M X - 8 0 F / T

EPSON DOT MATRIX PRINTER

Operation Manual

EPSON

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INTRODUCTION

The EPSON MX-80 F/T Dot Matrix Printer is a highly versatile, general-purpose and computer-grade printer featuring 80 CPS bi-directional printing with logical seeking capability and 9 X 9 dot-matrix character formation. The MX-80 F/T accepts the ASCII 96 codes and codes for special characters/symbols (e.g.. Ä Ç £). It also accepts codes for 64 graphic patterns.

Characters can be printed in any desired size - enlarged, condensed, emphasized, normal, etc. The one-chip microprocessor is engaged in performing all functions of the Printer and the two built-in stepper motors of the MX-80 F/T control the carriage and paper feeding functions respectively. Therefore, versatile software controls, such as horizontal and vertical tabs, and form feed are at your disposal.

The MX-80 F/T is capable of S-way paper handling such as fanfold paper,roll paper and cut paper sheet.

In addition, various interface options are available to permit handshaking with most personal   computers.
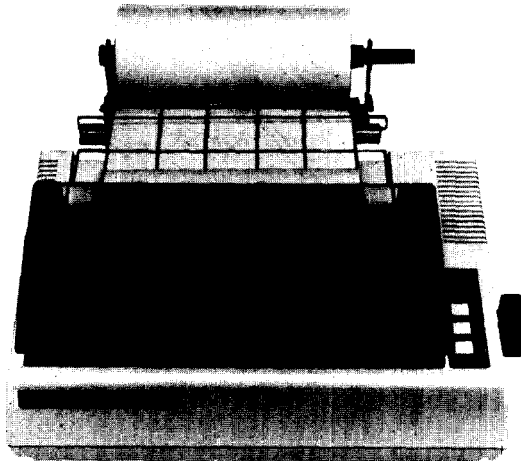
Fig. 1.   EPSON MX-80 F/T Dot Matrix Printer

INSTALLATION

1. Contents of Carton

The MX-80 F/T and standard accessories are as shown in Fig. 2. Upon unpacking, if you notice any listed contents missing or evident damage. contact the store where you purchased the MX-80 F/T as soon as possible.

Separator

Cartridge Ribbon

Power Cord (European Type) Operation Manual

MX-80 F/T Dot Matrix Printer
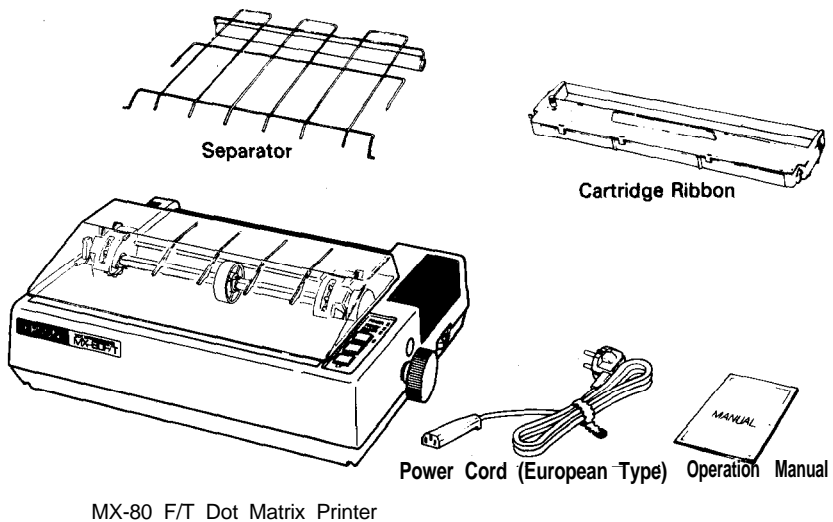
1. MX-80 F/T	1
2. Separator	1
3. Cartridge Ribbon	1
4. Power Cord (Only European Type 220/240V)	1
5. MX-80 F/T Operation Manual	1

Fig. 2 Contents of Carton

2. Unpacking

Before removing the MX-80 F/T from the carton, check the box for evidence of shipping damage or mishandling. If such evidence is present, notify the carrier immediately.

2.1. Unpacking steps

Unpacking steps are as follows:
STEP 1. Open the carton.
STEP 2. Remove accessories.
STEP 3. Remove the MX-80 F/T by holding its underside and lifting it straight up with the packing material attached.
STEP 4. Place the Printer with the packing material on a table or any other convenient flat surface.
STEP 5. Take off the packing material carefully.
STEP 6. Remove the vinyl cover.

2.2. Repacking steps

Repacking can be carried out by following the above steps in the reverse order.
(Repacking: Shipment for repair, storage, etc.)
NOTE: It is recommended that all original packing materials be saved for reuse in case the MX-80 F/T requires reshipment in the future.

3. Installation of the Printer

(1) Operating site selection
When installing the MX-80 F/T, observe the following instructions.
  (a) Place the Printer on a bench, tabletop or any other convenient flat surface with enough room for the separator in the back of the Printer.
    NOTE: Rubber feet are provided to prevent the marring of the surface on which the MX-80 F/T is placed.
  (b) Avoid operating the MX-80 F/T in places where it may be exposed to direct sunlight or where a great deal of greasy dust exists in the air.
    NOTE: Greasy dust may cause the malfunction of the print head.
  (c) Connect the power cord to an outlet separated from those connected to noise-generating equipment, such as large-power motors, refrigerators, etc.
  (d) Do not subject the Printer to temperatures below 5°C (40°F) or above 35°C (95°F) during operation, to sudden changes in temperature, or to extreme shock.
  (e) Avoid use of the Printer in humid locations or in the vicinity of heat generating sources such as heater, etc.

(2) Removal of protective paper for paper end detector

The MX-80 F/T is provided with a protective paper inserted between the inner and outer paper guides to protect the paper end detector from damage due to shocks or vibrations during transportation. Before using the Printer, be sure to remove this paper. If the MX-80 F/T is to be reshipped. remember to return it to the original position.

(3) Removal of shipping screws

The purpose of the shipping screws is to protect the MX-80 F/T against any damage that may be caused by shocks or vibrations during transportation. Therefore, before operating the MX-80 F/T, remove the screws as described below. (See Fig. 3.)

STEP 1. Open the printer lid.

STEP 2. Remove with a screwdriver, the two shipping screws visible inside the printer mechanism.
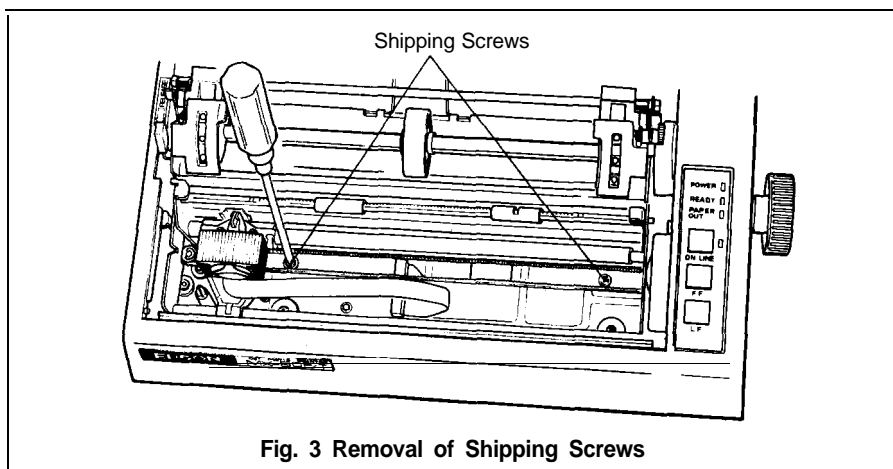
Shipping Screws

Fig. 3 Removal of Shipping Screws

NOTE: Save the two shipping screws for possible future use.

<SUPPLEMENT>

● If the printer lid is an obstacle when removing the shipping screws, be sure to take off the printer lid by observing the following steps. Rough or careless handling of the printer lid may result in damage to. or even breakage of its hinges.

Step 1. Stand the printer lid upright.

Step 2. Push the printer lid toward the right and pull up its left side. (See Figs. 4 (1) and (2).)

Printer Lid
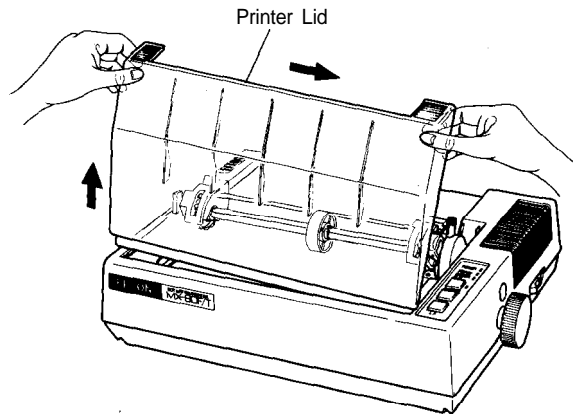
(1) Standard
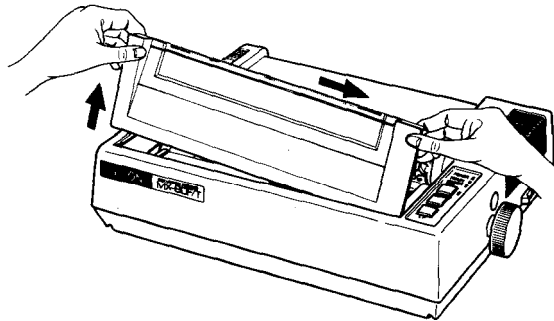
(2) Option

Fig. 4 Removal of Printer Lid

NOTE: The printer lid shown in Fig. 4 (2) is an optional accessory.

4. Cartridge Ribbon Setting

EPSON's Cartridge Ribbon is compact, long-lasting, and very easy to set and remove. Furthermore, you have no need to soil your fingers in handling it.

STEP 1. Open the printer lid (or remove it).

STEP 2. Confirm that the scale (paper retainer) is turned toward the platen and is touching.

STEP 3. Push the cartridge ribbon down and set it on the printer mechanism. To facilitate the cartridge ribbon setting, be sure to hold the projection at the center of the cartridge case when pushing the cartridge ribbon down. (See Fig. 5.)
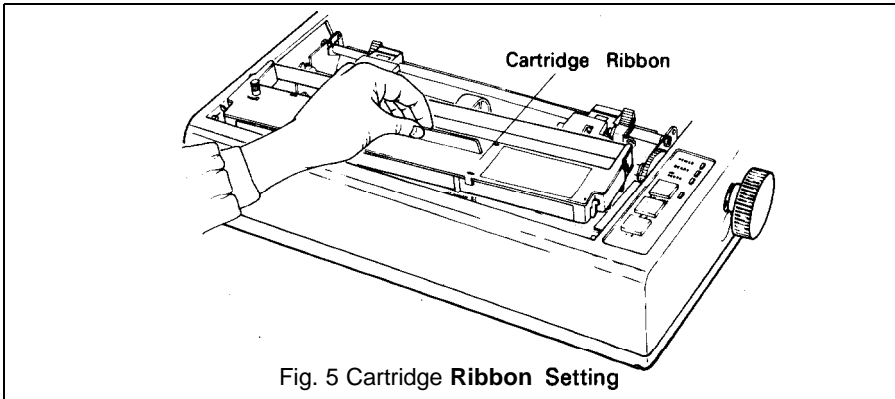
Fig. 5 Cartridge **Ribbon Setting**

STEP 4. Put the ribbon between the head nose and the ribbon mask. In this case, the ribbon can be set easily by hooking it to the edge of the head nose and turning the ribbon feeding knob of the cartridge case in the direction of the arrow (i.e., counterclockwise) while depressing the ribbon with a ball-point pen. Then, tension the ribbon by turning the ribbon feeding knob counterclockwise. (See Fig. 6.)
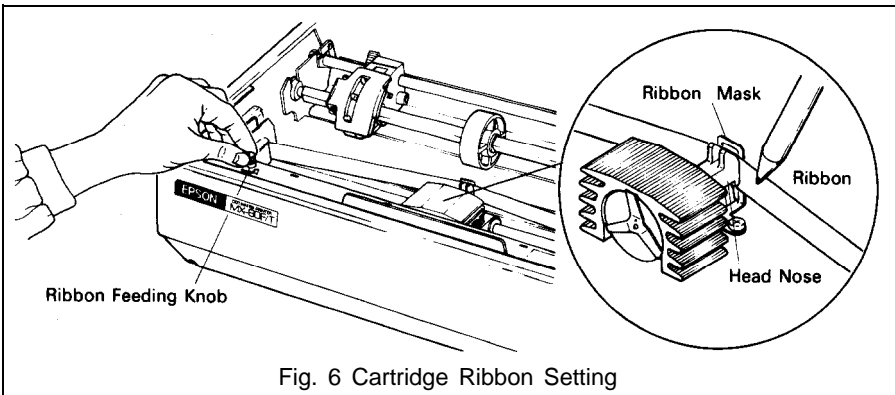
Fig. 6 Cartridge Ribbon Setting

NOTES: 1. Incorrect setting of the ribbon may cause it to come off. (See Fig. 7.)
2. Confirm that the ribbon is neither twisted nor creased and that the cartridge is set properly.

Fig. 7 Examples of Correct and Incorrect Ribbon Setting
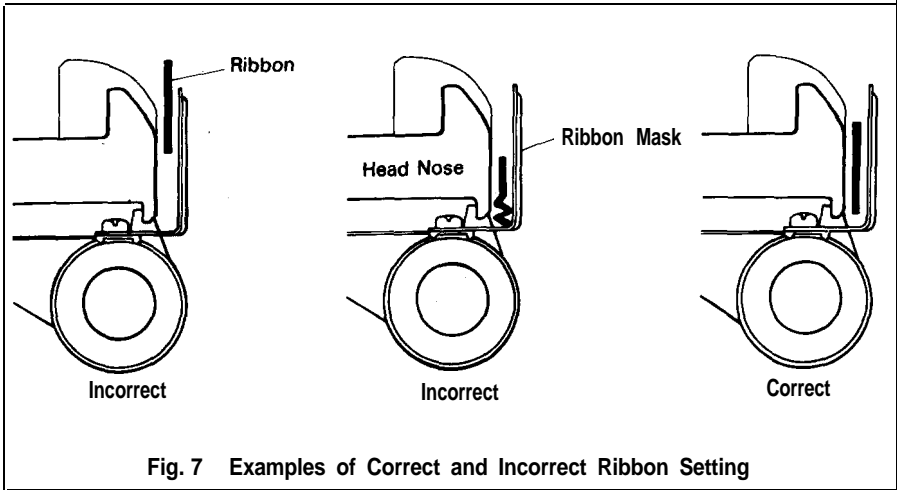
5. Separator Installation

The separator of the Printer contributes to smooth paper feeding. Set the separator by inserting its edge into the two holes located at the rear part of the paper feeding mechanism. (See Fig. 8.)

Fig. 8 Separator Installation
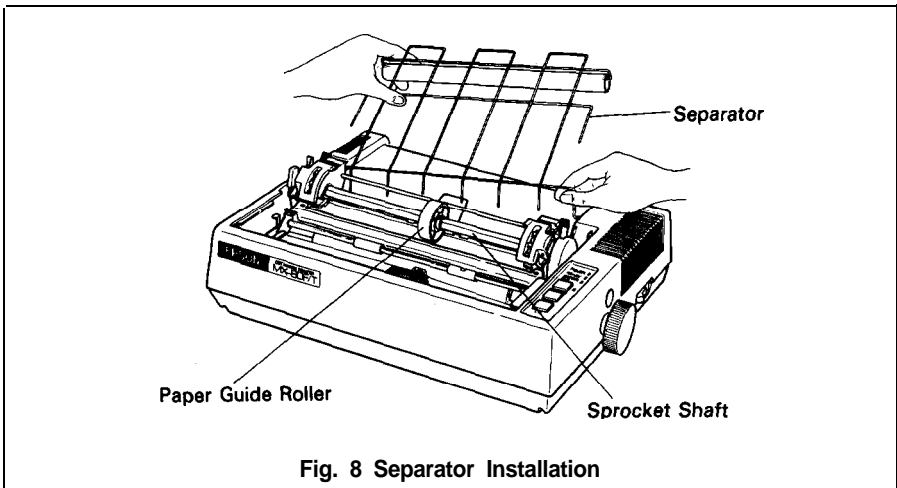
6. Dismounting of Tractor Unit

The tractor unit of the MX-80 F/T is detachable. If it is an obstacle when using roll paper, it can be taken out as follows;
STEP 1. Release the lock levers of the tractor unit by pulling in the direction as shown in Fig. 9.
STEP 2. Keep pulling the levers and pull up the tractor unit

Lock lever
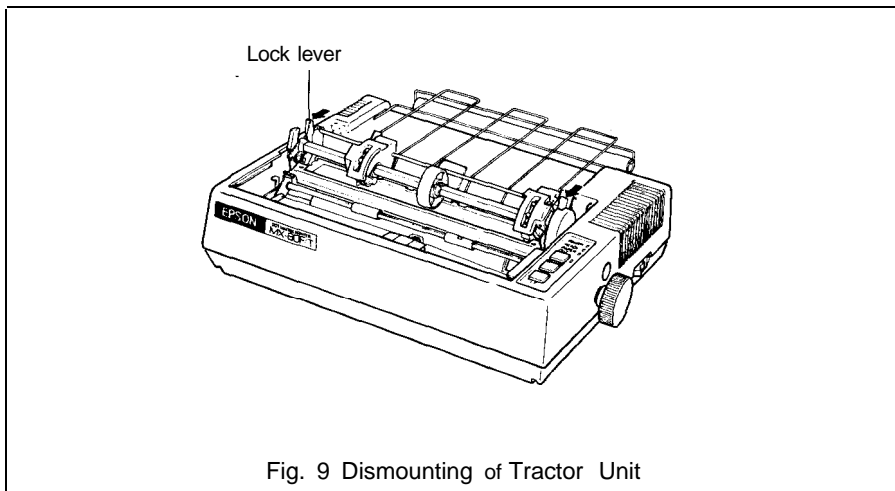
Fig. 9 Dismounting of Tractor Unit

To install the tractor unit, hook the notches of the tractor frames onto the shaft shown in Fig. 10 and then push down the tractor unit.
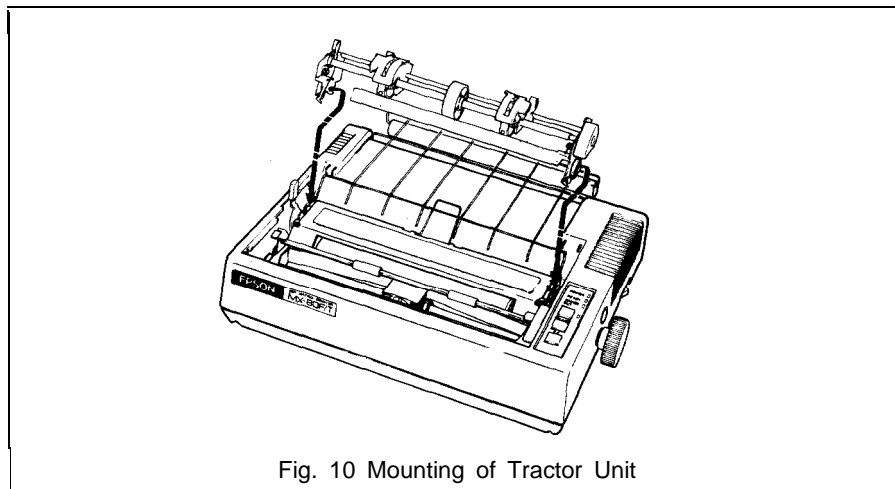
Fig. 10 Mounting of Tractor Unit

7. Paper Loading

7.1. Fanfold paper

7.1.1. Loading of fanfold paper

The MX-80 F/T Printer accommodates fanfold paper from 4" to 10" in width.
To load the fanfold paper, observe the following procedure.

STEP 1. Raise the printer lid.

STEP 2. Unlock the release lever by pulling it in the direction of the arrow. (See Fig. 11.)

STEP 3. Pull the scale toward the front of the Printer to detach the scale from the platen.

STEP 4. Confirm that the paper guide roller is at the center of the sprocket shaft, If not, set it at the center of the shaft.
NOTE: The paper guide roller contributes to smooth paper feeding.

STEP 5 Raise the two paper holding covers, and be sure to insert the fanfold paper between the frame and plastic roller of the separator. (See Fig. 11.)

Fig. 11   Insertion of Fanfold Paper

STEP 6. Push the paper into the insertion slot between the paper guides at the rear part of the printer mechanism.
NOTE: Be sure to pass the paper beneath the upper paper guide. Adjust the position of the head adjusting lever in the forward (+) direction when inserting thicker paper. (See Section 8. Gap Adjustment.)

STEP 7. After the leading edge of the paper has emerged from the Printer, pull it out gently to some length.

STEP 8. Raise the two sprocket lock levers to loosen, and adjust the sprocket pin position to the paper width. (See Fig. 12.)

Paper Holding Cover

Sprocket Lock Lever

Feeding Pin

Fig. 12   Raising of Sprocket Lock Levers
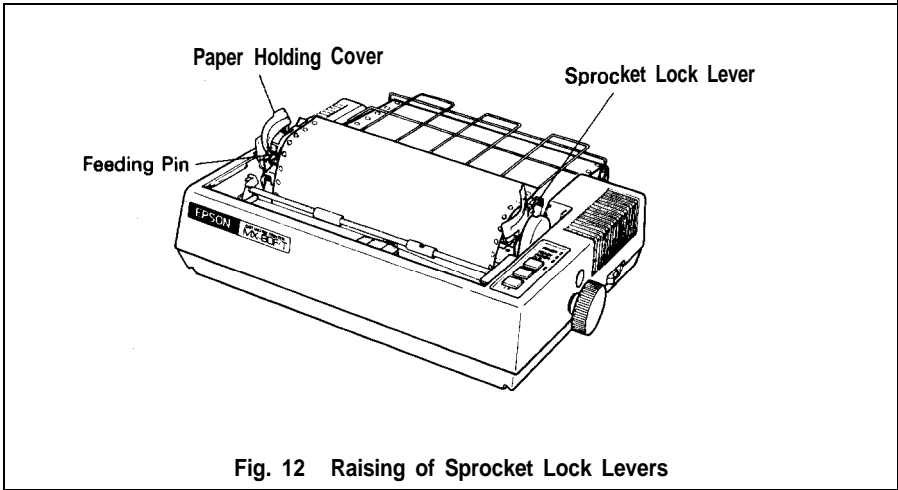
STEP 9. Engage the paper feed holes of the paper on the feeding pins, push the scale back into position, and adjust the tension of the paper. Then push the paper holding covers and the two sprocket lock levers down. (See Fig. 13.)
   NOTE: In this case, confirm that the feeding pins are centered in the respective paper feed holes of the paper.

Paper Holding Covers

Sprocket Lock Lever

Feeding Pin

Scale

Fig. 13   Engagement of Paper Feed Holes on Feeding Pins
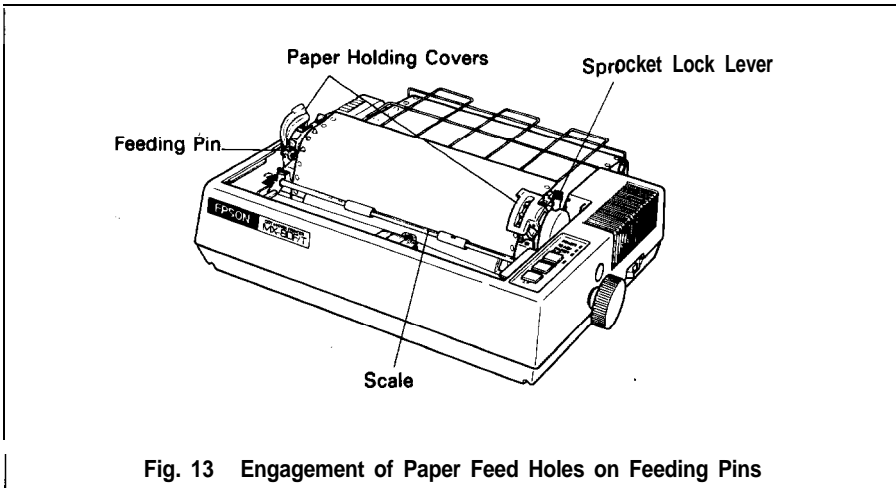
STEP 10. Put the printer lid on the Printer. (See Fig. 14.)
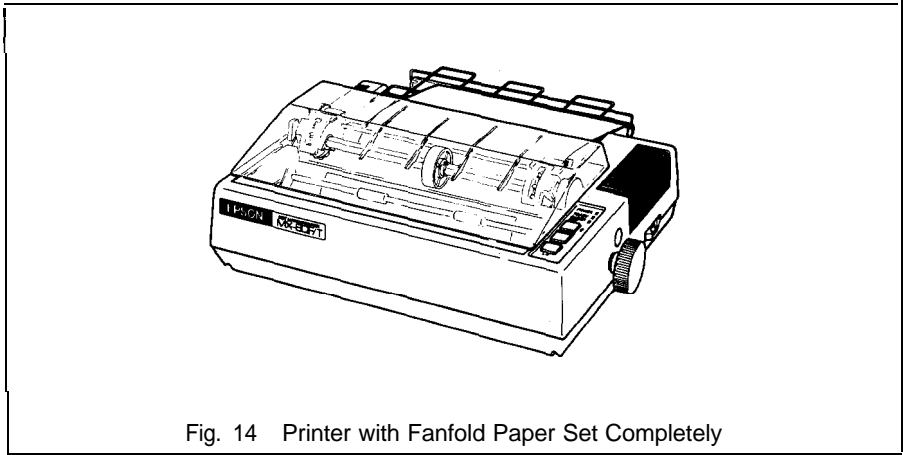
Fig. 14   Printer with Fanfold Paper Set Completely

NOTE: When the MX-80 F/T is to be used on a desk or a bench, arrangement
       of the fanfold paper in parallel with the MX-80 F/T as shown below
       will permit the paper to be folded in an accordion style.

Course of
Paper
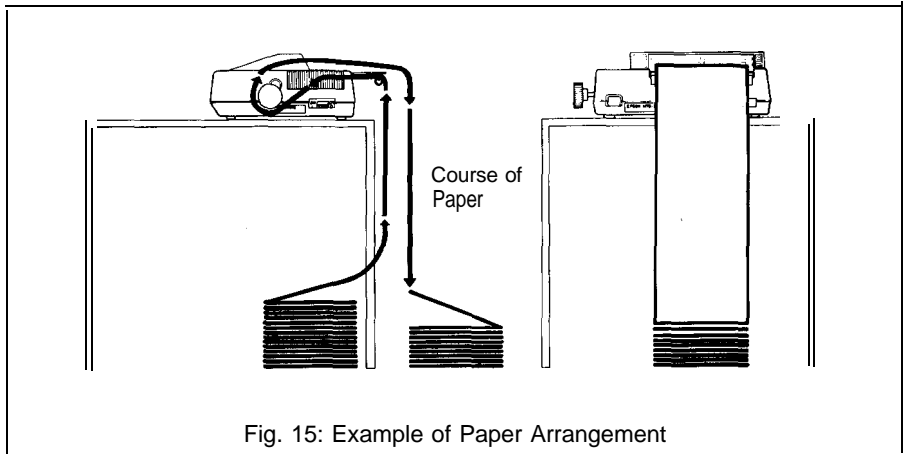
Fig. 15: Example of Paper Arrangement

7.1.2. Removal of fanfold paper

To remove the fanfold paper, follow either of the two methods described
below.

(1) To disengage the paper from the paper holding mechanism, pull it forward
    out of the Printer.
    NOTE: Do not attempt to pull out the paper in the backward direction.

(2) Feed the paper out of the Printer by electrical operation. For this, turn the
    Power Switch on and push the Line Feed button. (Details are described
    later.1

7.1.3. Column layout on fanfold paper

When fanfold paper of from 4" to 10" in width is supplied with the MX-80 F/T, the graduations on the scale can be used as the indexes of print column positions (1~80). Alignment of the print start position on fanfold paper with the 1st column position at the extreme left of the scale will facilitate column layout. Accordingly. center the paper by adjusting it to these indexes of the scale.

7.1.4. Top of form position setting

The term "Top of Form position" is defined as the position in which the first print line lies on the form, and this position is determined when the power switch is turned on. Namely, adjust the paper position by the manual paper feed knob so that the required line position (i.e., the point at which the first line of the form is desired to be printed) is at the print head level. If, at this point, power is applied to the Printer, this line position automatically becomes the Top of Form position.

When printing forms, the matchmarks located on both the sprockets facilitate the setting of the Top of Form position on the fanfold paper. To set the Top of Form position, first enter (or preprint) a mark at a position on the edge of the paper 77 mm above the first print line position of the paper, then align this mark with the matchmarks on the sprockets by turning the manual paper feed knob. At this point, turn the Power Switch on and the Printer will recognize this position as the Top of Form position. Now, the printing can be started from the Top of Form position. (See Fig. 16.)

In case of feeding one page of fanfold paper by operating the MX-80 F/T by the input of FF code, the abovementioned adjustment is effective.
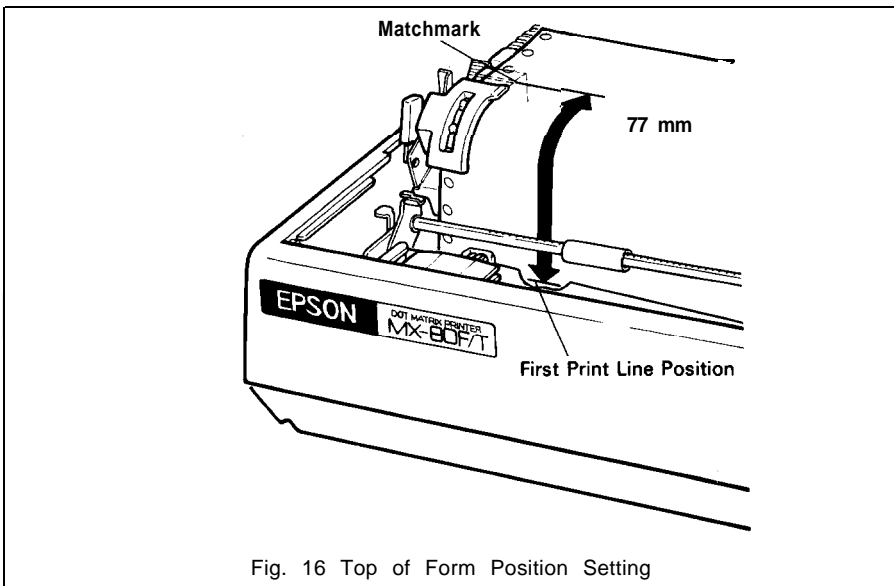
Fig. 16 Top of Form Position Setting

7.2. Roll Paper

7.2.1. Roll paper holder

EPSON offers the roll paper holder as an optional accessory for the MX-80 F/T.
See Appendix for the assembly instructions on Roll Paper Holder.

7.2.2. Loading of roll paper

The MX-80 F/T accommodates a roll of single ply paper measuring 8.5 ± 0.12
in. in width with a 1 in. core. To load it, observe the following procedure.

STEP 1. Raise the printer lid.

STEP 2. Unlock the release lever by pulling it in the direction of the arrow. (See
Fig. 17.)

STEP 3. Pull the scale toward the front of the Printer to detach the scale from
the platen. (See Fig. 17.)

STEP 4. Confirm that the paper guide roller is at the center of the sprocket
shaft. If not, set it at the center of the shaft. (See Fig. 17.)
NOTE: The paper guide roller contributes to smooth paper feeding.

STEP 5. Insert the end of the roll paper between the frame and the plastic roller
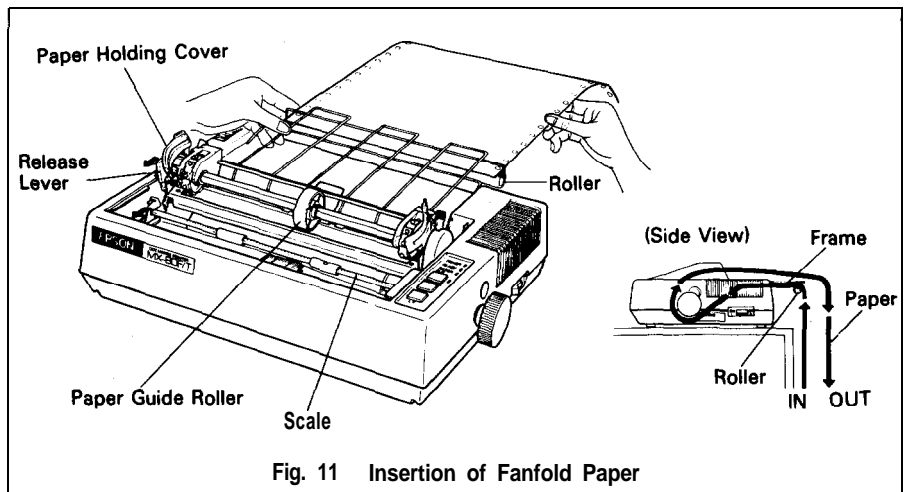of the separator. (See Fig. 17.)
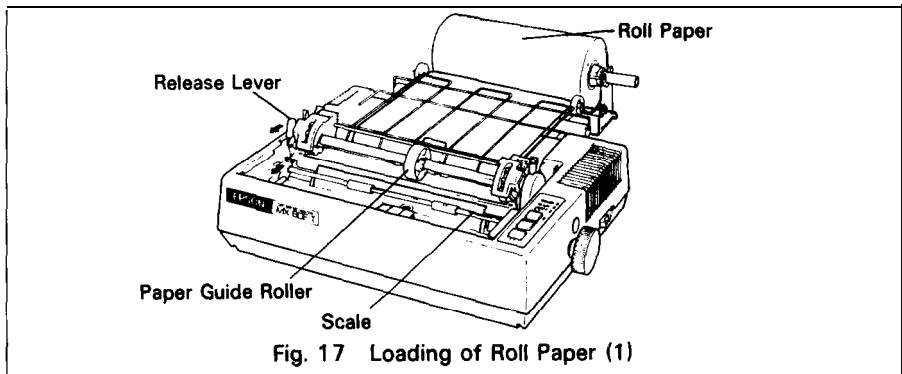
Fig. 17   Loading of Roll Paper (1)

STEP 6. Push the paper into the insertion slot between the paper guides at the
rear part of the printer mechanism. (See Fig. 18.)
NOTES: 1. Be sure to pass the paper beneath the upper paper guide.
2. Two-ply roll paper is not recommended for use.

STEP 7. Lock the release lever and push the scale back into position. (See Fig.
19.)

STEP 8. While turning the manual paper feed knob clockwise, confirm that the
paper advances straight up. If not, adjust the inserted paper position
by unlocking the release lever.

STEP 9. Put the printer lid on the Printer.

Fig. 18 Loading of Roll Paper (2)

Fig. 19 Loading of Roll Paper (3)
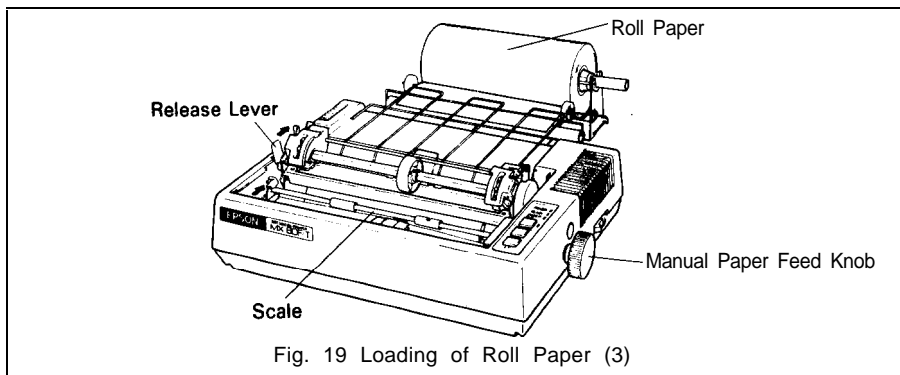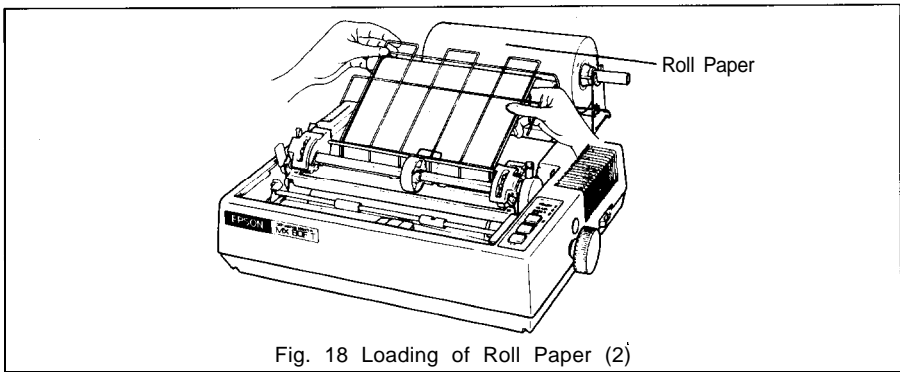
7.3. Cut paper sheet

7.3.1. Loading of cut paper sheet

The MX-80 F/T accommodates cut paper sheets measuring 8.3" to 8.5" in width. To load a cut paper sheet, observe the following procedure.

STEP 1. Raise the printer lid.

STEP 2. Unlock the release lever. (See Fig. 20.)

STEP 3. Pull the scale toward the front of the Printer to detach the scale from the platen. (See Fig. 20.)

STEP 4. Confirm that the paper guide roller is at the center of the sprocket shaft. If not, set it at the center of the shaft.

NOTE: The paper guide contributes to smooth paper feeding.

STEP 5. Insert the cut paper sheet between the paper guides at the rear part of the printer mechanism.

NOTE: The paper sheet can be installed without removing the separator.

Fig. 20 Loading of Cut Paper Sheet
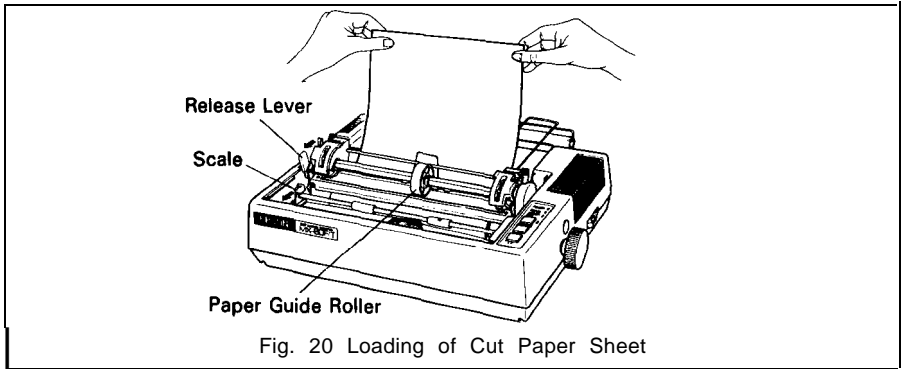
STEP 6. Lock the release lever.
STEP 7. While turning the manual paper feed knob clockwise, confirm that the paper advances straight up. (See Fig. 21.)

Fig. 21 Adjustment of Inserted Paper Position
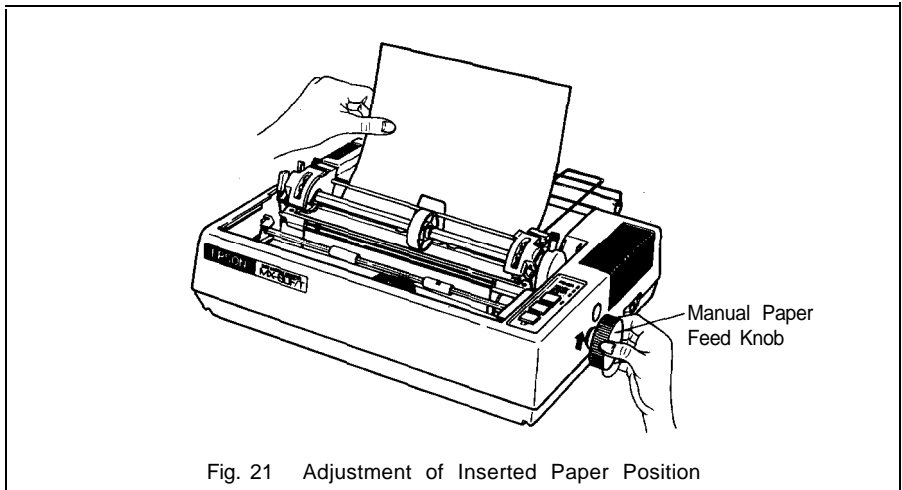
If not, adjust the inserted paper position as follows:
(a) If the cut paper sheet or form is long enough, unlock the release lever and align the side edges of the paper as shown in Fig. 22.

Fig. 22 Alignment of Side edges
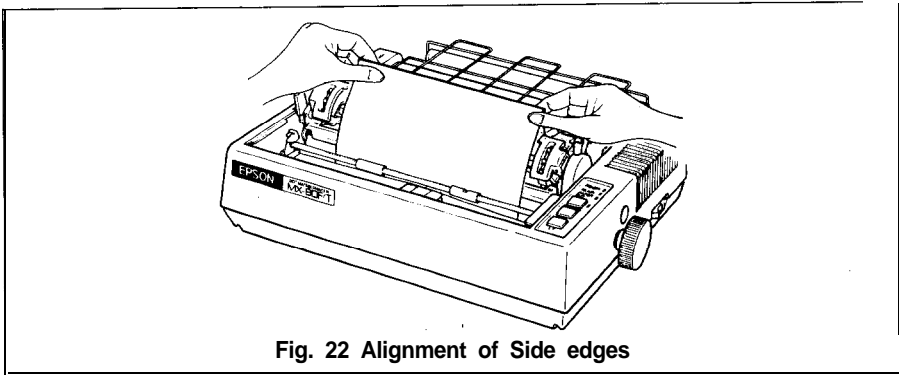
(b) If the **cut paper** sheet or form is not long enough to align the side edges, align the top edge of the paper with the form position setting mark on the tractor unit. (See Fig. 23.)

1/8
1/4

Fig. 23 Form Position Setting Mark
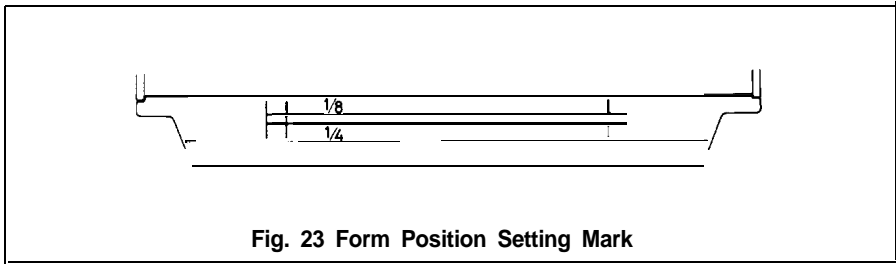
The print area on the cut paper sheet (when printing it with the tractor unit installed) is shown in Fig. 24.

210 mm (8.3")-216 mm (8.5")

5–8 mm   5–8 mm

28.6 or
30.2 mm

ABCD..
BCDE
CDE

0 1 2
1 2 3
2 3 4

305 mm
(12") Max.

NOPQ
OPQR..

A B
A B C

7.5 mm

Fig. 24 Print Area
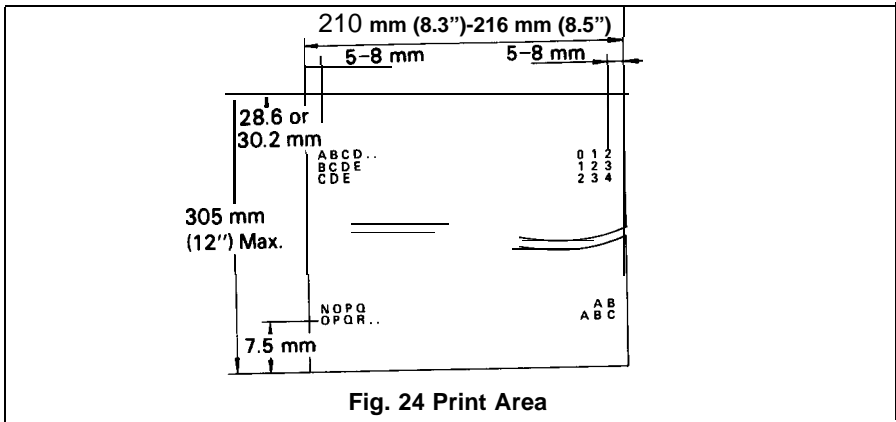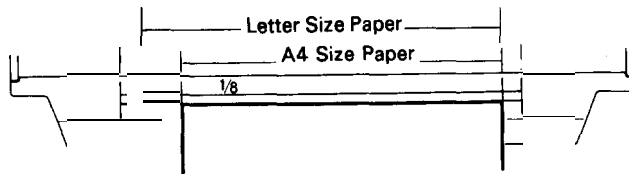
Fig. 25   Setting of Cut Paper Sheet
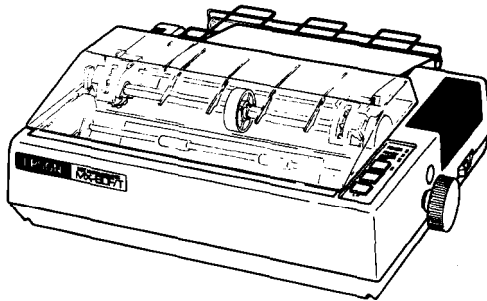
Fig. 26   Printer with Cut Paper Sheet Set Completely

NOTES: 1. The Paper End Detector function may be disabled under software control (ESC 8; refer to page 39) provided printing is left off within 7.5 mm from the paper bottom edge.

2. If the paper is set on the line marked 1/4as shown in Fig. 25, then the printing starts from a position 28.6 mm below the top edge of the paper. If the paper is set on the line marked 1/8. then the printing starts from a position 30.2 mm below the top edge of the paper.

STEP 8. Push the scale back into position and put the printer lid on the Printer. (See Fig. 26.)

- 1 7 -

8. Gap Adjustment

The adjustment of a gap between the head nose and the platen is used to adjust the printing pressure as well as to suit paper of a different thickness.
(1) Move the head adjusting lever (located on the left frame of the Printer) forward or backward to adjust the gap between the head nose and the platen. (See Fig. 27.)
   Forward: To widen gap.
   Backward: To narrow gap.
   NOTE: With a thick paper, be sure to widen this gap.
(2) Adjust the position of the head adjusting lever according to the type of paper to be used.

Paper	Position of adjusting lever
Single-leaf paper	Set the lever to the 4th step.
Carbon paper sheets	Set the lever to the 7th step.

(3) Should printed characters become faint due to the use of the Printer for an extended period, move the head adjusting lever backward (in the $\ominus$ direction) by one step. (See Fig. 27.)
(4) When a set of carbon paper sheets is used, be sure that no characters are printed within the area two lines each above and below the perforation.

9. Power Connection

The EPSON MX-80 F/T Dot Matrix Printer is capable of operating on the following three types of AC power.
(1) 115V AC, 60Hz
(2) 220V AC, 50Hz
(3) 240V AC, 50Hz
Before connecting the MX-80 F/T to a power source, make certain of the primary AC rating from the label located on the chassis at the rear of the Printer. After connection of the Printer to the proper power source and upon application of power to the Printer, "Initialization" will take place in the Printer with the effects described in "OPERATION" 5.4. If your MX-80 F/T has a primary AC rating different from the available power source, do not attempt to operate the Printer. Please obtain a replacement unit with the correct AC rating from the store where you purchased the MX-80 F/T.

Head Adjusting Lever

⊖ Backward

⊕ Forward

⊖ Backward ⟷ Forward ⊕

4th step

Head Adjusting Lever

(Side view)

7th step

Fig. 27 Gap Adjustment
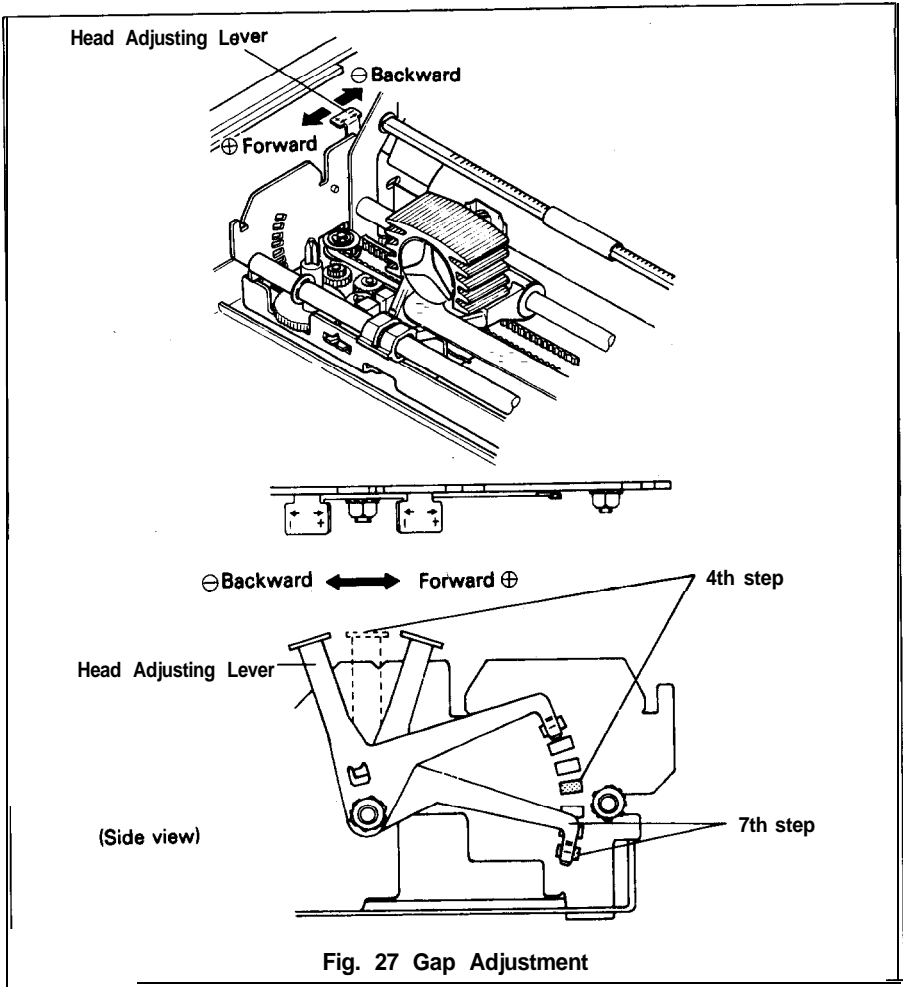
OPERATION

1. Switches and indicators

There are three switches and four indicators (green LED's) on the control panel and one power switch on the right side of the Printer case. In this section, panel operating procedures are covered in sufficient detail for the user to become familiarized with the Printer. (See Fig. 28 for the control panel.)
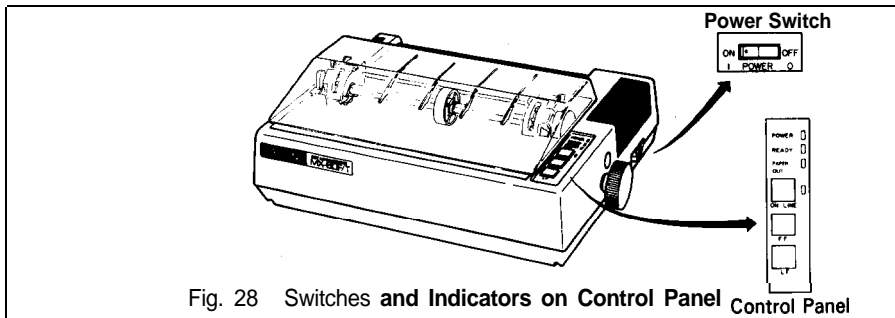
Fig. 28   Switches **and Indicators on Control Panel** Control Panel

1.1 Switches

POWER SW: Controls primary AC power to the Printer.

> **NOTE:** Before turning this switch on, check to see if the paper is properly set in the Printer.
> Incorrect setting of the paper may prevent the Printer from operating properly.

ON LINE SW: When this switch is depressed, the Printer enters the ON-LINE mode and can be utilized in conjunction with a host computer. Depressing the switch again will set the Printer in the OFF-LINE mode. The switch does not function while the Printer is actively engaged in printing. The Printer is automatically placed OFF-LINE if the paper supply is exhausted or if a mechanical error occurs in the Printer.

The operations of the Line Feed and Form Feed switches are effective only while the Printer is OFF-LINE.

When the ON LINE switch is pushed while data is being received, all data received up to then is printed immediately. This is helpful to avoid data loss. If data has been transferred into the print buffer without any print command such as CR, LF or VT code, no data can be printed out on the paper. However, if the ON LINE switch is turned off, the data stored in the print buffer is printed out. Therefore, no data is lost when the Printer becomes OFF-LINE.

FF SW: When this switch is depressed once, the paper is advanced ver-
(Form Feed) tically to the next Top of Form position. This switch must be
depressed while the Printer is OFF-LINE. Otherwise, the form
feed operation will not be carried out.

The Top of Form position is initialized when the POWER switch
is turned on or when INIT signal is applied to the interface con-
nector. Therefore, before turning the POWER switch on to start
operating the Printer, set the paper at the appropriate Top of
Form position. (See "INSTALLATION" 7.1.4.)

LF SW: The paper advances while this switch is being depressed. The
(Line Feed) line spacing for paper advancement is determined by ESC A+n
code (described later). When the POWER switch is on, the line
spacing is initialized at 1/6 inch.

The line feed operation is prohibited while the Printer is actively
engaged in printing.

1.2. Indicators

POWER: Illuminates while the Printer is receiving AC power.
READY: Illuminates when the Printer is ready to receive data.
PAPER OUT: Illuminates when the paper supply is near its end.
ON **LINE:** Illuminates when the Printer is in the ON-LINE mode.

2. Buzzer

The buzzer is located inside the Printer case, and sounds under the following
conditions.

BEL code: It sounds for about 3 seconds when the Printer receives BEL
code.

Error status: It sounds intermittently for about 30 seconds when the Printer
falls into error status.

NOTE: Setting of the DIP switch pin 1-6 (on the control circuit board)
OFF stops the buzzer from sounding under the above condi-
tions.

3. Paper End Detector

When the paper end detector (a reed switch located on the paper guide)
detects that the paper is nearly exhausted, the signals on the interface connec-
tor change to the following statuses.

Table 1   Interface Signals in Paper-Out Status

Signal	Pin No.	Status
ERROR	32	LOW
PE (Paper End)	12	HIGH
BUSY	11	HIGH
ACKNLG	10	No pulse is output

When the Printer falls into paper-out status, the buzzer sounds intermittently for 30 seconds to alert the operator. After the buzzer stops, paper advancement can be performed by depressing the LF switch.

After setting new paper in the Printer, depress the ON LINE switch so that the Printer may resume operation. There is another way to start the Printer again when it falls into paper-out status. Set new paper in the Printer, and turn the POWER switch off and on again, or apply the INIT signal.

In this case, however, all previously established data such as TAB, line spacing, etc. are erased.

4. **Self-Test**

The MX-80 F/T has a self-test (self-diagnostic) function to check the following.
(1) Print head operation and printing quality
(2) Operation of the printer mechanisms (motor, cartridge ribbon mechanism, belt. etc.)

The self-test function is pre-programmed and can be performed by turning the POWER switch on while depressing the LF switch. All characters provided by the internal software are printed out on the paper by this operation.

```
789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcd
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcde
9:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdef
:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
```
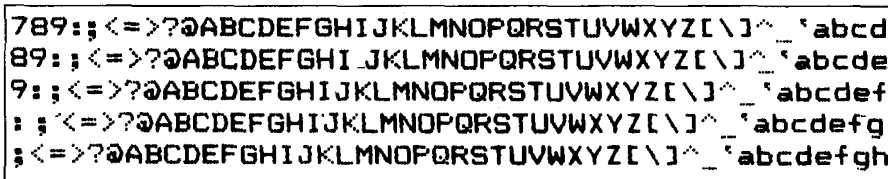
NOTES: 1. The self-test function cannot be performed when the printer is out of paper.

2. To check all interface logic including the interface connector, proceed as follows:

(a) Connect ACKNLG signal pin No. 10 to STROBE signal pin No. 1 with a lead wire.

(b) Turn the DIP switch 2-3 (on the control circuit board) ON to effect auto-line feed.

(c) Set the adequate ASCII code data to be printed. To obtain low logic level signals, connect the data transfer line required for printing (pin Nos. 2 to 9) to GND level (pin No. 33, etc.)

• Example of printing'?"

$''Z''=[5,A]_H=(0101\ 1010)$

In this case, connect pin Nos. 2, 4, 7 and 9 to pin No. 33.

5. Construction of MX-80 F/T

The EPSON MX-80 F/T Dot Matrix Printer consists of the following three major functional blocks.

(1) The model 3310 printer mechanism

(2) Control circuit board

(3) Power circuit

These three blocks are housed in a plastic case and are connected to one another.

5.1. Printer mechanism

The model 3310 printer mechanism has been developed by Shinshu Seiki with the technology in the precision and electronic industry fields amassed through its long association with SEIKO, manufacturer of the world-famous SEIKO watches.

The printer mechanism contains two stepper motors. One is to move the print head to the next print column position, and the other is to advance the paper.

(1) Stepper motor for head carriage

The stepper motor for head carriage is controlled under LSI "8041" called "slave CPU". The CPU knows the current printing position at any given time, and the print head is stopped at the last printing position. Then, the CPU seeks the shortest travel way to the next print line.

This feature and bi-directional printing enable the Printer to perform the logical seeking function which minimizes the head travel time to the next print line.

(2) Stepper motor for paper feed

Paper is fed by the stepper motor, like the head carriage. One complete rotation of the stepper motor corresponds to 1/3 inch paper advance. In the MX-80 F/T, the operator can select any paper feed length under software control (described in detail later).

(3) Micro print head

The micro print head has 9 dot wires to form 9 X 9 dot matrix characters. 9 wires form more legible characters than those formed by 7 wires. The print head for the 3310 printer mechanism is quite compact.

5.2. Control circuit board

In this paragraph, the printer LSI circuitry is outlined. The control circuit diagram is shown 'in Fig. 29, and the driver circuit diagram in Fig. 30.
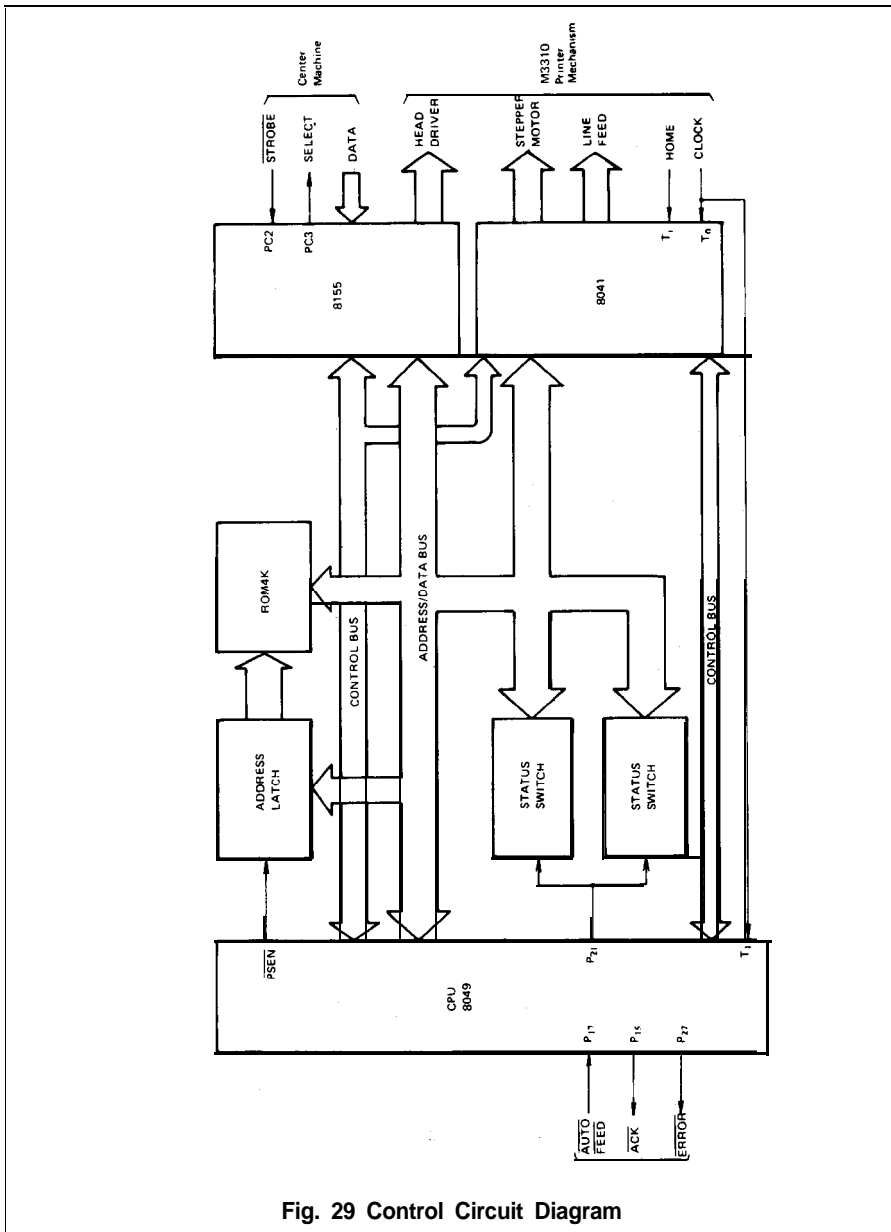
Fig. 29 Control Circuit Diagram
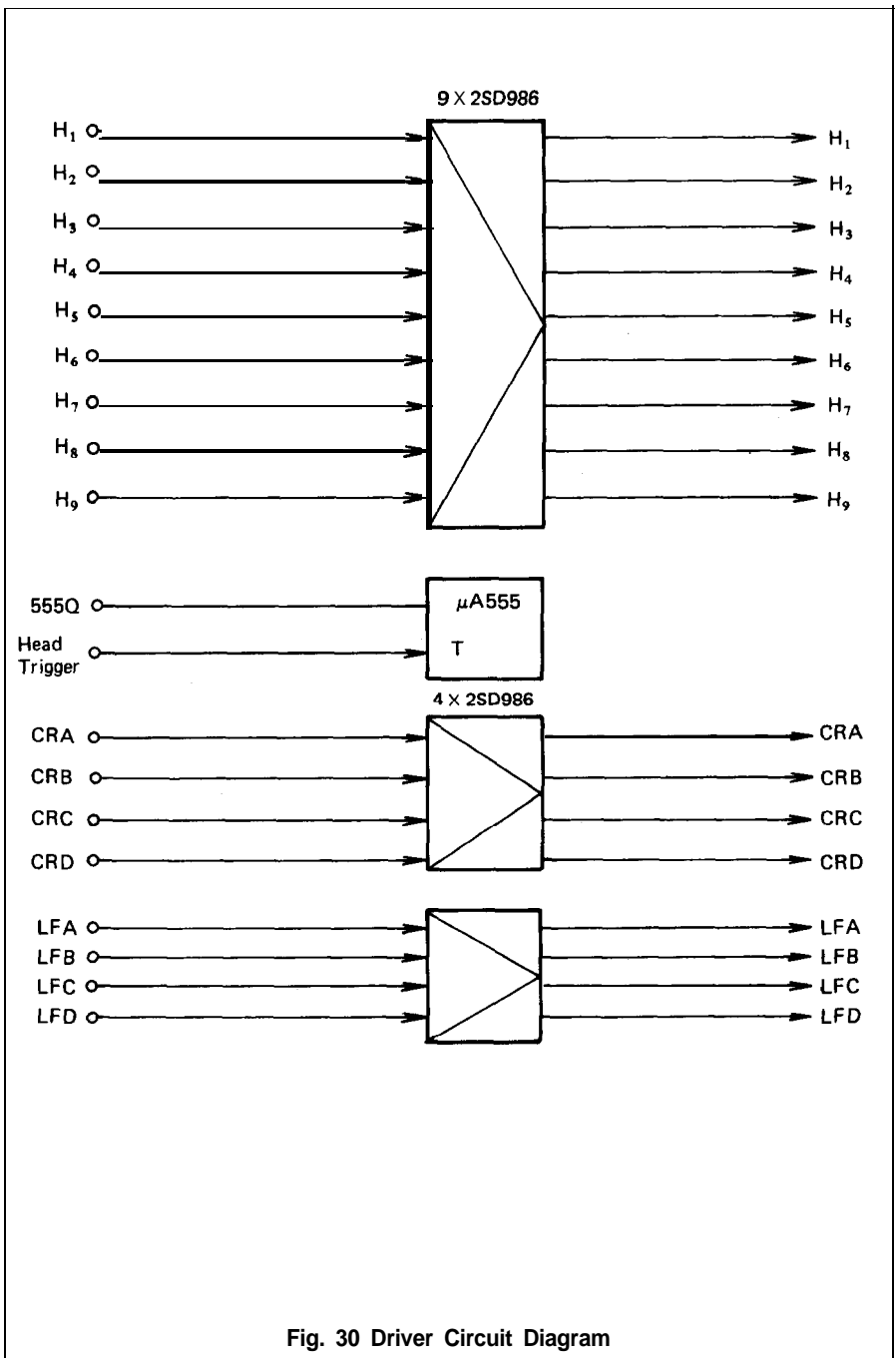
Fig. 30 Driver Circuit Diagram

5.3. Power circuit

The power circuit generates 5V DC for the logic circuit, and 24V DC to energize the solenoids of the print head and two stepper motors.

5.4. Printer initialization

Printer initialization is accomplished in either of the two ways described below.
(1) Initialization takes place automatically each time the primary AC power source is interrupted and reapplied (i.e.. by turning the Power Switch off and on).
(2) Initialization may be initiated remotely by activating the INIT signal to the parallel interface connector. This line should be driven by a TTL driver or its equivalent.
   The minimum reset pulse width is 50 psec at the receiving terminal. Upon application of the initialization signal, the following sequence of events take place in the Printer.
   (a) The print head returns to its home position.
   (b) The Printer is automatically placed ON-LINE, unless it is out of paper.
   (c) The print buffer is cleared.
   (d) The line spacing is set at 1/6 inch.
   (e) The form length per page is set to 66 or 72 lines.
      NOTE: The form length of 72 lines per page is applicable to only the version
            *marked with identifier code "M72" on the rear side of the lower case
             of the Printer.
   (f) Any stored vertical or horizontal tab stop positions are cleared.
   (g) The character print-width logic is reset to the normal state.

8. Setting of DIP Switches

There are two DIP switches on the control circuit board. In order to suit the user's specific requirements, desired control modes are selectable by the DIP switches. The functions of the switches and their preset conditions at the time of shipment are as shown in Table 2 (DIP Switch 1) and Table 3 (DIP Switch 2).

Fig. 31   Location of DIP Switches
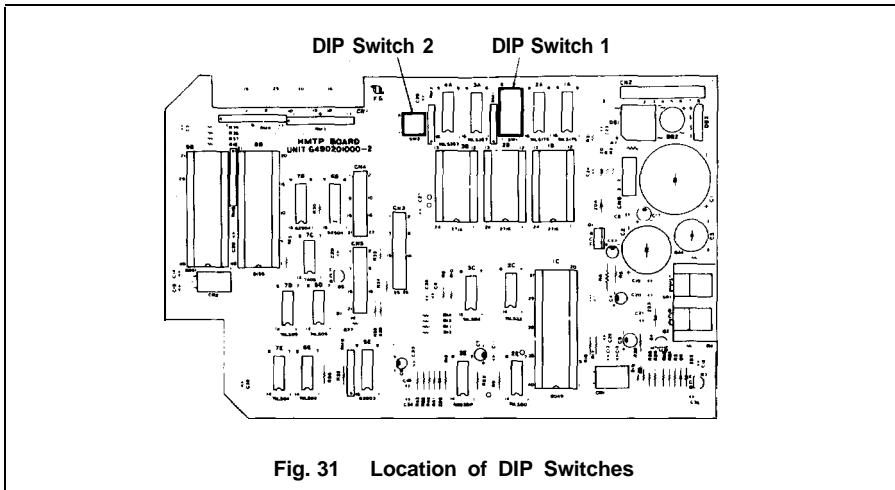
Table 2   Functions and Conditions of DIP Switch 1

Pin No.	Function		ON	OFF	Factory-set Condition
1	Not applicable				ON
2	CR	Print & Line Feed / Print only	Print only	Print & line feed	ON
3	Buffer full	Print & Line Feed / Print only	Print only	Print & line feed	ON
4	Cancel code	Valid / Invalid	Invalid	Valid	OFF
5	Delete code	Valid / Invalid	Invalid	Valid	ON
6	Error Buzzer		Sounds	Does not sound	ON
7	Character generator / Graphic patterns select / Japanese syllabary select		Japanese syllabary select	Graphic patterns select	OFF
8	SLCT IN signal / Fixed internally / Not fixed internally		Fixed	Not fixed	ON

Table 3   Functions and Conditions of DIP Switch 2

Pin No.	Function		ON	OFF	Factory-set Condition
1	Selectors of special characters/symbols (See Table 8)		—	—	ON
2			—		ON
3	AUTO FEED XT̄ signal	Fixed internally / Not fixed internally	Fixed	Not fixed	OFF
4	Coding table select	TRS-80 / Standard	TRS-80	Standard	OFF

NOTE: When DIP Switch pin 2-4 is set to the "ON" position (for TRS-80 mode), all the other pins of the DIP switches 1 and 2 will not function irrespective of these ON/OFF positions.

Table 4   Special Characters/Symbols Available for Selection (using DIP Switch Pins 2-1 and 2-2)

SW2-1	SW 2-2	Country
ON	ON	U.S.A.
ON	OFF	France
OFF	ON	Germany
OFF	OFF	England

7. Parallel Interface

The MX-80 F/T includes a parallel interface as the standard equipment, and this paragraph describes the parallel interface.

(1) Specifications
   (a) Data transfer rate: 1000 CPS (max.)
   (b) Synchronization: By externally supplied STROBE pulses.
   (c) Handshaking: By ACKNLG or BUSY signals.
   (d) Logic level: Input data and all interface control signals are compatible with the TTL level.

(2) Connector
   Plug: 57-30360 (AMPHENOL)
   It is recommended that interface cables be kept as short as possible.

(3) Connector pin assignment and descriptions of signals.
   Connector pin assignment and descriptions of respective interface signals are provided in Table 5.

Table 5   Connector Pin Assignment and Descriptions of Interface Signals

Signal Pin No.	Return Pin No.	Signal	Direction	Description
1	19	$\overline{\text{STROBE}}$	In	STROBE pulse to read data in. Pulse width must be more than 0.5μs at receiving terminal. The signal level is normally "HIGH"; read-in of data is performed at the "LOW" level of this signal.
2	20	DATA 1	In	
3	21	DATA 2	In	
4	22	DATA 3	In	
5	23	DATA 4	In	These signals represent information of the 1st to 8th bits of parallel data respectively. Each signal is at "HIGH" level when data is logical "1" and "LOW" when logical "0".
6	24	DATA 5	In	
7	25	DATA 6	In	
8	26	DATA 7	In	
9	27	DATA 8	In	
10	28	$\overline{\text{ACKNLG}}$	Out	Approx. 5μs pulse. "LOW" indicates that data has been received and that the printer is ready to accept other data.
11	29	BUSY	Out	A "HIGH" signal indicates that the printer cannot receive data. The signal becomes "High" in the following cases: 1. During data entry 2. During printing operation 3. In OFF-LINE state 4. During printer error status.
12	30	PE	Out	A "HIGH" signal indicates that the printer is out of paper.
13	–	SLCT	Out	This signal indicates that the printer is in the selected state.
14	–	$\overline{\text{AUTO FEED XT}}$	In	With this signal being at "LOW" level, the paper is automatically fed one line after printing. (The signal level can be fixed to "LOW" with DIP SW pin 2-3 provided on the control circuit board.)
15	–	NC		Not used.
16	–	0V		Logic GND level.
17	–	CHASSIS-GND	–	Printer chassis GND. In the printer, the chassis GND and the logic GND are isolated from each other.

Table 5 (cont.)

Signal Pin No.	Return Pin No.	Signal	Direction	Description
18	—	NC	—	Not used.
9 to 30	—	GND		TWISTED-PAIR RETURN signal GND level.
31	—	$\overline{\text{INIT}}$	In	When the level of this signal becomes "LOW", the printer controller is reset to its initial state and the print buffer is cleared. This signal is normally at "HIGH" level, and its pulse width must be more than 50μs at the receiving terminal.
32		$\overline{\text{ERROR}}$	Out	The level of this signal becomes "LOW" when the printer is in — 1. PAPER END state 2. OFF-LINE state 3. Error state
33	—	GND	—	Same as with Pin Nos. 19 to 30.
34	—	NC		Not used.
35				Pulled up to +5V through 4.7KΩ resistance.
36	—	$\overline{\text{SLCT IN}}$	In	Data entry to the printer is possible only when the level of this signal is "LOW". (Internal fixing can be carried out with DIP SW 1-8. The condition at the time of shipment is set "LOW" for this signal.)

NOTES:
1. "Direction" refers to the direction of signal flow as viewed from the printer.
2. "Return" denotes "TWISTED PAIR RETURN" and is to be connected at signal ground level.
   As to the wiring for the interface, be sure to use a twisted-pair cable for each signal and never fail to complete connection on the Return side. To prevent noise effectively, these cables should be shielded and connected to the chassis of the host computer and the printer, respectively.
3. All interface conditions are based on TTL level. Both the rise and fall times of each signal must be less than 0.2 μs.
4. Data transfer must not be carried out by ignoring the $\overline{\text{ACKNLG}}$ or BUSY signal. (Data transfer to this printer can be carried out only after confirming the $\overline{\text{ACKNLG}}$ signal or when the level of the BUSY signal is "LOW".)

(4) Data transfer sequence
    Fig. 32 shows the sequence for data transmission.
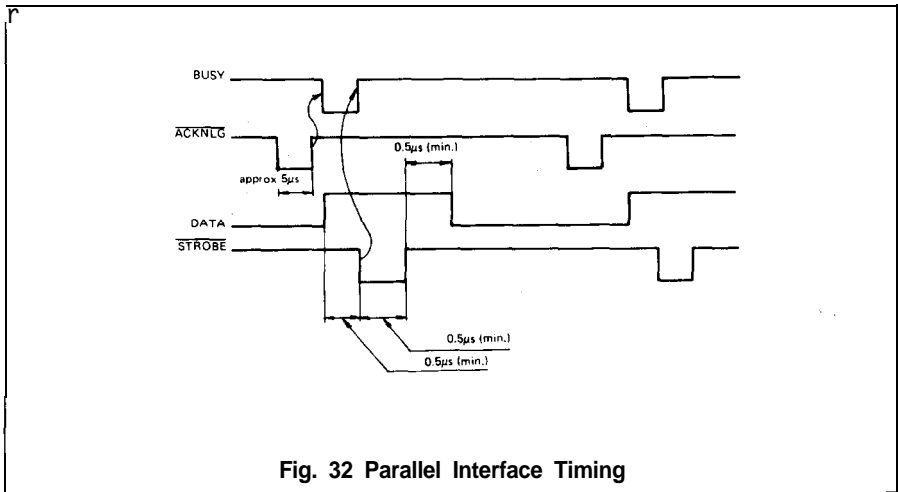
Fig. 32 Parallel Interface Timing

8. Coding Tables

(1) Table 6 shows all available codes when the Printer is set for operation with standard coding by setting the DIP switch pin 2-4 to the OFF position. This DIP switch pin is factory-set to the OFF position.
(2) When the DIP switch pin 2-4 is turned ON, the Printer behaves as a completely compatible printer to the Tandy Personal Computer TRS-80. The available codes in this case are shown in Table 7.
    Note that all the other pins of DIP switches 1 and 2 will not function irrespective of their ON/OFF positions whenever the DIP switch 2-4 is turned ON for TRS-80 mode.
(3) Table 8 shows Special Characters/Symbols which are selectable by the DIP switch pins 2-1 and 2-2 as described in paragraph 6 above.

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL		SP	0	@	P	`	p	NUL							
1	0001		DC1	!	1	A	Q	a	q		DC1						
2	0010		DC2	"	2	B	R	b	r		DC2						
3	0011		DC3	#	3	C	S	c	s		DC3						
4	0100		DC4	$	4	D	T	d	t		DC4						
5	0101			%	5	E	U	e	u								
6	0110			&	6	F	V	f	v								
7	0111	BEL		'	7	G	W	g	w	BEL							
8	1000		CAN	(	8	H	X	h	x		CAN						
9	1001	HT		)	9	I	Y	i	y	HT							
A	1010	LF		*	:	J	Z	j	z	LF							
B	1011	VT	ESC	+	;	K	[	k	{	VT	ESC						
C	1100	FF		,	<	L	\	l	|	FF							
D	1101	CR			=	M	]	m	}	CR							
E	1110	SO		•	>	N	^	n	~	SO							
F	1111	SI		/	?	O	—	o	DEL	SI							

Table 6 Coding Table (Standard)

		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000			SP	0	@	P	`	p								
1	0001			!	1	A	Q	a	q								
2	0010			"	2	B	R	b	r								
3	0011			#	3	C	S	c	s								
4	0100			$	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	LF		*	:	J	Z	j	z								
B	1011		ESC	+	;	K	[	k	{								
C	1100			,	<	L	\	l	¦								
D	1101	CR	GS	—	=	M	]	m	}								
E	1110		RS	.	>	N	^	n	~								
F	1111		US	/	?	O	_	o	DEL								

NOTE

GS : 16.5 chara/inch print

RS : 10 chara/inch print

US : 5 chara/inch print

ESC 6 : 6 lines/inch line feed

ESC 8 : 8 lines/inch line feed

ESC A : Long line mode

ESC B : Short line mode

Table 7 Coding Table (TRS-80)

Table 8 Special Characters/Symbols

code	U.S.A.	France	Germany	England
[23] H	#	#	#	£
[40] H	@	à	§	@
[5B] H	[	°	Ä	[
[5C] H	\	ç	Ö	\
[5D] H	]	§	Ü	]
[7B] H	{	é	ä	{
[7C]	H ¦	ù	ö	¦
[7D] H	}	è	ü	}
[7E]	H ~	¨	ß	

9. Control Codes

Various kinds of control codes are contained in Tables 6 and 7.

These control codes are recognized by the MX-80 F/T, and the Printer performs specified functions upon receipt of these codes.

The following are descriptions of respective control codes.

(1) CR (Carriage Return)

When the CR code is transmitted to the print buffer, all data stored in the print buffer is printed.

(When AUTO FEED XT (Pin No. 14) is at "LOW" level or DIP switch pin 2-2 is ON. the paper is advanced one line automatically after printing.)

NOTE: When 80 columns of print data (including spaces) are continuously received and the following data is valid and printable, the Printer automatically begins to print the data stored in the print buffer. In this case, if AUTO FEED XT is at "LOW" level or DIP switch pin 2-3 is ON, the paper is advanced one line after printing.

(2) LF (Line Feed)

When the LF code is input, all data in the print buffer is printed and the paper is advanced one line.

NOTE: If no data precedes the LF code, or if all preceding data is "SPACE", only paper feeding is performed.

For example, if the data is transferred in the order of DATA→CR→ LF. DATA will be printed by the CR code, and when the Printer receives the LF code, it only carries out one line feed.

(3) VT (Vertical Tab)

When the VT code is input, all data preceding this code is printed. And the paper is advanced to the line position set by "ESC B" (described later.) If no vertical tab position is set by ESC B, the VT code behaves like the LF code. Therefore, the paper is advanced one line after printing.

(4) FF (Form Feed)

The FF code carries out the printing of all data stored in the print buffer and advances the paper to the next predetermined Top of Form position. The Top of Form is determined when the POWER switch is turned on or the INIT signal is applied.

If the form length per page is not set by "ESC C+n," it is regarded as 66 or 72 lines.

NOTE: The form length of 72 lines per page is applicable to only the version marked with identifier code "M72" on the rear side of the lower case of the Printer.

This code always initializes the printing of the data stored in the print buffer.

(5) SO (Shift Out)

When the SO code is input, all data that follows it in the same line will be printed out in enlarged (double width) characters. This code is cancelled by the printing operation or the input of "DC 4" code and can be input at any column position on a line. Therefore, normal size and enlarged characters can be mixed on the same line.

```
 1. [DATA]   ABC  SO  DEF  DC 4  GHI  CR   LF
    [PRINT]   ABCDEF GHI


 2. [DATA]   ABCD  SO  EFGH  CR   LF   IJKL  SO  MNOP  CR   LF
    [PRINT]   ABCDEFGH
              I JKLMNOP
```

(6) SI (Shift In)

When the SI code is input, all data that follows it will be printed out in con-densed characters. This code is cancelled by the input of "DC 2" code. The SI code can be input at any column position on a line, but all characters/symbols on the line containing SI code are printed out in condensed characters.

When printing condensed characters, the data capacity of the print buffer will become 132 columns per line.

When the SO code is received after the input of the SI code, condensed enlarged characters (double width of condensed characters) can be printed. This condition is cancelled by "DC 4" code, and the character size returns to "condensed."

```
1. [DATA]    SI  ABCDEFGHIJKL  CR  LF
   [PRINT]   ABCDEFGHIJKL

2. [DATA]    ABC  SI  DEF  SO  GHIJKL  CR  LF
   [PRINT]  ABCDEFGHI JKL
```

(7) DC 4 (Device Control 4)

The DC 4 code cancels the SO mode.

```
[DATA]    SI  ABCDEF  SO  GHI  DC 4  JKL  CR  LF
[PRINT]   ABCDEFGHIJKL
```

(8) **DC 2** (Device Control 2)

The DC 2 code cancels the SI mode.

```
[DATA]    SI  ABCDEF  SO  GHI  CR  LF  DC 2  JKLMN  CR  LF
[PRINT]   ABCDEFGHI
          JKLMN
```

(9) **HT** (Horizontal Tab)

The HT code carries out the horizontal tabulation.

If there is no tab position set, this code is ignored. The tab stop positions are set by "ESC D+n" (described later).

(10) CAN (Cancel)

Upon the input of the CAN code, all data previously stored in the print buffer is cancelled.

Therefore, this code is regarded as the print buffer clear command. This code clears the print buffer, but control codes (excluding the SO code) are still valid even if the CAN code is transferred.

The validity or invalidity of the CAN code is selectable by the DIP switch pin l-4 on the control circuit board.

(11) DEL (Delete)

This code functions the same as the CAN code.

The validity or invalidity of the DEL code is selectable by the DIP switch pin 1-5 on the control circuit board.

(12) DC 1 (Device Control 1)

The DC 1 code places the Printer in the Selected state.

With the Printer is in the Selected state, if the DC 1 code is input during data transfer, all data stored before the DC 1 code is ignored.

(13) DC 3 (Device Control 3)

The DC 3 code places the Printer in the Deselected state. In other words, it disables the Printer to receive data. Once the Printer is put in the Deselected state by the DC 3 code, the Printer will not revert to the Selected state unless the DC 1 code is input again.

NOTE: When the DC 1 and DC 3 codes are used, DIP switch pin l-8 should be in the "OFF" position.

```
1. [DATA]    DC 1  AAAAA  DC 3  BBBBB  DC 1  CCCCC  CR  LF
   [PRINT]    AAAAACCCCC
2. [DATA] AAAAA  DC 1  BBBBB  DC 3  CCCCC  DC 1  CR  LF
   [PRINT]    BBBBB
```

Relations among the ON LINE switch, $\overline{\text{SLCT IN}}$ signal, DC l/DC 3 code and interface signals are shown in Table 9 below.

Table 9   DC 1/DC 3 and Data Entry

ON LINE SWITCH	$\overline{\text{SLCT IN}}$	DC 1/DC 3	$\overline{\text{ERROR}}$	BUSY	$\overline{\text{ACKNLG}}$	SLCT	DATA ENTRY
OFF-LINE	HIGH/LOW	DC 1/DC 3	LOW	HIGH	Not Generated	LOW	Impossible
ON-LINE	HIGH	DC 1	HIGH	LOW/HIGH	Generated	HIGH	Possible (Normal entry)
		DC 3	HIGH	LOW/HIGH	Generated	LOW	Possible (See Note 1.)
	LOW	DC 1/DC 3	HIGH	LOW/HIGH	Generated	HIGH	Possible (Normal entry)

NOTES: 1. In Table 9, it is assumed that as soon as the Printer receives data. it sends back the $\overline{\text{ACKNLG}}$ signal, though this data is not stored in the print buffer. In this status, the Printer is waiting for the DC 1 code for normal entry.

2. The DC l/DC 3 code is valid under the condition that the DIP switch pin l-8 is OFF, namely, the level of $\overline{\text{SLCT IN}}$ at the pin No. 36 of the interface connector is "HIGH." When $\overline{\text{SLCT IN}}$ is "LOW," the DC l/DC 3 code is not valid.

(14) NUL (Null)

The NUL code is regarded as the termination for tabulation setting sequence (described in detail later).

(15) BEL(Bell)

When the BEL code is input, the buzzer sounds for about 3 seconds.

(16) Escape (ESC) control

(a) Escape numerical control

Input of an "ESC" code followed by an ASCII numeric code permits each of the following functions to be performed.

1) ESC 0(Escape 0)

Receipt of an "ESC" followed by ASCII code "0" causes the line spacing to be set at 1/8 inch. Input of the ESC 2 code or $\overline{\text{INIT}}$ signal to the interface connector or turning the power off and on again causes the line spacing to return to 1/6 inch.

2) ESC 1 (Escape 1)

Receipt of an "ESC" followed by ASCII code "1" causes the line spacing to be set at 7/72 inch. Input of the ESC 2 code or INIT signal to the interface connector or turning the power off and on again causes the line spacing to return to l/6 inch.

3) ESC 2(Escape 2)

Receipt of an "ESC" followed by ASCII code "2" causes the line spacing to be set at 1/6 inch. When the POWER switch is turned on, the line spacing is set at initial 1/6 inch. The ESC 2 code is also a command to execute "ESC A+n" modes (described later).

4) ESC 8(Escape 8)

The ESC 8 code makes it possible to transmit data even if there is no paper in the Printer.

This code should be transmitted before the Printer runs out of paper.

After transmitting this code, when the Printer runs out of paper, the $\overline{PE}$ signal of the interface connector turns to High level; the $\overline{ERROR}$ signal remains at High level.

5) ESC 9(Escape 9)

This code cancels the ESC 8 condition.

When the power is turned on, the Printer is initialized into ESC 9 status. Therefore, the Printer cannot receive data when there is no paper.

6) ESC SI

This code functions the same as "SI."

7) ESC SO

This code functions the same as "SO."

(b) ESC alphabetic control

Receipt of an "ESC" code followed by ASCII code "X" (alphabetic code) permits each of the following functions to be performed.

NOTE: "n" represents **a 7-bit binary number,** and the most significant bit is **not treated as data. "+" is inserted for the purpose of legibility only, and should not be input in actual operation.**

1) ESC A+n

This code specifies the amount of line spacing in the Line Feed.
$1 \leqslant <n>_{10} \leqslant 85$ (Decimal): "n" is, a binary number.
"n"=1 is equivalent to 1/72 inch paper advancement.
Since the distance between any two dot wires of the print head is
1/72 inch, any line spacing in increments proportional to the dis-
tance between the dot wires can be established.
The ESC A code is the command only to store spacing data into
the memory. In other words, even if spacing data was transferred
into the memory, the Printer does not actually carry out the line
spacing in accordance with the spacing data. To execute the line
spacing in accordance with the stored data, the ESC 2 code
should be followed. Namely, the ESC 2 code is considered as the
execution command for the line spacing.

```
[DATA]   AAAAAAA [CR] [LF] BBBBBBB [CR] [LF] [ESC A+24]
         CCCCCCC [CR] [LF] DDDDDDD [ESC 2] [CR] [LF]
         EEEEEEE [CR] [LF] FFFFFFF [CR] [LF]
[PRINT]  AAAAAAA
         BBBBBBB  } 1/6 inch = 12 steps/72
         CCCCCCC
         DDDDDDD
                  } 1/3 inch = 24 steps/72
         EEEEEEE  ⌡

         FFFFFFF
```

NOTE: <How to input "n">
When "n" is actually transferred to the Printer as data, it is
transferred in the form of a 7-bit binary number.
In case of "ESC A+24", actual output to the Printer is performed
as <1B> H <41> H <18> H in hexadecimal code.
Keep in mind that the method of input from the keyboard of a
host computer is different, for which refer to the specifications of
your host computer.
*Example: Input from the keyboard of the TRS-80 personal com-
puter.

[LPRINT CHR$(27); CHR$(65); CHR$(24)]

2) E S C **B**+n₁+n₂+ . +nₖ+NUL
(1≦＜n＞₁₀≦66, 1≦k≦64, nₖ≦nₖ+1)

This code specifies the vertical tab stop positions.

The first 64 valid tab stops per page are recognized in the Printer; subsequent tab stops are ignored.

A tab stop set at a line exceeding the form length is ignored. Tab stop numbers must be received in incremental numerical order. To execute predetermined tab stop positions, the VT code should be input. Once vertical tab stops are established, the data will be valid until new tab stops are specified. If no tab stop is set, the VT code behaves like the LF code. Therefore, the paper is advanced one line after printing.

Receipt of "ESC B" code causes the Printer to accept the following codes as tab stop line numbers until the NUL code is input. The lack of the NUL code will cause incorrect data printout.

The form length must be set by "ESC C+n" code prior to setting tab stops.

Input of "ESC 8" code followed by only the NUL code cancels predetermined tab stops.

[DATA]   ESC B <4>H <6>H <A>H NUL
         AAAAAAA VT BBBBBBB VT CCCCCCC VT DDDDDDD
[PRINT] AAAAAAA   1st   line

         BBBBBBB . . . 4th lines

         CCCCCCC   6th   lines

         DDDDDDD . . . . 10th lines
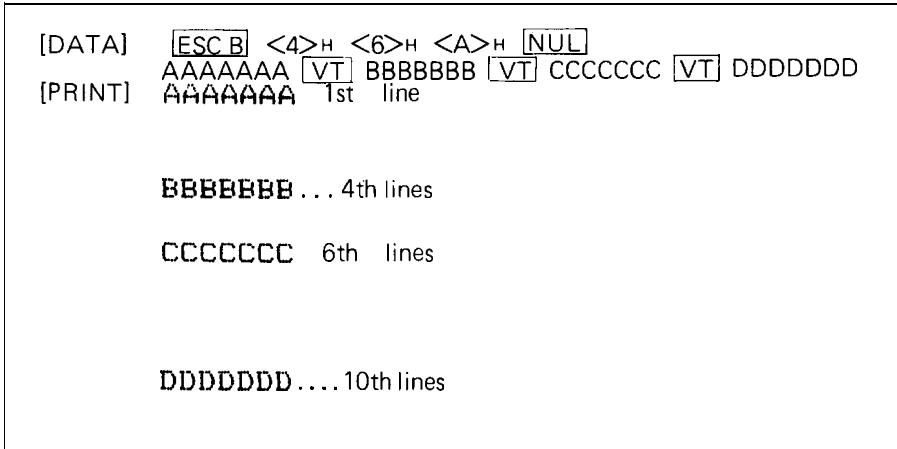
3) ESC C+n $(1 \leqq <n>_{10} \leqq 66)$

This code specifies the form length per page.

The form length is determined by the number of lines (="n"). The amount of a line spacing at this point is a predetermined numerical value by "ESC A+n." When the form length is not programmed, one page is assumed as 66 or 72 lines. Prior to setting the vertical tab position, the form length should be set.

4) E S C D+n_1+n_2+ . +n_k+NUL

$(1 \leqq <n>_{10} \leqq 127, k \leqq 112)$

This code specifies the horizontal tab stop positions. The first 112 tab stops per line are recognized in the Printer, and subsequent tab stops are ignored. Tab stop numbers must be received in incremental numerical order.

If a tab stop position of higher value than 80 is received in normal character printing mode, all horizontal tab functions after 80 columns are ignored.

To execute tab stop positions, the HT code should be input. The HT code is ignored when the horizontal tab position has not been programmed.

The NUL code should be input as the command for the termination of the tab set sequence, and the lack of this code will cause incorrect data printout.

---

1. Incase of 5th. 10th and 21st columns.

   [DATA]   ESC D <5>H <A>H <15>H NUL ABC HT DEF HT GHI HT JKL
              CR LF

   [PRINT]   ABC   DEF   GHI   JKL

2. In case of lack of stop position.

   [DATA]   ESC D <5>H <A>H NUL ABC HT DEF HT GHI HT JKL CR LF

   [PRINT]   ABC   DEF   GHIJKL

3. In case of character data transferring over next tab stop.

   [DATA]   ESC D <5>H <A>H <15>H NUL ABCDEF HT GHI HT JKL CR LF

   [PRINT]   ABCDEF   GHI   JKL

4. In case of transferring two HT codes at a time.

   [DATA]   ESC D <5>H <A>H <15>H NUL ABCD HT SPACE HT EFGH
              CR LF

   [PRINT]   ABCD   EFGH

5) ESC E

The ESC E code causes the Printer to print emphasized characters. Emphasized printing gives the character a stronger impression on the paper.

This code can be input in any column position on a line.

The speed of the head carriage reduces to 40 CPS while printing emphasized characters.

---

1. [DATA] ESC E ABCDEFGHI CR LF
   [PRINT] **ABCDEFGHI**

2. [DATA] SO ESC E ABCDEFGHI CR LF
   [PRINT] **ABCDEFGHI**

---

6) ESC F

The ESC F code cancels the emphasized printing mode.

7) ESC G

The ESC G code causes the Printer to perform the double printing. Double printing is carried out in the following manner.

1) A character is printed.
2) The paper is advanced by 1/216 inch.
3) The print head prints the same character again.

In this way, the character becomes bold.

[DATA] ESC G ABCDEFGHI CR LF
[PRINT] **ABCDEFGHI**

---

8) ESC H

The ESC H code cancels the double printing mode.

MAINTENANCE

1. Preventive Maintenance

Preventive maintenance for the MX-80 F/T consists basically of cleaning. The Printer should be cleaned with a soft brush to remove paper dust and particles after every three months of use. The exterior surface of the Printer can be cleaned by using a mild detergent and water solution.

2. Parts Replacement

(1) General

Owing to the sophisticated nature of the circuitry and mechanisms utilized in the MX-80 F/T, operator's troubleshooting is logically obliged to be limited to certain easily recognizable symptoms and cures.

If a Printer malfunction other than the print head unit should occur which is not covered in this section, the operator should contact the store from which the MX-80 F/T was purchased.

(2) Print head

In case of a print head trouble or a worn dot wire, replace the print head unit as described below. (See Fig. 33.)

NOTE: Be sure to replace the print head after it has cooled.

STEP 1. Take off the printer lid and cartridge ribbon.

STEP 2. Turn the head lock lever clockwise and remove the print head.

STEP 3. Pull the head cable out straight while steadying the head connector on the terminal board.

STEP 4. Put a new head on the carriage assembly and replace the head lock lever.

STEP 5. Insert the head cable into the head connector carefully.

NOTES: 1. Inadequate connection may cause malfunctioning of the head.

2. The carriage assembly should not be moved without the print head mounted on the carriage.

Print Head

Print Head Unit

Head Cable

Terminal Board

Head Lock Lever

Head Connector

'Be sure to hold this connector firmly to pull the head cable out straight.

Carriage Assembly

(Side View)

Head Cable

Head connector

'Take hold of the cable at the point indicated by arrows ⇧⇩ and apply force in either of the directions indicated by arrow ⟷ to push in or pull out the had cable.
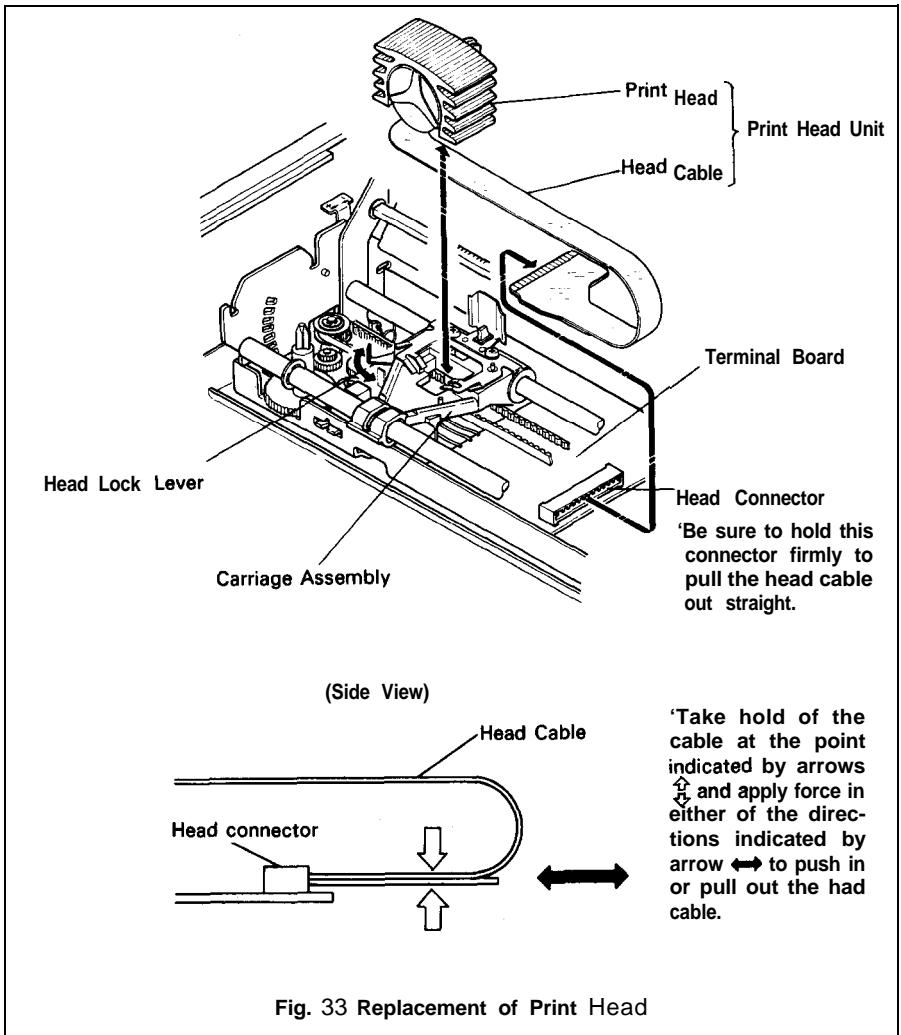
Fig. 33 **Replacement of Print** Head

SPECIFICATIONS

```
(1) PRINT METHOD:         Serial  impact  dot  matrix
(2) PRINT  SPEED:         80 CPS
(3) PRINT DIRECTION:      Bidirectional  with  logical  seeking
(4) NUMBER OF PINS IN
    HEAD:                 9
(5) LINE SPACING:         4.23  mm  (1/6")  or  programmable
(6) PRINTING CHARACTERISTICS
    Matrix:               9 x 9
    Character  Set:       Full 96-character ASCII with descenders. plus 9
                          international   characters/symbols
    Graphic  Character:   64  block  characters
(7) PRINTING SIZES
```

	Characters per inch	Maximum characters per line
Normal:	10	80
Enlarged:	5	40
Condensed:	16.5	132
Condensed Enlarged:	8.25	66

```
 (8)  MEDIA  HANDLING
     Paper Feed:          Friction feed or adjustable sprocket feed
                          selectable   manually
     Paper  Width  Range
     Fanfold  paper:      101.6  mm  (4")  to  254  mm  (10")
     Roll  paper:         215.9  mm  (8.5")±3  mm  (0.12")
     Cut  paper  sheet:   210  mm  (8.3")  to  216  mm  (8.5")
     Paper  Path:         Rear
 (9)  INTERFACES
     Standard:            Centronics-style  8-bit  Parallel
     Optional:            RS232. IEEE 488
(10) INKED RIBBON
     Color:               Black
     Type :               Exclusive  cartridge
     Life  Expectancy:    3  million  characters
(11) MCBF:                5 x 10^6 lines (excluding  print  head)
(12)  ENVIRONMENTAL  CONDITIONS
     Operating  Temperature
     Range:               5 to 35°C (41 to 95°F)
     Operating  Humidity:  10 to 80% non-condensing
```

SPECIFICATIONS (continued)

```
(13) POWER REQUIREMENT
     Voltage:              115V. 60 Hz
                           220/240V,  50  Hz
     Current:              1  Amp  maximum
     Power  Consumption:   100  VA  maximum
(14) PHYSICAL CHARACTERISTICS
     Height:               133  mm  (5.2")
     Width:                374  mm  (14.7")
     Depth:                305  mm  (12.0")
     Weight:               7.0  kg  (15.4  lbs.)
```

Specifications subject to change without notice.

SUMMARY OF MX-80 F/T CONTROL CODES

Control code data is sent to the MX-80 F/T along with character code data via the input data lines. Control codes are sent as data, and are interpreted as instructions by the Printer. The following is a summary of control codes and control code sequences recognized by the MX-80 F/T.

(1) Print action codes

Mnemonic	Decimal	Hex. code	Function
CR	13	0D	Performs the printing of a line stored in the print buffer.
LF	10	0A	Performs the printing and advances the paper one line.

(2) Paper movement codes

Mnemonic	Decimal	Hex. code	Function
FF	12	0C	Advances the paper vertically to the next predetermined Top of Form position.
ESC C	27. 67	1B,43	Specifies the form length per page. Execution command is FF.
HT	9	09	Advances the print head to the next predetermined tab stop position in a horizontal direction.
ESC D	27,68	1B.44	Specifies the horizontal tab stop positions. Execution command is HT.
VT	OB	11	Advances the paper to the next predetermined tab stop position in a vertical direction.
ESC B	27. 66	1B. 42	Specifies the vertical tab stop positions. Execution command is VT.
ESC 0	27. 48	1B. 30	Causes the line spacing to be set at 1/8 inch.
ESC 1	27. 49	1B. 31	Causes the line spacing to be set at 7/72 inch.
ESC 2	27. 50	1B. 32	Causes the line spacing to be set at 1/6 inch. This code is also a command to execute the predetermined line spacing mode.
ESC A	27. 65	1B. 41	Specifies the amount of line spacing in the Line Feed. Execution command is ESC 2.

(3) Character designation code

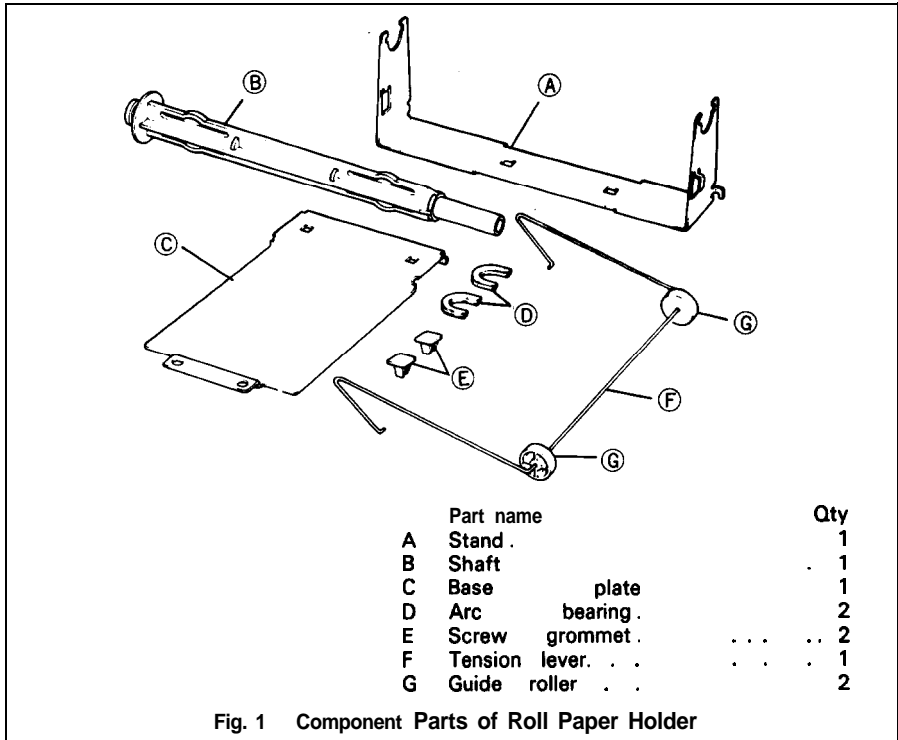| Mnemonic	Decimal	Hex. code	Function
SO	14	0E	Instructs the Printer to print subsequently received characters in double width size.
DC 4	20	14	Cancels the SO (enlarged character) mode.
SI	15	0F	Instructs the Printer to print characters in condensed size.
DC 2	18	12	Cancels the SI (condensed character) mode
ESC E	27. 69	1B. 45	Causes the Printer to print emphasized characters.
ESC F	27. 70	1B. 46	Cancels the ESC E mode.
ESC G	27. 71	1B. 47	Causes the Printer to perform double printing.
ESC H	27. 72	1B .48	Cancels the ESC G mode.

(4) Other codes

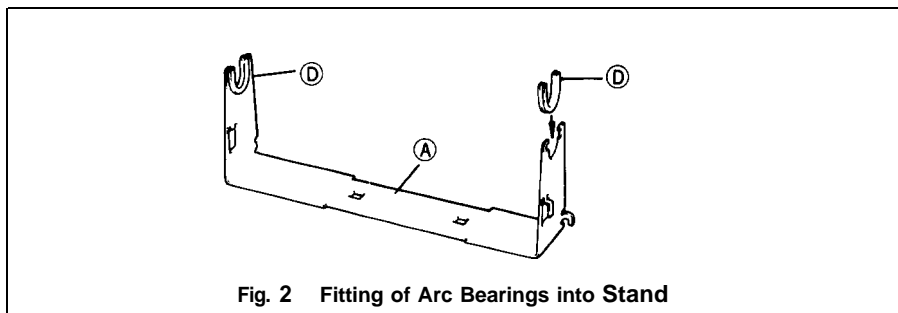| Mnemonic	Decimal	Hex. code	Function
NUL	0	00	Terminates the tabulation setting sequence.
BEL	7	07	Causes the buzzer to sound for about 3 seconds.
DC 1	17	11	Places the Printer in the selected (data receivable) state.
DC 3	19	13	Places the Printer in the deselected (data not receivable) state.
ESC 8	27, 56	1B. 38	Permits data to be transmitted even If there is no paper in the Printer.
ESC 9	27. 57	1B. 39	Cancels the ESC B condition.
CAN	24	18	Deletes from the print buffer all previously entered printable characters. (Print buffer clear command)
DEL	127	7F	Functions the same as 'CAN'.

APPENDIX
# Assembly Instructions on Roll Paper Holder

1. Confirm that all the component parts shown in Fig. 1 are contained in the carton.

	Part name	Qty
A	Stand .	1
B	Shaft	. 1
C	Base plate	1
D	Arc bearing .	2
E	Screw grommet	2
F	Tension lever.	1
G	Guide roller . .	2

Fig. 1   Component Parts of Roll Paper Holder

2. Fit each arc bearing D into stand A as shown in Fig. 2.

Fig. 2   Fitting of Arc Bearings into Stand

3. Put base plate C on stand A and secure it by inserting two screw grommets E to the corresponding square holes as shown in Fig. 3. In this case, take note of the direction in which base plate C must be placed on the stand.

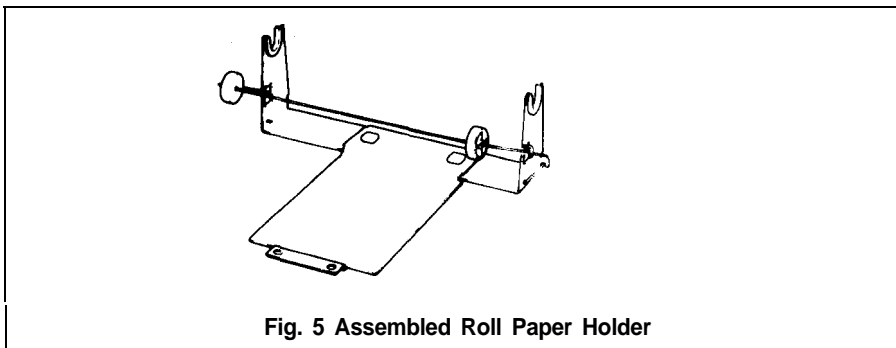
Fig. 3   Mounting **of Base Plate on Stand**
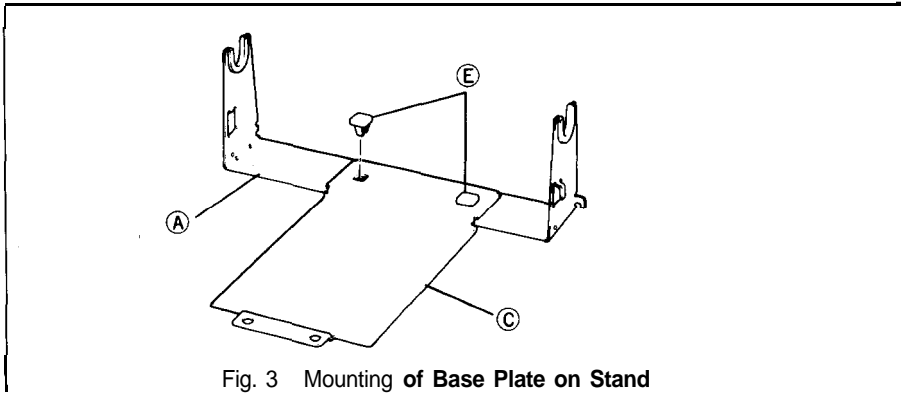
4. Set tension lever F on stand A as follows:
   4-1: Hook the tension lever on the nose of stand A as shown in Fig. 4-1.
   4-2: While pulling the tension lever up, put the wire into the hole as shown in Fig. 4-2.

Fig. 4-1   **Fig. 4-2**
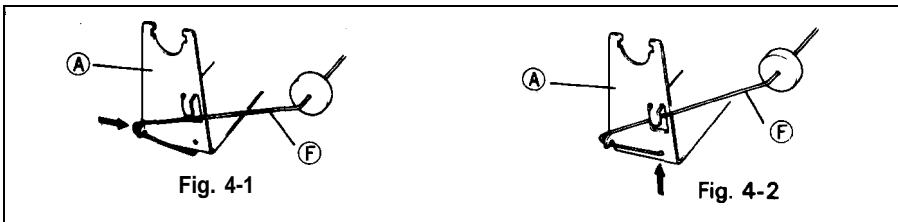
5. Fig. 5 shows the Roll Paper Holder in the assembled state.

**Fig. 5 Assembled Roll Paper Holder**

6. Set the Roll Paper Holder to the Printer by aligning the base plate with the knots located at the bottom of the printer.

Fig. 6
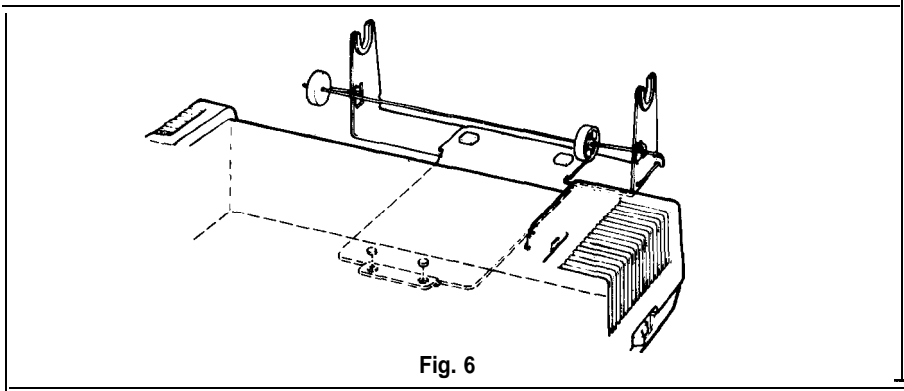
7. Fig. 7 shows how to insert shaft B into the core of the roll paper.

Fig. 7   Insertion of Shaft B into Roll Paper Core
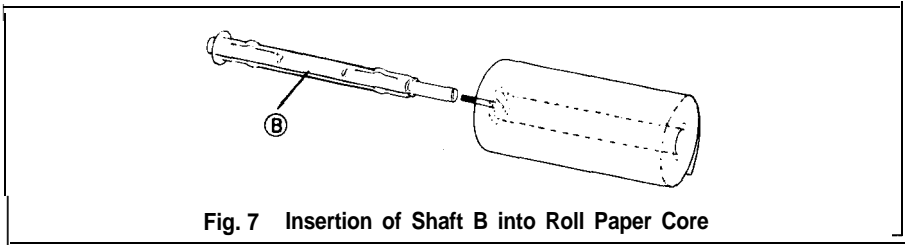
8. Fig. 8 shows the Printer with the Roll Paper Holder mounted thereto.

Fig. 8   Printer with Roll Paper Holder
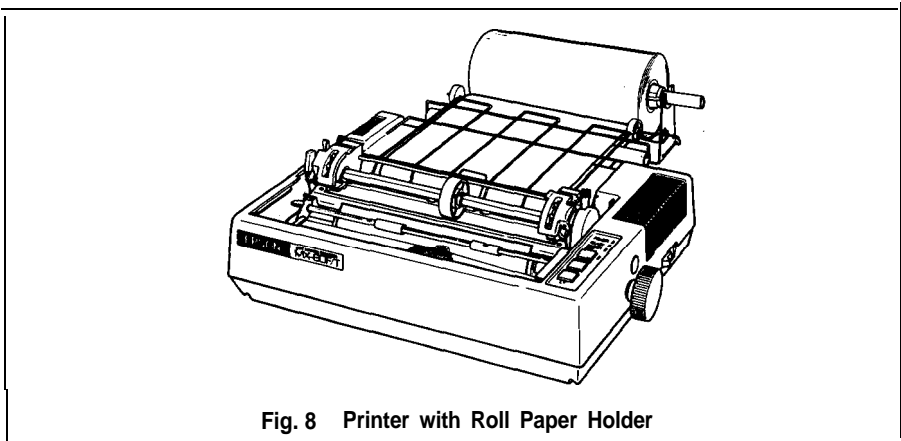
FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

Warning: This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only computers certified to comply with the Class B limits may be attached to this printer. Operation with non-certified computers is likely to result in interference to radio and TV reception.

This statement will be applied only for the printers marketed in the U.S.A.

EPSON

SHINSHU SEIKI CO., LTD