NOT READY PRESS START | <p>Meaning: Data is being received.</p> <p>Operator Action: Press Start to continue receiving data.</p> |
| HOST TRACE | <p>Meaning: The printer is set in the mode to print data from the host system in hexadecimal notation. (See 2.13, "Host Trace Printing" on page 2-77.)</p> <p>Operator Action: To end the host trace, press Stop, then Cancel.</p> |

| Message | Meaning and action taken by the operator |
|---|--|
| <p>TEST PRINT MODE TEST PATTERN</p> | <p>Meaning: The printer is in test mode. This is not a defect. Operator Action: Press Stop, then Cancel. (See 2.10, "Test Printing" on page 2-54.)</p> |
| <p>END OF FORM SET NEW FORM</p> | <p>Meaning: The form has ended. Operator Action: See 2.6, "Unloading and Setting the Printing Form" on page 2-18 to replace the form. To print to the bottom of the next page, press Cancel, then Start. (See 2.6.3, "At EOF" on page 2-30.)</p> |
| <p>FORM JAM REMOVE FORM</p> | <p>Meaning: A form jam has occurred. Operator Action: Recover the form jam according to 3.3, "Form Jam Recovery" on page 3-5.</p> |
| <p>RIBBON JAM RECOVER JAM</p> | <p>Meaning: A ribbon jam has occurred. Operator Action: Recover the ribbon jam according to 3.4, "Ribbon Jam Recovery" on page 3-8.</p> |
| <p>PLATEN OPN PRINT CLOSE PLATEN</p> | <p>Meaning: The platen was released during printing. Operator Action: Pull the platen open lever toward you to lock it.</p> |
| <p>PLATEN OPEN CLOSE PLATEN</p> | <p>Meaning: The platen is released. Operator Action: Pull the platen open lever toward you to lock it.</p> |
| <p>SCALE COVER OPEN CLOSE COVER</p> | <p>Meaning: The scale cover is open. Operator Action: Close the scale cover.</p> |
| <p>NOT READY (READY) REPLACE RIBBON</p> | <p>Meaning: The ribbon life has expired. Operator Action: Replace the ribbon according to 2.8, "Replacing the Ribbon" on page 2-33. Reset the ribbon life counter.</p> |
| <p>CLEAR COMMAND</p> | <p>Meaning: The clear command was received from the host. Operator Action: Press Stop. Ask the host system operator for the reason.</p> |
| <p>(Only if connected to AS/400)</p> | |
| <p>BELL COMMAND</p> | <p>Meaning: The bell command was received from the host. Operator Action: Press Stop. Ask the host system operator for the reason.</p> |
| <p>(Only if connected to AS/400)</p> | |

Messages and Actions

| Message | Meaning and action taken by the operator |
|--|--|
| <p>DATA CHECK</p> | <p>Meaning: An error was detected in the host system program. Operator Action: Press Stop. Consult the host system programmer.</p> |
| <p>(Only if connected to AS/400)</p> | |
| <p>DATA ERROR</p> | <p>Meaning: A data transfer error has occurred. Operator Action: Power off the printer, wait five seconds, and power on the printer again.</p> |
| <p>(Only if connected to a PC)</p> | |
| <p>HOST NOT ACTIVE</p> | <p>Meaning: The printer cannot communicate with the host system. Operator Action: Check if the communication cable is correctly connected. If communication is still not possible, contact the system operator.</p> |
| <p>(Only if connected to AS/400)</p> | |
| <p>6 XX MACHINE CHECK POWER ON/OFF</p> | <p>Meaning: Trouble might have occurred in the printer. Operator Action: Power off the printer, wait five seconds, and power on the printer again.</p> |
| <p>(Only if connected to AS/400)</p> | |
| <p>6CX MACHINE CHECK</p> | <p>Meaning: A communication error with the host system has occurred. The set address might be incorrect. Operator Action:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>6C0 MACHINE CHECK POWER ON/OFF</p> </div> <p>If the above code is displayed, consult the host system operator and set the correct address. See "Setting the Address" on page 1-22.) Otherwise, power off once and then power on again.</p> |
| <p>(Only if connected to AS/400)</p> | |
| <p></p> | <p>Meaning: The power was turned on. (The display changes after one second elapses.) Operator Action: If the display does not change, power off and then power on again.</p> |
| <p>Other Messages</p> | <p>Meaning: The printer is in the test mode. Operator Action: Press Cancel. Diag Exit? appears on the LCD. Press Start; the printer returns to the status just after it was powered on.</p> |
| <p>The Test lamp lights.</p> | |
| <p>Other Messages</p> | <p>Meaning: There might be a problem in the initial settings or with the printer. Operator Action: If the problem is the initial settings, continue initializing. If the problem is not the initial settings, power off the printer and power it on again.</p> |
| <p>The Test lamp is not lit.</p> | |
| <p>Note: X indicates an alphanumeric character.</p> | |

3.3 Form Jam Recovery

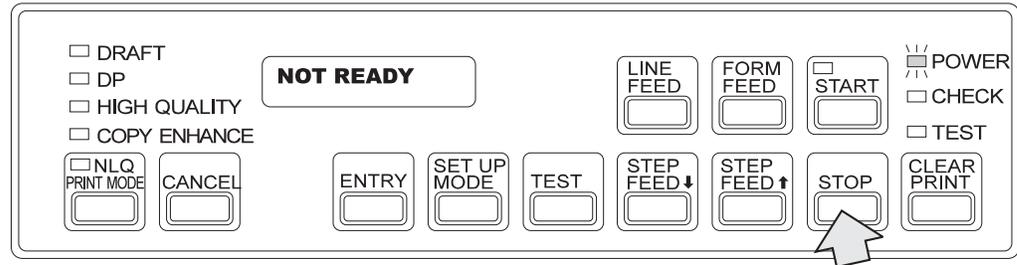
If a form jam occurs during printing, the alarm sounds, Test appears on the operator panel, and the following message is displayed:



To recover from a form jam, do the following:

Note: If form jams occur often or if a form jam does not occur but the “FORM JAM” message is displayed on the operator panel, power off the printer and power it on again. If the jam is not corrected, call your IBM service representative.

1 Press **Stop**. The alarm turns off and the Test lamp goes off.

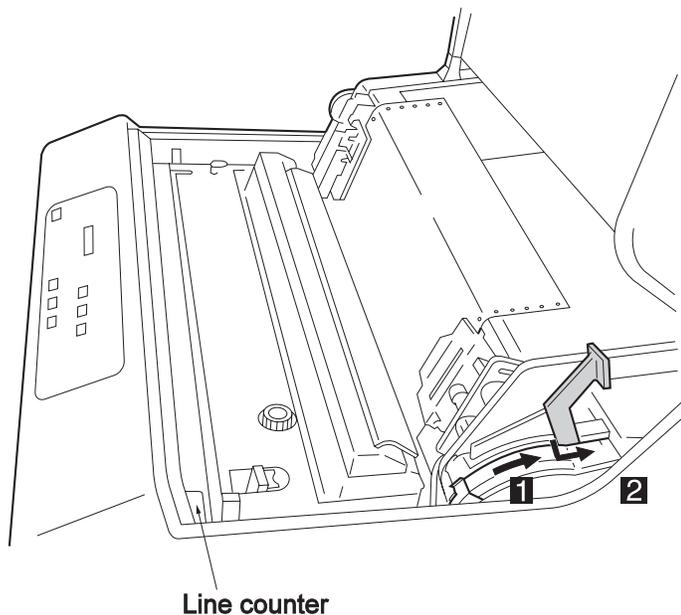


2 Open the set cover.

Form Jam Recovery

- 3** Push the platen open lever backward like in the figure below to set it in the all release status. Open the tractor covers and remove the jammed form.

The platen lever is set in the release status by pushing it in the direction of the arrow **1** in the figure below. While pushing the lever rightward, push it backward as shown **2**; the lever is set in the all release status.



Note: Do not set the platen open lever in the all release status unless you are removing a jammed form.

- 4** Check the form for the following items:

- Is the specified form being used?

Use specified forms only. Otherwise, form jam might result. (See Appendix A, "Forms Design.")

- Is the form torn?

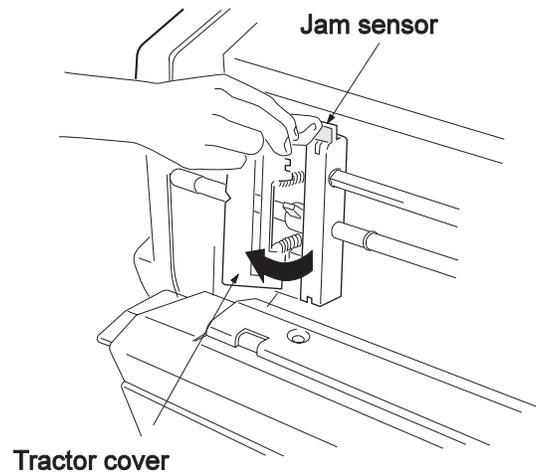
Torn forms might cause form jam.

- Is the form humid?

If forms stored in a humid place are used, they might cause form jam.

If any problems occur with the form, replace it with a new one.

- 5** Check the form stand and path.
 - Open the front door and check if the horizontal position of the form at the stacker is aligned with the horizontal position of the form at the tractors.
 - If form dust has accumulated on the form stand or the from path, remove it with a vacuum cleaner or a brush.
 - Check if the printed form is folded and stacked normally.
- 6** If the form jam sensor surface is dirty, open the left tractor cover and clean it with a soft cloth.



Note: Shut off sunlight to the form jam sensor by using blinds or drapes. Otherwise, the sensor detects sunlight as a form jam.

- 7** Set the form in the printer. (See 2.6, “Unloading and Setting the Printing Form” on page 2-18.)
- 8** Adjust the print form position. (See 2.9.2, “Adjusting the Vertical Position” on page 2-49 and 2.9.3, “Adjusting the Horizontal Position” on page 2-50.)
- 9** Press **Start**. Make sure that the Start lamp is lit.

3.4 Ribbon Jam Recovery

If a ribbon jam occurs in the printer, the Check lamp lights up on the operator panel, the alarm goes off, and the following message is displayed:



To recover from a ribbon jam, do the following:

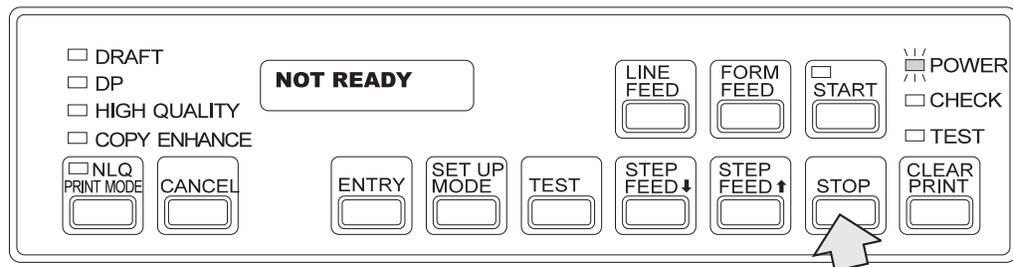
Note

- If a ribbon jam occurs often or the message “RIBBON JAM” is displayed on the operator panel, though a form jam does not actually occur, power off the printer, wait five seconds, and power on the printer again.

If the ribbon jam is not corrected by this action, call your IBM service representative.

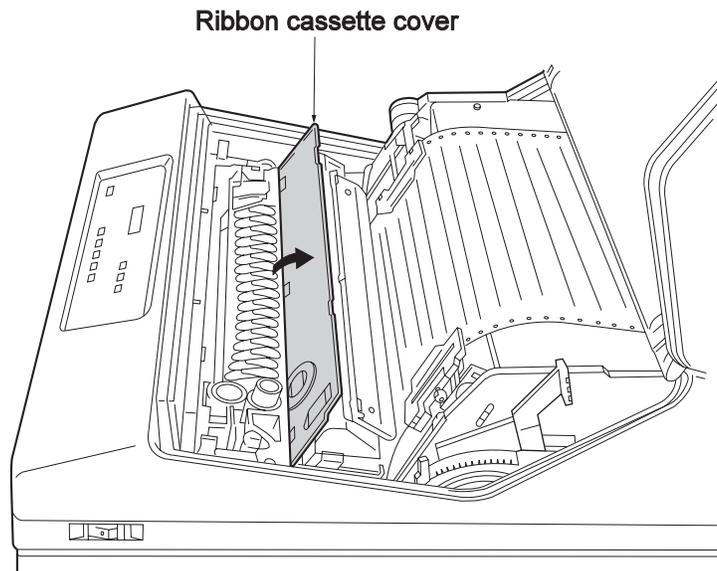
- Your hands might be stained by the ink. Wear gloves to keep your hands clean when handling the ribbon.

1 Press **Stop**. The alarm stops and the Test lamp turns off.



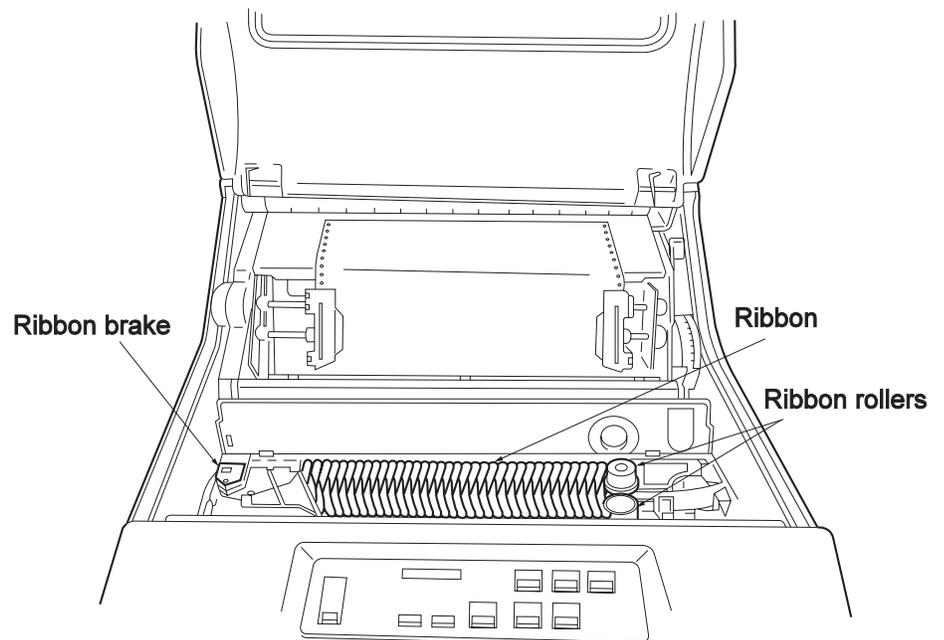
2 Open the set cover.

3 Open the ribbon cassette cover.



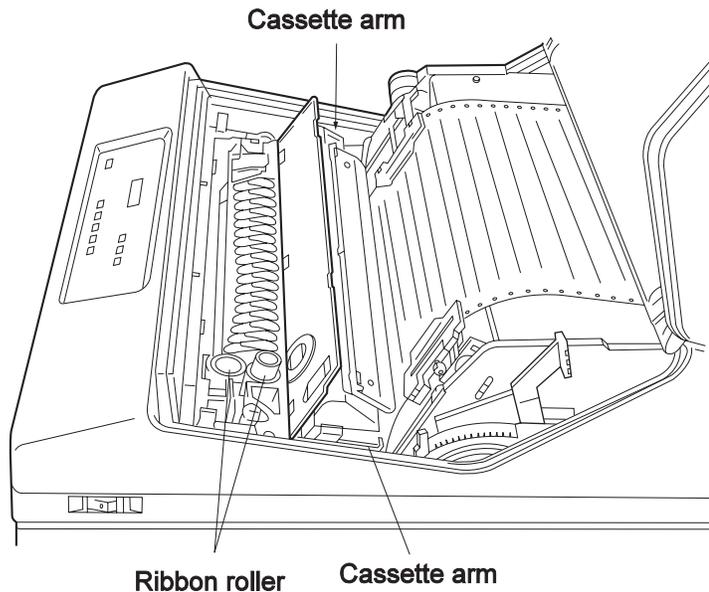
4 Check if the ribbon is on the ribbon path correctly.

- Check if the ribbon rollers are closed.
- If the ribbon is folded, slack, or wound on the roller, reset it correctly.
- If the ribbon is old or torn, replace it with a new one. (See 2.8, "Replacing the Ribbon" on page 2-33.)



Ribbon Jam Recovery

- 5 Remove ribbon dust from the left and right cassette arms and the ribbon rollers.



- 6 Make sure that the form thickness adjustment lever is correctly set according to 2.9.1, "Adjusting the Print Pressure" on page 2-47.

Note: If the form thickness adjustment lever is not set according to the form thickness, a ribbon jam might result.

- 7 Close the ribbon cassette cover.
- 8 Close the set cover.
- 9 Press **Start**. Make sure the Start lamp is lit.

Note

The ribbon can be changed ten times using the same ribbon cassette. If you use the same ribbon cassette for more than ten ribbons, a jam might occur. Make sure to change the ribbon cassette promptly.

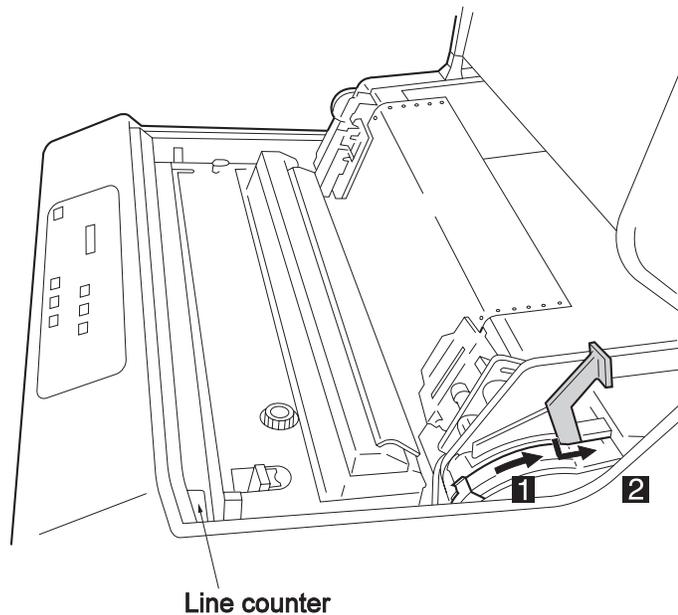
3.5 Inspecting the Platen and Changing Strike Position

3.5.1 Inspecting the Platen

If print becomes faint at a specific digit or some lines and the value of the line counter exceeds 100,000, check the platen using the following procedure:

- 1** Power off the printer.
- 2** Open the set cover.
- 3** Set the platen in the all release status.

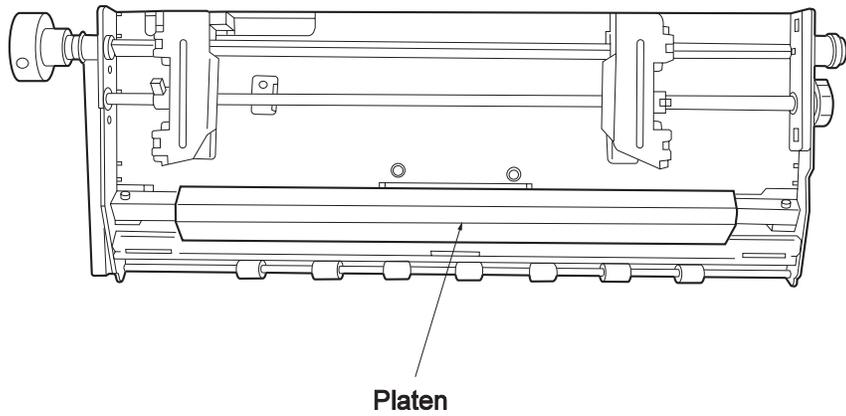
The platen open lever is set in the release status by pushing it in the direction of the arrow **1**. While pushing the lever rightward, push it backward as shown **2**. The platen open lever is set in the all release status.



- 4** Remove the printing forms. (See 2.6, “Unloading and Setting the Printing Form.”)

Inspecting the Platen and Changing Strike Position

- 5** Check whether the platen surface is defective or the print head pin is struck.
If the platen surface is damaged, see 3.5.2, "Changing Strike Position."



Caution

The printing mechanism is hot after printing.

3.5.2 Changing Strike Position

The platen strike position can be changed twice.

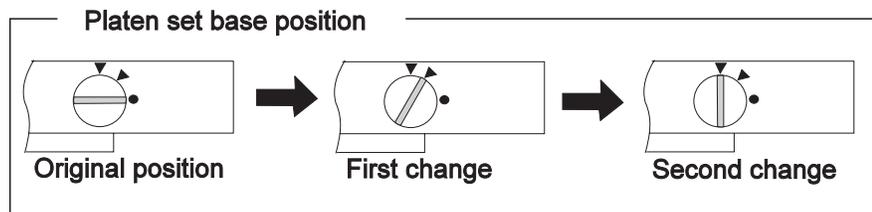
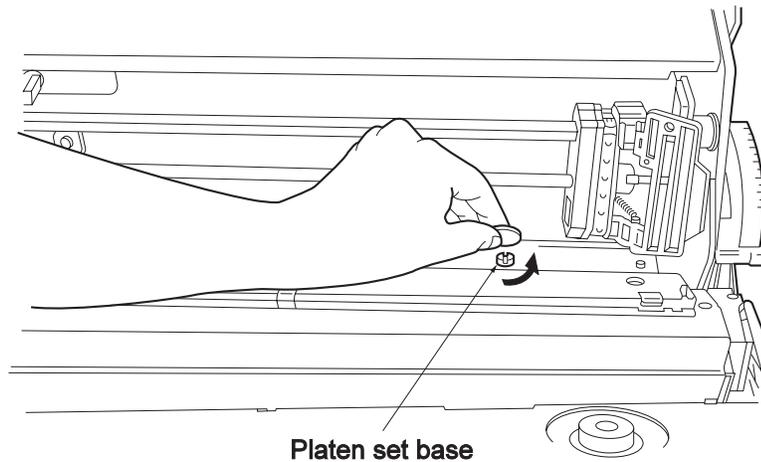
1 Make sure the power is off.

2 Set the platen open lever in the release status or the all release status.

Note: Do not try to change the strike position without putting the platen open lever in the release status or the all release status. This might damage the printer.

3 Turn both platen set bases counterclockwise 60 degrees with a coin. After the platen drops, the strike position changes. Make a note of the line counter value.

Note: If this is the second time to change the strike position, turn the platen set bases 30 degrees. The platen should be changed for the second time after the counter has increased 100,000 from the first time.



4 Pull the platen open lever toward you to close the platen.

5 Close the set cover.

Inspecting the Platen and Changing Strike Position

Chapter 4. IBM 5400-006 Features

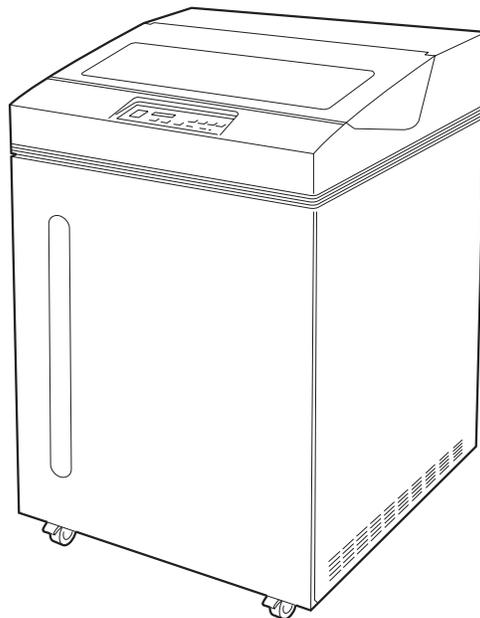
4.1 IBM 5400-006 Features

The IBM 5400-006 printer is a shuttle type multi-wire dot impact line printer that allows high quality printing.

There are two ways of connecting and using the printer.

System port Can be used as a system printer for the IBM AS/400 family.

Parallel port Can be used as a printer for IBM PCs and RS/6000 systems.



The IBM 5400-006 printer has the following features:

- There are various printing modes according to purposes such as NLQ mode, DP mode, draft mode, and copy enhance mode.
- Both double byte and alphanumeric characters can be printed by maximum 360 lines per minute in the NLQ mode, maximum 500 lines per minute in the DP mode, and maximum 600 lines per minute in the draft mode.
- Up to eight copy continuous forms can be printed in the copy enhance mode. (In the NLQ mode, up to five forms can be printed.)
- Characters are printed in 180 dpi (180 dots per 1 inch: about 7.09 dots per 1 mm). These can be defined by the user.
- Character spacing and line spacing can be selected freely according to the printing task.
- Horizontal and vertical spacing can be selected freely.
- For alphanumeric characters, the user can select two types of sizes: standard size and compact size of height 18 dots.

IBM 5400-006 Features

- Various styles can be chosen for alphanumeric characters.
- Various paper sizes can be chosen by the user.
- Bar codes can be printed (if connected to a PC, only in 5577 mode).
- When connected to an AS/400, the following feature is available:
 - Headings and highlighted characters can be printed with a magnified size.
- When connected to a PC, the following features are available:
 - Continuous form emulation of the IBM 5577 printer, used as a 5577 printer.
 - Continuous form emulation of the EPSON ESC/P printer, used as an ESC/P printer. In the Windows environment, specify the EPSON LQ-1070C printer using the Windows printer driver.

Note

- If you are using Windows NT, power off the printer and power on again after you cancel printing from the PC.
- If you are using Windows 3.1, power off the printer and power on again if a time out occurs for any reason.
- Of you are using the printer in a LAN environment, set the printer time out to the highest value.

4.1.1 Basic Functions

Functions are divided between system port and parallel port.

System Port

The system port connected to the AS/400 has the following specifications:

| | |
|--|---|
| Printing Method | Impact printing with shuttle mechanism |
| Print Mode for line spacing of 6 lpi | NLQ: 360 lines/minute maximum DP: 500 lines/minute maximum Draft: 600 lines/minute maximum High Quality: (Uni-directional printing) Copy Enhance |
| Printing Method | Vertical, horizontal |
| Resolution | 7.09 dots/mm (180 dots/inch) vertically and horizontally |
| Line pitch | 4, 6,7.5,and 8 lpi |
| Character Pitch | Alphanumeric Characters: 10, 12, 13.3, 15, 18 cpi Alphanumeric Characters: 5, 6, 6.7, 7.5 cpi |
| Printing Pitch | Double Byte Characters: 136 characters/line (10 cpi) maximum Alphanumeric characters: 68 characters/line (5 cpi) maximum |
| Alphanumeric Characters Set | 24 dots 8 sets 18 dots 1 set |
| IBM Double Byte Characters System Character Set | 24 dots 1 set |
| User Defined Character Hanji 1 set | |
| Bar Codes | Type: EAN Standard, EAN reduction, CODE39, Industrial 2 of 5, Inter- leaved 2 of 5, NW7 (Codabar) Rotation 0°, 90°, 180°, 270° (Clockwise) Size: Standard, Large |
| Form size | Continuous form paper Width: 3.5 inches to 16 inches (Note) Length: 8 inches to 12 inches |
| Power Supply | AC 100V (±10V), 50/60Hz (±1Hz) |
| Power Consumption | 1.5KVA maximum |

IBM 5400-006 Features

| | |
|------------|---------------------------------------|
| Dimensions | 660 mm (W) x 720 mm (D) x 1000 mm (H) |
| Weight | 100Kg |

Note: When using 16 inch wide forms, there are restrictions on the print start position. For details, see A.1, "Forms Specifications" and A.2, "Printable Area."

Parallel Port

This section describes the parallel port specifications.

| | |
|--|---|
| Printing Method | Impact printing with shuttle mechanism |
| Print mode For line spacing of 6 lpi | NLQ: 360 lines/minute maximum DP: 500 lines/minute maximum Draft: 600 lines/minute maximum High Quality: (One-way printing) Copy Enhance |
| Printing Method | Vertical, horizontal |
| Resolution | 7.09 dots/mm (180 dots/inch) vertically and horizontally |
| Line Pitch | 2, 3, 4, 5, 6, 7.5, 8 lpi |
| Character Pitch | Alphanumeric Characters ESC/P-C: 10, 12, 15 17.1 and 20 cpi 5577: 10, 12, 13.3, and 15 cpi Double Byte Characters 5, 6, 6.7, and 7.5 cpi |
| Printing Pitch | Double Byte Characters: 66/68 characters/line (5 cpi) Alphanumeric Characters: 132/136 characters/line (10 cpi) |
| Bar Codes | Type EAN Standard, EAN reduction, CODE39, Industrial 2 of 5, Interleaved 2 of 5, NW7 (Codabar), Rotation: 0°, 90°, 180°, 270° (Clockwise) Size: Standard, Large |
| Form size | Continuous form paper Width 3.5 inches to 16 inches (Note) Length 8 inches to 12 inches |
| Power Supply | AC 100V (±10V), 50/60Hz (±1Hz) |
| Power Consumption | 1.5KVA maximum |
| Dimensions | 660 mm (W) x 720 mm (D) x 1000 mm (H) |
| Weight | 1000Kg |

Note: When using 16 inch wide forms, there are restrictions on the print start position. For details, see A.1, "Forms Specifications" and A.2, "Printable Area."

4.2 Connecting to a Host System

The following ports are available for connecting to the host system:

- System Port
- Parallel Port

4.2.1 System Port

The IBM 5400-006 printer is used as a work station under the following host system:

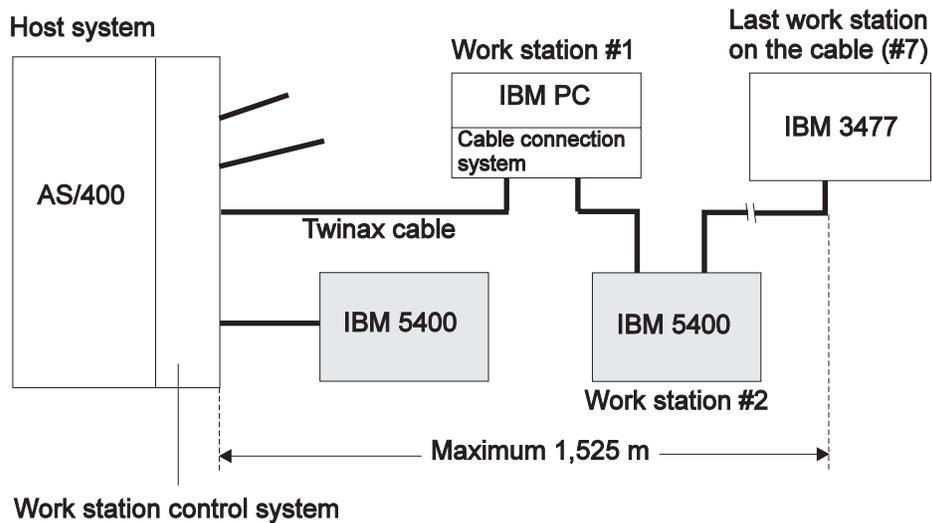
- IBM AS/400
Control program: OS/400 version 1, release 3.0 and above

The IBM 5400-006 printer is connected to the host with a twinax cable. This cable can be a maximum of 1525 m, including the host system and work station network and the work station network.

Note: A maximum of seven work stations can be connected with one cable.

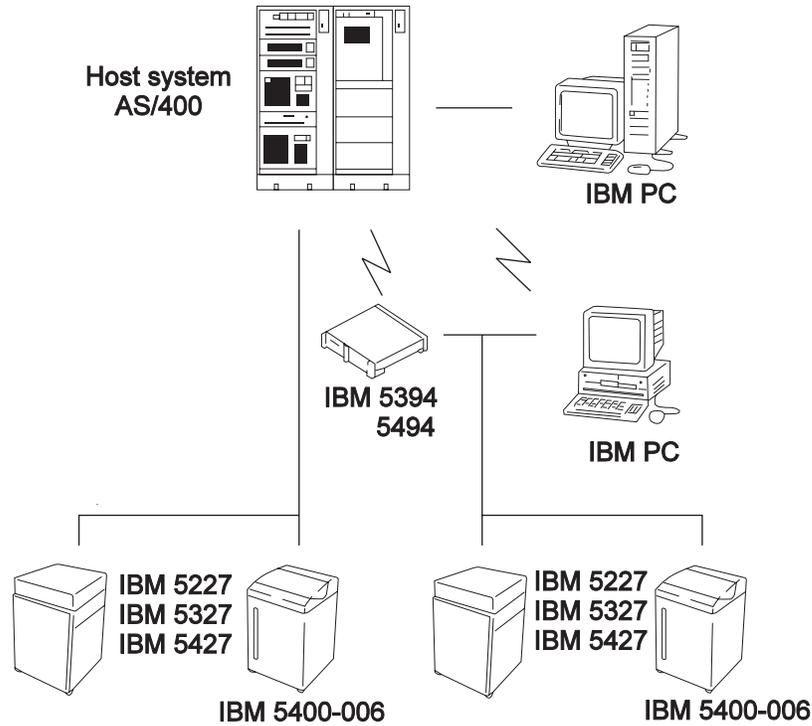
A special function of this cable is that even if a work station stops functioning, the other work stations on the same cable can continue to function.

The following is an example of a host system and work station network:



The following is an example of the IBM 5400-006 printer connected to a host system: The number of work stations that can be connected to the host system is defined as necessary by the host system or the user.

The IBM 5400-006 printer can be connected to host system directly or indirectly to an IBM 5394/5494.



4.2.2 Connecting to a Parallel Port

The IBM 5400-006 printer is connected to an IBM PC or an RS/6000.

4.3 System Port Basic Functions

This section describes the basic functions available when connected to an AS/400.

4.3.1 Printable Characters

The following character types and sizes are available:

Character Set

The following character sets can be used:

- Alphanumeric character set displayed as single byte EBCDIC code.
- System character set provided by IBM displayed as 2 byte IBM code.
- Vertical special character set displayed as 2 byte code.
- User defined, original character set.

The following describes the makeup of the character set.

| Character Set |
|---|
| Alphanumeric character set <ul style="list-style-type: none">• 24 dot high• 18 dot high (8LPI printing font) |
| Double byte character set |
| Special Character set for Vertical Writing |
| User Defined Character (2 byte) |

The alphanumeric characters set consists of; song (12 cpi), song (10 cpi), song (8cpi), Gothic, Courier, Elite, Condense, OCR-B, and DP Gothic font styles. An 18 dot vertical font is also available.

Character sets except user defined characters are stored in the Read Only Storage (ROS) in the printer.

The user defined characters are sent from the host as character data when they are required during printing.

Character Size and Type

The IBM 5400-006 printer can print nine types of alphanumeric characters and one type of double byte characters, according to the initialization and the host commands. Printed characters are all horizontal with a resolution of 7.09 dots/mm (180 dots/inch). For information about initial settings, see 2.12, "Initializing the Printer." Each character can be expanded to horizontal x 2, vertical x 2, horizontal and vertical x 2, horizontal and vertical x 3, and horizontal and vertical x 4.

The following is a definition for expanding 24 dot and 18 dot characters:

24 Dot Character: Alphanumeric characters displayed as 10, 12, 15, 18, and 24 dot wide, double byte characters 24 dot wide and 24 dot high displayed as dot matrix, or user defined characters.

18 Dot Characters (8 lpi printing): Alphanumeric characters displayed as 12 dot wide and 18 dot high dot matrix. These characters can be printed in 8 lpi without affecting images.

Expanded Characters: 18 and 24 dot high characters are expanded vertically, horizontally, or vertically and horizontally two times, vertically and horizontally 4 times, or vertically and horizontally 4 times.

Sizes and printed examples are shown below:

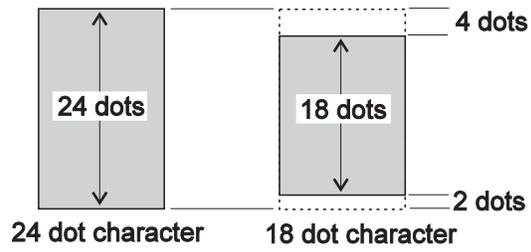
| | Character Set | | Character Size (Width × Height) | Normal Size | Enlarged character (Note 1) (Double Width) |
|---------------|----------------------|------------------|---------------------------------|-------------|--|
| 24-Dot Height | EBCDIC | 12 cpi Mincho | 12 × 24 | IBM Japan | IBM Japan |
| | | 10 cpi Mincyo | 18 × 24 | IBM Japan | IBM Japan |
| | | Gothic | 15 × 24 | IBM Japan | IBM Japan |
| | | OCR-B | 12 × 24 | IBM Japan | IBM Japan |
| | | Vertical Writing | 12 × 24 | ㄠㄨㄩ ㄣㄛㄜㄝ | ㄠㄨㄩ ㄣㄛㄜㄝ |
| | | Condense | 10 × 24 | IBM Japan | IBM Japan |
| | | Courier | 18 × 24 | IBM Japan | IBM Japan |
| | Elite | 15 × 24 | IBM Japan | IBM Japan | |
| | Double Byte (Note 2) | | 24 × 24 | 大和研究所 | 大和研究所 |
| 18-Dot Height | EBCDIC | | 12 × 18 | IBM Japan | IBM Japan |

Notes:

1. Expanded characters and vertical printing are used more than the multi-function double byte character printing utility (APW).
2. Double byte characters are included in user defined characters.

System Port Basic Functions

The placing of 18 dot and 24 dot characters is shown in the following:



4.3.2 Printing Density

The following character pitch and line pitch can be used with the IBM 5400-006 printer.

Character Pitch (Characters Per Inch: cpi)

| Character Set | Normal Size Characters | Double Width Characters |
|--|------------------------|-------------------------|
| Single Byte Characters | 10, 12, 13.3, 15, 18 | 5, 6, 6.7, 7.5, 9 |
| Double Byte Characters and User Defined Characters | 5, 6, 6.7, 7.5 | 2.5, 3, 3.3, 3.75 |

Note: Because of differences in the AS/400, specified characters that can be used differ. See 4.1.1, "Basic Functions."

Line Pitch (Lines Per Inch: lpi)

Each Character: 4, 6, 7.5 (when APW is used) 8 (120: for lines) lpi

4.3.3 Printing Speed

Printing speed for this machine at 6 lpi on NLQ mode is 360 wpm, in HP mode 500 wpm, and draft mode 600 lpm. The actual printing speed is affected by the following conditions.

1. Host System Processing Knowhow
2. System Makeup

Printing speed for the IBM 5400-006 printer is affected by the following conditions:

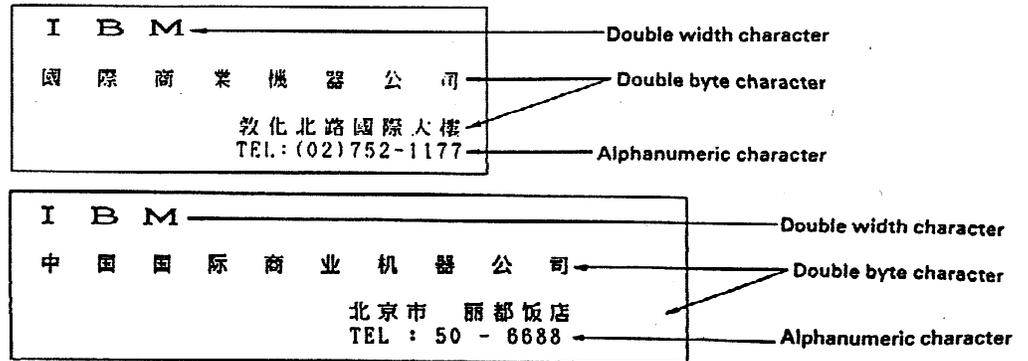
- Line width
- Number of double width characters per line
- Number of user defined characters per line
- Printing style (horizontal or vertical)
- Number of double byte characters per line
- Number of alphanumeric characters per line
- Character design
- Line pitch (lpi)
- Character pitch (cpi)
- Return mode (specified at initialization)
- Grid lines
- Bar codes
- Vertically expanded characters

4.3.4 Printing Style (Vertical, Horizontal)

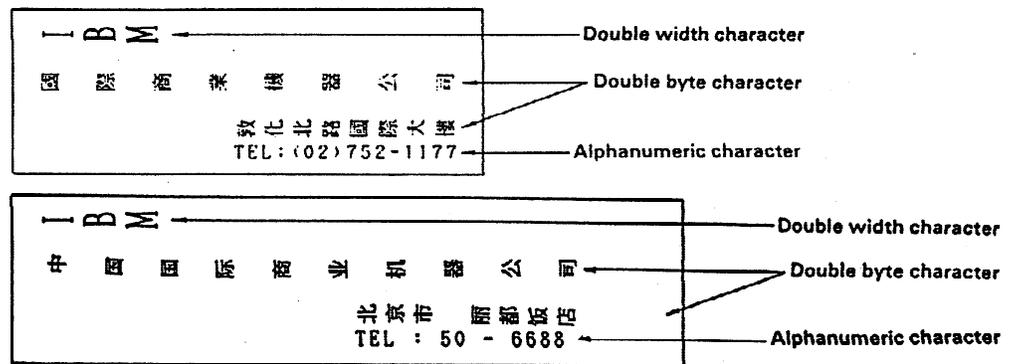
The IBM 5400-006 printer can print vertical or horizontal output. The printing styles are controlled by the host system.

Output Type

- Horizontal



- Vertical



Notes:

1. Alphanumeric vertical (single byte vertical) characters can be enabled at initialization or by a host command. Special double byte characters, for example ", " , are provided for and are automatically selected.
2. Double width characters and vertical characters are enabled by the multi-function double byte character printing utility (APW).

4.4 Parallel Port Basic Functions

This section describes the basic functions available when connected to a PC.

4.4.1 Support Emulation and Character Set

| | ESC/P-C (LQ-1070 Emulation) | | 5577 (5577-KC2 Emulation) | |
|-------|-------------------------------|---|--------------------------------|--|
| | Character Set | Font | Character Set | Font |
| ASCII | Italics Graphics | Song (12 cpi) Song (10 cpi) Song (15 cpi) | Code Page 938 Code Page 948 | Song (12 cpi) Song (10 cpi) Song (8 lpi) Gothic DP Gothic OCR-B Courier Elite |
| Hanji | BIG-5 NS TCA IBM5550 | Song | IBM5550 | Song |

User Defined Character

5577 Mode

| | Address | The number of UDC can be registered |
|----------|-------------------|-------------------------------------|
| IBM code | X'DB40' - X'FBFC' | Max. 1 |

ESC/P-C Mode

| | Address | The number of UDC can be registered |
|------------|-------------------------------------|-------------------------------------|
| IBM code | X'DBA0' - X'DBFC' | Max. 93 |
| NS code | X'FD21' - X'FD7E' X'FE21' - X'FE7E' | Max. 188 |
| TCA code | X'DE30' - X'DE39' X'DE41' - X'DE5A' | Max. 188 |
| | X'DE61' - X'DE7A' X'DE80' - X'DEF0' | |
| BIG-5 code | X'FA40' - X'FA7E' X'FAA1' - X'FAFE' | Max. 188 |
| | X'FB40' - X'FB5E' | |

Character sets except user defined characters are stored in the Read Only Storage (ROS) in the printer.

The user defined characters are sent from the Host as character data whenever they are required during printing.

4.4.2 Line Spacing (No. of lines per inch: lpi)

The IBM 5400-006 Printer has the following line spacing options.

- 2, 3, 4, 5, 6, 7.5, 8 lpi by the operator panel.

4.4.3 Printing Speed

The maximum printing speeds at 6 lines per inch are 360 lines per minute in the NLQ mode (normal speed), 500 lines per minute in the DP mode (high speed).

The actual printing speed is determined by the:

- Line width
- Number of user defined characters contained in one line
- Style of printing (horizontal or vertical writing)
- Number of double byte characters per line
- Number of alphanumeric characters per line
- Complexity of character design
- Line spacing (number of lines per inch)
- Character spacing (number of characters per inch)
- Grid lines

Parallel Port Basic Functions

Chapter 5. Installation Planning and Site Preparation

This chapter describes what is necessary for planning the installation of the IBM 5400-006 printer. This chapter includes:

- Site preparation
- Physical specifications (including layout plan)
- Power requirements
- Interface cable
- Environmental conditions

The IBM 5400-006 printer is connected via a system port or a parallel port.

- When connected with the system port, it connected to the host via a twinax cable.
- When connected with the parallel port, it is connected to the PC printing connector via a parallel interface printing cable.

In establishing an installation plan, refer also to the documents relating to the installation plan for the host system.

5.1.1 Site Preparation

The IBM 5400-006 printer is designed so that the user can establish and perform an installation plan. Below is a table of customer responsibilities:

| Job | Reference Material |
|------------------------------------|---|
| Determine installation schedule | - |
| Perform site preparations | "Physical Specifications" in this chapter |
| Prepare for Host System attachment | "Guide to Planning and Installation" of the host system "Cable" in this chapter. |
| Secure power source | "Power Requirements" in this chapter |
| Check environmental conditions | "Environmental Conditions" in this chapter |
| Install IBM 5400-006 printer | Chapter 1, "Installation" |

Note: As the IBM 5418 Printer works with the Host System, coordinate printer installation with Host System installation.

Physical Specifications

5.1.2 Physical Specifications

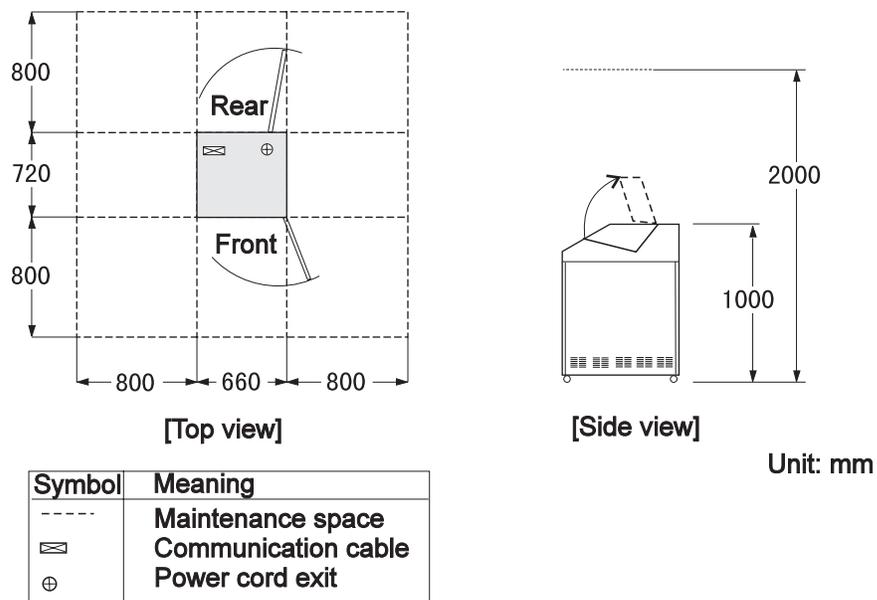
The physical specifications of the IBM 5400-006 printer are as follows.

- Dimensions

| | |
|--------|---------|
| Width | 660 mm |
| Depth | 720 mm |
| Height | 1000 mm |

- Weight: Approx. 100 kg
- Heat dissipation: 744 kcal/h (DP mode)
- Amount of exhaust air: 2.3 m³/min.
- Noise Level: 56 dBA (1m Position Average)
- Color: Pearl White
- Service clearance: Width: 800 mm, Height: 2000 mm

The following illustration shows the space necessary for operation and maintenance.



Monthly Output

The IBM 5400-006 printer is capable of the following output:

- **Monthly Output: 12,000 pages**

However, 15 x 11 inch forms have the following values:

- 1,500 printed characters per page.
- Ratio of Hanji to alphanumeric characters is 3:7.

5.1.3 Power Requirements

The power requirements for the IBM 5400-006 printer are as follows:

| | |
|---------------------------|---------------------|
| Voltage (allowable) | 100V to 240V |
| Maximum power consumption | 1.5 KVA |
| Frequency (allowable) | 50/60 Hz \pm 1 Hz |
| Length of power cord | 4.1 m |

Power Outlet Specifications

The power outlet must meet local standard specifications.

The power outlet which the power plug is connected must have a branch circuit ampacity of 15A.

5.1.4 Cables

Connecting to an AS/400

The IBM 5400-006 printer is connected to a host system or a remote control system by a twinax cable. To order the cable (with a connector), specify the following part number:

Twinax Cable Part No. 7362267

Note: When ordering this cable, calculate the required length according to the following:

Total Length=1.6m+ (distance from the printer to the **Host System**).

1.6 m is the minimum length required for cleaning (depending on conditions).

Connecting to a PC

For connecting the IBM 5400-006 printer to a PC, the following cable is sold separately. To order the cable, specify the following

- ID# 81X7875 (2.4 m)
- ID# 09F5544 (5.0 m)

5.1.5 Environmental Conditions

The environmental conditions of the IBM 5400-006 printer appear in the following table. Ensure that the installation site always meets these conditions.

| | Power On | Power Off | Storage | Transport |
|---------------------------|-----------|-----------|------------|------------|
| Temperature | 10°C~40°C | 5°C~43°C | 0.6°C~60°C | -20°C~60°C |
| Relative humidity | 20%~80% | 8%~80% | 5%~80% | 5%~100% |
| Max. wet bulb temperature | 27.0°C | 27.0°C | 29.0°C | 29.0°C |

Note: Do not allow condensation inside the printer.

In addition, check the applicable temperature and humidity ranges to the other units operating together with the IBM 5400-006 printer. The temperature and humidity ranges may vary with each unit.

If print forms and ribbons are not in the same environment as the printer, familiarize them to the temperature and humidity of the printer before use.

Avoid installing the printer in places where it is exposed to the strong sunlight, otherwise the form jam sensor detects sunlight as form jam. When installation in such place is inevitable, protect the printer from direct sunlight with a window shade.

Observe the following rules for storing forms:

- Avoid extremes of temperature and humidity
- Place forms to prevent deformation (warping, twisting, bending, or damage).

Consider the following points to maintain trouble-free operation.

- Electrostatic discharge

If humidity is low, static electricity may be generated by movements of personnel, trolleys, furniture, fixtures and forms. This static electricity can easily accumulate on the floors, furniture, fixtures, and clothes. If static electricity is discharged by contact of a body or other objects, a slight shock may be caused. Static electricity discharge to the system or other electric component might cause intermittent trouble. To minimize static electricity discharge:

- Avoid using floor surface material of high resistivity. The resistance measured between the floor surface and building (or something which provides suitable grounding) should be greater than 1.5×10^5 ohms and less than 2×10^{10} ohms.
- Use a carpet treated for anti static electricity.
- Do not use chairs covered with plastic.
- Avoid low humidity, especially in winter.

- Noise from electromagnetic fields

Avoid installing the printer in an area where electromagnetic interference is so strong that radiation (emittance) or conduction is possible, for example, place near radio transmitting antennas (for AM, FM, TV, or transceiver), radar, certain industrial machines (high frequency induction heating furnaces) or lines trans-

mitting high voltage or large current. If the printer is to be located in such an area, the installation plan should be reviewed to see if a special method of installation should be taken to ensure normal operation and maintenance of the system.

- Compliance with BCIQ (Class A)

This is a Class A product.

- Air pollution

Do not install the printer where the air is polluted by dust, steam or gas. Such an environment causes corrosion to copper and other metallic parts used in the printer, which adversely affect electric circuits.

For details, please consult our sales representative or technical staff.

Environmental Conditions

Appendix A. Forms Design

This chapter describes how to prepare forms used for the IBM 5400-006 printer.

A.1 Forms Specifications

The IBM 5400-006 printer supports a maximum of eight part form. The specifications of the forms are shown in the table below:

| | Single-part form | Multi-part form |
|--|--|---|
| Type (Note 1) | Continuous form (high quality) Label forms, see A-6 | Back-carbon paper: <ul style="list-style-type: none"> • Up to 8 sheets in double strike mode • Up to 5 sheets in NLQ mode Up to 5 sheets fanfold paper (non-carbon paper) |
| Form width | 3.5 ~ 16 inches (Note 2) (127 ~ 406 mm) | Same to the left column |
| Form length | 8 ~ 12 inches (203 ~ 305 mm) | Same to the left column |
| Distance between unfold perforations | 4 inches or more (102 mm or more) | Same to the left column |
| Horizontal absolute position of sprocket hole | 6.35 ± 0.25 mm from the form edge | Same to the left column |
| Horizontal relative shift | Less than 0.1 mm | Same as the left column |
| Sprocket hole spacing | 12.7 ± 0.1 mm | Same as the left column |
| Vertical relative shift of left and right sprocket holes | Less than 0.15 mm | Same as the left column |
| Sprocket hole diameter | 4.0 ± 0.1 mm | Same as the left column |
| Sprocket hole shape | Round or crown shape (Note 3) | Same as the left column |
| Remnant punched-out paper for sprocket holes | None | Same as the left column |
| Fold perforation (Note 4) | Uncut portion: More than 1 mm Cut portion: 2 to 3 mm | Same as the left column |
| Unfold perforation (Note 4) | Uncut portion: More than 1 mm Cut portion: Less than 2 mm | Same as the left column |
| Ream weight (Note 5) | | |
| Minimum | 55 kg | 30 kg |
| Maximum | 135 kg (Note 6) | 34 kg/45 kg (Note 7) |
| Form Thickness | — | Maximum 0.5 mm (with parts overlapped) |

Forms Specifications

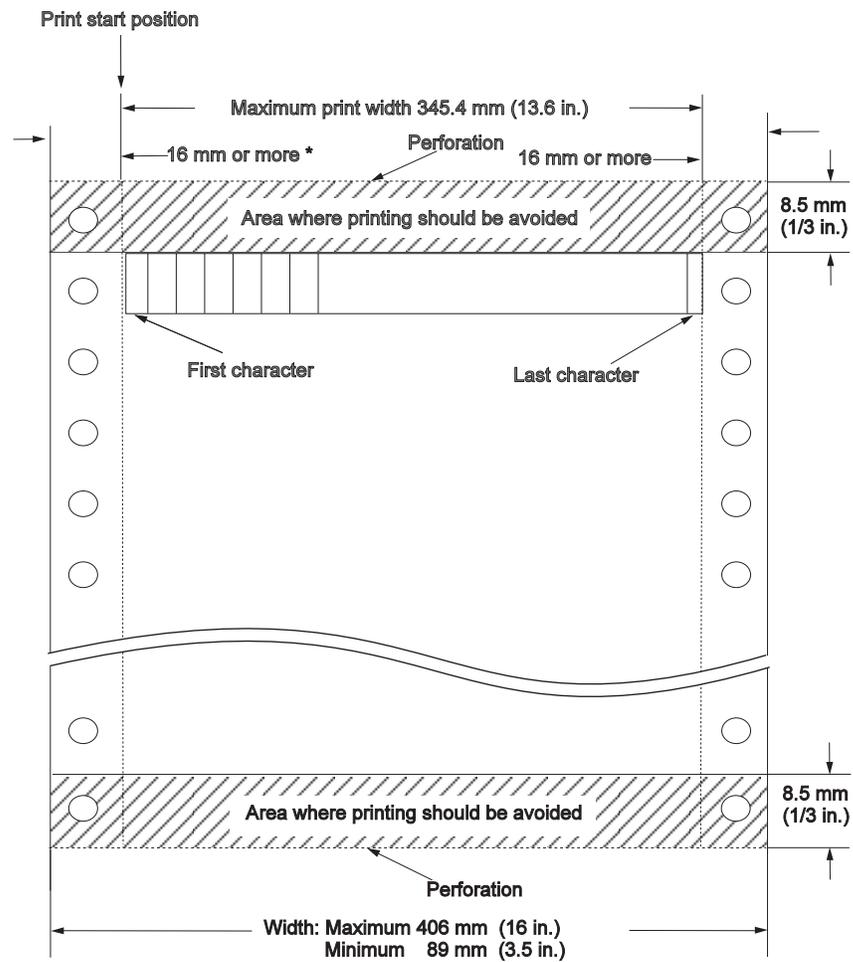
| | Single-part form | Multi-part form |
|----------------------------------|---|-------------------------------|
| Color coating and/or preprinting | Avoid more than 6.35 mm from center of tractor hole at right and left. (For details, see A.3.) For details, see A.4. | Same as the left column |
| Printable area | See A.2 | Same as the left column |
| Glue fastening specifications | — | Glued at both ends (see A.3). |

Notes:

1. Do not use label forms or forms having binder holes or corner cuts.
2. For a 16-inch wide form, the print start position is 30 mm or more from the left edge.
3. The maximum diameter of a crown-shaped hole must be 4.5 mm. The minimum diameter of a crown-shaped hole must be 4.0 mm \pm 0.1 mm.
4. Consider the following for perforations:
 - Horizontal and vertical perforation must not intersect at the cut portions.
 - Perforation must not cross sprocket holes.
 - Form edge's perforation must be uncut.
 - Perforation must not be swell.
 - Perforation must be free from tears.
5. Weight per 1000 sheets of 788 mm \times 1091 mm.
6. If you are using 135 kg single form, the paper might become smudged at the ribbon joint.
7. 2 or 3 part forms can be used up to 45 kg. 4 to 8 part forms can be used up to 34 kg.

A.2 Printable Area

The following illustration shows the printable area for the IBM 5400-006 printer.

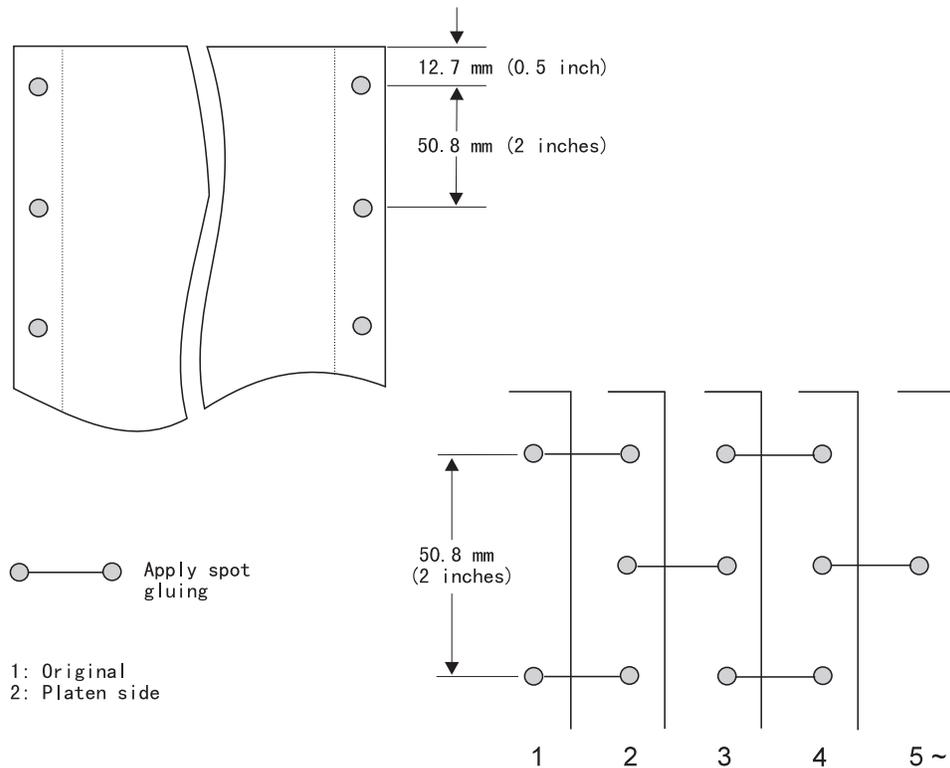


* for 16 inch wide paper, 30 mm or more

Note: Avoid printing on perforations.

A.3 Multiple-Part Forms Glue Fastening Specifications

If multiple part continuous forms are used, be sure they conform to the following specifications. (If they do not or you are not sure, run several test pages first to ensure there are no problems.)



Notes:

1. Glue fastening must be performed on a point basis within 12.7 mm from the left and right edges of the forms.
2. Sprocket holes must be free from glue.
3. Change in the form thickness due to glue fastening must be 0.05 mm or less.

A.4 Preprinting

Preprinting implies using, letterheads and predesigned forms to be printed upon.

In requesting preprinted forms:

- Test the preprinting form completely before printing. Make sure to be able to maintain print quality.
- Use the lightest color of ink possible.
- Dry preprinted ink completely before re-printing. Since the dry period varies depending on the kinds of inks and dry conditions, examine preprinting in advance.
- Ink must not be adhesive on the preprinting form or forms must not be adhesive because ink is not sufficiently dry.

A.5 Label Forms

When using the label forms (tack paper), pay attention to the following:

- Materials, ream, and thickness

| | |
|----------|--|
| Label | Ream 45 ~ 55 kg (Note 1) Materials High Quality Form Thickness 0.08 mm or less (Note 2) |
| Adhesive | Adhesiveness 350 g/25 mm or more Ball Tack No.3 or more Fit to the label material. Do not blot or let stick out. |
| Board | Ream 55 ~ 80 kg (Note 1) Material Glassine Paper Thickness 0.10 mm or more (Note 2) |

Notes:

1. The ream of the label forms (label + adhesive + board) must be 135 kg or less.
 2. The thickness of the label forms (label + adhesive + board) must be 0.2 mm or less.
- Type of label forms:
There are two types of label forms: half-cut type and modeled type. Ordinarily, use the half-cut type.
For the modeled type, the label is peeled in the machine and form jam results frequently. Do not use the modeled type.
 - Pretest
Test enough in advance and check that the following problems do not occur:
 - The label is not peeled. (This causes form jam.)
 - Glue does not stick out extremely. (This might cause machine trouble.)
 - No folding error is detected in the machine.
 - Storage Place
Since label forms reduce and transform as the temperature and humidity change, labels peel. Labels must be stored in a dark and cool place (temperature 20°C, relative humidity 40 to 60%) where the temperature and humidity are stable.
Label forms must be kept a vinyl package after use.

A.6 Maximum Number of Characters per Line

A.6.1 When Connected to the AS/400

| Character | Character Pitch (cpi) | Maximum number per line |
|---|-----------------------|-------------------------|
| Alphanumeric Characters 18 Dot Alphanumeric Characters | 10 | 136 |
| | 12 | 163 |
| | 13.3 | 181 |
| | 15 | 204 |
| | 18 (*1) | 244 |
| IBM-offered double byte characters User defined characters Double width alphanumeric characters Double width 18 dot alphanumeric characters 18 dot double byte characters | 5 | 68 |
| | 4 | 81 |
| | 6.7 | 90 |
| | 7.5 | 102 |
| Double Byte Characters User Defined Characters (*2) | 2.5 | 34 |
| | 3 | 40 |
| | 3.3 | 45 |
| | 3.8 | 51 |

*1 The PFC for AS/400 cannot be set.

*2 There are no parameter settings for double width double byte characters or double width user defined character CPI. They are defined in the double byte character CPI parameter settings.

Maximum Number of Characters per Line

A.6.2 Connecting to a PC

| Character | Character Pitch (cpi) | Maximum Number of Characters per Line |
|--|-----------------------|---------------------------------------|
| Single Byte Characters 18 Dot Single Byte Characters | 10 | 136 |
| | 12 | 163 |
| | 13.3 | 181 |
| | 15 | 204 |
| IBM Offered User Defined Character 18 Dot Double Byte Characters | 5* | 68 (66*) |
| | 6* | 81 (79*) |
| | 6.7 | 90 |
| | 7.5 | 102 |

Note 1) The printer initial setting is 10 cpi and 132 characters.

Appendix B. Print Control Characters (Connected to a System Port)

This appendix describes the print control characters necessary to execute the following functions.

B.1.1 System Printer Control Characters (SCS Mode)

- To select 18 cpi: HEX '2BD204290012'
- To select print speed: HEX '2BD20948000000000000nn'
 nn=01: DP
 nn=02: NLQ
 nn=04: High Quality
 nn=08: Draft
 nn=11: Copy Enhance + DP
 nn=12: Copy Enhance (NLQ)
 nn=14: Copy Enhance + High Quality
 nn=18: Copy Enhance + Draft
- To select EBCDIC character set: HEX '2BD10381nn'
 nn=01: Alphanumeric English Character Set
 nn=20: Alphanumeric Native Character Set
- To select EBCDIC font: HEX '2BD10385nn'

| nn= | Alphanumeric Native Character Set | nn= | Alphanumeric English Character Set |
|-----|---|-----|---|
| 70 | 12 cpi Mincho | 10 | 12 cpi Mincho |
| 71 | 10 cpi Mincho | 11 | 10 cpi Mincho |
| 72 | 12 cpi Mincho (Height: 18-dot character) | 12 | áwâ*ão 12 cpi (Height: 18-dot character) |
| 73 | Gothic | 13 | Gothic |
| 74 | OCR-B | 14 | OCR-B |
| 75 | Vertical writing character | 15 | Vertical writing character |
| 76 | Condense (18 cpi) | 16 | Condense (18 cpi) |
| 77 | Courier | 17 | Courier |
| 78 | Elite | 18 | Elite |

System Printer Control Characters

- To select enlarged characters: HEX '2BFD0402nn mm'

| nn = | mm = | Character Size |
|------|------|---------------------------------------|
| 10 | 10 | 1 time horizontal x 1 time vertical |
| 10 | 20 | 1 time horizontal x 2 times vertical |
| 20 | 10 | 2 times horizontal x 1 time vertical |
| 20 | 20 | 2 times horizontal x 2 times vertical |
| 30 | 30 | 3 times horizontal x 3 times vertical |
| 40 | 40 | 4 times horizontal x 4 times vertical |

B.2 Bar Code Print Function

The following explains the IBM 5400-006 printer bar code print function.

Bar code types

The bar code types printable with the bar code print function are as follows:

- CODE39
- EAN reduction
- EAN standard
- Industrial 2 of 5
- Interleaved 2 of 5 (ITF)
- NW-7 (CODABAR)

Set Items

The items specifiable with the bar code print function are as follows:

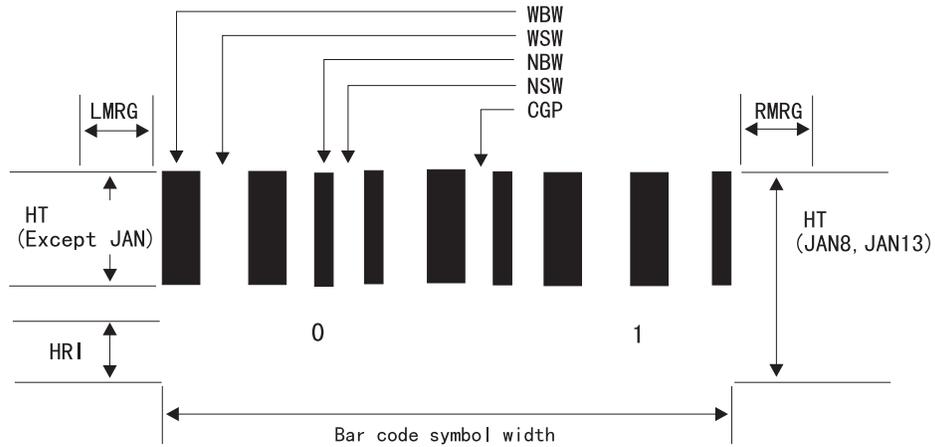
- Bar code type
- Bar code printing direction
- Bar code printing position
- Check digit presence or absence
- Bar and space widths
- Bar code height
- HRI printing presence or absence
- HRI printing position
- Asterisk presence or absence in HRI printing

Notes on bar code printing

- Specify a print format with the bar code print format specification command before using the bar code print command. The print format specified with the bar code print format specification command is valid until the power is turned off or the next bar code print format specification command is specified.
- After the bar code print command is executed, the current print position is not changed vertically or horizontally. To print all bar code images, lines must be fed (FF, LF, PP, or so) exceeding the bar code and HRI heights.
- Up to 20 bar codes can be printed at the same time (assumed to be printed at feeding of each line). This value is not affected by the bar code type, size, or rotation.
- The bar code print command must be specified at the head of a line. If print data or ruled-line command is received before the bar code print command, the bar code print command is ignored.
- The origin (current position) of the bar code print position is specified with the following commands:
LF, FF, IRS, PP
- Confirm that the bar code reading rate with the bar code reader used is sufficient.
- In the forward printing that vertically prints a black bar, one-way printing is better and the reading rate raises.

Bar Code Terminology

The following explains the bar code terminology used in this book:



- NBW (Narrow Bar Width) ----- Thin black bar width
- NSW (Narrow Space Width) ----- Thin white space width
- WBW (Wide Bar Width) ----- Bold black bar width
- WSW (Wide Space Width) ----- Bold white space width
- CGP (inter Character GaP) ----- Gap between characters
Specifies a bar code width between characters of a bar code.
- HT (Height) ----- Bar code height
Indicates the bar code height including the HRI height for EAN code.
For other codes, the HRI height is not included.
- LMRG (Left MaRGin) ----- Left margin
- RMRG (Right MaRGin) ----- Right margin

Indicate the spaces on the left and right of a bar code.

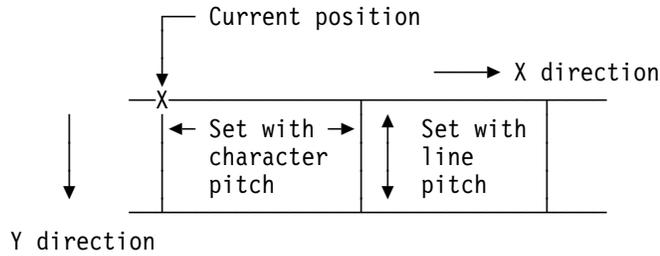
This is a space used in order that the bar code reader recognizes the beginning and end of a bar code. In this printer, the following is set: (1/180 inch unit = about 0.14 mm)

LMRG = EAN reduction (Symbol width excluding margin) ÷ 67 × 9
 EAN standard (Symbol width excluding margin) ÷ 95 × 9
 Others 0

RMRG = 0 mm

- XOFF (X OFFset) ----- X-direction offset from the current
- YOFF (Y OFFset) ----- Y-direction offset from the current

The current position means the upper-left end of the area determined depending on the set character pitch and line pitch. (See the figure.)



- HRI (Human Readable Information)--- Readable code data

The printed bar code data is indicated by the characters persons can recognize. The HRI font is specified with print control characters (selection of font: HEX'2BD10385nn'). EAN is printed with OCR-B regardless of the specified font.

Note: The NBW, NSW, WBW, WSW, CGP, HT, XOFF, and YOFF values can be specified in 1/1440 inch units. Since this printer operates in 1/180 inch units (about 0.14 mm), their values are rounded in 1/180 inch units. They must be specified with a multiple of 8 (8/1440 = 1/180). 1 inch is equal to 25.4 mm.

Bar Code Control Characters

- To specify a bar code print format: HEX'2BFE18910000 [...] FFFFFFFF

| | | | | | | | | | | | | |
|---|---|---|----|----|-----|-----|-----|-----|-----|---|---|---|
| [| O | R | BC | MD | NBW | NSW | WBW | WSW | CGP | H | T |] |
|---|---|---|----|----|-----|-----|-----|-----|-----|---|---|---|

OR (2 bytes): Bar code print direction

- OR = 0000 : 0° Forward printing
- OR = 2D00 : 90° 90° rotation printing
- OR = 5A00 : 180° 180° rotation printing
- OR = 8700 : 270° 270° rotation printing

BC (1 byte): Bar code type

- BC = 01 : CODE39
- BC = 08 : EAN reduction
- BC = 09 : EAN standard
- BC = 0A : Industrial 2 of 5
- BC = 0C : Interleaved 2 of 5 (ITF)
- BC = 0D : NW-7 (CODABAR)

MD (1 byte): Check digit printing or not

| Bar code type | MD | Check digit |
|---------------|--------|---|
| EAN reduction | 00 | Generates a check digit and prints it with a bar code. |
| EAN standard | Others | Error |
| Others | 01 | Prints a bar code without check digit. |
| | 02 | Generates a check digit and prints it with a bar code. (Note) |
| | Others | Error |

Bar Code Print Function

Note: The check digit is generated in the following calculation method:

| | |
|---------------|------------|
| CODE39 | Modulus 43 |
| NW-7 | Modulus 16 |
| Others | Modulus 10 |

| | |
|-----------------------|------------------------------|
| NBW (2 bytes): | Thin black bar width |
| NSW (2 bytes): | Thin white space width |
| WBW (2 bytes): | Bold black bar width |
| WSW (2 bytes): | Bold white space width |
| CGP (2 bytes): | Gap width between characters |

Must be specified in 1/1440 inch units. (However, this printer operates in 1/180 inch units, and a multiple of 8 must be specified.) If the bar code symbol width exceeds 13.6 inches, the excess is not printed.

When NBW, NSW, WBW, WSW, or CGP is equal to 0, the default value is used. When NBW, NSW, WBW, WSW, or CGP is equal to or less than the minimum value, the minimum value is used. The 1-character bar code symbol width determined by NBW, NSW, WBW, WSW, and CGP must not exceed 13.6 inches.

(Unit: 1/1440 inch 1 dot: 1/180 inch = about 0.14 mm)
width=textline scale='0.9'.

| Parameter | Default value D | Minimum value | D × 2 |
|-----------|-----------------|---------------|--------------|
| NBW | 16 (2 dots) | 8 (1dots) | 32 (4dots) |
| NSW | 32 (4dots) | 16 (2dots) | 64 (8dots) |
| WBW | 56 (7dots) | 24 (3dots) | 112 (14dots) |
| WSW | 72 (9dots) | 32 (4dots) | 144 (18dots) |
| CGP | 32 (4dots) | 16 (2dots) | 64 (8dots) |

- The correspondence between the thin and bold widths should be 1 : 2.5 to 3.0.
- WSW, WBW, and CGP are ignored in EAN code.
- For other than EAN codes, the minimum value of NBW is 0.191 mm.
- In the EAN standard, the NBW reference value is 0.33 mm width and the EAN code is defined between 0.26 mm (0.8 time) and 0.66 mm (2 times). A value exceeding 2 times can also be specified.
- The correct reading rate varies depending on blot by ribbon density and the features of the bar code reader. Preread data with the bar code reader and check enough the result.

HT (2 bytes): Bar code height

Can be specified in 1/1440 inch units. (However, this printer operates in 1/180 inch units, and a multiple of 8 must be specified.) If the height of the entire bar code symbol exceeds 13.6 inches, the excess is not printed.

HT = 0: The default value is used.

HT ≤ Minimum value: The minimum value is used.

A value greater than the maximum value cannot be specified.

The following lists the maximum value of the HT printable within 13.6 inches for each bar code type.

Bar Code Print Function

(Unit: 1/440 inch)

| Bar code type | Default value | Minimum value | Maximum value |
|--------------------|---|-----------------|--------------------|
| EAN reduction | 82.0% of total width of bar code | 312 (X'138') | 19584 (X'4C80') |
| EAN standard | 72.6% of total width of bar code | | 19584 (X'4C80') |
| CODE39 | MAX. (15.0%, 6.35 mm of total width of bar code)* | | 19296 (X'4B60') |
| Industrial 2 of 5 | MAX. (15.0%, 6.35 mm of total width of bar code)* | | 19296 (X'4B60') |
| Interleaved 2 of 5 | MAX. (15.0%, 6.35 mm of total width of bar code)* | | 19296 (X'4B60') |
| NW-7 | MAX. (15.0%, 6.35 mm of total width of bar code)* | | 19296 (X'4B60') |

The minimum value of the bar code height is 6.35 mm.

Note: For MAX (A, B), a greater value of A and B is used.

Reference: When a 1-character bar code symbol is printed within 13.6 inches at the following settings, the maximum NBW value is obtained for each setting as listed below.

Setting NBW : WBW = 1 : 3
 NSW = NBW + 16
 WSW = WBW + 16
 CGP = NSW

| | |
|--------------------|--------------------------------------|
| CODE39 | NBW = 960 (120 dots, about 16.8 mm) |
| INDUSTRIAL 2 OF 5 | NBW = 1624 (203 dots, about 28.4 mm) |
| INTERLEAVED 2 OF 5 | NBW = 1080 (135 dots, about 18.9 mm) |
| NW-7 | NBW = 1392 (174 dots, about 24.4 mm) |
| EAN reduction | NBW = 2784 (348 dots, about 48.2 mm) |
| EAN standard | NBW = 2784 (348 dots, about 48.2 mm) |

At CODE39, at least one data character and two asterisks (*) are necessary to validate a bar code symbol. In this case, at the setting above, the maximum NBW value is equal to 513 (64 dots, about 9.0 mm).

At NW7, at least three data characters (start and stop characters and data character) are necessary to validate a bar code symbol. In this case, at the setting above, the maximum NBW value is equal to 464 (58 dots, about 8.1 mm).

At EAN reduction, seven data characters, one check digit, space, left and right bars, and center bar are necessary to validate a bar code symbol. In this case, at the setting above, the maximum NBW value is equal to 248 (31 dots, about 4.3 mm).

At EAN standard, 12 data characters, one check digit, space, left and right bars, and center bar are necessary to validate a bar code symbol. In this case, at the setting above, the maximum NBW value is equal to 168 (21 dots, about 2.9 mm).

Bar Code Print Function

- Bar code printing: HEX '2BFE nn 92 [XOFF YOFF FLAG data]'

Prints data as specified with the bar code print format specification command.

nn (1 byte): Parameter length = (Data length + 7)

XOFF (2 bytes): X-direction offset

Assuming the current print position to be origin 0, specify the bar code image print starting position in the X direction in 1/1440 inch units. (Specify this position with a multiple of 8.) Up to 13.6 inches can be specified in the plus and minus directions; however, a point inside the right and left margins cannot be specified. If the image is inside the right margin, the excessive image is not printed. Take care not to set the image inside the right margin.

$$-19584 \leq XOFF \leq 19584$$

YOFF (2 bytes): Y-direction offset

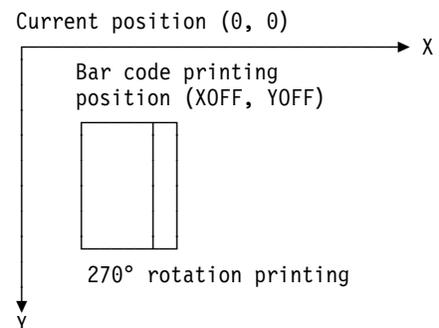
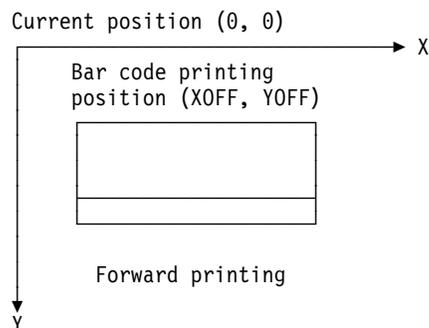
Assuming the current print position to be origin 0, specify the bar code image print starting position in the X direction in 1/1440 inch units. (Specify this position with in multiple of 8). Up to 13.6 inches can be specified in the plus and minus directions; however, a point inside the right an dleft margins cannot be specified. If the image is inside the right margin, the excessive image is not printed. Take care not to set the image inside the right margin.

$$-19548 \leq XOFF \leq 19584$$

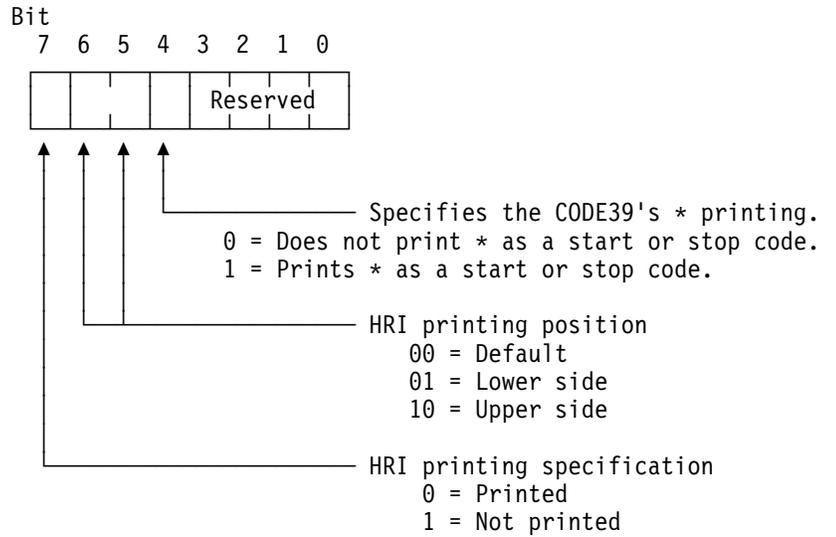
YOFF (2 bytes): Y-direction offset

Assuming the current position to be origin 0, specify the bar code image print starting position in the Y direction in 1/1440 inch units. Up to 1/6 inch (about 4.23 mm) can be specified in the plus direction. (Specify with a multiple of 8.) Take care not to set image outside a page.

$$0 \leq YOFF \leq 29$$



FLAG (1 byte): Specifies HRI printing.



Notes:

1. The reserved bits (bits 3 to 0) are ignored.
2. If bit 7 = 1 is specified, other bits are ignored.
3. Bit 4 is ignored for other than CODE39.
4. For EAN reduction and EAN standard, specify bit 7 = 0 and bits 6 - 5 = 01 (lower part).

FLAG specification example

| FLAG | HRI printing | Printing position | * printing |
|-------|--------------|------------------------|-------------|
| X'00' | Printed | Default | Not printed |
| X'20' | | Lower side of bar code | |
| X'40' | | Upper side of bar code | |
| X'10' | Printed | Default | Printing |
| X'30' | | Lower side of bar code | |
| X'50' | | Upper side of bar code | |
| X'80' | Not printed | | |

Bar Code Print Function

Data: The maximum and minimum values vary depending on bar code types.

| | Data configuration specified | Minimum data length | Maximum data length | Character set |
|--------------------|---|---------------------|---------------------|---|
| CODE39 | Data character | 1 | 45 | Numbers (0 ~ 9) Alphabetic characters (A to Z) Symbols (-,.,Space,\$,/,+,%) |
| EAN reduction | Data character | 7 | 7 | Numbers (0 ~ 9) |
| EAN standard | Data character | 12 | 12 | Numbers (0 ~ 9) |
| Industrial 2 of 5 | Data character | 1 | 45 | Numbers (0 ~ 9) |
| Interleaved 2 of 5 | Data character | 1 | 45 | Numbers (0 ~ 9) |
| NW-7 | Start code Data character Stop code | 3 | 45 | Numbers (0 ~ 9) Symbols (-,\$,:/,.,+) Start and stop codes (A to D, a to d) |

- Use only the characters applicable to each data item in this table.
- At NW-7, a start and stop code are required at the head and end of data respectively. The start and stop codes cannot be used as data characters.

Appendix C. Control Codes (Connected to a Parallel Port)

Control codes control the operation of the printer, however you do not need to know about them for daily use. Refer to the following as necessary for questions about controlling the printer.

C.1 Control Code List

The following lists control codes. For more information about control codes, see C.2, "Overview of Control Codes."

| | Function | Control Code | Code (Hexadecimal) |
|----|--------------------------------------|--------------------------|------------------------------------|
| 1 | Null | NUL | 00 |
| 2 | Bell | BEL | 07 |
| 3 | Backspace | BS | 08 |
| 4 | Horizontal tab | HT | 09 |
| 5 | Line Feed | LF | 0A |
| 6 | Vertical Tab | VT | 0B |
| 7 | Form Feed | FF | 0C |
| 8 | Carriage Return | CR | 0D |
| 9 | Device Control 1 (Ready) | DC 1 | 11 |
| 10 | Device Control 3 (Not Ready) | DC 3 | 13 |
| 11 | Cancel | CAN | 18 |
| 12 | Space | SP | 20 |
| 13 | Set Image Data | ESC %1 n1 n2 | 1B,25,31 n1,n2 |
| 14 | Set Image Data Enlargement | ESC %2 n1 n2 | 1B,25,32 n1,n2 |
| 15 | Variable Jump | ESC %3 n1 n2 | 1B,25,33 n1,n2 |
| 16 | Variable Back Jump | ESC %4 n1 n2 | 1B,25,34 n1,n2 |
| 17 | Variable Line Feed | ESC %5 n1 n2 | 1B,25,35 n1, n2 |
| 18 | Set Carriage Return | ESC %6 n1 n2 | 1B,25,36 n1,n2 |
| 19 | Variable Reverse Line Feed | ESC %8 n1 n2 | 1B,25,38 n1,n2 |
| 20 | Set Line Feed | ESC %9 n1 n2 | 1B,25,39 n1,n2 |
| 21 | Set Bi-directional Printing Mode | ESC %B | 1B,25,42 |
| 22 | Set Uni-directional Printing Mode | ESC %U | 1B,25,55 |
| 23 | Initialize | ESX 01 00 00 | 1B,7E,01,00,00 |
| 24 | Set Character Pitch | ESX 02 00 01 n | 1B,7E,02,00,00,n |
| 25 | Set Line Pitch | ESX 03 00 01 n | 1B,7E,03,00,00,n |
| 26 | Set Page Length | ESX 04 n1 n2 c1 c2 (c3) | 1B,7E,04,n1,12,c1,c2,(c3) |
| 27 | Font Style Selection | ESX 06 00 01 n | 1B,7E,06,00,01,n |
| 28 | All Character Printing Specification | ESX 08n1 n2 c1 c2 ... cn | 1B, 7E, 08, n1, n2, c1, c2 ..., cn |

Control Code List

| | Function | Control Code | Code (Hexadecimal) |
|----|------------------------------------|--|--|
| 29 | Set High Speed Mode | ESX 0E 00 01 01 | 1B,7E,0E,00,01,01 |
| 30 | Cancel High Speed Mode | ESX 0E 00 01 02 | 1B,7E,0E,00,01,02 |
| 31 | Eject Cut-Sheet | ESX 0E 00 01 06 | 1B,7E,0E,00,01,06 |
| 32 | Set Condensed Lower Character | ESX 0E 00 01 07 | 1B,7E,0E,00,01,07 |
| 33 | Cancel Condensed Lower Character | ESX 0E 00 01 08 | 1B,7E,0E,00,01,08 |
| 34 | Set Character Enlargement | ESX 0E 00 01 09 | 1B,7E,0E,00,01,09 |
| 35 | Cancel Character Enlargement | ESX 0E 00 01 0A | 1B,7E,0E,00,01,0A |
| 36 | Set Vertical Printing Mode | ESX 0E 00 01 0B | 1B,7E,0E,00,01,0B |
| 37 | Cancel Vertical Printing Mode | ESX 0E 00 01 0C | 1B,7E,0E,00,01,0C |
| 38 | Superscription | ESX 0E 00 01 0D | 1B,7E,0E,00,01,0D |
| 39 | Subscription | ESX 0E 00 01 0E | 1B,7E,0E,00,01,0E |
| 40 | Cancel Superscription/Subscription | ESX 0E 00 01 0F | 1B,7E,0E,00,01,0F |
| 41 | Reverse Half Line Feed | ESX 0E 00 01 13 | 1B,7E,0E,00,01,13 |
| 42 | Forward Half Line Feed | ESX 0E 00 01 14 | 1B,7E,0E,00,01,14 |
| 43 | Set 3 Bytes Transfer Mode | ESX 0E 00 01 15 | 1B,7E,0E,00,01,15 |
| 44 | Set 2 Bytes Transfer Mode | ESX 0E 00 01 16 | 1B,7E,0E,00,01,16 |
| 45 | Set Emphasized Printing | ESX 0E 00 01 17 | 1B,7E,0E,00,01,17 |
| 46 | Cancel Emphasized Printing | ESX 0E 00 01 18 | 1B,7E,0E,00,01,18 |
| 47 | Set Double Strike Printing | ESX 0E 00 01 19 | 1B,7E,0E,00,01,19 |
| 48 | Cancel Double Strike Printing | ESX 0E 00 01 1A | 1B,7E,0E,00,01,1A |
| 49 | Set/Cancel Underlining | ESX 11 00 01 n | 1B,7E,11,00,01,n |
| 50 | Set/Cancel Overstrike Mode | ESX 13 n1 n2 c1 c2 c3 (c4) | 1B,7E,13,n1,n2,c1, c2,c3,(c4) |
| 51 | Grid Line Printing | ESX 16 n1 n2 c1 ... cn | 1B,7E,16,n1,n2,c1,....,cn |
| 52 | Set Horizontal Tab | ESX 18 n1 n2 ht1 ... htn | 1B,7E,18,n1,n2,ht1,....,htn |
| 53 | Set Vertical Tab | ESX 19 n1 n2 vt1 ... vtn | 1B,7E,19,n1,n2,vt1,....,vtn |
| 54 | Set Left/Right Margin | ESX 1A 00 02 lm rm | 1B,7E,1A,00,02,lm,rm |
| 55 | Set Perforation Skip | ESX 1B 00 01 n | 1B,7E,1B,00,01,n |
| 56 | Horizontal Move | ESX 1C 00 02 n m | 1B,7E,1C,00,02,n,m |
| 57 | Vertical Move | ESX 1D 00 02 n m | 1B,7E,1D,00,02,n,m |
| 58 | Set Character Scaling | ESX 20 00 03 n1 n2 02 | 1B,7E,20,00,03,n1,n2,02 |
| 59 | Set Character Height | ESX 37 00 01 n | 1B,7E,37,00,01,n |
| 60 | Set Print Mode | ESX 39 00 01 n | 1B,7E,39,00,01,n |
| 61 | Set Bar Code Print Format | ESX 40 00 16 00 00 c1 ... c16 FF FF FF FF | 1B,7E,40,00,16,00,00,c1,....,c16, FF,FF,FF,FF |
| 62 | Bar Code Printing | ESX 42 n1 n2 c1 ... cn | 1B,7E,42,n1,n2,c1,....,cn |

Avoid using the following codes.

| | Function | Control Code | Code (Hexadecimal) |
|----|------------------------------|---------------------|---------------------------|
| 63 | Set Fixed Length Image | FS | 1C |
| 64 | Set 3 Byte Transfer Mode | ESC(| 1B,28 |
| 65 | Set 2 Byte Transfer Mode | ESC) | 1B,29 |
| 66 | Set Page Length | ESC F n1 n2 | 1B,46,n1,n2 |
| 67 | Set High Speed MOde | ESC O | 1B,4F |
| 68 | Cancel High Speed Mode | ESC P | 1B,50 |
| 69 | Eject Cut-Sheet | ESC V | 1B,56 |
| 70 | Set Character Enlargement | ESC | 1B,5B |
| 71 | Cancel Character Enlargement | ESC “ | 1B,5D |

C.2 Overview of Control Codes

C.2.1 Terms

The following explains terms that are used in describing control codes.

- Hexadecimal numbers are shown by X'n'. Binary numbers are shown by B'n'.
- Line pitch refers to the amount of feed between lines of printing. The line pitch returns to the default value when the printer is powered off.
- Page length (or form length) is the distance from the beginning of a page to the beginning of the next page. See control code FF, ESX, 04 n1 n2 c1 c2 (c3), or ESC F. The page length returns to the default value when the printer is powered off.
- TOF (Top Of Form) is the position of the first printed line on the form.
- Image data is graphic and character data that is sent directly to the printer without being converted to code first. This data is sent from the system unit in the form of data bytes (1 byte units).
- The minimum dot pitch when printing is approximately 0.141 mm (1/180 inch).
- If print data containing the control codes ESC %1 and ESC %2 is set beyond the right margin, the part inside of the right margin is received and printed. You can choose whether to discard the remaining data or to print it on the next line in the default setting.
- If operands (n1 and n2) used with ESC %1 and ESC %2 exceed the available range, the data for the number of bytes of that control code and its operands are ignored.
- If unspecified control codes are appended to ESC codes, the control code is ignored.
- If the values of n, n1, n2, or m exceed the specified range, the control code is ignored.
- Control codes starting with ESX (X'1B 7E') are extended control codes.
- The printing area extension mode sets the maximum printing width to 13.6 inches (345). Normally, the maximum printing width of the Set Image Data is 13.2 inches (335).

C.2.2 Conditions to Start Printing

Print data is processed line-by-line or block-by-block. Printing can start when any of the following codes are received by the printer.

- LF
- FF
- VT
- DC3
- ESC %5
- ESC %8
- ESC V
- ESX 01 00 00
- ESX 0E 00 01 06
- ESX 0E 00 01 13

- ESX 0E 00 01 14
- ESX 1D 00 02 n m

When the following codes are received, printing can start. If the following data on the same line is received, it is written over the data already in the print buffer:

- CR
- BS
- ESC %4
- ESC %6
- ESX 1C 00 02 n m (Moving to the left of current printing position)

Printing can also be started under the following conditions:

- data extending beyond the right margin is received.
- the line buffer is full.

C.3 Control Codes

1.Null: Nul (X'00')

No action. This code is ignored.

2.Bell: Bel (X'07')

The buzzer sounds upon reception of this control code.

Note: If you select "OFF" from the buzzer setting item during initialization, this code is ignored when received.

3.Back Space : BS (X'08')

The print position is moved back to the left single character space. In the character enlargement mode, the print position is moved back to the left double character space. In the condensed character mode, the print position is moved back to the left single character space.

If the print position is at the left end, this code is ignored. If print data is followed by this code, printing starts. If the succeeding data on the same line is received, it is written over the data already in the print buffer. If a condensed character setting is made, the single byte character width becomes 18 cpi and the print position is also moved back 18 cpi character spacing.

4.Horizontal Tab: HT (X'09')

Moves the print position from the current position to the next horizontal tab stop.

If no tab stops are set, the printer ignores this code.

5.Line Feed: LF (X'0A')

All data in the buffer is printed and the paper is fed one line. If no data precedes this code, the paper is advanced one line without printing any data.

6.Vertical Tab: VT (X'0B')

Prints all the data in the buffer and advances the form to the next vertical tab stop position.

7.Form Feed: FF (X'0C')

Prints all data in the print buffer and moves the form to the top of the next form. The print position moves to the first character position.

If the print position is already at the top of the form, this code is ignored

8.Carriage Return: CR (X'0D')

Returns the print position to the first character position on that line (left margin), after printing the content of the line buffer. If the succeeding data on the same line is received, it is written over the data already in the print buffer.

If the print position is already at the left margin, this code is ignored.

9.Device Control 1: DC1 (X'11')

Changes the printer to the "Ready" state. If the printer is in the "Ready" state and it receives DC1, it ignores the code.

10.Device Control 3: DC3 (X'13')

Prints all data stored in the buffer and changes the printer to the "Not Ready" state. If the printer is in the "Not Ready" state and it receives DC3, it ignores the code.

11.Cancel: CAN (X'18')

Clears the print buffer. The printer enters the "Ready" state. This control code is valid even during a printing interruption. If the CAN code is received during printing, printing continues to the end of the current line and clears the content in the print buffer.

The CAN code cannot be used to cancel the following:

- Line Feed (LF) Setting
- Page Length Setting
- The Current Position from TOF
- Uni-directional Print Mode Setting (High Quality)
- The n1 and n2 Values of Image Data
- High Speed Print Setting
- Character Pitch
- Font Style
- Vertical and Horizontal Margins
- Perforation Skip
- Superscription/Subscription
- Emphasized Printing
- Double-strike Printing
- Underlining
- Strike-out Mode
- Vertical or Horizontal Tab Position
- Vertical Printing
- Character Scaling
- Horizontal Condensed Character Mode

12.Space: SP (X'20')

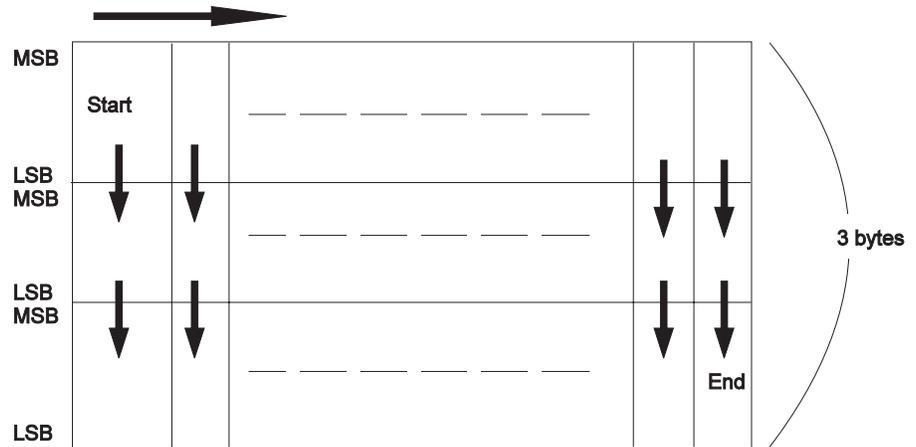
Moves the width of a single character, which is the same as a single byte character, at that point. (The print position moves to the right.) In the character enlarging mode, this code moves the position the width of double character spacing at that point. In the condensed mode, it moves a single character space.

If the condensed character mode has been selected, the single byte character pitch is 18 cpi. Any movements caused by this control code are executed accordingly in 18 cpi.

13.Set Image Data: ESC %1 n1, n2 (X'1B 25 31 n1 n2)

Sets the horizontal number of image data print dots. The n1 and n2 indicate the number of printing dots. The number of print dots is calculated by $n1 \times 256 + 2$. The range of X'n1n2' is from X'0001' to X'0948' when the MPP is set at 13.2 inches. The range of X'n1n2' is from X'0001' to X'0990' when the MPP is set at 13.6 inches.

Image data is sent following the control code. The data byte sequence is as follows: (MSB: Most Significant Byte, LSB: Least Significant Byte).



14.Set Data Enlargement: ESC %2 n1,n2 (X'1B 25 32 n1 n2')

Specifies horizontally double-sized printing of image data. The n1 and n2 indicates the number of horizontal image data dots before enlargement. The range of X'n1n2' is from X'0001' to X'04A4' when the MPP is set at 13.2 inches.

The data byte format followed by this control code is the same as that of ESC %1 n1 and n2. The range of X'n1n2' is from X'0001' to X'04C8' when the MPP is set at 13.6 inches.

15.Variable Jump: ESC %3 n1, n2 (X'1B 25 33 n1 n2')

Horizontally jumps the number of dots specified by n1 and n2. (The printing position moves to the left.) The range of

X'n1n2' is X'0001' to X'0948' when the MPP is set to 13.2 inches. The range of

X'n1n2' is X'0001' to X'0990' when the MPP is set to 13.6 inches.

16.Variable Back Jump: ESC %4 n1, n2 (X'1B 25 34 n1 n2')

Horizontally jumps back the number of dots specified in n1 and n2. (The print position move to the left.) If it follows print data, printing starts. If the succeeding data on the same line is received, it is written over the data already in the print buffer.

The range of X'n1n2' is from X'0001' to X'0948' when the MPP is set at 13.2 inches. If the back jump exceeds the left margin, the print position returns to the left end. The range of X'n1n2' is from X'0001' to X'0990' when the MPP is set at 13.6 inches.

17.Variable Line Feed: ESC %5 n1, n2 (X'1B 25 35 n1 n2')

Line feeds a number specified by n1 and n2. If it follows the print data, the printer starts printing. The range of X'n1n2' is from X'0001' to X'00FF'. The line feed is 0.21 mm (1/120 inch) times X'n1n2'.

18.Set Carriage Return: ESC %6 n1, n2 (X'1B 25 36 n1 n2')

Moves the print position to X'n1n2' dot position based from the first print position. If it follows print data, the printer starts printing. If the succeeding data on the same line is received, it is written over the data already in the print buffer.

In the next printing only, printing starts from the position specified by this control code. The first print position does not change.

The range of X'n1n2' is from X'0001' to X'0948' when the MPP is set to 13.2 inches. The range of X'n1n2' is from X'0001' to X'0990' when the MPP is set to 13.6 inches.

19.Variable Reverse Line Feed: ESC %8 n1, n2 (X'1B 25 38 n1 n2')

Reverse line feeds the sheet by 0.21 mm (1/120 inch) as one unit. If it follows print data, the printer starts printing.

X'The range of n1n2' is from X'0001' to X'0028'. The range of the reverse line feed is 0.2 mm (1/120 inch) to 8.47 mm (1/3 inch).

The total reverse line feed cannot exceed 8.47 mm (1/3 inch) in per page. If the print position reaches the TOF, printing stops.

20.Set Line Feed: ESC %9 n1, n2 (X'1B 25 39 n1 n2')

Sets the line pitch by n1 and n2 using 0.21 mm (1/120 inch) as one unit. The range of X'n1n2' is from X'0001' to X'003C'. Thus the range setting of a line feed is from 0.21 mm (1/120 inch) to 12.7 mm (60/120 inch).

If this code is received at the beginning of a print line, the new movement distance applies to this and succeeding lines. If this code is received at the middle or the end of a print line, the new movement distance applies to the next and succeeding lines. This code also affects the line feed carried out by the line feed switch.

Note: The function of this control code is the same as that of ESX 03 00 01 n (line feed pitch setting) with the exception that the values that can be set are different.

21.Set Bi-directional Printing Mode: ESC %B (X'1B 25 42')

Sets the bi-directional printing mode. Mode switching is done by a line as a unit. If this control code is included in the printing data, the line including the control code and the following lines are printed bi-directionally.

Note: This code is ignored if a speed other than normal speed is selected during initialization or by using operation switches on the control panel.

22.Set Uni-directional Printing Mode: ESC %U (X'1B 25 55')

Set the uni-directional printing mode. The printing direction is from the left only. Mode switching is done by a line as a unit. If this control code is received at the middle of a line, the lines following are printed uni-directionally.

Note: This code is ignored if a speed other than normal speed is selected during initialization or by using operation switches on the control panel. This code is also ignored if the UNI-DIR. COMMAND item is set to IGNORE.

23.Initialize: ESX 01 00 00 (X'1B 7E 01 00 00')

Resets the printer after a page break. Use this code at the end of printing.

24.Set Character Pitch: ESX 02 00 01 n (X'1B 7E 02 00 01 n')

Set the double byte character pitch to $n \times 1/10$ cpi. Specify a value for n from the table below. Values other than those shown are ignored. The single byte character pitch is set to double the pitch of a double byte character.

| n | Double Byte Character (cpi) |
|-------|-----------------------------|
| X'32' | 5 |
| X'3C' | 6 |
| X'43' | 6.7 |
| X'4B' | 7.5 |

25.Set Line Pitch: ESX 03 00 01 n (X'1B 7E 03 00 01 n')

Sets the lines per inch to n times the 1/10 lpi. Values other than those shown below are ignored.

| n | Lines Per Inch (lpi) |
|-------|----------------------|
| X'14' | 2 |
| X'1E' | 3 |
| X'28' | 4 |
| X'32' | 5 |
| X'3C' | 6 |
| X'4B' | 7.5 |
| X'50' | 8 |

If this code is received at the beginning of a line of print, the new line pitch applies to this and succeeding lines. If this code is received at the middle of a line of print, the new line pitch applies to the next and succeeding lines.

26.Set Page Length: ESX 04 n1 n2 c1 c2(c3) (X'1B 7E 04 n1 n2 c1 c2 (c3'))

Sets the page length of continuous form.

Setting c1 to X'00', c2 and c3 sets the page length to 1/6 inch. In this

case, $n1=X'00'$ and $n2=X'03'$, and the range of $c2$ and $c3$ is from $X'0001'$ to $X'01FF'$.

If $c1$ is $X'01'$, then $c2$ sets the page length by line. In this case, $n1=X'00'$ to $n2=X'02'$, and the range of $c2$ is from $X'01'$ to $X'FF'$. Do not specify $c3$ in this case.

If $c1$ is $X'02'$, then $c2$ sets the page length by line. In this case, $n1=X'00'$ to $n2=X'02'$, and the range of $c2$ is from $X'01'$ to $X'7F'$. Do not specify $c3$ in this case.

When this control code is received, the left end of the receiving line is set as TOF.

27. Font Style Selection: ESX 06 00 01 n (X'1B 7E 06 00 01 n')

Changes the single byte character font style. Specify an n value from the table below. Values other than those shown below are ignored.

27. Font Style Selection : ESX 06 00 01 n (X'1B 7E 06 00 01 n')

Changes the font style of the single byte character. Specify the value of n from the table below. The values other than those shown in the table below will be ignored.

| n | Font Style | Example |
|-------|-----------------------|------------------------|
| X'00' | Default (Song 12 cpi) | ABCDEF0123456789#\$\$% |
| X'01' | DP Gothic (10 cpi) | ABCDEF0123456789#\$\$% |
| X'06' | Elite (12 cpi) | ABCDEF0123456789#\$\$% |
| X'07' | Courier (10 cpi) | ABCDEF0123456789#\$\$% |
| X'08' | Song (12 cpi) | ABCDEF0123456789#\$\$% |
| X'09' | Song (10 cpi) | ABCDEF0123456789#\$\$% |
| X'0A' | Gothic | ABCDEF0123456789#\$\$% |
| X'0B' | Song (12 cpi/8 lpi) | ABCDEF0123456789#\$\$% |
| X'11' | OCR-B | ABCDEF0123456789#\$\$% |

28. All Character Printing Specification: ESX 08 n1 n2 c1 c2 ... cn (X'1B 7E 08 n1 n2 c1 c2 ... cn')

Receives a number of data specified by $n1$ and $n2$ which follows the control code as the specified character code.

Codes such as $X'1B'$ and $X'1C'$ that are normally used as the control code are also handled as a character code in this mode.

Specify the c_i ($i=1, \dots, n$) as one byte for single byte characters or two bytes for double byte characters. Undefined code is dealt with either a single byte space or a double byte space. However, $NUL(X'00')$ is ignored.

29.Select High Speed Mode: ESX 0E 00 01 01 (X'1B 7E 0E 00 01 01')

Switches the printer to the high speed mode. This setting is done by a line as a unit. If this control code is included in the middle of a line, the lines following are printed in the high speed mode.

If the printer is already in the high speed mode, this code is ignored. The high speed mode takes precedence over the uni-directional printing mode. Upon reception of this code, the printer enters the bi-directional printing mode. The printer resumes uni-directional printing if it receives a high speed mode cancel command.

Note: This code is ignored if a speed higher than normal speed is selected during initialization or by using operation panel switches.

30.Cancel High Speed Mode: ESX 0E 00 01 02 (X'1B 7E 0E 00 01 02')

Cancels the high speed mode. This control code is done by a line as a unit. If it is included in the middle of a line, the lines following are printed at normal speed.

If the printer is already in normal speed mode, this code is ignored.

Note: This code is ignored if a speed other than normal speed is selected during initialization or by using operation panel switches.

31.Eject Cut-Sheet: ESX 0E 00 01 06 (X'1B 7E 0E 00 01 06')

Prints all data stored in the printer and then operation similar to FF is performed. The form is fed to the TOF of the next page. If the printing position is already TOF, this command is ignored.

32.Set Condensed Character: ESX 0E 00 01 07 (X'1B 7E 0E 00 01 07')

Prints single byte characters after this control code condensed horizontally. Character pitch becomes 18 cpi, regardless of the current setting. The double byte character pitch is not changed.

33.Cancel Condensed Character: ESX 0E 00 01 08 (X'1B 7E 0E 00 01 08')

Cancels the condensed character mode set by ESX 0E 00 01 07. This control restores the character pitch of single byte characters to the previous setting.

34.Set Character Enlargement: ESX 0E 00 01 09 (X'1B 7E 0E 00 01 09')

Characters following this code have double width.

35.Cancel Vertical Enlargement: ESX 0E 00 01 0A (X'1B 7E 0E 00 01 0A')

This code cancels the character enlargement setting by the control codes ESX 0E 00 01 09 or ESC .

36.Set Vertical Printing Mode: ESX 0E 00 01 0B (X'1B 7E 0E 00 01 0B')

All characters following the reception of this control code are rotated 90 degrees counter-clockwise at the same position of normal printing.

37.Cancel Vertical Printing Mode: ESX 0E 00 01 0C (X'1B 7E 0E 00 01 0C')

All characters following the reception of this control code are printed without character rotation.

38.Superscription: ESX 0E 00 01 0D (X'1B 7E 0E 00 01 0D')

Prints in the superscription the single byte characters starting at the reception of this code until either the Superscription or the Cancel Super/Subscription code is received.

39.Subscription: ESX 0E 00 01 0E (X'1B 7E 0E 00 01 0E')

Prints the single byte characters in subscription starting at the reception of this code until either the Superscription or the Cancel Super/Subscription code is received.

40.Cancel Super/Subscription: ESX 0E 00 01 0F (X'1B 7E 0E 00 01 0F')

From reception of this control code, super/subscription is cancelled.

41.Reverse Half Line Feed: ESX 0E 00 01 13 (X'1B 7E 0E 00 01 13')

Prints all data in the print buffer and reverse line feeds for half a line.

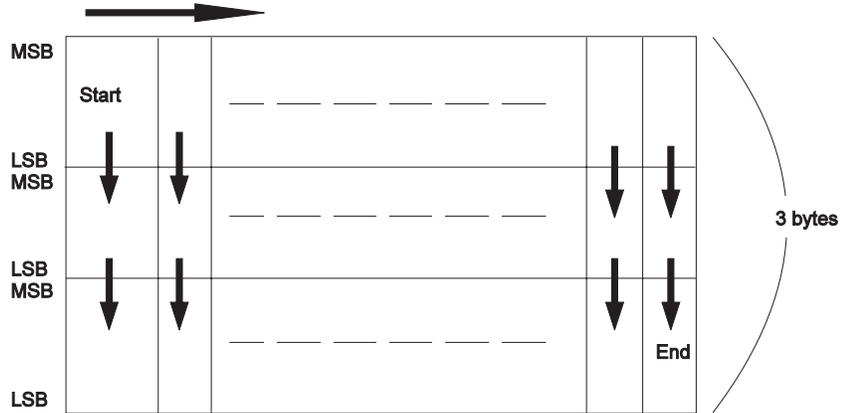
If the printing position reaches the top of a form, this code is ignored. The total reverse feed can not exceed 8.47 mm (1/3 inch).

42.Half Line Feed: ESX 0E 00 01 14 (X'1B 7E 0E 00 01 14')

Prints all data in the print buffer and feeds a half line forward. A page change occurs if the bottom margin is reached.

43. Set 3 Bytes Transfer Mode: ESX 0E 00 01 15 (X'1B 7E 0E 00 01 15') Sets the 3 bytes transfer mode. This mode is set as a default at power on.

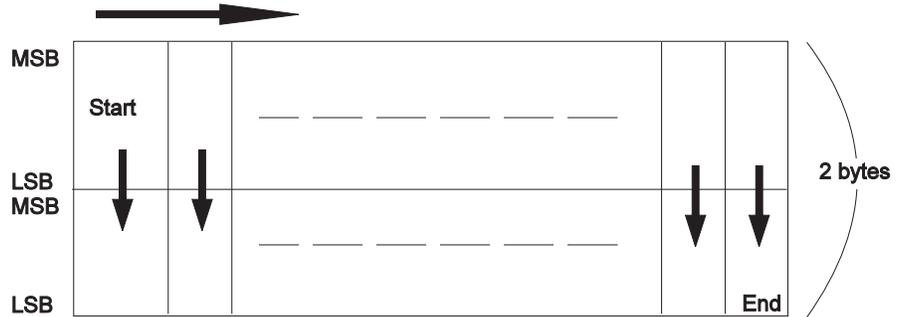
Transfer data byte is as follows. (MSB: Most Significant Bit, LSB: Most Significant Bit).



44. Set 2 Bytes Transfer Mode: ESX 0E 00 01 16 (X'1B 7E 0E 00 01 16')

Sets the 2 bytes transfer mode. At power on, the 3 bytes transfer mode is the default.

Transfer data byte is as follows. (MSB: Most Significant Bit, LSB: Most Significant Bit).



45. Set Emphasized Printing: ESX 0E 00 01 17 (X'1B 7E 0E 00 01 17')

All characters are emphatically printed (shifted by single dot to a side and stacked) starting from the reception of this control code.

46.Cancel Emphasized Printing: ESX 0E 00 01 18 (X'1B 7E 0E 00 01 18')

The emphasized printing mode is cancelled by this code.

47.Set Double Strike Printing: ESX 0E 00 01 19 (X'1B 7E 0E 00 01 19')

If this code is received at the beginning of a print line, double strike starts immediately.

Note: This command is ignored if the printing speed is other than normal speed specified by initial value or a switch on the operation panel.

48.Cancel Double Strike Printing: ESX 0E 00 01 1A (X'1B 7E 0E 00 01 1A')

If this code is received at the beginning of a print line, double strike printing is cancelled immediately. If it is received at some point in a print line, double strike printing is cancelled at the beginning of the next line.

Note: This command is ignored if the printing speed is other than normal speed specified by initial value or a switch on the operation panel.

49.Set/Cancel Underlining: ESX 11 00 01 n (X'1B 7E 11 00 01 n')

Sets or cancels underlining.

The setting or cancelling of underlining is specified by n as follows:

n=B'0000 00n1n0'

n0 1 :Start Underlining

0 :End Underlining

n1 1 :Skip Blanks

0 :Skip Blanks

The maximum number of underlined blocks that can be printed by this control code is 256.

50. Set/Cancel Overstrike Mode: ESX 13 n1 n2 c1 c2 c3 (c4) (X'1B 7E 13 n1 n2 c1 c2 c3 (c4)')

Specifies the single or double byte character to be overstruck. The character specified is overstruck after this. The previously specified overstrike ends when the cancellation specified (set Bit0 of c1 to 0) or the overstrike mode is newly specified.

To specify n1, n2, c1, c2, c3, or (c4), do the following:

Single Byte Character

n1=X'00', n2=X'03'

c1: Overstrike Flag

Bit 0

1: Set Overstrike Mode

0: Cancel Overstrike Mode

Bit 1

1: Does not overstrike spaces

0: Overstrikes spaces

Bit 2 ~ 7

Not defined. These bits are ignored.

c2: Undefined byte. This byte is ignored.

c3: Specify the DOS internal 1 byte code.

Note: Do not specify c4.

Double Byte Character

n1=X'00', n2=X'04'

c1: Same as the single byte character

c2: Same as the single byte character

c3: Specify the upper byte of the DOS internal 2 byte code

c4: Specify the upper byte of the DOS internal 2 byte code

Note: Overstrike cancellation is as follows:

X'1B 7E 13 00 01 00'

The overstrike character is changes accordingly, as font style, condensed character, or superscript/subscript are made.

51.Grid Line Printing: ESX 16 n1 n2 c0 c1 ... cn (X'1B 7E 16 n1 n2 c0 c1 ... cn')

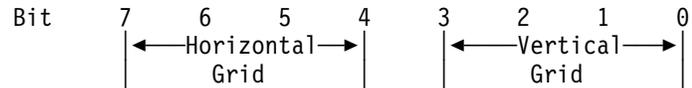
Specifies the grid lines vertically and horizontally for a line. Send this code before sending the printing data for this line.

The specifications for parameters are as follows:

n1, n2: Number of bytes of c0 ~ cn

c0: .Specify 1

c1 ... cn: Specify the grid line information as follows in single byte unit:

**Types of Grid Lines**

Bit (7 6 5 4)

Bit (3 2 1 0)

0 0 0 0 : No Grid Line

0 0 0 1 : Line

0 0 1 0 : Bold Line

0 0 1 1 : Dashed Line

Grid lines that are beyond the right margin are ignored. Since the grid line is not a character it is not affected character decorations, but it is printed over when the double strike mode is set. Double strike printing can be immediately set or cancelled in the middle of a line so caution is required when using grid lines.

52.Set Horizontal Tab: ESX 18 n1 n2 ht1 ht2 ... htn (X'1B 7E 18 n1 n2 ht1 ht2 ... htn')

Sets the horizontal tab position. The n1 and n2 indicate the number of horizontal tabs, and the ht1, ht2 ... htn (one byte each) specifies the tab positions by the number of single byte characters. Set tab positions in ascending order. If the order is broken, the order returns to what it was before the order was broken.

The tab position is set in the current character pitch. The maximum number of tabs is 28. If more than 28 tabs are set, all tabs are ignored.

In the case of n1n2=X'0001', ht1=X'00', the tab position is the default setting (at every 8 characters to the 9th character). In the case of n1n2=0, horizontal tabs are cleared.

53.Set Vertical Tab: ESX 19 n1 n2 vt1 vt2 ... vtn (X'1B 7E 19 n1 n2 vt1 vt2 ... vtn')

Sets the vertical tab. The n1 and n2 indicate the number of vertical tabs, and the vt1, vt2 ... vtn (one byte each) specifies the tab positions in the single character unit.

The tab position is set at the current line pitch. The maximum number of tabs that can be set is 64. Anything above 64 is ignored.

In the case of n1n2=0 vertical tabs are cleared.

54.Set Left and Right Margins: ESX 1A 00 02 lm rm (X'1B 7E 1A 00 02 lm rm')

The left margin and the right margin are one byte each. lm specifies the left margin and rm specifies the right margin from the far left of the printed area, by the number of single byte characters.

If the distance between the left margin and the right margin is less than 12.7 mm (0.5 inch/90 dot row), the right margin exceeds the right end (8, 13.2, or 13.6 inches), or the left margin or right margin is specified as zero, the specification is ignored.

55.Set Perforation Skip: ESX 1B 00 01 n (X'1B 7E 1B 00 01 n')

This control code activates or cancels the perforation skip function. The function moves the printing position from the last line of the page to the first line (TOF) of the next page by a specified number n (one byte hexadecimal number) of lines.

The skip distance is set in the current line pitch. If n=0 or the receiving Set Page Length command or the Initialization command, perforation skip returns to the default setting.

Setting the perforation skip in the default setting function, the skip distance is set to 12.7 mm (0.5 inch) or 25.4 mm (1 inch).

Note: If the skip distance specified by this control code is less than the length between the perforation and the TOF, the printer prints on the perforation.

56.Horizontal Move: ESX 1C 00 02 n m (X'1B 7E 1C 00 02 n m')

Moves the position horizontally in the number of single byte characters according to current character pitch. In the condensed lower character mode, the position moves in 18 cpi.

Specify the values of n and m in each byte as follows:

- n=00: Absolute position move from the left margin. Settings that exceed the right margin are ignored.
- n=01: Relative position move toward the right from the current position. If the setting exceeds the right margin, the remaining data is printed on the next line.
- n=02 : relative position move toward the left from the current position. If the setting exceeds the left margin, the current printing position is moved to the left end.

Note: If n is set to values other than 00, 01, or 02, this control is ignored.

Set the number of characters to move in m.

Note: Movements controlled by this code are not affected by the specifications of character enlargement or reduction. If the print position is moved back to the left from the current print position when 00 is set for n or if print data follows when 02 is set for n, printing starts. If succeeding data is received on the same line, it is written over the data already in the print buffer.

57.Vertical Move: ESX 1D 00 02 n m (X'1B 7E 1D 00 02 n m')

Prints all the data in the line buffer, and moves vertically one line, according to the current line pitch.

Specify the values of n and m in each byte as follows:

- n=01: Relative move downward from the current position.

Note: If n is set to values other than 01, this control code is ignored.

Set the number of lines to move in m.

58.Set Character Scaling: ESX 20 00 03 n1 n2 02 (X'1B 7E 20 00 03 n 1 n2 02')

Changes the proceeding character size according to the values of n1 and n2.

| n1 | n2 | Character Size (H x V) |
|-------|-------|------------------------|
| X'08' | X'08' | 1/2 × 1/2 |
| X'10' | X'10' | 1 × 1 |
| X'10' | X'20' | 1 × 2 |
| X'20' | X'10' | 2 × 1 |
| X'20' | X'20' | 2 × 2 |

YOFF (2 bytes): Y direction offset
 FLAG (1 byte): Specifies the HRI printing
 Data: Bar code data

For bar code printing precautions, see "Notes on bar code printing" on page B-3.

63.Set Fixed Length Image: FS (X'1C')

This code is used to substitute for ESC %1 or n1 n2 or ESC %2 n1 n2. To print image data, it is recommended that ESC %1 n1 n2 or ESC %2 n1 n2 be used.

Before this control code is used, valid n1 and n2 must be specified in the ESC %1 or ESC %2 sequence. The values of n1 and n2 referred to at this time are those specified most recently. The number of data bytes following this control code should not contradict with the values of the previously specified n1 and n2.

64.Set 3 Byte Transfer Mode: ESC (X'1B 28')

Same as ESX 0E 00 01 15 (X'1B 7E 0E 00 01 15'). It is recommended that ESX 0E 00 01 15 be used whenever possible.

65.Set 2 Byte Transfer Mode: ESC) (X'1B 29')

Same as ESX 0E 00 01 16 (X'1B 7E 0E 00 01 16'). It is recommended that ESX 0E 00 01 16 be used whenever possible.

66.Set Page Length: ESC F n1 n2 (X'1B 46 n1n2')

Same as ESX 04 00 03 00 n1 n2 (X'1B 7E 04 00 03 00 n1 n2'). It is recommended that ESX 04 00 03 00 n1 n2 be used whenever possible.

67.Set High Speed Mode: ESC O (X'1B 4F')

Same as ESX 0E 00 01 01 (X'1B 7E 0E 00 01 01'). It is recommended that ESX 0E 00 01 01 be used whenever possible.

68.Cancel High Speed Mode: ESC P (X'1B 50')

Same as ESX 0E 00 01 02 (X'1B 7E 0E 00 01 02'). It is recommended that ESX 0E 00 01 02 be used whenever possible.

69.Eject Cut Sheet: ESC V (X'1B 56')

Same as ESX 0E 00 01 06 (X'1B 7E 0E 00 01 06'). It is recommended that ESX 0E 00 01 06 be used whenever possible.

70.Set Character Enlargement: ESC [(X'1B 5B')

Same as ESX 0E 00 01 09 (X'1B 7E 0E 00 01 09'). It is recommended that ESX 0E 00 01 09 be used whenever possible.

71.Cancel Character Enlargement: ESC] (X'1B 5D')

Same as ESX 0E 00 01 0A (X'1B 7E 0E 00 01 0A'). It is recommended that ESX 0E 00 01 0A be used whenever possible.

C.4 Considerations in Creating a 5577 Data Stream

Important items to be considered in creating a data stream for print jobs are as follows:

- About level E printers
- Initialization of printer for print job
- Initial printer values
- Character layout
- Difference between line pitch and actual line feed distance
- Format setting
- Specification of font style
- Handling data exceeding right margin

The above considerations are described below. In the description below, character decoration refers to enlargement, reduction, emphasis, or double strike printing.

C.4.1 About Level E Printers

Printers that can be used with all the control codes listed in C.1, "Control Code List" are called level E printers.

The printer has a factory setting of level E, allowing it to be used without changing the level. If your software is not ready for a level E printer, this printer can be used with the level E function turned off. Normally, use this printer with the level E function turned on.

Notes:

1. For how to turn off the level E function, see 2.12, "Initializing the Printer."
2. To use this printer with the level E function off, see C.4.3, "Character Layout" on page C-24 or C.4.4, "Difference Between Line Pitch and Actual Line Pitch Distance" on page C-27.
3. When using IBM OS/2 on the system connected to the printer, use the level E function.

C.4.2 Printer Initial Values

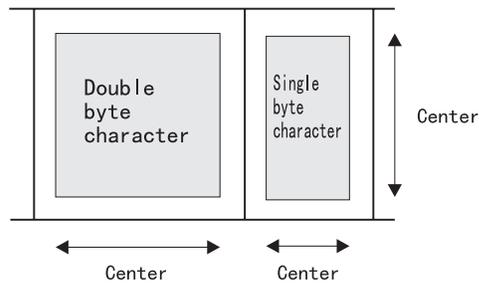
When the printer is turned on after a print test or after the printer has received an initialization setting control code (X'1B 7E 01 00 00'), the following values are assigned:

| Parameter | Initial Value |
|--|--|
| Page length | Value specified during initialization |
| Character Pitch (dpi) | Double byte (5 dpi), single byte (10 dpi) |
| Line pitch (lpi) | Value specified during initialization |
| Left/right margin | Left margin: Column 1 Right margin: 8, 13.2, or 13.6 inch is specified in the initial setup |
| Horizontal tab | 8-column blocks is specified (starting at column 9) |
| Vertical tab | Each line |
| Vertical printing mode | Value specified during initialization |
| Font style | Value specified during initialization |
| Skip perforation | Value specified during initialization |
| Image transfer mode | 3 byte transfer mode |
| Print mode | Value specified during initialization |
| Uni-directional printing command (valid/invalid) | Value specified during initialization |
| Other modes (set/cancel) | Cancel |

Considerations in Creating a 5577 Data Stream

C.4.3 Character Layout

When the level E function is turned on, each character is printed at the center of the area determined by the character pitch and line pitch. See the figure below.



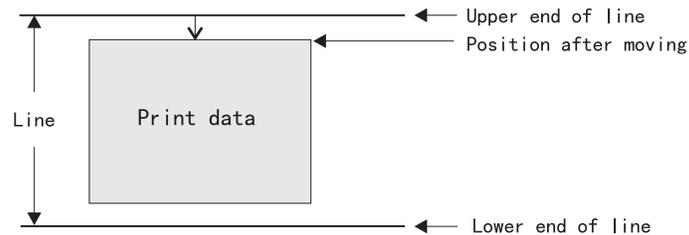
Considerations in Setting Line Pitch

Control codes for setting line pitch:

- ESC %9 n1 n2
- ESX 03 00 01 n

The above control codes for setting line pitch must be taken into consideration the following points:

When the level E function is turned on, the upper and lower ends of a line are determined by the set line pitch at the instance when the first character code or image data for this line is received. Then, the print position moves vertically so that print data is positioned at the center of the area determined by the upper and lower ends of the line. (See the figure below.)



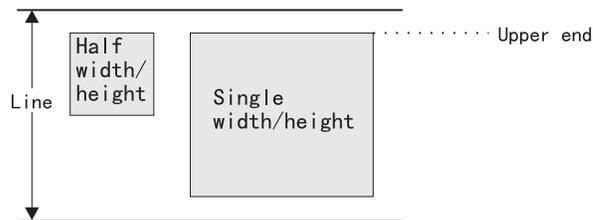
After the print position has moved vertically, the line pitch of the current line cannot be changed. If it is changed, it is effective for the next and succeeding lines.

Considerations in Creating a 5577 Data Stream

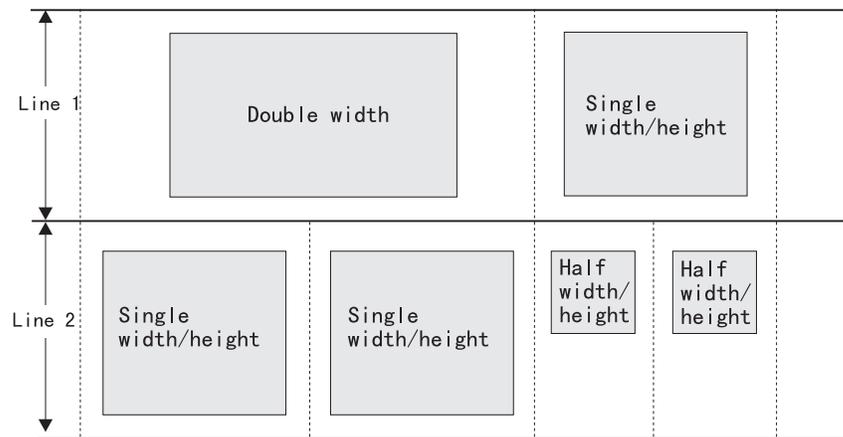
However, the following codes use the line pitch set most recently, regardless of the line pitch in the current line:

- ESX 04 n1 n2 c1 c2 (c3)
(for c1-1)
- ESX 19 n1 n2 vt1 vt2 ... vtn
- ESX 1B 00 01 n

When a character scaling is set, the upper end of each character is aligned with that of the single-width and single-height character. The line pitch does not change if a half-width and half-height character size is specified.



The left and right ends of each character are positioned as shown below:

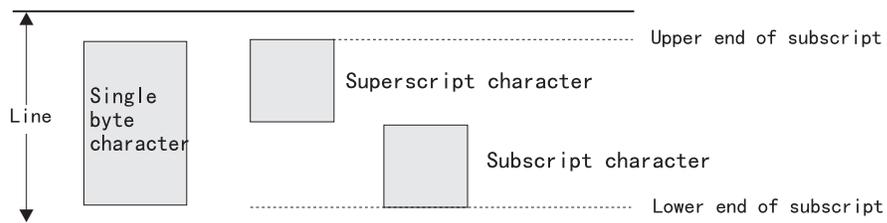


Considerations in Creating a 5577 Data Stream

In the superscript/subscript mode, the widths of a superscript or subscript are equal to the width of a single byte character. The upper end of the superscript is aligned with the upper end of the single byte character. The lower end of the subscript is aligned with the lower end of the single byte character. (See the figure below.)

Superscript Character: $X^2 + Y^2 = Z^2$

Subscript: H_2O



C.4.4 Difference Between Line Pitch and Actual Line Pitch Distance

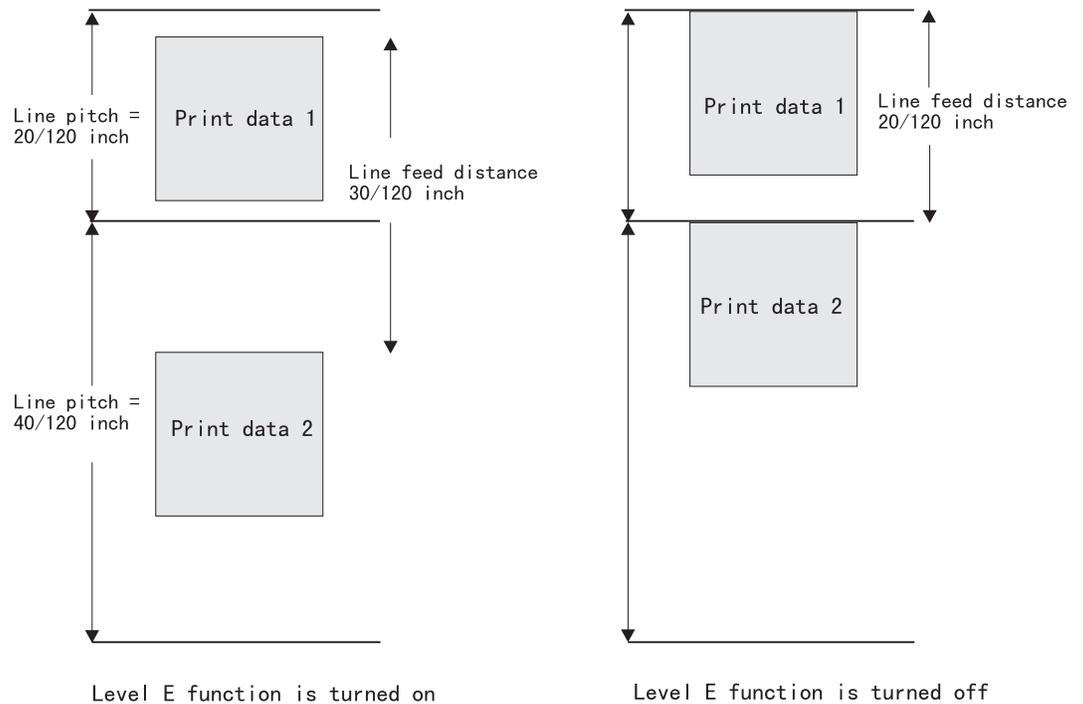
When changing the line pitch of a level E printer, notice must be taken of the difference between line pitch and actual line pitch distance.

The line feed distance of the level E printer is determined by the line pitches of the current and next lines. Therefore, the line pitch and line feed distance of the current lines are not always the same.

Example: Suppose the following data is received:

ESC %9 0014 (line pitch = 20/120 inch)
 Print data 1, CR, LF
 ESC %9 00 28 (line pitch = 40/120 inch)
 Print data 2, CR, LF

Then, the print results are as follows:



C.4.5 Setting a Format (Setting a Print Area and Tabs and Moving the Print

Position Vertically/Horizontally)

The following settings made with control codes are determined by the line pitch or character pitch set when the control code is transferred. Care is needed when changing the line pitch or character pitch.

- Print area setting (page length setting in lines, perforation skip setting, left and right margin setting)
- Vertical and horizontal tab setting
- Vertical and horizontal position movement

Setting the Print Area

A page length (ESX 04 ... is set to C₁= X'01') and perforation skip (ESX 1B...) must be specified with a number of lines respectively. These numbers are converted to absolute values according to the line pitch set at a reception of these control codes.

Be sure to set a page length and perforation skip immediately after the paper has been advanced one page (X'0C', etc).

The specified left and right margins (ESX 1A...) are converted to absolute values according to the single byte character pitch (18 cpi when a condensed lower character setting is made) set at reception of this control code. Even if the character pitch is changed after conversion to absolute values, the left and right margins are not affected

Setting Vertical and Horizontal Tabs

The specified vertical tab (ESX 19...) is converted to an absolute value according to the line pitch set at reception of this control code. Even if the line pitch is changed after conversion to the absolute value, the vertical tab position is not affected.

The specified horizontal tab (ESX 18...) is converted to an absolute value according to the single byte character pitch (18 cpi when a condensed lower character setting is made) set at reception of this control code. Even if the character pitch is changed after conversion to the absolute value, the horizontal tab position is not affected.

Moving the Print Position Vertically/Horizontally

The print position is moved vertically (ESX 1D...) or horizontally (ESX 1C...) in units of the line pitch or single byte character pitch (18 cpi when a condensed lower character setting is made) set at reception of this control mode.

Note on Perforation Skip

When a perforation skip setting is made, ruled lines on the last line on a page for which ruled line printing is specified may be printed on two contiguous pages separated by the perforation. (This is the case where the last line encounters the perforation or physical last line.)

C.4.6 Specifying a Font Style

A control code for changing a font style allows you to change the font style of single byte characters. Note the following:

- Select a font style suited to the character pitch. If the font style is not suited to the character pitch, the left and right sides of the characters might be trimmed.
If the single byte pitch is 13.3 cpi or 15 cpi, select Song 12 cpi font style.
- If vertical printing is specified, vertical characters are printed irrespective of font style.
- When condensed character, superscript and subscript, and font style settings are made, the priority among them is as follows:
 1. Condensed character setting
 2. Superscript and Subscript setting
 3. Vertical printing setting
 4. Font style setting

If a font style is changed when a condensed lower character setting is made, the new font style becomes effective after the condensed character setting has been cancelled.

C.4.7 Combining Character Decorations

Character decorations (enlargement/reductions, emphasis, and double strike printing can be combined as desired).

C.4.8 Printing Data Exceeding the Right Margin

When power is turned on, the right margin is set to 8, 13.2, or 13.6 inches (the right margin can be selected in the initial setup mode). The right margin can also be set with a left and right margin setting control code ("ESX 1A ...").

When data is printed exceeding the right margin, the difference between the image transfer and the character transfer are as follows:

- Whether the data exceeding the right margin is to be discarded in the main transfer mode (ESC %1, ESC %2, or ESC %3 is used) or it is to be printed on the next line should be determined during the initial setup (image loopback mode).
- In the code transfer mode, characters exceeding the right margin are printed on the next line after inserting a line feed automatically.

Appendix D. ESC/P-C Mode and ESC/P-C Control Modes

IBM 5400-006 printers have the function to emulate ESC/P. This function can be used by selecting the ESC/P emulation mode.

For more information on ESC/P control codes, see the *ESC/P Reference Manual*.

D.1 Initialization for ESC/P-C

Mode

Initialization for ESC/P-C mode:

- When using the printer under ESC/P-C mode, connect the printer to the IBM PC or RS/6000, and install the ESC/P-C printer driver in the operating system or on the system unit.
- Select ESC/P for the emulation choice during printer initialization.

For information on initialization, see 2.12, "Initializing the Printer" on page 2-65.

D.2 Control Codes

The IBM 5400-006 printer supports the following control codes:

Character/Style Specification

| Control Code | Function |
|--------------|------------------------------------|
| ESC R | Select international character set |
| ESC t | Code table selection |
| ESC x | Select print quality |
| ESC % | Set/cancel download character set |
| ESC q | Character style selection |

Horizontal movement

| Control Code | Function |
|--------------|---------------------------------|
| BS | Backspace |
| HT | Horizontal tab |
| ESC D | Horizontal tab position setting |
| ESC \$ | Absolute position setting |
| CR | Print and carriage return |
| ESC 1 | Left margin setting |
| ESC Q | Left margin setting |
| ESC \ | Relative position setting |

Line Spacing

| Control Code | Function |
|--------------|-------------------------|
| ESC 0 | 1/8 inch line spacing |
| ESC 2 | 1/6 inch line spacing |
| ESC 3 | n/180 inch line spacing |
| ESC + | n/360 inch line spacing |
| ESC A | n/60 inch line spacing |

Form

| Control Code | Function |
|--------------|-------------------------------|
| ESC C 0 | Set form length in inch units |
| ESC C | Set form length in line units |
| ESC N | Perforation skip setting |
| ESC O | Cancel perforation skip |

Printer Control

| Control Code | Function |
|--------------|---------------------------------|
| BEL | Buzzer |
| DC1 | Device Control 1 |
| DC3 | Device Control 3 |
| CAN | Cancel data in the print buffer |
| ESC U | Select print direction |
| ESC @ | Initialization |
| ESC EM | Cut sheet feeder control |

Text Print

| Control Code | Function |
|--------------|--|
| ESC w | Set/cancel enlargement |
| ESC - | Set/cancel underlined printing |
| ESC E | Set emphasized character printing |
| ESC F | Cancel emphasized character printing |
| ESC G | Set double strike printing |
| ESC H | Cancel double strike printing |
| ESC S | Set super/subscript characters |
| ESC T | Cancel super/subscript characters |
| DEL | Cancel last character |
| ESC M | Set 12 cpi printing |
| ESC g | Set 15 cpi printing |
| ESC p | Set 10 cpi printing |
| ESC W | Set/cancel double width character printing |
| SI | Set condensed character printing |

| Control Code | Function |
|--------------|---|
| SO | Set double width printing for one line |
| ESC SO | Cancel double width printing for one line |
| ESC SI | Set condensed character printing |
| ESC SP | Set character space |
| ESC ! | Set printing style |
| DC2 | Cancel condensed printing |
| DC4 | Cancel double width printing for one line |
| ESC 4 | Set italic characters |
| ESC 5 | Cancel italic characters |
| ESC p | Set/cancel proportional printing |

Vertical position movement

| Control Code | Function |
|--------------|---------------------------------|
| LF | Line feed |
| VT | Vertical tab |
| FF | Form feed |
| ESC J | Forward paper feed (n/180 inch) |
| ESC B | Set vertical tab position |
| ESC b | Set VFU tab position |
| ESC / | Set VFU channel |

Other

| Control Code | Function |
|--------------|----------------------------|
| ESC & | Define download characters |
| ESC : | Character set copy |
| ESC < | Return home |

Graphic Command

| Control Code | Function |
|--------------|---|
| ESC K | Set 8 dot single-density bit image printing mode |
| ESC L | Set 8 dot double-density bit image printing mode |
| ESC Y | Set 8 dot double-speed, double density bit image printing |
| ESC Z | Set 8 dot quadruple-density bit image printing |
| ESC * | Set bit image printing |
| ESC ? | Assign bit image print mode |

Limits When Using ESC/P-C Mode

Hanji Mode

| Control Code | Function |
|--------------|---|
| FS SO | Set double width character printing for one line |
| FS SI | Set half width printing |
| FS DC2 | Cancel half width printing |
| FS DC4 | Cancel double width character printing for one line |
| FS ! | Set print style |
| FS & | Set Hanji mode |
| FS - | Hanji underline |
| FS . | Cancel Hanji |
| FS 2 | Download Chinese characters |
| FS D | Print a pair of half width characters in vertical line printing |
| FS J | Set vertical line printing |
| FS K | Set horizontal line printing |
| FS S | Set Chinese character spacing |
| FS T | Set half width character spacing |
| FS U | Adjust the half width character space |
| FS V | Cancel half width character space adjustment |
| FS W | Set/cancel quadruple size character printing |
| FS k | Select font family |
| FS r | Select 1/4 square printing |
| FS x | Set/cancel high speed printing |

D.2.1 Limits When Using ESC/P-C Mode

The following codes cannot be used:

Font Family Selection **ESC k**

D.3 ESC/P-C Character Set

Note: For the Hanji code table, see the *ESC/P Reference Manual*.

ESC/P-C Character Set

Appendix E. DC 12V Outlet



DANGER:

Before connecting a DC 12V LAN adapter, read "Safety Instructions" on page iii.

The IBM 5400-006 printer has a DC outlet on the left side of the interface panel. The DC outlet can be used for a LAN adapter connected to the parallel port.

Carefully check the following specifications before using the DC plug:

- DC: + 12V
- **Electric Current: Maximum 0.5A**

The output is interlocked with the printer. When you plug it in and unplug it, make sure you power off the printer.

