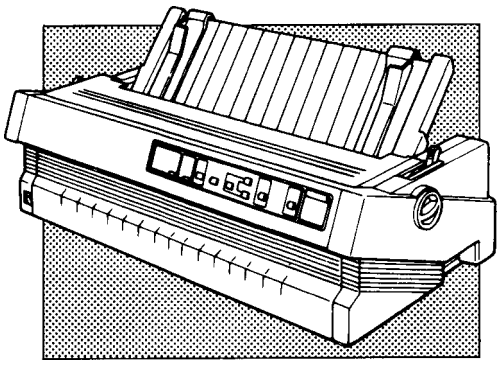
EPSON

EPSON TERMINAL PRINTER

SQ - 870/1170



SERVICE MANUAL

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NOTICE

“ The contents of this manual are subject to change without notice.
“ All efforts have been made to ensure the accuracy of the contents of this manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.
‘ The above notwithstanding SEIKO EPSON can assume no responsibility for any errors in this manual or the consequences thereof.

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 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 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 SQ-870/1 170.
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.

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

REVISION SHEET

REVISON	DATE ISSUED	CHANGE DOCUMENT
A	Feb. 21, 1992	1st issue

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CHAPTER 1
GENERAL DESCRIPTION

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1.1 FEATURES

The SQ-870/1170 is a high speed 48-nozzle ink jet printer which provides advanced paper handling that is upper compatible with the TSQ-4800. 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:
  660 cps (draft, 12 cpi)
  550 cps (draft, 10 cpi)
  240 cps (LQ, 12 cpi)
  200 cps (LQ, 10 cpi)
- Optional interface card
- Clear, easy-to-read printing with standard EPSON fonts
- Multiple fonts resident in the printer
  2 scalable fonts (Roman, Saris Serif)
  8 LQ bit-map fonts (Roman, Saris Serif, Courier, Prestige, Script, Script C, Orator, Orator-S)
  1 draft bit-map font
- Control panel switch selection of fonts, pitch, and cut-sheet feeder (CSF) bin
- Optional tractor unit that can make up push-pull tractor
- Easy handling of cut sheets with the optional cut-sheet feeder
- Continuous Paper
  Two ways to insert continuous paper (front/rear path)
  Backout & loading
  Continuous paper can be used without removing CSF
  Standard tractor unit can be attached in two positions (front/rear)
- Cut Sheet
  Two ways to insert cut sheets (front/top)
  Auto loading

The SQ-870/1170 is equipped with the standard EPSON 8-bit parallel interface and 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 SQ-870/1170, and Figure 1-1 shows an exterior view of the SQ-870/1170.

Table 1-1. Interface Options

Model	Descriptions
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

NOTE: Refer to the "Optional Interface Technical Manual" for details.

Table 1-2. Optional Units

Model	Descriptions
C80647	Single-bin cut-sheet feeder (80 columns)
C80648	Single-bin cut-sheet feeder (136 columns)
C80637	Second bin hopper (80 columns)
C80640	Second bin hopper (136 columns)
C80023	Tractor unit (80 columns)
C80024	Tractor unit (136 columns)
SO2OO1O	Ink cartridge

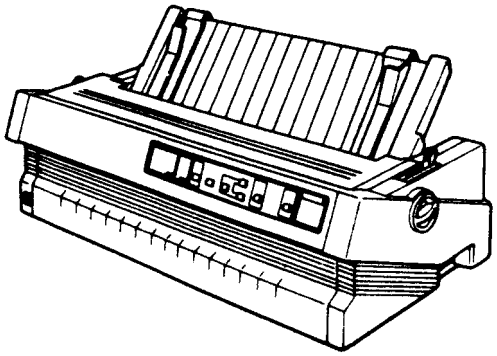


Figure 1-1. Exterior View of the S(2-870/1 170

1.2 SPECIFICATIONS

This section provides specifications for the SQ-870/1 170 printer.

1.2.1 Hardware Specifications

Printing method	On-demand type ink jet system
Nozzle configuration	48 nozzles (48 X 1 diagonal)

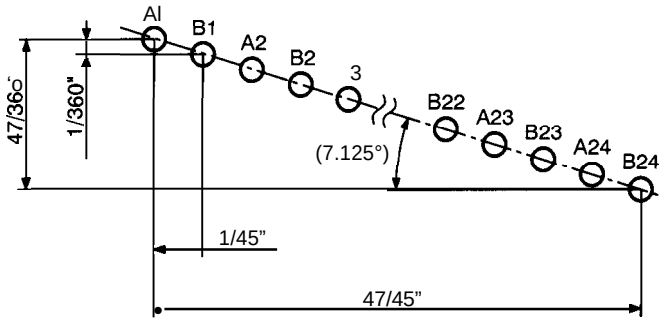


Figure 1-2. Nozzle Configuration

Feeding methods	Friction feed (front/top) Push tractor feed (front/rear) Push-pull tractor feed (with optional tractor) (front/rear)

NOTE: Do not perform pull tractor feed.

Line spacing	1/6 inch, 1/8, or programmable in units of 1/180 or 1/360 inch	
Paper insertion	Friction feed — Front or top side	
	Tractor feed — Front or rear side	
Paper-feed speed	Friction without CSF	45 msec (1/6-inch feed)
		4.5 inches per second (ips) (continuous)
	Friction with CSF	49 msec (1/6-inch feed)
		4.0 ips (continuous)
	Tractor	45 msec (1/6-inch feed)
		4.5 ips (continuous)

NOTE: Following are the precautions for handling paper.

1 Friction feed (release lever in FRICTION POSITION).

- The 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.) or bottom 22 mm (.87 in.) area.
- Do not perform reverse feeds greater than 1/6 inch after a paper end has been detected.

2 Push tractor feed (release lever in REAR PUSH POSITION or FRONT PUSH POSITION).

- The paper must be loaded from the front or rear entrance.
- Release the friction-feed mechanism.
- Do not perform reverse feeds greater than 1/6 inch.
- Since accuracy of paper feed cannot be assured after the paper end has been detected, do not perform reverse feeding after the detection of a paper end.

3. Push-pull tractor feed (release lever in REAR PUSH POSITION or FRONT PUSH POSITION).

- The paper must be loaded from the front or rear entrance.
- Release the friction-feed mechanism.
- 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.
- Paper for multiple copies must be spot pasted on both side of the perforation between the tractor holes.
- Do not perform reverse feeds greater than 1/6 inch.
- Do not perform a reverse feed after the paper end has been detected.

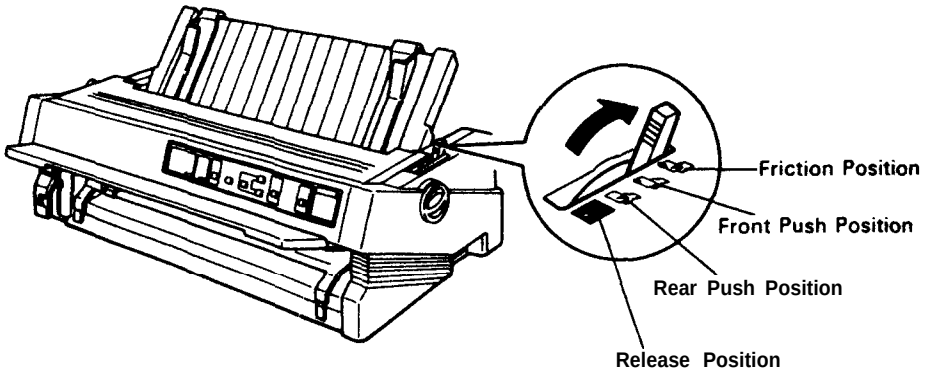


Figure 1-3. Release Lever Positions

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

Table 1-3. Specifications for Cut Sheets

Width	182 mrn to 257 mm (7.2 in. to 10.1 in.) (80 columns) 182 mm to 420 mm (7.2 in. to 16.5 in.) (136 columns)
Length	182 mm to 364 mm (7.2 in. to 14.3 in.)
Thickness	0.065 mm to 0.10 mm (0.0025 in. to 0.0039 in.)
Weight	14 lb to 22 lb (52.3 g/m² to 82 g/m²)
Quality	Standard paper (photocopier paper, etc.)

Table 1-4. Specifications for Continuous Papers

Width	101 mm to 254 mm (4.0 in. to 10.0 in.) (80 columns) 101 mm to 406 mm (4.0 in. to 16.0 in.) (136 columns]
Quality	Stan dard paper
Thickness	0.065 mm to 0.10 mm (0.0025 in. to 0.0039 in.)
Weight	14 lb to 22 lb (52.3 g/m² to 82 g/m²)

Table 1-5. Envelopes

Size	No. 6 166 mm X 92 mm (6.5 in. X 3.625 in.)
	No. 10240 mm X 104 mm (9.5 in. X 4.125 in.)
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 (45 g/m² to 91 g/m²)
Quality	Bond paper, standard paper, airmail

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 1-6. Labels Specifications

Label size	2.5 in. X 0.94 in.
	4.0 in. X 0.94 in.
	4.0 in. X 1.44 in.
Copies	These three kinds of labels are recommended.
Thickness	0.22 mm (0.0079 in.) maximum

NOTES:
- Printing on labels is available only at normal temperatures.
- Labels must be of the continuous type.
- Examples of labels AVERY CONTINUOUS FORM LABELS
  AVERY MINI-LINE LABELS

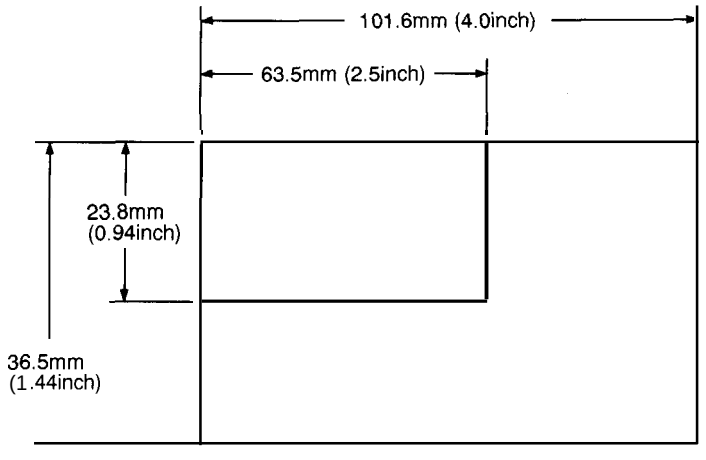
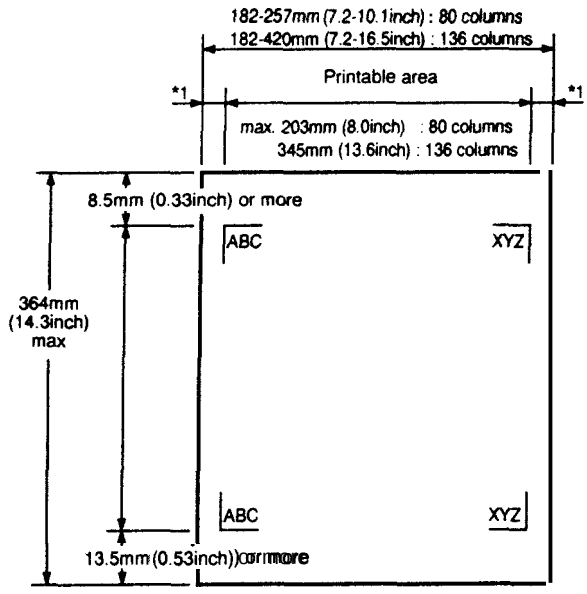


Figure 1-4 Label Size

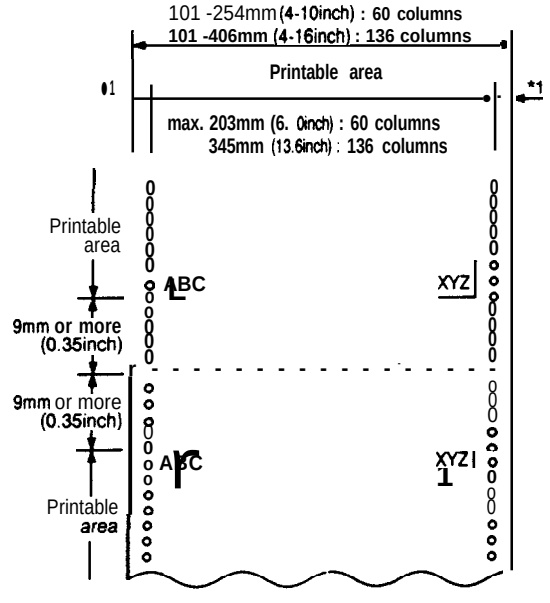
Printable area **See figures 1-5 and 1-6**



● 1: 80 columns: 3.0 mm (0.12 in.) or more when the width of paper is less than 229 mm (9 in.).
13 mm (0.51 in.) or more when the width of paper is 257 mm (10.1 in.).
136 columns: 3.0 mm (O. 12 in.) or more when the width of paper is less than 364 mm (1 4.3 in.)
25 mm (0.98 in.) or more when the width of paper is 420 mm (16.5 in.).

NOTE: The paper feed accuracy can not be assured within the following area.
Front insertion: 47 mm (1 .85 in.) from the bottom edge of paper.
Rear insertion: 26 mm (1 .02 in.) from the bottom edge of paper.

Figure 1-5. Printable Area for Cut Sheets



● 1: 80 columns: 13 mm (0.51 in.) or more when the 101 mm (4.0 in.) to 241 mm (9.5 in.) width paper is used.
26 mm (1 .02 in.) or more when the 254 mm (1 O in.) width paper is used.
136 columns: 13 mm (0.51 in.) or more when the "101 mm (4.0 in.) to 377.8 mm (1 4.87 in.) width paper is used.
15 mm (0.59 in.) or more when the 381 mm (15 in.) to 406 mm (16 in.) width paper is used.

Figure 1-6. Printable Area for Continuous Papers

Ink cartridge	**Type:**	**Exclusive ink cartridge**
	Color:	**Black**
	Ink capacity:	**105 to 115 cc**
	Print capacity (depending on the cleaning operation):	
	Draft:	**6 million characters**
	Letter Quality:	**3 million characters**
	Ink life:	**2 years from production date**
	Storage temperature:	
		–30 to 40 degrees C (–22 to 104 degrees F) -Storage (within a month at 40 degrees C (104 degrees F))
		–30 to 60 degrees C (–22 to 140 degrees F) -Transit (within a month at 40 degrees C (104 degrees F)) (within 120 hours at 60 degrees C (140 degrees F))
	Dimension of cartridge:	
		24.8 mm (W) X 138 mm (D) X 99.3 mm (H) (0.98 inch X 5.43 inch X 3.91 inch)

NOTES:

- **Ink will be frozen under –7 degrees C (19 degrees F) environment, however it will be usable after placing it at room temperature. (It will take approx2.5 hours until melting at 25 degrees C (77 degrees F).)**
- **Do not use the ink cartridge which has been stored longer than the ink life.**

Reliability	**Mean cycles between failures (MCBF)**	**5 million lines (excluding printhead)**
	Mean time between failures (MTBF)	**4000 power on hours (POH) (25% duty)(SQ-870)**
		6000 power on hours (POH)(25% duty)(SQ-1 170)
Life of printhead	**4000 million dots/nozzle**	
Safety approvals	**Safety standards**	**UL1 950 with D3 (U. Aversion)**
		CSA22.2#220
		EN 60950 (TUV) (European version)
	Radio frequency interference (RFI)	**FCC class B (U. Aversion)**
		VDE0871 (self-certification) (European version)

Electrical specifications	**120 V version**	**Rated voltage**	**120 VAC**
		Input voltage range	**103.5 to 132 VAC**
		Rated frequency range	**50 to 60 Hz**
		Input frequency range	**49.5 to 60.5 Hz**
		Rated current	**0.6 A**
		Power consumption	**Approx. 30 W (SQ-870)**
			Approx. 30 W (SQ-1 170)
			(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 1 minute or 1200 VACrms 1 second (between AC line and chassis)
	220/240 version	Rated voltage	220 to 240 VAC
		Input voltage range	198 to 264 VAC
		Rated frequency range	50 to 60 Hz
		Input frequency range	49.5 to 60.5 Hz
		Rated current	0.4 A
		Power consumption	Approx. 30 W (SQ-870) Approx. 30 W (SQ-1 170) (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 VACrms 1 minute or 1500 VACrms 1 second (between AC line and chassis)
Environmental conditions	Temperature	10 to 35 degrees C (50 to 95 degrees F) – operating –30 to 60 degrees C (–22 to 140 degrees F) -in shipment container	
	Humidity	20 to 80 % RH - operating 5 to 85 % RH - storage	

NOTE: Figure 1-5 shows the operating environment.

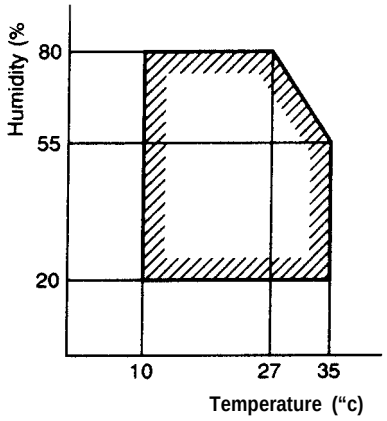


Figure 1-7. Printer Operating Environment

	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	Weight	9.5 Kg, approx. (2 1.0 pounds, approx.)(SQ-870) 12.2 Kg, approx. (27.0 pounds, approx.)(SQ-1 170)
	Dimensions	462 mm (width) X 325 mm (depth) X 205 mm (height) 18.2 in(width) X 12.8 in(depth) X 8.1 in(height)(SQ-870) 657 mm (width) X 325 mm (depth) X 205 mm (height) 25.9 in(width) X 12.8 in(depth) X 8.1 in(height)(SQ-1 170)

1.2.2 Firmware Specifications

Control code	ESC/P™ level 2 (EPSON standard code for printers)
Printing direction	Bi-directional with logic seeking (text printing)
	Uni-directional (bit-image printing)
Input data buffer	16KB (Standard)
	128KB (factory option)
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	See table 1-7
Scalable fonts	EPSON Roman 8 pt to 32 pt
	EPSON Saris-serif 8 pt to 32 pt

Table 1-7. Built in Bit-map Fonts

	Family No.	10 CPI	12 CPI	15 CPI	Proportional
EPSON Roman	o	0	0	0	0
EPSON Saris-serif	1	0	0	0	0
EPSON Courier	2	0	0	0	•
EPSON Prestige	3	0	0	0	•
EPSON Script	4	0	0	0	•
EPSON Script-C	9	0	0	0	·
EPSON Orator	7	0	·	x	·
EPSON Orator-S	8	0	*	x	•
EPSON DRAFT	..-	0	0	0	xx

0-- Resident

' -- Desired pitch is made by software using selected font

x -- print Roman 15 CPI

xx -- Print LQ proportional font selected by ESC k

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 (1 O, 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

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	Con-densed	Empha-sized	Double width	Printable Columns		Character Pitch (cpi)	Printing Speed (cps)	
				80 col.	136 col.		Draft	LQ
10	0	0	0	80	136	10	550	200
	0	0	1	40	68	5	275	100
	0	1	0	80	136	10	400	200
	0	1	1	40	68	5	200	100
	1	x	o	137	233	17.1	684	342
	1	x	1	68	116	8.5	342	171
12	0	0	0	96	163	12	660	240
	0	0	1	48	81	6	330	120
	0	1	0	96	163	12	480	240
	0	1	1	48	81	6	240	120
	1	x	o	160	272	20	800	400
	1	x	1	80	136	10	400	200
15	0	0	0	120	204	15	825	300
	0	0	1	60	102	7.5	412	150
	0	1	0	120	204	15	600	300
	0	1	1	60	102	7.5	300	150
	1	x	x	Cannot be condensed				

CPI: characters per inch
CPS: characters per second
LQ: letter quality

Table 1-9. Printing (Bit Image Mode)

Pins	m	Dot Density (DPI)	Adjacent Dot Printing	256 X n2 + nl		Printing Speed (IPS)
				80 Columns	136 Columns	
8	0	60	Yes	480	816	55
	1	120	Yes	960	1632	20
	2	120	No	960	1632	20
	3	240	No	1920	3264	20
	4	80	Yes	640	1088	20
	6	90	Yes	720	1224	55
24	32	6 0	Yes	480	816	55
	33	120	Yes	960	1632	20
	38	90	Yes	720	1224	55
	39	180	Yes	1440	2448	20
	40	360	No	2880	4896	20
48	71	180	Yes	1440	2448	20
	72	360	No	2880	4896	20
	73	360	Yes	2880	4896	20

DPI: dots per inch

IPS: inches per second

Table 1-10. Character Matrix and Character Size

Printing Mode	Face Matrix	HOD	Character Size	Unit ESC sp
Draft, 10 pitch	15 x 44	180	2.1 x 3.1	120
Draft, 12 pitch	13 x 44	180	1.8 x 3.1	120
Draft, 15 pitch	11 X 32	180	1.6 X 2.3	120
Draft, 17 pitch	15 x 44	360	1.1 x 3.1	120
Draft, 20 pitch	13 x 44	360	0.9 x 3.1	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, 17 pitch	16 X 44	360	1.1 x 3.1	180
LQ, 20 pitch	14 x 44	360	1.0 x 3.1	180
LQ, proportional	Max. 37 X 44 Min. 18 X 44	360 360	2.6 X 3.1 1.0 x 3.1	180
LQ, proportional, super/subscript	Max. 28 X 32 Min. 12 X 32	360 360	1.8 X 2.3 0.7 X 2.3	180

NOTES:
- HDD is horizontal dot density in dots per inch.
- Face matrix and character size indicate the maximum size of a character. This value is dependent on paper, etc.
- Unit ESC sp (which also can be sent as unit, followed by the character string CHR$(&h20)), indicates the minimum length to be added to the right of the character specified in the ESC SP control code.

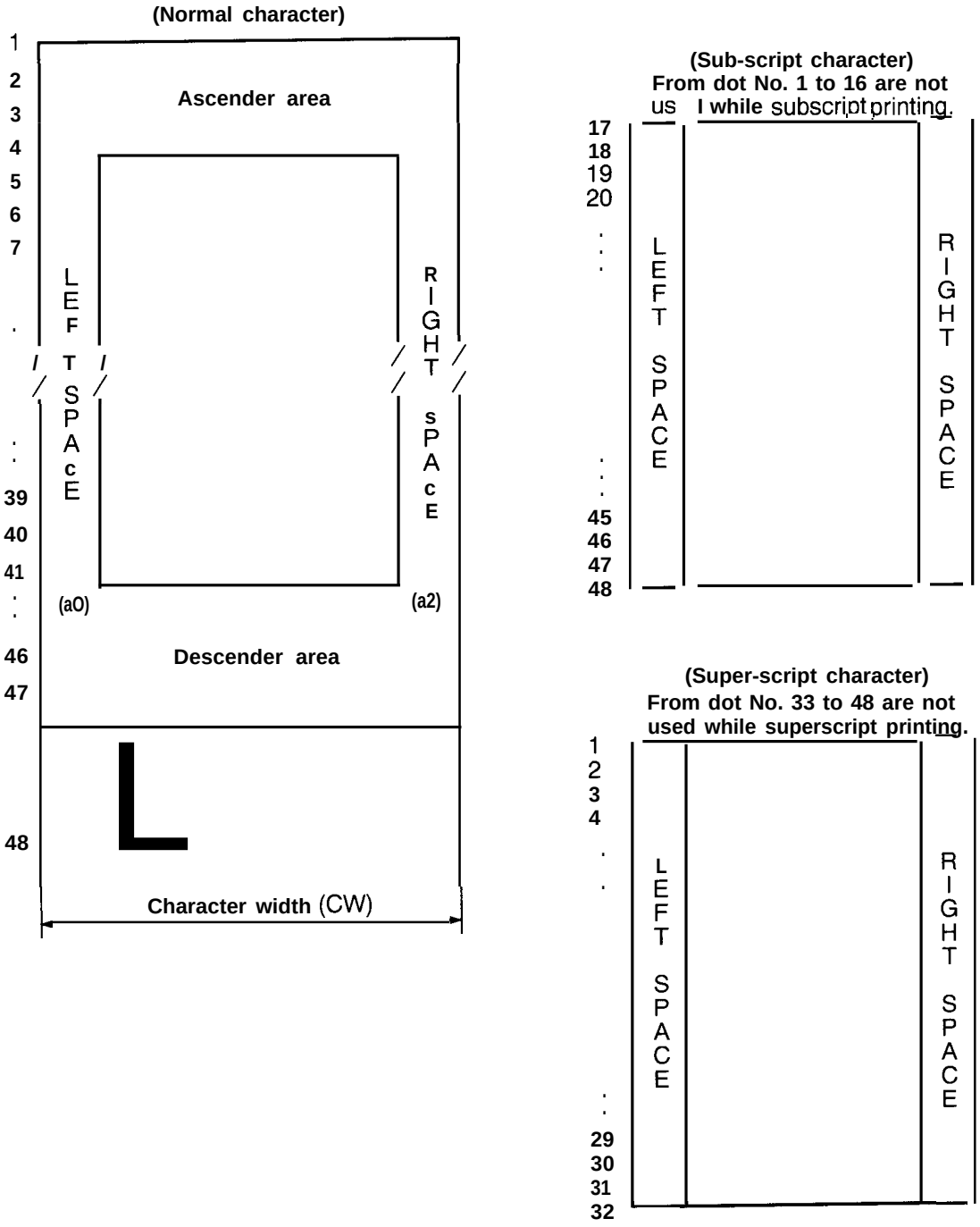


Figure 1-8. Character Matrix

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	$\overline{\text{STROBE}}$ signal
Handshaking	BUSY and $\overline{\text{ACKNLG}}$ signal
Signal level	TTL-compatible
Adaptable connector	57-30360 (Amphenol) or equivalent
Data transmission timing	See Figure 1-9.

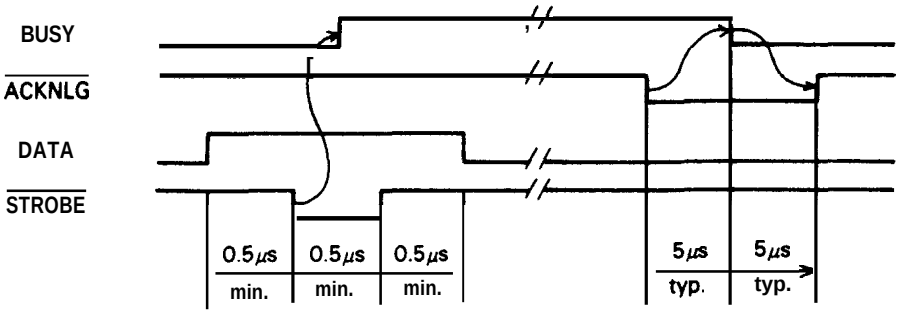


Figure 1-9. Data Transmission Timing

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	$\overline{\text{STROBE}}$	19	IN	$\overline{\text{STROBE}}$ pulse to read the input data. Pulse width must be more than 0.5μs. 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 " 1".
4	DATA 3	22	IN	LOW level means "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	$\overline{\text{ACKNLG}}$	28	OUT	This pulse indicates data has been received and the printer is ready to accept more data. Pulse width is approximately 11μs.
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 $\overline{\text{ERROR}}$ signal is LOW,
13	SLCT		OUT	Always HIGH output (Pulled up to +5V 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	$\overline{\text{AUTOFEED-XT}}$	--	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	INIT	16	IN	Pulse (width: 50μs, min., active LOW) input for printer initialization.
32	$\overline{\text{ERROR}}$		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	$\overline{\text{SLCT-IN}}$	--	IN	If LOW when the printer is initialized, DC 1/DC3 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 0.2μs.
5. The $\overline{\text{AUTOFEED-XT}}$ signal can be set to LOW by DIP switch 2-4.
6. The $\overline{\text{SELECT-IN}}$ signal can be set to LOW by jumper 1.
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 $\overline{\text{STROBE}}$ signal.

1.4 CONTROL PANEL

On the control panel are: 10 non-lock type buttons, and 24 indicators.

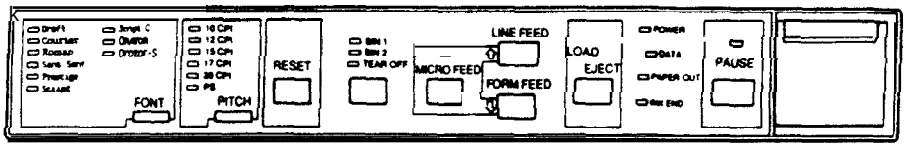


Figure 1-10. Control Panel

BUTTONS

(1) PAUSE Button

This button controls printer action. Pressing the button toggles the printer between PAUSE condition (no printing, no paper feeding, or no data acception) and RUNNING.

(2) FORM FEED Button

Advances the paper to the next top of from position. This switch is also used for the micro feed function.

(3) LINE FEED Button

Advances the paper by one line (1/6 inch)By pressing this switch more than 0.5 second, the paper is fed continuously until releasing this switch. This switch is also used for the micro feed function.

(4) LOAD/EJECT Button

Pushing this switch loads the paper when paper-out condition is detectedAnd ejects the paper when out of paper condition is not detected as in the Forms Override function.

(5) TEAR-OFF/BIN l/BIN 2 Button

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

(6) MICRO FEED Button

Selects or cancels the micro feed function. When this function is enabled, the MICRO FEED indicator is lit. In the micro feed mode, the LINE FEED button is used to feed the paper forward, and the FORM FEED button is used to feed the paper backward.

Paper feed performed by this micro feed function does not affect the page position control. And this function is also used to adjust the paper loading position and to adjust the continuous paper to meet the tear off edge.

(7) FONT Button

Pressing this button selects a font, and pressing it continuously selects the following ones in sequence. The FONT LED indicates the currently selected font.

(8) PITCH Button

Pushing this switch once selects the character pitch. And holding this button down selects the following ones in sequence. PITCH indicators indicate the currently selected character pitch.

(9) RESET Button

Holding this button down more than 0.45 second, the input data buffer is cleared and the printer initialized by software as ESC @.

(10) CLEANING Button

Holding this button down more than 0.5 second, the print head cleaning is performed. This button is only effective in the PAUSE condition. The CLEANING button is located inside the DIP switch cover.

INDICATORS

(1) POWER (green)

Lit when the printer's power switch is on, and AC power is supplied.

(2) PAUSE (orange)

Lit when the printer is in PAUSE mode (no printing, no paper feed, or no data accepting).

(3) DATA (orange)

Lit when the printer has received data from the host machine.

(4) PAPER-OUT (red)

Lit when the paper-out detector detects no paper. Refer to Section 1.6.3, Paper-out Detection and Forms Override Function.

(5) INK END (red)

Lit when the printer detects the ink empty condition.

(6) MICRO FEED (orange)

Lit when the micro feed function is enabled.

(7) TEAR-OFF (orange)

Lit when the sheet is advanced to the tear-off position.

(8) BIN 1 (green)

Lit when bin 1 is selected.

(9) BIN 2 (green)

Lit when bin 2 is selected.

(1 O) FONT (green) --Draft, Courier, Roman, Saris Serif, Prestige, Script, Script C, Orator, Orator-S

These indicators show the currently selected font.

(1 1) PITCH (green) --10 CPI, 12 CPI, 15 CPI, 17 CPI, 20 CPI, PS

These indicators show the currently selected pitch.

1.5 DIP SWITCHES AND JUMPER SETTING

This section describes the DIP switch selections and jumper setting for the SQ-870/1 170 printer.

1.5.1 DIP Switch Settings

The two DIP switch banks for the printer, located on the control panel, are used to set various print conditions 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	Not Used			OFF
7				OFF
8				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	1 inch skip for continuous paper	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 ON,
If italic table was selected by
ESC t O, country setting becomes U.S.

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

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 1 is connected to GND, the $\overline{\text{SLCT-IN}}$ signal is fixed to LOW and DC 1/DC3 control is ignored.

1.6 OPERATING INSTRUCTIONS

This section describes the self-test and hexadecimal dump functions as well as 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 LINE FEED button. To run the self-test using the letter quality (LO) mode, turn the printer on while pressing the 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.

1.6.2 Hexadecimal Dump Function

To put the printer in hexdump mode, power it on while pressing both the LINE FEED and FORM FEED buttons.
In hexdump mode, the printer prints out the hexadecimal representation of the input data, along with the corresponding ASCII characters. This function is useful 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.

1.6.3 Paper-out Detection and Forms Override Function

When the paper-out detector detects a paper-out condition, the printer enters the PAUSE mode with the following status.

- PAPER OUT indicator lit
- BUSY signal becomes HIGH
- $\overline{\text{ERROR}}$ signal becomes LOW
- PE signal becomes HIGH

In the PAUSE mode, you can perform the "Forms Override" function by pressing the PAUSE button, or continue the printing operation by pressing the PAUSE button after loading new paper.
In the forms override function, the printer ignores the paper-out condition temporarily and prints additional lines beyond the bottom line specified for the page. Once the "Forms Override" function is performed, the paper-out detection will not be enabled until paper is loaded.

1.6.4 Error Conditions

If the following conditions are detected, the printer recognizes them as errors and enters the error mode.

● Paper-out

Paper-out is detected after performing paper loading operation.

. Ink end

Ink end condition is detected. Perform 200 lines of printing or remove the ink cartridge.

● Cover open

The printer lid is opened.

● Fatal errors

In the following cases, the printer recognizes them as fatal errors and enters the fatal error mode. The fatal error condition cannot be recovered until turning the power off.

- ● Carriage does not move correctly
- ● Control circuit cannot work correctly

When the error condition is detected, the printer automatically enters 'PAUSE' mode and outputs appropriate interface signal.
When parallel interface is selected, the following interface signals are outputted to indicate the error and to stop data transmission.

- ● BUSY signal becomes HIGH
- ● $\overline{\text{ERROR}}$ signal becomes LOW
- ● Output no $\overline{\text{ACKNLG}}$ pulse
- ● PE signal becomes HIGH (only paper out error)

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 respectively, with 0.1 second intervals).
- ● Ink end error is detected (beeps 5 times for 0.1 second respectively, with 0.1 second intervals).
- ● Cover open error is detected (beeps 5 times for 0.1 second respectively, with 0.1 second intervals).
- ● Fatal error is detected (beeps 5 times for 0.5 second respectively, with 0.5 second intervals).
- ● When panel setting is accepted (beeps 1 time for 0.1 second).

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 with the AC power cord plugged in or when the INIT signal is received.

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

- (a) Initialize 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 initialize the printer. Printer initialization by ESC@ code does not perform functions (d) or(e) above. The settings changed by the last SelecType operation are maintained.

(3) Panel initialization

This printer can be initialized by pressing the RESET button on the front panel. When the printer is initialized in this method, the functions (b), (d) and (e) 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	Last pitch selected from the panel
Printing effects	Cleared
Printer condition	Not PAUSE

1.6.8 Sheet Loading and Sheet Ejection

The release lever has a disengage capability of tractor unit drive mechanism. Therefore, this printer provides some improved paper handling in combination with the release *lever.*

(a) Automatic cut sheet loading without cut sheet feeder

Change the release lever to friction feed position and put a cut sheet with the paper guide (rear or front insertion).

A few seconds laster, the cut sheet is automatically loaded to the top-of-form position.

(b) Automatic cut sheet loading & ejection with cut sheet feeder

Change the release lever to the friction feed position and the put cut sheets into the hopper of the cut sheet feeder.

Pushing LOAD/EJECT button loads a sheet to the top-of-form positionIf paper out is detected before printing starts, a sheet is automatically loaded to the top-of-form position.

(c) Continuous paper loading & ejection (back-out)

Change the release lever to the rear push position *or* front push position, and set the continuous paper into the tractor unit. Pushing LOAD/EJECT button loads the paper automatically to the top-of-form position. If paper out is detected before printing starts, the paper is automatically loaded to the top-of-form position.

if LOAD/EJECT button is pushed when continuous paper is loaded, the paper is ejected backward to the push tractor unit.