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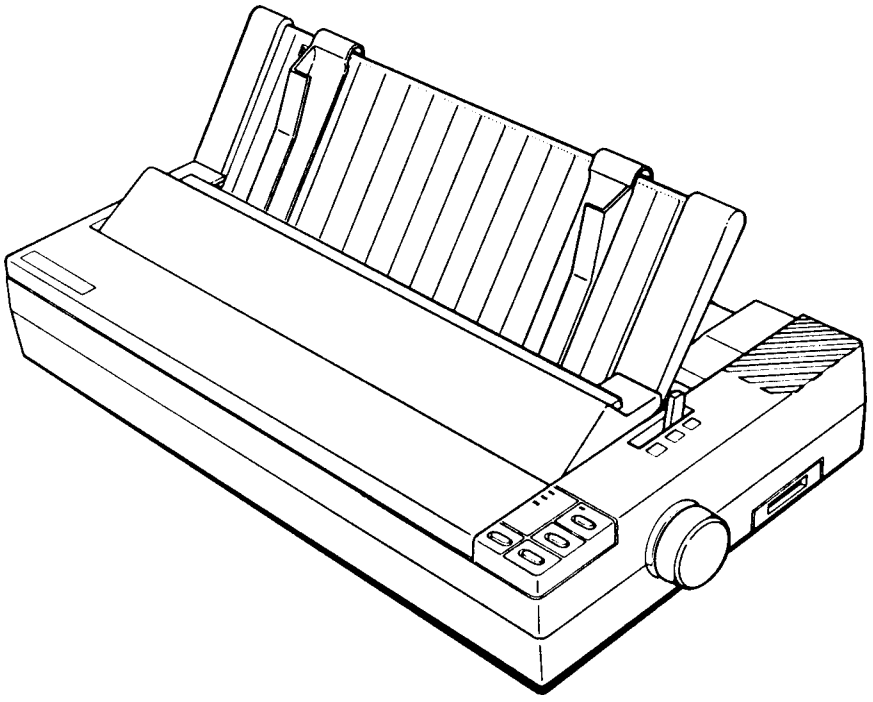
EPSON TERMINAL PRINTER

LX-1050+

SERVICE MANUAL



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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/ maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURE.

2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.

3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.

2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.

3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.

4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.

5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of LX-105O+.
The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:

CHAPTER 1. GENERAL DESCRIPTION

Provides a general product overview, lists specifications, and illustrates the main components of the printer.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

Includes a step-by-step guide for product disassembly and assembly.

CHAPTER 4. ADJUSTMENTS

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides Epson-approved techniques for adjustment.

CHAPTER 6. MAINTENANCE

Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.

APPENDIX

Describes connector pin assignments, circuit diagrams, circuit board component layout and exploded diagram.

The contents of this manual are subject to change without notice.

REVISION SHEET

Revision	Issue Date	Revision Page
Rev. A	May 18, 1994	1st **issue**

TABLE OF CONTENTS

Chapter 1 General Description

Table of Contents

List of Figures

List of Tables

1.1 FEATURES

The LX-1050+ is a small, light-weight, low-cost, advanced paper handling printer. Its main features are:

- The LX-1050+ has four versions. Different parts are Program ROM version only.
  Standard version: ROM version SOxxxx
  India version: ROM version Slxxxx
  Russian version: ROM version S2xxxx
  Latin version: ROM version S3xxxx
  South Europe version: ROM version S4xxxx
- Command compatible with following printers.
  Standard, Latin, and South Europe version: with LX-1050
  Russian and India version: with FX-1OOO
- Printing speeds:
  200 cps (draft 10 cpi)
  240 cps (draft 12 cpi)
  40 cps (NLQ 10 cpi)
  48 cps (NLQ 12 cpi)
- PC table support as follows.
  Standard version: Italic, PC437, PC850, PC860, PC863, PC865
  India version: Italic, PC437
  Russian version: Italic, PC437, PC866, PC855, Bulgaria
  Latin version: Italic, PC437, PC852, MAZOVIA, codeMJK
  South Europe version: Italic, PC437, PC857, 1S0 Latin IT, PC437 Greek, PC869, 1S0 8859-7
- Two built-in NLQ (Near Letter Quality) fonts (Roman and Saris Serif)
- Input buffer size is as follows.
  Standard, Latin, and South Europe version: 4Kbytes
  Russian and India version: 1K bytes
- Optional EPSON TYPE-A interface

Figure 1-1 shows the an exterior view of the LX-1050+.

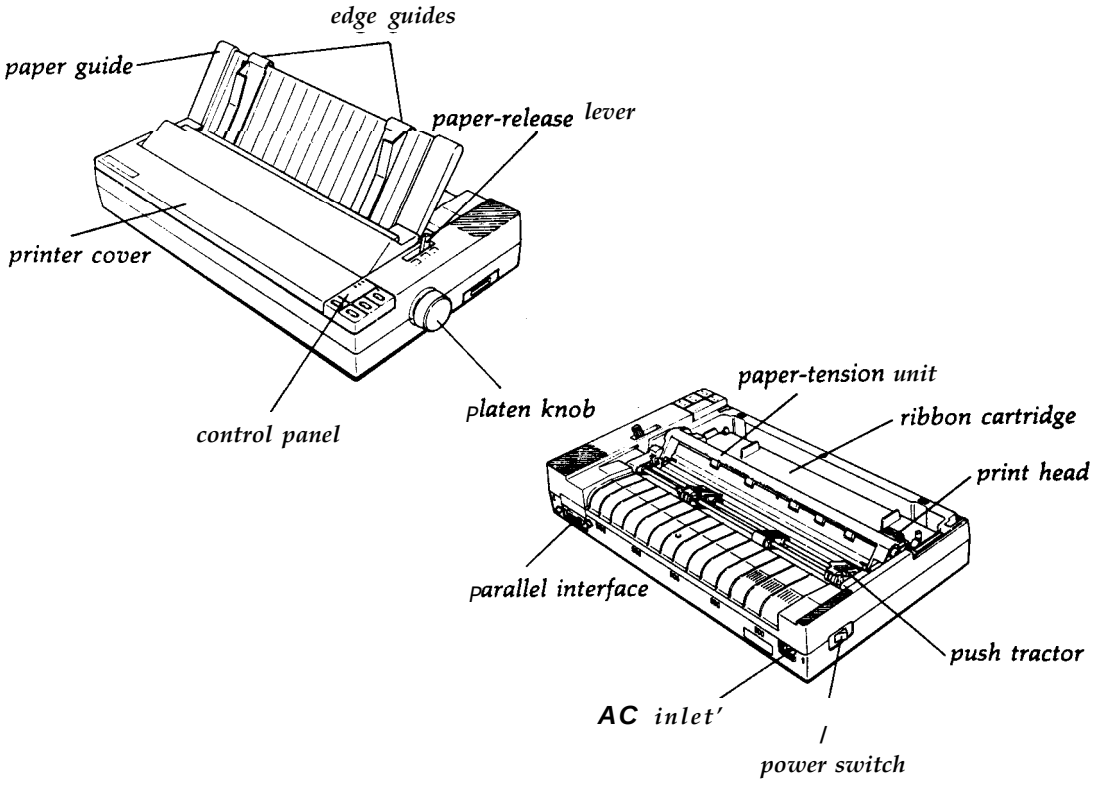

Figure 1-1. Exterior View of the LX-1050+

Table 1-1 lists the optional units available for the LX-1050+.

Table 1-1. Options for LX-1050+

Cat. No.	Description
8143	New Serial Interface Board
C82302*/C82304*	32KB Serial Interface
C82303*	32KB Parallel Interface
8165	IEEE-488 Interface Board
C80624*	Single Bin Cut Sheet Feeder
C80014*	PullTractorUnit
8755	Ribbon Cartridge

1.2 SPECIFICATIONS

This section provides detailed statistics for this printer.

1.2.1 Printing Specification

Printing Method: Serial, impact, dot matrix

Pin Configuration: 9 wires (diameter 0.29rnm)

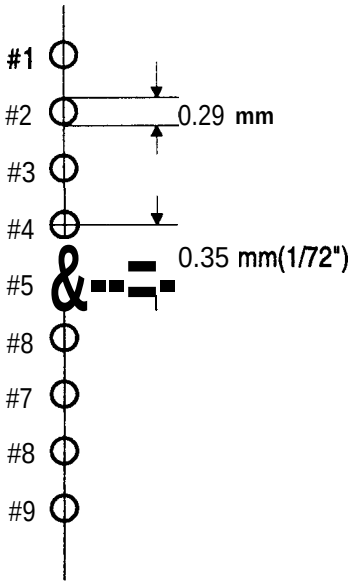

Figure 1-2. Pin Configuration

Print direction: Bi-directional printing with logical seeking (Text mode)
Uni-directional (left to right) printing (Bit image mode)

Print speed: See Table 1-2.

Printable columns See Table 1-2.

Table 1-2. Print Speed and Printable Columns

Type of Letters	Printable Columns	Print Speed
Pica (10 cpi)	136	200 cps
Elite (12 cpi)	163	240 cps
Double-width pica	68	100 cps
Emphasized pica	136	100 cps
Double-width emphasized pica	68	50 cps
Condensed pica (17 cpi)	233	171 cps
Double-width condensed pica (17 cpi)	115	86 cps
Double-width elite	81	120 cps
Condensed elite (20 cpi)	272	200 cps
NLQ pica (1 O cpi)	136	40 cps
NLQ elite (12 cpi)	163	48 cps

lot matrix format: **9 X 9** Text mode (Draft)
18X 20 Text mode (NLQ

Character sets: 13 international character sets

Character tables: See Table 1-3.

Table 1-3. Character Tables

Character Table	Standard Model	India Model	Russian Model	Latin Model	South Europe Model
ITALIC	o	0	0	0	0
PC437 (US/ Standard Europe)	o	0	0	0	0
PC850 (Multilingual)	o	x	x	x	x
PC860 (Portuguese)	o	x	x	x	x
PC863 (Canadian-French)	o	x	x	x	x
PC865 (Nordic)	o	x	x	x	x
PC866 (Russian)	x	x	o	x	x
PC855 (Cyrillic)	x	x	o	x	x
PC852 (East Europe)	x	x	x	o	x
PC857 (Turkish)	x	x	x	x	o
PC437 Greek	x	x	x	x	o
PC869 (Greek)	x	x	x	x	o
Bulgaria	x	x	o	x	x
MAZOVIA (Poland)	x	x	x	o	x
Code MJK (CSFR)	x	x	x	o	x
ISO Latin IT (Turkish)	x	x	x	x	o
ISO 8859-7 (Latin/Greek)	x	x	x	x	o

Font: Draft, NLQ Roman, NLQ Saris Serif

Control code: ESC/P-81
Standard, Latin, and South Europe model compatible with LX-1050
India and Russian model compatible with FX-1OOO (except IBM mode)

Input buffer: Standard, Latin, and South Europe model: 4K bytes
India and Russian model: 1K bytes

1.2.2 Paper Handling Specification

Line spacing:	1/6 inch or 1/8 inch, or programmable in units of 1/216 inch
Line feed speed:	Approximately 95 ms (1/6 inch line feed) Approximately 75 ms (1/6 inch in page feed)
Paper feed method:	Friction feed Tractor feed (push tractor: standard, pull tractor: optional)
Paper insertion:	Rear

1.2.3 Paper Specification

Useable paper:

<Cut sheet>	Width: 182 to 364 mm (4 to 14.3 inch) Length: 182 to 364 mm (4 to 14.3 inch) Thickness: 0.065 to 0.14 mm (0.0025 to 0.055 inch) Weight: 45 to 78 Kg (14 to 24 lb)
<Continuous paper>	Width: 101 to 406.4 mm (4 to 16 inch) Copies: 3 sheets (1 original 2 copies) Total thickness: 0.065 to 0.25 mm (0.0025 to 0.010 inch) Weight: 45 to 70 Kg (14 to 22 lb) 34 to 50 Kg (12 to 15 lb)-- copy paper
<Envelope>	Size: No. 6 (166X 92 mm), No.1O (240X 104 mm) Total thickness: 0.16 to 0.52 mm (0.0063 to 0.0197 inch) Weight: 39 to 78 Kg (12 to 24 lb)
<Label>	Size: 63.5 X23.8 mm (2.5 inch X 15/16 inch)
Printing Area:	Cut sheet

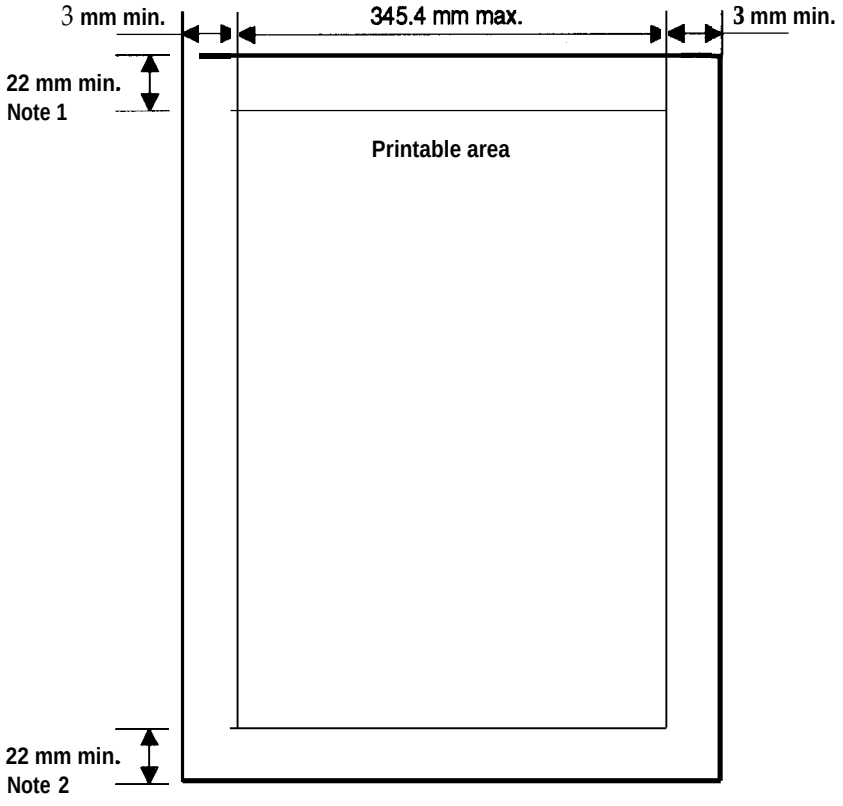

Figure 1-3. Printable Area - Cut Sheet

Notes: *1. In the area from 8.5 mm to 22 mm from the top of paper, it is printable but paper-feed is not assured.*

2. In the area from 13.5 mm to 22mm from the bottom of the paper, it is printable but paper-feed is not assured.

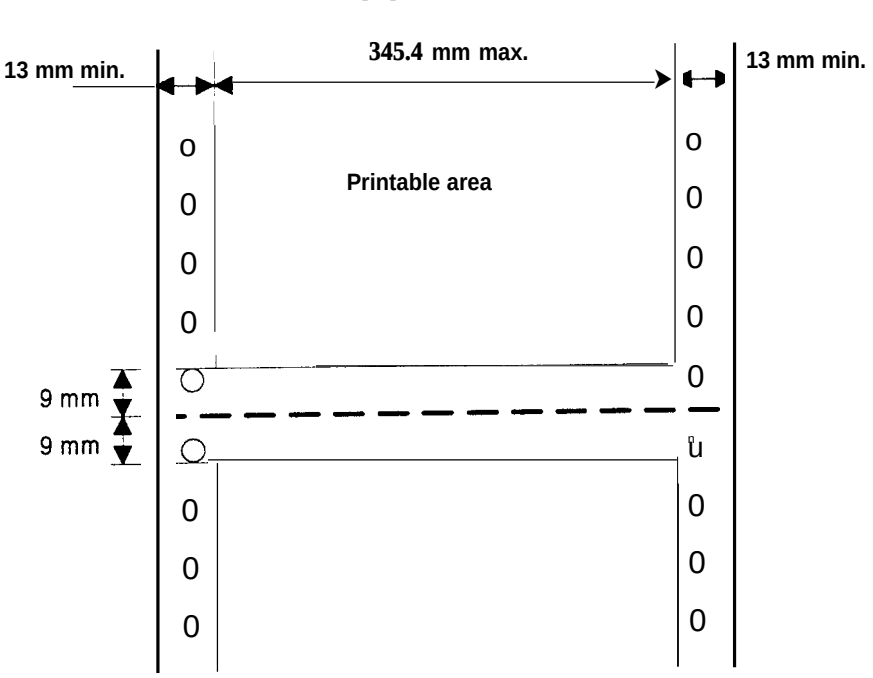

Figure 1-4. Printable Area - Continuous Paper

Adjust lever settings

The adjust lever must be set to the proper position for the paper thickness.

Table 1-4. Adjust Lever Settings

Lever position	Paper Thickness
2nd step	0.06 to 0.18 mm
3rd step	0.19 to 0.25 mm

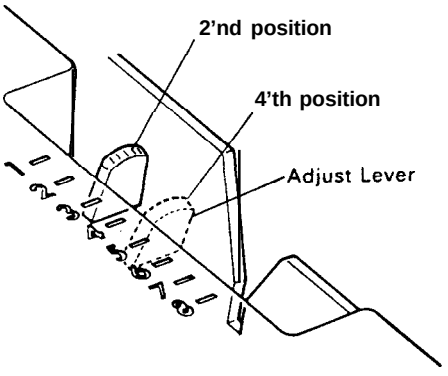

Figure 1-5. Adjust Lever Position

1.2.4 Ink Ribbon

Type:	#8755 Ribbon Cartridge
Color:	Black
Reliability:	3 million characters at 14 dots/character

1.2.5 Environmental Conditions

Temperature:	-30 to60"C - Storage 5to35"C - Operation
Humidity:	5 to 85 %RH (no condensation) - Storage 10to801%0 RH (no condensation) - Operation
Resistance to shock:	2 G, 1 ms - Storage 1 G, 1 ms - Operation
Resistance to vibration:	0.50 G (55 Hz max.) - Storage 0.25 G (55 Hz max.) - Operation

1.2.6 Electrical Specifications

Table 1-5. Electrical Specifications

Item	120V Version	220- 240V Version
Rated voltage	120 V AC	220- 240V AC
Input voltage range	103.5 to 132V	198 to 264V
Rated frequency range	50 to 60 Hz	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz	49.5 to 60.5 Hz
Power consumption	Approx. 28W (Self test in draft 10 cpi)	Approx. 28W (Self test in draft 10 cpi)
Insulation resistance	10 MΩ, min. (between AC line and chassis)	10 MΩ, min. (between AC line and chassis)
Dielectric strength	AC 1000 V rms 1 minute or AC 1200 V rms 1 second	AC 1250 V rms 1 minute or AC 1500 V rms 1 second

1.2.7 Reliability

MCBF:	3 million lines (except printhead)
MTBF:	6000 POH
Life of Printhead:	200 million strokes/wire

1.2.8 Safety Approval

Safety Standards:	UL4785th(U.S. version) CSA22.2 #220. (U.S. version) VDE 0806 (TUV) (European version)
RFI:	Vfg.243 (VDE 0878 part 3, part 30) EN 55022 (CISPR Pub.22) class B"

1.2.9 Physical Specifications

Dimensions	619.3 mm (Width) x 339 mm (Depth) x 141 mm(Height), excluding knobs
Weight	8.80 Kg

1.3 INTERFACE OVERVIEW

The LX-1050+ is equipped with the following external interfaces;

- Centronics parallel interface
- Optional Type A interface

1.3.1 Parallel InterFace

Data Format	8-bit parallel
Synchronization	By $\overline{\text{STROBE}}$ pulse
Handshaking	By BUSY and $\overline{\text{ACKNLG}}$ signal
Signal Level	Ill-compatible
Adaptable Connector	57-30360 (amphanol) or equivalent

Table 1-6 shows the connector pin assignments and signal functions of the parallel interface.

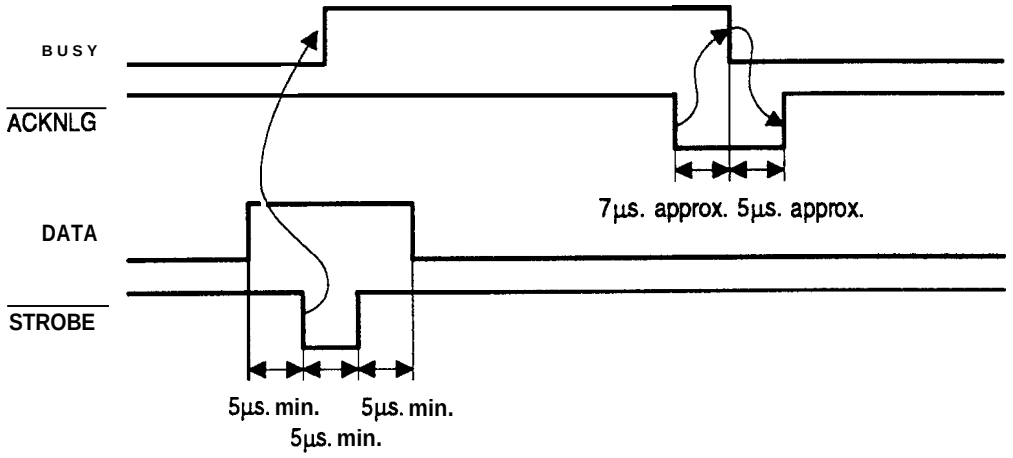

Figure 1-6. Data Transmission Timing

Table 1-6. Connector Pin Assignments and Signal Functions

Pin No.	Signal Name	I/O	Description
1	$\overline{\text{STROBE}}$	I	**The STROBE pulse is used to read data from the host computer. The pulse width must be 0.5µs** or more. Normally, it is HIGH, and data is latched with rising edge of this signal.
2-9	DATA 1-8	I	DATA 1-8 are parallel data bits. When one of these signals is HIGH, the data bits is 1; when LOW, the data bits is O. The most significant bit (MSB) is data 8. The signal state must be maintained for 0.5µs on either side of $\overline{\text{STROBE}}$ signal's active edge.
10	$\overline{\text{ACKNLG}}$	O	ACKNLG is an acknowledge pulse with a width of approximately 10P.s. This signal goes LOW upon the completion of data reception, to indicates that the printer is ready to receive further data.
11	BUSY	O	The BUSY signal informs the host computer of the printer's status. When this signal is HIGH, the printer cannot accept further data.

Table 1-6. Connector Pin Assignments and Signal Functions (Cont.)

Pin No.	Signal Name	I/O	Description
12	PE	O	This signal indicates whether paper is available in the printer or not. A HIGH level indicates a no paper condition.
13	SLCT	O	Pulled up to +5V through 3.3KΩ resistor in the printer. ,
14	$\overline{\text{AUTO FEED XT}}$	I	If this signal is set to LOW, the printer automatically performs one line feed upon receipt of a CR (carriage return) code.
15	NC		Not used.
16	GND		Signal ground
17	CHASSIS GND	-	Chassis ground.
18	NC	·	Not used.
19-30	GND		Twisted-pair return signal ground.
31	INIT	I	If this signal goes LOW, the printer is initialized. The pulse width of this signal must be 50µs or more.
32	$\overline{\text{ERROR}}$	O	This signal goes LOW if the printer: - has a fatal error. - runs out of paper. - off line.
33	GND		Signal ground.
34	NC		Not used
35	+5V		Pulled up to +5 V through 3.3 KΩ resistor in the printer.
36	$\overline{\text{SLCT IN}}$	I	The DC1/DC3 code is only valid when this signal is HIGH.

Notes: ***A// interface conditions are based on TTL /eve/s. Both the rise and fall times of all signals must be less than*** 0.2 p.s.
The AUTO FEED-XT signal can be set LOW by DIP switch 2-4.
The SELECT IN signal can be set LOW by jumper 1.

1.3.2 Optional Interface #8143

The LX-1050+ can use the non-intelligent serial interface board #8143.

Tyep: RS-232C or current loop

Synchronization: Asynchronous start-stop system
Start bit: 1 bit
Stop bit: 1 bit or more
Data length: 7 or 8 bits
Parity: Odd, Even or none

Protocol: X-ON/X-OFF or DTR control

Transfer speed: 75,110,134.5,150,200, 300,600,1200,1800,2400, 4800, and 9600

1.4 PRINTER OPERATIONS

This section describes the basic operations of the printer.

1.4.1 Control Panel

The control panel of this printer contains four non-lock type push buttons and four LED indicators for easy operation of the various printer function.

[Buttons]

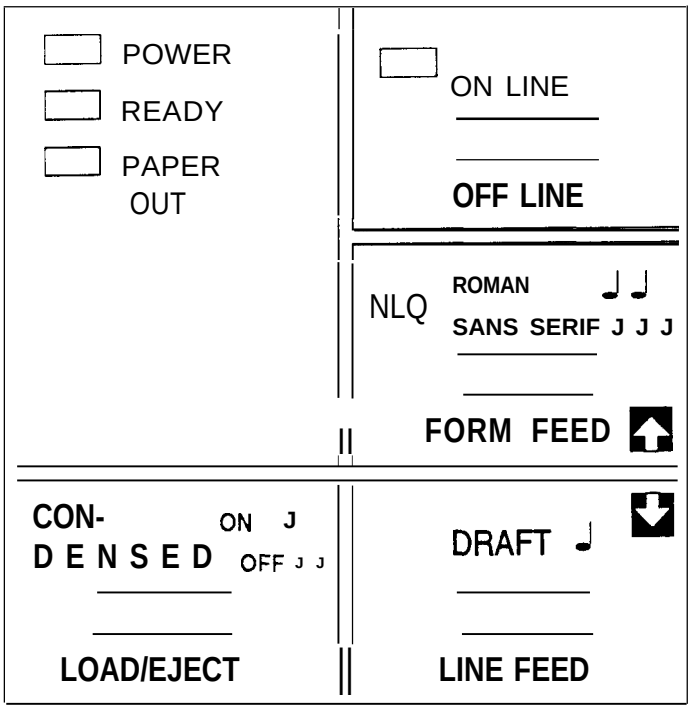

Figure 1-7. Control Panel

ON LINE: Switches printer status between on line and offline.

FORM FEED: When the printer is off line, press this button to eject a single sheet of paper or to advance continuous paper to the top of the next page.

LINE FEED: When the printer is off line, press this button to advance the paper one line, or hold it down to advance the paper continuously.

LOAD/EJECT: This button is used to feed the paper to the loading position, or to eject paper that is already loaded. Paper is ejected forward if the paper-release lever is set to the single-sheet position, or is ejected backward (removed from the paper path) if the release lever is set to the continuous paper position.

[Indicators]

POWER: On when the power switch is on and power is supplied.

READY: On when the printer is ready to accept input data. Flickers while data is printed.

PAPER OUT: On when the printer is out of paper or when continuous paper ia in a standby position. The printer also beeps when it is out of paper.

ON LINE: On when the printer is on line and ready to accept data from the computer. When this indicator is blinking, the micro-adjustment feature can be used.

1.4.2 SelecType Functions

SelecType allows the user to choose fonts and the printing mode easily. This function provides for selection of Draft, Roman, or Saris Serif fonts and selection of normal printing or condensed printing modes. SelecType is effective only when the printer is ON LINE and not printing.

To select Roman or Saris Serif, press the NLQ button. A buzzer sounds when the NLQ button is pressed. When it sounds twice, the Roman font is selected. When it sounds three times, the Saris Serif font is selected.

To select the Draft font, press the DRAFT button. The buzzer will sound once, indicating that the DRAFT font is selected.

To set for condensed printing when the printer is in the print mode, press the CONDENSED button once (the buzzer will sound once), and the printer will enter the condensed print mode.
To cancel condensed printing, press the CONDENSED button again. After you press the button, the buzzer sounds twice to tell you that condensed printing is canceled.

1.4.3 Micro Adjustment

By pressing the FORM FEED or LINE FEED buttons immediately after loading paper or when using the tear-off feature, you can make tine adjustment to the loading and tear-off positions.

1.4.4 Panel Operation at Power ON

The following functions can be activated at power on by holding down the specified button on the control panel.

Self-test mode: To begin printing the self-test in the Draft mode, turn the printer ON while pressing the LINE-FEED button. To begin printing the self-test using the NLQ mode (Near Letter Quality), press FORM FEED and hold it down, then turn the printer power ON.
Self-test printing can be stopped or started by pressing ON-LINE (ON-LINE indicator is not lit). To finish the self-test, stop the printing by pressing the ON-LINE switch then turn OFF the printer power.
The firmware revision number is printed as the first line of the self-test, and subsequently, current DIP switch settings are printed.

Hex Dump mode: The printer enters the HEX-DUMP mode when it is powered on while the LINE-FEED and FORM-FEED buttons are pressed down.
In the HEX-DUMP mode, the hexadecimal representation of the input data is printed out, along with corresponding ASCII characters. This function is valuable for checking the data the printer has received from the host. If input data is a control code rather than a character code, a period (.) is printed in the ASCII column.

1.4.5 DIP Switch Settings

The two DIP switches are located on the side of the printer and function as shown in Tables 1-7 through 1-10. Note that the status of the DIP switches is read only at power on or upon receipt of the INIT signal.

Table 1-7. Settings for DIP Switch

SW No.	Description	ON	OFF	Factory Settings
1-1	Character Pitch	12 cpi	10 cpi	OFF
1-2	Shape of Zero	0	0	OFF
1-3 1-4	Page length	See Table 1-10.		OFF OFF
1-5	Table selection	Graphics	Italics	OFF
1-6 1-7 1-8	Character table selection	See Table 1-8 or 1-9.		ON ON ON
2-1	Short tear-off	Invalid	Valid	OFF
2-2	Cut sheet feeder control	Valid	Invalid	OFF
2-3	Skip over perforation	1 inch	None	OFF
2-4	$\overline{\text{AUTO FEED XT}}$ signal internally fixed or not	Fixed to LOW	Depends on external signal	OFF

Table 1-8. International Character Set Selection (DIP SW 1-5: OFF)

Sw 1-6	Sw 1-7	Sw 1-8	Country	Sw 1-6	Sw 1-7	Sw 1-8	Country
ON	ON	ON	U.S.A	OFF	ON	ON	Denmark
ON	ON	OFF	France	OFF	ON	OFF	Sweden
ON	OFF	ON	Germany	OFF	OFF	ON	Italy
ON	OFF	OFF	U.K.	OFF	OFF	OFF	Spain

Table 1-9. Character Table Selection (DIP SW 1-5: ON)

Sw 1-6	Sw 1-7	Sw 1-8	Standard Version	India version	Russian Version	Latin Version	South Europe Version
ON	ON	ON	PC437	PC437	PC437	PC437	PC437
ON	ON	OFF	PC850	PC437	PC866	PC852	PC857
ON	OFF	ON	PC860	PC437	PC869	MAZOWIA	ISO Lat. IT
ON	OFF	OFF	PC863	PC437	Bulgaria	Code MJK	PC437G.
OFF	ON	ON	PC865	PC437	PC437	PC437	PC869
OFF	ON	OFF	PC437	PC437	PC437	PC437	1S088597
OFF	OFF	ON	PC437	PC437	PC437	PC437	PC437
OFF	OFF	OFF	PC437	PC437	PC437	PC437	PC437

Table 1-10. Page Length Selection

SW 1-3	SW 1-4	Page Length
OFF	OFF	11 inch
ON	OFF	12 inch
OFF	ON	8.5 inch
ON	ON	70/6 inch

1.4.6 Buzzer Operation

The buzzer sounds under the following conditions:

BEL code:	The buzzer sounds for 0.1 second when a BEL code is input.
Carriage trouble:	Beeps 6 times, pausing briefly after 3rd beep.
Paper-out:	Beeps 20 times, pausing briefly after every 4 beeps.
Abnormal voltage:	Beeps 5 times, pausing after every beep.
Incorrect SRAM:	Beeps 8 times, pausing briefly after every 2 beeps.
Incorrect RAMinside CPU:	Beeps indefinitely until power OFF.
Recognition of panel operation:	Beeps 1 or 2 or 3 times in setting print mode.
Factory setting:	Beeps once when the value under micro-adjusting is equal to the factory-set value.
Sheet ejection failure (in CSF mode):	Beeps 20 times, pausing briefly after every 4 beeps.
Illegal paper release/ unrelease:	Beeps continuously when the paper release lever is changed when the paper is in the paper path. Beeps until the lever is changed again or the paper is completely out of the path.

1.4.7 EEPROM Reset

This printer has EEPROM, it memorized SelecType settings, position of continuous paper, and bi-directional printing adjustment value. EEPROM reset operations are only required after the main board replacement, EEPROM replacement, or printer mechanism replacement.
The EEPROM is cleared, when the printer power on while FF and LOAD/EJECT switches are pressed.

1.5 MAIN COMPONENTS

The main components of the LX-1050+ printers are designed for easy removal and replacement to maintain/repair the printers.
The main components are:

- TAMA board: Main control board. The CPU on this board controls all main functions.
- TAPNL-W control panel: Control panel.
- TAa filter unit: Transformer and filter board.
- M-3D60: Printer mechanism.

1.5.1 TAMA Main Control Board

The TAMA board is the main controller of this printer. It takes charge of interfacing with the host computer and processing of received print data, as well as control of the whole printer mechanism. This-board consists of the following components.

CPU (2C):	8-bit CPU (PPD781OHG) 15 MHz operation clock
Gate-array (3B):	E05A30 Includes the following functions: - MMU (Memory Management Unit) - IFU (Interface Control Unit) - PCU (1/0 Port Control Unit) - Head control unit
Program ROM (3C):	256 Kbit EPROM or mask ROM
RAM (3D):	64 Kbit PS RAM
EEPROM (lC):	256 bit EEPROM
CR Motor driver (1A):	SLA7020M

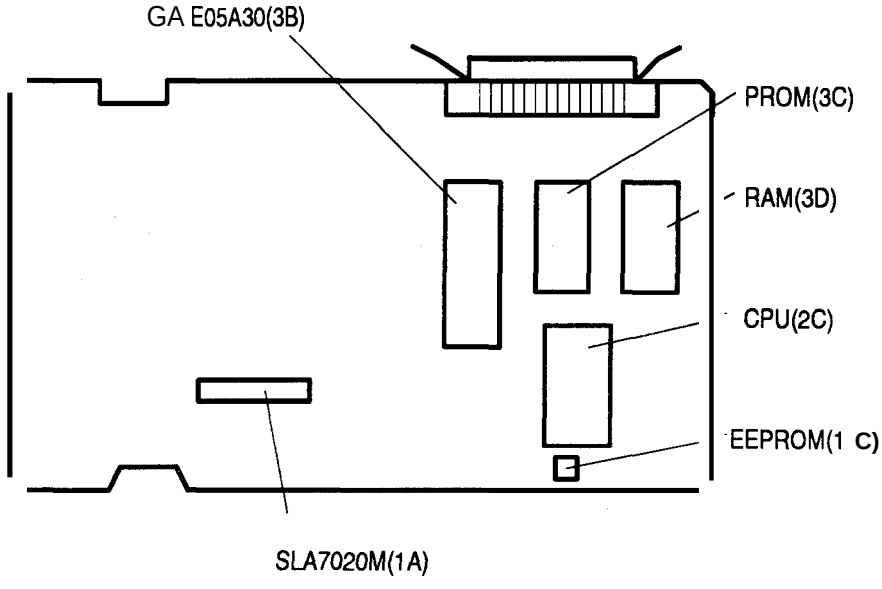

Figure 1-8. TAMA Board Component Layout

1.5.2 TAa Filter Unit

The TAa filter unit contains a power cord (120V Version) or AC inlet (220/240V Version), power switch, fuse filter circuit, and power transformer.

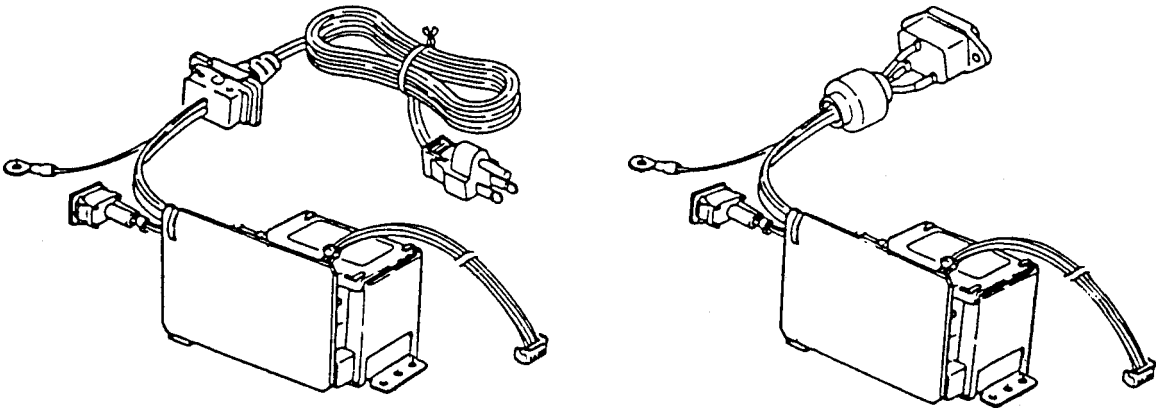

Figure 1-9. TAa Filter Unit

1.5.3 Printer Mechanism (M-3D60)

The M-3D60 printer mechanism was developed specifically for the LX-1050+ printer. Its components include:

Carriage motor
Carriage mechanism
Paper feed motor
Paper feed mechanism
Ribbon feed mechanism
Printhead
Sensors

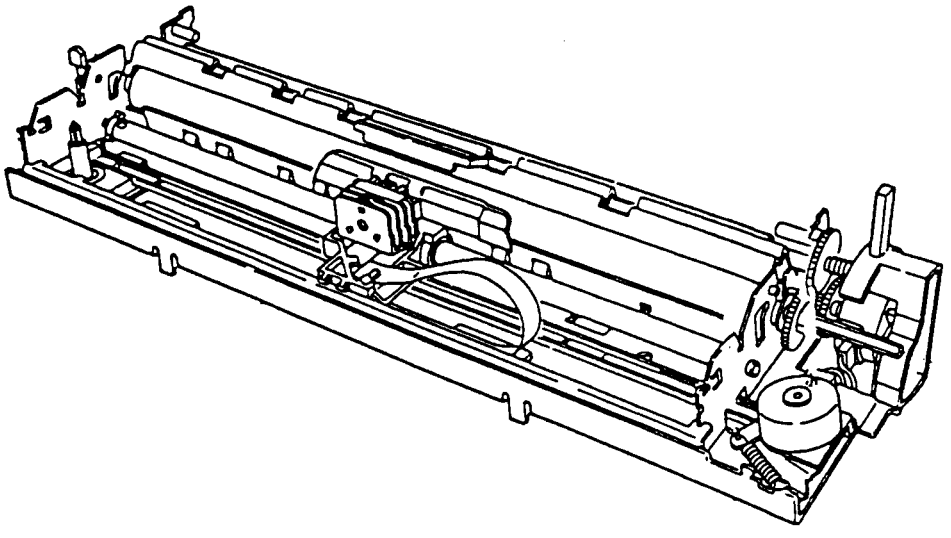

Figure 1-10. Printer Mechanism (M-3D60)

Chapter 2 Operating Principles

Table of Contents

List of Figures

List of Tables

2.1 OVERVIEW

This section describes the operating principles of the printer mechanism and the electrical circuits of the LX-1050+.

2.2 OPERATING PRINCIPLES OF THE PRINTER MECHANISM

The LX-1050+ printer mechanism is composed of the **printhead** unit, paper feed mechanism, carriage drive mechanism, and various sensors. The figure below shows a block diagram of the printer mechanism.

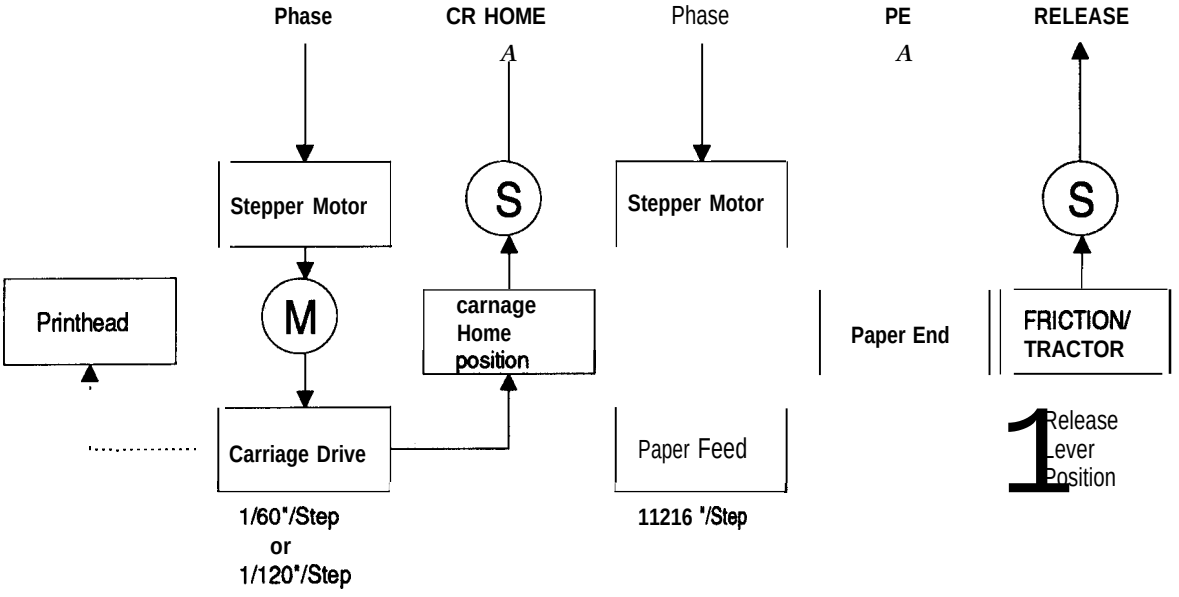

Figure 2-1. Block Diagram of the Printer Mechanism

2.2.1 Printhead Printing Operation

The dot-wire operation during printing is as follows. When the head-driving coil for a dot wire is energized, the actuating plate, which is engaged to one end of the dot wire, is attracted to the iron core, and drives the dot wire toward the platen. The dot wire forcefully pushes both ribbon and paper against the platen, causing a dot to be printed.

When the head-driving coil is deenergized, the actuating plate spring causes the actuating plate to return to its initial position. After striking the platen, the dot wire also returns to its initial position, partly in response to the impact energy, and partly as a result of the wire-resetting spring. The dot wire then remains engaged to the actuating plate until it is driven again.

Printhead specifications areas follows:

Solenoids:	9 solenoids
Wire Diameter:	0.29 mm
Drive Voltage:	24 VDC ± 10Yo
Coil Resistance:	19.2 ± 1.0 Ω at 25° C

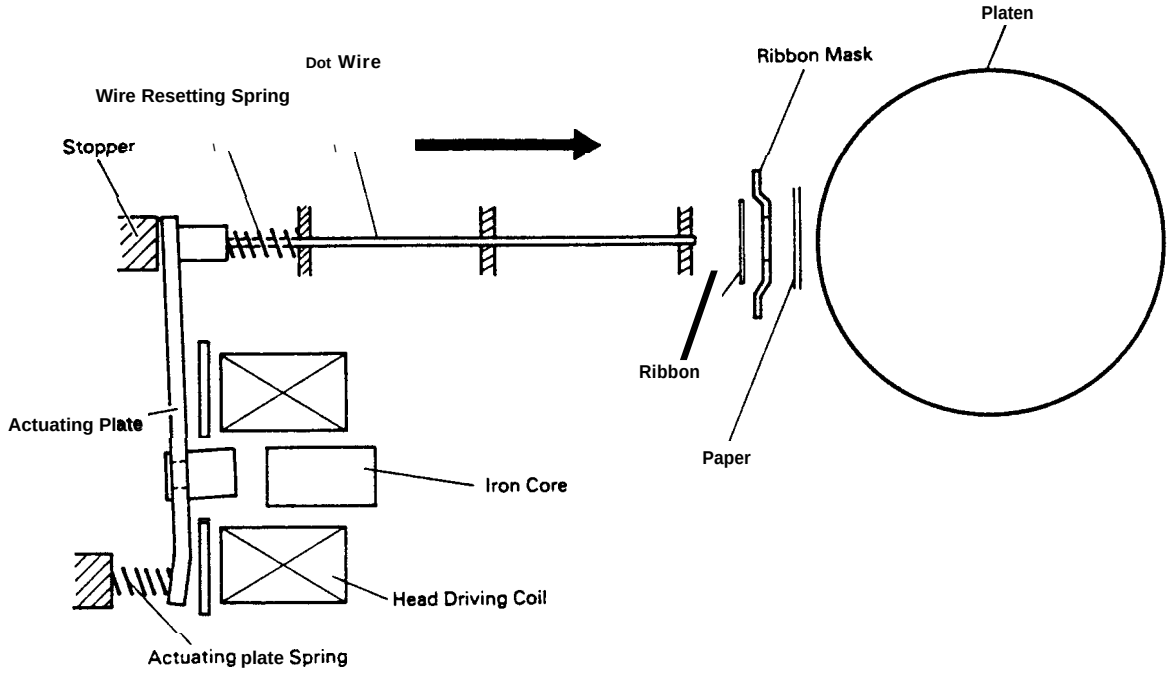

Figure 2-2. Printhead Printing Operation

2.2.2 Carriage **Drive Mechanism**

The carriage mechanism includes the printhead, the carriage, the timing belt, the carriage motor, and the platen.

The timing belt is connected to the bottom of the carriage. The belt is driven by the carriage motor and moved via the beltdriven pulley. The printhead is mounted on the carriage, and the entire unit is moved right and left along the carriage guide shaft and plate.

Carriage motor specifications are as follows:

Type:	4-phase, 48-pole step motor
Drive Voltage:	24 V ± MY/o
Coil Resistance:	11 Ω ± 7% at 25°C
Current Driving:	0.36 A ±10%(Typical) (Draft Printing) 0.28 A ±10%(Typical) (NLQ Printing) Holding: 0.09 A ±10%

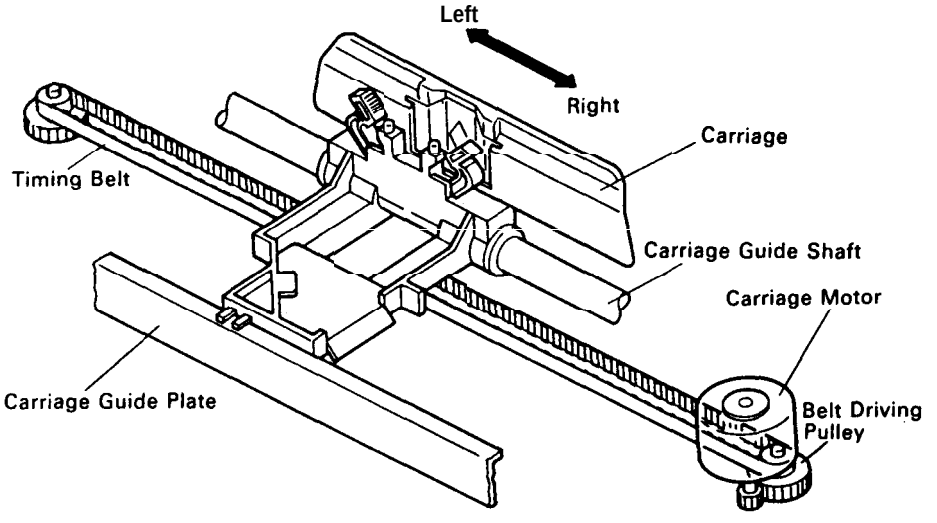

Figure 2-3. Carriage Drive Mechanism

2.2.2.1 Home Position Sensor

Following figure shows the home position sensor. The sensor switch is ON when the carriage is at the home position.

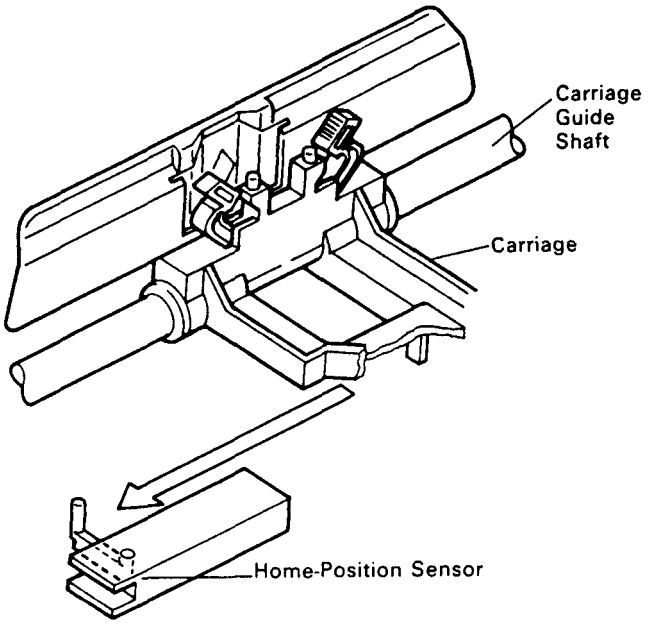

Figure 2-4. Home Position Sensor Mechanism

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2.2.3 Paper Feed Mechanism Operation

Friction feeding is used for cut sheets, and push tractor feeding is used for fanfold paper.

Friction-Feed Operation

The paper is held against the platen by paper-feed rollers. The paper-feed motor rotates the platen gear, via the paper-feed reduction gear, in the direction shown in following figure. Because of the friction between the paper-feed rollers and the platen, the rotation of the platen gear causes the paper to be fed. The feeding direction is indicated by the arrow in the Figure.

The paper is held against the platen by the spring force of the paper-feed rollers, and can be released by shifting the paper-release lever forward.

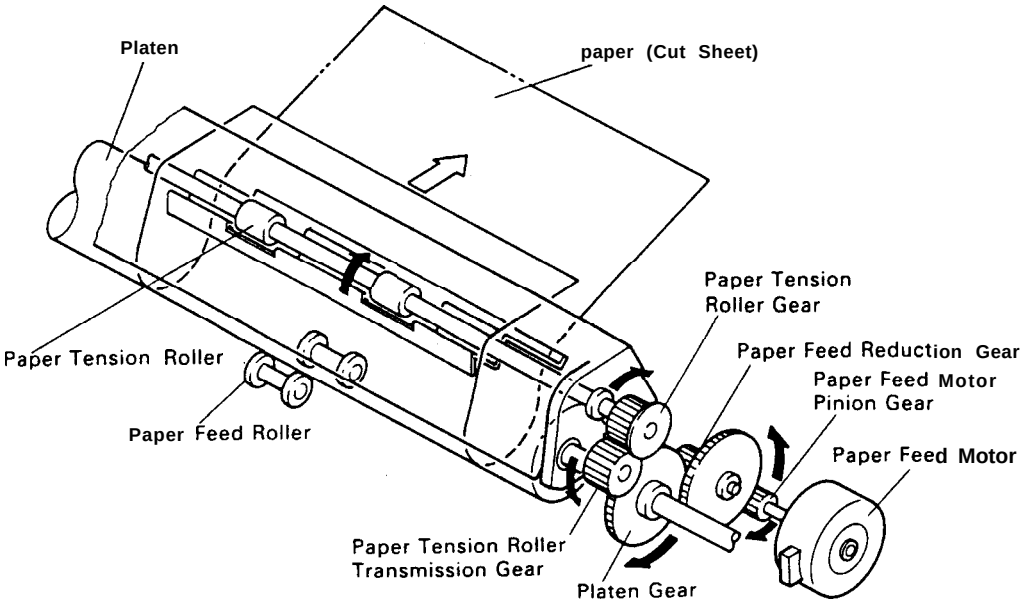

Figure 2-5. Friction Feed Operation

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