EPSON

EPSON TERMINAL PRINTER

LQ-570/1070

SERVICE MANUAL

4000566
REV.-B

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 a DANGER heading.

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 THE HOST COMPUTER BEFORE 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 THE 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 μP CHIPS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.

5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS RECOMMENDED BY THE MANUFACTURER; 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 the LQ-570/1 070.

The instructions and procedures included herein are intended for the experienced repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:

Chapter 1 - Provides a general product overview, lists specifications, and illustrates the main components of the printer.

Chapter 2 - Describes the theory of printer operation.

Chapter 3 - Includes a step-by-step guide for product disassembly and assembly.

Chapter 4 - Includes a step-by-step guide for adjustment.

Chapter 5 - Provides Epson-approved techniques for troubleshooting.

Chapter 6 - Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.

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

REVISION SHEET

REVISON	DATE ISSUED	CHANGE DOCUMENT
A	June 20, 1991	1st issue
B	Sept. 6, 1991	Added information for the LQ-1 070: I-i, I-ii, 1-1 - 1-8, 1-10, 1-11, 1-24, 1-26 - 1-28 2-i, 2-ii, 2-1 - 2-11, 2-13- 2-15, 2-17, 2-18 3-i, 3-ii, 3-5 - 3-20 4-i, 4-1 - 4-4, 4-6 5-i, 5-1 - 5-5, 5-9, 5-11 - 5-19 6-i, 6-1, 6-4 A-1, A-ii, A-1 - A-1 5, A-17 - A-1 9, A-22, A-23

TABLE OF CONTENTS

CHAPTER 1
GENERAL DESCRIPTION

LIST OF FIGURES

LIST OF TABLES

1.1 FEATURES

The LQ-570/1 070 are small, light-weight, low-cost, printers with advanced paper handling that is compatible with the LQ-5 10/550/1010. The printer's main features are as follows:

● **Use of ESC/P 2 control codes**
   Ability to print multi-point fonts
   Ability to receive and print raster graphic images
   Compatibility with the LQ/SQ series available on the market
● **Printing speeds: 225 characters per second (cps) (high-speed draft, 10 characters per inch (cpi))**
   252 cps (draft, 12 cpi)
   210 cps (draft, 10 cpi)
   84 cps (LQ, 12 cpi)
   64 cps (LQ, 10 cpi)
● **Optional interface card**
● **Clear, easy-to-read printing with standard EPSON fonts**
● **Multiple fonts resident in the printer**
   9 LQ fonts (Roman, Saris Serif, Courier, Prestige, Script, OCR-B, Script C, Orator, Orator-S)
   1 draft font
● **Control panel switch selection of fonts, condensed, and cut-sheet feeder (CSF) bin**
● **Optional tractor unit for push-pull tractor feed**
● **Flexible handling of continuous paper**
   Three ways to insert continuous paper (front/bottom/rear path)
   Auto backout and auto loading (rear insertion)
   Use of continuous paper without removing CSF
   Attachment of standard tractor unit in either of two positions (push/pull)
● **Easy handling of cut sheets with the optional cut-sheet feeder**
   Two ways to insert cut sheets (front/top)
   Auto loading

The LQ-570/1 070 are equipped with the standard EPSON 8-bit parallel interface. Various interface options ensure compatibility with a wide variety of computers. Table 1-1 lists the interface options, Table 1-2 lists the optional units available for the LQ-570/1 070, and Figure 1-1 shows an exterior view of the LQ-570/1 070.

Table 1-1. Interface Options

Model	Description
C82305	Serial interface card (inch screw)
C82306	Serial interface card (mini screw)
C82307	32KB serial interface card (inch screw)
C82308	32KB serial interface card (mini screw)
C82310	32KB parallel interface card
C82313	32KB IEEE-488 interface card

Printing is not possible for the following baud rates : 1800, 200, 134.5, 110, 75 bps.
NOTES: Refer to the "Optional Interface Technical Manual" for details.
   The asterisks (*) in the table above represent the last digit of the part numbers. This digit varies, depending on the country. For instance, in the U.S. the last digit is 1.

Table 1-2. Optional Units

Model	Description
C80637*	Single-bin cut-sheet feeder (80-column)
C80638*	High-capacity cut-sheet feeder (80-column)
C80639*	Singl-bin cut sheet feeder (1 36-column)
C80640*	High capacity cut sheet feeder (1 36-column)
C80019*	Tractor unit (80-column)
C80022*	Tractor unit (1 36-column)
7753	Fabric ribbon cartridge (80-column)
7754	Fabric ribbon cartridge (1 36-column)
7768	Film ribbon cartridge (80-column)
7770	Film ribbon cartridge (1 36-column)

Note: When a part number in the table above is followed by an asterisk ('), the last digit of the number varies, depending on the country. For example, in the U. S., the model number for a single-bin cut-sheet feeder (80-column) is C80673.
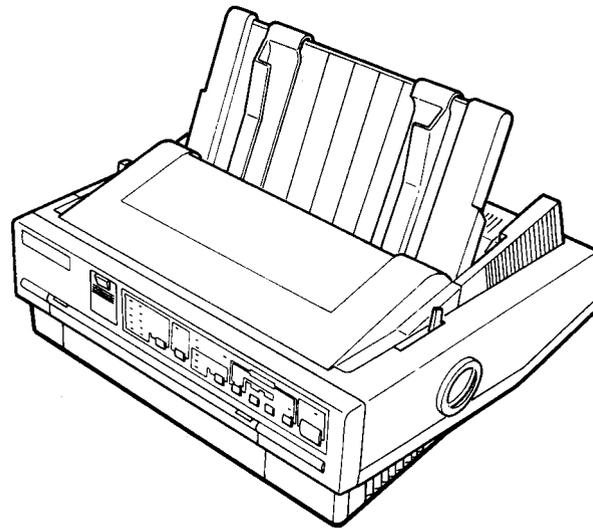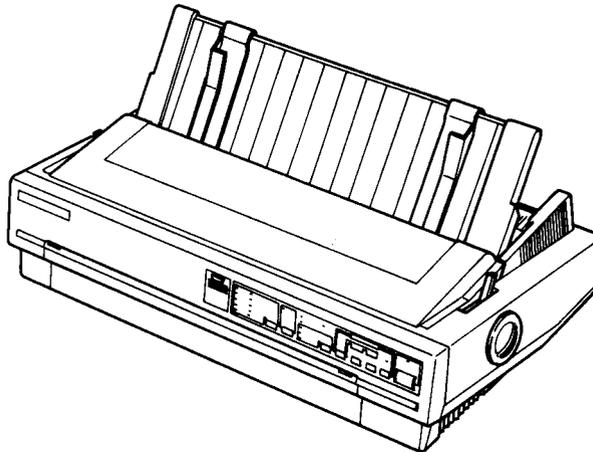
(LQ-570)

(LQ-107O)

Figure 1-1. Exterior View of the LQ-570/1070

1.2 SPECIFICATIONS

This section provides specifications for the LQ-570/1 070 printer.

1.2.1 Hardware Specifications

Printing method   Serial, impact, dot matrix

Pin configuration   24 wires (12 X 2 staggered, diameter 0.2 mm)
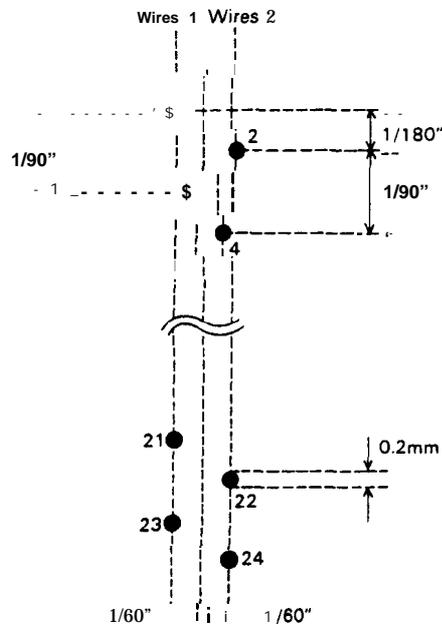
Figure 1-2. Pin Configuration

Feeding methods   Friction feed (front/top)

Push tractor feed (rear)

Pull tractor feed (front/bottom)

Push-pull tractor feed (with optional tractor) (rear)

Line spacing   1/6 inch, 1/8, or programmable in units of 1/360 inch

Paper insertion   Friction feed   Front or rear side

Tractor feed   Front, bottom, or rear side

Paper-feed speed   Friction without CSF   77.6 msec (1/6-inch feed)

2.2 inches per second (ips) (continuous)

Friction with CSF   77.6 msec (1/6-inch feed)

2.2 ips (continuous)

Tractor   77.6 msec (1/6-inch feed)

2.2 ips (continuous)

NOTE: The points below provide precautions for handling paper.

1. Friction feed (release lever in FRICTION POSITION).
   ● Paper must be loaded from the front or top entrance.
   ● Do not use continuous paper.
   ● Do not perform any reverse paper feeds within the top 8.5 mm (.34 in.), bottom 22 mm (.87 in.) (top entrance), or bottom 40.2mm (1.6 in.) (front entrance) area.
   ● Do not perform reverse feeds greater than 1/6 inch after a paper end has been detected.

- ● Use the paper tension unit.
- ● Do not use multi-part cut-sheet forms, except with front insertion.
- ● Do not perform reverse feeds greater than 1/6 inch when using envelopes.

2. Push tractor feed (release lever in REAR PUSH POSITION).
   - ● Paper must be loaded from the rear entrance.
   - ● Release the friction-feed mechanism.
   - ● Multi-part forms must be spot pasted beyond the perforation between the tractor holes.
   - ● Paper for multiple copies must be carbonless multi-part paper.
   - ● Use the paper tension unit.
   - ● Do not perform reverse feeds greater than 4/15 inch.
   - ● Since accuracy of paper feed cannot be assured after the paper end has been detected, please do not perform reverse feeds after detection of a paper end.

3. Push-pull tractor feed (release lever in REAR PUSH POSITION).
   - ● Paper must be loaded from the front, rear, or bottom entrance.
   - ● Release the friction-feed mechanism.
   - ● Remove the paper tension unit and attach the pull tractor unit.
   - ● Ensure that there is no slack in the paper between the platen and the pull tractor.
   - ● Precisely adjust the horizontal position of the pull tractor and push tractor sprockets.
   - ● Paper for multiple copies must be spot pasted beyond the perforation between the tractor holes.
   - ● Paper for copies must be a carbonless multi-part paper.
   - ● Do not perform reverse feeds greater than 4/15 inch.
   - ● Do not perform reverse feeds after the paper end has been detected.

4. Pull tractor feed (release lever in PULL POSITION).
   - ● Paper must be loaded from the front or rear entrance.
   - ● Release the friction-feed mechanism.
   - ● Remove the paper tension unit and attach the pull tractor unit.
   - ● Insert the paper from either front or bottom.
   - ● Paper for multiple copies must be spot pasted beyond the perforation between the tractor holes.
   - ● Paper for copies must be a carbonless multi-part paper.
   - ● Do not perform reverse feeds.

Paper specifications   See tables 1-3, 1-4, 1-5, 1-6, and 1-7

Table 1-3. Specifications for Cut Sheets (One-Part Paper)

Width	148 mm to 257 (*420) mm (5.8 in. to 10.1 (* 16.5) in.) (top insertion) 182 mm to 257 (*364) mm (7.2 in. to 10.1 (* 16.5) in.) (front insertion)
Length	364 mm (1 4.3 in.), maximum
Thickness	0.065 mm to 0.14 mm (0.0025 in. to 0.0055 in.)
Weight	14 lb. to 24 lb. (52.3 g/m² to 90 g/m²)
Quality	Standard paper (photocopier paper, etc.) Recycled paper (at normal temperatures)

(*136-column)

Table 1-4. Specifications for Cut Sheets (Carbonless Duplicating Paper)

Width	182 mm to 216 ('364) mm (7.2 in. to 8.5 (* 14.3) in.)
Length	257 mm to 297 mm (10.1 in. to 11.7 in.)
Thickness	0.065 mm to 0.14 mm (0.0025 in. to 0.0055 in.) - single sheet
	0.12 mm to 0.32 mm (0.0047 in. to 0.012 in.) - total
Weight	17 lb. to 24 lb. (52.3 g/m² to 90 g/m²) - single sheet
	12 lb. to 15 lb. (40 g/m² to 58 g/m²) - each
Quality	Carbonless duplicating paper
Copies	4 sheets (1 original and 3 copies)

(*136-column

Table 1-5. Specifications for Continuous Paper

Width	101 mm to 254 ("406) mm (4.0 in. to 10.0 (* 16) in.)
Thickness	0.065 mm to 0.10 mm (0.0025 in. to 0.0039 in.) - single sheet
	0.065 mm to 0.32 mm (0.0025 in. to 0.012 in.) -total
Weight	14 lb. to 22 lb. (52.3 g/m² to 82 g/m²) - single sheet
	12 lb. to 15 lb. (40 g/m² to 58 g/m²) - each
Quality	Standard paper or carbonless duplicating paper
	Recycled paper (at normal temperatures)
Copies	4 sheets (1 original and 3 copies)

(*:1 36-column)

Table 1-6. Envelopes

Size	No. 6= 166 mm X 92 mm
	No. 10= 240 mm X 104 mm
Thickness	0.16 mm to 0.52 mm (0.0063 in. to 0.0197 in.)
	Differences in thickness within the printing area must be less than
	0.25 *mm* (0.0098 in.)
Weight	12 lb. to 24 lb. (40 g/m² to 91 g/m²)
Quality	Bond paper, standard paper, airmail
Copies	Not available

NOTES: ● Printing on envelopes is available only at normal temperatures and only using top insertion.

● Keep the longer side of the envelope horizontal during insertion.

● Place the left edge of a No. 6 envelope at the sheet guide setting mark.

Table 1-7. Label Specifications

Label size	2 1/2 in. X 15/16 in.
	4 in. X 15/16 in. "
	4 in. X 1 7/16 in.
Copies	Not available
Thickness	0.07 mm to 0.09 mm (0.0028 in. to 0.0031 in.) - base paper
	0.16 mm to 0.19 mm (0.0063 in. to 0.0075 in.) -total

NOTES: ● Printing on labels is available only at normal temperatures.

● Labels must be of the fanfold type.

● Labels with pressure sensitive paper must be spot pasted beyond the perforation between the tractor holes. The total thickness must be less than or equal to 0.3 mm (0.01 18 in.). Labels can be printed out only if the temperature is between 5 and 35 degrees C (41 and 95 degrees F) and humidity is between 10 % and 80 % RH.

● Examples of labels AVERY CONTINUOUS FORM LABELS
AVERY MINI-LINE LABELS

● Labels must be used with the pull tractor (front or bottom).

● Do not perform reverse feeds.

Printable area

See figures 1-3, 1-4, and 1-5

top insertion 148 - 257 mm (5.8 ~10. 1")
148 - 257 (✳ 420) mm (5.8 ~ 10. 1" (✳ 16.5))
front insertion 182 ~ 257 mm (7.2 ~ 10 1")
182 ~ 257 (✳ 364) mm (7.2 ~10.1" (✳ 14.3'"))

., Printable area max. 203.2 mm (8 in.) '1)

8.5 mm
(0.33")
or more

ABC   XYZ

364mm
(14.3")
max.

ABC   XYZ

13.5mm
(0.53")
or more
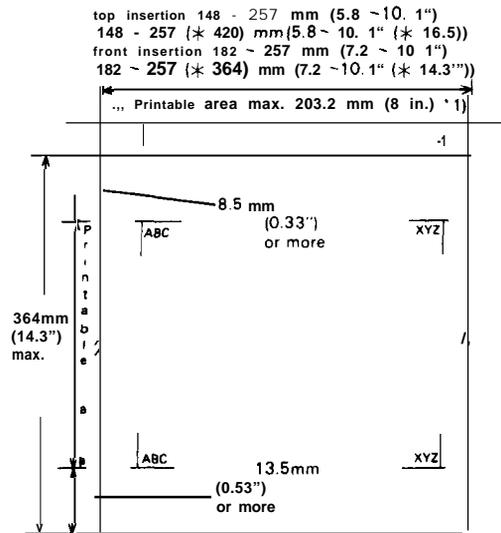
(✳ 136-column)

(80-column):

*1) 3.0 mm (O. 12 in.) or more when paper width is less than 229 mm (9 in.).

24 mm (0.9 in.)(top insertion)/26 mm (1.0 in.)(front insertion) or more when paper width is 229 mm (9.0 in.) to 257 mm (10.1 in.).

(136-column:)

3.0 mm (O. 12 in.) or more when paper width is less than 392 mm (1 5.4 in.). 29 mm (1.14 in.) (top insertion) /31 mm (1.22 in.) (front insertion) or more when paper width is 392 mm (1 5.4 in.) to 420 mm (1 6.4 in.).

● Paper-feed accuracy cannot be assured within 22 mm (0.87 in.) from the bottom edge of paper (top insertion).

Paper-feed accuracy cannot be assured within 40.2 mm (1 .58 in.) from the bottom edge of paper (front insertion).

Paper-feed accuracy cannot be assured within 22 mm (0.87 in.) from the top edge of paper.

Figure 1-3. Printable Area for Cut Sheets

101.254 mm (4 10")
101.254 x406) (4- 10" (✳16))

✳ 1✳   Printable area   ✳ 1

1' Max. 203.2 mm (8"); 80 column
Max. 345.4 mm(13.6"): 136 colum

Printable
area

ABC   XYZ

9 mm (O 35")
or more

9 mm (0.35")
or more

ABC   XYZ

t
Printable
area
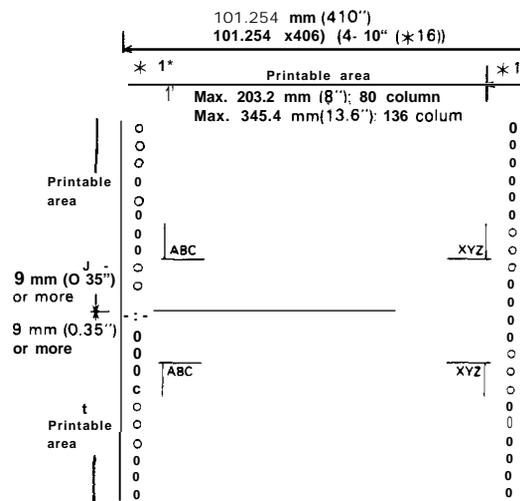
(* 136-column)

Figure 1-4. Printable Area for Continuous Sheets

(80-column):

● 1) 13 mm (0.51 in.) or more when a paper width of 101 mm (4 in.) to 241 mm (9.5 in.) is used.
24 mm (0.9 in.)(rear insertion)\ 26 mm (1.0 in.)(front/bottom insertion) or more when a paper width of 254 mm (10 in.) is used.

(1 36-column):

13 mm (0.51 in.) or more when a paper width of 101 mm to 401.3 mm (4 in. to 15.8 in.) is used.
15 mm or more when a paper width of 381 mm to 406 mm (15 in. to 16 in.) is used. 13 mm (rear insertion) (0.5 1 in.) /1 7 mm (front/bottom insertion) (0.67 in.) is used. (136-column).

Ink ribbon	Type #7753 black ribbon cartridge (80-column)
	#7768 film ribbon cartridge (80-column)
	#7754 black ribbon cartridge (1 36-column)
	#7770 film ribbon cartridge (1 36-column)
	Color Black
	Life 2 million characters at 48 dots/character (black ribbon)
	(80-column) 0.2 million characters at 48 dots/character (film ribbon)
	(136-column) 0.3 million characters at 48 dots/character (film ribbon)
	Dimensions of ribbon cartridge
	Fabric Type:
	(80-column): 293 mm (W) X 34 mm (H) $\times$ 72 mm (D)
	(136-column): 468.3 mm (W) X 34 mm (H) X 72 mm (D)
	Film Type:
	(80-column): 293 mm (W) X 34 mm (H) X 72 mm (D)
	(136-column): 468.5 mm (W) X 34 mm (H) X 72 mm (D)
Reliability	Mean cycles between failures (MCBF) 3 million lines (excluding printhead)
	Mean time between failures (MTBF) 4000 power on hours (POH) (25% duty)
Life of printhead	200 million strokes (black ribbon)
	100 million strokes (film ribbon)
Safety approvals	Safety standards UL1 950 with D3 (U.S. version)
	CSA22.2#220
	EN 60950 (TUV) (European version)
	Radio frequency interference (RFI)
	FCC class B (U.S. version)
	VDE0871 (self-certification) (European version)

Electrical specifications	120 V version	Rated voltage	120 VAC
		Input voltage range	103.5 to 132 VAC
		Rated frequency	50 to 60 Hz
		Input frequency	49.5 to 60.5 Hz
		Rated current	2.0 A
		Power consumption	Approx. 33 W (during a self-test in draft mode, 10 cpi)
		insulation resistance	10 megohms, minimum (at 500 VDC between AC line and chassis).
		Dielectric strength	1000 VACrms for 1 minute or 1200 VACrms for 1 second (between AC line and chassis)

	220 to 240 V version	Rated voltage	220 to 240 VAC
		Input voltage range	198 to 264 VAC
		Rated frequency	50 to 60 Hz
		Input frequency	49.5 to 60.5 Hz
		Rated current	1.0 A
		Power consumption	Approx. 33 W (during a self-test in draft mode, 10 cpi)
		Insulation resistance	10 megohms, minimum (at 500 VDC between AC line and chassis).
		Dielectric strength	1250 VAC rms 1 minute *or 1500* VAC rms 1 second (between AC line and chassis)

Environmental conditions	Temperature range	5 to 35 degrees C (41 to 95 degrees F) - operating
		−30 to 60 degrees C (−22 to 140 degrees F) – in shipment container
	Humidity	10 to 80 % RH - operating
		5 to 85 % RH − storage
	Resistance to shock	1 G, within 1 ms − operating
		2 G, within 1 ms - storage
	Resistance to vibration	0.25 G, 55 Hz, max. - operating
		0.50 G, 55 Hz, max. - storage

Physical specifications (80-column):

Weight	6.1 kg, approx. (13.5 lbs., approx.)
Dimensions	434 mm (width) X 368 mm (depth) X 151 mm (height)
	17.4 in. (width) X 14.7 in. (depth) X 6 in. (height)

(136-column):

Weight	8.4 kg, approx. (1 8.6 lbs., approx.)
Dimension	609 mm (width) X 368 mm (depth) X 151 mm (height)
	24.4 in. (width X 14.7 (depth) X 6 in. (height)

1.2.2 Firmware Specifications

Control code	ESC/P™ level ESC/P 2
	(EPSON standard code for printers)
Printing direction	Bidirectional with logic seeking
Input data buffer	8KB (when SW 1-7 is OFF)
	OKB (when SW 1-7 is ON)
Character code	8 bits
Character tables	Italic character table, PC 437, PC 850, PC 860, PC 863, PC 865
	(PC indicates character table for personal computer)

Fonts and pitches

Bit-map fonts	EPSON Roman	10, 12, 15, proportional
	EPSON Saris Serif	10, 12, 15, proportional
	EPSON Courier	10, 12, 15
	EPSON Prestige	10, 12
	EPSON Script	10, 12
	EPSON Script C	proportional
	OCR-B	10
	EPSON Orator	10
	EPSON Orator-S	10
	EPSON Draft	10, 12, 15
Scalable fonts	EPSON Roman	8 pt to 32 pt
	EPSON Saris Serif	8 pt to 32 pt

Printing modes   Selection and mixture of the following modes are allowed, excluding 15 cpi condensed mode:

- O Print quality (draft/letter quality)
- O Character pitch (10, 12, 15, or proportional)
- O Condensed
- O Double-width
- O Double-height
- O Emphasized
- O Double-strike
- O Italic
- O Underlined
- O Double-underlined
- O Overscore
- O Strike-through
- O Outline
- O Shadow

NOTES: High-speed draft is valid if the printer status is as follows:

● **High-speed draft is selected by DIP switch.**

● **Emphasized character mode is not selected.**

● **Condensed character mode is not selected.**

● **Draft is selected.**

● **No D/L (download) characters are sent to the printer,**

● **The horizontal dot space of characters is not set.**

● **No bit image is sent to the printer.**

● **Super/subscript is not selected.**

(The printer switches back into normal mode to print emphasized, condensed, or download characters and bit images.)

Printing speed	**See tables 1-8 and 1-9.**
Printing columns	**See Table 1-8.**
Character matrix	**See Table 1-10.**
Character size	**See Table 1-10.**

Table 1-8. Printing (Text Mode)

Print Pitch	Condensed	Printable Columns	Character Pitch (cpi)	Printing Speed (cps)		
				Draft	**LQ**	**HSD**
10	0	80 (* 136)	10	210	70	225
	1	137 ("233)	17.1	180	120	—
12	0	96 (* 164)	12	252	84	—
	1	160 (*272)	20	210	140	—
15	0	120("204)	15	315	105	—
	1	Invalid				

(* 136-column)

cpi:	characters per inch
Cps:	characters per second
LQ:	letter quality
HSD:	high-speed draft

Table 1-9. Printing (Bit Image Mode)

Pins	Bit Image Printing Mode	Density (dpi)	Printable Dots	Printing Speed (ips)
8	Single-density	60	480 (*8 16)	21.0
8	Dual-density	120	960 (* 1632)	10.5
8	Double-speed, dual-density	120	960 ("1632)	21.0
8	Quadruple-density	240	1920 (*3264)	10.5
8	CRT graphics	80	640 (" 1088)	10.5
8	CRT graphics II	90	720 ("1224)	14.0
24	Single-density	60	480 (*8 16)	21.0
24	Dual-density	120	960 (* 1632)	10.5
24	CRT graphics II	90	720 ("224)	14.0
24	Triple-density	180	1440 ("2448)	7.0
24	Hex-density	360	2880 (*4896)	7.0

(* 136-column)

dpi: dots per inch

ips: inches per second

Table 1-10. Character Matrix and Character Size

Printing Mode	Face Matrix	HDD	Character Size	Unit ESC sp
High-speed draft, 10 pitch	7 × 22	90	2.0 x 3.1	—
Draft, 10 pitch	9 x 22	120	1.9 x 3.1	120
Draft, 12 pitch	9 x 22	120	1.9 x 3.1	120
Draft, 15 pitch	7 X 16	120	1.0 X 2.3	120
Draft, 10 pitch, condensed	—	240	—	120
Draft, 12 pitch, condensed	—	240	—	120
LQ, 10 pitch	31 x 22	360	2.2 x 3.1	180
LQ, 12 pitch	27 X 22	360	1.9 x 3.1	180
LQ, 15 pitch	22 X 16	360	1.6 X 2.3	180
LQ, 10 pitch, condensed	—	360	—	180
LQ, 12 pitch, condensed	—	360	–	180
LQ, proportional	Max. 37 X 22 Min. 18 X 22	360 360	2.6 X 3.1 1.0 x 3.1	180
LQ, proportional, condensed	— —	360 360	— —	180
LQ, proportional, super/subscript	Max. 28 X 16 Min. 12 X 16	360 360	1.8 X 2.3 0.7 X 2.3	180
LQ, proportional, super/subscript, condensed	— —	360 360	— —	180

NOTES: . HDD is horizontal dot density in dots per inch.
- Face matrix and character size indicate the size of the maximum character. This value is dependent on paper, ribbon, etc.
- Unit ESC sp (which also can be sent as unit, followed by the character string CHR(&h2O)), indicates the minimum length to be added to the right of the character specified with the ESC sp control code.
- "-" indicates that the character matrix is reshaped by printer firmware. Character width becomes half of the noncondensed character width.

(Typical draft character)

(Typical LQ character)

1	Ascender area
2	

Face width
9 dots
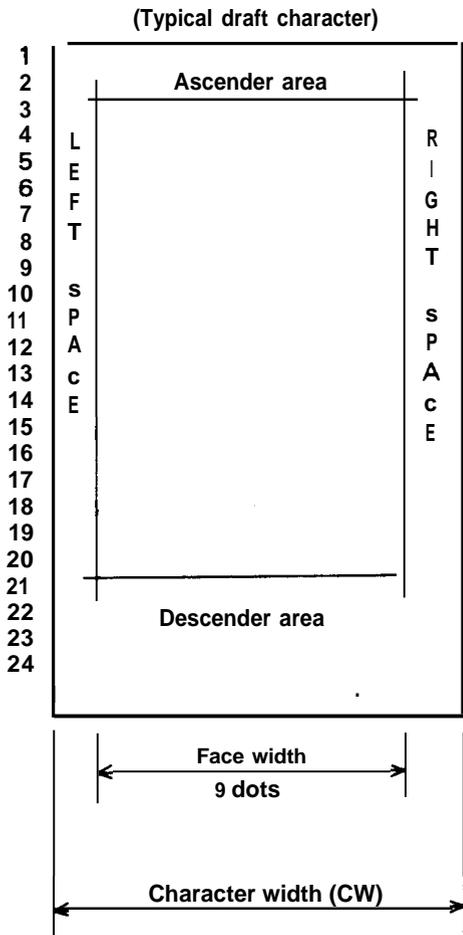
12 **dots (10 CPI) 120 DPI**
15 **dots (12 CPI) 180 DPI**
16 **dots (15 CPI) 240 DPI**
14 **dots (condensed 10 CPI) 240 DPI**
12 **dots (condensed 12 CPI) 240 DPI**

Face width

29 dots
(Typical LQ, excluding 15 pitch)
15 dots for
15 pitch and condensed LQ

Character width (CW)
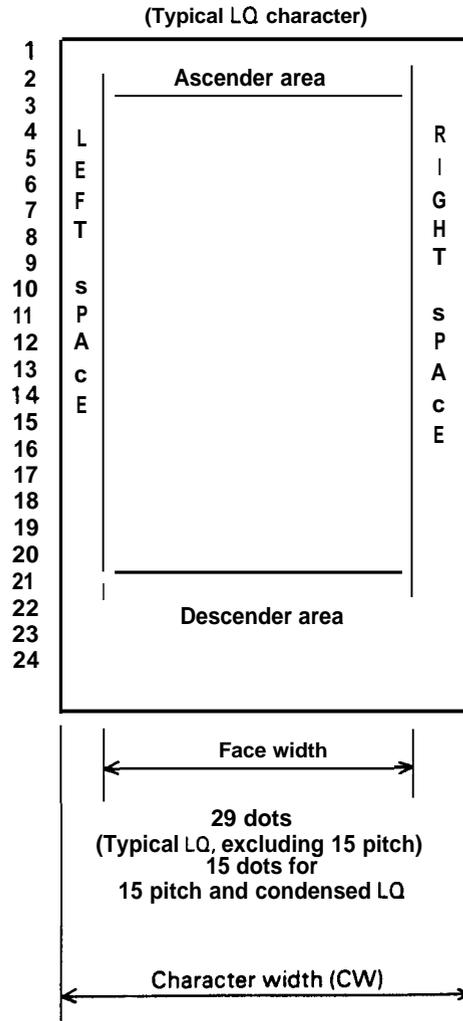
36 **dots (10 CPI) 360 DPI**
30 **dots (12 CPI) 360 DPI**
24 **dots (15 CPI) 360 DPI**
21 **dots (condensed 10 CPI) 360 DPI**
18 **dots (condensed 12 CPI) 360 DPI**

(Subscript character)

(Subscript character)
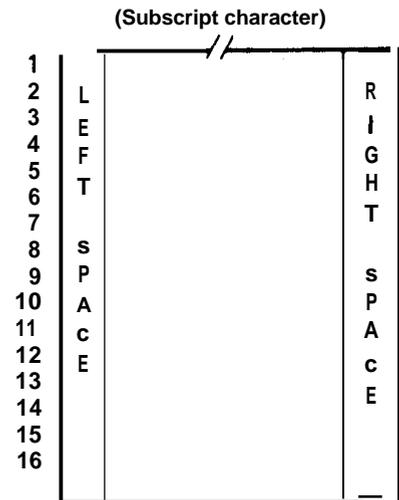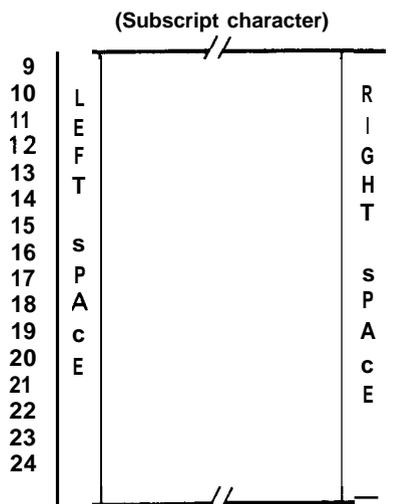
Figure 1-5. Character Matrix

1.3 INTERFACE OVERVIEW

The printer has a parallel interface with the specifications described below.

1.3.1 Parallel Interface

Specifications for the 8-bit parallel interface are as follows:

Data format	8-bit parallel
Synchronization	STROBE signal
Handshaking	BUSY and ACKNLG signal
Signal level	TTL-compatible
Adaptable connector	57-30360 (Amphenol) or equivalent
Data transmission timing	See Figure 1-6.
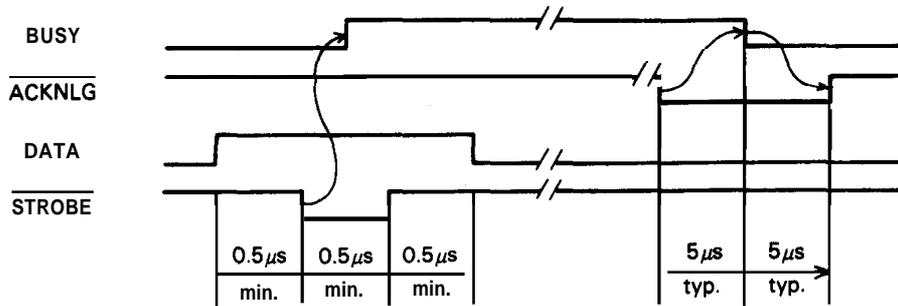
Figure 1-6. Data Transmission Timing

Table 1-11 shows the connector pin assignments and signal functions of the 8-bit parallel interface.

Table 1-11. Connector Pin Assignments and Signal Functions

Pin No.	Signal Name	Return Pin No.	Dir.	Functional Description
1	STROBE	19	IN	STROBE pulse to read the input data. Pulse width must be more than $0.5\mu s$. Input data is latched at falling edge of this signal.
2	DATA 1	20	IN	Parallel input data to the printer.
3	DATA 2	21	IN	HIGH level means data 1.
4	DATA 3	22	IN	LOW level means data O.
5	DATA 4	23	IN	
6	DATA 5	24	IN	
7	DATA 6	25	IN	
8	DATA 7	26	IN	
9	DATA 8	27	IN	
10	ACKNLG	28	OUT	This pulse indicates data has been received and the printer is ready to accept more data. Pulse width is approximately 11 μs.
11	BUSY	29	OUT	HIGH indicates the printer cannot accept more data.
12	PE	30	OUT	HIGH indicates paper out. This signal is effective only when the ERROR signal is LOW.
13	SLCT	—	OUT	Always HIGH output. (Pulled up to +5 V through a 3.3K ohm resistor.)

Table 1-11. Connector Pin Assignments and Signal Functions (Cont.)

Pin No.	Signal Name	Return Pin No.	Dir.	Functional Description
14	AUTO FEED-XT	—	IN	If LOW when the printer is initialized, the printer automatically performs a line feed upon input of the CR code (Auto LF).
15				Not used.
16	GND		—	Ground for twisted-pair grounding.
17	Chassis GND	—	—	Chassis ground level of printer.
18				Not used.
19 to 30	GND			Ground for twisted-pair grounding.
31	I NIT	16	IN	Pulse (width: $50\mu s$, min., active LOW) input for printer initialization.
32	ERROR		OUT	LOW indicates an error has occurred in the printer.
33	GND	—	—	Ground for twisted-pair grounding.
34				Not used.
35			OUT	Always HIGH. (Pulled up to $+5V$ through 3.3K ohm resistor.)
36	SLCT-IN	—	IN	DC 1/DC 3 control is disabled.

NOTES: 1. "Dir." indicates the direction of the signal flow as viewed from the printer.

2. "Return Pin No." denotes a twisted-pair return line.

3. The cable used must be shielded to prevent noise.

4. All interface conditions are based on TTL levels. Both the rise and fall times of all signals must be less than $0.2\mu s$.

5. The AUTOFEED-XT signal can be set to LOW by DIP switch 2-4.

6. The SELECT-IN signal can be set to LOW by jumper 3.

7. Printing tests, including those of the interface circuits, can be performed without using external equipment by setting DATA 1- DATA 8 pins to the STROBE signal.

1.4 CONTROL PANEL

On the control panel are: a power button (labeled OPERATE), 7 non-lock type buttons, and 19 indicators.
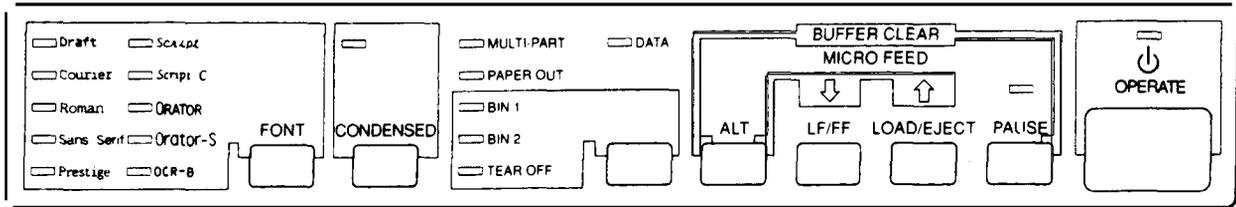
Figure 1-7. Control Panel

BUTTONS

(1) OPERATE Button
This button turns on the power supply to the printer.

(2) PAUSE Button
This button controls printer action. Pressing the button toggles the printer between PAUSE condition (no printing, no paper feeding, and not accepting data) and RUNNING. This button is also used in conjunction with the ALT button as a buffer clear to clear the input buffer and perform software initialization, as if ESC @ had been received.

(3) LINE FEED/FORM FEED Button
Pressing this button performs a line feed, and holding down the button performs a form feed, irrespective of the PAUSE/RUNNING condition. This button is also used in conjunction with the ALT button as the micro reverse feed.

(4) LOAD/EJECT Button
Pressing this button loads or ejects the paper. Refer to Section 1.6.8, Sheet Loading and Sheet Ejection. This button is also used in conjunction with the ALT button as the micro forward feed.

(5) TEAR-OFF/BIN 1/BIN 2 Button
In tractor-feed mode, pressing this button advances continuous paper to the tear-off position, and the TEAR-OFF indicator is lit. In friction-feed mode, pressing this button toggles between bin 1 and bin 2, and the selected BIN indicator is lit.

(6) ALT Button
This button is used only in combination with another button,

(7) FONT Button
Pressing this button selects a font, and pressing it continuously selects the next one, sequentially. The FONT LED indicates the currently selected font.

(8) CONDENSED Button
Pressing this button toggles the printing mode between normal and condensed, alternatively.

NOTE: Selections of the FONT and CONDENSED buttons are stored as defaults, so that the last FONT and the CONDENSED selection become effective when the printer is initialized.

INDICATORS

(1) OPERATE (green)
Lit when the printer's OPERATE button is on, and AC power is supplied.

(2) PAUSE (orange)
Lit when the printer is in PAUSE-mode (no printing, no paper feeding, and not accepting data).

(3) TEAR-OFF (orange)
Lit when the sheet is advanced to the tear-off position.

(4) DATA (orange)
Lit when the printer has received data from the host. .

(5) PAPER-OUT (red)
Lit when the paper-out detector senses no paper. Refer to Section 1.6.3, Paper-out Detection and Forms Override Function.

(6) MULTI-PART (green)
Lit when the adjust lever is positioned at the 4th step or higher,

(7) BIN 1 (green)
Lit when bin 1 is selected.

(8) BIN 2 (green)
Lit when bin 2 is selected.

(9) FONT (green) - Draft, Courier, Roman, Saris Serif, Prestige, Script, Script C, Orator, Orator-S, OCR-B
These indicators show the currently selected font.

(10) CONDENSED (green)
Lit when condensed mode is selected.

1.5 DIP SWITCHES AND JUMPER SETTING

This section describes the DIP switch selections and jumper setting for the LQ-570 printer.

1.5.1 DIP Switch Settings

The two DIP switch banks for the printer, located on control panel, function as shown in tables 1-12 through 1-15. (Note that the status of the DIP switches is read only at power on or upon receipt of the INIT signal.)

Table 1-12. Settings for DIP Switch 1 (SW1)

No.	Description	ON	OFF	Factory Setting
1 2 3	International character set and PC selection	See Table 1-14.		ON ON ON
4	Character table selection	Graphic	Italic	OFF
5	Graphic print direction	Unidir.	Bidir.	OFF
6	High-speed draft	Invalid	Valid	OFF
7	Input buffer	Invalid	Valid	OFF
8	I-inch skip continuous paper	ON	OFF	OFF

Table 1-13. Settings for DIP Switch 2 (SW2)

No.	Description	ON	OFF	Factory Setting
1 2	Page length of continuous paper	See Table 1-15.		OFF OFF
3	Auto tear-off	ON	OFF	OFF
4	Auto LF	ON	OFF	OFF

Table 1-14. International Character Set Selection

1-1	1-2	1-3	Country	PC
ON	ON	ON	Us.	437
ON	ON	OFF	France	850
ON	OFF	ON	Germany	860
ON	OFF	OFF	U.K.	863
OFF	ON	ON	Denmark 1	865
OFF	ON	OFF	Sweden	(437)
OFF	OFF	ON	Italy	(437)
OFF	OFF	OFF	Spain 1	(437)

When SW 1-4 is OFF,
If graphic table was selected by
ESC t 1, PC becomes 437.

When SW 1-4 is ON,
if italic table was selected by
ESC t O, country setting becomes U.S.

Table 1-15. Page Length

2-1	2-2	Page Length
OFF	OFF	11 inches
ON	OFF	12 inches
OFF	ON	8.5 inches
ON	ON	70/6 inches

1.5.2 Jumper Setting

If Jumper 3 is connected to GND, the $\overline{\text{SLCT-IN}}$ signal is fixed to LOW.

1.6 OPERATING INSTRUCTIONS

This section describes the self-test and hexadecimal dump functions and also includes the error states, printer initialization, and buzzer operation.

1.6.1 Self-Test

To run the self-test using draft mode, turn the printer on while pressing the LOAD/EJECT button. To run the self-test using the letter quality (LQ) mode, turn the printer on while pressing the LINE FEED/FORM FEED button. You can stop or start self-test printing by pressing the PAUSE button. When you are satisfied with the self-test, stop the printing by pressing the PAUSE button and turn the printer off.

The firmware revision number is printed on the first line of the self-test, followed by the current DIP switch settings.

```
Xxxxxx
Country/PC    SW1-1 1-2 1"3 1-4    High speed draft SW1-6
  U.S.A.        on  on  on  off      Valid            off
  France        on  on  off off      Invalid          on
  Germany       on  off Orl off    Receive buffer   SW1-7
  U.K.          on  off off off      Valid            off
  Denmark       off on  on  off      Invalid          on
  Sweden        off on  off oft    1 inch skip      SW1-8
  Italy         off off on  off      1 rival id       off
  Spain         off off off off     Valid            on
  PC 437        on  on  on                           SW2-1 2-2
                                                     off  off
```

Figure 1-8. Self-Test Printout

1.6.2 Hexadecimal Dump Function

To put the printer in hex. dump mode, power it on while pressing both the LOAD\ EJECT and LINE FEED/FORM FEED buttons. In hex. dump mode, the printer prints out the hexadecimal representation of the input data, along with the corresponding ASCII characters. This function is valuable for checking the data the printer has received from the host. If input data is a nonprintable character code, a period (.) is printed in the ASCII column.

```
1B 40 1B 52 00 1B 74 01 1B 36 12 1B 50 1B 70 00   .@. R. . t. .6. .P. D.
20 20 54 68 69 73 20 69 73 20 61 6E 20 65 78 61   This is an exa
6D 70 6C 65 20 6F 66 20 61 20 64 61 74 61 20 64   mple of a data d
75 6D 70 20 70 72 69 6E 74 6F 75 74 2E 20 54 68   ump printout. Th
69 73 20 66 65 61 74 75 72 65 20 6D 61 6B 65 73   is feature makes
0.4 20 20 20 20 20 69 74 20 65 61 73 79 20 66 6F  .    it easy fo
```

Figure 1-9. Hexadecimal Dump Function

1.6.3 Paper-out Detection and Forms Override Function

When the paper-out detector, attached to the printer mechanism, detects a paper-end, the printer first performs a forms override. If paper loading fails, the BUSY signal goes HIGH, the PAPER OUT indicator is lit, the interface PE signal becomes HIGH, the $\overline{\text{ERROR}}$ signal becomes LOW, and the printer enters the PAUSE condition automatically.

By ignoring the paper out, the printer can print additional lines after the paper out is detected. This function is called the forms override function. After you load new paper and press the PAUSE button, the printer recovers to the RUNNING condition, and printing restarts.

The printer enters the paper-out condition only when a paper-out is detected after the printer performs paper loading.

1.6.4 Error Conditions

If any of the following error conditions are detected, the printer automatically enters PAUSE condition.

● Home position is not detected at printer mechanism initialization.
● Home position is detected during printing.
● The PAUSE button is pressed, and the printer enters PAUSE condition.
● A paper-out is detected after performing paper loading operation.

If parallel interface is selected, the following interface signals are output to indicate the error and to stop data transmission:

The BUSY signal becomes HIGH.
The $\overline{\text{ERROR}}$ signal becomes LOW.
No $\overline{\text{ACKNLG}}$ pulse is sent.

1.6.5 Buzzer Operation

The buzzer sounds under the following conditions:

. A paper-out error is detected (beeps 3 times for 0.1 second, with 0.1 second intervals).
● Abnormal carriage movement is detected (beeps 5 times for 0.5 second, with 0.5 second intervals).
● A panel setting is accepted (O. 1 second beep).

1.6.6 Printer Initialization

There are three initialization methods: hardware initialization, software initialization, and panel initialization.

(1) Hardware initialization

This type of initialization takes place when the printer power button is turned on (and the AC power cord is plugged in) or when the INIT signal is received.

When the printer is initialized, it performs the following actions:

REV. A

(a) Initializes printer mechanism.

    (b) **Clears input data buffer.**

    (c) **Clears downloaded character set.**

    (d) **Clears print buffer.**

    (e) **Returns printer settings to their default values.**

(2) Software initialization

Input of the $ESC@$ command also initializes the printer. Printer initialization by $ESC@$ code does not perform functions (a), (b), and (c) above. The settings changed by the last $SelecType$ operation are maintained.

(3) Panel initialization

This printer can be initialized by pressing the PAUSE button in combination with the ALT button. When the printer is initialized from the front panel, functions (a) and (c) above are not performed. The settings changed by the last $SelecType$ operation are maintained.

1.6.7 Default Values

When the printer is initialized, the following default values are set:

Page position	The current paper position becomes the top-of-form position
Left and right margins	Released
Line spacing	1/6 inch
Vertical tabs	Cleared
Horizontal tabs	Every 8 characters (relative)
Family number of type style	Last font selected from the panel
Download characters	Kept - software initialization
	Cleared – hardware initialization
Character spacing	10 cpi
Printing effects	Cleared, except condensed printing
Condensed printing	Last setting selected from the panel
Printer condition	RUN

1.6.8 Sheet Loading and Sheet Ejection

The release lever can disengage the pull-tractor unit drive mechanism, giving this printer improved paper-handling for functions that utilize the release lever. These functions are described below:

Automatic cut-sheet loading without the cut-sheet feeder

Move the release lever to the friction-feed position, and place the sheet along the paper guide (top or front). A few seconds later, the sheet is automatically loaded to the top-of-form position and the printer enters the RUNNING condition.