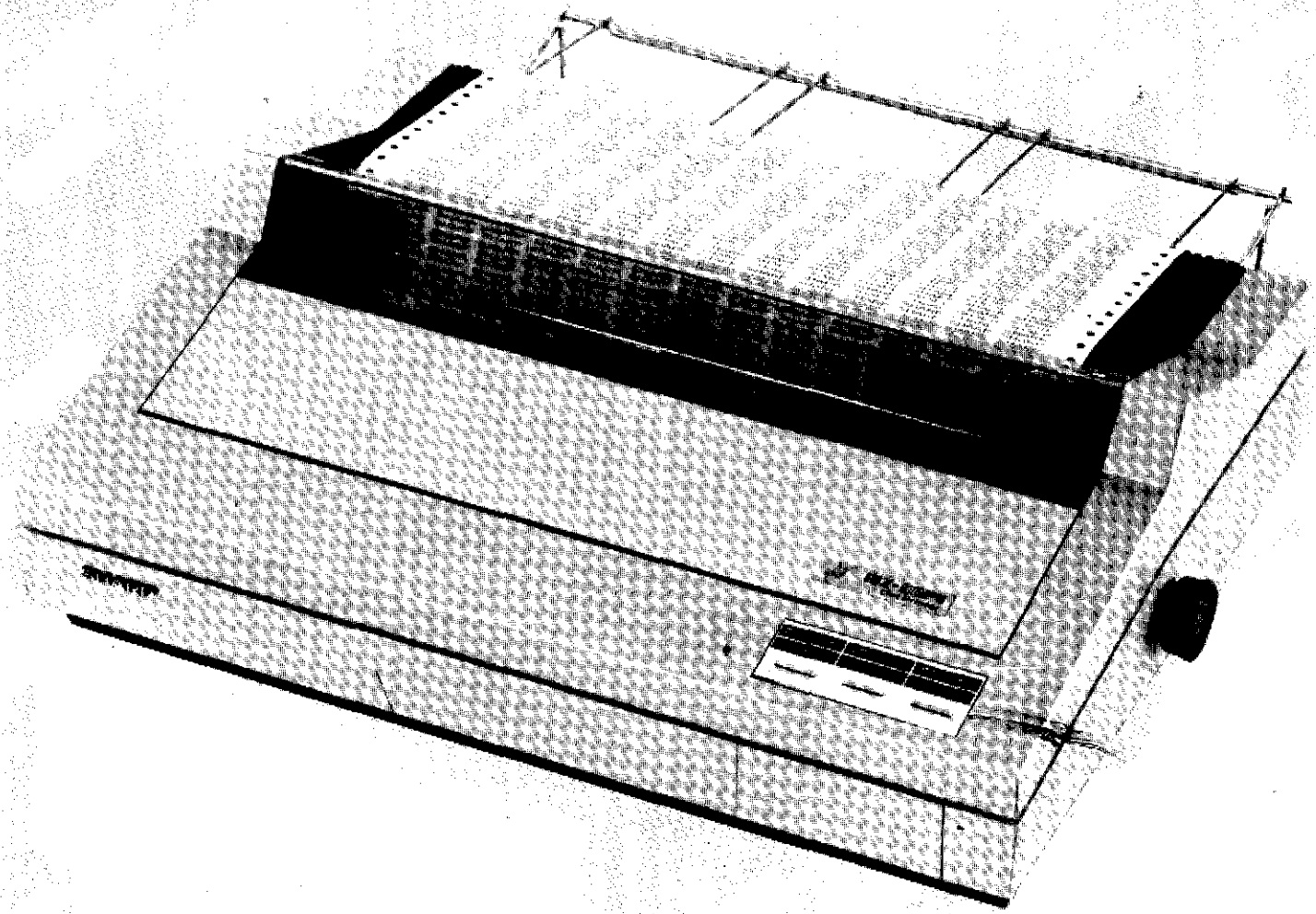


SHARP

DOT PRINTER

MZ-80P4

INSTRUCTION MANUAL





Note for Users in UK
IMPORTANT

The wires in the mains lead of this apparatus are coloured in accordance with the following code:

BLUE:	Neutral
BROWN:	Live

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- * The wire which is coloured **BLUE** must be connected to the terminal which is marked with the letter **N** or coloured **BLACK**.
- * The wire which is coloured **BROWN** must be connected to the terminal which is marked with the letter **L** or coloured **RED**.

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Outline

This is a lightweight, high-performance dot printer, capable of printing a maximum of 160 characters on one line at a printing speed of 150 characters/sec. max. The two-way shortest-distance method is adopted to increase its processing capacity. Fan-fold paper having a width of 5 to 15 inches, or paper sheets (letter pad, etc.) can be used for printing with this machine.

The control programs and print character data are made into several ROM units. The user can easily exchange these ROM units, which can be utilized as terminal printers for corresponding systems.

Certain ROM units must be selected, depending on what computer this machine is connected to. If the machine is to be connected to Sharp Computer Series MZ80, different signal cables, I/O cards, etc. are required for different models.

ROM unit	Computer connected	Expansion unit	Signal cable	I/O card
MZ-8BP4R	MZ-80B	MZ-80EU	MZ-8BP4C	MZ-8PB5I
MZ-8AP4R	MZ-80A	MZ-80AEU	MZ-8BP4C	MZ-8BP5I
MZ-8KP4R	MZ-80K	MZ-80I/O	MZ-8KP4C	MZ-8KP4I
MZ-8SP4R	—	—	—	—

(Notes)

1. When MZ-8BP4R, MZ-8AP4R or MZ-8KP4R is connected to the above-mentioned system, the machine is actuated by the control of the Sharp original software for the computer.
2. When MZ-8SP4R is mounted on this machine, this machine can be used as a terminal printer with 8-bit parallel interface specification in accordance with the Centronics System.

Cautions for operation

■ Installation

- Do not install this machine in the following places.
 - Humid place, excessively dry place
 - Place exposed directly to sunlight
 - Dusty place
 - Extremely hot/cold place
 - Place with a lot of vibration
- Install this machine as horizontally as possible.
- Do not install this machine near equipment generating noise. Further, different power source must be used for such equipment, since wrong operation may be caused if the same power source is employed.
- Voltage of power source used for this machine must conform to the specification on the rating plate on the back of the machine. Do not connect other power source, or else trouble may be caused.
- Connect/disconnect the ROM unit when power is turned off.

■ Cautions during operation

- Do not touch the printing head during operation.
- If water or other liquid or metallic articles such as needles and pins should enter this machine, turn off power immediately, unplug the power cord, and contact the dealer. If the machine is operated under such a condition, accident may be caused.
- Do not print characters when printing paper or cartridge ribbon is not inserted. Otherwise, the printing head may be damaged.
- Proper paper feeding function must be selected for specific paper used for printing.
 - Fan fold paper Tractor system
 - Paper sheets Friction systemThe simultaneous use of the two systems will cause clogging of paper. When fan fold paper is used, pull the paper release lever backwards to carry out tractor feed. (See page 7)

■ Power cord

- Do not damage the power cord by placing it under a desk or chair, or by compressing it between two articles.
- It is dangerous to use damaged power cord. Furthermore, be sure to hold the plug when unplugging the power cord.

■ Impact

This machine consists of high-precision electronic components. Do not cause impact to this machine, by hitting it with other articles or by dropping it.

■ When this machine is not to be operated for a long time

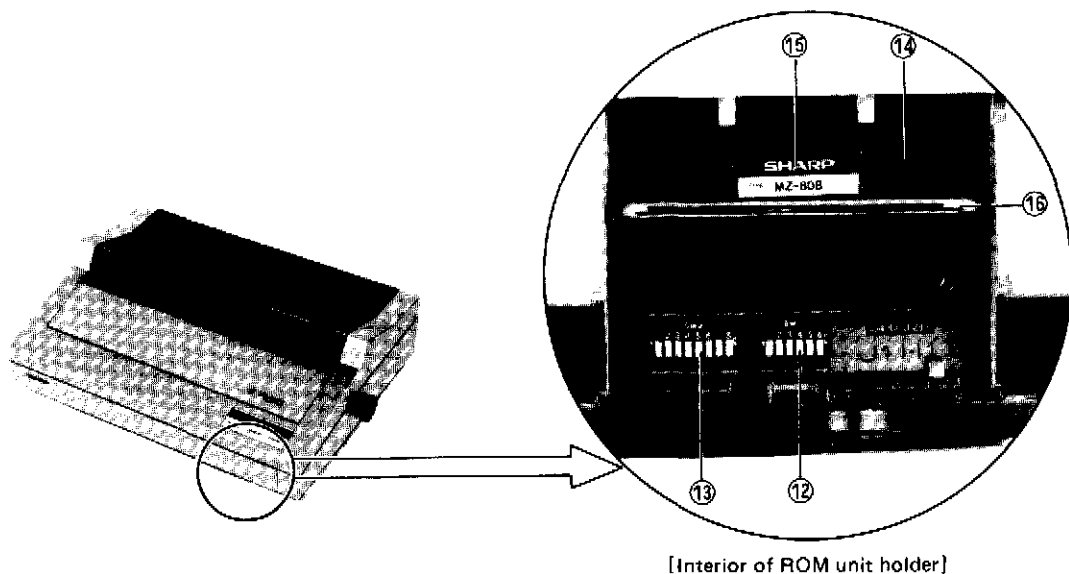
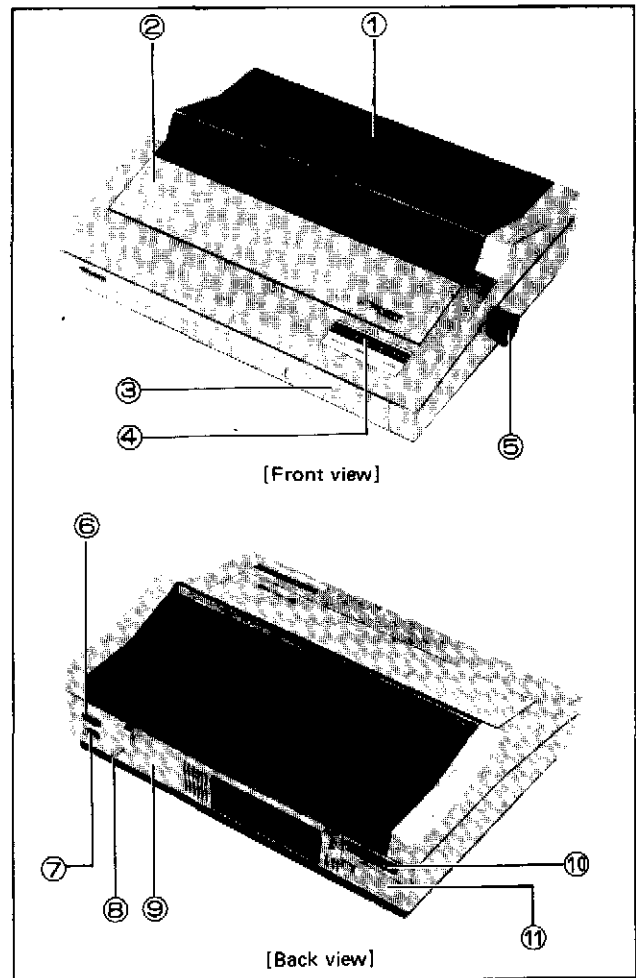
When this machine is not to be operated for a long time, be sure to unplug the power cord from the outlet.

■ Stain

Wipe off stain on this machine with soft cloth impregnated with water or detergent. The use of benzine, thinner, or other volatile substance, or insecticide will cause discoloration of the case.

Names of parts of the main body

- ① Rear cover
- ② Front cover
- ③ ROM unit holder (Accommodating ROM unit)
- ④ Control panel
- ⑤ Manual feed knob
- ⑥ Power switch
- ⑦ Power socket
- ⑧ FG (Frame ground) terminal
- ⑨ Rating indication plate
- ⑩ Signal terminal
- ⑪ Cell holder
- ⑫ Function switch (SW1)
- ⑬ Function switch (SW2)
- ⑭ ROM unit (optional)
- ⑮ ROM unit model indication label
- ⑯ ROM unit arm

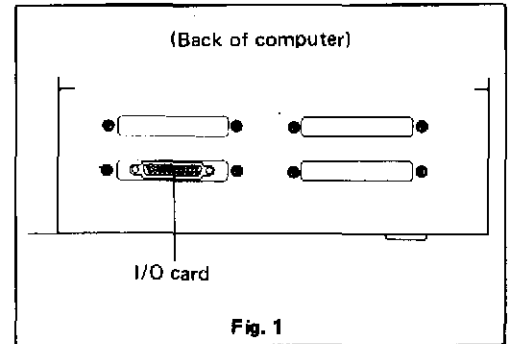


Connection with computers

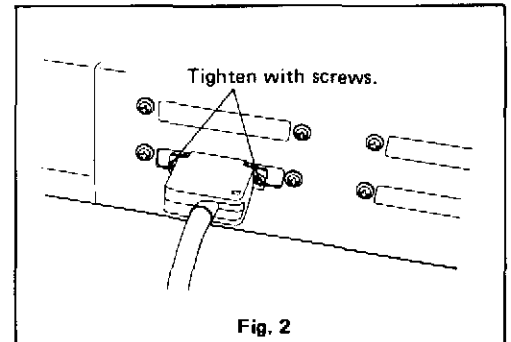
(1) Connection with computer MZ-80B/MZ-80A

STEP 1. Turn off power for all equipment.

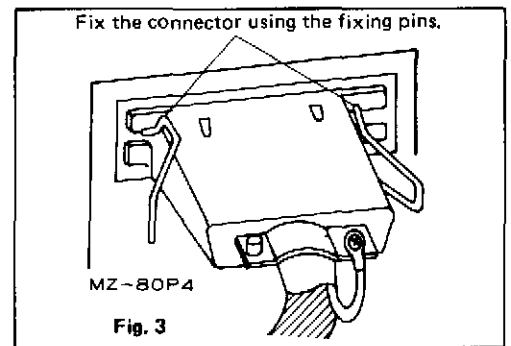
STEP 2. Install an expansion unit in the computer and insert an I/O card into this unit. Insert the card in Slit No.3 for MZ-80B (where 6 slits are available), and in Slit No.2 for MZ-80A (where 4 slits are available). The picture on the right shows correct insert of the I/O card.



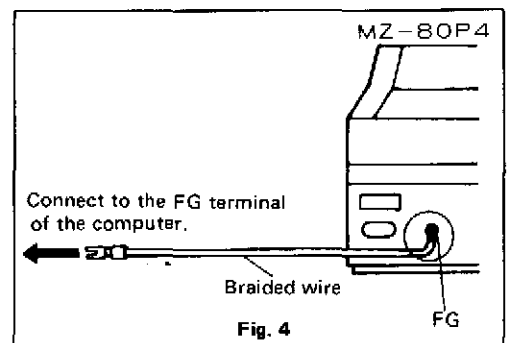
STEP 3. Connect the connector on one end of the signal cable to the signal terminal of the I/O card. Then, fix the connector with the attached screws. Since the connectors provided on both ends of the signal cable have different shapes, do not confuse them. Be sure to use the two screws for fixing the connector.



STEP 4. Connect the connector on the other end of the signal cable to the signal terminal on the back of the printer. Then fix the connector using the fixing pins on both ends of the signal terminal.



STEP 5. Connect one end of the attached braided wire to the FG terminal of the printer, and the other end to the FG terminal of the computer. Do not fail to connect the braided wire.

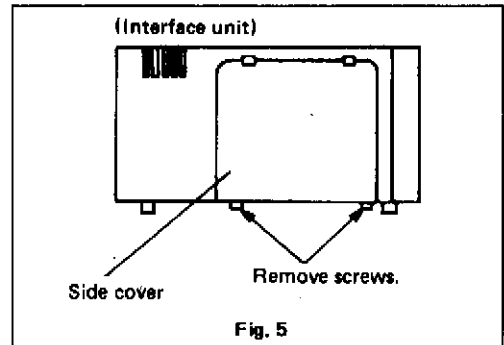


(2) Connection with computer MZ-80K

STEP 1. Turn off power for all equipment.

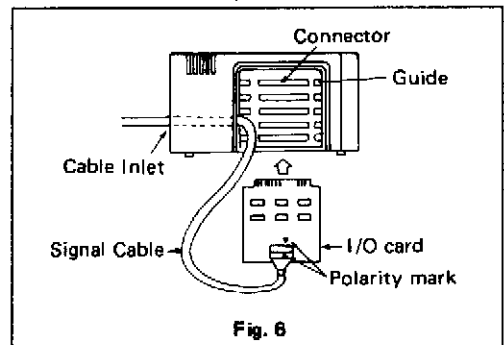
STEP 2. Connect the interface unit MZ-80I/O to MZ-80K.
(Refer to Interface Unit Instruction Manual.)

STEP 3. Remove the side cover of the interface unit.
➤ Insert an I/O card in any one of the five slots.

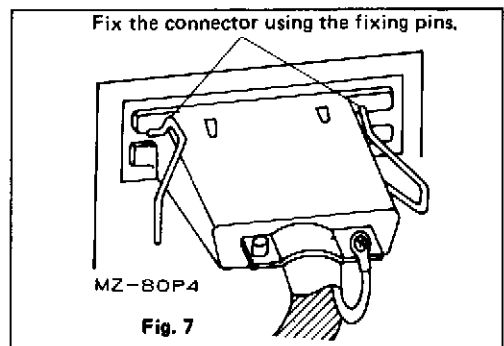


STEP 4. Connect the connector on one end of the signal cable to the signal terminal of the I/O card.
Match the polarity symbols (▼) on this occasion.

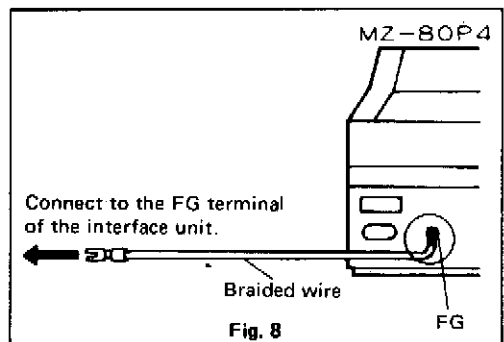
STEP 5. Put the side cover back on the interface unit.



STEP 6. Connect the connector on the other side of the signal cable to the signal terminal on the back of the printer. Fix the connector using the fixing pins provided on both ends of the signal terminal.



STEP 7. Connect one end of the attached braided wire to the FG terminal of the printer, and the other end to the FG terminal of the interface unit.
Do not fail to connect the braided wire.



Setting cartridge ribbon

For this machine, endless ink ribbon is used to simplify installation and removal. For handling the cartridge ribbon, follow the procedure described below.

How to install the cartridge ribbon

STEP 1. Open the front cover to your side.

STEP 2. Turn on power while pressing the top feed switch to shift the carriage to the prescribed position. When power is turned off, the carriage can be shifted manually. On this occasion, however, do not touch the printing head.

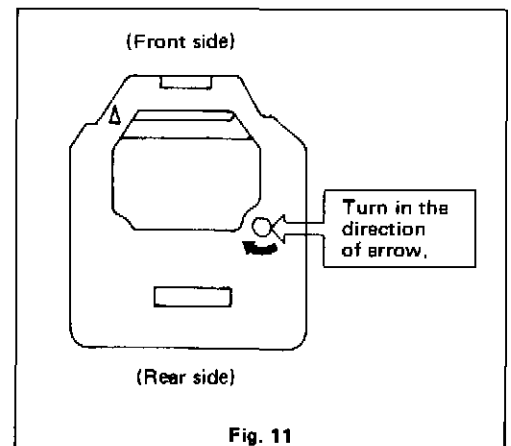
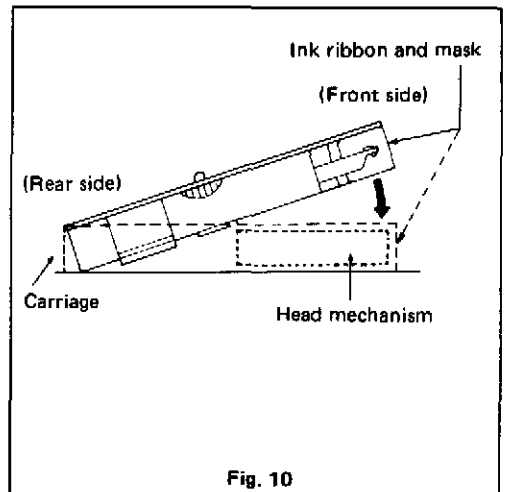
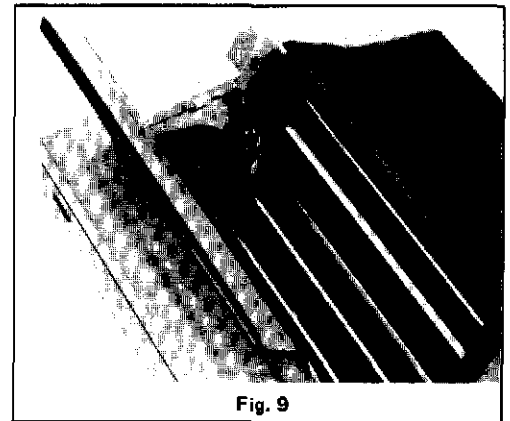
STEP 3. Install the cartridge ribbon in the carriage – the rear side first.

STEP 4. Insert the cartridge ribbon and mask in the gap between the platen and the printing head. Make sure that the cartridge is set horizontally on the carriage.

STEP 5. Turn the knob of the cartridge ribbon in the direction shown by the arrow, in order to tighten the ribbon. Finally, check the ink ribbon for twisting and crease.

(Caution)

- Incorrect positioning of the cartridge ribbon may cause wrong printing or destruction of the head.
- Replace the old cartridge ribbon with high-quality Sharp cartridge ribbon. Do not use ribbon which does not conform to the requirement or which is poor in quality. Otherwise, trouble may be caused.



Setting paper

Fan fold paper or paper sheets whose width is 5 to 15 in. can be used for this machine.

■ Specification for paper

Item		Paper	Fan fold paper (Tractor feed system)	Paper sheets (Friction feed system)
Paper width			5 in. ~ 15 in.	5 in. ~ 15 in.
Number of copies			Original + 2 copies	1 part only (Copying not allowed)
Paper thickness (Note)	Total thickness		0.23mm max.	—
	1 part		45kg ~ 60kg	45kg ~ 60kg
	Copy paper	Original		35kg ~ 45kg
Copy			35kg ~ 45kg	—

(Notes)

- Weight (thickness) of paper in kg indicates the weight of 1000 sheets of A0-type paper.
- Do not print characters outside the paper, or the head may be damaged.

■ Setting the assistant guide

In order to make the flow of printing paper smooth, install the attached assistant guide.

Insert the tip of the assistant guide into the holes on the right and left sides of the back paper feeding mechanism section.

- On this occasion, connect the lead wire from the assistant guide to the FG terminal of the main body. Thus, wrong operation of the equipment caused by static electricity generated during paper feed can be avoided. Install it correctly as shown in Fig. 12.

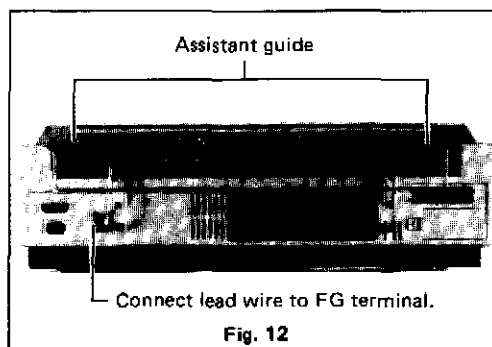


Fig. 12

■ Setting paper

Fan fold paper

STEP 1. Pull the front cover to your side, and turn the paper release lever to your side.

STEP 2. Pass the paper from the back of the assistant guide as shown in Fig. 14. Insert the end of the paper beneath the platen, pull the manual feed knob, and turn the knob until the end of the paper comes out of the printer by about 10 cm.

STEP 3. Turn the paper release lever backwards, and insert the sprocket pin in the feeding hole of the printing paper. Confirm that the printing paper is set to the sprocket pin in parallel. At this time, release the sprocket lock lever by pulling it to your side to adjust the tension and position of the printing paper. After that, set the sprocket lock lever back to the original position.

STEP 4. Put the printer cover back, and finish setting the printing paper.



Fig. 13

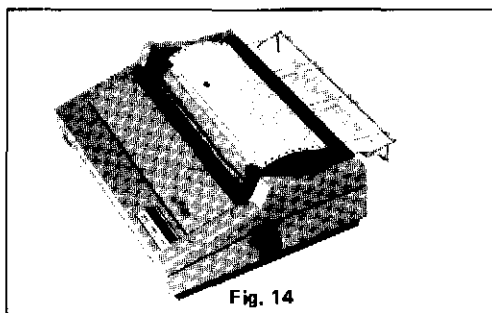
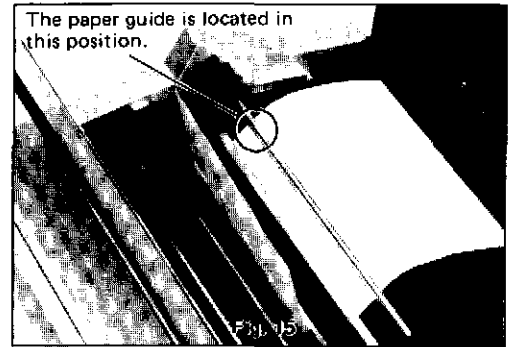


Fig. 14

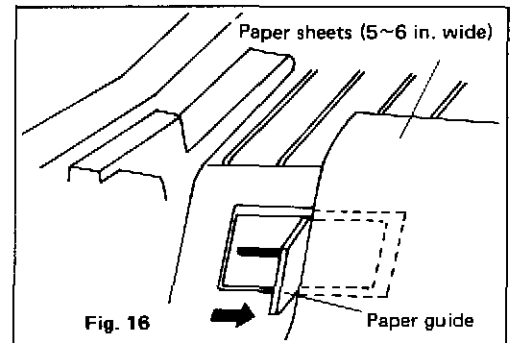
Paper sheets

- Open the front and rear covers, and pull the paper release lever to your side.
- Insert the paper from the paper guide provided on the back of the printer mechanism section. While pulling the manual feed knob, adjust the paper so that its end is set at the desired printing position. Then, turn the paper release lever backwards, and set the paper to achieve parallelism.
- Before starting printing on paper sheets, be sure to pull the paper release lever to your side. Otherwise, paper feeding function will not be actuated, thereby causing double printing.
- Set the paper to the left edge. Otherwise, the *PE detection function will not be actuated, thereby causing breakdown of the equipment.
*means the function to detect running-out of paper.



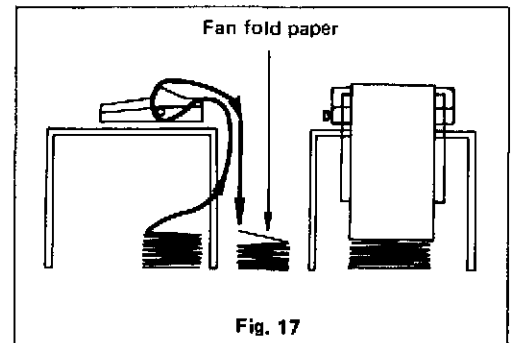
(Note)

When paper sheets with a width of 5 – 6 in. in used, slide the paper guide on the back of the printer mechanism section to its rightmost position, and set the printing paper along this paper guide. Otherwise, correct feeding will be hampered, resulting in deviated printing. Be careful to avoid printing outside the printing paper. Normally, the paper guide is set at its leftmost position.



■ Setting printing paper

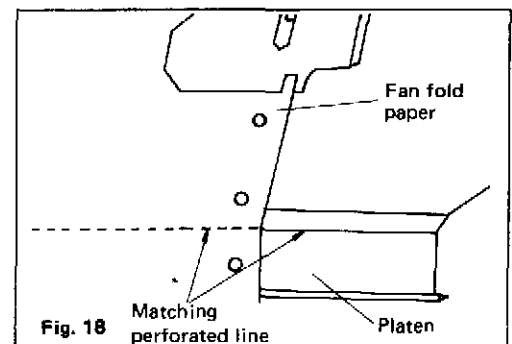
The top surface of the fan fold paper shall be set in a position lower than the surface of the assistant guide. (Fig. 17)
The printing paper must be set parallel to both printer and printing section. Otherwise, accurate feeding is hampered, thereby causing trouble due to clogging of paper.



■ Setting form position of printing paper

The top printing line on each page of the fan fold paper can be roughly determined by matching the perforated line of the fan fold paper with the platen as shown on the right.

This is regarded as the form position of each page, when power is turned on while the paper is set in this position.
For memory backup of form position, refer to page 14.



Mounting/Dismounting ROM unit

When installing the ROM unit in this machine or replacing it, follow the procedure described below. Since the ROM unit is susceptible to electric shock, such as static electricity, adequate precautions must be taken in handling or storing it.

■ Installation of ROM unit

- STEP 1.** Turn off power for this machine, and remove the ROM unit holder cover.
- STEP 2.** While keeping the model indication label of the ROM unit facing upwards, set the ROM unit to the connector in the holder part. Then insert the unit by applying uniform force to both sides of this unit.
- STEP 3.** Confirm that the ROM unit is inserted correctly, and put the ROM unit holder cover back in its original position.

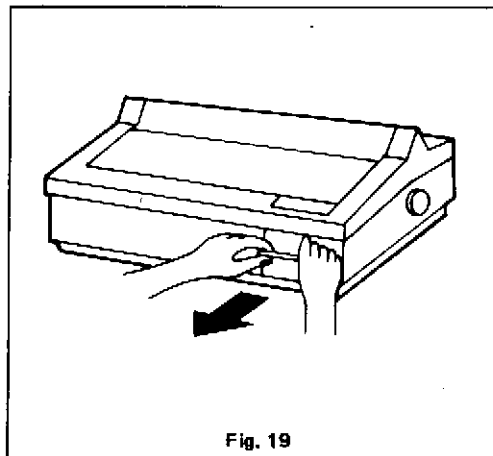


Fig. 19

■ Removal of ROM unit

- STEP 1.** Be sure to turn off power for the main body.
- STEP 2.** Pull the ROM unit from the ROM unit holder by holding the arm.
- STEP 3.** The removed ROM unit must be stored in an electrically conductive bag so as to protect it from breakdown caused by static electricity, etc. Since optional ROM units are packaged in conductive bags, use these bags for storage.

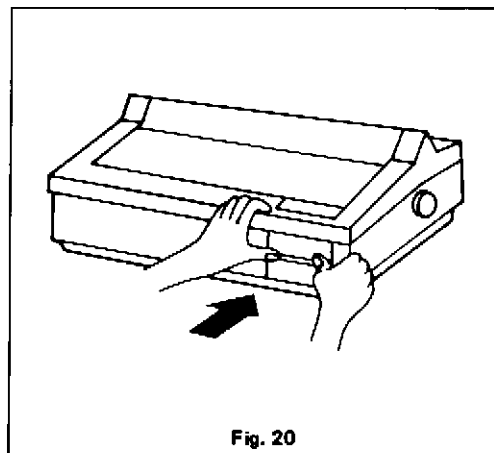


Fig. 20

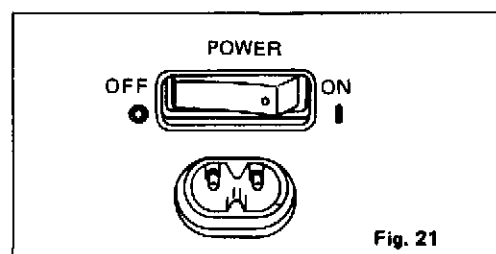
(Caution)

- When a ROM unit is replaced or newly installed, renew the setting of the function switches. (See page 11)
- When memory backup function is actuated, set the position of the top printing line again. (See page 14)
- Incorrect connection of the ROM unit will hamper normal operation and may cause trouble. Utmost care must be taken since, in the worst case, the ROM unit may be broken.

Operation switches and checking function

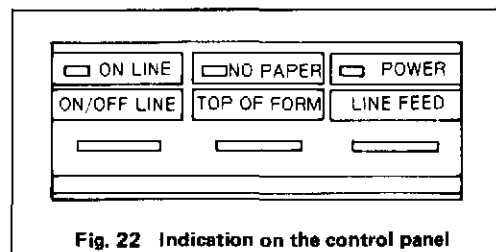
■ Power switch

The power switch is indicated by "POWER" on the rear side of this machine. Press this switch towards the "ON" side ("I") in order to turn on power..



■ Operation switches

On the control panel on the front side of this machine, there are 3 switches and 3 indicators.



Switches

Indication	Function
TOP OF FORM	Feeds paper to the designated form feed position. (See Note 1)
LINE FEED	Changes lines. When this switch is pressed once, feed operation for only one line will be carried out. (See Note 1)
ON/OFF LINE	<ul style="list-style-type: none"> ● Selects ON-LINE or OFF-LINE. ● Every time this switch is pressed, ON-LINE or OFF-LINE is selected alternately. ● No operation will be caused when the carriage is operated or during line feed.

Indicators

Indication	Function
POWER	Lights when power is turned ON. (Red light)
ON LINE	Lights when ON-LINE is selected. (Green light)
NO PAPER	Lights when there is no printing paper left. (See Note 2) (Green light)

(Note 1) This switch cannot be operated when the printer is ON-LINE.

(Note 2) When the PE detecting function is neglected by the use of software, printing can be continued even if the NO PAPER indicator is lit. For normal operation, actuate the PE safety function, in order to prevent breakdown.

■ Self-diagnosis function (incremental printing)

When power is turned on while the line feed switch is pressed, the self-diagnosis routine will be actuated to print all characters sequentially. If it is desired to stop this function, turn off power. When self-diagnosis function is utilized, use paper with a width of 15 in. Otherwise, printing will be made outside the paper, causing breakdown of the head.

■ Override function

When the ON/OFF LINE switch is pressed in PE condition, SELECT condition will emerge, canceling PE and reading data for one line. After printing, OFF-LINE will be selected again. This function can be effectively utilized when paper sheets are used, provided that ROM unit MZ-8BP4R or MZ-8SR4R is employed.

Function switches

■ Position of function switches

When the ROM unit holder cover is removed from this machine, two multiple-switches are found on the lower side of the ROM unit. These are called "function switches". Before operating the printer, set these function switches following the procedure described below.

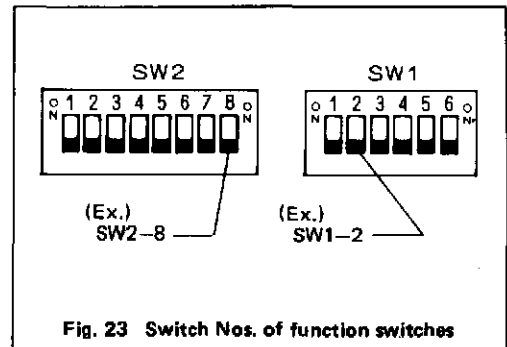


Fig. 23 Switch Nos. of function switches

■ Setting the function switches

By setting the function switches, the state of the printer after turning on power can be determined. Follow the procedure described below, in operating the function switches.

1. Confirm that power is turned off while the ROM unit is connected to MZ-80P4.
2. Next, set the function switches representing the desired operations.
3. Turn on power for MZ-80P4.

(Caution) Do not operate the function switches while power is turned on. Otherwise, wrong operation or trouble may be caused.

■ Functions of function switch SW1

The switch SW1 has common functions for any ROM unit.

Switch No.	Function	ON	OFF
SW1-1	Designates the size of one page (See Note 1)	66 lines/page	72 lines/page
SW1-2	Designates the distance between lines (See Note 2)	Distance: 1/6 in.	Distance: 1/3 in.
SW1-3	Selects 0 print indication	"0" indication	"Ø" indicator
SW1-4	Processes ON-LINE/ OFF-LINE after power is turned on	ON-LINE ("Select" condition emerges, and the green light goes ON.)	OFF-LINE (The green light goes OFF.)
SW1-5	Selects printing system	136 characters/line mode (Pica pitch)	160 characters/line mode
SW1-6	Memory backup function	<ul style="list-style-type: none"> ● Memory backup function is actuated by cell. (Note 4) 	<ul style="list-style-type: none"> ● Memory backup is not carried out. ● The position selected when power is turned on is regarded as form position.

(Note 1) Setting can be changed by the use of software.

(Note 2) Priority is given to the designation by the switch in regard to changing lines. For example, compression by control code will be 2/9 inch when the distance between lines is set at 1/3 inch.

(Note 3) In the 136-character mode, the space dot between characters is expanded to 2 dots.

(Note 4) If there is not electricity in the cell when this switch is turned ON, the position selected when power is turned on will not become form position.

■ Functions of function switch SW2

The functions of switch SW2 vary, depending on ROM units used in this machine. Set the switch, after carefully confirming the following.

When ROM unit MZ-8BP4R is used

Switch No.	Function	ON	OFF
SW2-1	Selects operation when the buffer is full.	Starts printing operation, and does not carry out line feed upon completion of printing.	Starts printing operation, and carries out line feed upon completion of printing.
SW2-2	Sets NL (new line) function.	If carriage return code (ODH) is received, line feed is not carried out upon completion of printing.	If carriage return code (ODH) is received, line feed is carried out upon completion printing.
SW2-3	Processing of DC1/DC3 code.	Receives and processes device control "DC1" code and "DC3" code.	Ignores device control "DC1" and "DC3" codes.
SW2-8	Automatic WAIT function (Refer to Note 1)	Automatic WAIT is effected, depending on the number of fonts in one line.	Stops automatic WAIT function. (Refer to Note 2)

When ROM unit MZ-8KP4R or MZ-8AP4R is used

Switch No.	Function	ON	OFF
SW2-1	Selects operation when the buffer is full.	Starts printing operation, and does not carry out line feed upon completion of printing.	Starts printing operation, and carries out line feed upon completion of printing.
SW2-2	Processing of paper detecting function signal (PE)	Receives paper detector signal as effective.	Ignores paper detector signal. (Refer to Note 2)
SW2-8	Automatic WAIT function (Refer to Note 1)	Automatic WAIT is effected, depending on the number of fonts in one line.	Stops automatic WAIT function. (Refer to Note 2)

When ROM unit MZ-8SP4R is used

Switch No.	Function	ON	OFF
SW2-1	Selects operation when the buffer is full.	Starts printing operation, and does not carry out line feed upon completion of printing.	Starts printing operation, and carries out line feed upon completion of printing.
SW2-2	Setting of NL function.	Carriage return code only designates printing, but does not carry out line feed upon completion of printing.	Carriage return code (ODH) carries out line feed completion of printing.
SW2-3	Processing of DC1/DC3	Receives device control DC1 and DC3 codes.	Does not receive device control DC1 or DC3 code.
SW2-4	Selection of character specification	ASCII standard character specification.	International character specification (Set by SW2-5 through SW2-7).
SW2-5 SW2-6 SW2-7	Selection of nation-wise specification of international character	<ul style="list-style-type: none"> ● Refer to a separate table. ● SW2-4 must be kept "OFF". 	
SW2-8	Automatic WAIT function (Refer to Note 1)	Automatic WAIT is effected, depending on the number of fonts in one line.	Stops automatic WAIT function. (Refer to Note 2)

Languagewise international character setting

For differences in languagewise international characters, refer to the Character Code Table on page 45.

Language	SW2-4	SW2-5	SW2-6	SW2-7
(ASCII standard)	ON	—	—	—
French	OFF	OFF	ON	ON
German	OFF	ON	OFF	ON
Danish	OFF	OFF	OFF	ON
Swedish	OFF	ON	ON	OFF
Italian	OFF	OFF	ON	OFF
Spanish	OFF	ON	OFF	OFF

(Note 1) Automatic WAIT

When automatic WAIT function is effected, the dot duty calculating routine is actuated to automatically creat lag time when the capacity of the head is exceeded.

When stopping the automatic WAIT function, pay attention to what is printed. Do not use image print or quasi-graphic pattern when the automatic WAIT function is stopped. Further, avoid printing the same character continuously. Especially, limit the number of fonts per minute to less than 70,000 dots.

(Note 2)

Not applicable to incremental printing.

Memory backup function

This machine is capable of memory backup by cells. (Cells are sold separately, though.) When the memory backup function is effected, form position will not be affected by turning on/off of power. Thus, handling of fan-fold paper can be simplified. This function can be stopped by operating pertinent function switch inside the machine.

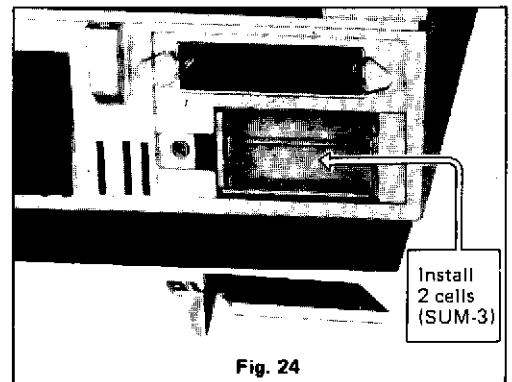


Fig. 24

■ How to set form position

- STEP 1.** Confirm that power source for the printer is turned OFF when the ROM unit is connected.
- STEP 2.** Insert 2 dry cells (SUM-3) into the cell case provided inside the main body. For details of the cells, read the cautions given below.
- STEP 3.** Turn the function switch (SW1-6) ON, then supply power to the printer.
- STEP 4.** Press the form feed switch. After form feed, pull the manual feed knob to determine the form position of paper. (See page 8)

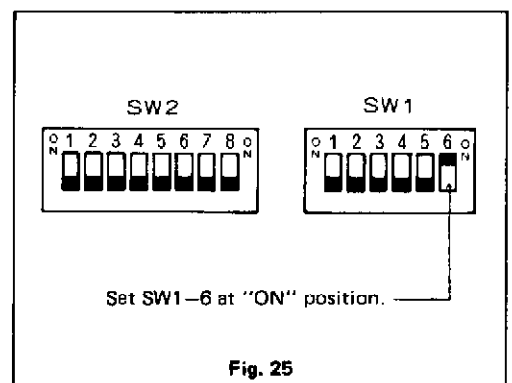


Fig. 25

(Caution)

- When PE condition emerges, set the paper in accordance with the above-mentioned procedure again.
- When the memory backup function is to be utilized, do not turn the manual feed knob. Otherwise, form position may be deviated.
- Wrong use of dry cells will cause leakage or breakdown. Keep the following in mind when using them.
 1. Set the cells with their plus (+) and minus (-) sides correctly positioned as indicated on this machine.
 2. Do not mix new and old dry cells for use.
 3. Do not use different kinds of dry cells. They may differ in voltage, even if their shapes are the same.
 4. Remove dry cells from this machine, if they are not to be used over a long period of time.
 5. There are charging-type and non-charging-type cells. Read the cautions written on them, before using these cells.
- Do not turn off power when the following operation is carried out during memory backup. Otherwise, form position may be deviated.
 - Line feed
 - Form feed operation
- If ROM units are exchanged during memory backup, readjust form position of paper.
- Replace old cells with new ones every year, although the life of cell differs depending on internal discharge and frequency of use. (Trouble may occur to some cells, due to corrosion, etc.)

Printer control codes

The printer control differs, depending on the kinds of ROM units used in this machine.

■ When ROM unit MZ-8BP4R is used

(MZ-8BP4R)

Control code	Function
(0DH)	<ul style="list-style-type: none"> ● When CR code is input, data inside the buffer is printed. ● When there is not data before CR code is received, the carriage does not shift. ● When the internal function switch is turned OFF, line feed is carried out. (Refer to the function of SW2-2.)
(0AH)	<ul style="list-style-type: none"> ● Line feed code. ● This code is used both as line change instruction and printing instruction.
(0BH)	<ul style="list-style-type: none"> ● Vertical tabulation (VT) ● This is a multiple-line feed code. Operation is carried out in accordance with the tabulation previously set in RAM. ● Printing instruction code. When this VT code is received, stored data will be printed, and after that, automatic feeding will be carried out to the line previously set by tabulation. ● Tabulation in excess of the set page length will be ignored, and the same operation as by (0AH) code will be carried out.
(0CH)	<ul style="list-style-type: none"> ● Form feed ● This is a multiple-line feed code. Automatic feeding is carried out to the form feed position set in the memory. ● This is also used as printing instruction. ● If the buffer already has printing data, the data will be printed first before automatic feeding is started.
(09H)	<ul style="list-style-type: none"> ● Horizontal tabulation ● When this code is received, data for tabulation set in RAM will be reorganized, for storage in the buffer. ● Excess over the maximum number of characters designated by (1B)+(19H)+(HEX) will be ignored. ● This is not a printing inspection.
(11H)	<ul style="list-style-type: none"> ● Device control 1 (DC1) ● This is a printer select instruction code. ● This code can be ignored by manipulating the internal function switches. ● When the data are received, the on-line indicator lights up.
(12H)	<ul style="list-style-type: none"> ● The 136-character/line mode will be selected. ● When this code is received, the carriage returns to its home position for line feed, and the 136-character/line mode will be selected.

Control code	Function
(13H)	<ul style="list-style-type: none"> ● Device control 3 (DC3) ● This is a printer deselect instruction code. ● This code is ignored when the printer is in DESELECT mode.
(14H)	<ul style="list-style-type: none"> ● Instruction to cancel enlarged characters. ● This code can be set in any place in the data code string. ● This code is ignored when the 136 character/line mode is selected.
(18H)	<ul style="list-style-type: none"> ● Cancel code ● This cancel code clears printing data before this code is received as well as SO/SI. ● This code is not applicable to image printing.
(0EH)	<ul style="list-style-type: none"> ● Shift out (SO) ● This code is enlarged character instruction, and can be inserted in any place during data receiving. ● Data after receipt of SO is effective until SI code is received. They will not be cancelled by changing lines. ● Even if SO code is received after the previous SO code is received and before SI code is received, the SO will be ignored.
(0FH)	<ul style="list-style-type: none"> ● Shift in (SI) ● When this code is received, the printer prints the data stored in the buffer, makes the carriage to return, and changes into the 160 characters/line mode. ● This code will be ignored when the 160 characters/line mode is already selected.
(1BH)	<ul style="list-style-type: none"> ● Escape code ● HEX code following this code controls various printers.
(1B)+<00>	<ul style="list-style-type: none"> ● Compression mode ● After this code is received, 1/9 inch line feed will be made. ● This code will not be cancelled until (1B)+<02> is received. ● This code can be received any time during data receiving. ● This code will be ignored when 1/9 inch feed is already selected.
(1B)+<02>	<ul style="list-style-type: none"> ● Cancels compression mode. ● When this code is received, automatic line feed is started. Line feed will take place every 1/6 inch.
(1B)+<19H>+<HEX>	<ul style="list-style-type: none"> ● The <HEX> value following (1B)+<19H> designates the maximum number of printing characters. ● When the 136-character mode is specified, $0 < \text{HEX} \leq 136$ ● When the 160-character mode is specified, $0 < \text{HEX} \leq 160$ ● Not applicable to image printing.
(1B)+<05H>	<ul style="list-style-type: none"> ● When this code is received, line feed will be carried out twice. For example, if 1/6 inch feed is specified before this code is received, 1/3 inch line feed will be started.

Control code	Function
(1B)+<06H>	<ul style="list-style-type: none"> ● Code to cancel (1B)+<05H>
(1B)+<08H>	<ul style="list-style-type: none"> ● When this code is received, PAPER EMPTY (PE) will be ignored.
(1B)+<09H>	<ul style="list-style-type: none"> ● Makes PAPER EMPTY (PE) signal effective.
(1B)+<11H>+<HEX ₁ > +.....+<HEX _n >+<00>	<ul style="list-style-type: none"> ● Sets vertical tabulation. ● Following (1B)+<11H>, transfers tabulation setting position in hexadecimal number. ● Upon completion of tabulation setting, transfers <00> NULL code. The maximum tabulation value shall be [specified page length - 1]. Example: When page length is 72 lines, tabulation value will be 71 or less. ● Tabulation value can be set in a random manner. ● Tabulation value is an absolute value from home position.
(1B)+<14H>	<ul style="list-style-type: none"> ● Clears vertical tabulation setting.
(1B)+<12H>+<HEX>	<ul style="list-style-type: none"> ● Sets the number of lines per page. ● Any number up to 72 lines can be set in <HEX> following (1B)+<12H>. ● Any number in excess of 72 lines will be ignored. ● 0 line will be ignored. ● When this code is received, form feed will be executed automatically.
(1B)+<13H>+<HEX ₁ > +.....+<HEX _n >+<00>	<ul style="list-style-type: none"> ● Sets horizontal tabulation. ● n value can be up to 135 lines. ● n values can be transferred in no particular order. ● Upon completion of tabulation setting, NULL code shall be transferred.
(1B)+<15H>	<ul style="list-style-type: none"> ● Clears horizontal tabulation setting.
(1B)+<18H>+<HEX ₁ > +<HEX ₂ > +<Data string>	<ul style="list-style-type: none"> ● Image print instruction. ● The number of image data to be transferred following (1B)+<18H> shall be transferred in 2 bytes: <HEX₁>+<HEX₂>. <HEX₁> represents lower 8-bit data, while <HEX₂> represents upper 8-bit data. If the number of transfer bytes is 16 bytes, (1B)+<18H>+<10H>+<00H>+<16-byte data>. When this code is received, line feed is started automatically after printing the 16-byte data. ● This code will be ignored when <HEX₁>+<HEX₂> = <00>+<00>.

■ When ROM unit MZ-8KP4R or MZ-8AP4R is used

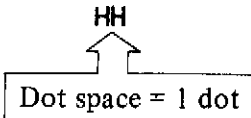
(MZ-8KP4R/MZ-8AP4R)

Control Code	Functions
(0DH)	<ul style="list-style-type: none"> ● Prints data in the buffer by CR code input. ● If there is not data before CR code is received, only line feed is carried out.
(0BH)	<ul style="list-style-type: none"> ● Control code to create enlarged characters. ● Enlarges each character as 80 characters/line (in the 160-character mode) or as 68 characters/line (in the 136-character mode). ● Enlarged characters cannot be changed into ordinary characters when lines are changed. (The function cannot be cancelled.)
(0CH)	<ul style="list-style-type: none"> ● Command to cancel enlarged characters.
(0FH)	<ul style="list-style-type: none"> ● Executes form feed. ● Also functions as printing instruction. ● If data already exist in the buffer, feed operation is automatically carried out upon completion of printing.
(09H)	<ul style="list-style-type: none"> ● Compression mode (1/9 inch feed) ● Cannot be cancelled by changing lines.
(0AH)	<ul style="list-style-type: none"> ● When this code is executed, automatic line feed is carried out to cancell the compression mode.
(09H)+(09H)+(ASCII) _H +(ASCII) _L	<ul style="list-style-type: none"> ● Specifies the number of lines on one page. ● ASCII (two bytes) following (09H)+(09H) expresses hexadecimal data. (Ex.) If HEX 16H transfers (ASCII)_H 31 (ASCII)_L 36 ● If error is found in continuous data, the control will be ignored. ● Any number of lines can be specified par page up to 72 lines.
(09H)+(09H)+(09H)	<ul style="list-style-type: none"> ● By transferring (09H) continuously three times, the 160-character mode can be selected. ● The mode when power is turned on can also be set the function switch SW1-5. ● After the mode change, line feed is carried out automatically. ● If data exist in the buffer, the carriage returns to the home position after printing, line feed is carried out, and modes are changed.

Control Code	Functions
(09H)+(09H)+(0BH)	<ul style="list-style-type: none"> ● 136-character mode can be selected. ● The mode when power is turned on can also be set the function switch SW1-5. ● After the mode change, line feed is carried out automatically. ● If data exist in the buffer, the carriage returns to the home position after printing, line feed is carried out, and modes are changed.
(0BH)+(0BH)+ (Data string)	<ul style="list-style-type: none"> ● Permits image printing. ● (0BH) is transferred continuously twice, and the hexadecimal data are transferred in 2-byte ASCII expression. (Ex.) For image printing of 16-byte data, data string will be as follows: Data string → <HEX1>+.....+<HEX16> (Note) <HEX1> ~ <HEX16> above is hexadecimal data in ASCII expression. ● Printing instruction for image print is given by 0DH, as in the case of ordinary character printing. ● If continuous data have an error, this code will be ignored.

Control code	Contents	Function/Operation
09H	Horizontal tabulation	<ul style="list-style-type: none"> ● When this code is received, data for tabulation previously set in RAM will be reorganized and stored in the buffer.
0AH	Line feed	<ul style="list-style-type: none"> ● This functions both as line change instruction and as printing instruction. ● If no printing data exists prior to line feed, the paper will be fed by only one line.
0BH	Vertical tabulation	<ul style="list-style-type: none"> ● Paper is fed to the tabulation position previously set in RAM. ● This code also functions as a printing instruction. ● If no tabulation is set, the same operation as in Line Feed will be carried out. ● When the horizontal tabulation code is received, stored data will be printed and then paper is automatically fed to the line predetermined by tabulation setting.
0CH	Form feed	<ul style="list-style-type: none"> ● Automatic feeding is carried out to the form feed position set in the memory. ● This code also functions as printing instruction. ● If the buffer already has printing data, automatic feeding will be carried out after printing.
0DH	Carriage return	<ul style="list-style-type: none"> ● Printing instruction code ● Whether to change lines after printing can be also determined by the internal function switch. ● The carriage will not be shifted if there is no data before this code is received. However, if the internal function switch SW2-2 is turned OFF, line feed will be carried out.
0EH	Shift out (SO)	<ul style="list-style-type: none"> ● This is an enlarged character instruction code. ● Printing characters after SO are received will be enlarged until SI code is received. (Ordinary characters cannot be resumed by changing lines.) ● SO code can be input in any place during printing. ● If ordinary characters and enlarged characters are mixed on one line, the position where a certain enlarged character falls on the 135th digit when converted into ordinary characters will be regarded as the end of the line.

Control code	Contents	Function/Operation
0FH	Shift in (SI)	<ul style="list-style-type: none"> ● Input of SI code cancels enlarged characters. ● When SO and SI are mixed, printing will be carried out as follows. <ul style="list-style-type: none"> A) Input SO+"A"+CR+LF Printing: A (enlarged character) B) Input SO+"A"+SI+"A"+CR+LF Printing: AA
11H	Device control 1 (DC1)	<ul style="list-style-type: none"> ● This is a printer select instruction code. ● This code can be ignored by the operation of the internal function switch. ● When this code is received, the ON-LINE indicator will go on.
13H	Device control 3 (DC3)	<ul style="list-style-type: none"> ● This is a printer deselect instruction code. ● This code will be ignored when the printer is executing deselect operation. ● This code can be ignored by selecting the relevant function switch.
18H	Cancel code	<ul style="list-style-type: none"> ● This is a cancel code, which cancels data in the buffer stored before this code is received. SO/SI code is also cancelled. ● Not applicable to image printing.
ESC+(00H) [ESC=1BH]	Compression mode instruction	<ul style="list-style-type: none"> ● After this code is received, 1/9 inch line feed will be carried out. ● This code cannot be cancelled until ESC+02H is received or power is turned off. ● This code can be received anywhere during data receiving operation.
ESC+(02H)	Cancellation of compression mode	<ul style="list-style-type: none"> ● After this code is received, 1/6 inch line feed will be resumed. <p>After automatic feeding is executed to the next line position, 1/6 inch feed will be started.</p>
ESC+(04H)	136-character mode instruction	<ul style="list-style-type: none"> ● When this code is received, the carriage returns to the home position and then the 136-character mode will be selected. ● Printing after this code is received will have the following printing construction – or gap between characters. (Ex.) <div style="text-align: center;"> <p>HH</p> <p>Dot space = 2 dots</p> </div>

Control code	Contents	Function/Operation
	136-character mode instruction	<ul style="list-style-type: none"> ● If the buffer contains data, they will be printed before line feed. After that, the 136 character mode will be selected. ● If the 136-character mode is already selected, this code will be ignored.
ESC+(03H)	160-character mode instruction	<ul style="list-style-type: none"> ● When this code is received, the carriage returns to the home position. ● Printing after this code is received will have the following printing construction – or gap between characters. (Ex.) <div style="text-align: center;">  <p style="margin-left: 100px;">HH</p> <p style="margin-left: 100px;">↑</p> <p style="margin-left: 100px;">Dot space = 1 dot</p> </div> <ul style="list-style-type: none"> ● If the buffer contains data, the 160-character mode will be selected after printing them. ● If the 160-character mode is already selected, this code will be ignored.
ESC+(05H)	1/3 line feed instruction	<ul style="list-style-type: none"> ● After this code is received, 1/3 inch line feed is carried out. If compression is instructed, however, 2/9 inch feed will be carried out.
ESC+(06H)	Cancellation of 1/6 line feed	<ul style="list-style-type: none"> ● After this code is received, 1/6 inch line feed is carried out. If compression is instructed, however, 1/9 inch line feed will be carried out.
ESC+(08H)		<ul style="list-style-type: none"> ● Ignores signals from the paper detector.
ESC+(09H)		<ul style="list-style-type: none"> ● Receives signals from the paper detector as effective.
ESC+(11H)+ (HEX ₁)+.....+ (HEX _n)+(00H)		<ul style="list-style-type: none"> ● Carries out vertical tabulation setting. ● Tabulation can be set by the hexadecimal number following ESC+(11H). ● Tabulation value shall not exceed 71. (When one page contains 72 lines.) (Refer to Note 1) ● Tabulation can be set in a random manner. ● Tabulation value is an absolute value from the form position on the printing paper.
ESC+(12H)+ (HEX)		<ul style="list-style-type: none"> ● Sets the number of lines per page. ● The number in excess of 72 lines is ignored. ● 0 (zero) is ignored. ● When this code is received, form feed is automatically carried out.

Control with BASIC language

This printer can be easily controlled with the use of Sharp BASIC language. Note, however, that different computers employed have different versions of BASIC language and commands to the printer. For details, refer to the BASIC Language Manual.

■ BASIC for MZ-80B/BASIC for MZ-80A

(MZ-80B/80A)

Command	Example of application	Function
LIST/P	LIST/P	Outputs all the lists in the BASIC text to the printer.
	LIST/P-100	Outputs BASIC text as far as statement No.100 to the printer.
	LIST/P 100-500	Outputs BASIC text from statement Nos.100 to 500 to the printer.
	LIST/P 500-	Outputs BASIC text above the statement No.500 to the printer.
PRINT/P	PRINT/P A\$	Outputs the contents of string variable A\$ to the printer.
	PRINT/P CHR\$(N)	If $32 \leq N \leq 255$, N shall be regarded as ASCII code, and the character corresponding to it shall be output to the printer. IF N = 65, "A" shall be printed.
	PRINT/P CHR\$(5) Form feed	Paper shall be fed to the top (form position) of the next page. The function of the printer control button (TOP OF FORM) will be carried out by software.
	PRINT/P CHR\$(6) Initialization	Resets all the control codes to their initial positions. At this instance, form feed is carried out. <ul style="list-style-type: none"> • The 136 characters/line mode can be resumed. 1/6 inch line feed is selected.
	PRINT/P CHR\$(16) Cancellation of line-to-line compression mode	1/6 inch line feed is selected.
	PRINT/P CHR\$(17) Line-to-line compression mode	1/9 inch line feed is selected.
	PRINT/P CHR\$(18) Enlarged character instruction	The mode in which the present printing character size is doubled is set. If the 136-character mode is set presently, the 68-character mode will be selected. If the 160-character mode is set presently, the 80-character mode will be selected.

Command	Example of application	Function
PRINT/P	PRINT/P CHR\$(19) Cancellation of enlarged characters	The 136-character mode or 160-character mode is resumed.
	PRINT/P CHR\$(20) Character-to-character compression	The space between characters is compressed. (The 160-character mode will be selected.)
	PRINT/P CHR\$(21) Cancellation of character-to-character compression	Cancels character-to-character compression. (The 136-character mode shall be selected.)
IMAGE/P	IMAGE/P "A"	<p>ASCII code of character "A", or bit pattern corresponding to 41H, will be printed in the vertical direction.</p> <div style="text-align: center;"> <p>LSB → 0 0 0 0 0 0 0 1 MSB → 1</p> <p>IMAGE/P "A" →</p> <p>{ 41H = 01000001</p> <p> ↑ ↑</p> <p> MSB LSB</p> <p>This dot is printed.</p> </div> <p>IMAGE/P CHR\$(65) equals IMAGE/P "A". This print-out is called the "Bit Image Mode".</p> <p>(Note 1) Bit image data are given as string data.</p> <p>(Note 2) The length of bit image data shall be 960/line. If the data exceeds 960, the remainder will be printed after line feed.</p> <p>(Note 3) BASIC for MZ-80A does not have this IMAGE/P command.</p>
COPY/P		<p>COPY/P command is used for output of pattern indicated on the computer CRT screen (or more strictly, data in V-RAM region) to the printer as it is displayed on one screen.</p> <p>The following four copy formats are available.</p> <p>However, BASIC language for MZ-80A does not have COPY/P2, COPY/P3, or COPY/P4 commands.</p>
	COPY/P 1	If the CRT screen displays data in V-RAM region for characters, the data on one screen will be output to the printer.
	COPY/P 2	Outputs one-screen data accommodated in graphic region 1 out of 2-screen V-RAM regions for graphic use (graphic region 1 and graphic region 2) to the printer, and carries out bit image pattern printing.

Command	Example of application	Function
COPY/P	COPY/P 3	Outputs one-screen data accommodated in graphic region 2 to the printer, and carries out bit image pattern printing.
	COPY/P 4	OR of the bits of the data accommodated in graphic regions 1 and 2 will be regarded as output data to the printer. Therefore, the patterns obtained by COPY/P2 and COPY/P3 will be superposed for printing.
PAGE/P	COPY/P N	The value specified by N shall be the maximum number of lines to be printed on one page. The number of lines here means the value for 1/6 inch line feed. N shall be an integer selected from 1 through 72. In the initial stage, one page is allowed to contain 66 lines.

(Note 1) If $M = 0 \sim 4, 7 \sim 15, \text{ or } 22 \sim 31$ in PRINT/P CHR\$(M), it will be ignored.

(Note 2) M in CHR\$(M) can be expressed in hexadecimal number. For example, since $(32)_{10} = 20H$, the indication shall be CHR\$(20). \$ in the parentheses in front of the hexadecimal number indicates hexadecimal representation.

(Note 3) If NO PAPER takes place during the printing operation of the printer, ERROR in the BASIC language will be NOT READY [ERR65] in order to actuate the over function. [ERR67] will not be indicated.

Command	Example of application	Function
LIST/P	LIST/P	Outputs all the lists in the BASIC text to the printer.
	LIST/P-100	Outputs BASIC text as far as statement No.100 to the printer.
	LIST/P 100-150	Outputs BASIC text from statement Nos.100 to 500 to the printer.
	LIST/P 500-	Outputs BASIC text from statement No.500 on to the printer.
PRINT/P	PRINT/P A\$	Outputs the contents of string variable A\$ to the printer.
	PRINT/P CHR\$(N)	If $32 \leq N \leq 255$, N will be regarded as ASCII code, and the character corresponding to it will be output to the printer. If N = 65, "A" will be printed.
	PRINT/P "f" Form feed	Paper is fed to the top (form position) of the next page. The function of the printer control button (TOP OF FORM) will be carried out by the use of software.
	PRINT/P "c" Clear form	Cancels line-to-line compression and enlarged characters.
	PRINT/P "e" Enlarged character instruction	The 80 characters/line mode 68 characters/line mode will be selected.
	PRINT/P "l" Line-to-line compression mode	1/9 inch line feed will be selected.
	PRINT/P "ll XX" (xx = number of lines) Page setting	<ul style="list-style-type: none"> • Designates the number of lines per page. • One page can contain a maximum of 72 lines. • The number of lines can be designated in hexadecimal number. (Ex.) If it is desired to print 11 lines on one page, hexadecimal representation of 11 (0BH) shall be transmitted. PRINT/P "ll 0B" • If no designation is made by software, the number of lines as designated by the function switch SW1-1 will be adopted (66 lines or 72 lines).

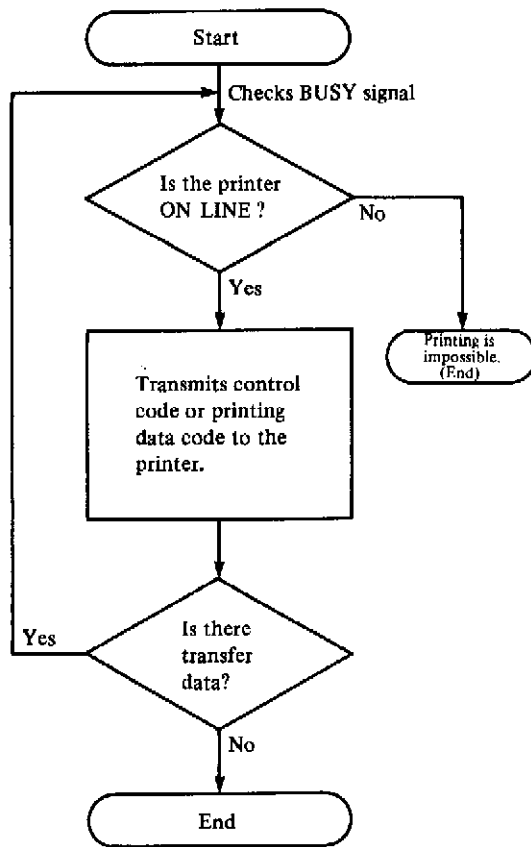
Command	Example of application	Function
PRINT/P	PRINT/P" 00XX " (xx = data string in bit pattern) Image print	<ul style="list-style-type: none"> ● Permits image printing. ● Bit pattern data expressed in hexadecimal number will be printed in the vertical direction as previously determined. (Ex.) PRINT/P " 01 01 " If 01H is converted into a binary indication, 01H = <u>0000 0001</u> → <div style="display: inline-block; vertical-align: middle; margin-left: 20px;"> LSB → ● ○ ○ ○ ○ ○ ○ ○ MSB → ○ </div> This dot is printed. <div style="display: inline-block; vertical-align: middle; margin-left: 20px;"> ↑ 0 1 ↑ MSB LSB </div>
	PRINT/P " 0000 "	● 160 characters/line mode is selected.
	PRINT/P " 0001 "	● 136 characters/line mode is selected.

Example of control with machine language

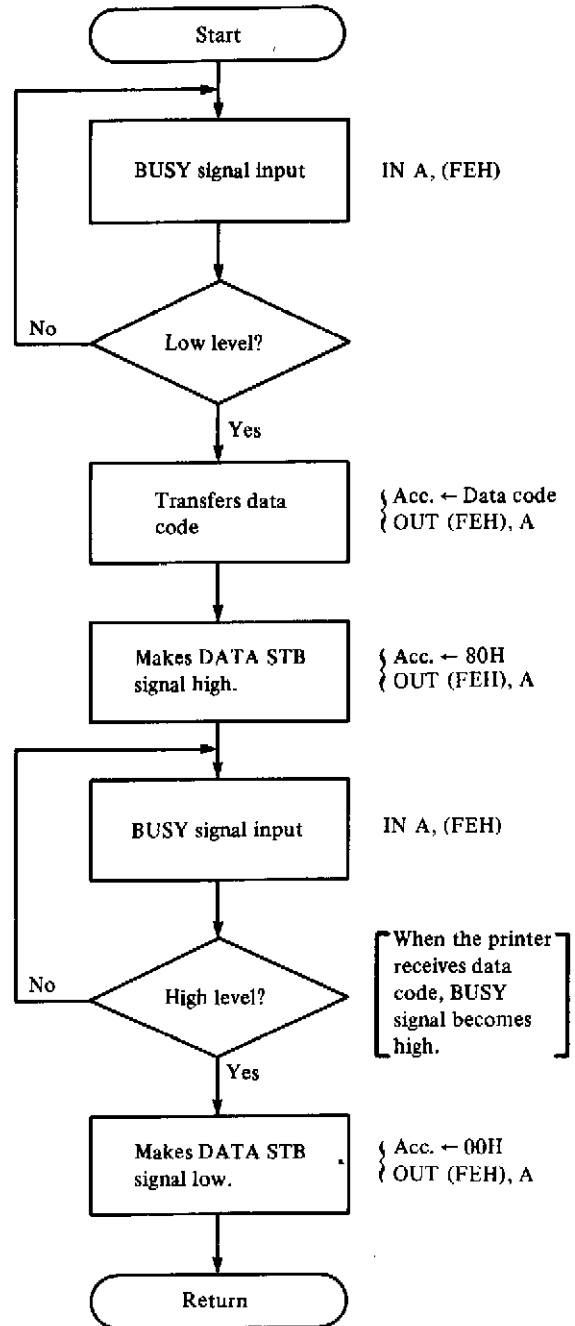
The example of program for controlling this printer with machine language is shown below. The method of control varies, depending on the ROM unit used. The example shown below represents reference subroutine program which constitutes the most basic part of the control.

■ Control as printer for MZ-80B/MZ-80A

[Concept of printer control]



[Printing data transfer routine]



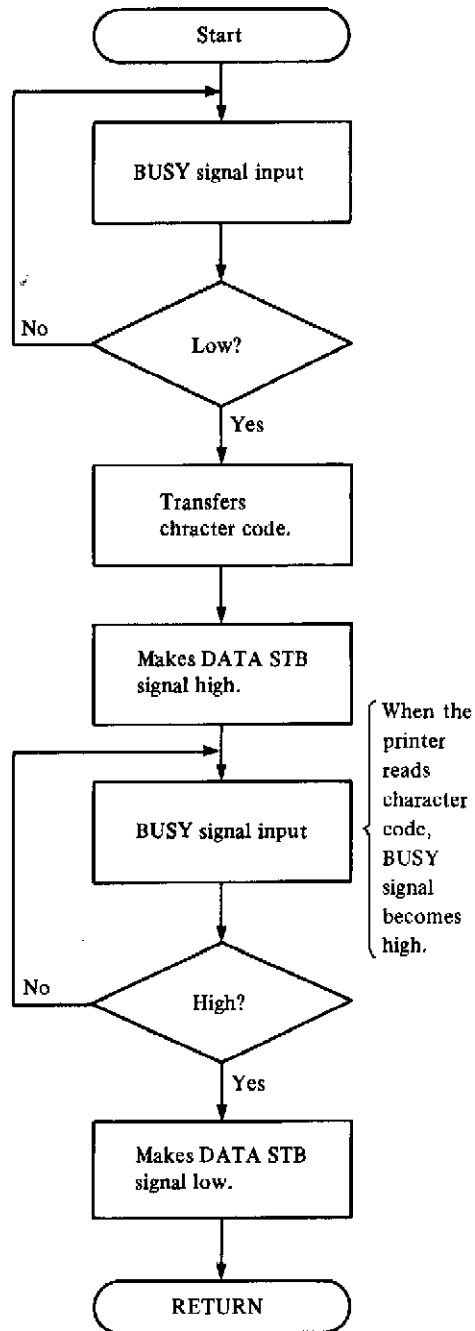

```

01 0000          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
02 0000          ; PRINTER MZ-80P4 CONTROL SUBROUTINE
03 0000          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
04 0000          ;
05 0000 P        PORT/I: EQU   FEH
06 0000 P        PORT/O: EQU   FFH
07 0000          ;
08 0000          ; JP ABNML:NO POWER,NO PAPER,DISELECT OR MECHANICAL TROUBLE
09 0000          ;
10 0000          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
11 0000          ; DATA CODE TRANSFER SUBROUTINE
12 0000          ;
13 0000          ; BEFORE CALL "PRINT",SET TRANSFERED PRINT CODE IN ACC
14 0000          ; ALL REGISTOR RESERVED ON NORMAL RETURN
15 0000          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
16 0000          ;
17 0000          PRINT: ENT
18 0000 F5        PUSH  AF
19 0001 3E00      LD    A,00H
20 0003 CD1600    CALL  BUSY/C          ;BUSY SIGNAL IS LOW?
21 0006 F1        POP   AF
22 0007 D3FF      OUT   (PORT/O),A      ;DATA TRANSFER
23 0009 3E80      LD    A,80H
24 000B D3FE      OUT   (PORT/I),A      ;IT MAKES DATA STB HIGH
25 000D 3E01      LD    A,01H
26 000F CD1600    CALL  BUSY/C          ;BUSY SIGNAL IS HIGH?
27 0012 AF        XOR   A
28 0013 D3FE      OUT   (PORT/I),A      ;IT MAKES DATA STB LOW
29 0015 C9        RET
30 0016          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
31 0016          ; BUSY SIGNAL CHECK SUBROUTINE
32 0016          ;
33 0016          ; ONLY ACC. IS BROKEN ON NORMAL RETURN
34 0016          ; RESURVED EXCEPT ACCUMULATION (A)
35 0016          ; BEFORE CALL "BUSY/C",SET FOLLOWING CODE IN ACC.
36 0016          ; A=0:CHECKS IF BUSY IS LOW LEVEL
37 0016          ; A=1:CHECKS IF BUSY IS HIGH LEVEL
38 0016          ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
39 0016          ;
40 0016 C5        BUSY/C: PUSH  BC
41 0017 D5        PUSH  DE
42 0018 57        LD    D,A
43 0019 1E0C      LD    E,0CH
44 001B 010000    LD    BC,0000H          ;FOR TIME DELAY
45 001E DBFE      LOOP: IN   A,(PORT/I)
46 0020 E60D      AND   0DH
47 0022 BA        CP    D          ;CHECKS BUSY SIGNAL
48 0023 2003      JR    NZ,+5          ;REPEAT
49 0025 D1        POP   DE
50 0026 C1        POP   BC
51 0027 C9        RET          ;NORMAL RETURN
52 0028 0B        DEC   BC
53 0029 78        LD    A,B
54 002A B1        OR    C
55 002B 20F1      JR    NZ,LOOP
56 002D 1D        DEC   E
57 002E 20EE      JR    NZ,LOOP
58 0030 D1        POP   DE
59 0031 C1        POP   BC
60 0032 C30000    JP    ABNML          ;PRINTER IS NOT ON LINE
61 0035          END

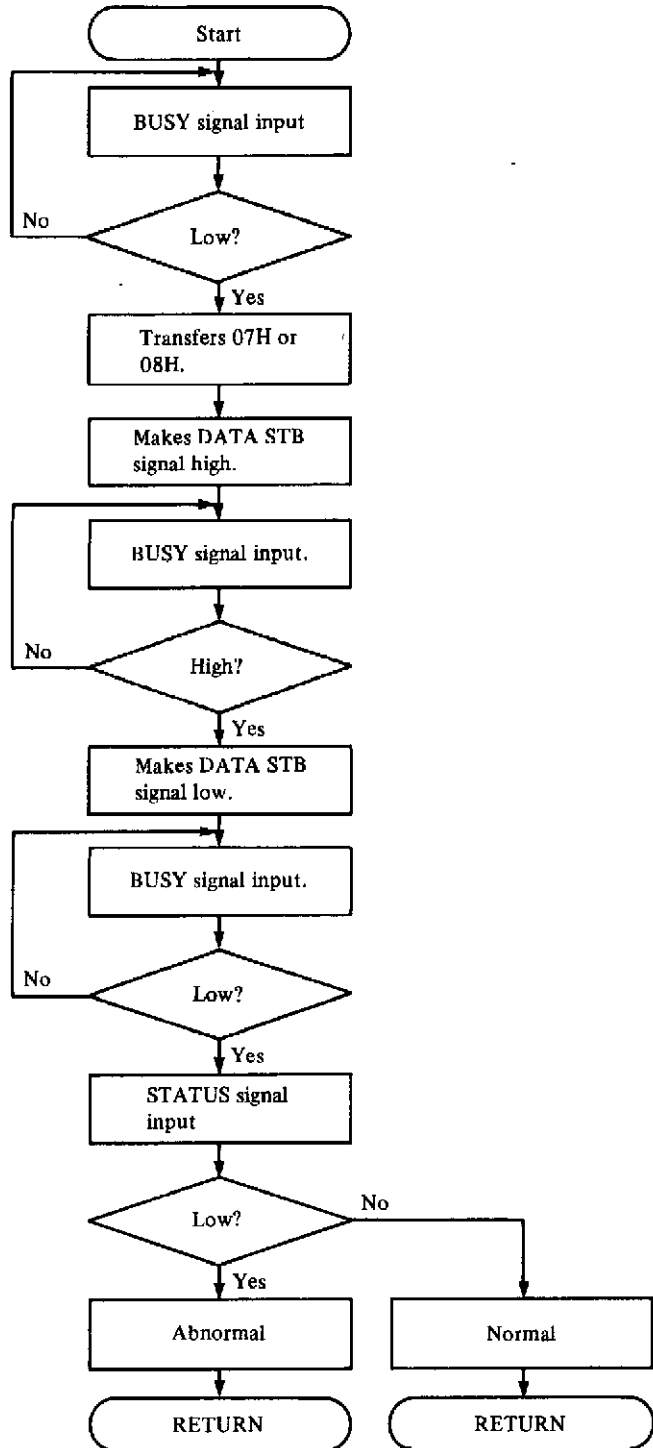
```

■ Control as printer for MZ-80K

[Printing character transfer flow chart]



[Status check flow chart]



```

01 0000 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
02 0000 ;
03 0000 ; PRINTER CONTROL ROUTINE ;
04 0000 ;
05 0000 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
06 0000 ;
07 0000 ; PRINT CONTROL
08 0000 ;
09 0000 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
10 0000 ;
11 0000 ; ACC PRINT
12 0000 ;
13 0000 PRINT: ENT
14 0000 F5 PUSH AF
15 0001 CD1D00 CALL ?PRNT
16 0004 CD6500 CALL STCK
17 0007 F1 POP AF
18 0008 C9 RET
19 0009 ;
20 0009 ; MESSAGE PRINT
21 0009 ; DE=DATA LOW ADR
22 0009 ; (END=CR CODE)
23 0009 ;
24 0009 PMSG1: ENT
25 0009 F5 PUSH AF
26 000A D5 PUSH DE
27 000B 1A PMSG1: LD A,(DE)
28 000C CD1D00 CALL ?PRNT
29 000F 1A LD A,(DE)
30 0010 FE0D CP ODH
31 0012 2803 JR Z,PMSG2
32 0014 13 INC DE
33 0015 18F4 JR PMSG1
34 0017 CD6500 PMSG2: CALL STCK
35 001A D1 POP DE
36 001B F1 POP AF
37 001C C9 RET
38 001D ;
39 001D ; PRINT
40 001D ;
41 001D F5 ?PRNT: PUSH AF
42 001E 3E00 LD A,0H ;BUSY CHECK
43 0020 CD3300 CALL BUSY
44 0023 F1 POP AF
45 0024 D3FF OUT (POTFF),A ;DATA OUT
46 0026 3E80 LD A,80H
47 0028 D3FE OUT (POTFE),A ;DATA STB HIGH
48 002A 3E01 LD A,01H ;BUSY CHECK
49 002C CD3300 CALL BUSY
50 002F AF XOR A

```

```

01 0030 D3FE          OUT   (POTFE),A          ;DATA STB LOW
02 0032 C9           RET
03 0033              ;
04 0033              ;   BUSY CHECK
05 0033              ;
06 0033 D9           BUSY:  EXX
07 0034 57           LD     D,A
08 0035 010000       LD     BC,0000H          ;ACC=COMPARE DATA
09 0038 DBFE         BUSY1: IN     A,(POTFE)      ;TIMER SET
10 003A E60D         AND     ODH
11 003C BA           CP     D
12 003D 2002        JR     NZ,4
13 003F D9           EXX
14 0040 C9           RET
15 0041              ;
16 0041 1E10        LD     E,10H
17 0043 1D           DEC     E
18 0044 20FD        JR     NZ,-1
19 0046 0B           DEC     BC
20 0047 78           LD     A,B
21 0048 B1           OR     C
22 0049 20ED        JR     NZ,BUSY1
23 004B D9           EXX
24 004C CD0900       CALL  NL
25 004F 117D00       LD     DE,MSG1
26 0052 CD1500       CALL  MSG
27 0055 C30000       JP     ABNML          ;ABNORMAL JUMP
28 0058              ;
29 0058              ;   STATUS INPUT
30 0058              ;
31 0058 CD1D00       STIN:  CALL ?PRNT
32 005B 3E00        LD     A,0H
33 005D CD3300       CALL  BUSY
34 0060 DBFE         IN     A,(POTFE)
35 0062 0F          RRCA
36 0063 0F          RRCA
37 0064 C9           RET
38 0065              ;
39 0065              ;   STATUS CHECK
40 0065              ;
41 0065 3E07        STCK:  LD     A,07H          ;PAPER CHECK
42 0067 CD5800       CALL  STIN
43 006A D8           RET     C          ;NORMAL RETURN
44 006B              ;
45 006B 119F00       STCK1: LD     DE,MSG2
46 006E CD0900       CALL  NL
47 0071 CD1500       CALL  MSG
48 0074 119500       LD     DE,MSG11
49 0077 CD1500       CALL  MSG
50 007A C30000       JP     ABNML          ;ABNORMAL JUMP

```

```

01 007D 4E4F2050      MSG1:  DEFM  'NO POWER'
02 0081 4F574552
03 0085 4F52204E      DEFM  'OR NO CONNECTION'
04 0089 4F20434F
05 008D 4E4E4543
06 0091 54494F4E
07 0095 28505249      MSG11: DEFM  '(PRINTER) '
08 0099 4E544552
09 009D 29
10 009E 0D            DEFB  0DH
11 009F 50415045      MSG2:  DEFM  'PAPER EMPTY'
12 00A3 5220454D
13 00A7 505459
14 00AA 0D            DEFB  0DH
15 00AB
16 00AB P            POTFF: EQU  FFH
17 00AB P            POTFE: EQU  FEH
18 00AB
19 00AB P            NL:   EQU  0009H
20 00AB P            MSG:  EQU  0015H
21 00AB              END

```

Printer interface

■ Signal terminals

The printer has a total of 36 I/O signal terminals (Fig. 26). The relationship between the signal and the terminals are as shown below.

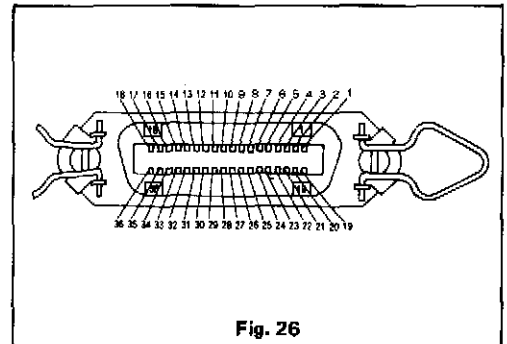


Fig. 26

■ Signal arrangement and description

(A) When a combination of host computer MZ-80B, interface card MZ-8BP5I, and signal cable MZ-8BP4C is employed.

Terminal No.	Name of signal	Description
1	DATA STB	<ul style="list-style-type: none"> ● Synchronization signal to read DATA 1 through DATA 8. (Positive logic).
2	DATA 1	<ul style="list-style-type: none"> ● These terminals are signal lines to receive information contained in the 1st to 8th bits of data.
3	DATA 2	
4	DATA 3	
5	DATA 4	
6	DATA 5	
7	DATA 6	
8	DATA 7	
9	DATA 8	
10	ACK	<ul style="list-style-type: none"> ● Data request signal to inform externally that the printer is ready for data receiving after completion of work related to the received data and code. (Negative logic). ● This signal is output whenever BUSY signal changes from high level to low level.
11	BUSY	<ul style="list-style-type: none"> ● BUSY signal becomes high level under the following circumstances. <ol style="list-style-type: none"> (a) When the printer is feeding and printing. (b) When the printer is in DESELECT mode. (c) When the printer is in FAULT state. (d) When the printer is receiving data. (e) When the printer receives PRIME signal.
12	PE	<ul style="list-style-type: none"> ● Becomes high level when the printer is in PE condition.

Terminal No.	Name of signal	Description
13	*SELECT	<ul style="list-style-type: none"> ● Signal to indicate whether the printer is in SELECT or DESELECT mode. When the printer is in SELECT mode (ON-LINE mode), data can be received. ● High level when the printer is in SELECT mode. (Positive logic)
14	0V	
15	NC	
16	0V	
17	FG	
18	+5V	<ul style="list-style-type: none"> ● PULL UP at 330Ω
19 - 30	GND	<ul style="list-style-type: none"> ● Twist pair, GND
31	$\overline{\text{PRIME}}$	<ul style="list-style-type: none"> ● Printer reset signal (Negative logic) <p>(Note) IRT for terminal No.34 is also a printer reset signal, but has an opposite logic. When one reset signal is employed, the other signal shall be made NC.</p>
32	$\overline{\text{FAULT}}$	<ul style="list-style-type: none"> ● Signal to indicate that the printer is in FAULT state. (Negative logic) ● Conditions for FAULT <ul style="list-style-type: none"> • PE • Deselect
33	0V	
34	IRT	<ul style="list-style-type: none"> ● Printer reset signal (Positive logic) <p>(Refer to terminal No.31.)</p>
35, 36	NC	

* (Note)

Conditions for SELECT (ON-LINE)

- When ON-LINE/OFF-LINE switch is pressed during DESELECT.
- When "DC1" is received.
- When PE occurs.
- If the ON-LINE/OFF-LINE switch is pressed in PE state, the select state emerges to cancel PE, 1-line data is read and printed, and then OFF-Line state emerges again. Then, the SELECT signal becomes LOW. (Override function)

Conditions for DESELECT

- When ON-LINE/OFF-LINE switch is pressed during SELECT.
 - When "DC3" code is received.
 - When PE occurs.
 - When power source is turned on.
- (This state can be altered by the operation of the internal function switch.)
- When an error occurs in the printer.

- (B) ● When a combination of host computer MZ-80K, interface card MZ-8KP4I, and signal cable MZ-8KP4C is employed.
- When a combination of host computer MZ-80A, interface card MZ-8BP5I, and signal cable MZ-8BP4C is employed.

Terminal No.	Name of signal	Description
1	DATA STB	● Synchronization signal to read DATA 1 through 8.
2	DATA 1	● These terminals receive signals contained in the 1st to 8th bits of DATA.
3	DATA 2	
4	DATA 3	
5	DATA 4	
6	DATA 5	
7	DATA 6	
8	DATA 7	
9	DATA 8	
10	NC	
11	BUSY	<ul style="list-style-type: none"> ● Data input is not permitted when this signal is high level. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>(Conditions under which BUSY signal becomes high level)</p> <ul style="list-style-type: none"> • When the printer is feeding or printing • When the printer is in DESELECT mode • When data are being received • When IRT signal is received </div>
12	PE	
13	SELECT	
14	0V	
15	NC	
16	0V	
17	FG	
18	+5V	
19 - 29	GND (Twist pair)	
30	GND	
31	PRIME	
*32	STATUS	<p>The printer transmits a response signal every time it receives the following signals.</p> <p>05H LOW</p> <p>06H HIGH</p> <p>07H LOW</p> <p>08H LOW</p>
33	0V	
34	IRT	Printer reset signal
35	NC	
36	NC	

* When used for MZ-80A, terminal No.32 is made NC.

(C) When this machine is used by the Centronics System (ROM unit MZ-8S P4R)

Data input system: 8 bit parallel

Control signal: $\overline{\text{ACK}}$, BUSY, SELECT $\overline{\text{DATA STB}}$, $\overline{\text{PRIME}}$, $\overline{\text{FAULT}}$

Data input code: ● ASCII code
 (Setting of international characters is also possible.)
 ● 960-byte image printing is possible.

Data buffer: 1 line

Terminal No.	Name of signal	Description
1	$\overline{\text{DATA STB}}$	<ul style="list-style-type: none"> ● Synchronization signal to read DATA 1 ~ DATA 8. (Negative logic) ● Pulse width shall be 1 μsec. min.
2 3 4 5 6 7 8 9	DATA 1 DATA 2 DATA 3 DATA 4 DATA 5 DATA 6 DATA 7 DATA 8	<ul style="list-style-type: none"> ● These terminals are signal lines to receive information contained in the 1st to 8th bits of DATA. ● Pulse width of data shall be 3 μsec.
10	$\overline{\text{ACK}}$	<ul style="list-style-type: none"> ● To be output when the printer finishes all its work related to received data and codes. (Negative logic) ● To be output whenever BUSY signal changes from high to low. ● Typical pulse width shall be 8 μsec.
11	BUSY	<ul style="list-style-type: none"> ● When this signal is high level, codes other than DC code shall not be input. (Positive logic) (However, no input can be made during printing or line feed.) ● Conditions to make BUSY signal high . <ol style="list-style-type: none"> (a) When the printer is feeding of printing. (b) When the printer is in DESELECT mode. (c) When the printer is in FAULT state. (d) When data received. (e) When PRIME signal is received.
12	PE	<ul style="list-style-type: none"> ● Becomes high level when the printer is in PE state.
13	*SELECT	<ul style="list-style-type: none"> ● Signal to indicate whether the printer is in SELECT or DESELECT mode. (Positive logic) ● DATA can be input during SELECT. ● Becomes high level when the printer is in SELECT mode.

Command	Example of application	Function
14	0V	
15	NC	
16	0V	
17	FG	
18	+5V	<ul style="list-style-type: none"> ● PULL UP at 330Ω
19 – 30	GND	<ul style="list-style-type: none"> ● Provided for twist pair cable.
31	$\overline{\text{PRIME}}$	<ul style="list-style-type: none"> ● Printer reset signal (Negative logic) (Note) IRT for terminal No.34 is also a printer reset signal, but has an opposite logic. When one reset signal is employed, the other signal shall be made NC. Otherwise, trouble may be caused.
32	$\overline{\text{FAULT}}$	<ul style="list-style-type: none"> ● Signal to indicate that the printer is in FAULT state. (Negative logic) ● Conditions for FAULT <ol style="list-style-type: none"> 1) PE 2) DESELECT
33	0V	
34	IRT	<ul style="list-style-type: none"> ● Printer reset signal. ● Refer to terminal No.31 $\overline{\text{PRIME}}$.
35, 36	NC	

***(Note) Conditions for SELECT**

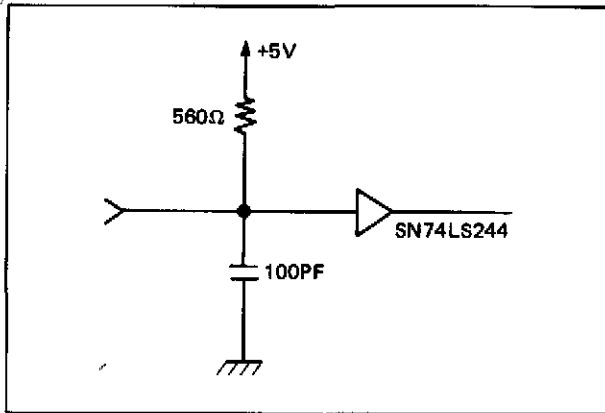
- When the ON-LINE/OFF-LINE switch is pressed during DESELECT.
- When DC 1 code is received.
- When the ON-LINE/OFF-LINE switch is pressed in PE state, SELECT mode will emerge to cancel PE and read 1-line data. After printing, OFF-LINE mode will be resumed. (Override function)

Conditions for DESELECT

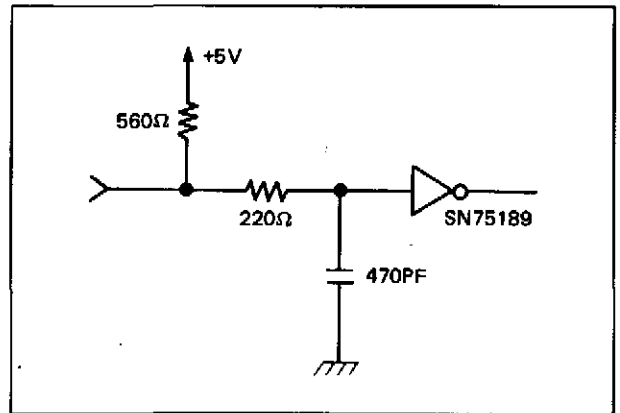
- When the ON/OFF LINE switch is pressed during SELECT.
- When "DC3" code is received.
- When PE occurs.
- When power is turned ON.
(This state can be altered by the operation of the internal function switch.)

■ I/O circuit configuration

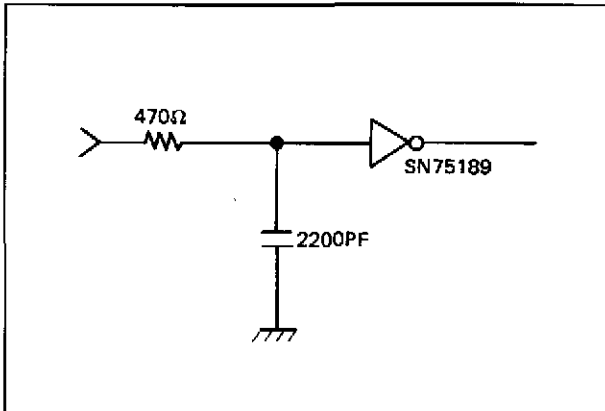
(1) DATA1 ~ DATA8 (Input)



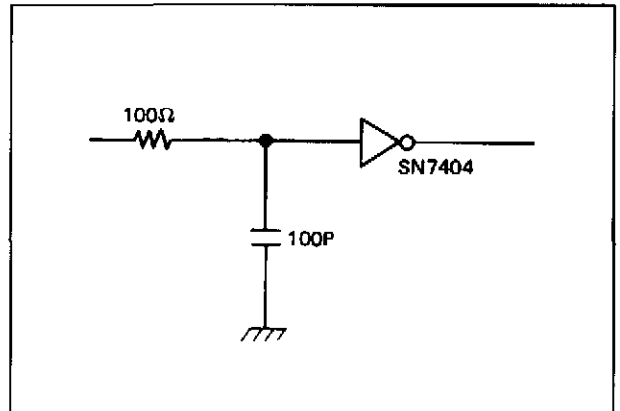
(2) DATA STB, $\overline{\text{DATA STB}}$



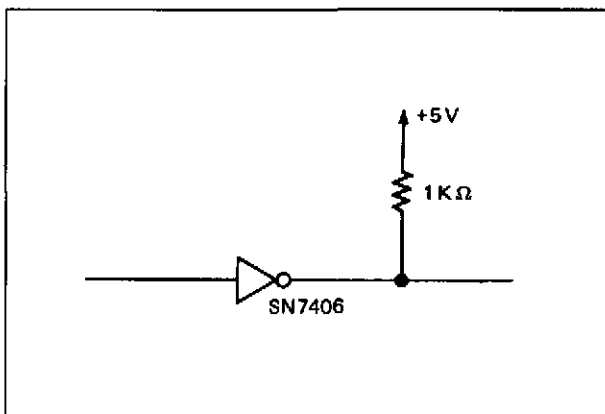
(3) IRT (Input)



(4) $\overline{\text{PRIME}}$ (Input)



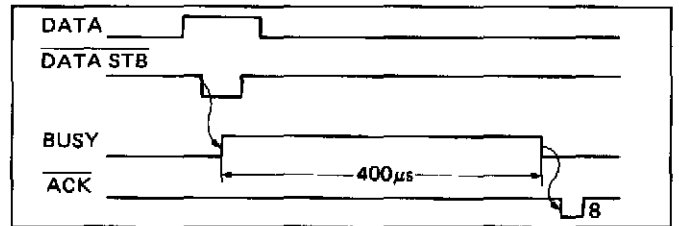
(5) BUSY, $\overline{\text{SELECT FAULT}}$, $\overline{\text{ACK}}$, PE, STATUS (Output)



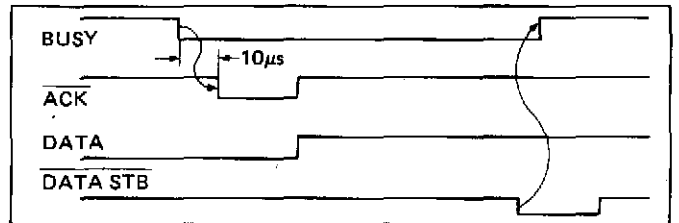
■ **Signal timing**

The timing charts (standard) are shown below.

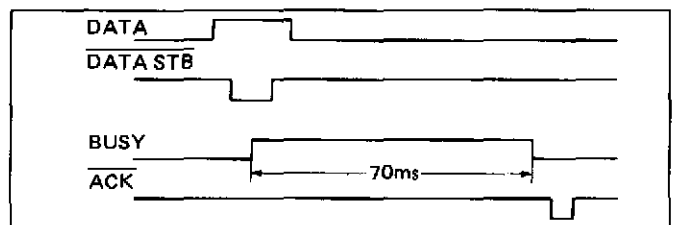
1. Data input



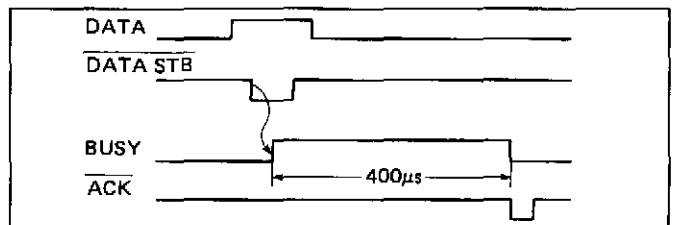
2. BUSY signal



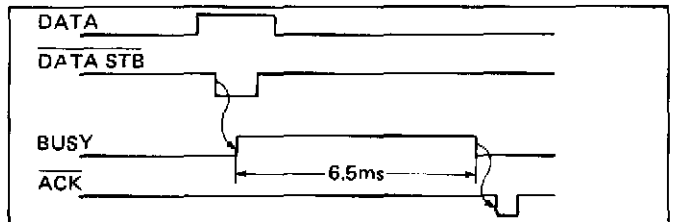
3. Line feed



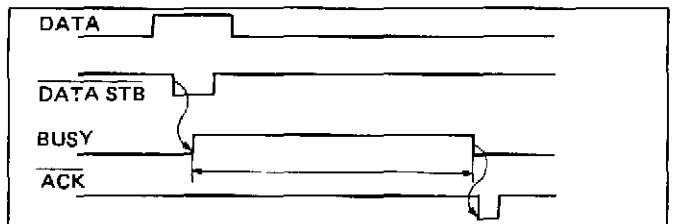
4. Cancel code, undefined code



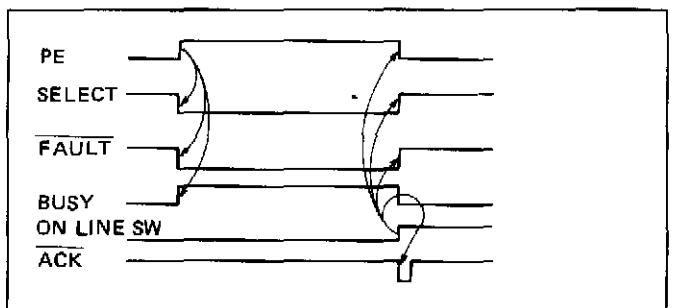
5. Horizontal tabulation (09H)



6. Carriage return (Printing instruction code)



7. When PE occurs during SELECT



Character Code Table (ASCII)

The set of printing characters varies, depending on the kind of ROM unit used. Character Code Tables for individual ROM units are shown below. Each table has a matrix structure, with the upper 4 bits of hexadecimal ASCII code shown in columns and the lower 4 bits thereof shown in rows. For example, the ASCII code for alphabet "A" is 41H.

- When ROM unit MZ-8BP4R is used
Character Code Table (For MZ-80B)

Upper 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower 4 bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0 0000			□	0	@	P	`	p	||	—	■	0	@	P	`	p
1 0001	↓		!	1	A	Q	a	q	↓	¥	!	1	A	Q	a	q
2 0010	↑		”	2	B	R	b	r	↑	£	”	2	B	R	b	r
3 0011	→		#	3	C	S	c	s	→	●	#	3	C	S	c	s
4 0100	←		\$	4	D	T	d	t	←	○	\$	4	D	T	d	t
5 0101	H		%	5	E	U	e	u	♠	□	%	5	E	U	e	u
6 0110	C		&	6	F	V	f	v	♥	□	&	6	F	V	f	v
7 0111			'	7	G	W	g	w	♦	□	'	7	G	W	g	w
8 1000			(	8	H	X	h	x	♣	□	(	8	H	X	h	x
9 1001			)	9	I	Y	i	y	♠	+	)	9	I	Y	i	y
A 1010			*	:	J	Z	j	z	♠	|	*	:	J	Z	j	z
B 1011			+	;	K	[	k	}	♠	—	+	;	K	[	k	}
C 1100			,	<	L	\	|	|	♠	♠	,	<	L	\	|	|
D 1101			—	=	M	]	m	}	♠	♠	—	=	M	]	m	}
E 1110			.	>	N	^	n	~	♠	♠	.	>	N	^	n	~
F 1111		■	/	?	O	_	o	↓	♠	♠	/	?	O	■	o	π

■ When ROM unit MZ-80AP4R is used

Character Code Table (For MZ-80A)

Upper 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower 4 bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			O	@	P	♣	▣	}	▬	q	n	|	▣	▬	▣
1	0001	↓	!	I	A	Q	H	▣	+	▣	a	/	▣	▣	♠	●
2	0010	↑	"	2	B	R	I	▣	▬	e	z	ü	▣	▣	▬	▬
3	0011	→	#	3	C	S	♣	▣	▬	`	w	m	▣	▣	▬	♥
4	0100	←	\$	4	D	T	♣	▣	▬	~	s	/	▣	▣	▬	▬
5	0101	H	%	5	E	U	♣	▣	▬	▣	u	/	▣	▣	▬	▬
6	0110	C	&	6	F	V	♣	▣	▬	t	i	/	→	▣	▬	✕
7	0111		'	7	G	W	●	▣	▬	g	≡	o	▣	▣	▬	○
8	1000		(	8	H	X	☺	▣	▬	h	ö	l	▣	▣	▬	♣
9	1001		)	9	I	Y	♣	▣	▬	k	Ä	▣	▣	▬	▬	▬
A	1010		✕	:	J	Z	♣	▣	▬	b	f	ö	▣	▣	▬	♦
B	1011		+	;	K	□	♣	o	^	x	v	ä	▣	▣	▬	£
C	1100		,	<	L	▬	♣	▣	▬	d	||	/	○	▣	▣	↓
D	1101		-	=	M	□	♣	▣	▬	r	ü	y	▣	▣	▬	▬
E	1110		.	>	N	↑	▣	▣	▬	p	β	{	▣	▣	▬	▬
F	1111		/	?	O	←	▣	▣	▬	c	j	/	▣	▣	▬	π

■ When ROM unit MZ-8KP4R is used

Character Code Table (For MZ-80K)

Upper 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower 4 bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			O	@	P	☘	▣		👁	q	n		⌋	⌋	□
1	0001	↓	!	I	A	Q	H	▣	+	▣	a	▣	▣	H	♠	●
2	0010	↑	”	2	B	R	I	▣	▣	e	z	ü	▣	H	⌋	▣
3	0011	→	#	3	C	S	♣	▣	▣	w	m		▣	H	⌋	♥
4	0100	←	\$	4	D	T	♣	▣	▣	s		▣	▣	▣	▣	▣
5	0101	H	%	5	E	U	♣	▣	▣	u	▣	▣	▣	▣	▣	▣
6	0110	C	&	6	F	V	♣	▣	▣	t	i	▣	→	▣	▣	✕
7	0111		'	7	G	W	●	▣	▣	g	▣	o	▣	▣	▣	○
8	1000		(	8	H	X	☺	▣	▣	h	ö	l	▣	▣	▣	♣
9	1001		)	9	I	Y	☺	▣	▣	k	ä	▣	▣	▣	▣	▣
A	1010		*	:	J	Z	♣	▣	▣	b	f	ö	▣	▣	▣	♦
B	1011		+	;	K	☒	♣	o	☺	x	v	ä	H	▣	▣	£
C	1100		,	<	L	▣	♣	▣	▣	d	▣	▣	○	▣	▣	↓
D	1101		-	=	M	J	♣	▣	▣	r	ü	y	▣	▣	▣	▣
E	1110		.	>	N	↑	H	▣	▣	p	β	☺	▣	▣	▣	▣
F	1111		/	?	O	←	▣	▣	▣	c	j	▣	▣	▣	▣	π

■ When ROM unit MZ-8SP4R is used

As for characters marked " © " in the table below, different characters can be printed by the use of the function switch. For details, refer to the Languagewise Character Table given below.

Character Code Table

Upper 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower 4 bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			□	O	©3	P	©8	P							
1	0001			!	I	A	Q	a	q							
2	0010			"	2	B	R	b	r							
3	0011			©1	3	C	S	c	s							
4	0100			©2	4	D	T	d	t							
5	0101			%	5	E	U	e	u							
6	0110			&	6	F	V	f	v							
7	0111			'	7	G	W	g	w							
8	1000			(	8	H	X	h	x							
9	1001			)	9	I	Y	i	y							
A	1010			×	:	J	Z	j	z							
B	1011			+	;	K	©4	k	©9							
C	1100			,	<	L	©5	l	©10							
D	1101			-	=	M	©6	m	©11							
E	1110			.	>	N	©7	n	©12							
F	1111			/	?	O	□	o								

Languagewise Character Table

Character code (Hexadecimal)	©1	©2	©3	©4	©5	©6	©7	©8	©9	©10	©11	©12
Character code (Hexadecimal)	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
ASCII standard	#	\$	@	|	\	\]	^	^	|	|	|	-
French	#	\$	à	°	ç	§	-	-	é	ù	è	-
German	#	\$	§	Ä	Ö	Ü	-	-	ä	ö	ü	ß
Danish	#	\$	@	Æ	Ø	Å	-	-	æ	ø	å	-
Swedish	#	ö	É	Ä	Ö	Å	Û	é	ä	ö	å	u
Italian	#	\$	@	"	\	é	-	-	ù	à	ò	è
Spanish	Pt	\$	@	í	Ñ	¿	-	-	-	ñ	|	~

Note) Character codes 20H through 7EH are effective.
7FH through FFH shall be ignored as character codes.

Specifications

Item	Specification
Printing system Feeding system Maximum number of printing characters Kind of printing characters	Dot matrix impact system <ul style="list-style-type: none"> ● Tractor system ● Friction system ● 136 characters/line (ordinary character) 68 characters (enlarged character) ● 160 characters/line (ordinary character) 80 characters (enlarged character) Differs depending on ROM units. For details, refer to the text.
Character dot construction Interval between characters Graphic dot construction Dot pitch Line changing pitch Printing speed Line changing speed Quick return	9 (horizontal) x 8 (vertical), including half-dots. <ul style="list-style-type: none"> ● 10 characters/inch (in 136 character mode) ● 11.8 characters/inch (in 160-character mode) ● 7 x 8 in 136-character mode ● 6 x 8 in 160-character mode 0.3628 mm (horizontal) x 0.37 mm (vertical) 1/6 inch, 1/9 inch (compression mode) 150 characters/sec (in 160-character mode) 70ms 600ms
Printing direction	Bidirectional shortest-distance printing
Parts for replacement	<ul style="list-style-type: none"> ● Head assembly ● Cartridge ribbon
Printing recording paper Cartridge ribbon	Refer to the specifications for printing recording paper. Sharp cartridge ribbon (For MZ-80P4) <ul style="list-style-type: none"> ● Color: Signal color (Black) ● Material: Nylon (plain weave) ● Dimension: 13 mm in width ● Length: 13 mm (endless)
Other functions	<ul style="list-style-type: none"> ● Graphic function (through the use of software). ● Form position memory backup function (through the use of dry cells)
Applicable conditions Rated voltage Power consumption External dimensions Weight	Relative humidity: 30% ~ 80% Ambient temperature: 5°C ~ 35°C (operation) 0°C ~ 50°C (storage) Local supply voltage (provided that it conforms to the specification on the rating indication plate.) 80W Width: 530 mm Depth: 464 mm (including the assistant guide) Height: 178 mm 15 kg

- For improvement of the product, part of the specifications and appearance may be changed without prior notice. Please understand that the description herein contained may be different from the actual product in which improvement is made.
- This apparatus complies with requirements of EEC directive 76/889/EEC.