EPSON

EPSON TERMINAL PRINTER

LQ-860/1060

TECHNICAL MANUAL

Y571999010-A

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 LQ-860/1060.
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 - Discusses the options

Chapter 4 - Includes a step-by-step guide for product disassembly, assembly, and 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 TABLE

REVISION	DATE ISSUED	CHANGE DOCUMENT
A	April 4, 1989	*1st* issue

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CHAPTER 1
GENERAL DESCRIPTION

LIST OF FIGURES

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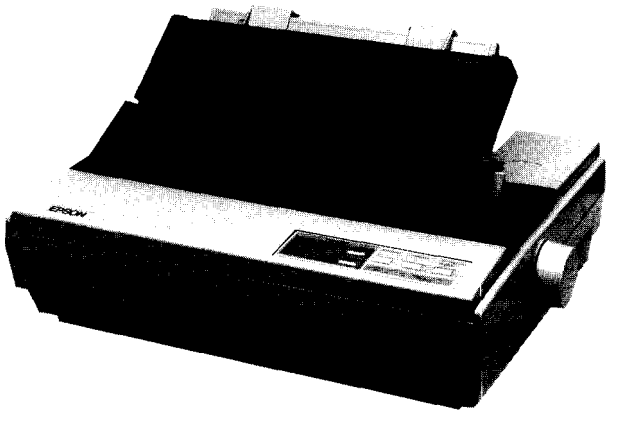
1.1 FEATURES

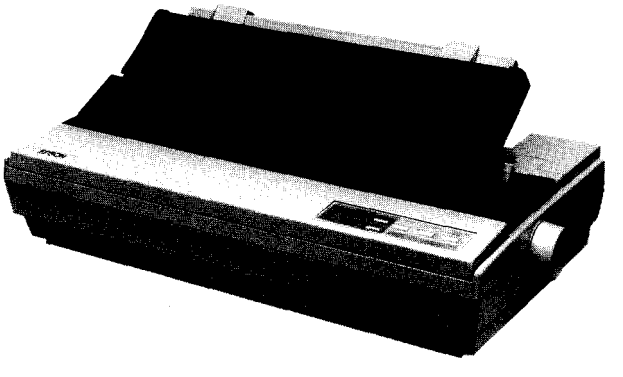
The LQ-860/1060 printers are multifunctional, 24-pin printhead, impact dotmatrix printers. The main features of the these printers are:

- Upward compatibility with the LQ-850/1050
- A maximum print speed of 290 CPS in super draft mode at 10 CPI, of 270 CPS in draft mode at 12 CPI, and of 90 CPS in LQ mode at 12 CPI
- Direct selection of font and pitch in SelecType feature from the control panel
- Both 8-bit parallel and RS-232C serial interfaces
- Color printing capability
- Push and (optional) pull tractor feeding
- Advanced paper handling:
  - Automatic paper-loading/ejecting function
  - Tear-off function
  - Printing of fanfold paper without removal of the cut sheet feeder (option)
- Low-noise acoustics
- Optional interface for the EPSON 8100 series
- Optional low-priced, single-bin and double-bin cut sheet feeders which contains envelope feeding capability

Figure 1-1 shows exterior views of the printers, Table 1-1 lists optional units available, and Table 1-2 lists the optional interface boards (refer to Chapter 3 for more detailed information) for the LQ-860/1060.



LQ-860



LQ-1060

Figure 1-1. LQ-860/1060 Exterior Views

Table 1-1. Optional Units

No.	Name	LQ-860	LQ-106O
C800071	Pull tractor unit	o	–
C800101	Pull tractor unit		o
C806141	Cut sheet feeder (single-bin)	O	—
C806181	Cut sheet feeder (single-bin)		o
C806151	Cut sheet feeder (double-bin)	o	–
C8O6191	Cut sheet feeder (clouble-bin)	—	o
#7762	Ribbon cartridge (black)	o	
#7763	Ribbon cartridge (color)	o	
#7764	Ribbon cartridge (film)	o	
#7407	Multi font module	o	

Table 1-2. Optional Interface Boards

No.	Name
#8143	New serial interface
#8145	RS-232C current loop interface type II
#8148	Intelligent serial interface
#8149	Intelligent serial interface type II
#8149M	Intelligent serial interface type III
#8161	IEEE-488 interface
#8165	Intelligent IEEE-488 interface
#8172	32K-byte buffer parallel interface
#8172M	128K-buffer parallel interface

1.2 SPECIFICATIONS

This section describes the specifications for the printer without the Identity Module option. Specifications not affected by firmware (hardware specifications) are the same whether or not the Identity Module is installed.

1.2.1 Hardware Specifications

Printing Method	**Serial, impact dot matrix**
Pin Configuration	**See Figure 'I-2 (12x2 staggered, diameter: 0.2 mm).**

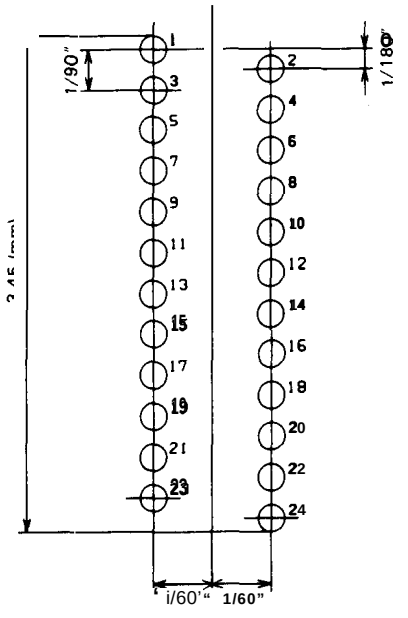


Figure 1-2. Printhead Pin Configuration

Feeding Method	**Friction feed**
	Tractor feed (push: standard, pull : optional)

NOTES : 1. When using friction feed :

Adjust the paper release lever at rear position.

Use the paper tension unit.

Do not use continuous paper.

Do not use a single sheet paper shorter than 182 mm or longer than 257 mm (LQ-860), 364 mm (LQ-106O).

Do not perform any reverse paper feed operations within the top 8.5 mm and bottom 22 mm area of the paper.

Do not perform reverse feed beyond than 1/6 " after the paper end has been detected.

Do not use multi-part single sheet forms.

2. When using tractor feed:

. Multiple copies for printing must be finished by pasting them together at the line or dots.

. Copy paper must be a carbonless multi-part paper.

a) When using push tractor feed:

. Adjust the paper release lever at center position.

· Use the paper tension unit.

- Do not perform reverse feeding for more than 1/6 ".
- Because accuracy of paper feed cannot be assured, do not perform reverse feeding after the paper end has been detected.

b) When using pull tractor feed :

- Adjust the paper release lever at front position.
- Remove the paper tension unit and mount the pull tractor unit.
- Use the paper path when a single sheet is inserted.

c) When using push-pull tractor feed :

Adjust the paper release lever at front position.
Remove the paper tension unit and mount the pull tractor unit.
Do not loosen the paper between the platen and the pull sprocket.
Precisely the horizontal position of the pull sprocket and push tractor.
Do not perform reverse feeding for more than 1/6".
Do not perform reverse feeding after the paper end has been detected.

Paper Loading Directions	Inserted from the rear side
Line Spacing	1/6" or programmable (min. 1/360")
Line Feed Speed	See Table 1-3.

Table 1-3. Line Feed Speeds

Feeding Method	1 /6" line spacing [ins/line]	Continuous [IPS]
Friction without CSF	56.4	3.1
Friction with CSF	67.3	
Tractor	64.1	

Paper specifications

Cut sheet paper — Refer to Table 1-4.

Table 1-4. Cut Sheet Paper Specified Conditions

	LQ-860	LQ-106O
Width [mm]	182-257 (7.2 -10.1 ")	182-364 (7.2- 14.3")
Length [mm]	182-364 (7.2-14.3")	
Thickness [mm]	0.065-0.10 (0.0025-0.004")	
Weight [lb]	14-22 (52-82 g/m^2)	
Quality	Plain paper	
Copies	Not available	

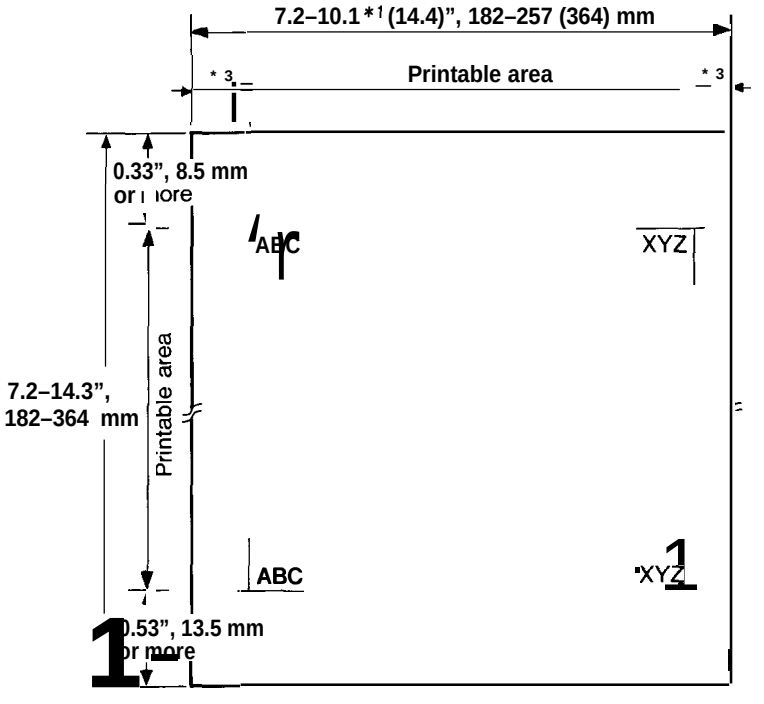
Continuous paper Refer to Table 1-5.

Table 1-5. Continuous Paper Specified Conditions

	LQ-860	LQ-I 060
Width [mm]	101-254 (4.0-10.0")	101-408 (4.0-16.0")
Copies [sheet]	4 (1 original +3) at normal temperature 3 (1 original +2) at all temperature range	
Quality	Plain paper	
Total Thickness [mm]	0.085-0.32 (0.0025-0.01 2")	
Weight [lb]	1 sheet" ··14～22 (52-82 g/m²) 4 sheets" ··12～15 (40-58.2 g/m²) for each	

Printable Area

Cut sheet paper See Figure 1-3.

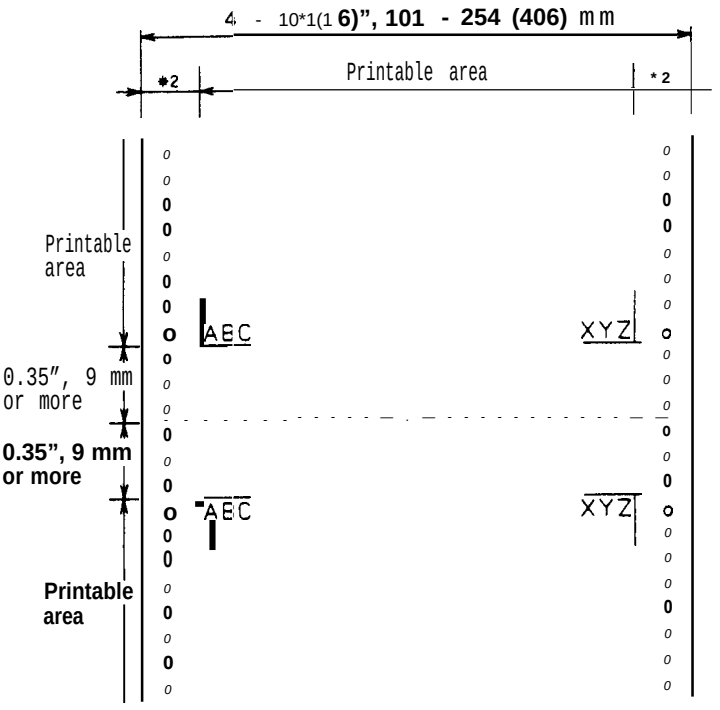


NOTES :

1. Values in the parentheses apply to the LQ-106O.
2. Printing is possible for approximately 42 mm after the bottom edge of a page has been detected. Thus, the value 13,5 mm (lowest print position) is given for reference only. Paper feed accuracy cannot be assured in the area approximately 22 mm (0.87") from the bottom edge of the page.
3. 0.12", 3.0 mm or more when the 12", 305 mm or less width paper is used. 0.58", 15 mm or more when the 13" width paper is used.

Figure 1-3. Cut Sheet Paper Printable Area

Fanfold (continuous) paper **See Figure 1-4.**



NOTES : 1. Values in the parentheses are apply to LQ-106O.

2. 0.47", 12 mm or more when the 101 to 242 mm, 4 to 9.5" (101 to 378 mm, 4 to 14.9") width paper is used. 0.98", 25 mm or more when the 254 mm, 10", (381 to 406 mm, 15 to 16") width paper is used.

Figure 1-4. Fanfold Paper Printable Area

Envelopes

Size	**No. 6 (166 x 92 mm), No. 10 (240 x 104 mm)**
Quality	**Bond paper, xerographic copier paper, airmail paper**
Thickness	**0.16-0.52 mm (0.0063-0.0197")**

NOTES : Differences in thickness within printing area must be less than 0.25 mm (0.0098").

Weight	**12-24 lb (45~91 g/m²)**

NOTES : 1. Envelope printing is only available at normal temperature.

2. Keep the longer side of the envelope horizontally at setting.

3. Set the left of No. 6 envelope at the setting mark of the sheet guide.

Label

Size	**2½ X 15/16", 4 X 15/16", 4 X 17/16"**
Thickness	**0.19 mm (0.0075") max.**

NOTES: Thickness excluding the base paper must be less than or equal to 0.12 mm (0.0075").

NOTES : 1. Printing of labes is only available at normal temperature.
2. Labels must be fanfold.
3. Labels with pressure-sensitive paper must be jointed by pasting along the dots or lines, and the total thickness must be less than or equal to 0.3 mm (0.0118") to be printed out under conditions that must be between 5 to 35-C and 10 to 80% RH.
4. Examples of lavels: AVERY CONTINUOUS FORM LABELS
AVERY MINI-LINE LABELS

Lever Adjustment See Figure 1-5 and l-able 1-6.

Table 1-6. Lever Adjustment

Lever Position	Paper Thickness [mm]
2nd	0.06~0.12
3nd	0.13-0.17
4th	0.18~0.25
5th	0.26-0.32

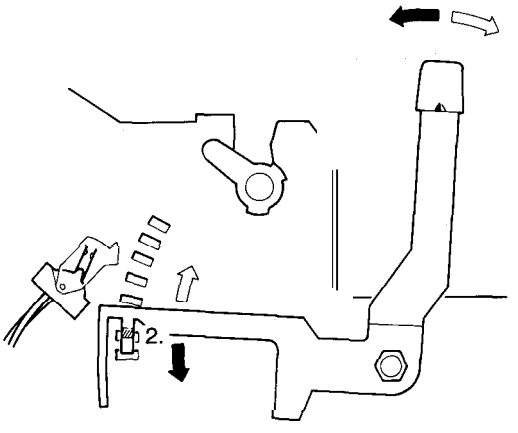


Figure 1-5. Head Adjustment Lever Positioning

NOTES : 1. When printing density becomes lighter, set the head adjustment lever one position lower.
2. When using thicker paper than shown in the above table, set the head adjustment lever to the 6th or higher appropriate position by performing the self-test operation.

Ribbon Cartridge See Table 1-7.

Table 1-7. Ribbon Cartridge Specification

Ribbon Model No.	#7762	#7764	#7763
Type	Normal	Film	Multi-color
Color	Black		Black, Cyan, Magenta, and Yellow
Life [characters] (48 dot character)	3 million	0.1 million	Black : 1 million Cyan : 0.7 million Magenta : 0.7 million Yellow : 0.5 million

Dimensions See Table 1-8 (Details are shown in Figures A-36 and A-39.)

Weight See Table 1-8.

Table 1-8. Dimensions and Weinght

	Width [mm]	Height [mm]	Depth [mm]	Weight [Kg]
LQ-860	469	194	399	10
LQ-106O	609	194	399	13

NOTE : Excluding paper feed knob and sheet guide.

Electrical Specifications See Table 1-9.

Table 1-9. Electrical Specifications

	100-120 V Version	220-240 V Version
Voltage [V AC]	108-132	198-264
Frequency Range [Hz]	49.5 -60.5	
Rating Current [A]	2	1
Insulation Resistance [M ohm] min. (bitween AC line and chassis)	10	
Dielectric Strength [V AC, rms] (1 minute, between AC line and chassis)	1250	3750

Environmental Conditions Refer to Table 1-10.

Table 1-10. Environmental Conditions

	Storage	Operating
Temperature [℃]	−30~65	5~35
Humidity [% RH]	5~85	10~80
Resistance to shock [G] (within 1 ms)	2	1
Resistance to Vibration [G] (55 Hz, max.)	0.50	0.25

Reliability

MCBF	5 million lines (excluding printhead)
	(MCBF . . . Mean Cycles Between Failure)
MTBF	
LQ-860 :	4000 POH (duty 25 %)
LQ-106O :	6000 POH (duty 25 %)
	(POH . . . . Power On Hours)
Printhead life	200 milion strokes/wire

Safety Approvals

Safety standards	UL478 (U.S.A. version)
	CSA22.2#154
	VDEO806 (TUV) (European version)
Radio Frequency (RFI)	FCC class B (U.S.A. version)
Interference	VDEO871 (self-certification)
	(Europe version)

1.2.2 Firmware Specifications

Control Code	ESC/P-84C	
Printing Direction	Bidirectional with logic seeking	
Input Data Buffer	6 K-byte or none (DIP SW 1-8 selectable)	
Character Code	8 bits	
Character Set	96 ASCII, 14 international, and 1 Legal charactersets	
Family	Roman:	No. O
	Sansserif :	No. 1
Font	Roman:	10, 12, 15, Proportional
	Sansserif :	10, 12, 15, Proportional
	Draft:	10, 12, 15
Printing Mode	Printing quality (Draft/LQ)	
	Character pitch (10, 12, 15 CPI or Proportional)	
	Condensed	
	Double-width	
	Double-height	
	Emphasized	
	Double-strike	
	Italic	
	Underlined	
	Double-underlined	
	Overscore	
	Strike-through	
	Shadow/Outline	

NOTES : A condensed mode for 15 CPI characters is not available.

Print Speed	Refer to I-able 1-11.
Print Columns	Refer to I-able 1-11.

Table 1-11. Printing Mode

Print Pitch	Condensed	Emphasized	Double Width	Character Pitch [CPI]	Printing Speed [CPS]		Printable Columns	
					Draft	LQ	LQ-860	LQ-1060
10	0	0	0	10	225"'	75	80	136
			1	5	113	38	40	68
		1	0	10	113	75	80	136
			1	5	56	38	40	68
	1	x	o	17.1	193	129	137	233
			1	8.5	96	64	69	117
12	0	0	0	12	270	90	96	164
			1	6	135	45	48	82
		1	0	12	135	90	96	164
			1	6	68	45	48	82
	1	x	o	20	225	150	160	272
			1	10	113	75	80	136
15	0	0	0	15	338	113	120	204
			1	15	169	56	60	102
		1	0	7,5	169	113	120	204
			1	7.5	84	56	60	102
	1	x	x	Ignored				
Proportional	o	x	o	8.6		64	Max. 69	Max. 117
				20	—	150	Min. 160	Min. 272
			1	4.3		32	Max. 34	Max. 59
				10	—	75	Min. 80	Min. 136
	1	x	o	17.1	—	129	Max. 137	Max. 233
				40	—	300	Min. 320	Min. 544
			1	8.6	—	64	Max. 69	Max. 117
				20		150	Min. 160	Min. 272
'proportional Super/ Subscript	o	x	o	12.8	—	96	Max. 103	Max. 175
				30		225	Min. 240	Min. 408
			1	6.4	—	48	Max. 51	Max. 87
				15	—	113	Min. 120	Min. 204
	1	x	o	25.7	–	193	Max. 206	Max. 349
				60	—	450	Min. 480	Min. 816
			1	12.8	—	96	Max. 103	Max. 175
				30	—	225	Min. 240	Min. 408

*1 : 290 CPS at super draft printing (DIP SVV 1-6 is off).

NOTES : 1. Max. means the value when the maximum width characters are printed.

2. Min. means the value when the minimum width characters are printed.

3. "—" means that LQ character set is automatically selected when proportional pitch is specified.

Character Matrix See Figure 1-6 and Table 1-12.

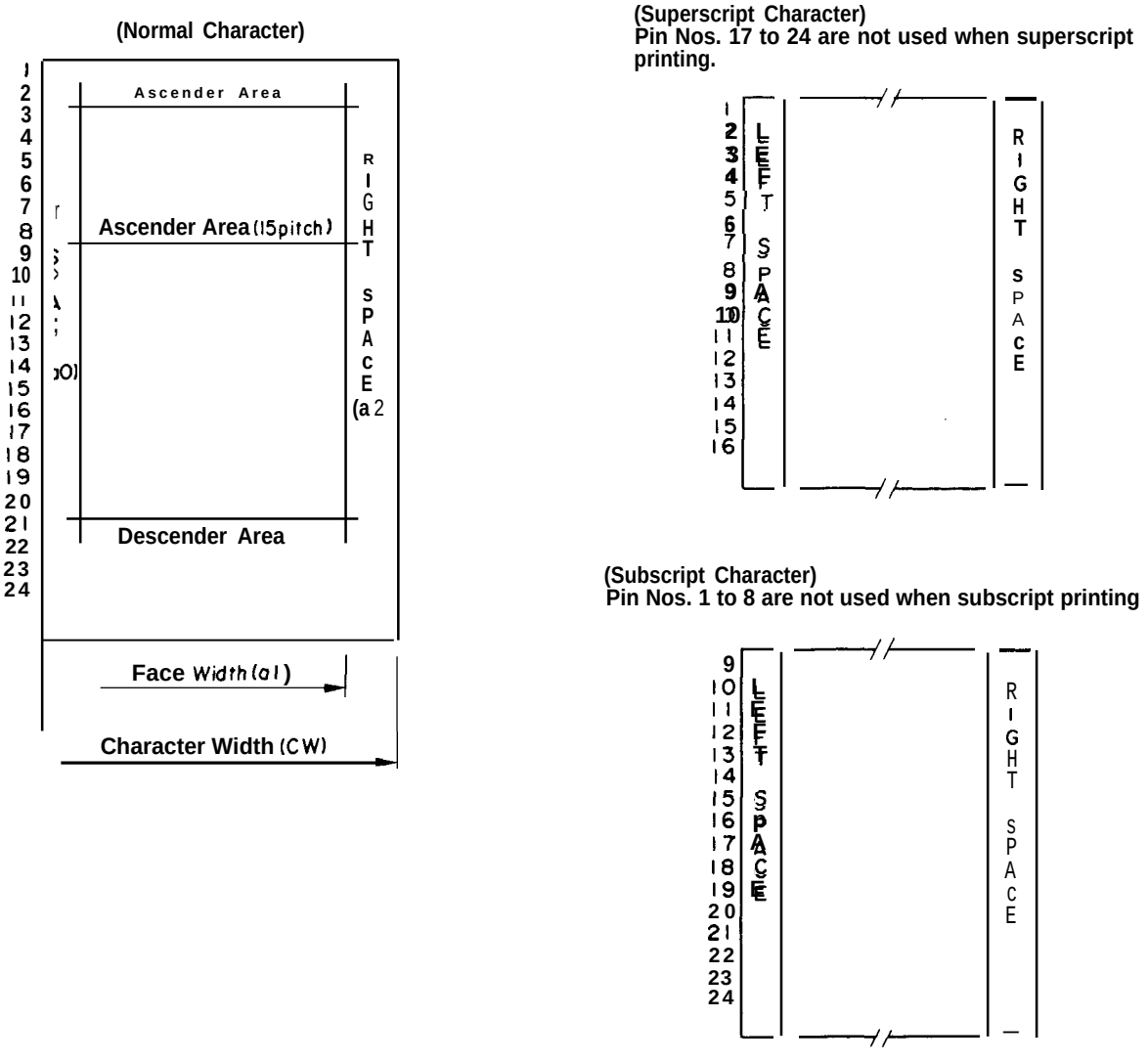


Figure 1-6. Character Matrix

Character Size **See Table I-12.**

Table 1-12. Character Matrix and Character Size

Printing Mode	Face Matrix	HDD	Character Size H. XV. (mm)	Unit ESC sp
DRAFT, 10 pitch	9×23	120	1.9x 3.2	120
DRAFT, 12 pitch	9 X 23	120	1.9x 3.2	120
DRAFT, 15 pitch	9x 16	120	1.0 X 2.3	120
DRAFT, 10 pitch, condensed	···	240	···	120
DRAFT, 12 pitch, condensed	···	240	···	120
LQ, 10 pitch	29X 23	360	2.0x 3.2	180
LQ. 12 pitch	29X 23	360	2.0 x3.2	180
LQ, 15 pitch	15X 16	360	1.0X 2.3	180
LQ, 10 pitch, condensed	···	360	···	180
LQ, 12 pitch, condensed	···	360	···	180
LQ, proportional	max. 37X 23	360	2.6X 3.2	180
	min. 18X 23	360	1.0x 3.2	
LQ, proportional, condensed	···	360	···	180
	···	360	···	
LQ, proportional, super/subscropt	max. 28X 16	360	1.8x 2.3	160
	min. 12x 16	360	0.7X 2.3	
LQ, proportional, super/subscript, condensed	···	360	···	180
	···	360	···	

NOTES : 1. "HDD" means the Horizontal dot density, and the "Unit" shows the number of dots per inch.

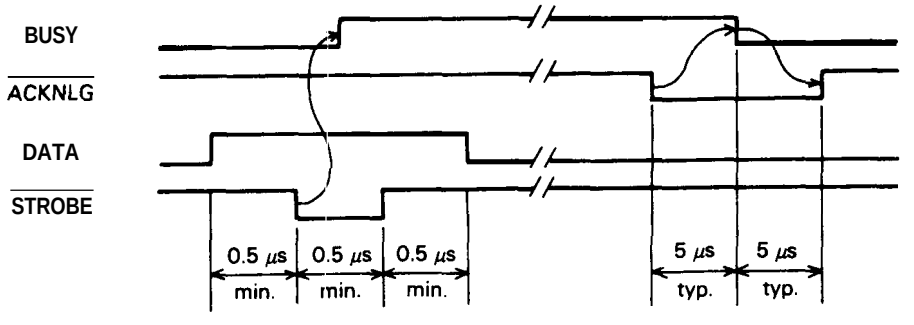
2. "Face matrix" and "character size" indicate the size of maximum characters and this value will be changed condition of paper, ribbon, and etc.
3. "Unit ESC sp" indicates the minimum length which is added to the right of the character that can be specified with ESC sp control code.
4. "···" indicated that the character matrix is reformed by firmware. Character width becomes half of a non-condensed character.

1.3 INTERFACE OVERVIEW

The LQ-860/1060 has both 8-bit parallel interface and RS-232C serial interface as standard. They can be selected by DIP switches 2-3 and 2-4 respectively. (This detail of DIP switch settings, refer to Table 1-20.)

1.3.1 8-bit Parallel Interface Specifications

Data Transmission Mode	8-bit pallarel
Synchronization	By $\overline{\text{STROBE}}$ pulse
Hand Shaking	By BUSY and $\overline{\text{ACKNLG}}$ (either or both)
Logic Level	TTL compatible
Data Transmission Timing	See Figure 1-7.
Adaptable Connector	57-30360 (AMPHENOL) or equivalent (See Figure 1-8.)
Connector Pin Assignment	Refer to Table 1-13.
Select/Deselect (DC1/DC3) Control	Refer to Table 1-14.



NOTES : Transmission time (rising and falling time) of every input signal must be less than 0.2 μs.

Figure 1-7. 8-bit Parallel Interface Data Transmission Timing

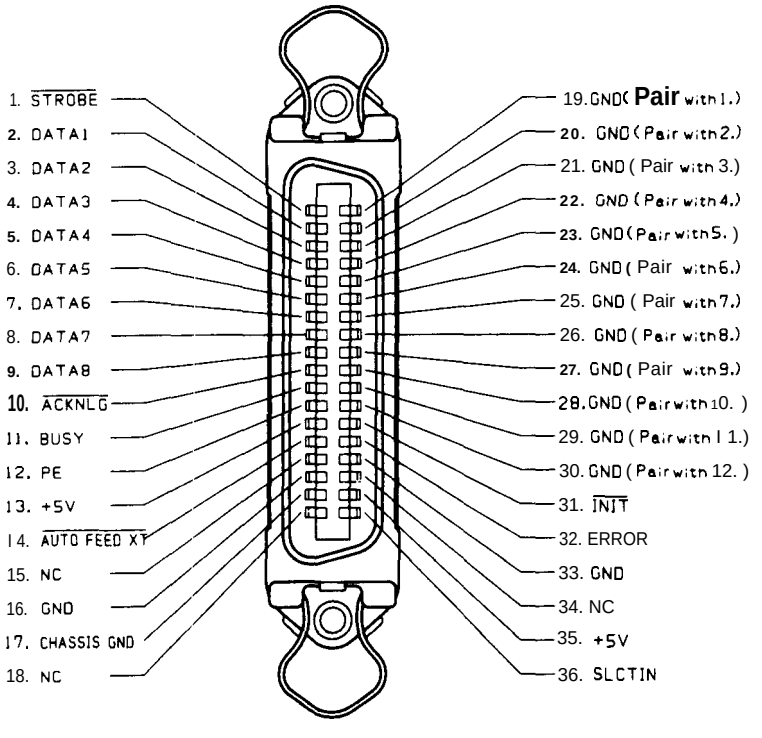


Figure 1-8. 36-Pin Printer Side Connector

Table 1-13. 8-bit Parallel I/F Connector Pin Assignments

Pin No.	Signal	Return	I/O	Description
1	$\overline{\text{STROBE}}$	19	I	Strobe pulse to read the input data. Pulse width must be more than 0.5 μs. input data is latched after falling edge of this signal.
2	DATA1	20	I	Parallel input data to the printer.
3	DATA2	21	I	"HIGH" level means data "1".
4	DATA3	22	I	"LOW" level means data "O".
5	DATA4	23	I	
6	DATA5	24	I	
7	DATA6	25	I	
8	DATA7	26	I	
9	DATA8	27	I	
10	$\overline{\text{ACKNLG}}$	28	0	This pulse indicates data are received and the printer is ready to accept next data. Pulse width is approx. 11 μs.
11	BUSY	29	0	"HIGH" indicates printer can not accept data.
12	PE	30	0	"HIGH' 'indicates paper-out. This signal is effective only when $\overline{\text{ERROR}}$ signal is "LOW".
13	SLCT	—	o	Always "HIGH". (Pulled up to +5V through 3.3 K ohms resistor.)
14	$\overline{\text{AUTOFEED-XT}}$	–	I	If this signal is "LOW" when the printer is initialized, a line feed is automatically performed by input of "CR" code (Auto LF).
15	NC	—	—	Not used.
16	GND	—	—	Ground for twisted-pair.
17	Chassis GND	–	–	Printer chassis ground.
18	NC	—	—	Not used.
19 to 30	GND	—	—	Ground for twisted-pair.
31	INIT	16	I	Pulse (width : 50 μs min., active "LOW") input for printer initialization.
32	$\overline{\text{ERROR}}$	·	0	"LOW indicates that some error has occurred in the printer.
33	GND	—	·	Ground for twisted-pair.
34	NC	—	—	Not used.
35	+5V	—	o	Always "HIGH". (Pulled up to +5V through 3.3 K ohms resistor.)
36	$\overline{\text{SLECT-IN}}$	—	I	If the signal is "LOW" when printer is initialized, the DC1/DC3 control is disabled.

NOTES : 1. "Direction" of signal flow is as viewed from the printer.
2. "Return" denotes "TWISTED PAIR RETURN" and is to be connected at signal ground level.

As to the wiring for the interface, be sure to use a twisted-pair cable for each signal and never fail to connect the return side. To prevent noise, cables should be shielded and connected to the chassis of the host computer and the printer.

Table 1-14. Select/Deselect Control

ON-LINE SW	$\overline{\text{SLCT-IN}}$	DC1/DC3	$\overline{\text{ERROR}}$	BUSY	$\overline{\text{ACKNLG}}$	DATA ENTRY
OFF-LINE	HIGH/LOW	DC1/DC3	LOW	HIGH	No pulse	Disable
ON-LINE	HIGH	DC1	HIGH	LOW/HIGH (During data entry)	Pulse output after entry	Enable (Normal Process)
		DC3	HIGH	LOW/HIGH (During data entry)	Pulse output after entry	Enable (Waits DC1. See NOTE 2)
	LOW	DC1	HIGH	LOW/HIGH (During data entry)	Pulse output after entry	Enable (Normal Process)
		DC3	HIGH	LOW/HIGH (During data entry)	Pulse output after entry	

NOTES : 1. In Table 1-14, it is assumed that no $\overline{\text{ERROR}}$ status exists other than that attributable to the OFF-LINE mode.

2. Once the printer is deselected by the DC3 code, the printer will not revert to the selected state until the DC1 code is input. (In the deselected state, input data is ignored until DC1 is received.)
3. The DC1 and DC3 codes are enabled only when the $\overline{\text{SLCT-IN}}$ signal (Input Connecter Pin No. 36 when the parallel interface unit is used) is HIGH and the printer is initialized.
4. The $\overline{\text{SLCT-IN}}$ signal is “LOW” when the printer is initialized. At this time the DC1/DC3 printer select/deselect control is invalidated, and these control codes are ignored.

1.3.2 RS-232C Serial Interface Specifications

Data Transmission Mode	RS-232C serial
Synchronization	Asynchronous
Handshaking	(By DTR(REV) signal or X-ON/OFF Protocol (Refer to Table 1-15 and Figure 1-9.)

Table 1-15. Serial Interface Handshaking

DTR Signal	X-ON/OFF protocol	Description
MARK	X-OFF (DC3/13H)	When the number of bytes remaining in the input buffer reaches 256 or less, the signal level goes to MARK, or and X-OFF code is sent to the host computer. This indicates that the printer is not ready to receive data.
SPACE	X-ON (DC1/11 H)	When the number of bytes remaining in the input buffer reaches 528 or more, the signal level goes to SPACE, or an X-ON code is sent to the host computer. This indicates that the priter is ready to receive data.

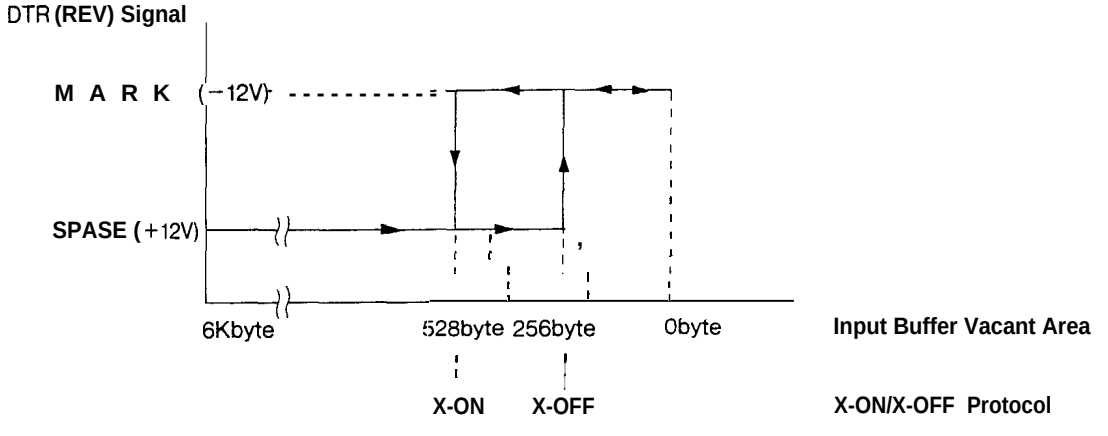


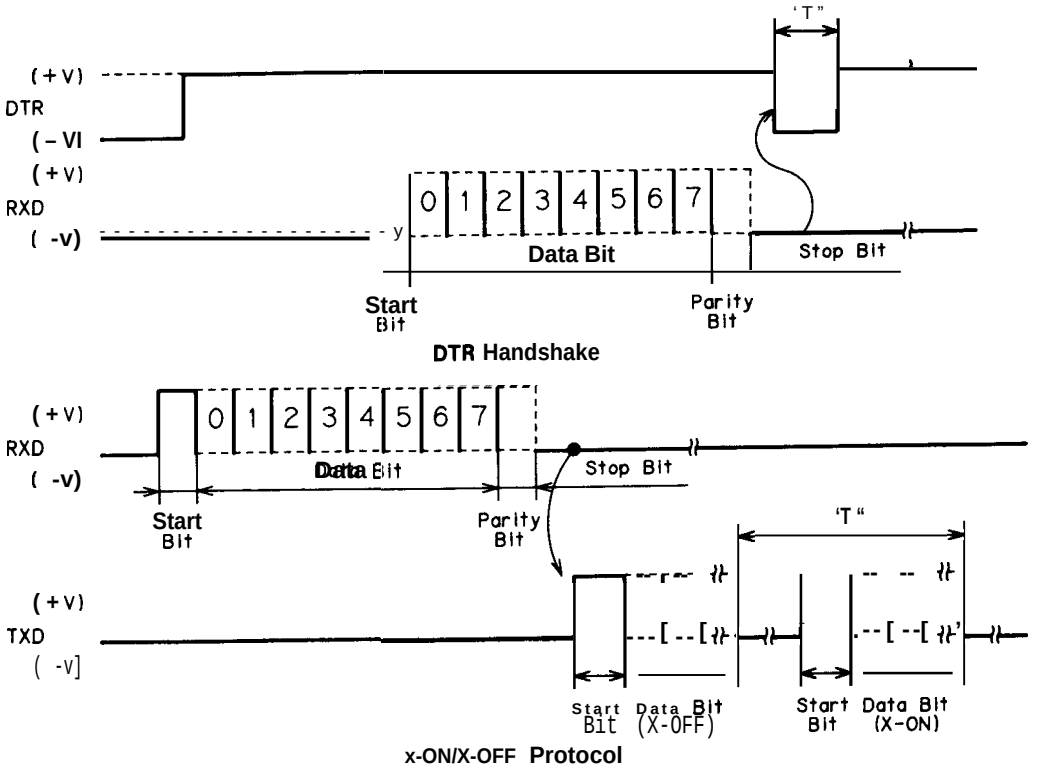
Figure 1-9. RS-232C Interface Handshaking

Word Length

Start bit:	1
Data bits:	8
Parity:	Odd, Even, or none
Stop bits:	1 bit or more

Bit Rate	300, 1200, 9600, or 19200 BPS
Logic Level	EIA level, IMARK: logical 1 (–3- –27 V) SPACE : logical O (+3 ~ +27 V)

Data Transmission Timing **See Figure 1-10.**



NOTES : 1. The value of "T" varies according to the input data.
2. The word structure of serial data is 1 start bit + 8 data bits+ parity (Odd, Even, or none; + 1 or more stop bits.

Figure 1-10. Serial Data Transmission Timing

Error Detection

Parity error : "x" is printed.
Overrun error: Ignored
Framing error: Ignored

Connector D-SUB 25-pin connector (See Figure 1-11.)

Connector Pin Assignments Refer to Table 1-16.

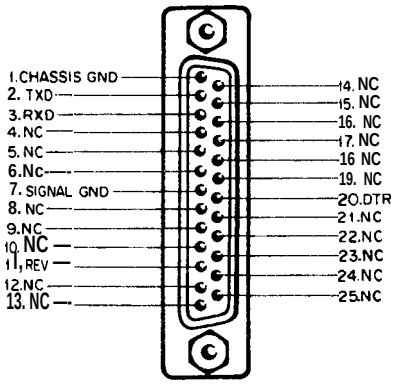


Figure 1-11. Serial Interface Connector

Table 1-16. RS-232C Serial I/F Connector Pin Assignments

Pin No.	Signal	Dir.	Description
2	TXD	o	Transmit data.
20	DTR	o	Indicates when printer is ready to receive data. "MARK" level indictes printer is not ready to receive data.
11	REV (=2nd RTS)	o	Same as DTR.
3	RXD	I	Receive data.
7	SIGNAL GND	–	Signal (Logic) ground level.
1	CHASSIS GND	–	Printer chassis ground.

NOTE : "Direction" of signal flow is as viewed from the printer.

1.4 DIP SWITCH AND JUMPER SETTINGS

This section describes DIP switch settings and jumper settings on the JUNMM board.

1.4.1 DIP Switch Settings

The DIP switches that users can set are SW1 and SW2. These switches are positioned at the left side of the control panel, and have the functions as shown in Tables 1-17 through 1-21, (note that the status of the DIP switches are read only when the printer power on or an INIT signal is input.)

Table "I-17. DIP Switch 1 Settings

DIP SW.	Function	ON	OFF	Factory Setting
1-1 1-2 1-3	International chacter set	See Table 1-18.		ON ON ON
1-4	Code table select	Graphic	Italic	OFF
1-5	Graphic print direction"'	Uni-d.	Bi-d.	OFF
1-6	Super draft	off	On	OFF
1-7	CSF mode	Valid	Invalid	OFF
1-8	Input buffer	None	6K-byte	OFF

* 1 : "Graphic print" means follows

a) Bit image printing

b) Multi pass printing

- 30 dots graphics . Orator/Orator-S font
- Double height character . Double-strike
- Double overscore/underline . Violet, Orange, Green color printing

Table 1-18. International Character Set Designation

Country	1-1	1-2	1-3
U. S. A.	ON	ON	ON
France	ON	ON	OFF
Germany	ON	OFF	ON
U. K.	ON	OFF	OFF
Demarkl	OFF	ON	ON
Sweden	OFF	ON	OFF
Italy	OFF	OFF	ON
Spain1	OFF	OFF	OFF

NOTE : The above settings can be changed to any country's characters set by inputting ESC R control codes.

Table 1-19. DIP Switch 2 Settings

DIP SW.	Function	ON	OFF	Factory Setting
2-1	Page length	12"	11"	OFF
2-2	1" skip-over perforation	Valid	Invalid	OFF
2-3	Interface selection	See Table 1-20.		OFF
2-4				OFF
2-5	Baud rate selecton	See Table 1-21.		OFF
2-6				OFF
2-7	Auto fear-off mode	Valid	Invalid	OFF
2-8	Auto LF	Valid	Invalid	OFF

Table 1-20. Interface Selection

2-3	2-4	Function
OFF	OFF	8-bit Parallel
ON	OFF	Serial, Even parity
OFF	ON	Serial, Odd parity
ON	ON	Serial, None parity

Table 1-21. Baud Rate Selection

2-5	2-6	Function
OFF	OFF	19,200
ON	OFF	9,600
OFF	ON	1,200
ON	ON	300

1.4.2 Jumper Settings

Table 1-22 shows the jumper settings.

Table 1-22. Jumper Settings

No.	Type				Location
	27256	27512			6A
JI	256	512			
	4M/2M-BIT	1M-BIT	512K/256K-BIT		3A (CG1)
	MASK-ROM		ROM		
J2	B4	+ 5	+ 5		
J3	RD	A16	RD		
	4M/2M-BIT	1M-BIT'	512K/256K-BIT	256K-BIT	4A (CG2)
	MASK-ROM		ROM	RAM	
J4	B4	+ 5	+ 5	+ 5	
J5	RD	A16	RD	RD	
J6	B1	B1	B2	WR	
	SLCT-IN inable		SLCT-IN disable		
J7	SLIN		GND		
	LQ-860		LQ-106O		
J8	Close		Open		
J9	Open		Open		

NOTE : Bold indicates the factory settings.