

receipt, journal, slip printer

TM-930II series

Operator's Manual

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FCC CLASS A

FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

The connection of a non-shielded printer interface cable to this printer will invalidate the FCC Verification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

FOR CANADIAN USERS

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Class A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

INTRODUCTION

The TM-93011/93011P are high-quality POS printers which can print on slip, journal, and receipt paper.

The main features are as follows:

- Wide slip paper. (Max. characters per line: 88 at 7 X 9 font)
- The interface connector is included within the external dimensions.
- High thorough using bi-directional, minimum distance printing.
- Precision paper feeding at 1/144 inch.
- Maximum 2 K bytes receive buffer.
- The command protocol is based on the ESC/POS™ standard.
- Either the serial interface (RS-232C or RS-422) or the parallel interface (Centronics) is selectable as a factory option.

Before trying to use this printer, be sure to read this manual carefully to make sure that you use the unit correctly.

The illustrations in the manual show the TM-93011 serial interface.

The TM-93011 is divided into 2 types. The serial interface and parallel interface.

About this manual

I. SETTING UP

- * **Chapter 1** contains information on unpacking the printer, choosing the place for the printer, and names and functions of parts.
- * **Chapter 2** and **Chapter 3** contain information on connecting and setting up the printer.
- * **Chapter 4** contains information on testing the printer.

II. REFERENCE

- * **Chapter 5** contains information on using the printer.
- * **Chapter 6** contains information on software control including printer command descriptions.

APPENDIX

Appendixes contain information on general specifications, character code tables and a list of commands.

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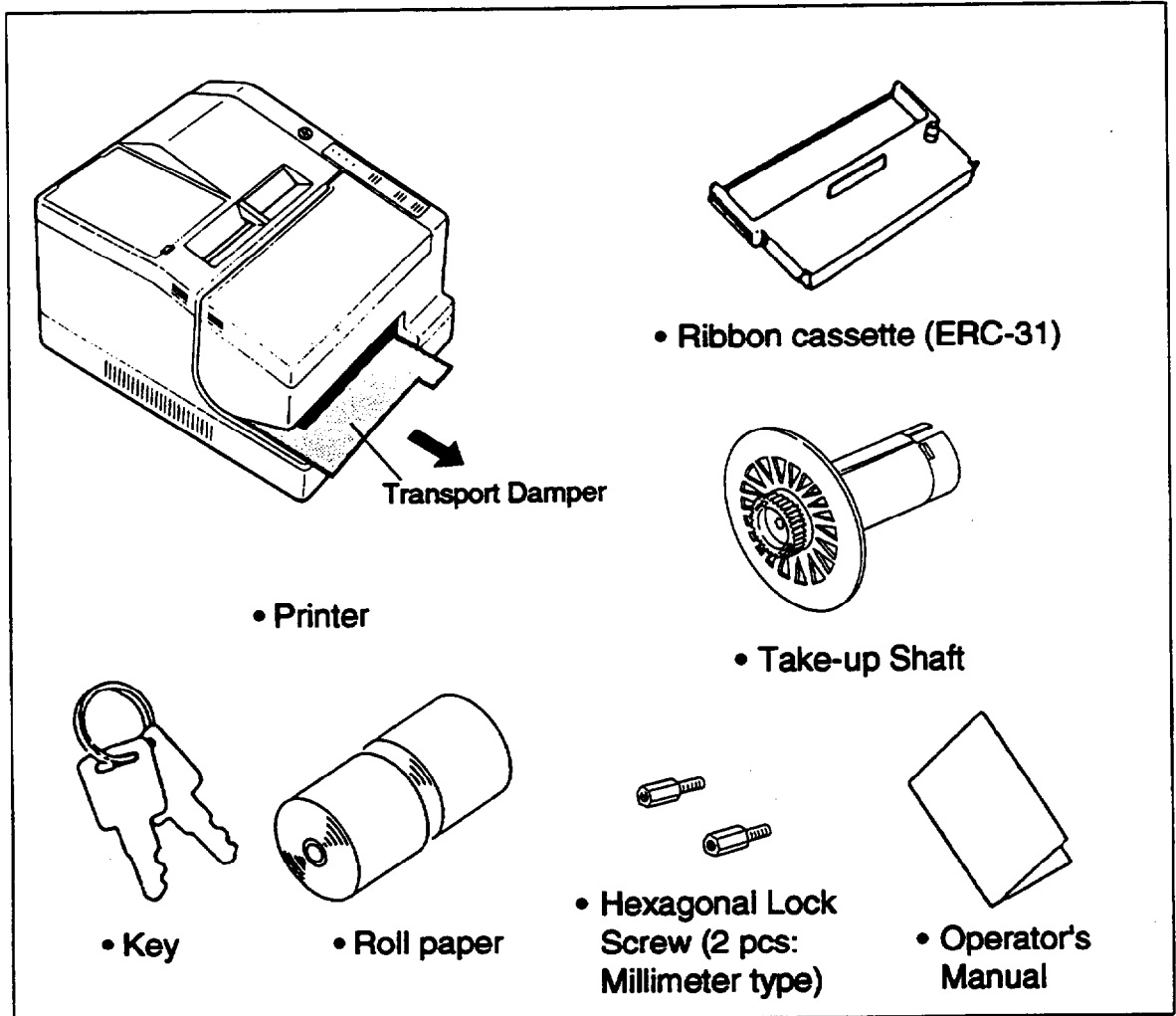
I. SETTING UP

Chapter 1 Unpacking the Printer

1-1 Checking the Contents of the Box

■ Checking the parts

① Remove the printer and other parts from the box.



② Check that the units are not damaged.

③ If there are damaged or missing components, please contact the dealer.

④ Before using printer, remove the transport damper.

■ Maintenance

Keep the packing case and the transport damper for future transportation to protect from damage.

■ Optional Parts

Power supply (PS-120 or 130)

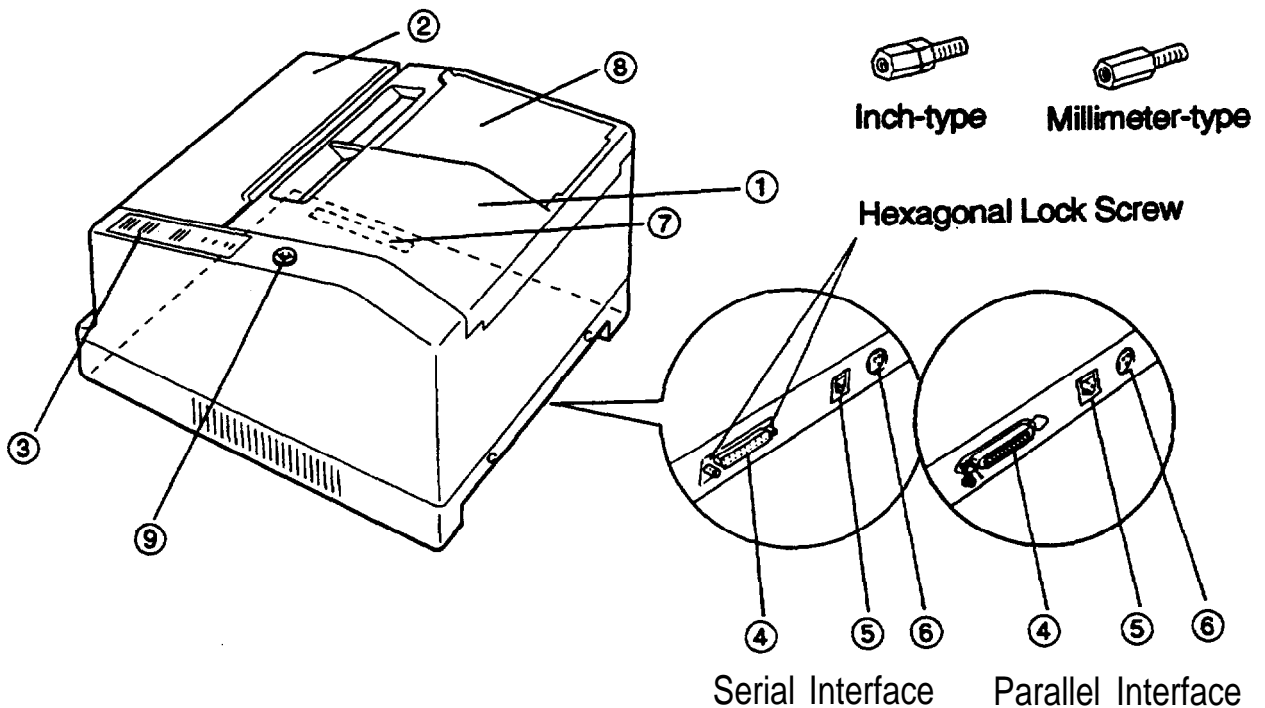
1-2 Choosing a Place for the Printer

- Do not place the printer near heaters.
- Avoid using or keeping the printer in places subject to excessive high or low temperatures, or moisture.
Do not place the printer in direct sunlight.
- Do not use or store the printer in a dusty or dirty place.
- When setting up the printer. Choose a location, which is stable.
Intense vibration or shock may damage the printer.
- Ensure printer has enough space, it can be used easily.
- Use the ribbon cassette specified.
- Do not use the printer without installing paper and a ribbon cassette.

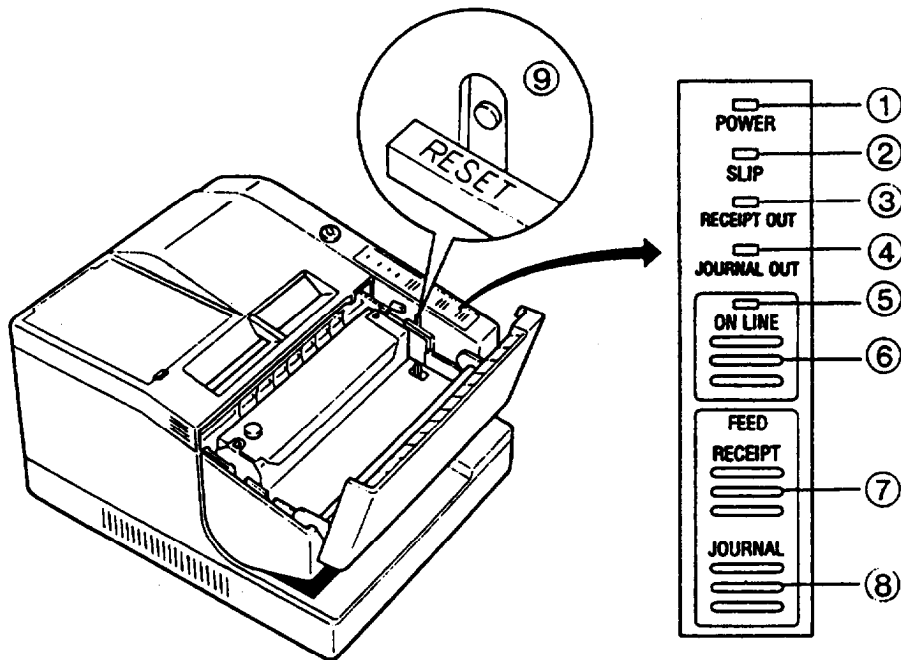
1-3 Names and Functions Part

■ Part names

- | | |
|-----------------------------|---|
| ① Roll-paper cover | ⑥ Power connector |
| ② Ribbon cover | ⑦ DIP switches (On the bottom of the printer) |
| ③ Operation panel | ⑧ Receipt-paper cover |
| ④ Interface connector | ⑨ Key |
| ⑤ Drawer kick-out connector | |



■ Operation panel



INDICATORS (LEDs)

- | | |
|---------------------------|---|
| ① POWER lamp (green): | Turns on when the power is turned on. |
| ② SLIP lamp (green): | Turns on in the slip mode and flashes when the printer is waiting for the slip paper. |
| ③ RECEIPT OUT lamp (red): | Turns on when the roll paper at the receipt side is close to running. |
| ④ JOURNAL OUT lamp (red): | Turns on when the roll paper on the journal side is close to running. |
| ⑤ ON-LINE lamp (green): | Turns on when the printer is on line and turns off when it is off line. |

* The printer is in error status when the ON-LINE lamp blinks.

SWITCHES

- | | |
|------------------------|--|
| ⑥ ON-LINE switch: | Toggles between on and off line status. |
| ⑦ RECEIPT FEED switch: | Feeds the receipt paper. |
| ⑧ JOURNAL FEED switch: | Feeds the journal paper. |
| ⑨ RESET switch: | Sets the printer to the initial conditions, the same as when the power is turned on. This switch is located on the same side as the panel switch, and can be accessed when the ribbon case is open. Press the switch using a pointed article, such as a ballpoint pen. |

* The data remaining in the printer is erased if this switch is pressed.

Chapter 2 Before Setting Up

2-1 Connecting the Power Supply to the Printer

■ Plugging in power supply

The printer must be connected to an external power supply.

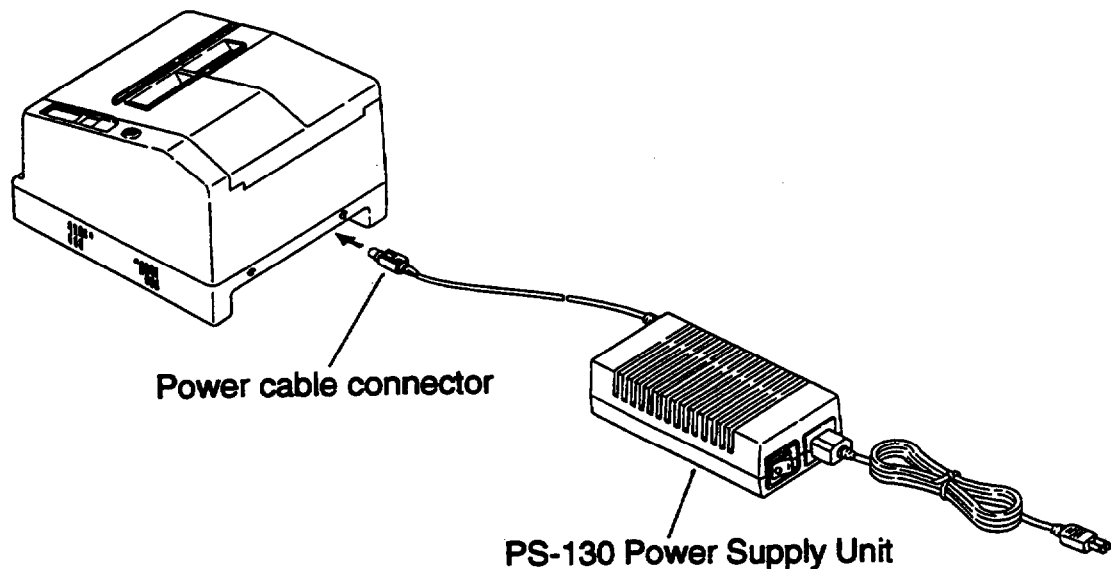
Be sure to use a power cable that matches the specifications of both the printer and the power supply unit.

CAUTIONS:

- Before connecting the printer to the power supply, make sure that the voltage (24 VDC) and power specifications match the printer's requirements.
- Using an incorrect power supply can cause serious damage to the printer.

Connect the power unit according to the following procedure.

- ① Confirm the power is turned off to the power unit, then connect the power cable to the connector.
- ② Turn on the power switch of the power unit.



CAUTION:

- Remove the power cable by grasping the connector firmly at the arrow mark and pulling straight out.

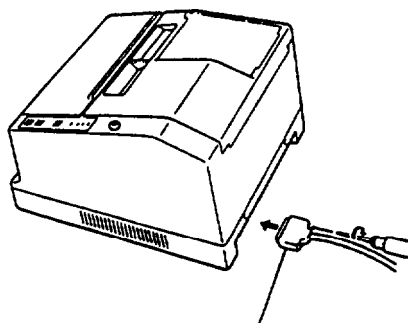
2-2 Connecting the Host Computer to the Printer

■ Connecting the interface cable

Connect the printer with the host ECR (the host computer) using an interface cable conforming to specifications.

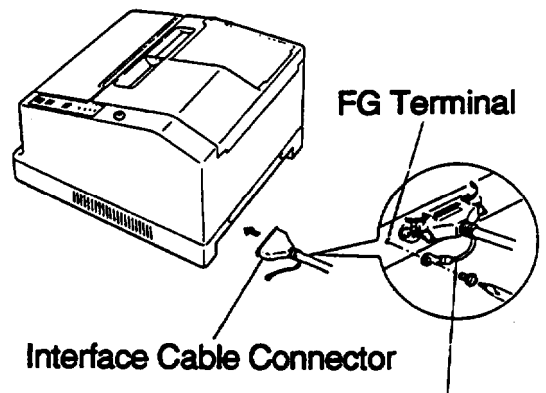
Connect the interface cable according to the following procedure.

- ① Turn off the printer and the host computer.
- ② Connect the interface cable to the interface connector on the printer in the correct orientation.
- ③ When connecting the drawer kick-out connector, attach as shown in the Figure c.



Interface Cable Connector

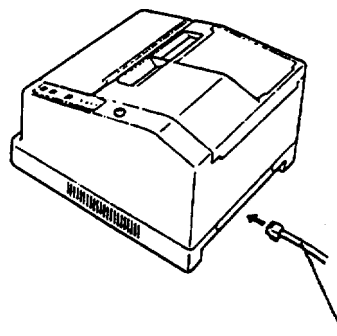
a. Serial Interface



Interface Cable Connector

Earth Wire

b. Parallel Interface



Drawer Kick-out Cable

c. Example Drawer Kick-out Connection

NOTES:

- This printer comes installed with inch-type hexagonal lock screws to fix the interface cable to the interface connector.
- If you plan to use an interface cable which requires millimeter-type lock screws, please replace the inch-type screws with the included millimeter-type screws using a hex screwdriver (5 mm).

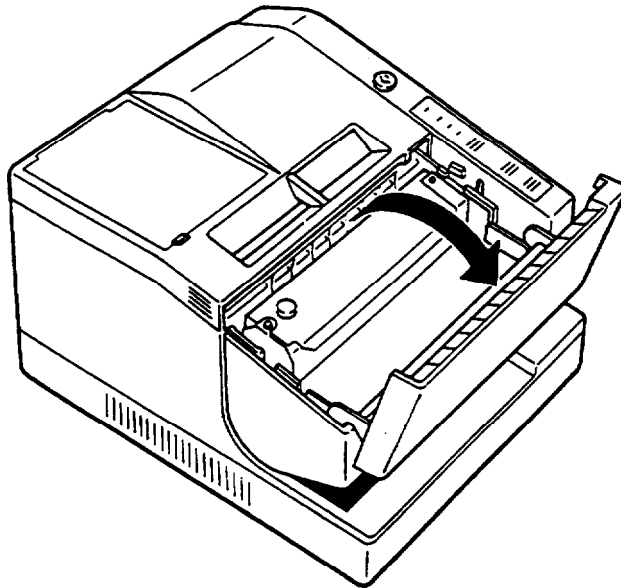
Chapter 3 Installing the Parts

3-1 Installing the Ribbon Cassette

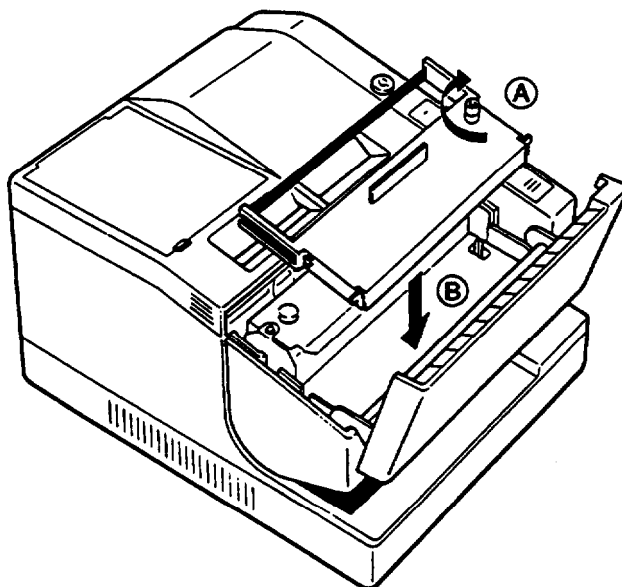
■ Installing the ribbon cassette

Be sure to use a ribbon cassette that matches the printer's specifications.

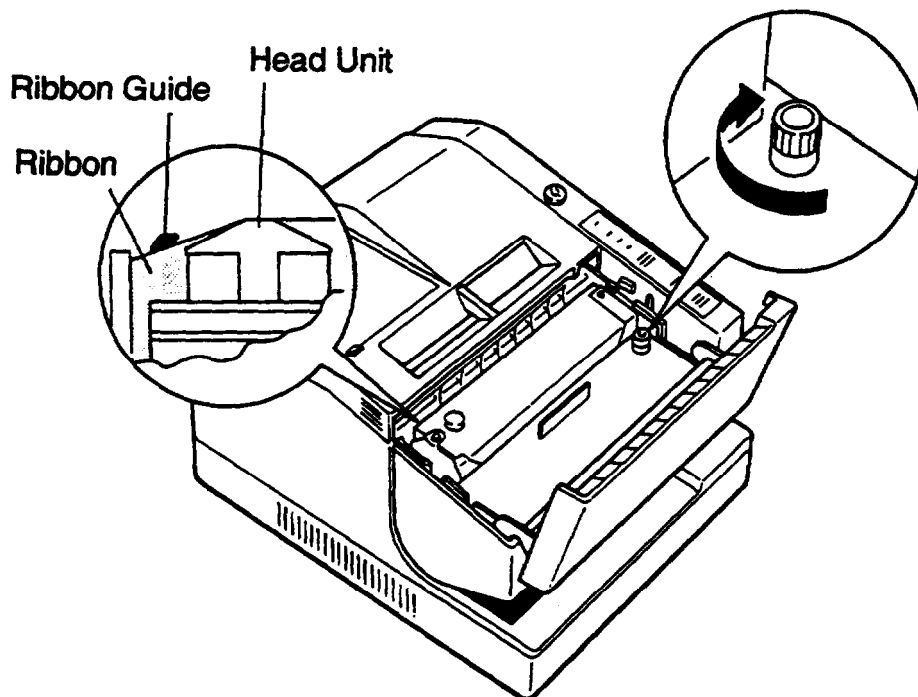
- ① Turn on the printer and open the lower ribbon cover.
The print head will move to the home position (left-side).



- Ⓐ Eliminate the slackness in the ribbon by turning the ribbon-feed roller in the direction of the arrow.
- Ⓑ Install the ribbon cassette from above and press it into position.



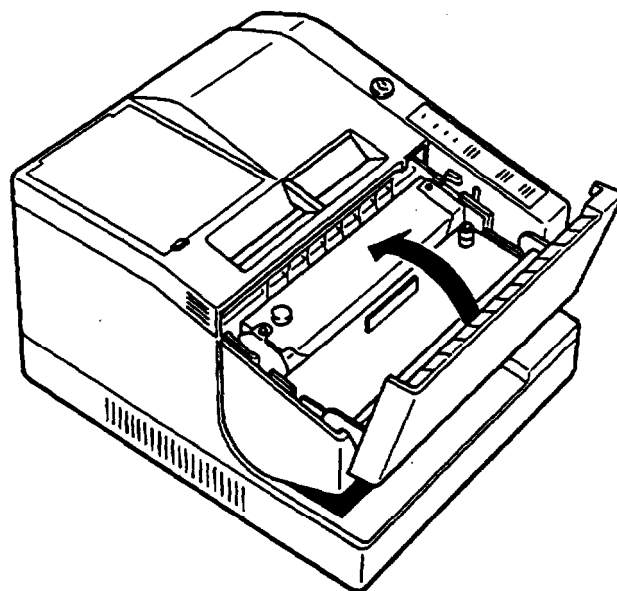
- ③ Turn the ribbon-feed roller five or six times in the direction of the arrow so that the ribbon is positioned between the head unit and the ribbon guide.



CAUTIONS:

- Do not turn the feed roller in the direction opposite that shown by the arrow.
- To remove a ribbon cassette, pull it up by holding the protruding tab on top the cassette with your fingers.

Close the ribbon cover.



■ Exchanging the Ribbon Cassette

Be sure to use the correct ribbon cassette.

- ① Turn on the power to the unit and open the ribbon-cassette cover.
- ② Confirm the head is in the home position, then remove the ribbon cassette.



- ③ Install a new ribbon cassette (refer to 3-1 Installing the Ribbon Cassette ④), then close the ribbon cover.

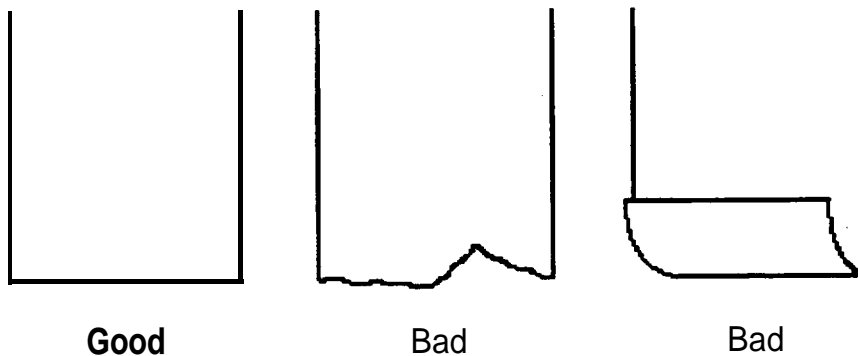
3-2 Installing the Roll Paper

■ Installing the roll paper

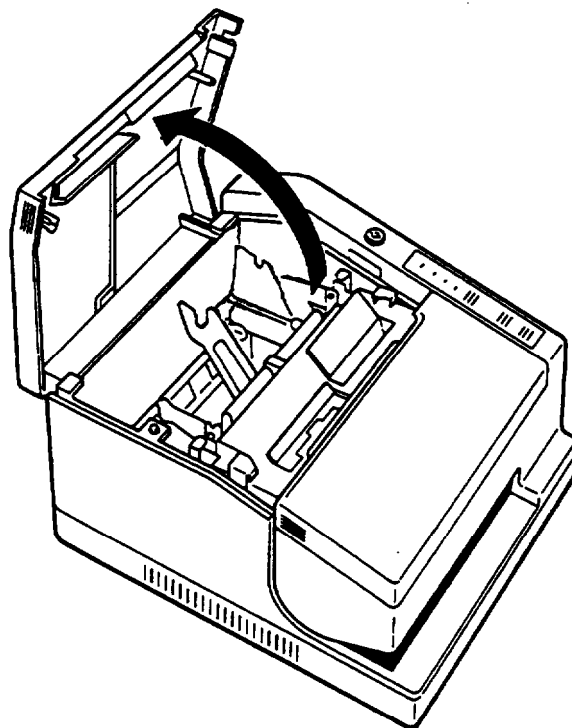
Be sure to use the roll paper that matches the specifications.

*! See 3-3 Changing the Roll Paper-Width.

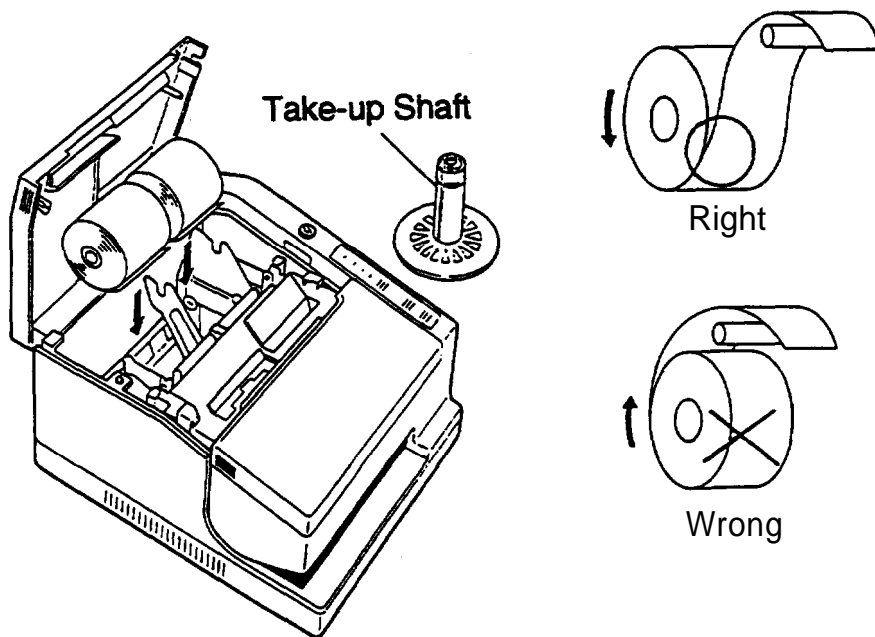
- ① Confirm that the edge of the roll paper is cut straight across, and is not folded or crooked.



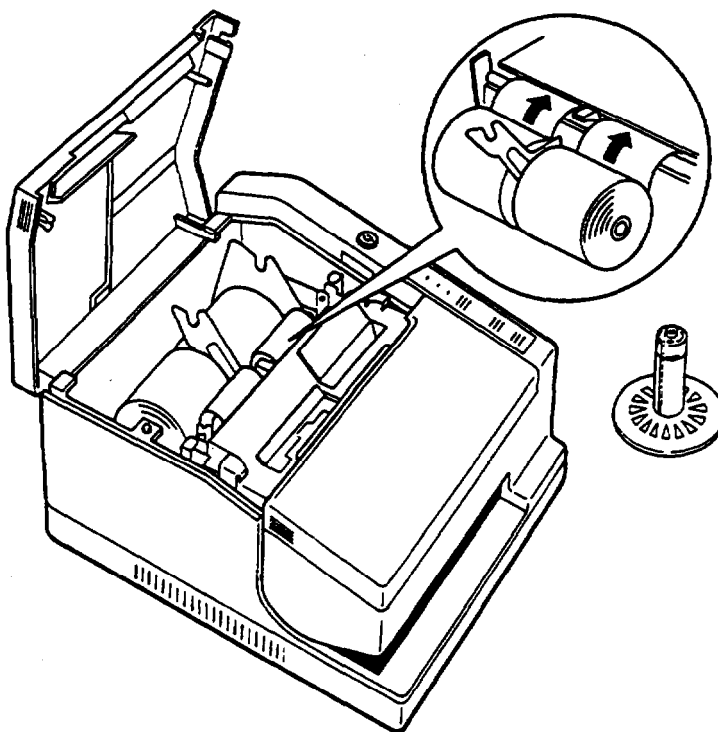
- ② Turn on the printer. The POWER lamp, the RECEIPT OUT lamp, and the JOURNAL OUT lamp will light.
- ③ Check if the ribbon cassette is already installed. If not, install the cassette first.
- ④ Open the roll-paper cover.



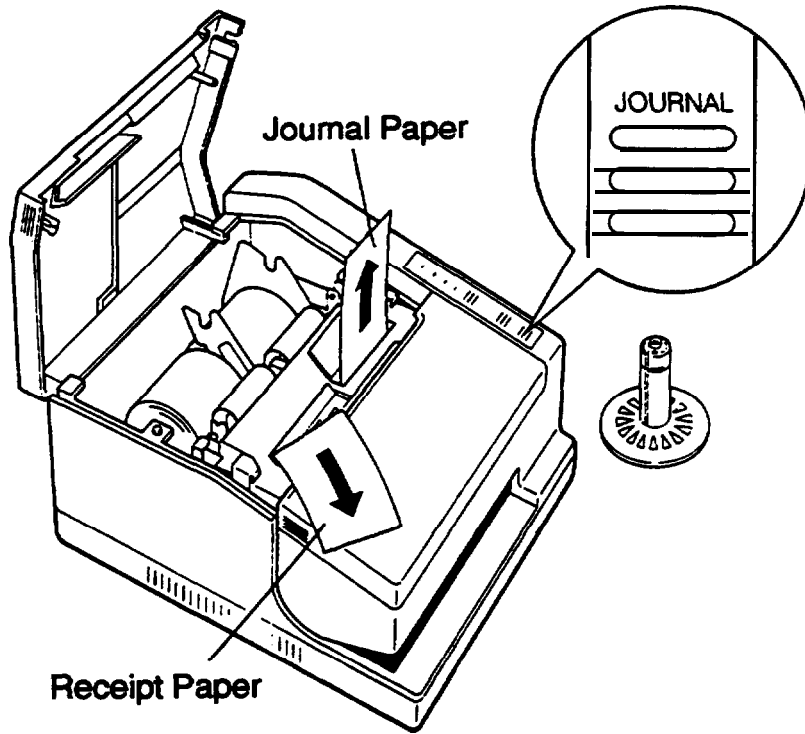
- ⑤ Remove the take-up shaft and install the roll paper into the roll-paper holder in the correct orientation.



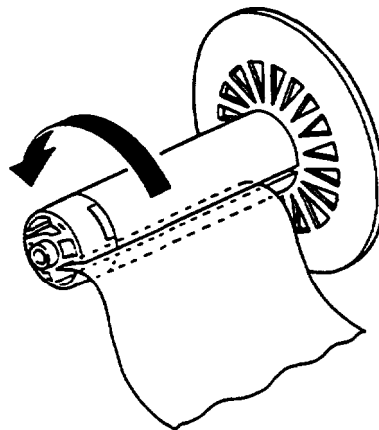
- ⑥ While leaving some slack in the roll paper, insert the end of the roll paper straight into the paper inlet. The roll paper will be automatically fed into the printer approximately 18 cm, and the RECEIPT and the JOURNAL lamps will **go off**.



- ⑦ Tear off the receipt paper on the tear-off edge of the printer. Press the JOURNAL FEED switch to feed the journal paper so that it can be wound onto the take-up shaft.



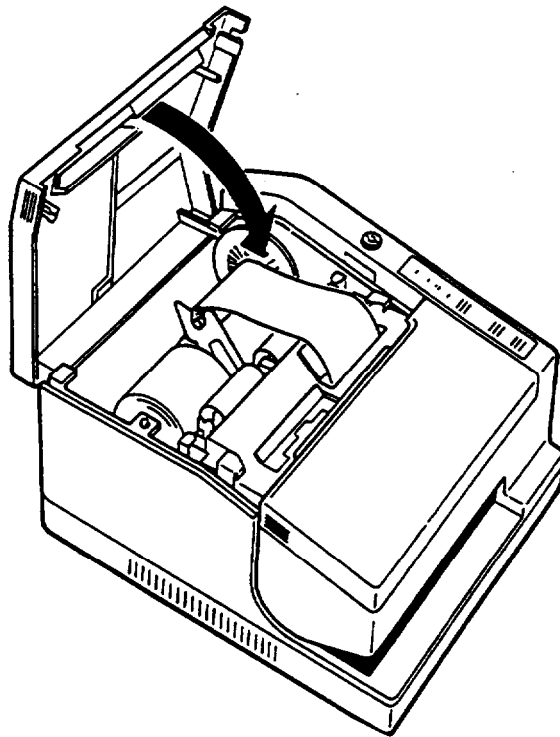
- ⑧ Insert the end of the journal paper into the groove on the take-up roll and turn the shaft two or three times to secure the roll paper.



- ⑨ Install the take-up shaft into the printer and close the roll-paper cover, then turn the key to lock.

CAUTION:

- Eliminate the slackness in the journal paper by turning the take-up shaft in the direction of the arrow (see ⑧).

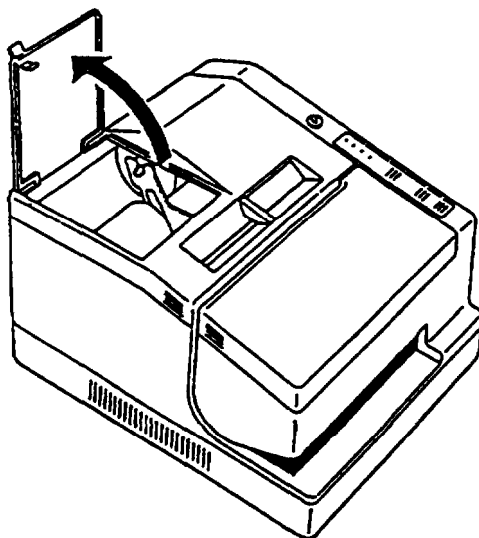


■ Exchanging the paper roll

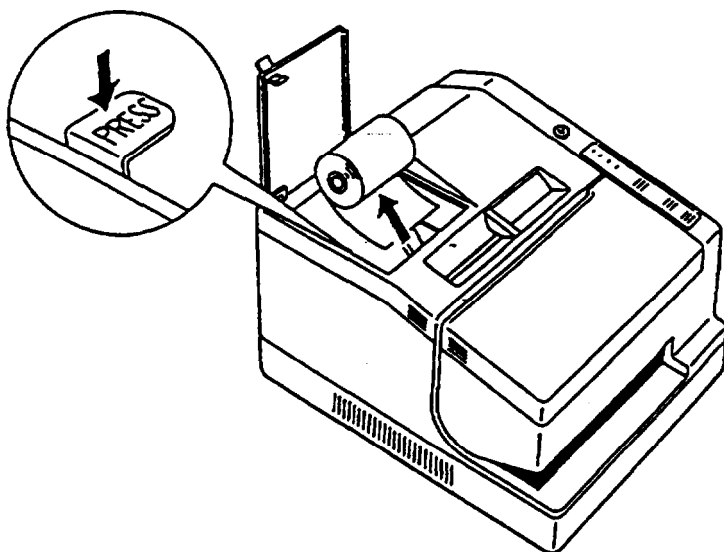
Be sure to use roll paper confirming to specifications.

Exchange the receipt paper

① Open the receipt-paper cover.



② While pressing the tab marked 'PRESS' on the release lever, at the left side of the tear-off unit, remove the remaining roll paper by pulling it out in the direction of the arrow.

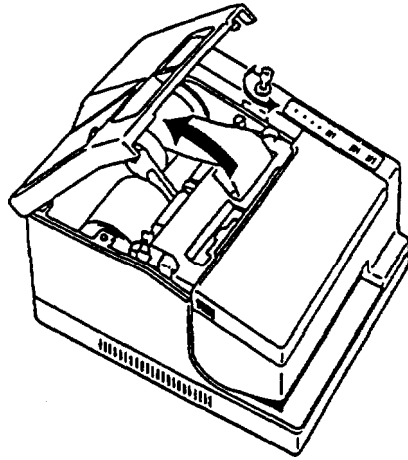


③ Install a new roll of receipt paper (refer to 3-2 Installing the Roll Paper).

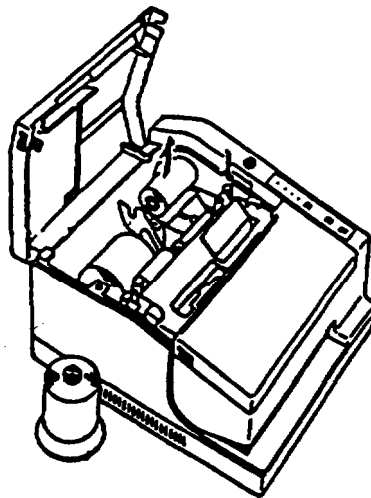
④ Close the receipt-paper cover.

Exchanging the Journal paper

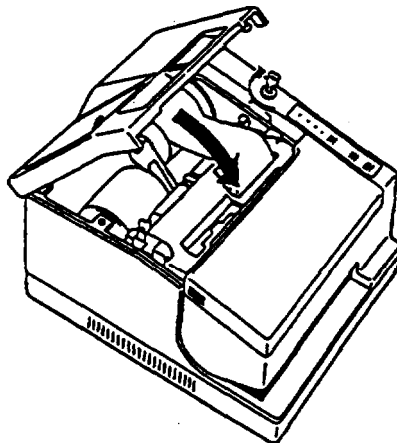
- ① Turn the key, to unlock the roll-paper cover, then open cover.



- ② Cut off the journal paper using a pair of scissors or the like. While pressing the tab marked 'PRESS' on the release lever at the right side of the tear-off, remove the remaining roll paper by pulling it out in the direction of the arrow.



- ③ Install new roll paper (refer to 3-2 Installing the Roll Paper).
- ④ Close the roll paper cover: turn the key to lock the cover.



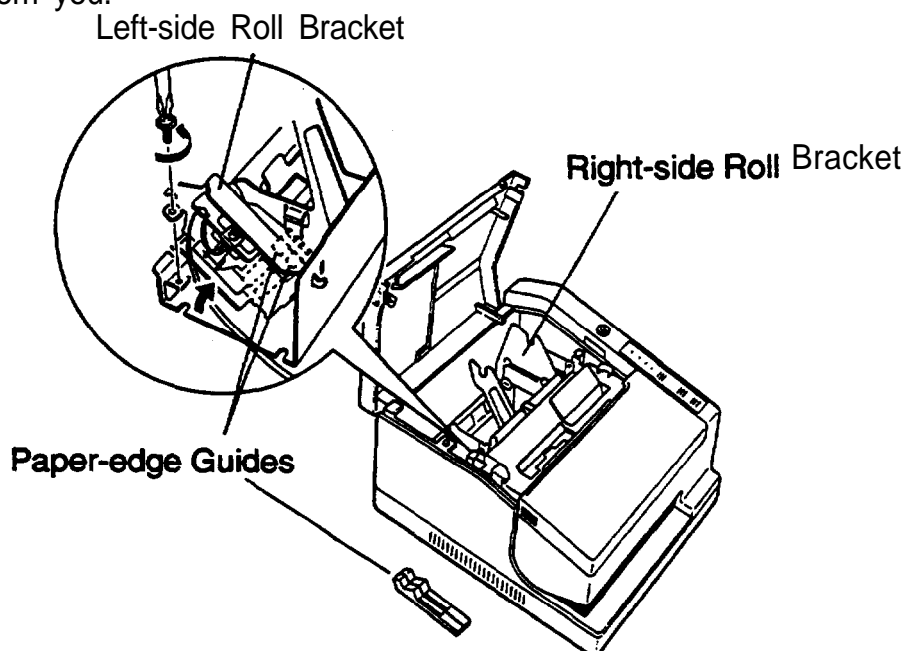
3-3 Changing the Roll Paper-Width

- **Cleaning the roll paper width**

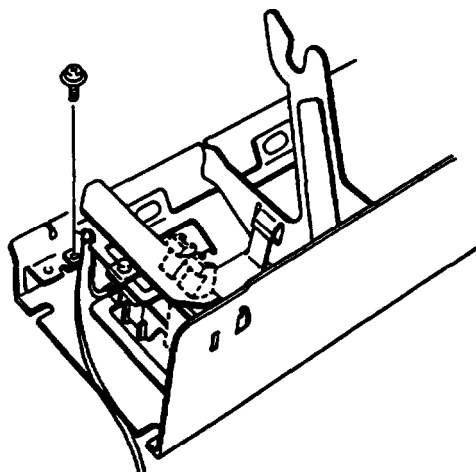
The TM-93011 only can accommodate paper widths of 56 mm or 70 mm. When shipped out of the factory, the printer is set to accommodate the 70 mm paper width.

Changing the paper width from 70 mm to 56 mm

- ① Turn off the power and open the roll-paper cover; remove the take-up shaft, cross-head the roll paper and the paper-edge guides.
- ② Unscrew the outside screw of the roll paper holders at both sides with a screwdriver, and remove the side roll bracket at both sides by pulling it up and away from you.



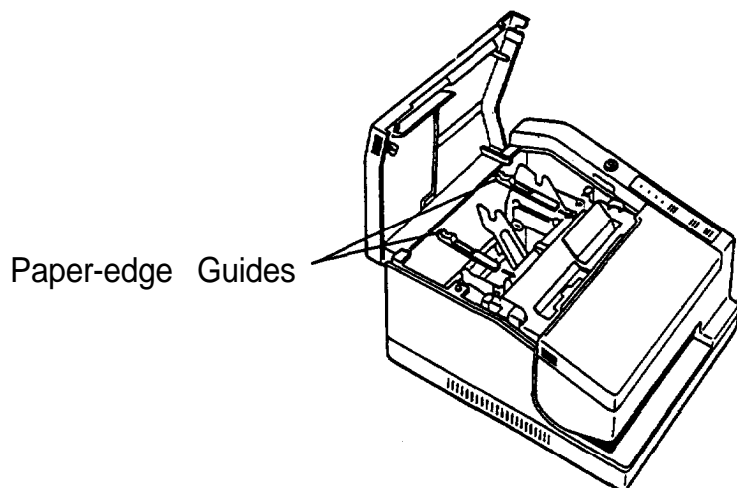
- ③ Install one edge of the side roll bracket at both sides into the slot and tighten down the screw on the other end.



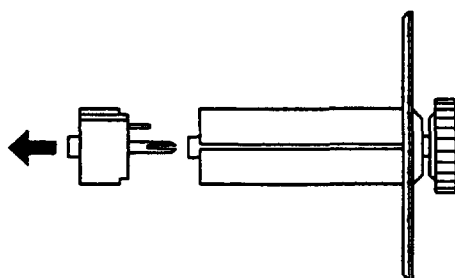
NOTES:

- Install the side roll bracket while being careful not to pull on the cable of the near-end detector. After installing the bracket, confirm the near-end detector lever operates normally (see 3-4 Adjusting the Paper-End Detector ②).
- Installing the side roll bracket on the journal-paper side after confirming the belt of the take-up unit is installed in position.

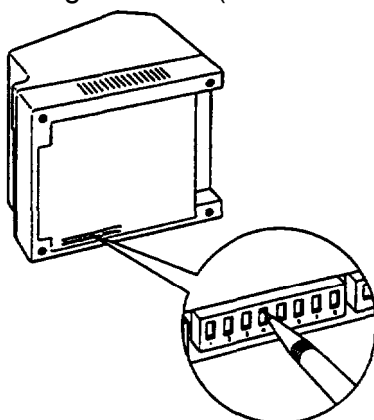
- ④ Insert the paper-edge guides at the side of each paper inlet until they click.



- ⑤ Remove the auxiliary shaft from the tip of the take-up roll.



- ⑥ Set DIP switches SW2-3 through SW2-4 (refer to 3-7 Setting the DIP Switches Table 3).



- ⑦ Turn on the printer and install the roll paper.
⑧ Close the roll-paper cover.

Change the paper width from 58 mm to 70 mm

- ① Turn off the power and open the roll-paper cover; remove the roll-paper rolls from both sides.
- ② Unscrew the outside screws of the roll paper holders on both sides with a cross-head screwdriver, and remove the side roll bracket by pulling it up and away from you.
- ③ Install one end of the side roll bracket into the slot and tighten down the screw on the other end.
- ④ Remove the paper-edge guide from the side of each paper inlet and insert them into the paper-edge guide holder on the left side of the roll-paper holder.
- ⑤ Install the auxiliary shaft on the tip of the take-up roll.
- ⑥ Set DIP switches SW2-3 through SW2-4 (refer to 3-7 Setting the DIP Switches Table 3).
- ⑦ Turn on the power and install the roll paper.
- ⑧ Close the roll-paper cover.

3-4 Adjusting the Near-End Detectors

■ The Near-End Detector

When the roll paper is close to running out, the near-end detector causes the RECEIPT OUT lamp to light for the receipt paper, and the JOURNAL OUT paper to light for the journal paper.

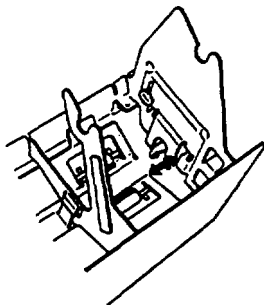
The amount of the remaining roll paper which causes near-end status can be adjusted.

■ Method of adjustment

Adjust the detector on the right side of the roll paper holder for receipt paper, and the detector on the left side for journal paper. See APPENDIX D Near-End Detector Set Handling.

- ① Remove the roll paper and take-up shaft. Unscrew the screw using a coin or similar object, and align the needle with the desired value on the scale. To increase the amount of roll paper which causes a near-end condition, move the needle to a higher value; to decrease the amount, move it to a lower value.

- ② Tighten the screw. Check that the near-end detection lever moves smoothly.



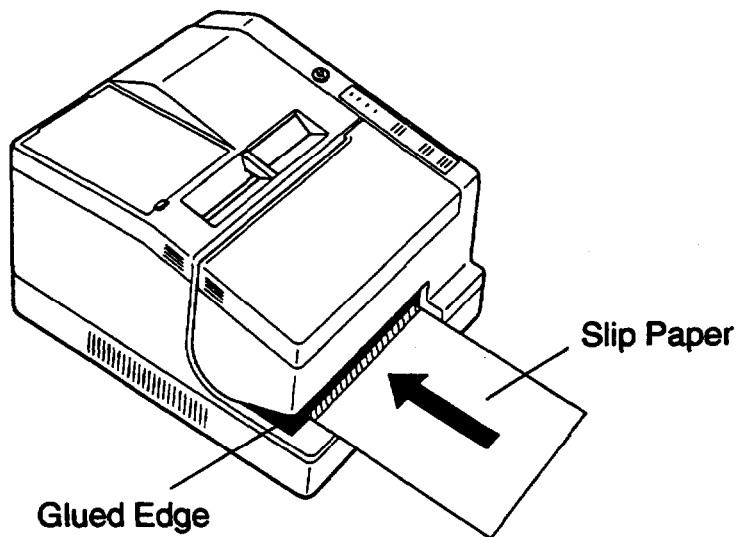
3-5 Printing on Slip Paper

■ Printing on slip paper

When printing on slip paper, make sure the roll paper is installed.

Be sure to use a type of slip paper which is in accordance with the specification. Slip paper must be as flat as possible, without curls or wrinkles (especially along the top edge.)

- ① Use only flat sheets of paper. If the sheet is wrinkled, paper may jam.
- ② Check once again that the roll paper and ribbon cassette are already installed in position. If not, install them first.
- ③ Turn on the printer. The POWER lamp will light.
- ④ Use the software command to switch the printer to the slip-paper print mode. The printer will be in the paper setting wait status, and the SLIP lamp will flash.
- ⑤ Insert a sheet of slip paper from the paper inlet at the front of the printer. **The** SLIP lamp will light.



NOTES:

- When feeding single-sheet duplicate paper, be sure to insert the paper with the glued edge positioned as shown in the above illustration.
- Lightly hold the slip paper until printing starts.

⑥ After a brief period, which is determined by command, the printer will feed the paper to the printing position and will print on the sheet.

* After printing, remove the slip paper.

3-6 Installing the Stamping System (Option)

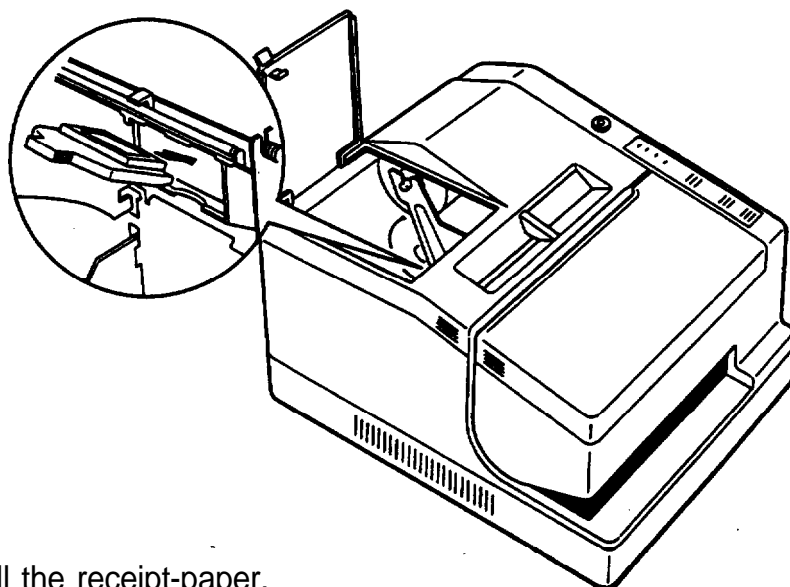
■ Installing the stamp system

When you install the stamping system, the printer can be set so the receipt paper is stamped in conjunction with printing.

Be sure to specify the correct model name when you purchase the unit.

See APPENDIX A General Specifications for the recommended stamp.

- ① Open the receipt-paper cover.
- ② Remove the receipt paper.
- ③ Install the stamp system beneath paper inlet.



- ④ Install the receipt-paper.
- ⑤ Close the receipt-paper cover.

NOTE:

- When the stamping becomes faint, refill the stamping system with the specified ink.

3-7 Setting the DIP Switches

■ The purpose of the DIP switches

To allow presetting of several functions, this printer provides DIP switches at the bottom of the printer.

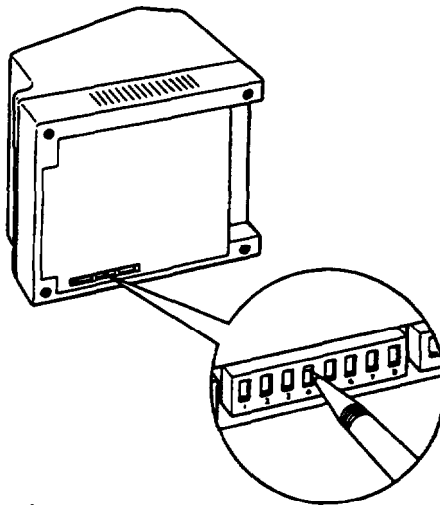
DIP switches SW1 -1 through SW3-10 are arranged starting from the left side. However, it changes SW1 -1 through SW2-10 by parallel interface method. Functions of the various switches are shown in the tables on the next page.

■ Changing the DIP switches

Follow these steps when changing DIP-switch settings.

① Turn off the printer.

② Use a pointed article, such as a pair of tweezers, to change DIP switch settings. Move a switch upward to set it to the ON position, and downward to the OFF position.



③ Turn the printer back on.

NOTES:

- Change the DIP switch settings only after you have turned off the printer.
- Changes in switch settings while the power is turned on will not take effect until the printer is turned off and then on again, or the RESET switch is pressed.

■ DIP Switch Functions

DIP Switch 1

Serial Interface

Number	Function	ON	OFF
SW1-1	Auto line feed	Always valid	Always invalid
SW1-2	Selects font (default)	9 x 9	7 x 9
SW1-3	ON-LINE switch function (default)	Enable	Disable
SW1-4	Selects interface	Always ON	—
Selects international character set (default) Refer to Table 1.			

Parallel Interface

Number	Function	ON	OFF
SW1-1	Auto line feed	Always valid	Depends on AUTO FEED XT signal
SW1-2	Selects font	9 x 9	7 x 9 (default)
SW1-3	ON-LINE switch	Enable function (default)	Disable
SW1-4	Selects interface	—	Always OFF
SW1-5	Selects international character set (default) Refer to Table 1.		
SW1-6			
SW1-7			
SW1-8			

Table 1 Interface character selections

Countries	SW1-5	SW1-6	SW1-7	SW1-8
United States	ON	ON	ON	ON
France	OFF	ON	ON	ON
Germany	ON	OFF	ON	ON
United Kingdom	OFF	OFF	ON	ON
Denmark I	ON	ON	OFF	ON
Sweden	OFF	ON	OFF	ON
Italy	ON	OFF	OFF	ON
Spain	OFF	OFF	OFF	ON
Japan	ON	ON	ON	OFF
Norway	OFF	ON	ON	OFF
Denmark II	ON	OFF	ON	OFF

NOTE: Any combination of switch settings other than those listed will automatically default to the United States selection.

DIP Switch 2

Number	Function	ON	OFF
SW2-1	Selects the receive buffer capacity. Refer to Table 2.		
SW2-2			
SW2-3			
SW2-4			
SW2-5	Fixed	-	Always OFF
SW2-6	Not used	-	-
SW2-7	Not used	-	-
SW2-8	Switches SLCT signal	Cover open	+5 v

- NOTES:
- SW2-8 is enabled only with the parallel interface.
 - The SLCT signal is disabled with the serial interface.

Table 2 Receive Buffer Capacity**Serial Interface**

Receive Buffer Capacity	SW2-1	SW2-2
32 bytes	ON	ON
128 bytes	OFF	ON
256 bytes	ON	OFF
2048 bytes	OFF	OFF

Parallel Interface

Receive Buffer Capacity	SW2-1	SW2-2
0 bytes	ON	ON
128 bytes	OFF	ON
258 bytes	ON	OFF
2048 bytes	OFF	OFF

Table 3 Roll Paper width

Roll Paper Width	SW2-3	SW2-4
Invalid	ON	ON
58 mm	OFF	ON
70 mm	ON/OFF	OFF

DIP Switch 3

Number	Function	ON	OFF
SW3-1	Data word length	7 bits	8 bits
SW3-2	Parity	Valid	Invalid
SW3-3	Selects parity	Even	Odd
SW3-4	Selects transmitting speed Refer to Table 4.		
SW3-5			
SW3-6			
SW3-7	Data receive error	Ignored	Prints '?'
SW3-8	Handshaking	XON/XOFF	DTR/DSR
SW3-9	Transmission termination resistance	Connected	Open
SW3-10	Reception termination resistance	Connected	Open

NOTE: For the parallel interface, DIP switch 3 is not provided.

Table 4 Selects transmitting speed

Transfer rate (BPS)	SW3-4	SW3-4	SW3-6
Invalid	ON	ON	ON
150	OFF	ON	ON
300	ON	OFF	ON
600	OFF	OFF	ON
1200	ON	ON	OFF
2400	OFF	ON	OFF
Text	ON	OFF	OFF
Text	OFF	OFF	O F F

- NOTES:**
- For the parallel interface, DIP switch 3 is not provided.
 - **SW3-9** and SW3-10 are enabled only with the RS-422 serial interface.
 - For the RS-422 serial interface, SW3-8 must always be ON.

II. REFERENCE

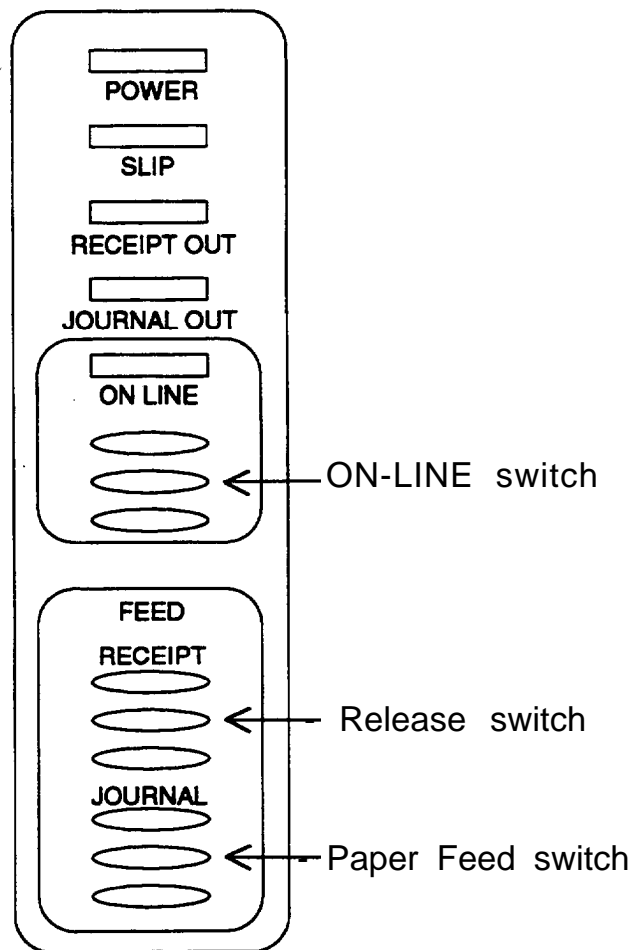
Chapter 5 Cautions while Using the Printer

5-1 Panel Switches and Commands

■ Panel switches

Panel switches are controlled by **ESC c 5**.

When the panel switches are disabled, none of the switches can be used. Also, in the slip paper waiting state, none of the panel switches can be used.



(1) ON-LINE switch

[Function] Switches between ON-LINE and OFF-LINE.

- [Note]
- Normally, the printer is ON-LINE and can print data. When switched OFF-LINE, the printer stops after printing the current line.
 - The ON-LINE switch can be disabled by command **ESC c 6** or DIP switch. When disabled, the ON-LINE/OFF-LINE state cannot be changed by the ON-LINE switch.

(2) Receipt feed switch

[Function] Feeds the receipt paper based on the line feed parameters set by ESC 2 and ESC 3 when this switch is pushed once. If the switch is held, the printer executes continuous line feeding.

[Note]

- When the ON-LINE switch is enabled, the Receipt feed switch can be used only when the printer is OFF-LINE. When the ON-LINE switch is disabled, the receipt feed switch is always valid.
- Since the paper is fed after the carriage is moved to the center of the receipt paper roll, special attention is required when the cover is open.

(3) Journal feed switch

[Function] Feeds the journal paper based on the line feed parameters set by ESC 2 and ESC 3 when this switch is pushed once. If the switch is held, the printer executes continuous line feeding.

[Note]

- When the ON-LINE switch is enabled, the journal feed switch can be used only when the printer is OFF-LINE. When the ON-LINE switch is disabled, the journal feed switch is always valid.
- Since the paper is fed after the carriage is moved to the center of the journal paper roll, special attention is required when the cover is open.

■ Reset switch

[Function] Resets the printer.

[Note]

- This switch is located at the inner right-side of the ribbon cover. It should be noted that the RAM will be completely initialized if the printer is reset using this switch.

5-2 Printable Area (Roll Paper, Slip Paper)

Printable Area

The print area must be within the range indicated below.

(1) Roll Paper

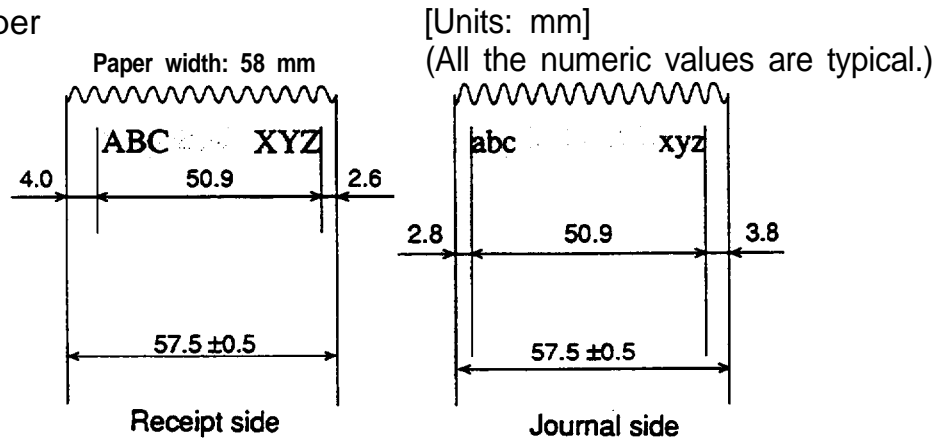


Figure 5-1. Roll Paper Printable Area

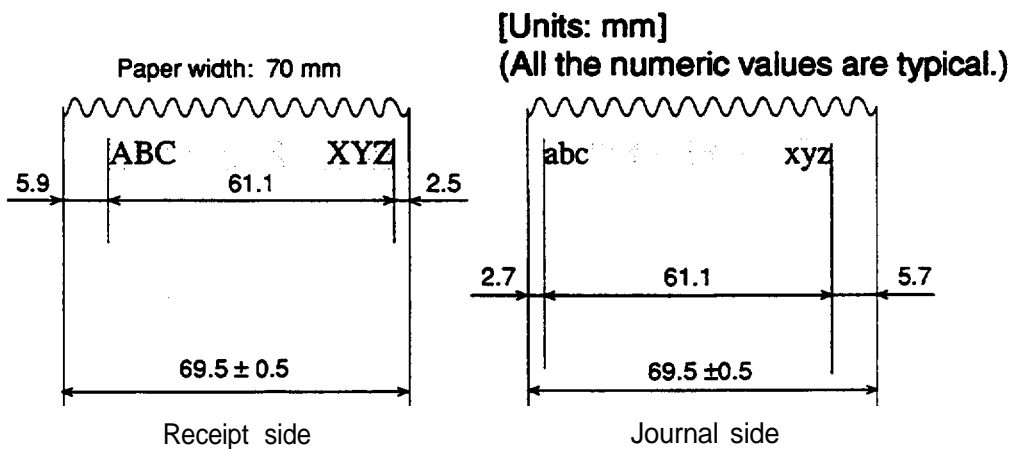


Figure 5-2. Roll Paper Printable Area

(2) Slip Paper

[Units: mm]
(All the numeric values are typical.)

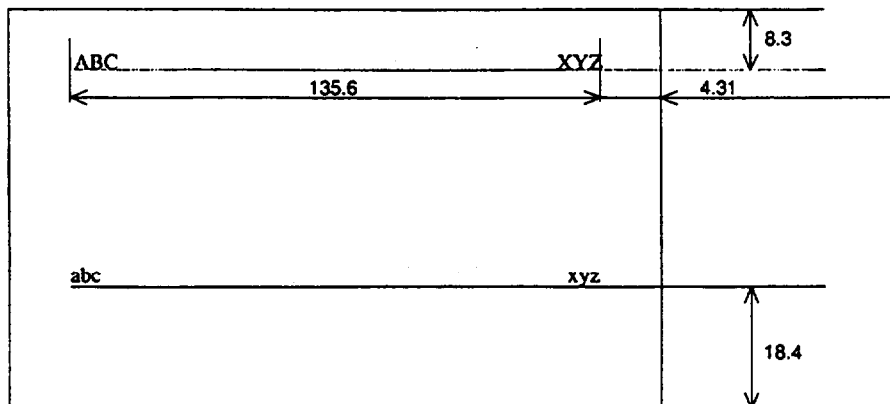


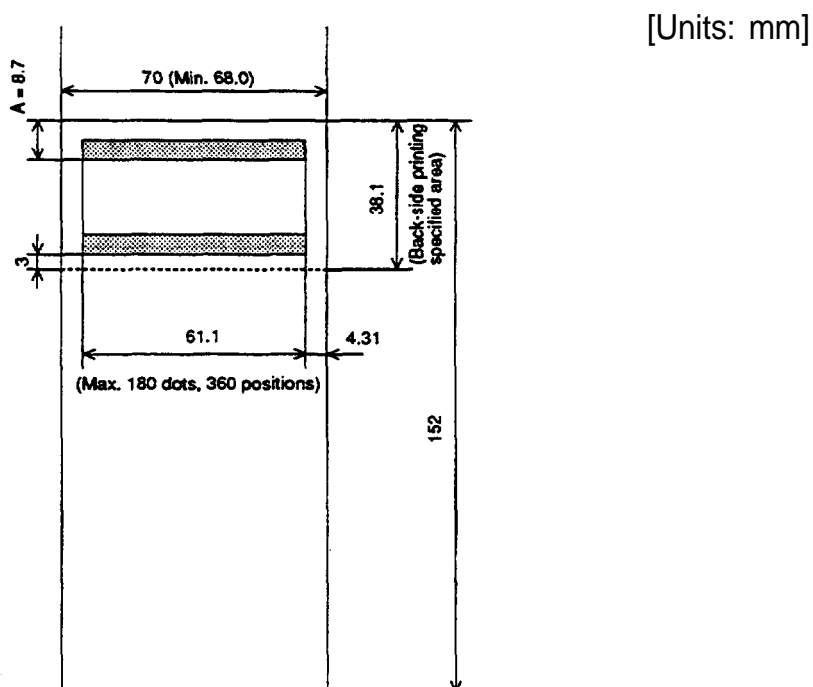
Figure 5-3. Slip Paper Printable Area

[Reference] Printing USA personal checks

- 1) Paper size: **70** (Min. 68) mm X 152 mm
- 2) Paper thickness: 0.09 to 0.2 mm
- 3) Lengthwise printing (on the back)

Paper width is smaller than the specified standard value, so that paper is fed using one slip roller at the side. Printing within the printable area shown in the Figure below is possible, but pay attention to the following points.

- ① Printing may easily become crooked due to being fed by only the one roller.
- ② Paper fed per step is calculated as 0.1771 mm.
From the top of the slip to the printing position is 8.7 mm (= A) (calculated value).
- ③ Printable area is 180 dots (360 positions) from the right edge.
- ④ To print endorsements on the back in the specified area (within 1.5 inches from the top) set the check so that there is a 3 mm space at the bottom.



(All the numeric values are typical.)

Figure 5-4. Lengthwise Printing

- 4) Widthwise printing (on the front)

Paper length is smaller than the specified standard value, so pay attention to the following points.

- ① The paper-end is detected when the paper is fed to the print starting position.
- ② Since the printable area is not calculated correctly, the printing stop function using the slip detector should be set disabled. (Refer to ESC c 4.)

5-3 Printing on Slip Paper and Notes

■ Printing on slip paper

Use the following procedure to start printing on the slip paper.

User Operation	Printer Operation
1 Transmit “ESC f m n”	Sets the internal timer for set-up time (m) and (n).
2 Transmit “ESC c0 n”	Printer switches to slip mode and waits for slip paper to be loaded (waits the set-up time set by ESC f m n). Blinks the slip LED.
3 Insert paper.	After detecting the paper, lights the slip LED, redetects the paper after set-up time (n) has passed, then feeds the slip paper to the printing start position. If the paper is not detected after set-up time (n) has passed, the printer returns to the paper waiting state. If the paper is not inserted during set-up time (m), the printer cancels the slip mode and goes to P-sheet mode.
4 Transmit data and commands.	Prints the data and feeds the paper.
5 Transmit “FF”	After printing, ejects the paper and switches to 2-sheet mode. Turns off the slip LED.

NOTES:

1. Ejecting **is** performed in the forward direction only.
2. Since the paper feed pitch is inaccurate directly after the paper feed direction has been changed, special attention should be paid to the printing thereafter.
3. The mechanical structure allows the paper to feed only when the roll paper is loaded properly. Accordingly, roll paper must be loaded onto both the receipt and journal sides before selecting slip paper printing by **ESC c 0 n**.
4. In the slip paper waiting state, all the panel switches and the cover open detectors are disabled.
5. When successive printing is executed on slip paper, the paper insertion interval should be set to more than 10 seconds to limit the mechanical duty.
6. Slip paper should be set correctly by matching the top edge with the front stopper and the right-side with the right-side of the paper insertion position.
7. After executing FF (Form Feed), the printer switches to P-sheet mode with the cut sheet left in the printable area. Therefore, before receiving print data, the cut sheet must be removed within the time required for switching to P-sheet mode (approx. 2 seconds) to prevent the next data from being printed on the cut sheet form.

■ Notes on slip paper

The paper must be as flat as possible, without curls or wrinkles (especially along the top edge). Otherwise, it may be stained with ink from touching the ribbon.

Slip paper that has a glued portion located on the bottom edge must not be used. The glued portion should be located on the top edge. For slip paper with a glued portion located on the side (left or right), the glued conditions (e.g. type, area, and length) will affect paper feeding.

Therefore, the user must check these specifications in advance (refer to Figure 5-5).

The user should also pay attention when the paper is very wide and the glued portion is located on the side (the paper may not be feed properly). Since the slip detector is equipped with a photo sensor, paper that has one or more holes at the detector position, or is translucent, must not be used (refer to Figure 5-6).

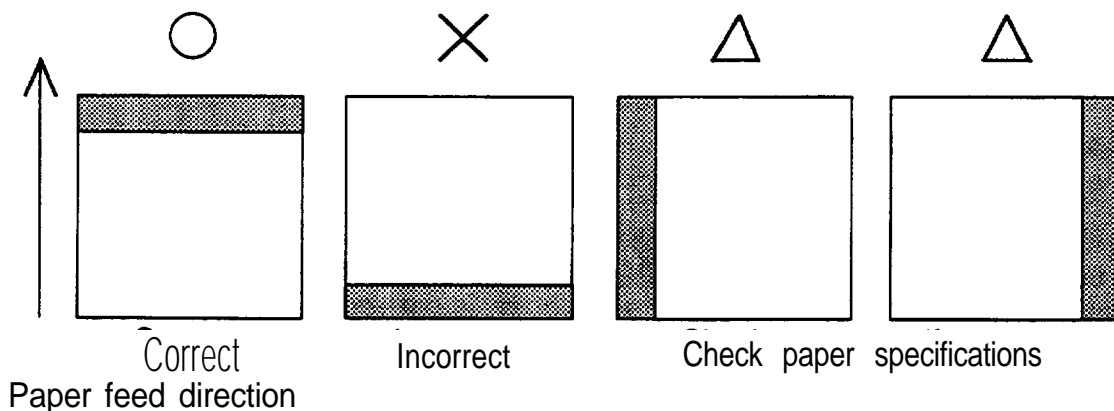


Figure 5-5. Slip paper Glued Portion

[Units: mm]

(All the numeric values are typical.)

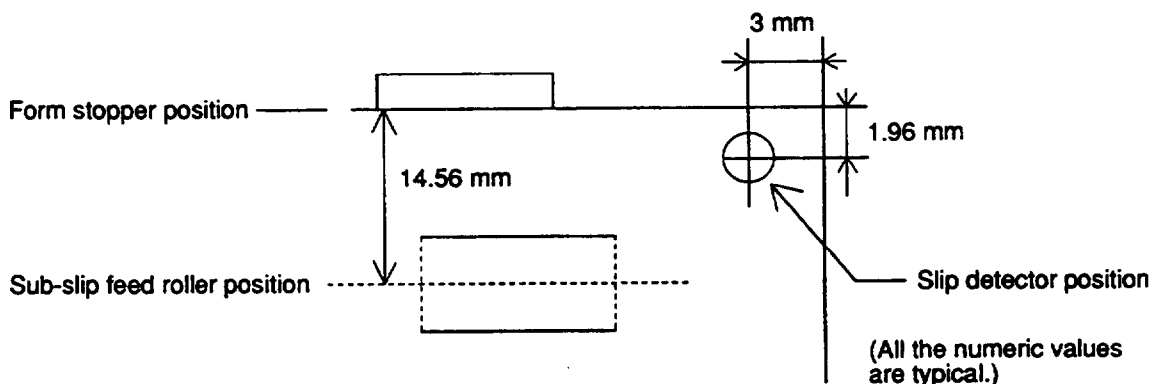


Figure 5-6. Slip Detector Position

5-4 Error Correction

■ Mechanical errors

(1) Error detection

The following two errors are detected as mechanical errors.

- Abnormal loading caused by paper jam, etc. during auto cutting.
- Abnormal loading caused by paper jam, etc. during carriage initialization.

If something abnormal is detected, the printer will perform the following:

- Stop all normal operations.
- Set the interface signals to the error state.
- Blinks the ON-LINE LED.

(2) Recovery

To recover from the error state, reset the printer by cycling the power or pushing the reset button, after correcting the cause of the error.

■ RAM check error

(1) Error detection

The RAM is checked when the power is turned on or when the printer is reset using the reset switch. The RAM check consists of writing and reading back the data pattern 55H, AAH. If a problem is detected, the printer stops all operation thereafter, and blinks the ON-LINE LED.

(2) Recovery

This error is fatal. The printer cannot be recovered.

5-5 Cover-Open Function

■ Cover-open function

If the roll-paper cover or the ribbon cover is opened when the power is turned on, the printer goes off line. When the ribbon cover is opened, the head moves to the home position.

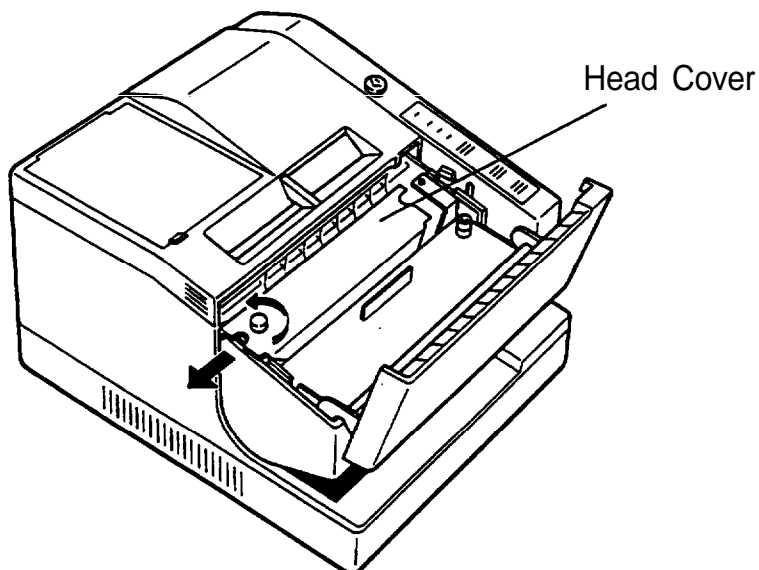
■ Returning the printer to on-line status.

- (1) When the on-line switch has been activated by software command:
Close the roll-paper cover and the ribbon cover, and press the on-line switch.
- (2) When the on-line switch has been inactivated by software command:
Close the roll-paper cover and the ribbon cover.

5-6 Recovering from a Paper Jam

Remove jammed paper according to the following steps.

- ① Turn off the power and open the ribbon cover.
- ② Unscrew the screw at the left side of the head cover and remove the head cover.

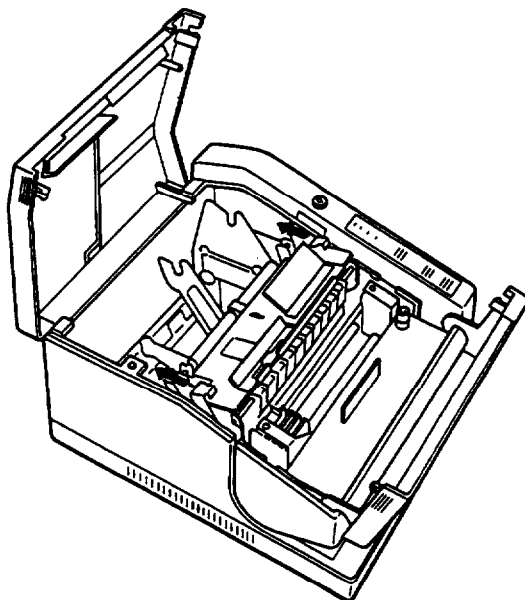


- ③ Remove the jammed paper around the head.

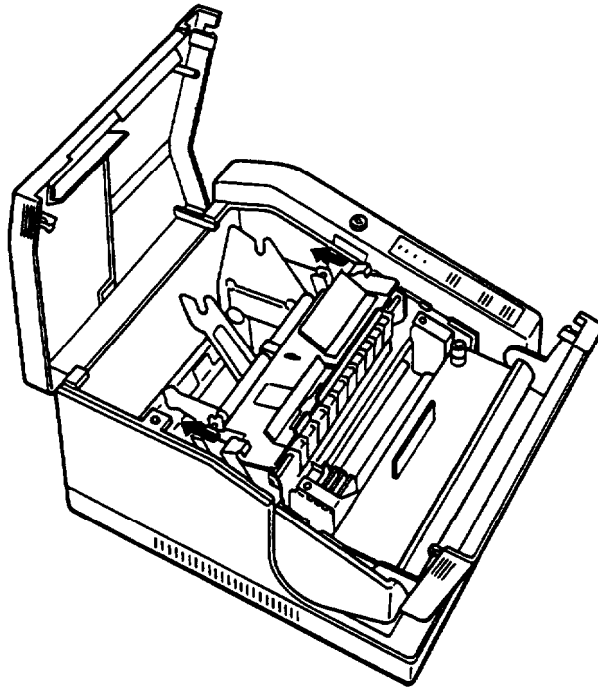
NOTE:

- If you can remove the jam at this stage, go to ⑧.

- ④ Turn the key to unlock the roll-paper cover; open the cover and remove the roll-paper.
- ⑤ Push the lock lever of the tear-off unit away from you; lift up the tear-off unit.



- ⑥ Remove the jammed paper.
- ⑦ Press down on the tear-off unit, and return the lock lever to the forward position.



- ⑧ Insert the tab on the right side of the head cover into the slot, and tighten down the head-cover screw.
- ⑨ Close the roll-paper cover and turn the key to lock the cover. Close the ribbon cover.

Chapter 6 Software Control

6-1 Printer Control

■ Controlling the printer by commands

The printer is controlled by “commands” that can change the size of the letters, and other functions.

This allows you to modify letters and figures.

See APPENDIX D character code table.

There are two types of commands.

① One-byte commands

- **HT** Horizontal tab
- **LF** Print and line feed

Several-bytes commands

- **ESC SP** Set character right-side spacing
- **ESC 3 n** Set line spacing to n/144 inches

■ How to use this table

Horizontal by vertical hex

i.e.. 4XA= J

< >H denotes Hexadecimal

< > denotes Decimal Numbers

(Refer to APPENDIX D Page 0 (International character set: U.S.A.))

Top Bit			4	Hexadecimal
Bottom Bit			0100	Binary
A	1010		J	
			74	
Hexadecimal	Binary		Decimal Numbers	

6-2 Command Descriptions

■ Command descriptions

C o m m a n d

[Name]	The name of the command.
[Format]	The code sequence. In this description, < >H denotes hexadecimal numbers, < > 10 denotes decimal numbers and < >B denotes binary numbers. In []k format, the contents of the [] should be repeated k times.
[Range]	The allowable range for the codes.
[Description]	Provides a description of the command function.
[Notes]	Included only when necessary.
[Default]	The default values for the commands.
[Reference]	Related commands.
[Example]	Example of using the commands.

6-3 Commands

LF

[Name]	Print and line feed
[Format]	<0A>H or <10>10
[Description]	Prints the data in the print buffer and performs one line feed based on the current line spacing. <ul style="list-style-type: none">• Sets the print starting position to the beginning of the line.
[Reference]	ESC 2, ESC 3

FF

[Name]	Print and eject cut sheet
[Format]	<0C>H or <12>10
[Description]	Prints the data in the print buffer and ejects a slip sheet.
[Notes]	<ul style="list-style-type: none">• Valid only when slip sheet is selected as the print sheet. Otherwise, this command is ignored by the printer.• When the slip ejectlength has not been set by ESC C, the paper is completely ejected. When the eject length has been set, the set length is ejected.• After paper ejection is completed, the sheet set by ESC c 0 as default is selected.• The eject direction of the slip sheet is forward only.
[Default]	ESC c 0, ESC C

CR

[Name]	Print and carriage return
[Format]	<0D>H or <13> 10
[Description]	If 'automatic line feed' is enabled, this command has the same functions as LF . When "automatic line feed' is disabled, executes printing only and the paper is not fed. <ul style="list-style-type: none">• Sets the print starting position to the beginning of the line.
[Reference]	LF

RS

[Name]	Journal tab
[Format]	<1E>H or <30>10
[Description]	Moves the print position to the beginning of the line of the journal paper.
[Notes]	<ul style="list-style-type: none">• This command is enabled only when both receipt and journal paper are selected, and parallel printing on receipt/journal paper is canceled.
[Reference]	ESC c 0, ESC z

ESC SP *n*

[Name]	Set the character right-side spacing
[Format]	<1 B>H<20>H<n> or <27>10<32>10<n>
[Range]	$0 \leq n \leq 32$
[Description]	Sets the character right-side spacing in half-dot units.
[Notes]	<ul style="list-style-type: none">The character right-side spacing for double-width mode is twice the set value.
[Default]	$n = 0$

ESC ! *n*

[Name]	Set print mode
[Format]	<1B>H<21>H<n> or <27>10<33>10<n>
[Range]	$0 \leq n \leq 525$
[Description]	Set a print mode. <ul style="list-style-type: none">Each bit of <i>n</i> is used as follows:

Bit	Function	Value	
		0	1
0	Character font	9 x 9 font	7 x 9 font
1	Undefined	|	|
2	Undefined	|	|
3	Undefined	|	|
4	Double-height enlarged mode	Canceled	set
5	Double-width enlarged mode	Canceled	set
6	Undefined	|	|
7	Undefined	|	|

[Note]	<ul style="list-style-type: none">When both double-height mode and double-width mode are set, quadruple characters are printed.Since bi-directional printing may cause printing position misalignment between the upper and lower halves during double-height enlarged printing, it is better to set unidirectional printing (using ESC U) for that mode.
[Default]	$n = 0$ or 1 depending on the DIP switch setting.

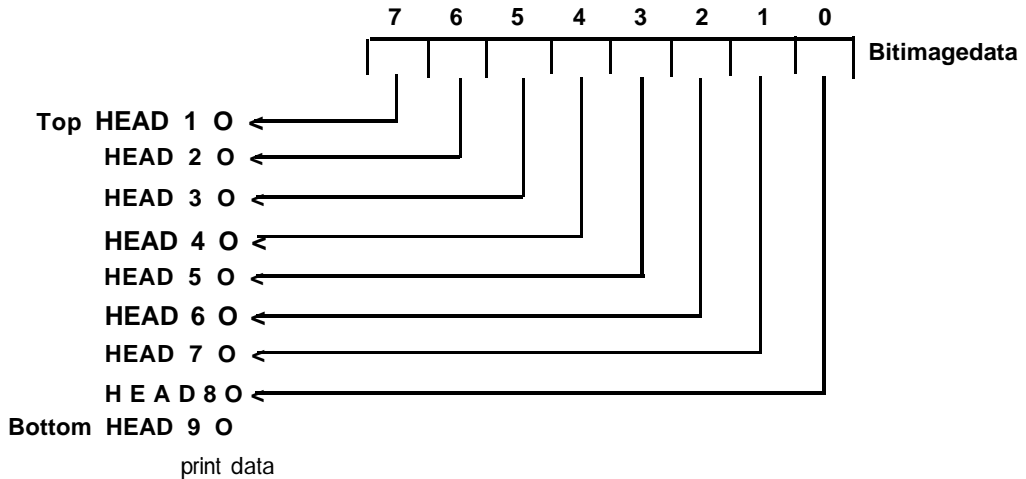
ESC * *m n1 n2*[*d*] *n1+256xn2*

- [Name] Set bit image mode
- [Format] <1B>H<2A>H<*m*><*n1*><*n2*>[<*d*>]*n1+256xn2* or <27>10
<42>10 <*m*><*n1*><*n2*> [<*d*>] *n1 + 256 X n2*
- [Range] $m = 0, 1$
 $0 \leq n1 \leq 255$
 $0 \leq n2 \leq 3$
 $0 \leq d \leq 255$
- [Description] Sets the bit image mode using *m* and the number of dots using *n1* and *n2*.
- Divide the number of dots to be printed by 256. The integer answer is *n2* and the remainder is *n1*.
Therefore, the number of dots in the horizontal direction is calculated as: $n1 + 256 \times n2$.
 - If the bit image data input exceeds the number of dots to be printed on a line, the excess data is ignored.
 - "d" indicates the bit image data. Set a corresponding bit to 1 to print a dot, otherwise set it to 0.
 - The bit image modes selectable by *m* are as follows:

<i>m</i>	Number of Vertical Dots	Horizontal Direction		Number of Horizontal Dots		
		Dot Density	Horizontally Adjacent Dots	Roll paper		Slip paper
				50 mm	70 mm	
0	B	Single density	Permitted	150	180	400
1	8	Double density	Prohibited	300	360	800

[Notes]

- If m is out of range, the data following n ($n+1$ is included) is processed as normal data.
- After printing a bit image, the printer returns to normal data processing mode.
- The relationship between the image data and the dots to be printed is as follows:



ESC 2

- [Name] Set 1/6 inch line spacing
- [Format] <1B>H<32> or <27>10<50>10
- [Description] Sets the line spacing to 1/6 of an inch.
- [Notes] • Sets the line spacing only for the sheet(s) selected using **ESC c 1**.
- [Reference] **ESC c I**

ESC 3 n

- [Name] Set line spacing using minimum units
- [Format] <1B>H<33>H<n> or <27>10<51>10<n>
- [Range] $0 \leq n \leq 255$
- [Description] Sets the line spacing to $n/144$ inches.
- [Notes] • Sets the line spacing only for the sheet(s) selected using **ESC c 1**.
- [Default] $n = 24$ (1/6 inch)
- [Reference] **ESC c 1**

ESC <

[Name]	Return home
[Format]	<1B>H<3C>H or <27>10<60>10
[Description]	Moves the carriage to the left-most position. <ul style="list-style-type: none">• The position of the left-most end is detected by the home position detector.
[Notes]	<ul style="list-style-type: none">• Because this command can detect the carriage motor malfunctions, it is desirable to use this command each time a receipt is issued.• The mechanical carriage initialization by this command may cause printing position misalignment before and/or after this command is executed.

ESC @

[Name]	Initialize printer
[Format]	<1B>H<40>H or <27>10<64I>10
[Description]	Clears the data in the print buffer and resets the printer mode (the same state as when the power is turned on.)
[Notes]	<ul style="list-style-type: none">• The DIP switches are not read again.• The data in the receive buffer is not cleared.• If this command is executed in slip mode, the slip sheet is ejected and the switching from slip mode to 2-sheet mode is performed mechanically.

ESC C n

[Name]	Set cut sheet eject length
[Format]	<1B>H<43>H<n> or <27>10<67>10<n>
[Range]	$0 \leq n \leq 127$
[Description]	Sets the eject length for slip sheet to n lines. <ul style="list-style-type: none">• When $n = 0$, no eject length will be set.
[Notes]	<ul style="list-style-type: none">• If the line spacing is changed after the eject length is set, the eject length remains unchanged.
[Default]	$n = 0$
[Reference]	FF

ESC J n

[Name]	Print and feed paper using minimum units
[Format]	<1B>H<4A>H<n> or <27>10<74>10<n>
[Range]	$0 \leq n \leq 255$
[Description]	Prints the data in the print buffer and feeds the paper n/144 inches. <ul style="list-style-type: none">• The predetermined line spacing remains unchanged.• Sets the print starting position to the beginning of the line.
[Default]	Not defined.

ESC K n

[Name]	Print and reverse feed using minimum units
[Format]	<1B>H<4B>H<n> or <27>10<75>10<n>
[Range]	$0 \leq n \leq 24$
[Description]	Prints the data in the print buffer and feeds the paper n/144 inches in the reverse direction. <ul style="list-style-type: none">• The predetermined line spacing remains unchanged.• Sets the print starting position to the beginning of the line.
[Notes]	<ul style="list-style-type: none">• This command should not be executed continuously more than two times.• If n is out of range, the printer will print, but the paper will not be fed.• If the paper gets out of the slip detector during slip printing, the printer will print, but the paper will not be fed.• The user should note that paper feed in the reverse direction causes the following problems.<ul style="list-style-type: none">① Paper feed pitch may be incorrect.② The printing noise for the following line will be louder than normal.③ The paper may rub against the ribbon and become dirty.
(Default)	Not defined.

ESC R *n*

[Name] Select international character set
[Format] <1B>H<52>H<*n*> or <27>10<82>10<*n*>
[Range] $0 \leq n \leq 10$
[Description] *n* selects an international character set from the following table.

<i>n</i>	Character Set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

[Default] Depends on the DIP-switch setting.
[Reference] APPENDIX F Character Code Tables

ESC U *n*

[Name] Set/cancel uni-directional printing
[Format] <1B>H<55>H<*n*> or <27>10<85>10<*n*>
[Range] $0 \leq n \leq 255$
[Description] Sets or cancels uni-directional printing.

- Only the lowest bit of *n* is valid.
When $n = \langle * * * * * 1 \rangle B$, unidirectional printing is set.
When $n = \langle * * * * * 0 \rangle B$, uni-directional printing is canceled. (and the bi-directional printing is set.)

[Notes]

- When unidirectional printing is set, the printer prints from left to right.
- When the user wants to avoid horizontal misalignment, it is better to set unidirectional printing by this command.

[Default] $n = 0$

ESC c 0 n

- [Name] Select the print sheet(s)
[Format] <1B>H<63>H<30>H<n> or <27>10<99>10<48>10<n>
[Range] $1 \leq n \leq 4$
[Description] Selects the sheet(s) to be printed.

- Each bit of n is used as follows:

		Value	
Bit	Function	0	1
0	Journal	Invalid	Valid
1	Receipt	Invalid	Valid
2	Slip	Invalid	Valid
3	Undefined		
4	Undefined		
5	Undefined		
6	Undefined		
7	Undefined		

- [Notes]
- Valid only when input at the beginning of a line.
 - Slip paper cannot be selected at the same time as other paper.
 - When this command is input, the printer executes the following:
 - ① If a slip sheet which was previously selected is canceled, the sheet is ejected.
 - ② If a slip sheet which was previously selected is reselected, no operation is executed.
 - ③ If either receipt or journal was previously selected, and then a slip sheet is selected, the printer waits for a slip sheet to be loaded.

[Default] $n = 3$

ESC c1 n

- [Name] Select sheet(s) for setting the line spacing
[Format] <1B>H<63>H<31>H< n > or <27>10<99>10<49>10< n >
[Range] $1 \leq n \leq 7$
[Description] Selects the sheet(s) for which the line spacing is to be set.
- The line spacing is set using the **ESC 2** and **ESC 3**.

- Each bit of n is used as follows:

Bit	Function	Value	
		0	1
0	Journal	Invalid	Valid
1	Receipt	Invalid	Valid
2	Slip	Invalid	Valid
3	Undefined		
4	Undefined		
5	Undefined		
6	Undefined		
7	Undefined		

[Default]

$n = 7$

[Reference]

ESC 2, ESC 3

ESC c 3 n

[Name]

Select paper detectors to output signals.

[Format]

<1B>H<63>H<33>H< n > or <27>10<99>10<51>10< n >

[Range]

$0 \leq n \leq 255$

[Description]

Selects the paper detectors to output signals on the 'paper-end status line'.

- Each bit of n is used as follows:

Bit	Function	Value	
		0	1
0	Journal near-end	Invalid	Valid
1	Receipt near-end	Invalid	Valid
2	Undefined		
3	Undefined		
4	Slip	Invalid	Valid
5	Slip	Invalid	Valid
6	Undefined		
7	Undefined		

- [Note]
- This command is valid when the parallel interface is selected. When the serial interface is selected, this command will be ignored.
 - It is possible to select multiple detectors for print control to output signals. In this case, if only one paper detector detects no paper, the paper-end signal is output.
 - The detector is switched when executing this command. Therefore, there will be a time lag between receiving this command and switching the paper-end signal, according to the condition of the receive buffer.

[Reference] $n = 3$

ESC c 4 n

- [Name] Select paper detectors to stop printing
 [Format] <1B>H<63>H<34>H< n > or <27>10<99>10<52>10< n >
 [Range] $0 \leq n \leq 5$
 [Description] Selects the paper detectors used to stop printing.
- Each bit of n is used as follows:

Bit	Function	Value	
		0	1
0	Journal near-end	Invalid	Valid
1	Receipt near-end	Invalid	Valid
2	Undefined		
3	Undefined		
4	Slip	Invalid	Valid
5	Slip	Invalid	Valid
6	Undefined		
7	Undefined		

- [Notes]
- Even when a paper-end detector is enabled with this command, printing is not stopped unless the corresponding paper is selected as the print sheet.
 - It is possible to sheet multiple detectors for print control (to stop printing). In this case, if only one detector detects on paper, the printer stops printing.
 - Printing is stopped after the current line is completed and the paper is fed.
 - When a paper-end is detected by the journal or receipt detector, the printer goes OFF-LINE after printing stops.
 - When a paper-end is detected by the slip detector, printing is continued until printing on the slip sheet completes, the sheet ejected, and the printer waits for another slip sheet to be loaded. In addition, the detector checks for paper-end after the print and paper feed sequence is completed. Therefore, if the actual paper length does not correspond to the paper feed length set by command, the printer may continue printing even after the paper reaches its end. The user should pay attention to this.
- [Default] $n = 0$

ESC c 5 n

- [Name] Enable/disable panel switches
- [Format] <1B>H<63>H<35>H< n > or <27>10<99>10<53>10< n >
- [Range] $0 \leq n \leq 255$
- [Description] Enables or disables all the panel switches.
- Only the lowest bit of n is valid.
When $n = < * * * * * 1 > B$, panel switches are enabled.
When $n = < * * * * * 0 > B$, panel switches are disabled.
- [Notes]
- If the panel switches are disabled by this command, all the panel switches are affected. The functions executed using the panel switches, e.g., switching between ON-LINE and OFF-LINE, feeding paper, etc. are disabled.
- [Default] $n = 0$
- [Reference] **ESC c 6**

ESC c 6 n

[Name]	Enable/disable ON-LINE switch
[Format]	<1B>H<63>H<36>H< n > or <27>10<99>10<54>10< n >
[Range]	$0 \leq n \leq 255$
[Description]	Enables or disable ON-LINE switch. <ul style="list-style-type: none">• Only the lowest bit of n is valid. When $n = \langle * * * * * * 1 \rangle_B$, the ON-LINE switch is enabled. When $n = \langle * * * * * * 0 \rangle_B$, the ON-LINE switch is disabled.
[Notes]	<ul style="list-style-type: none">• When the ON-LINE switch is disabled by this command, switching between ON-LINE and OFF-LINE using the ON-LINE switch is impossible.• When the ON-LINE switch is disabled, the normal mode is fixed ON-LINE, but the receipt feed switch and journal feed switch are always valid.
[Default]	$n = 0$ or 1 depending on the DIP-switch setting.

ESC d n

[Name]	Print and feed paper n lines
[Format]	<1B>H<64>H< n > or <27>10<100>10< n >
[Range]	$0 \leq n \leq 255$
[Description]	Prints the data in the print buffer and performs n line feeds. <ul style="list-style-type: none">• Sets the print starting position to the beginning of the line.
[Default]	Not defined.

ESC e n

[Name]	Print and reverse feed n lines
[Format]	<1B>H<65>H< n > or <27>10<101>10< n >
[Range]	$0 \leq n \leq 255$
[Description]	Prints the data in the print buffer and performs n line feeds in the reverse direction. <ul style="list-style-type: none">• Sets the print starting position to the beginning of the line.

- [Notes]
- This command must not be executed continuously more than two times.
 - If n is out of range and the line feed amount is set to over 1/6 inch, the printer will print, but the paper will not be fed.
 - If the paper gets out of the slip detector during slip printing, the printer will print, but the paper will not be fed.
 - The user should be noted that paper feeding in the reverse direction causes the following problems.
 - ① Paper feed pitch may become incorrect.
 - ② The printing noise of the following line will be louder than normal.
 - ③ The paper may rub against the ribbon and become dirty.
- [Default] Not defined.

ESC f m n

- [Name] Set cut sheet waiting time
- [Format] <1B>H<66>H< m >< n > or <27>10<102>10< m >< n >
- [Range] $0 \leq m \leq 15$
 $0 \leq n \leq 64$
- [Description] Sets the time the printer waits for a slip sheet to be loaded and the time from when the slip sheet is loaded to when the printer starts operation.
- "m" specifies the slip sheet waiting time to " $m \times 1$ " minutes. If no slip sheet is loaded after this time period has elapsed, the slip sheet mode is automatically canceled, and the sheet(s) set by the default value of ESC c 0 is selected.
 - When $m = 0$, the printer waits forever for a slip sheet to be loaded.
 - "n" specifies the time from when the slip sheet is loaded to when printer operation begins to " $n \times 0.1$ " seconds.
- [Notes]
- If either m or n is out of the defined range, this command is ignored and the previously set value is not changed.
- [Default] $m = 0, n = 10$

ESC i

[Name]	Execute full cut
[Format]	<1B>H<69>H or <27>10<105>10
[Description]	Executes a full cut of the receipt paper.
[Notes]	<ul style="list-style-type: none">• Valid only when input at the beginning of a line.• Valid only when receipt is selected for printing by ESC c 0.

ESC m

[Name]	Execute partial cut
[Format]	<1B>H<6D>H or <27>10<109>10
[Description]	Executes a partial cut of the receipt paper.
[Notes]	<ul style="list-style-type: none">• Valid only when input at the beginning of a line.• Valid only when receipt is selected for printing by ESC c 0.

ESC o

[Name]	Stamp
[Format]	<1B>H<6F>H or <27>10<111>10
[Description]	Executes stamping the receipt paper.
[Notes]	<ul style="list-style-type: none">• Valid only when input at the beginning of a line.• Valid only when receipt is selected for printing by ESC c 0.

ESC p *m n1 n2*

[Name]	Generate pulse
[Format]	<1B>H<70>H< <i>m</i> < <i>n1</i> < <i>n2</i> > or <27>10<112>10< <i>m</i> >< <i>n1</i> >< <i>n2</i> >
[Range]	$m = 0$ $0 < n1 \leq 255$ $0 < n2 \leq 255$
[Description]	The pulse set by <i>n1</i> and <i>n2</i> is output to the connector pin <i>m</i> . <ul style="list-style-type: none">• The value of <i>m</i> is used as follows:

<i>m</i>	Connector pin
0	Drawer kick-out connector 2nd pin

- ON time is *n1* x 10 ms, and OFF time is *n2* x 10 ms

[Default] Neither m , $n1$, nor $n2$ is defined.

[Reference] APPENDIX B Connectors

ESC t n

[Name] Select character code table

[Format] <1B>H<74>H< n > or <27>10<116>10< n >

[Range] $0 \leq n \leq 3$

[Description] Selects page n from the character code table.

[Default] If Japanese is selected by DIP switches, $n = 1$. If other than Japanese is selected, $n = 0$.

[Reference] APPENDIX F Character Code Tables

ESC u n

[Name] Transmit peripheral device status

[Format] <1B>H<75>H< n > or <27>10<117>10 < n >

[Range] $n = 0$

[Description] Transmits the status of the connector pin n when executing this command.

- The value of m is used as follows:

m	Connector pin
0	Drawer kick-out connector 3rd pin

- [Notes]
- This command is valid when the serial interface is selected. When the parallel interface is selected, this command is ignored.
 - The status to be transmitted is *shown* in the table below.
 - When the connector is not used, the value of bit 0 is always "1".
 - When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer will keep waiting until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.
 - This status is transmitted when executing this command. Therefore, there will be a lag between receiving this command and transmitting the status, according to the condition of the receive buffer.

Bit	Function	Value	
		0	1
0	3rd pin voltage level	"LOW"	"HIGH"
1	Undefined		
2	Undefined		
3	Undefined		
4	Not used	Fixed to 0	—
5	Undefined		
6	Undefined		
7	Not used	Fixed to 0	—

[Reference] APPENDIX B Connectors

ESC v

[Name] Transmit printer status

[Format] <1B>H<76>H or <27>10<118>10

[Description] Transmits the paper detector status when executing this command.

- [Notes]
- This command is valid when the serial interface is selected. When the parallel interface is selected, this command will be ignored.
 - The status to be transmitted is shown in the table below.
 - When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE). If the host computer is not ready to receive data (DSR signal is MARK), the printer will keep waiting until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the condition of the DSR signal.
 - This status is transmitted when executing this command. Therefore, there will be a time lag between receiving this command and transmitting the status, according to the condition of the receive buffer.

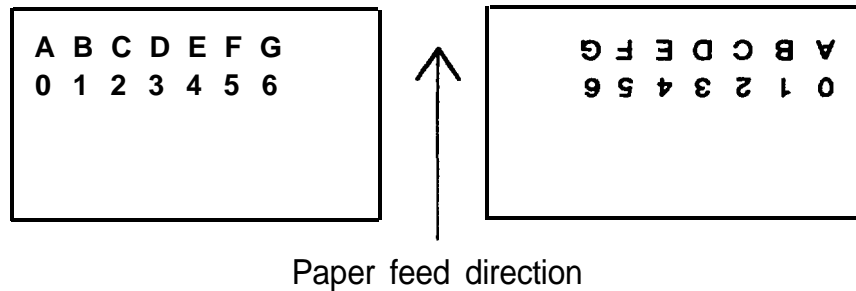
Bit	Function	Value	
		0	1
0	Journal near-end	Paper present	No paper
1	Receipt near-end	Paper present	No paper
2	Undefined		
3	Undefined		
4	Not used	Fixed to 0	—
5	Slip detector	Paper present	No paper
6	Undefined		
7	Not used	Fixed to 0	—

ESC z n

[Name]	Set/cancel parallel printing on two sheets
[Format]	<1B>H<7A>H< n > or <27>10<122>10< n >
[Range]	0 ≤ n ≤ 2 5 5
[Description]	<p>Sets or cancels parallel printing (printing the same data) on the receipt/journal sheets.</p> <ul style="list-style-type: none"> • Only the lowest bit of n is valid. When n = < * * * * * 1 >B, parallel printing is set. When n = < * * * * * 0 >B, parallel printing is canceled.
[Notes]	<ul style="list-style-type: none"> • Valid only when input at the beginning of a line. • Valid only when both receipt and journal are selected as the print sheets by ESC c 0 n.
[Default]	n = 0
[Reference]	ESC c 0

ESC { n

[Name]	Set/cancel upside-down character printing
[Format]	<1B>H<7B>H< n > or <27>10<123>10 < n >
[Range]	$0 \leq n \leq 255$
[Description]	Sets or cancels upside-down character printing. <ul style="list-style-type: none">• Only the lowest bit of n is valid. When $n = \langle * * * * * 1 \rangle B$, upside-down character printing is set. When $n = \langle * * * * * 0 \rangle B$, upside-down character printing is canceled.
[Notes]	<ul style="list-style-type: none">• The upside-down character specification rotates normal characters on the line by 180° and prints them.• Valid only when input at the beginning of a line.
[Default]	$n = 0$
[Example]	When upside-down character printing is canceled.
	When upside-down character printing is set.



GS ENQ

[Name]	Status enquiry
[Format]	<1D>H<05>H or <29>10<5>10
[Description]	Transmits the printer status when receiving this command.
[Notes]	<ul style="list-style-type: none">• This command is valid only when DTR/DSR control is selected for the serial interface. When the parallel interface is used, or when XON/XOFF control is selected for the serial interface, this command will be ignored.• The status to be transmitted is shown in the table below.• Transmits 1 byte without confirming the DSR signal state.• This command is executed even in the OFF-LINE state, in the receive buffer full state, and in the mechanical error state.• The status is also transmitted whenever the data sequence of <1D>H<05>H is received besides this command. Therefore, the user should pay attention to this.

<Example>

In ESC p m n1 n2 n1 = <1D>H, n2 = <05>H

In ESC] m n1 n2 [d] n1 +256 5 n2: d1 = <1D>H, d2 = <05>H

- Be sure that this command should not be used within the data sequence of another command.

<Example>

When attempting to transmit the ESC 3 n to the printer, suppose that DTR (DSR for the host computer) goes to MARK before the n is transmitted.

In this case, be sure to transmit the n regardless of the DTR signal (DSR for the host computer) before transmitting the GS ENQ. If the GS ENQ is transmitted before the n, n will be processed as <1D>H.

Bit	Function	Value	
		0	1
0	Journal near-end	Paper present	No paper
1	Receipt near-end	Paper present	No paper
2	Ribbon cover/take-up cover state	Both are closed	Either is open
3	ON-LINE/OFF-LINE	ON-LINE	OFF-LINE
4	Drawer kick-out connector pin 3 state	"LOW"	"HIGH"
5	Slip detector	Paper present	No paper
6	Mechanical error state	No error	Error occurs
7	Unused	—	Fixed to 1

bit 3: Becomes "1" in the OFF-LINE state due to a paper-out, cover open, or ON-LINE switch operation. (Therefore, when this bit is "1" but paper is present, the cover is closed and no mechanical error has occurred, the printer can be set ON-LINE by operating the ON-LINE switch.)

bit 6: Becomes "1" when a mechanical error occurs related to **auto** cutting or detecting the home position. Home position is de-tected in the following cases:

- ① Initialization at power-on.
- ② Ribbon cover is open.
- ③ ESC <

bit 7: Bit 7 of status data for ESC v and ESC u is fixed to "0", but bit 7 of this command is fixed to "1". Therefore, the status of this command can be easily identified from that for ESC v and ESC u.

APPENDIX

APPENDIX A General Specifications

1. Printing Specifications

Printing method:	Impact dot matrix
Head wire arrangement:	9 pins in a vertical line; Wire pitch: 1/72 inch
Head wire diameter:	0.29 mm
Printing directions:	Bi-directional, minimum distance printing
Characters per second:	Refer to Table A-I.
Characters per line:	Refer to Table A-I.
Characters per inch:	Refer to Table A-I.

2. Characters Specifications

Number of characters:	Alphanumeric:	95
	Katakana:	64
	Hiragana:	64
	Double-width Kanji:	112
	Extended graphics:	128
	International characters:	32
Character structure:	9 x 9 3-dot spacing in half dot unit	
	7 x 9 2-dot spacing in half dot unit	
	The spacing can be set larger than the above values by command.	
Character size:	Refer to Table A-I.	

Table A-I. Characters Per Inch, Characters Per Second, Characters Per Line, character Size

CG Mode (Horizontal dots × Vertical dots)	Character Spacing Half Dots	Characters Per Inch (CPI)	Characters Per Second (CPS)	Characters Per Line (CPL)			Character Size (mm) Width × Height
				Roll Paper		Slip Paper	
				58 mm	70 mm		
9 × 9	3 dots	12.5	Approx. 158	25	30	66	1.6 × 3.1
7 × 9	2 dots	16.7	Approx. 211	33	40	88	1.3 × 3.1

- NOTES:**
- Concerning the roll paper width, either 58 mm (57.5 mm ±0.5 mm) or 70 mm (89.5 mm ±0.5 mm) is selectable.
 - The maximum roll paper width for the corresponding mode (58 mm or 70 mm) are shown in the table. Refer to 5-2 Printable Area for the details of the paper width.

3. Ribbon

Inking method: Exclusive cassette ribbon
Color: Purple
Ribbon cassette: ERC-31
Ribbon life: 7,000,000 characters
(when one character is 18 dots.)

Ribbon cassette overall dimensions:

Refer to Figure A-1.

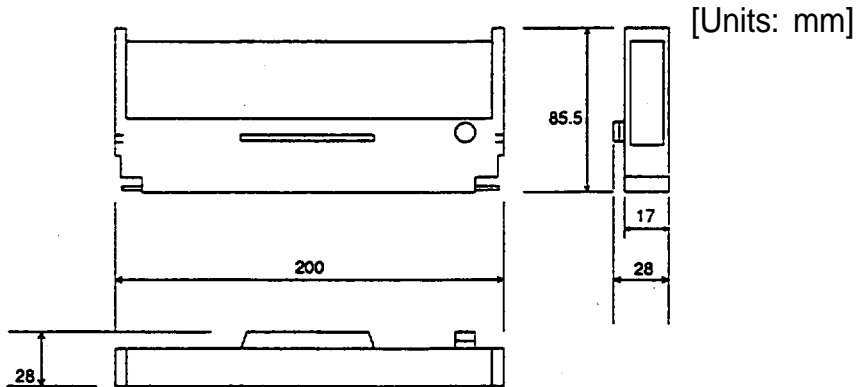


Figure A-1. Ribbon Cassette Overall Dimensions

4. Stamp

Recommended stamp: FUJI COPIAN
CPS-2038C
Recommended ink: FUJI COPIAN
Super Ink (purple)
Printable area dimension: 38 mm (width) X 20 mm (height)
Stamp overall dimensions: Refer to Figures A-2
NOTE: Stamp and stamp set should be supplied by the user.

[Units: mm]

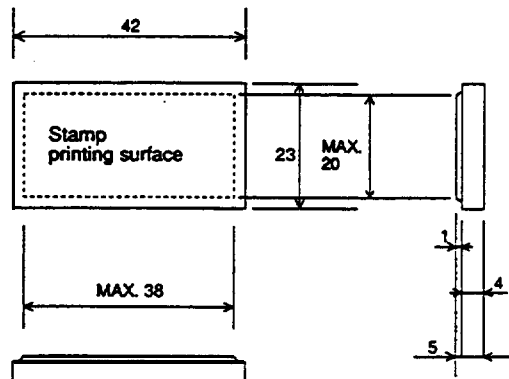


Figure A-2. TM-930II/930IIP Stamp Overall Dimensions

5. Auto-Cutter

- 1) Full cut/partial cut: Auto cutting is executed (receipt side only) by software command.

6. Roll Paper Supply Device

- Supply method: Drop-in loading
- Near-end detector: For journal and receipt paper
- Detection method: Micro switch
- Roll paper core: Inside diameter 10 mm or more
- Near-end adjustment: Use an adjusting screw
- Paper width: The position of the supply frame is adjustable to accommodate different width of roll paper.

7. Journal Paper Take-up Mechanism

- Take-up method: The paper is automatically taken-up by the journal paper feed motor.
- Paper width: According to the roll paper used, a sub take-up shaft can be installed or removed.

8. Paper

- Paper feed method: Friction feed
- Paper feed pitch: Default-1/6 inch
Can be set in units of 1/144 inch by software command.
- Paper feed speed: Approx. 64.3 ms/line (1/6 inch feeding)
Approx 3.4 inches/second (continuous feeding)
- Paper size:
Roll paper (Receipt, Journal)
Only single-ply paper can be used.
- Paper width: **57.5** mm ± 0.5 mm or 69.5 mm ± 0.5 mm
- Maximum diameter: 83 mm
- Paper thickness: 0.06 to 0.09 mm
- Roll paper core: Inside diameter 10 mm or more
- Slip paper
- Paper width: 80 to 210 mm
- Length: 80 to 297 mm, Maximum size: A4

- Paper thickness:
- ① Single-ply sheet: 0.09 0.2 mm
 - ② Combination of copy paper and carbon copy paper
 - 5 sheets maximum (1 original + 4 copies, 25°C)
 - Backing paper: **0.07** to 0.15 mm
 - Copy paper, original paper: 0.04 to 0.07 mm
 - Carbon copy paper: Approx. 0.035 mm
 - Total thickness of copy paper: 0.09 to 0.37 mm
 - ③ Pressure sensitive paper
 - 5 sheets maximum (1 original + 4 copies, 25°C)
 - Backing paper: **0.07** to 0.15 mm
 - Copy paper, original paper: 0.04 to 0.07 mm
 - Total thickness of copy paper: 0.09 to 0.25 mm

NOTE: Copy capability is greatly influenced by the ambient temperature, so the user should be aware of this.

9. Receive Buffer

When the serial interface is selected, buffer size (32, 128, 256, or 2048 bytes) is selectable using DIP switches.

When the parallel interface is selected, buffer size (0,128,256, or 2048 bytes) is selectable using DIP switches.

10. Electrical Characteristics

Supply voltage: +24 VDC \pm 10%

Current consumption: Operating

When slip paper is fed to the print starting position: Mean-approx. 2.3 A
(approx. 1.4 sec.)

Printing: Mean-approx. 1.5 A

Standby Mean-approx. 0.2 A

8. EMI (using EPSON PS-120)

FCC: Class A

FIZ: Class B

9. Reliability

MCBF: Mechanism: 5,000,000 lines (except for print head)

Auto cutter mechanism:

Approx. 300,000 cuts

Print head life: 100 million characters
(mean: 2 dots/wire per character)

10. Environmental Conditions

Temperature:

Operating: 5 to 40°C

Storage: -10 to 50°C (except for ribbon)

Humidity:

Operating: 30 to 85% (non-condensing)

Storage: 30 to 90% (non-condensing, except for ribbon)

11. External Dimensions and Weight

Height: 197 mm

Width: 251 mm

Depth: 298 mm

Weight: Approx. 6 kg

12. Case Color

EPSON standard gray

APPENDIX B Connectors

1. Connectors

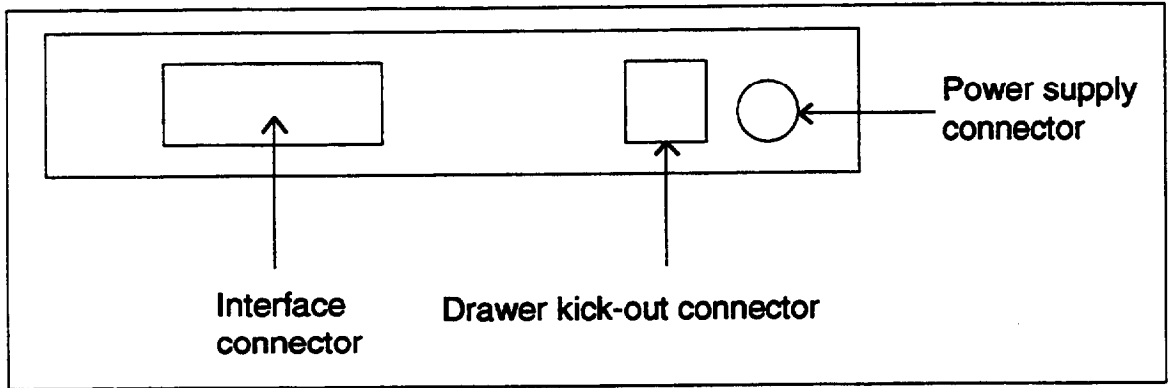


Figure B-1. Serial Interface Connector Panel External Appearance

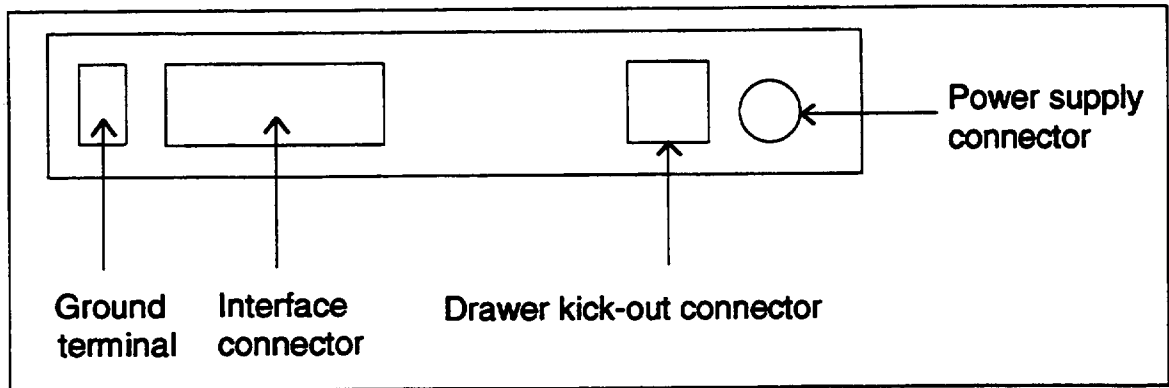


Figure B-2. Parallel interface Connector Panel External Appearance

2. interface connectors

Refer to **APPENDIX C** Interfaces

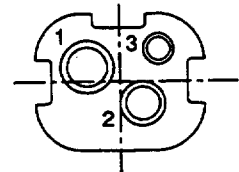
3. Power supply connector

This connector is used to connect an external power source.

- 1) Pin assignment: Refer to Table B-I.
- 2) Model (printer side): Hosiden TCS7960-53-2010 or equivalent
(user side): Hosiden TCP8927-63-1100 or equivalent

Table B-I. Power Supply Connector Pin Assignment

Pin Number	Function
1	24 VDC
2	GND
3	NC



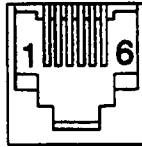
4. Drawer kick-out connector (Modular Connector)

The signal specified by ESC p is output to this connector.
The host can confirm the input signals using ESC u.

- 1) Pin assignment: Refer to Table B-2.
- 2) Model (printer side): MOLEX52065-6615 or equivalent
(user side): 6-position 6-contact (RJ 12 Telephone jack)

Table B-2. Drawer kick-out Connector Pin Assignments

Pin Number	Signal Name	Direction
1	Frame GND	—
2	Drawer kick-out drive signal	Output
3	Drawer open/close signal	Input
4	+24 VDC	—
5	NC	—
6	Signal GND	—



3) Drawer kick-out drive signal

output: Output voltage: Approx. 24 VDC
Output current: 1 A or less

Output waveform: Outputs the waveform in Figure B-3 to the point A in Figure B-4.

($n7$ (ON time) and $n2$ (OFF time) are specified by the ESC p command.)

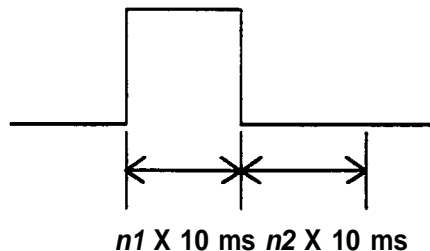


Figure B-3. Drawer kick-out Drive Signal Output Waveform

4) Drawer open/close signal

Input signal level (Connector 3rd pin):

"L" = 0 VDC

"H" = 2 to 5 VDC

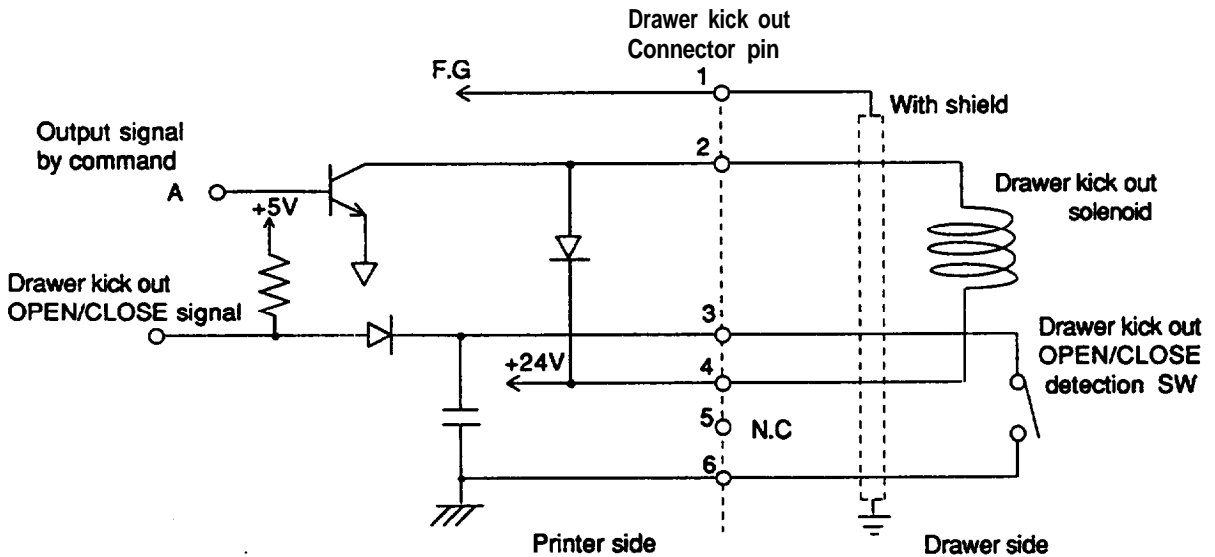


Figure B-4. Drawer kick-out Signal Drive Circuit

See APPENDIX E Notes on Using the Drawer Kick-out Connector

APPENDIX C Interfaces

1. Serial interface

■ RS-232C serial interface

1) Specification (based on RS-232C)

Data transmission: Serial

Synchronization: Asynchronous

Handshaking: DTR/DSR or XON/XOFF control (selectable using DIP switch)

Signal levels: MARK = -3 to -15 V: Logic "1"

SPACE = +3 to +15 V: Logic "0"

Stop bits: 1 or more

Connector (printer side):

HONDA GMM-A25HUGDFDB1 (DB-25) or equivalent

2) Interface connector terminal assignments and signal functions

Pin Number	Signal Name	Signal Direction	Function
1	FG	—	Frame ground
2	TXD	Output	Transmit data
3	RXD	Input	Receivedata
6	DSR	Input	This signal indicates whether the host computer can or cannot receive data. SPACE indicates that the host computer can receive data and MARK indicates that the host computer cannot receive data. When DTR/DSR control is selected, this printer transmits data after confirming this signal. (Except when transmitting data by GS ENQ.) when XON/XOFF control is selected, the printer does not confirm this signal.
1	SG	—	Signal ground
20	DTR	Output	This signal indicates whether the printer can or cannot receive data. When DTR/DSR control is selected, SPACE indicates that the printer can receive data and MARK indicates that the printer cannot receive data. The signal turns to "MARK" in the following cases: <ul style="list-style-type: none"> • During the period from when the power is turned on to when the printer initialization completes. • During the self-test printing. • In the OFF-LINE state. • In the receive buffer full state. • In a mechanical error state. When XON/OFF control is selected, the signal is always "SPACE" except the following cases: <ul style="list-style-type: none"> • During the period from when the power is turned on to when the printer initialization completes. • During the self-test printing. • In a mechanical error state.

- NOTES:**
- When the remaining space in the receive buffer is 16 bytes, the printer becomes 'receive buffer full' and this state continuous until the space in the receive buffer increases to 26 bytes (because data is processed).
 - If the remaining space in the receive buffer is 0 byte, the received data will be ignored.

3) XON/XOFF transmit timing

When XON/XOFF control is selected, this printer transmits XON or XOFF at the following timings.

XON: a) When the printer becomes ON-LINE after turning the power on.
 b) When the receive buffer is released from the buffer-full state.
 c) When the printer turns OFF-LINE to ON-LINE.

XOFF: d) When the receive buffer becomes full.
 e) When the printer turns ON-LINE to OFF-LINE.
 f) when a mechanical error has occurred.

- NOTES:**
- The XON code is <11>H and XOFF code is <13>H.
 - In case of c), XON is not transmitted when the receive buffer is full.
 - In case of e), XOFF is not transmitted when the receive buffer is full.

■ RS-232C setial interface

1) Specifications

Data transmission: Serial

Synchronization: Asynchronous

Handshaking: XON/XOFF control

Stop bits: 1 or more

Termination resistance:
Connected or open by DIP switch setting.

Connector (printer side):
HONDA GMM-A25HUGDFDB1 (DB-25) or equivalent

2) Interface connector terminal assignments and signal functions

Pin Number	Signal Name	Signal Direction	Function
1	FG	—	Frame ground
2	PS (-)	Output	Transmit data
3	RS (+)	Output	Transmit data
4	PR (-)	Input	Receive data
5	PR (+)	Input	Receive data
7	SG	—	Signal ground

3) XON/XOFF transmit timing

Same as RS-232C serial interface

4) Circuit diagram

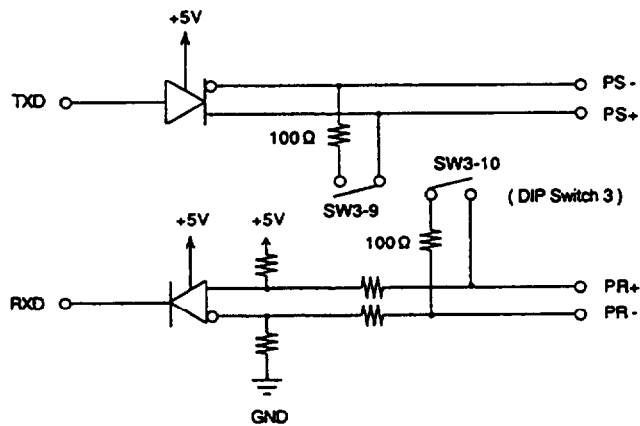


Figure C-I. RS-422 Circuit Diagram

2 Parallel interface

1) Specifications

- Data transmission: 8-bit parallel
- Synchronization: STROBE pulse supplied by host computer.
- Handshaking: ACKNLG and BUSY
- Logic level: All of the interface control signals are **TTL** compatible
- Connector (printer side): **HONDA ADS-B36BLFDR116** or equivalent

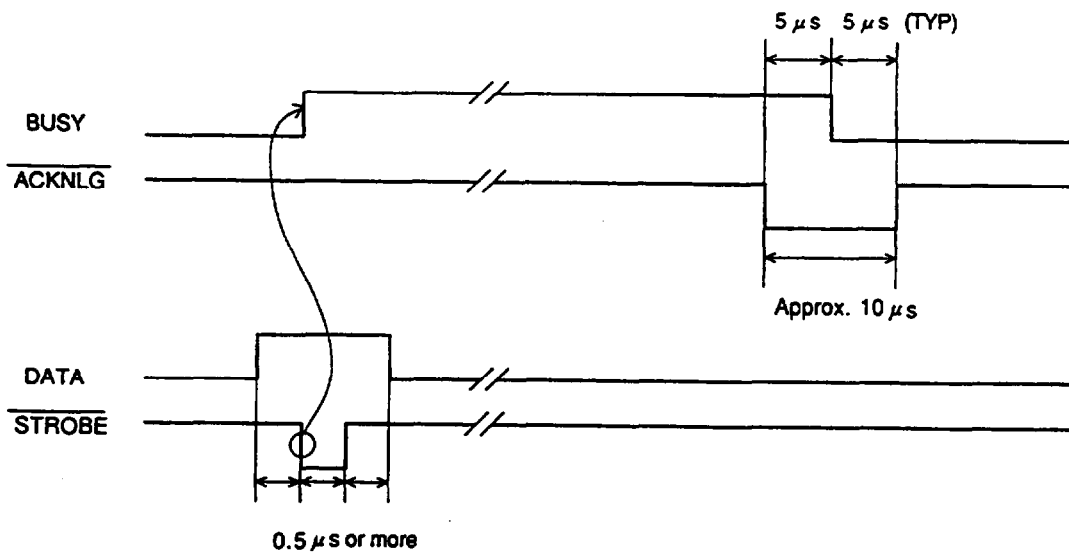
2) Input connector terminal assignments and signal functions

Pin Number	Signal Name	Signal Direction	Function
1	<u>STROBE</u>	Input	<u>STROBE</u> pulse for reading data. Normally, this signal is "HIGH". Just after it goes "LOW", the printer reads the data. Pulse width must be 0.5 μ s or more at the receive terminal.
2	DATA 1	Input	These signals are the eight parallel data bits. "HIGH" indicates that the bit is "1" and "LOW" indicates that it is "0".
3	DATA 2	Input	
4	DATA 3	Input	
5	DATA 4	Input	
6	DATA 5	Input	
7	DATA 6	Input	
8	DATA 7	Input	
9	DATA 8	Input	
10	<u>ACKNLG</u>	Output	This signal indicates that the printer is ready to receive data. Under normal conditions, it is "HIGH" and goes "LOW" for approx. 10 μ s.

Pin Number	Signal Name	Signal Direction	Function
11	BUSY	Output	This signal indicates whether the printer can or cannot receive data. When this signal is 'HIGH', it indicates that the printer cannot receive data. When it is 'LOW', it indicates that the print is ready to received data.
12	PE	Output	This signal indicates whether paper is present or not. "HIGH" indicates that the paper has run out. "LOW " indicates that paper is present.
13	SLCT	Output	1) When DIP SW2-8 is ON, this signal indicates whether the roll paper cover and ribbon cover are open or dosed. 'HIGH' indicates that both covers are closed. 'LOW' indicates that either or both them am open. 2) When DIP SW2-8 is OFF, this signal is pulled up to +5V through a 3.3 K Ω resistor.
14	$\overline{\text{AUTO FEED XT}}$	Input	If this signal is 'LOW, printing and line feed are performed automatically by CR commend.
15	NC		
16	GND		Signal ground
17	CHASSIS GND		Chassis ground
18	NC		
19 to 30	GND		Signal ground
31	$\overline{\text{INIT}}$	Input	Printer hardware reset signal. Normally, this signal is 'HIGH'. The printer is reinitialized, just as when power is turned on, by receiving a "LOW" pulse of 50 μ s or more.
32	$\overline{\text{ERROR}}$	Output	This signal indicates whether the printer is in an error state or not. It is "LOW" in the following cases. <ul style="list-style-type: none"> • During the period from when the power is turned on to when the printer initialization completes. • During the self-test printing. • In the OFF-LINE state. • In a mechanical error state.
33	GND		Signal ground
34	DRAWER KICK-OUT STATUS	Output	Pulled up to +5V through a 4.7 K Ω resistor, and the status signal of the drawer kick-out connector is directly output to this terminal.
35	+5V	Output	This signal indicates whether the power is turned on or off. "LOW" means that the power is turned on.
36	SLCT IN		This signal is pulled up +5V through a 3.3 K Ω resistor.

- NOTES:**
- For interface wiring, be sure to use a twisted-pair cable for each signal and connect the return side to the signal GND level. To prevent noise, these cables should be shielded and connected to the chassis of the host computer.
 - All of the interface conditions are based on TTL levels. The rising time and falling time of any signal should be $0.2 \mu\text{s}$ or less.
 - Never transmit data without checking ACKNLG and BUSY. (Data should only be transmit to this printer after confirming that ACKNLG is active, or when BUSY is 'LOW'.)
 - The interface cable should be as short as possible.

3) Timing chart



4) Data control

Reception of data is controlled by the ACKNLG or BUSY signal. The BUSY signal goes 'HIGH' depending on whether the receive buffer is available or not as follows:

- When the receive buffer capacity is 0 byte:
 - During the period from when power is turned on to when the printer initialization completes.
 - During the self-test printing
 - During data entry
 - During printing
 - During paper feeding
 - During auto cutting
 - During stamping
 - In the OFF-LINE state
 - In a mechanical error state

- b) When the receive buffer capacity is 128, 256, 2048 bytes:
- During the period from when power is turned on to when the data reception becomes possible after the printer initialization completes.
 - During the self-test printing
 - During data entry
 - In the OFF-LINE state
 - In the receive buffer full state
 - In a mechanical error state

- NOTES:
- When the remainings spade in the receive buffer is 5 bytes, the printer becomes 'receive buffer full'.
 - If the remaining spade in the receive buffer is 0 byte, the received data will be ignored.

APPENDIX D Near-End Detector Set Handling

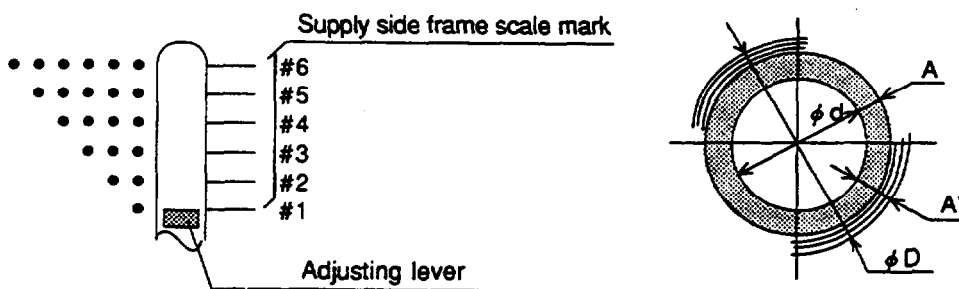
■ Adjusting roll paper near-end

The remaining detectable amount of roll paper differs depending on the inside and outside diameters of the paper core. Therefore, the minimum detectable amount corresponding to the paper core can be set as follows. The inside diameter (0d) of the roll paper used should be 10 mm or more.

- 1) Measure the paper core thickness A.
- 2) Match the top of the adjusting lever with the scale mark (paper supply side frame), which corresponds to the thickness A of the core, and fix the adjusting lever using the adjusting screw.

The relationship between the scale mark and value A is shown below.

- 3) Be sure that the near-end detecting lever operates smoothly after finishing the adjustment.



- A: Paper core thickness
- A': Paper pore thickness A + Remaining paper thickness (2 mm)
- Od: Core inside diameter
- OD: Core inside diameter Od + (paper core thickness A+ Remaining paper thickness (2 mm) X 2

Figure D-1. Relationship between Adjusting Position and Paper Core thickness

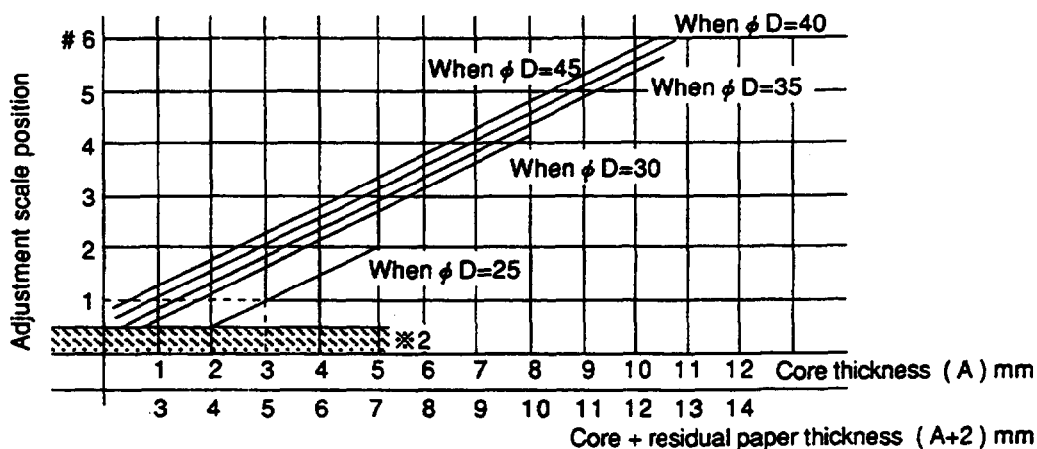


Figure D-2. Relationship between core Thickness and Adjustment Scale Position

- NOTES:
- To avoid detection errors due to the near-end detector detection accuracy, obtain the adjustment scale that corresponds to the paper pore thickness + remaining paper thickness 2 mm.
 - Be sure not to set the indicator part to the position **0.7** mm or less lower than #1 to prevent the detecting lever malfunctions.
 - Honeycomb shaped pore should not be used to prevent detection errors due to the occurs and other defects of the pore.

■ **Relationship between roll paper core thickness and roll paper remaining amount**

The diagram below shows the relationship between the paper core and the minimum remaining amount of roll paper when the EPSON recommended roll paper (45 Kg, paper thickness approx. 0.06 mm) is used. (Calculated values)

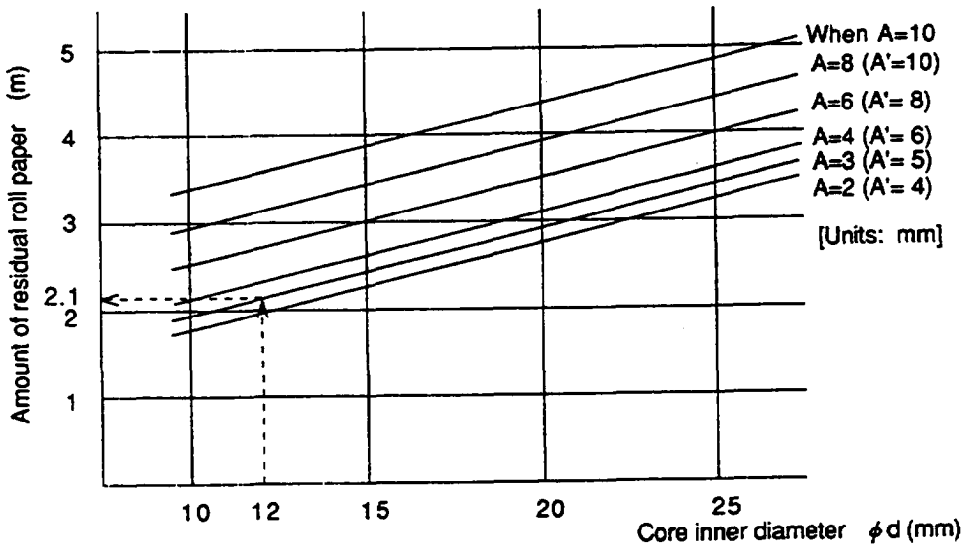


Figure D-3. Relationship between the Roll Paper Core Inside Diameter and the Roll Paper Remaining Amount

- NOTES:**
- The roll paper remaining amount varies with the thickness of the roll paper used. The above diagram does not apply when papers other than that specified above is used.
 - If there is an end mark at the end of the roll paper, the end mark can act as an adhesive, and the roll paper is pulled up. In this case, the remaining amount of paper does not apply to the figure above.

■ **Example of roll paper remaining amount adjustment**

The adjusting method and the remaining length of roll paper when the paper core that meets the JIS standard ($\phi d = 12$ mm, $A = 3$ mm) is used are shown below.

- 1) Obtain the adjusting lever position for the roll paper ($A = 3$ mm, $\phi D = 25$ mm) from Figure D-2 (indicated by - - - mark). #1 is obtained. Set the adjusting lever to #1.
- 2) The remaining paper length at this time can be obtained from Figure D-3. (indicated by - - - mark). The remaining paper length corresponding to the paper roll ($\phi d = 12$ mm, $A = 3$ mm ($A' = 5$ mm)) is approx. 2.1 m.

APPENDIX E Notes on Using the Drawer Kick-out Connector

1) Usage conditions of drawer kick-out connector (Refer to APPENDIX 6).

Because drawer specifications differ greatly depending on the manufacture and the part No., make sure that the specifications of the drawer to be used meet the following conditions before connecting it to the drawer kick-out connector of this printer. These conditions also apply to any devices that use the drawer kick-out connector.

Any devices that do not satisfy all the following conditions must not be used.

[Conditions]

- A load must be provided between the drawer kick-out connector pins 4 and 2 or between 4 and 5. (*1)
- When the drawer open/close signal is used, the drawer open/close switch must be provided between the drawer kick-out connector pins 3 and 6. (* 2)
- The resistance of the drawer open/close solenoid load shall be 24 Ω or more, or the output current shall be 1 A or less. (* 3)
- Be sure to use the drawer kick-out connector pin 4 (24 V power output) to drive the device. Never connect any other power supply to the drawer kick-out connector. (* 4)

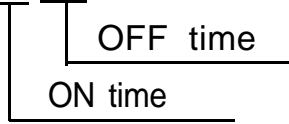
In this case the peak current is 1 A, and the energizing conditions described in 2) must be followed.

- NOTES:**
- Operation of this printer with incorrectly installed devices voids the warranty.
 - Connecting devices other than the switch voids this printer's warranty.
 - If a device with the resistance of less than 24 Ω or the input current of over 1 A is used, the resulting overcurrent could damage the device.
 - Operation of this printer with devices other than those specified voids the warranty.

2) Notes on using the specified pulse generation command (**ESC p**)

When the drawer is connected to the drawer kick-out connector and driven using the specified pulse generation command (**ESC p**), **specify the parameters** $n1$ and $n2$ in this command so that they will meet the following conditions.

ESC p m n1 n2



$$\frac{\text{ON time}}{\text{ON time} + \text{OFF time}} \leq 0.2 \quad (\text{Formula E-1})$$

or $\text{OFF time} \geq \text{ON time} \times 4$ (Formula E-2)

When the drawer is driven in accordance with the conditions above, the signal waveform of the drive signal is as shown in Figure E-1.

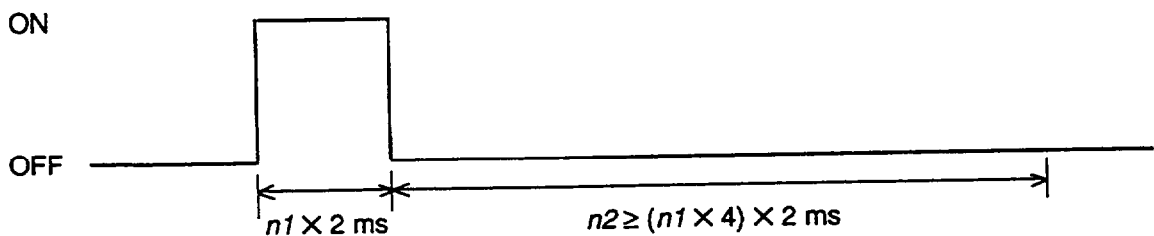


Figure E-1. Drawer Drive Signal Waveform

Because ON time differs depending on the drawer used, set the ON time according to the drawer specifications. However, drawers which do not meet formulas E-1 and E-2 cannot be used.

3) Notes on using the drawers that do not satisfy the conditions described in 2)

When the values of $n1$ and $n2$ are determined according to the conditions described in 2), the setting value range of $n1$ is 0 to 255 and the $n1$ value range inevitably becomes $0 \leq n1 \leq 63$, and the maximum ON time is 126 ms.

If the drawer needs more than 126 ms ON time, set the ON time and OFF time so that they can satisfy Formula E-3.

$$\frac{\text{ON time}}{\text{ON time} + (\text{OFF time} + a)} \leq 0.2 \quad (\text{Formula E-3})$$

a: other sequence processing time

NOTE: a means the drawer driving prohibited period from the end of OFF time to the start of ON.

The following shows an example program used when the drawer connected to the drawer drive signal 1 is driven using an ON time of 200 ms.

```

PRINT #1, CHR$ (&H1B); "P"; CHR$ (0); CHR$ (100) CHR$ (250);
GOSUB * WAIT300MS
*WAIT300MS
  300 [ms] wait routine ] (* NOTE)
RETURN

```

ON time 200 ms OFF time 500 ms

NOTE: This part is indicated in Formula E-3. Set this value so that it can satisfy Formula E-3 (or provides an internal processing time at least as long as the wait routine time.)

When the drawer is driven according to the conditions above, the drive waveform is as shown in Figure E-2.

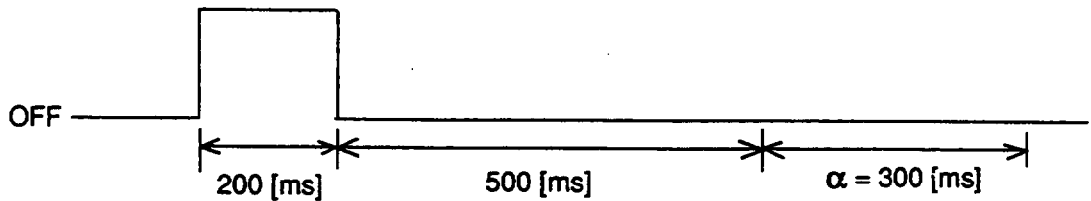


Figure E-2. Example Drawer Drive Signal Waveform

APPENDIX F Character Code Tables

■ Page 0 (International character set: when U.S.A. is selected.)

HEX	HEX BIN	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX	BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	0	16	SP	0	@	P	`	p	Ç	É	á	·	L	⋈	α	≡
1	0001	1	17	NON	1	A	Q	a	q	ü	æ	í	¶	⋈	τ	β	±
2	0010	2	18	"	2	B	R	b	r	é	Æ	ó	■	τ	π	Γ	≥
3	0011	3	19	KOFF	3	C	S	c	s	â	ô	ú	|	†	⋈	π	≤
4	0100	4	20	\$	4	D	T	d	t	â	ö	ñ	†	-	⋈	Σ	∫
5	0101	5	21	ENQ	5	E	U	e	u	à	ò	ñ	†	†	⋈	σ	∫
6	0110	6	22	&	6	F	V	f	v	â	û	ä	†	†	⋈	μ	÷
7	0111	7	23	'	7	G	W	g	w	ç	ù	ö	π	†	†	τ	≈
8	1000	8	24	(	8	H	X	h	x	ê	ÿ	¿	†	⋈	†	Φ	°
9	1001	9	25	)	9	I	Y	i	y	ë	ÿ	˘	†	†	†	θ	•
A	1010	10	26	*	:	J	Z	j	z	è	Ü	˘	||	⋈	†	Ω	·
B	1011	11	27	ESC	;	K	[	k	{	ï	ϕ	‡	†	†	■	δ	√
C	1100	12	28	,	<	L	\	l	|	î	£	‡	⋈	⋈	■	∞	∞
D	1101	13	29	-	=	M	]	m	}	ï	¥	ı	⋈	=	■	∅	²
E	1110	14	30	·	>	N	^	n	~	Ä	Ŕ	«	†	†	■	€	■
F	1111	15	31	/	?	O	_	o	SP	Å	ŕ	»	†	†	■	∞	SP

	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX	BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			SP	0	@	P		p	訂	計	SP	一	夕	ミ	払	売
1	0001		XON	!	1	A	Q	a	q			°	ア	チ	ム		
2	0010			"	2	B	R	b	r	正	小	「	イ	ツ	メ	掛	取
3	0011		XOFF	#	3	C	S	c	s			」	ウ	テ	モ		
4	0100			\$	4	D	T	d	t	品	金	、	エ	ト	ヤ	入	係
5	0101	ENQ		%	5	E	U	e	u			・	オ	ナ	ユ		
6	0110			&	6	F	V	f	v	円	現	ヲ	カ	ニ	ヨ	貸	未
7	0111			'	7	G	W	g	w			ア	キ	ヌ	ラ		
8	1000			(	8	H	X	h	x	種	釣	イ	ク	ネ	リ	出	消
9	1001			)	9	I	Y	i	y			ウ	ケ	ノ	ル		
A	1010	LF		*	:	J	Z	j	z	担	預	エ	コ	ハ	レ	支	費
B	1011		ESC	+	;	K	[	k	{			オ	サ	ヒ	ロ		
C	1100	FF		,	<	L	\	l	|	当	税	ヤ	シ	フ	ワ	単	年
D	1101	CR	GS	-	=	M	]	m	}			ユ	ス	ヘ	ン		
E	1110		RS	·	>	N	^	n	~	合	引	ヨ	セ	ホ	、	返	月
F	1111			/	?	O	-	o	SP			ツ	ソ	マ	°		

	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HEX	BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	0	16	SP	0	@	P	`	p	日	会	水	受	点	課	買	非
1	0001	1	KON 17	!	1	A	Q	a	q								
2	0010	2	18	"	2	B	R	b	r	扱	客	木	前	中	証	号	承
3	0011	3	KOFF 1	#	3	C	S	c	s								
4	0100	4	20	\$	4	D	T	d	t	外	券	土	残	内	組	有	送
5	0101	5	ENQ 21	%	5	E	U	e	u								
6	0110	6	22	&	6	F	V	f	v	額	回	振	止	部	店	期	一
7	0111	7	23	'	7	G	W	g	w								
8	1000	8	24	(	8	H	X	h	x	割	在	数	純	別	認	限	棄
9	1001	9	25	)	9	I	Y	i	y								
A	1010	10	LF 26	*	:	J	Z	j	z	檢	算	精	替	戻	廃	頭	累
B	1011	11	ESC 27	+	;	K	[	k	{								
C	1100	12	FF 28	,	<	L	\	l	|	高	上	銭	代	門	両	差	違
D	1101	13	CR 29	-	=	M	]	m	}								
E	1110	14	RS 30	.	>	N	^	n	~	価	火	総	値	料	効	括	番
F	1111	15	31	/	?	O	_	o	SP								

	HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F															
HEX	BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111															
0	0000	0	16	SP	32	0	48	@	64	P	80	96	p	112	名	128	次	144	SP	160	一	176	た	192	み	208	SP	224	SP	240		
1	0001		XON	17	!	33	1	49	A	65	Q	81	a	97	q	113		129		145	°	161	あ	177	ち	193	む	209	SP	225	SP	241
2	0010			18	"	34	2	50	B	66	R	82	b	98	r	114	個	130	不	146	「	162	い	178	つ	194	め	210	SP	226	SP	242
3	0011		XOFF	1	#	35	3	51	C	67	S	83	c	99	s	115		131		147	」	163	う	179	て	195	も	211	SP	227	SP	243
4	0100			20	\$	36	4	52	D	68	T	84	d	100	t	116	領	132	枚	148	、	164	え	180	と	196	や	212	SP	228	SP	244
5	0101		BNQ		%	37	5	53	E	69	U	85	e	101	u	117		133		149	・	165	お	181	な	197	ゆ	213	SP	229	SP	245
6	0110			22	&	38	6	54	F	70	V	86	f	102	v	118	収	134	誤	150	を	166	か	182	に	198	よ	214	SP	230	SP	246
7	0111			23	'	39	7	55	G	71	W	87	g	103	w	119		135		151	あ	167	き	183	ぬ	199	ら	215	SP	231	SP	247
8	1000			24	(	40	8	56	H	72	X	88	h	104	x	120	予	136	休	152	い	168	く	184	め	200	り	216	SP	232	SP	248
9	1001			25	)	41	9	57	I	73	Y	89	i	105	y	121		137		153	う	169	け	185	の	201	る	217	SP	233	SP	249
A	1010		LF		*	42	:	58	J	74	Z	90	j	106	z	122	約	138	契	154	え	170	こ	186	は	202	れ	218	SP	234	SP	250
B	1011		ESC		+	43	;	59	K	75	[	91	k	107	{	123		139		155	お	171	さ	187	ひ	203	ろ	219	SP	235	SP	251
C	1100		FF		,	44	<	60	L	76	\	92	l	108	|	124	込	140	開	156	や	172	し	188	ふ	204	わ	220	SP	236	SP	252
D	1101		CR		GS	45	=	61	M	77	]	93	m	109	}	125		141		157	ゆ	173	す	189	へ	205	ん	221	SP	237	SP	253
E	1110		RS		·	46	>	62	N	78	^	94	n	110	~	126	明	142	閉	158	よ	174	せ	190	ほ	206	ゝ	222	SP	238	SP	254
F	1111			31	/	47	?	63	O	79	_	95	o	111	SP	127		143		159	つ	175	そ	191	ま	207	°	223	SP	239	SP	255

■ International character set

		ASCII code (hexadecimal)											
	Country	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U.S.A.	#	\$	@	[	/	]	^	`	{	|	}	~
1	France	#	\$	à	°	ç	š	^	`	è	ù	è	·
2	Germany	#	\$	š	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	U.K.	#	\$	@	[	/	]	^	`	{	|	}	~
4	Denmark I	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Û	é	ä	ö	å	ü
6	Italy	#	\$	@	°	/	é	^	ù	à	ò	è	ì
7	Spain	¤	\$	@	;	Ñ	í	^	`	::	ñ	í	~
8	Japan	#	\$	@	[	¥	]	^	`	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Û	é	æ	ø	å	ü
10	Denmark II	#	\$	É	Æ	Ø	Å	Û	é	æ	ø	å	ü

APPENDIX G Command Summary

Command	Name	Reference Page
LF	Print and line feed	38
FF	Print and eject cut sheet	39
CR	Print and carriage return	39
RS	Journal tab	39
ESC SP <i>n</i>	Set character right-side spacing	40
ESC!n	Set print mode	40
ESC * m <i>n1 n2</i> [d]	Set bit image mode	41
ESC 2	Set 1/6 inch line spacing	42
ESC 3 <i>n</i>	Set line spacing using minimum units	42
ESC <	Return home	43
ESC @	Initialize printer	43
ESC C <i>n</i>	Set cut sheet eject length	43
ESC J <i>n</i>	Print and feed paper using minimum units	44
ESC K <i>n</i>	Print and reverse feed. using minimum units	44
ESC R <i>n</i>	Select international character set	45
ESC U <i>n</i>	Set/cancel uni-directional printing	45
ESC c 0 <i>n</i>	Select print sheet(s)	46
ESC c 1 <i>n</i>	Select sheet(s) for setting the line spacing	46
ESC c 3 <i>n</i>	Select paper detectors to output signals	47
ESC c 4 <i>n</i>	Select paper detectors to stop printing	46
ESC c 5 <i>n</i>	Enable/disable panel switches	49
ESC c 6 <i>n</i>	Enable/disable ON-LINE switch	50
ESC d <i>n</i>	Print and feed paper <i>n</i> lines	50
ESC e <i>n</i>	Print and reverse feed <i>n</i> lines	50
ESC f <i>m n</i>	Set cut sheet waiting time	51
ESC i	Execute full cut	52
ESC m	Execute partial cut	52
ESC o	Stamp	52

Command	Name	Reference Page
ESC p m n1 n2	Generate pulse	52
ESC t n	Select character code table	53
ESC u	Transmit peripheral device status	53
ESC v	Transmit printer status	54
ESC z n	Set/cancel parallel printing for receipt/journal	55
ESC { n	Set/cancel upside-down character printing	56
GS ENQ	Status enquiry	56