



Technical Reference Guide

ML1120/ML1190



PREFACE

Every effort has been made to ensure that the information in this document is complete, accurate, and up-to-date. Oki Printing Solutions assumes no responsibility for the results of errors beyond its control. Oki Printing Solutions also cannot guarantee that changes in software and equipment made by other manufacturers and referred to in this guide will not affect the applicability of the information in it. Mention of software products manufactured by other companies does not necessarily constitute endorsement by Oki Printing Solutions.

While all reasonable efforts have been made to make this document as accurate and helpful as possible, we make no warranty of any kind, expressed or implied, as to the accuracy or completeness of the information contained herein.

The most up-to-date drivers and manuals are available from the Oki Printing Solutions web site:

<http://www.okiprintingsolutions.com>

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As an ENERGY STAR Program Participant, the manufacturer has determined that this product meets the ENERGY STAR guidelines for energy efficiency.



This product complies with the requirements of the Council Directives 89/336/EEC (EMC) and 73/23/EEC (LVD) as amended where applicable on the approximation of the laws of the member states relating to electromagnetic compatibility and low voltage.



CONTENTS

Preface	2
Notes, cautions and warnings.	10
Introduction	11
Features	11
Standard configuration	12
Identifying component parts	13
Front view	13
Rear view	14
About this guide	16
Online usage	17
Printing pages	17
Interface specifications	19
IEEE1284 parallel interface specifications	19
Connectors and cable	19
Parallel interface signals	20
Parallel interface levels	20
Parallel interface circuits	21
Parallel interface timing chart	21
Support mode	21
Universal Serial Bus (USB)	21
Connectors	22
Cable	22
USB interface signals	22
Mode and class of device	23
Data signalling rate	23
Interface circuit	24
Signal level	24
Timing chart	26
RS-232C serial interface specifications	28
Interface signals	28
Electrical characteristics	29
Interface timing charts	30
Receiving margin	30
Description of communication procedures	30
Interface control code	30
Local test function	32
Operator interface.	34
Operator panel functions	34
Print mode	35
Hex Dump mode, Menu mode, Test mode	37

Maintenance mode 1	38
Maintenance mode 2	38
Lamp functions.	39
ML1120.	39
ML1190.	40
Alarm/error indications	40
Recoverable alarms	40
Unrecoverable alarms.	41
Menu selection	43
Overview.	43
Button switch functions.	44
Operation	44
Menu items	45
Initialising menu settings	53
Initialising menu settings	54
Adjusting TOF position	55
Printer speed settings	56
Printer impact mode.	56
Registration menu	57
Overview.	57
Operation	57
Registration details.	57
Self test printing.	57
Rolling ASCII self test printing	58
Hexadecimal Dump mode	59
Overview.	59
Operation	60
Function	60
Continuous paper auto-loading.	60
Continuous paper auto-parking	61
Cut-sheet paper semi-auto-loading.	61
Form tear-off	62
Function	62
Set-up	62
Action.	62
Command descriptions	63
Horizontal control	63
Carriage return	63
Horizontal tab set.	63
Horizontal tab	65
Reset tab settings to power-on default values	65
Execute absolute horizontal dot position	66
Execute relative dot position	66

Move right relative dot position	68
Move left relative dot position	69
Left margin set	69
Right margin set	70
Set left/right margin	71
Auto justification	72
Set/reset unidirection printing	73
One line unidirectional printing	74
Set/reset half speed printing	74
Backspace	75
One character data delete	76
Vertical control	76
Set 1/8 inch fixed line spacing	76
Set 7/72 inch fixed line spacing	77
Start line spacing	77
Set 1/6 inch line spacing	77
Set n/60 inch line spacing	78
Set n/180 inch line spacing	78
Set n/360 inch fine line spacing	79
Set n/360 inch line spacing	80
Line feed	80
Set/reset automatic linefeed	81
Fine line feed (n/180 inch)	81
Fine line feed (n/360 inch)	82
Fine line feed (n/360 inch)	83
Reverse line feed	83
Reverse line feed	84
Form feed	84
Vertical tab	85
Set vertical tab stops	86
Set vertical format unit (VFU)	86
Select vertical tab channel	87
Form length set by inches	88
Form length set by lines	88
Set perforation auto skip	89
Reset perforation auto skip	90
Top of form set	90
Set vertical units	91
Set n/360 inch fine line spacing	91
Set n/360 inch line spacing	92
Set forward line spacing	92
Set reverse line spacing	92
Character set	92

Copies ROM CG to RAM CG	92
Character definition	93
Load DLL character.	95
DLL font select.	97
Foreign character set select.	97
Select international character set	100
Select character table	101
Enable upper ASCII characters	101
Select character set II	101
Print continuously from all characters chart.	102
Print one character from all characters chart	102
Select character set I	103
Select character set II	103
Code page select	103
Assign character table	106
Select character table	107
Select font.	108
Print quality – select HSD	108
Print quality – select HSD	109
Font description	109
Select character font	109
Select type styles.	110
Set/reset proportional spacing	111
Set/reset proportional spacing	112
Set pica character pitch (10 CPI)	113
Set 10 CPI.	113
Set elite character pitch (12 CPI)	113
Set 12 CPI.	114
Set 15 character per inch	114
Set compressed character pitch (17.1/20 CPI).	115
Set compressed character pitch (17.1/20 CPI).	115
Reset compressed character pitch	116
Set character spacing	116
Set italic characters	117
Reset italic characters.	117
Set italic character	118
Reset italic characters.	118
Text print features	118
Set/reset underlining	118
Set subscript/superscript.	119
Reset super/subscript.	120
Set emphasised print mode.	120
Reset emphasised print mode	120

Set double strike print mode	121
Reset double strike mode	121
Set double or expanded characters	122
Set immediate double width characters.	122
Set immediate double width characters.	123
Reset immediate double width characters	123
Set/reset double height characters.	124
Set/reset double height characters.	124
Set/reset double height characters.	125
Overscore set/reset	126
Select character style	126
Set double width or expanded characters	127
Set/reset double height characters.	127
Graphics mode	128
Enter/exit bit image graphics.	128
Single density graphics	131
Double density graphics	131
Quasi-double-density graphics	132
Set quadruple density graphics	133
Reassign alternate graphics codes	134
Graphics resolution.	135
Select aspect ratio	136
Composite commands	137
Print mode select	137
Print mode select	138
General control.	138
Printer initialisation	138
Cancel code	139
Set bit 7 code to 1	139
Set bit 7 code to 0	139
Reset 8 bit mode	140
Set print suppress	140
Print suppress	140
Reset print suppress mode	141
Stop printing	141
Enable paper out sensor	141
Disable paper out sensor.	142
Select emulation	143
Printer initialisation	143
Printer initialisation	143
Barcode.	144
Print barcode	144

Specifications 148

ML1120	148
Physical specification	148
Power requirements	149
Electrical insulation.	149
Environmental conditions	149
Noise	150
Agency approvals.	150
Print specification.	151
Paper specification	153
Ribbon specification	154
Reliability	154
ML1190	155
Physical specification	155
Power requirements	156
Electrical insulation.	156
Environmental conditions	156
Noise	157
Agency approvals.	157
Print specification.	157
Paper specification	160
Ribbon specification	161
Reliability	161
Appendix A – Command summary	163
Command summary by initiator	163
Command summary by function.	171
Appendix B – Print modes/features	178
IBM mode	178
EPSON mode	179
Appendix C – Code pages	180
Appendix D – Media specifications	188
General	188
Unsuitable paper	188
Pre-printed paper.	189
Paper storage conditions.	190
Usable paper types and assurance range	190
Continuous paper (continuous forms)	191
Vertical and horizontal dimensions	191
Feed hole (sprocket hole) positions and sizes	192
Perforation dimensions	194
Paper size and printing areas.	196
Paper quality	197
Paper weight and max. no. of form parts	198

Methods for joining parts of multipart forms	198
Horizontal perforation rising	202
Misalignment between feed holes	203
Binding holes	203
Corner cuts	204
Paper condition	205
Cut-sheet paper	206
Vertical and horizontal dimensions	206
Paper size and printing areas	207
Paper quality	209
Paper weight and max. no. of form parts	209
Joining of parts of multipart forms	210
Binding holes	211
Perforations	211
Folds, bends and curls of cut-sheet paper	212
Envelopes (individual)	213
Label paper	214
Package delivery slips	218
Recycled paper	219
Index	220
Oki Printing Solutions contact details	221

NOTES, CAUTIONS AND WARNINGS.

NOTE

A NOTE PROVIDES ADDITIONAL INFORMATION TO SUPPLEMENT THE MAIN TEXT.

CAUTION!

A caution provides additional information which, if ignored, may result in equipment malfunction or damage.

WARNING!

A warning provides additional information which, if ignored, may result in a risk of personal injury.

INTRODUCTION

The ML1120 (9-pin) and ML1190 (24-pin) are designed to provide highly reliable letter quality printing and high resolution graphics for the desktop/office printing environment. Both models combine state-of-the-art serial impact dot matrix printing technology with advanced materials and superior construction to provide high performance and versatility in a desktop sized unit. Careful attention to ergonomics and application needs provides user friendly operation for operators of varying technical capabilities.

FEATURES

ML1120 and ML1190 features include:

- > OKI smart Paper Handling (ML1190)
- > Direct access control panel
- > Structured direct access menu for easy set up
- > Printhead life: 200M characters (average) in 10 CPI Utility mode at normal 25% duty, 35% page density
- > Bidirectional short-line-seeking printing
- > Print speed:
 - 333 CPS HSD (10 CPI)
 - 250 CPS Utility (10 CPI)
 - 83 CPS NLQ (10 CPI) (ML1190)
 - 62.5 CPS LQ (10 CPI)(ML1120)
- > Paper feed
 - Rear path (with push tractor)
 - Top tray
 - Bottom path (with pull tractor)
- > Paper handling
 - Automatic sheet loading
 - Short paper tear-off available by menu selection or TEAR switch operation
 - Auto-loading for single sheet and continuous paper
 - Auto park feature
- > Paper copies

- 9 – 11 lb, 4 part (with rear feed)
- 9 – 11 lb, 6 part (with bottom feed)
- > Cartridge ribbon
- > Interfaces
 - Standard IEEE1284 parallel interface
 - USB interface
 - RS-232C Serial interface
- > 53 dBA noise
- > ML1190: 64 kbytes max. receive buffer
- > ML1120: 128 kbytes max. receive buffer
- > Line feed resolution at:
 - ML1190: 1/6 in, 1/8 in, n/72 in, n/144 in, n/180, n/216 in simulated by n/288 in, n360 in
 - ML1120: 1/6 in, 1/8 in, n/72 in, n/144 in, n/216 in simulated by n/288 in
- > Agency approved by:
 - 200 V system: UL
 - 230 V model: CE, GS
- > Barcode data printing
- > Postnet bar code data printing

STANDARD CONFIGURATION

The ML1120 and ML1190 consist of the following components:

- > Printer mechanism
- > Power supply unit
- > Control board (including an IEEE1284 parallel interface, RS-232C serial interface and USB interface)
- > Operation panel board
- > Acoustic covers
- > Tractor feed unit

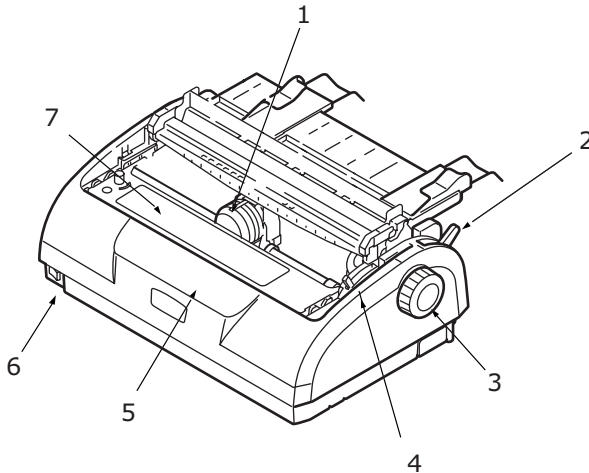
NOTE

It is not recommended that you use either the parallel or USB port when the RS-232C option is installed in this product.

IDENTIFYING COMPONENT PARTS

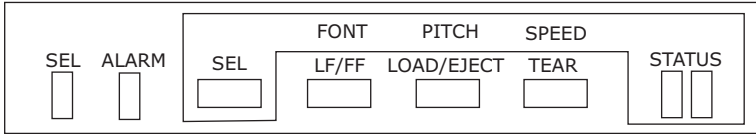
The main parts of your printer are identified and briefly explained below.

FRONT VIEW

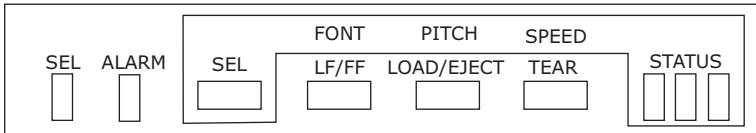


- 1.** Print Head: prints the characters on the paper.
- 2.** Paper Type Lever: set according to the type of paper used – cut sheet or continuous forms.
- 3.** Platen Knob: turn to move or eject the paper.
- 4.** Paper Thickness Lever: set according to the thickness of the paper. There is also a setting to facilitate ribbon replacement.
- 5.** Control Panel: contains button switches and indicators (described in detail later) that allow you to operate the printer.

ML1120

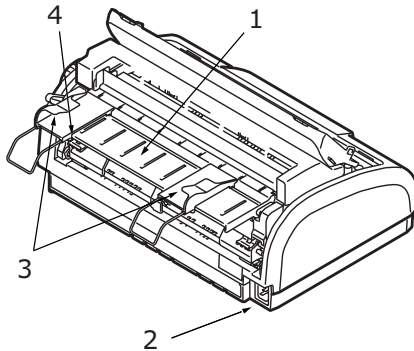


ML1190



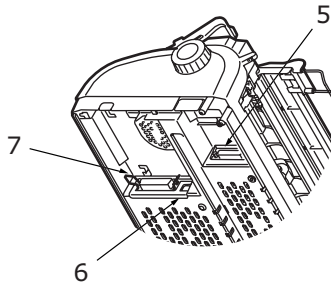
- 6.** Power Switch: to turn the printer power ON/OFF.
- 7.** Ribbon Cartridge: holds the printer ribbon.

REAR VIEW



- 1.** Paper Tray: insert cut sheet paper for use by the printer (one sheet at a time)
- 2.** Power connector: connect to printer power cable.
- 3.** Paper Guides: can be adjusted as required to locate the left edge of cut sheet paper.

4. Pin Tractor: to load and feed continuous forms.



5. Serial connector: connect to serial interface cable.
6. USB connector: connect to USB interface cable.
7. Parallel connector: connect to parallel interface connector.

ABOUT THIS GUIDE

NOTE

Images used in this manual may include optional features that your printer does not have installed.

If required, you may wish to refer for basic information to the User's Guide which is stored on the manuals CD.

This manual is your Technical Reference guide (check the web site, www.okiprintingsolutions.com, for the most up-to-date version) for your printer and forms part of the overall user support listed below:

- > **Installation Safety booklet:** provides information as to safe use of the printer.

This is a paper document that is packaged with the printer and should be read before setting up your printer.

- > **Set-up guide:** to describe how to unpack and set up your printer.

This is a paper document that is packaged with the printer.

- > This **Technical Reference Guide:** to provide detailed technical information for programmers and more technical users.

This is an electronic document available on the web site www.okieng.com.

- > **User's Guide:** to help you to become familiar with your printer and make the best use of its many features. Also included are guidelines for troubleshooting and maintenance to ensure that it performs at its best. Additionally, information is provided for adding optional accessories as your printing needs evolve.

This is an electronic document stored on the manuals CD.

- > **Network Configuration Guide:** to provide detailed technical information for network administrators to configure the optional accessory network interface.

This is an electronic document stored on the CD that accompanies the network interface card optional accessory.

- > **Installation Guides:** accompany consumable items and to describe how to install them.

These are paper documents that are packaged with the consumables and optional accessories.

- > **Online Help:** online information accessible from the printer driver and utility software.

ONLINE USAGE

This guide is intended to be read on screen using an Adobe Acrobat Reader. Use the navigation and viewing tools provided in Acrobat.

You can access specific information in two ways:

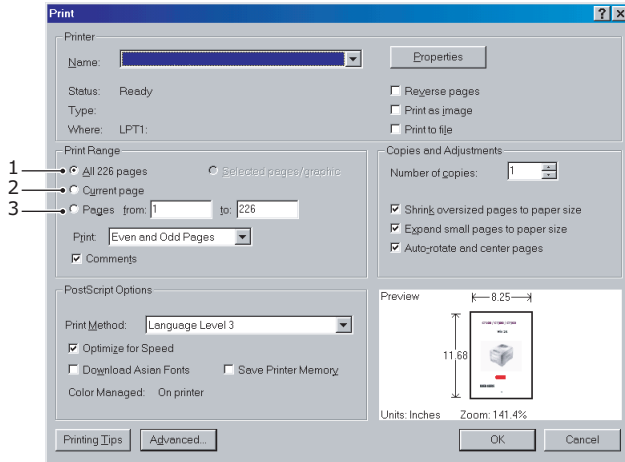
- > In the list of bookmarks down the left hand side of your screen, click on the topic of interest to jump to the required topic. (If the bookmarks are not available, use the ["Contents" on page 3.](#))
- > In the list of bookmarks, click on Index to jump to the Index. (If the bookmarks are not available, use the ["Contents" on page 3.](#)) Find the term of interest in the alphabetically arranged index and click on the associated page number to jump to the page containing the term.

PRINTING PAGES

The whole manual, individual pages, or sections may be printed. The procedure is:

1. From the toolbar, select File -> Print (or press the Ctrl + P keys).

- 2.** Choose which pages you wish to print:
- (a) [All pages], (1), for the entire manual.
 - (b) [Current page], (2), for the page at which you are looking.



- (c) [Pages from] and [to], (3), for the range of pages you specify by entering their page numbers.

- 3.** Click on OK.

INTERFACE SPECIFICATIONS

IEEE1284 PARALLEL INTERFACE SPECIFICATIONS

CONNECTORS AND CABLE

Connectors

Printer side:

36-pin receptacle 57-40360-830B (Amphenol or Daiichi Electronics) or equivalent

Cable side:

36-pin plug 57-30360 (Amphenol or Daiichi Electronics) or equivalent.

Cable

Use a cable less than 6 ft (1.8 m) in total length.

(A shielded cable is required and use of twisted-pair wires is recommended for noise prevention.)

The cable is not supplied with the printer.

PARALLEL INTERFACE SIGNALS

PinNo.	Signal	Direction	Description	
			Compatible	Nibble
1	STROBE	To printer	Samples input data when changing from low level to high level.	HostClk
2	DATA BIT 1	To printer	Input data: High level indicates 1 and low level 0.	←
3	DATA BIT 2			
4	DATA BIT 3			
5	DATA BIT 4			
6	DATA BIT 5			
7	DATA BIT 6			
8	DATA BIT 7			
9	DATA BIT 8			
10	ACKNLG	From printer	Indicates character input completion, or function operation end, at low level.	PrtClk
11	BUSY	From printer	Indicates data cannot be received at high level. Data can be input at low level.	PrtBusy
12	PE	From printer	High level indicates paper end.	AckDataReq
13	SEL	From printer	High level indicates select (on line) condition.	Xflag
14	AUTO FEED	To printer	"Auto Feed" in menu set as valid in EPS mode	HostBusy
16, 33	GND	-	Signal ground.	←
17	CHASSIS GROUND	-	Frame ground.	←
18	-	-	Fixed to High (Connected to + 5 V via 235 KΩ)	←
19 to 30	GND	-	Twisted pair return (for pin No. 1 to 11)	←
31	INIT	To printer		←
32	ERROR	From printer	This signal goes from high to low level when paper runs out. (Possible to indicate error and Off Line state).	nDataAvail
15, 34	-	-	Unused	←
35	-	-	Fixed to High (Connected to +5 V via 3.3 KΩ)	←
36	SLCT IN	To printer	Connected to input port	IEEE1284 active

NOTE

Connector pin arrangement for above.

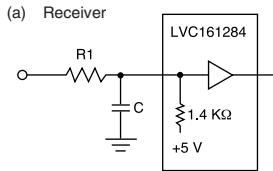


PARALLEL INTERFACE LEVELS

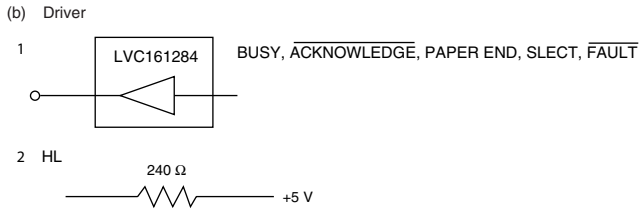
Low level: 0.0 V to + 0.8 V

High level: +2.4 V to +5.0 V

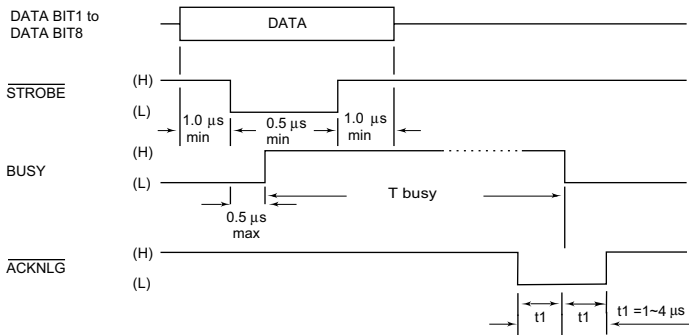
PARALLEL INTERFACE CIRCUITS



	R1	C
INPUT PRIME	51Ω	1,000pF
DATA STROBE	51Ω	47pF
AUTO FEED XT	51Ω	-
SLCT IN	51Ω	47pF
DATA BIT1~8	51Ω	-



PARALLEL INTERFACE TIMING CHART



SUPPORT MODE

Compatible

Nibble (PnP Device ID only)

UNIVERSAL SERIAL BUS (USB)

Universal Serial Bus Specification Revision 1.1 compliance.

CONNECTORS

Printer Side:

“B” Receptacle (Upstream Input to the USB Device)

Cable Side:

Series “B” Plug

CABLE

Length:

Max. 5 m (Cable must be shielded and meet the USB Spec Rev 2.0 for normal operation.)

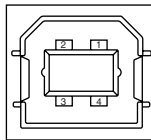
The cable is not supplied with the printer.

USB INTERFACE SIGNALS

CONTACT NUMBER	SIGNAL NAME
1	Vbus (Not Used)
2	D-
3	D+
4	GND
Shell	Shield

NOTE

Connector pin arrangement for above:



MODE AND CLASS OF DEVICE

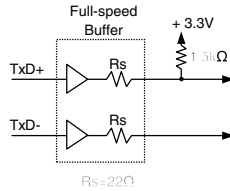
Full-speed driver

Self-powered device

DATA SIGNALLING RATE

Full-speed function – 12 Mb/s

INTERFACE CIRCUIT



SIGNAL LEVEL

Input/output level

PARAMETER	SYMBOL	MIN.	MAX.	UNITS
Input levels:				
High (driven)	V_{IH}	2.0		V
High (floating)	V_{IHZ}	2.7	3.6	V
Low	V_{IL}		0.8	V
Output levels:				
Low	OL	0.0	0.3	V
High (driven)	OH	2.8	3.6	V
Output signal crossover voltage	V_{CRS}	1.3	2.0	V

Signalling levels

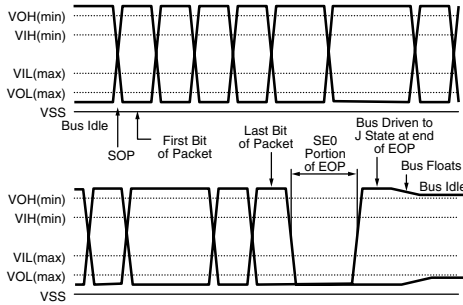
Bus State	Signalling Levels	
	Required	Acceptable
Differential "1"	$(D+)-(D-)> 200\text{mV}$ and $D+ > V_{IH}(\text{min})$	$(D+)-(D-)> 200\text{mV}$
Differential "0"	$(D-)-(D+)> 200\text{mV}$ and $D- > V_{IH}(\text{min})$	$(D-)-(D+)> 200\text{mV}$
Single-ended 0 (SE0)	$D+ \text{ and } D- < V_{IL}(\text{max})$	$D+ \text{ and } D- < V_{IH}(\text{min})$
Data J state: Low-speed Full-speed	Differential "0" Differential "1"	
Data K state: Low-speed Full-speed	Differential "1" Differential "0"	
Idle state: Low-speed Full-speed	$D- > V_{IHZ}(\text{min})$ and $D+ < V_{IL}(\text{max})$ $D+ > V_{IHZ}(\text{min})$ and $D- < V_{IL}(\text{max})$	$D- > V_{IHZ}(\text{min})$ and $D+ < V_{IH}(\text{min})$ $D+ > V_{IHZ}(\text{min})$ and $D- < V_{IH}(\text{min})$
Resume state	Data K state	
Start-of-Packet (SOP)	Data lines switch from Idle to K state	
End-of-Packet (EOP)	SE0 for ≥ 1 bit time ¹ followed by a J state for 1 bit time	SE0 for ≥ 1 bit time ¹ followed by a J state
Disconnect (at downstream port)	SE0 for $\geq 2.5\mu\text{s}$	
Connect (at downstream port)	Idle for $\geq 2\text{ms}$	Idle for $\geq 2.5\mu\text{s}$
Reset	$D+ \text{ and } D- < V_{IL}(\text{max})$ for $\geq 10\text{ms}$	$D+ \text{ and } D- < V_{IL}(\text{max})$ for $\geq 2.5\mu\text{s}$

NOTE

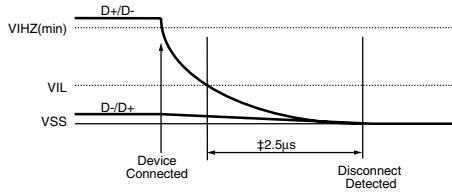
The width of EOP is defined in bit times relative to the device type receiving the EOP. The bit time is approximate.

TIMING CHART

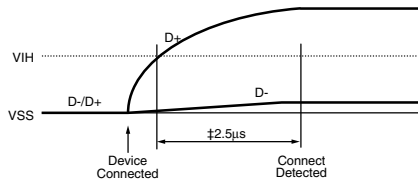
Packet voltage levels



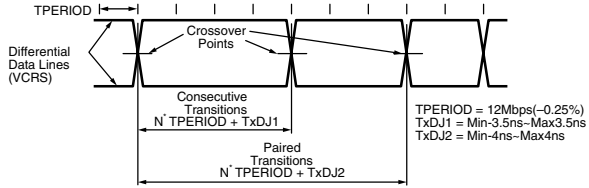
Disconnect detection



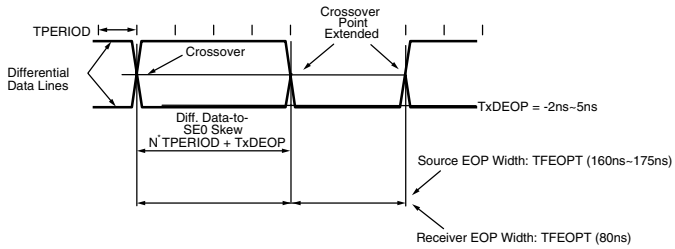
Full-speed device connect detection



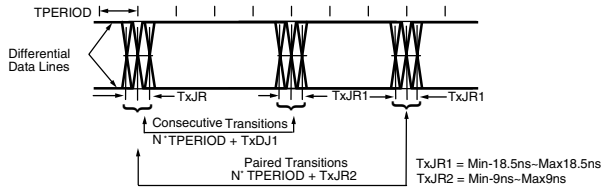
Differential data jitter



Differential-to-EOP transition skew and EOP width



Receiver jitter tolerance



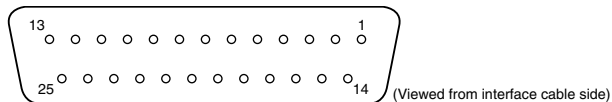
RS-232C SERIAL INTERFACE SPECIFICATIONS

INTERFACE SIGNALS

PIN NO.	SIGNAL	CODE	SIGNAL	FUNCTION
1	Protective Ground	PG	—	Frame ground
2	Transmitted Data	TD	From printer	Data from printer
3	Received Data	RD	To printer	Data to printer
4 Note 2	Request to Send	RTS	From printer	Signal to indicate printer cannot receive data in printer Busy/Ready protocol
7	Signal Ground	SG	—	Signal ground
11 Note 2	Supervisory Send Data	SSD	From printer	Signal to indicate printer cannot receive data in printer Busy/Ready protocol
20 Note 2	Data Terminal Ready	DTR	From printer	Signal to indicate printer cannot receive data in printer Busy/Ready protocol
5, 8 to 10, 12 to 19, 21 to 25	—	—	—	Unused

NOTE

1. Connector pin arrangement for above:



ELECTRICAL CHARACTERISTICS

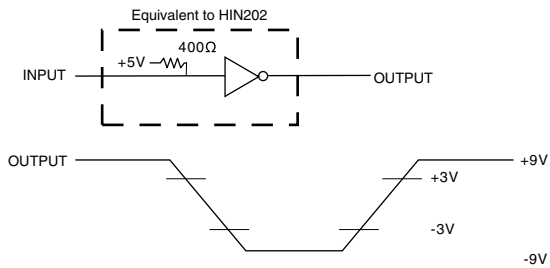
Signal levels

RS-232C interface signal levels are as specified below, and meet the EIA Standard RS-232C:

-15 to -3 V: LOW = OFF = LOGIC "1"

+15 to + 3 V: HIGH = ON = LOGIC "0"

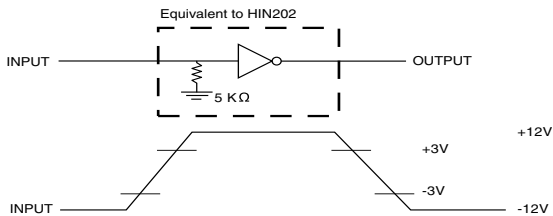
Line driver



NOTE

The above figures are the standard values for a load of 3 Kohm, 15 pF and a driver source level of ±9 V.

Line receiver

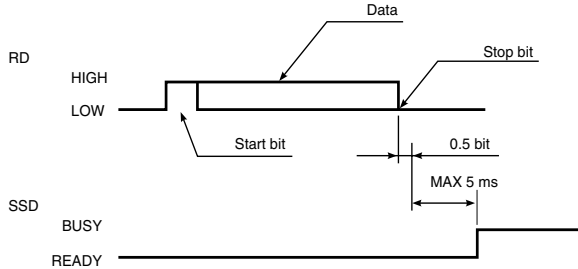


NOTE

If the power on the input side is OFF, the output of the receiver becomes high (+2.4 V or more) at TTL level.

INTERFACE TIMING CHARTS

SSD signal timing chart



RECEIVING MARGIN

Receiving margin is more than 37% at any baud rate.

DESCRIPTION OF COMMUNICATION PROCEDURES

Three types of protocol can be selected by menu communication procedures:

- > DTR
- > X-ON/X-OFF
- > DTR and X-ON/X-OFF

INTERFACE CONTROL CODE

The following function codes are used in the high-speed serial interface:

COMMAND	CODE
DC1	(17)D (11)H
DC3	(19)D (13)H

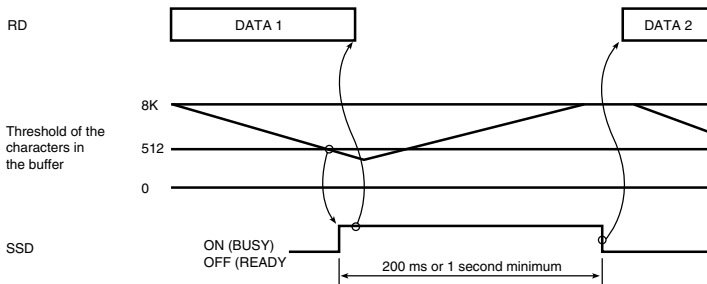
NOTE

Characters to be printed according to the parity error indication code (40)H will differ depending on the setting of the printer character set. Refer to the printer User's Guide.

Ready/Busy protocol

Block format	Free
Error indication	The parity error indication is printed as character 40(H).
Busy state indication	The busy signal turns on (becomes Busy) when the space in the interface buffer has become less than 256 bytes. The busy signal turns off (becomes Ready) after 200 ms or 1 second has passed if 256 bytes have recovered within 200 ms or 1 second. If the recovery time exceeds 200 ms or 1 second, the busy signal turns off (becomes Ready) immediately after the recovery has occurred.

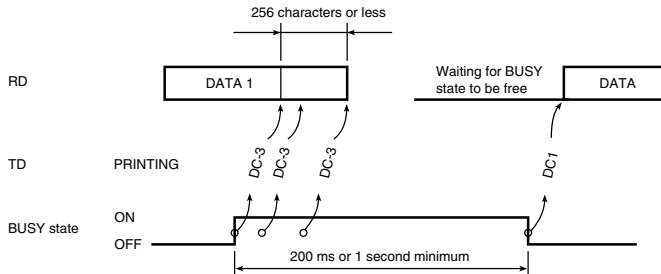
Timing chart



X-ON/X-OFF protocol

Block format	Free
Error indication	The parity error indication character is converted into code 40(H).
Busy state indication	The DC3 will be sent to the transmission side immediately after the space in the interface buffer has become less than 256 bytes to indicate that receiving is impossible. The transmission of the DC3 stops when data receiving has stopped. If the recovery time for 256 bytes is within 200 ms or 1 second after the DC3 is sent, DC1 will be sent 200 ms or 1 second after the recovery to indicate that receiving is possible. If the recovery time exceeds 200 ms or 1 second, the DC1 is sent immediately after the recovery has occurred.

Timing chart



NOTE

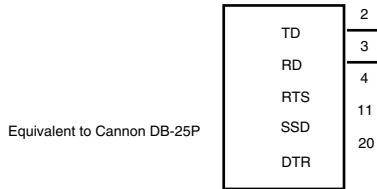
If data is transferred when the printer is still BUSY, the printer sends a DC3 code every time it receives data.

LOCAL TEST FUNCTION

Circuit Test mode setting

Diagnostic: Test set by menu

Test connector: Connect the test connectors as shown below to the interface connectors.



Circuit Test mode function

After the settings outlined in Circuit Test mode setting are completed and power is turned on, the serial interface checks the message buffer memory and interface driver and receiver circuits, then prints all characters. To start and stop this test, press the SEL switch on the front of the printer. Details of this test are explained below.

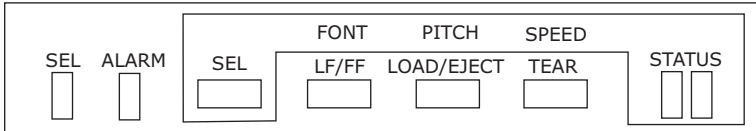
1. Print the program revision with two numerical characters.
2. Print "LOOP TEST."
3. Check memory for message buffer.
Print "GOOD" if memory check is OK, and print "BAD" if memory check fails.
4. Transmit characters from code 20H to 7FH by TD signals. At the same time, characters are received from the RD signal and stored in the message buffer.
5. Print the characters that were stored in the message buffer as indicated in Step 4.
6. Repeat from Step 1.

OPERATOR INTERFACE

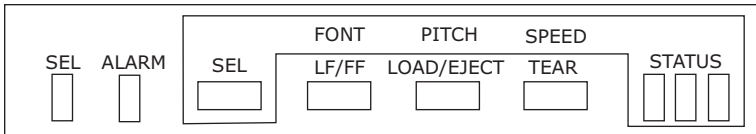
OPERATOR PANEL FUNCTIONS

The operator panel button switches and lamps are located as follows:

ML1120



ML1190



Button switch functions depend on the printer state which can be any one of:

- > Print Mode (for a summary of print modes and features see ["Appendix B – Print modes/features" on page 178.](#))
- > Hex Dump Mode
- > Menu Mode
- > Test Mode
- > Power-On Mode
- > Maintenance Mode 1 (not for use by general users)
- > Maintenance Mode 2 (not for use by general users)

PRINT MODE

PRINTER STATE SWITCH	SELECT	
	CONT. FORMS	CUT-SHEET
SEL	Sets printer off-line	Sets printer off-line
LF/FF	Performs a line feed	Performs a line feed
LOAD/EJECT	Feeds forms or loads paper	Ejects paper
TEAR	Feeds paper to the tear or print position	Invalid
SEL + LF/FF	Selects font type	Selects font type
SEL + LOAD/EJECT	Selects font pitch	Selects font pitch
SEL + TEAR	Selects print speed	
LF/FF + LOAD/EJECT	Invalid	Invalid
LF/FF + TEAR	Invalid	Invalid
LOAD/EJECT + SEL	Selects compress rate	Microfeed down 0.366 mm (1/144 in) step.
LOAD/EJECT + LF/FF	Store print position data in EEPROM	Microfeed up 0.366 mm (1/144 in) step.
LOAD/EJECT + TEAR	Reset the printer	
TEAR + SEL	Microfeed down (see "NOTE" on page 39): ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.	
TEAR + LF/FF	Microfeed up (see "NOTE" on page 39): ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.	
TEAR + LOAD/EJECT	Invalid	Invalid
SEL + LF/FF +LOAD/EJECT	Invalid	Invalid

PRINTER STATE SWITCH	SELECT	
	CONT. FORMS	CUT-SHEET
TEAR + LF/FF + SEL	Invalid	Invalid
TEAR + LOAD/EJECT + SEL	Invalid	Invalid
TEAR + LOAD/EJECT + LF/FF	Invalid	Invalid

NOTE

While holding down the TEAR button, press the SEL or LF/FF button to perform fine feed of paper. This allows for slight movements of the paper in order to reach the cut-off position.

PRINTER STATE SWITCH	DESELECT	
	CONT. FORMS	CUT-SHEET
SEL	Sets printer on-line	Sets printer on-line
LF/FF	Performs a line feed	Performs continuous line feeding. Ejects the cut sheet.
LOAD/EJECT	Feeds forms or loads paper	Feeds forms or ejects paper
TEAR	Feeds paper to the tear or print position	Invalid
SEL + LF/FF	Selects font type	Selects font type
SEL + LOAD/EJECT	Selects font pitch	Selects font pitch
SEL + TEAR	Selects print speed	
LF/FF + LOAD/EJECT	Invalid	Invalid
LF/FF + TEAR	Invalid	Invalid
LOAD/EJECT + SEL	Selects compress rate	Microfeed down: ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.

PRINTER STATE SWITCH	DESELECT	
	CONT. FORMS	CUT-SHEET
LOAD/EJECT + LF/FF	Store print position data in EEPROM	Microfeed up: ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.
LOAD/EJECT + TEAR	Reset the printer	
TEAR + SEL	Microfeed down (see "NOTE" on page 39): ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.	
TEAR + LF/FF	Microfeed up (see "NOTE" on page 39): ML1120: 0.366 mm (1/144 in) step. ML1190: 0.555 mm (1/180 in) step.	
TEAR + LOAD/EJECT	Invalid	Invalid
SEL + LF/FF + LOAD/EJECT	Invalid	Invalid
TEAR + LF/FF + SEL	Invalid	Invalid
TEAR + LOAD/EJECT + SEL	Invalid	Invalid
TEAR + LOAD/EJECT + LF/FF	Invalid	Invalid

HEX DUMP MODE, MENU MODE, TEST MODE

SWITCH				MENU TYPES
SEL	LF/FF	LOAD/EJECT	TEAR	
X	O	X	X	Activates Self Test mode

SWITCH				MENU TYPES
SEL	LF/ FF	LOAD/EJECT	TEAR	
X	O	O	X	Performs skip/ continuous pattern
O	O	X	X	Activates Rolling ASCII (1 page) when pressed and printer powered ON
O	X	O	X	Activates Hex Dump mode
O	X	X	X	Activates Menu mode
O	X	X	X	Sets Menu factory default setting
O	O	X	X	Activates Maintenance Mode 1 (Note 1)
O	O	X	O	Activates Maintenance Mode 2 (Note 1)

NOTE

When a Maintenance Mode is launched, the SEL lamp lights and waits for the switch to be pressed.

MAINTENANCE MODE 1

SWITCH				MENU TYPES
SEL	LF/ FF	LOAD/EJECT	TEAR	
X			O	Activates Maintenance Menu mode
X			O	Activates Registration Menu mode

NOTE

The above mode appears by pressing and holding down the switch marked X and then pressing the switch marked O.

MAINTENANCE MODE 2

SWITCH				MENU TYPES
SEL	LF/ FF	LOAD/EJECT	TEAR	
	X	O		Activates Flash Loading mode

NOTE

The above mode appears by pressing and holding down the switch marked X and then pressing the switch marked O.

SPECIAL SWITCH OPERATIONS

Hex Dump mode

- > Enter Hex Dump mode by pressing the SEL + LOAD/EJECT buttons at power ON.
- > Exit Hex Dump mode by switching the printer OFF.

- > The function of the other buttons does not change, that is, the SEL, LF/FF, LOAD/EJECT and TEAR buttons all have the same function as when in normal print mode.
- > For more information, see ["Hexadecimal Dump mode" on page 61.](#)

Self Test mode

- > Enter Self Test mode by pressing the LF/FF + LOAD/EJECT buttons at power ON.
- > Exit Self Test mode by switching the printer OFF.
- > For more information, see ["Self test printing" on page 59.](#)

Rolling ASCII mode

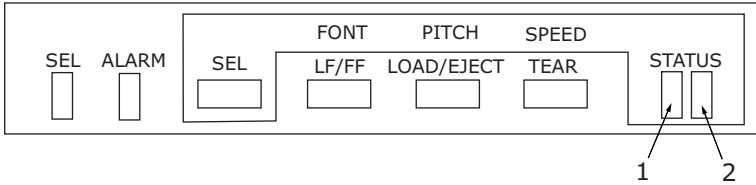
- > Enter Rolling ASCII mode by pressing the LOAD/EJECT + TEAR buttons at power ON.
- > Exit Rolling ASCII mode by switching the printer OFF.
- > For more information, see ["Rolling ASCII self test printing" on page 60.](#)

Continuous fine line feed

- > To carry out a continuous fine line feed, press SEL to set the printer offline and then press the following buttons:
Forward: LOAD/EJECT + SEL
Reverse: LOAD/EJECT + LF/FF
- > Continuous fine line feed is used to adjust the auto TOF position.

FLAMP FUNCTIONS

ML1120

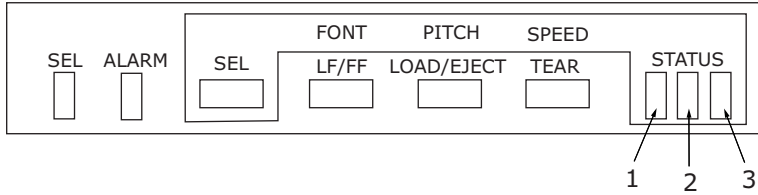


LAMP	COLOUR	ON	OFF	BLINKING
SEL	Green	SELECT (data receiving enable) state	DESELECT (data receiving impossible) state	Recovery impossible alarm state (Note 1). Keep printing data state.
ALARM	Red	Paper end state	Paper present.	Cut sheet removal standby state. Recovery impossible alarm state (Note 1). Paper jam state. Media switching alarm state.
1	Green	MENU mode	Normal print mode	LF/FF and SP motor protecting alarm.
3	Green	Power ON state	Power OFF state	Power save mode (1s ON/1s OFF).

NOTE

In recovery impossible alarm state, both SEL and ALARM lamps are blinking.

ML1190



LAMP	COLOUR	ON	OFF	BLINKING
SEL	Green	SELECT (data receiving enable) state	DESELECT (data receiving impossible) state	Recovery impossible alarm state (Note 1). Keep printing data state.
ALARM	Red	Paper end state	Paper existing state	Cut sheet removal standby state. Recovery impossible alarm state (Note 1). Paper jam state. Media switching alarm state.
1	Green	MENU mode	Normal print mode	LF/FF and SP motor protecting alarm.
2	Green	Quiet print mode	Normal print mode	High multipart print mode.
3	Green	Power ON state	Power OFF state	Power save mode (1s ON/1s OFF).

NOTE

In recovery impossible alarm state, both SEL and ALARM lamps are blinking.

ALARM/ERROR INDICATIONS

RECOVERABLE ALARMS

ML1120

LED	SEL	ALARM	MENU
ALARM			
Paper End	R	O	R
Paper Lever		B	R
Paper Jam (Load jam, Ejection jam)		B	R
Head Temperature	R	R	B
SPACE/LF/FF MOTOR Temperature	R	R	B

NOTE

O: LED continuously ON

B: LED blinking (500 ms ON, 500 ms OFF)

R: Current LED indication retained

Blank: LED OFF

ML1190

LED	SEL	ALARM	MENU
ALARM			
Paper End	R	O	R
Paper Lever		B	R
Paper Jam (Load jam, Ejection jam)		B	R
Head Temperature	R	R	B
SPACE/LF/FF MOTOR Temperature	R	R	B

NOTE

O: LED continuously ON

B: LED blinking (500 ms ON, 500 ms OFF)

R: Current LED indication retained

Blank: LED OFF

UNRECOVERABLE ALARMS

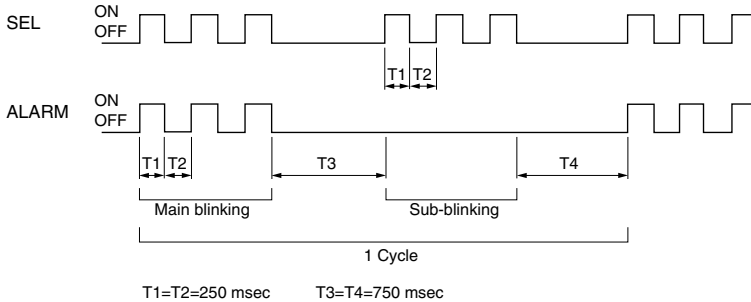
Unrecoverable alarms are shown below. The numbers of blinks of the alarms indicate the states of the alarms.

Alarm indication consists of main blinking and sub-blinking. Main blinking is the concurrent blinking of the SEL and ALARM LEDs and sub-blinking is the blinking of only the SEL LED.

ALARM INDICATION		ALARM CONTENTS
MAIN BLINKING	SUB-BLINKING	
1	1	Head homing alarm
	2	Spacing alarm
	3	Roller alarm
2	1	Program ROM alarm
	2	CG ROM alarm
	3	Flash ROM alarm
3	1	DRAM alarm

ALARM INDICATION		ALARM CONTENTS
MAIN BLINKING	SUB-BLINKING	
4	1	CPU (inside RAM) alarm
	2	Manual reset alarm
	3	NMI alarm
	4	CPU address alarm
	5	DMA address alarm
	6	General invalid instruction alarm
	7	Slot alarm
	8	Watchdog timer alarm
	9	Invalid interrupting alarm
5	1	F/W alarm
9	1	Head A/D error

LED blink time periods



MENU SELECTION

OVERVIEW

Features selected in Menu mode become the default features for the printer each time it is powered on. The Menu function allows

features to be activated without the use of a software command but software commands override Menu settings.

NOTE

Maintenance Menu items are not accessible to day-to-day users.

BUTTON SWITCH FUNCTIONS

SWITCH	FUNCTION
SEL	Moves forward through a group of menu items. When the last group is selected, the first group will come up on pressing SEL.
TEAR + SEL	Moves backward through a group of menu items. When the first group is selected, the last group will come up on pressing SEL.
LF/FF	Moves forward through the menu items. When the last item is selected, the first item will come up on pressing LF/FF.
TEAR + LF/FF	Moves backward through the menu items. When the first item is selected, the last item will come up on pressing TEAR + LF/FF.
LOAD/EJECT	Moves forward through the values of a menu item. When the last value is selected, the first value will come up on pressing LOAD/EJECT.
TEAR + LOAD/EJECT	Moves backward through the values of a menu item. When the first value is selected, the last value will come up on pressing TEAR + LOAD/EJECT.
TEAR + LOAD/EJECT + SEL	Exits the Menu mode. The printer enters the initial state as at power on.

OPERATION

- 1.** To enter Menu Mode:

If the printer power is OFF, while holding down the SEL button turn the power ON.

To enter Maintenance Menu mode.

- (a) Hold down the SEL, LF/FF and LOAD/EJECT buttons and turn the power ON to activate Maintenance Mode.
 - (b) After Maintenance Mode is enabled, hold down the TEAR and LF/FF buttons and press the SEL button.
2. On entering the Menu mode, "Menu Print?" is printed.
 3. See ["Button switch functions" on page 46](#) for a description of how to navigate the menus.
 4. To exit the Menu mode, hold down the TEAR and LOAD/EJECT buttons and press the LF/FF button.

The TOF position is not affected by Menu mode. (However, TOF setting is executed if page length changes.)

NOTE

When entering/exiting Menu Mode, the user is not prompted.

MENU ITEMS

In the menu settings tables below, factory default settings are shown emboldened. Menu items and settings

In the menu settings tables below, factory default settings are shown in bold.

MENU	ITEM	FUNCTION	SETTING
Printer control menu	Emulation Mode	Select EPSON mode, IBM mode, or ML mode.	IBM EPSON ML

MENU	ITEM	FUNCTION	SETTING
Font menu	Print Mode	Select quality of ANK characters.	NLQ Courier NLQ Gothic NLQ OCR-B DRAFT Utility
	Draft Mode	Select HSD or SSD.	HSD SSD
	Pitch	Select character pitch.	10 CPI , 12 CPI, 15 CPI, 17.1 CPI, 20 CPI
	Proportional Spacing	Select whether to use proportional spacing or not.	Yes No
	Style	Select either font style.	Normal , Italics
	Size	Select the character scale size.	Single , Double

MENU	ITEM	FUNCTION	SETTING
Symbol sets menu	Character Set	Select either ANK character code table.	Standard Line Graphics Block Graphics (displayed for ML emulation only) Set I Set II (displayed for IBM and EPSON emulation only)
	Language Set	Select a language character set.	ASCII , French, German, British, Danish I, Swedish I, Italian, Spanish I, Japanese, Norwegian, Danish II, Spanish II, Latin American, French Canadian, Dutch, TSR80, Swedish II, Swedish III, Swedish IV, Turkish, Swiss I, Swiss II, Publisher
	Zero Character	Select either print font pattern to receive a zero character located at 30H in ANK code or at AA30H in a single-byte code.	Unslashed Slashed

MENU	ITEM	FUNCTION	SETTING
Symbol sets menu	Code Page	Select a code page.	USA Canada French Multilingual Portugal Norway Turkey Greek_437 Greek_869 Greek_928 Grk_437 CYPRUS Polska Mazovia Serbo Croatian I Serbo Croatian II ECMA-94 Hungarian CWI Windows Greek Windows East Europe Windows Cyrillic East Europe Latin II-852 Cyrillic I-855 Cyrillic II-866 Kamenicky(MJK) ISO Latin 2 Hebrew NC (862) Hebrew OC Turkey_857 Latin 5 (Windows Turkey) Windows Hebrew Ukrainian Bulgarian ISO Latin 6 (8859/ 10) Windows Baltic Baltic_774 KBL-Lithuanian Cyrillic Latvian Roman-8 Icelandic-861 Multilingual 858 ISO 8859-15 Greek_737 Asmo449+ Asom708 Arabic864 Windows Arabic
	Slashed Letter 0	Set whether to convert slashed 0 located at 9BH and 9DH in USA code page or not.	Yes No

MENU	ITEM	FUNCTION	SETTING
Rear feed menu	Line Spacing	Select line feed pitch.	6 LPI 8 LPI
	Form Tear-Off	Select manual or auto as the method to advance a continuous form to the form tear-off position.	Off 500 ms 1 sec 2 sec
	Skip Over Perforation	Select whether to skip over perforation or not. (When a skip over perforation setup command is received, the received command is given priority.)	Yes (25.4 mm/ 1 in) No
	Page Length	Select the length of a continuous form.	279.4 mm(11 in) 296.3 mm(11 2/3 in) 304.8 mm (12 in) 355.6 mm(14 in) 431.8 mm(17 in) 127.0 mm(5 in) 76.2 mm(3 in) 82.6 mm(3.25 in) 84.7 mm(10/3 in) 93.1 mm(11/3 in) 101.6 mm(4 in) 139.7 mm(5.5 in) 152.4 mm(6 in) 177.8 mm(7 in) 203.2 mm(8 in) 215.9 mm(8.5 in)
	Initial Position (Paper position when power on)	This is the position of the paper when the paper is already loaded at power on. (For continuous form mode only.)	Print Tear OFF
	Cut position adjust	Select an adjustment value for the position to cut the end of a continuous form. (In 1/90 in increments)	-20 - -1 0 +20 - +1

MENU	ITEM	FUNCTION	SETTING
Rear feed menu	TOF adjustment (continuous)	Select an adjustment value for the reference position in regard to the TOF position of a continuous form. The position moves to the rear of the form by [+] and to the top of the form by [-] in 1/60 in increments.	-20 - -1 0 +20 - +1
	TOF (continuous)	Select the reference position for the TOF position when auto loading continuous form paper from the rear of the printer. (Up to the mid-section of characters in the first line.)	2.12 mm (1/12 in) 4.23 mm (1/6 in) 6.35 mm (1/4 in) 8.47 mm (1/3 in) 10.58 mm (5/12 in) 12.7 mm (1/2 in) 14.82 mm (7/12 in) 16.93 mm (2/3 in) 19.05 mm (3/4 in) 21.17 mm (5/6 in) 23.28 mm (11/12 in) 25.4 mm (1 in) 27.52 mm (13/12 in) Use top of form
	Continuous paper LF adjust	Select an adjustment value for the line feed position.	-2 -1 0 +1 +2
	Centring for paper top (continuous)	Find centre position	Valid Invalid

MENU	ITEM	FUNCTION	SETTING
Bottom feed menu	Line Spacing	Select line feed pitch.	6 LPI 8 LPI
	Skip Over Perforation	Select whether to skip over perforation or not. (When a skip over perforation setup command is received, the received command is given priority.)	Yes (25.4 mm/1 in) No
	Page Length	Select the length of a continuous form.	279.4 mm(11 in) 296.3 mm (11 2/3 in) 304.8 mm (12 in) 355.6 mm(14 in) 431.8 mm(17 in) 127.0 mm(5 in) 76.2 mm(3 in) 82.6 mm(3.25 in) 84.7 mm(10/3 in) 93.1 mm(11/3 in) 101.6 mm(4 in) 139.7 mm(5.5 in) 152.4 mm(6 in) 177.8 mm(7 in) 203.2 mm(8 in) 215.9 mm(8.5 in)
Top feed menu	Line Spacing	Select line feed pitch.	6 LPI 8 LPI
	Page Length	Select the page length of cut paper.	279.4 mm(11 in); 296.3 mm (11 2/3 in) 304.8 mm (12 in) 355.6 mm(14 in) 431.8 mm(17 in) 127.0 mm(5 in) 76.2 mm(3 in) 82.6 mm(3.25 in) 84.7 mm(10/3 in) 93.1 mm(11/3 in) 101.6 mm(4 in) 139.7 mm(5.5 in) 152.4 mm(6 in) 177.8 mm(7 in) 203.2 mm(8 in) 215.9 mm(8.5 in)

MENU	ITEM	FUNCTION	SETTING
Top feed menu	Top feed wait time	Select the waiting time between setting paper on the tray and feeding it while the printer is waiting for paper to be fed in cut-paper manual feed mode.	Invalid 500 ms 1 sec 2 sec
	Page length control	Control the page length of cut paper.	by MENU setting by Actual page length
	Cut sheet auto eject Position	Select a printable area at the bottom of cut sheets of paper in cut-paper mode (the character centre position).	6.35 mm (1/4 in) 12.70 mm (6/12 in) 14.82 mm (7/12 in)
	TOF Adjustment (Cut Sheet)	Select an adjustment value for the reference position in regard to the TOF position of cut-paper/ passbooks. The position moves to the rear of the form by [+] and to the top of the form by [-] in 1/60 in increments.	-20 - -1 0 +20 - +1
	TOF (cut sheet top of form)	Select the reference position for the TOF position when feeding cut-paper in manual mode. (Up to the mid-section of characters in the first line.)	2.12 mm (1/12 in) 4.23 mm (1/6 in) 6.35 mm (1/4 in) 8.47 mm (1/3 in) 10.58 mm (5/12 in) 12.7 mm (1/2 in) 14.82 mm (7/12 in) 16.93 mm (2/3 in) 19.05 mm (3/4 in) 21.17 mm (5/6 in) 23.28 mm (11/12 in) 25.4 mm (1 in) 27.52 mm (13/12 in) Use top of form
	Cut sheet LF adjustment	Adjust a line feed amount in cut-paper mode.	-14 - -1 0 +14 - +1

MENU	ITEM	FUNCTION	SETTING
Set-up menu	Graphics	Select the printing direction when double-height print data exists in a line.	Bi-directional Uni-directional
	Receive buffer size	Select size of the received buffer.	1line 32 K 64 K
	Paper out override	Select whether to detect paper end or not.	No Yes
	Print Registration 1	Adjust the print starting position on printing in the reverse direction. (The position moves to the right or left in 1/720 in increments.)	-10 - -1 0 +10 - +1
	Print Registration 2	Adjust the print starting position on printing in the reverse direction. (The position moves to the right or left in 1/720 in increments.)	-10 - -1 0 +10 - +1
	-Print Registration 3	Adjust the print starting position on printing in the reverse direction. (The position moves to the right or left in 1/720 in increments.)	-10 - -1 0 +10 - +1
	Operator panel function	Select full or limited operation.	Full operation Limited operation
	Reset inhibit	Set whether to enable or disable an initial command.	No Yes
	Print suppress effective	Set whether to enable or disable a print suppress setup command.	Yes No

MENU	ITEM	FUNCTION	SETTING
Set-up menu	Auto LF	Select whether to perform auto LF operation or not upon receiving a CR code.	Yes No
	Auto CR	Select whether to perform auto CR operation upon receiving a carriage return command.	Yes No
	SI select pitch (10 CPI)	Set how to handle an SI command received in 10 CPI mode.	15 CPI 17.1 CPI
	SI select Pitch (12 CPI)	Set how to handle an SI command received in 12 CPI mode.	12 CPI 20 CPI
	Time out print	Select valid or invalid.	Valid Invalid

INITIALISING MENU SETTINGS

To restore the menu settings to their initial values, carry out the steps below.

NOTE

The values adjusted by the Adjustment menus are not initialised by the following procedure.

1. Set the Power Switch to OFF.
2. Press and hold down the SEL and LF/FF buttons together and then set the Power Switch to ON.

ADJUSTING TOF POSITION

Use the following procedure to set TOF to accord with the reference position (6.35 mm (0.25 in)). The reference position refers to the first line of the paper i.e. the position to which the printer feeds the paper when automatically loading the paper.

NOTE

Adjusting of TOF can be done in cut sheet mode or continuous forms mode.

1. Print out the menu settings of the printer and confirm that the TOF (in cut sheet mode or continuous forms mode) is 6.35 mm (0.25 in).

2. Set the Paper Type lever to the required paper type.

3. When continuous forms are used, place the paper on the Pin Tractor.

For cut sheet mode, do not insert the paper at this stage.

4. In continuous forms mode, press the LOAD/EJECT button.

5. In cut sheet mode, place the paper in the Paper Tray and press LOAD/EJECT.

As the paper is taken into the printer, press the LF/FF button and the paper is taken into the 6.35 mm (0.25 in) position.

6. In off-line mode, press the following buttons to adjust the first printing line:

To feed the paper forward by a small amount, press and hold down the LOAD/EJECT button and then press the SEL button.

To feed the paper backward by a small amount, press and hold down the LOAD/EJECT button and then press the LF/FF button.

NOTE

If the specified correction range is more than ± 0.366 mm (1/144 in), the QUIET indicator flashes and the paper cannot be moved.

When the paper is positioned at the required TOF, release the buttons in Step 5 above.

To save this position as the TOF, press and hold down the LOAD/EJECT and the LF/FF buttons together for 3 seconds.

NOTE

Do not turn the Platen Knob or switch off the printer during the above procedure.

PRINTER SPEED SETTINGS

PRINTER IMPACT MODE

When switched ON, the printer enters the impact mode selected in the menu. You can change this to normal speed and quiet printing without using the menus as follows.

Normal speed printing

Use this for standard file printing operations.

- 1.** Ensure the SEL indicator is illuminated.
- 2.** Hold down the SEL button and press the TEAR button.
Status Indicator 2 turns off.

Quiet printing

Use this for quieter printing.

- 1.** Ensure the SEL indicator is illuminated.
- 2.** Hold down the SEL button and press the TEAR button.
Status Indicator 2 is illuminated.

REGISTRATION MENU

OVERVIEW

This is a factory shipped configuration to adjust the horizontal print position correction and is capable of setting the horizontal print position.

OPERATION

To enter registration menu mode:

1. Hold down the SEL + LF/FF switches and turn on the power to activate the maintenance mode.
2. After the maintenance mode is enabled, hold down the TEAR switch and press the LF/FF switch.

REGISTRATION DETAILS

NO	ITEM	SET	REMARK
1	Registration Low	+10, +9,...0...-9, -10	Factory Shipped Configuration: +-10/720 in increments of 1/720 in.
2	Registration Normal		
3	Registration High 1		
4	Registration High 2		

SELF TEST PRINTING

1. Start:
While pressing the LF/FF switch, turn on the power.
2. Stop:
Stop the test by pressing the SEL switch.

3. Print Pattern:

(a) Header:

aaaa EI E F/W bb.cc ddddddYR-ee
LD ff.gg

as defined by:

POSITION & CHAR. COUNT	DESCRIPTION	DATA PRINTED	COMMENTS
aaaa	Model name	ML6300FB	
bb.cc	Revision no.	00.00 – 99.99	Firmware revision
ddddddd	Part Number	43058201	YR Number
ee	Part Number	01 – 99	ROM-FD Number
ff.gg	Revision no.	00.00-99.99	Boot program revision

- (b) The first firmware revision is '01.xx' (30)H(31)H(2E)H(x)H(x)H
- (c) The test pattern is a consecutive printing of ASCII characters 20H to 7EH in all print quality and pitch combinations

NUMBER OF CHARACTERS PRINTED PER LINE	
80 at 10 CPI	136 CH
96 at 12 CPI	163 CH
120 at 15 CPI	204 CH
137 at 17.1 CPI	233 CH
160 at 20 CPI	272 CH

ROLLING ASCII SELF TEST PRINTING

1. Start:

Start the continuous rolling ASCII by pressing and holding the Load/Eject and Tear buttons and then turning the power on.

2. Stop:
Stop the test by pressing the SEL switch.
3. Print pattern:
 - (a) Header:

aaaaa EI E F/W bb.cc dddddddYR-ee
LD ff.gg

as defined by:

POSITION & CHAR. COUNT	DESCRIPTION	DATA PRINTED	COMMENTS
aaaaa	Model name	ML6300FB	
bb.cc	Revision no.	00.00 – 99.99	Firmware revision
ddddddd	Part Number	43058201	YR Number
ee	Part Number	01 – 99	ROM-FD Number
ff.gg	Revision no.	00.00 - 99.99	Boot program revision

- (b) Pattern will be continuous printing of all ASCII characters.
- (c) The test completes when one print pattern is printed out.

HEXADECIMAL DUMP MODE

OVERVIEW

Normally a printer prints character patterns that correspond with the input character code. The printer does not print function codes or invalid codes. If the printer does not operate normally, the data sent from the host computer must be checked to determine if the commands are correct.

In this mode the printer converts input data into hexadecimal data and prints all the input data, making it is easy to check all the codes sent from the host computer to the printer.

When the paper does not cross the paper-end sensor within an 8-in feed of the paper, a paper-end state occurs.

The print position of the first data line can be set by menu function or in first character setting mode.

NOTE

TOF is the position that is set when the operation was completed properly.

CONTINUOUS PAPER AUTO-PARKING

With continuous paper loaded in continuous paper mode, pressing the PARK switch starts auto-parking.

When the end of continuous paper is detected by the time the paper is fed 22 in reverse, auto-parking finishes and a paper-end state is established.

If the end of continuous paper is not detected after a 22-in reverse feed, auto-parking terminates. The position that is set when the auto-parking terminated becomes TOF.

Pressing the PARK switch again repeats the auto-parking operation.

The number of reverse movements using the switch is limited to one.

Do not perform reverse feed if the last sheet of continuous paper will come off the tractor.

CUT-SHEET PAPER SEMI-AUTO-LOADING

By loading paper on the input tray in cut-sheet mode or while waiting for cut-sheet feed, semi-auto-loading starts after the menu-set paper feed wait time (0.5 sec/1.0 sec/2.0 sec) has elapsed.

Once started, cut-sheet paper is fed until the print position of the first data line is reached, the printer is placed in the SELECT state and the operation finishes.

The TOF set at that time is the printing start position of the first data line.

FORM TEAR-OFF

FUNCTION

Form tear-off allows the user to tear the continuous forms paper at a desired cut position by advancing the paper to the cutting edge of the front upper cover.

SET-UP

- 1.** Conditions:
 - (a) Continuous forms paper is loaded into the tractor feed.
- 2.** Tear Position:
 - (a) Load continuous forms paper.
Press the TEAR switch while On line to move the paper up to tear position.
 - (b) Adjust to the desired tear position using fine LFs.

ACTION

- (a) The paper will advance to the tear-off position approximately 500ms/1sec/2sec after printing.
- (b) When data is received by the printer or the SEL switch is pressed to select the printer, the paper will retract to the user-defined printing position.
- (c) Tear Up/Down operations are alternately executed by pressing the TEAR switch.

COMMAND DESCRIPTIONS

For a summary of the commands available see ["Appendix A – Command summary"](#) on page 163.

HORIZONTAL CONTROL

CARRIAGE RETURN

- > Code: CR
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III/ML
- > Function:
Terminates the print line and returns the print position to the start of the line.
The data in the print buffer will be printed.
- > Additional details:
Double width mode which is designated by SO (and ESC SO in Epson mode) will be reset.
Auto feed XT signal low – Epson.

HORIZONTAL TAB SET

- > Code: ESC D n1 n2 ... nj nk NUL
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Sets the tab stops to according to the values of n, which specify the character tab positions starting from Epson 32 tab) and IBM (28 tab).
- > Range:
Epson: k = 1 – 32

IBM: k = 1 - 28

Range n = 1 - 255

ML1190

CPI	WIDE	NARROW
10	135	79
12	163	95
15	203	119
17.1	233	137
20	255	159

nj < nk: valid.

nj >= nk: nk invalid - IBM, nk ignored and sequence terminated - Epson.

ML1120

CP1	EPSON VALUE	IBM VALUE
10	79	80
12	95	96
15	119	120
17.1	137	138
20	159	160

> Out of range:

If k = 0 or k > 32 - Epson, k > 28 - IBM

The last value and any following value of n will be ignored.

Maximum n value in each CPI, values larger than maximum are ignored.

> Additional details:

The tab settings n1, n2, n3, nk must be entered in ascending order.

Entire command string is terminated with a NUL, CHR\$ (0).

MODE	LEFT MARGIN CHANGE	PITCH CHANGES
Epson	Position adjusted	Position not affected
IBM	Position not affected	Position relative to pitch

Tabs are set at every eighth character after powering up the printer, receiving an I-PRIME (INIT) signal or executing an ESC @ (Epson mode only).

Receiving ESC } NULL signal.

Receiving ESC { n signal.

Executing Menu setting.

If n = 0, clear all tabs set.

Example: ESC D 30 40 1 10 60 70 NUL

IBM mode: 30 40 60 70 valid

Epson mode: 30 40 valid

> Related functions:

Horizontal Tab – HT

HORIZONTAL TAB

> Code: HT

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

This command causes a skip to the next Horizontal Tab (HT) position.

> Additional Details:

Epson – Tabs are absolute positions; changes in character pitch do not change tab positions.

IBM – Tabs are relative to character pitch.

Upon power up the default tabs are set at columns 9, 17, 25, 33... and every eight spaces after that, according to the default character pitch.

The spaces generated by a horizontal tab will not be scored.

- > Related Functions:
Horizontal tab stop set – ESC D

RESET TAB SETTINGS TO POWER-ON DEFAULT VALUES

- > Code: ESC R
- > Compatibility:
ML1190: IBM
ML1120: IBM III
- > Function:
This command sets horizontal tabs at every eighth character starting at column 9 and clears all vertical tabs.
- > Additional details:
The horizontal tabs will be set according to the default character pitch.

EXECUTE ABSOLUTE HORIZONTAL DOT POSITION

- > Code: ESC \$ n1 n2
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Moves the printhead to the specified absolute horizontal dot position in a line from the left margin; subsequent data is printed from this position.
- > Range:
In dot position setting, n1 becomes low byte and n2 becomes high byte.

$n1, n2 = 0 - 255$ (bit7 of $n2$ is ignored).

Limit:

$0 \leq n1 + (n2 * 255) \leq 10922$ (0/120 - 10922/120 in)

$10923 \leq n1 + (n2 * 255) \leq 21845$ (0/120 - 10922/120 in)

$21846 \leq n1 + (n2 * 255) \leq 32767$ (0/120 - 10921/120 in)

> Out of range:

Any position specified beyond the right margin is ignored.

> Additional details:

Dot position = $(n1 + n2 * 256) / 60 \leq 10.6$ in.

The position specified as $n1 = n2 = 0$ is the left margin.

Dot position is absolute. The character pitch does not affect the dot position.

This command starts print when specified dot position is left of the current print position.

Spaces generated by moving the horizontal positioning are not scored if score is set.

EXECUTE RELATIVE DOT POSITION

> Code: ESC \ $n1 n2$

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

This moves the printhead to the dot position from which all subsequent data is to be printed, relative to the current position in a line.

> Range:

$n1$ and $n2$ specify the dot position; the lower byte is $n1$ and the upper byte is $n2$.

Range $n1$ and $n2$ is 0 - 255.

> Out of range:

Defined values beyond the left or right margins are ignored.

> Additional details:

This relative setting defines the next printing position by calculating on the basis of the printing position immediately preceding the input of this code. Printing starts at a position before or after the previous position at a dot spacing defined by the selected print mode.

Positive values move the print position to the right and negative values move it to the left.

Dot position = $n1 + n2 * 256$.

Physical position = dot position/density = $(n1 + n2*256)/DPI$.

With the score mode selected, score is added only for skip to right.

Actual relative dot positioning depends on the current mode.

Dots/line:

	DPI	VALUE
Utility – All CPI	120	1272
LQ – All CPI & Prop	180	1908

Example:

DOTS NUMBER	N2	N1
2448	09	90
3	0	3
2	0	2
1	0	1
0	0	0
-1	FF	FF

DOTS NUMBER	N2	N1
-2	FF	FE
-3	FF	FD
-2448	F6	70

MOVE RIGHT RELATIVE DOT POSITION

- > Code: ESC d n1 n2
- > Compatibility:
ML1190: IBM
ML1120: IBM III
- > Function:
Moves the print position n/120 in to the right from the current printhead position.
- > Range:
Specify dot position following n1 and n2.
n1 is low byte, n2 is high byte.
n1 and n2 range is 0 – 255
Limit $0 \leq n1 + (n2 * 255) \leq 1632$
- > Out of range:
Values beyond the right margin will be ignored.
- > Additional details:
If score is set any horizontal positioning is scored.

MOVE LEFT RELATIVE DOT POSITION

- > Code: ESC e n1 n2
- > Compatibility:
ML1190: IBM

ML1120: IBM III

> Function:

Moves current logical horizontal position to the left (toward home position) in steps of $n/120$ in. Prints data in print buffer.

> Range:

In dot position setting, n_1 becomes low byte and n_2 becomes high byte.

$n_1, n_2 = 0 - 255$ (bit7 of n_2 is ignored).

Limit:

$0 \leq n_1 + (n_2 * 255) \leq 10922$ (0/120 - 10922/120 in)

$10923 \leq n_1 + (n_2 * 255) \leq 21845$ (0/120 - 10922/120 in)

$21846 \leq n_1 + (n_2 * 255) \leq 32767$ (0/120 - 10921/120 in)

> Out of range:

Current logical horizontal position is set to the left margin if value is entered beyond left margin.

> Additional details:

No score is added to spaces generated by this command.

LEFT MARGIN SET

> Code: ESC I n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Left margin is set at (n) characters from printhead home position.

> Range:

Range n = 0 – 255

NAME	PITCH	VALUE
PICA/PROPORTIONAL	10	0 – 105
ELITE	12	0 – 126
-	15	0 – 158
COMPRESSED	17.1	0 – 180
COMPRESSED ELITE	20	0 – 211
COMPRESSED Prop	20	0 – 211

> Out of range:

If n exceeds the maximum value, this command will be ignored.

> Additional details:

The left margin is set as an absolute position according to the current character pitch. Changes in character pitch do not change the margin position.

The print buffer will be cleared.

Maximum difference between left margin and right margin values is 2 characters for 5 CPI.

> Related functions:

Right margin set – ESC Q n

RIGHT MARGIN SET

> Code: ESC Q n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Right margin is set at (n) characters from head home position.

> Range:

Range n = 1 – 255

NAME	PITCH	VALUE
PICA/PROPORTIONAL	10	1 – 106
ELITE	12	1 – 127
-	15	1 – 159
COMPRESSED	17.1	1 – 181
COMPRESSED ELITE	20	1 – 212
COMPRESSED Prop	20	1 – 212

> Out of range:

The number “n” must be within the ranges given above, otherwise it will be ignored.

If n = 0, or is less than or equal to the left margin, this command is ignored.

> Additional details:

The right margin is set as an absolute position, according to the current character pitch. Changes in character pitch do not change the margin setting.

While in proportional mode the character pitch width will be set in pica character size. (10 CPI = 36 dots)

Any graphics after the right margin are lost.

Setting the right margin clears the print buffer.

Minimum difference between left margin and right margin values is 5 characters for 5 CPI.

Attempting to print a character beyond the right margin will print the character on the next line after a line feed and carriage return are executed.

SET LEFT/RIGHT MARGIN

> Code: ESC X n1 n2

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

Sets the left and right margins in character positions from the home position by the current character pitch.

> Range:

The ranges for n1 and n2 are:

0 ≤ n1 ≤ 255 Left margin

0 ≤ n2 ≤ 255 Right margin

n1 < n2

> Out of range:

If n1 or n2 = 0 then the current margin setting is used.

If n2 exceeds the default range n2 will be converted to the default value.

	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI
Value	106	127	159	181	212

> Additional details:

The default value of the left margin is the first character.

The margin settings are absolute. Changes in character pitch do not affect the margin position.

n1, n2 indicate the left and right edges of printable area. For example, if n1 = 10, n2 = 100, the printable area is from the 10th column to the 100th column: 91 characters are printable.

AUTO JUSTIFICATION

> Code: ESC a n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

The text position/alignment will be set according to one of the four given modes assigned by n. (n is a Binary value.)

> Range:

N	JUSTIFICATION
00H	Left
01H	Centre
02H	Right
03H	Full

> Additional details:

n = 0: Left justification is the default or standard format, in which the left margin is justified and the right margin is not.

n = 1: The centring command centres a line of text between the margins. This command is used for headings, titles and captions.

n = 2: Right justification is the opposite of left justification. The right margin is justified and the left is not.

n = 3: Full justification puts extra spaces where necessary so that both the left and right margins are justified.

Full justification (n = 3) is performed when data exceeding 75% of printable characters in a line is received at the time of print start.

BS, DEL, HT are invalid when auto justification is used except when n = 0.

Print position will be affected by the commands which set the left/right margin.

NOTE

When using full auto justification, use carriage return at the end of paragraphs only, not at the end of each line of text.

SET/RESET UNIDIRECTION PRINTING

> Code: ESC U n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Unidirectional printing, from left to right, or bidirectional printing will be performed based on the value of n.

> Range:

Range n:

EPSON	IBM	ACTION
01H, 31H, 81H, B1H	ODD	SET Unidirectional
00H, 30H, 80H, B0H	EVEN	RESET (Bidirectional)

> Out of range:

This command will be ignored if n equals a value other than the values mentioned above.

> Additional details:

Short line seeking is performed in both unidirectional and bidirectional print modes.

ONE LINE UNIDIRECTIONAL PRINTING

> Code: ESC <

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Unidirectional printing for one line only will be performed.

> Additional details:

The line is printed from left to right.

Subsequent lines will be printed, bidirectionally, according to short line seeking priorities logic.

This command returns the printhead to the start of the print line before printing begins.

SET/RESET HALF SPEED PRINTING

- > Code: ESC s n
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

The printer starts/stops printing at 50% of normal speed upon receipt of this command depending on the value of n.
- > Range:
 - n = 01H, 31H, 81H, or B1H SET half-speed printing.
 - n = 00H, 30H, 80H, or B0H SET full speed printing.
- > Out of range

This command will be ignored if n equals a value other than the values mentioned above.
- > Additional details:

Half Speed mode can be used to reduce printer noise.

If the print speed is slower than the printer's physical lowest speed, the half speed command is ignored and data is printed at that lowest speed.

BACKSPACE

- > Code: BS
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Prints the data in the print buffer and moves the printhead one character to the left according to the character pitch set.
- > Additional details:

If a Multipass character (e.g. double height character) needs to be printed, after the BS the printer performs a back space and a LF to the printing position and prints the character. (Precise printing position is not guaranteed.)

A backspace code given when the printhead is at the left margin is ignored.

Moves back two character spaces if the printer is in double width mode.

If clearance between characters is set, BS value will be character width and clearance.

In proportional mode:

EPSON LQ – The first character is back spaced by the width of the proportional character and subsequently by 10 CPI character width (or reduced 12 CPI character width in Reduce mode).

IBM – Back space by 12 CPI character width.

ONE CHARACTER DATA DELETE

> Code: DEL

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Deletes the last character data input into the print buffer.

> Additional details:

If the data which is to be deleted is a SP code, (20)H or (32)D, one SP code is deleted by this command.

If the data which is to be deleted is in Bit Image Graphics, this command is ignored.

Horizontal tab or skip is not deleted.

Control codes are not affected.

This command is ignored if auto-justification is set, except when $n = 0$.

VERTICAL CONTROL

SET 1/8 INCH FIXED LINE SPACING

- > Code: ESC 0
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
The line spacing is set to 1/8 in.
- > Additional details:
This command remains in effect until a new line spacing command is sent to the printer.
This command does not set the top of form position.
- > Related functions:
LF or CR (and the condition that Auto LF is on) executes 1/8 in LF.

SET 7/72 INCH FIXED LINE SPACING

- > Code: ESC 1
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Line spacing will be set to 7/72 in upon receipt of this command.
- > Additional details:
This command remains in effect until a new line spacing command is sent to the printer.
This command is used to set line spacing for graphics printing.

START LINE SPACING

- > Code: ESC 2
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

The line spacing value which is set by ESC A n will be activated when ESC 2 is sent.

The line spacing set by Menu is selected if it has not been stored by ESC A n.

SET 1/6 INCH LINE SPACING

- > Code: ESC 2
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

The line spacing is set to 1/6 in.
- > Additional details:

This command remains in effect until a new line spacing command is sent to the printer.

This command does not set the top of form position.
- > Related functions:

LF or CR (and the condition that Auto LF is on) executes 1/6 in LF.

SET N/60 INCH LINE SPACING

- > Code: ESC A n
- > Compatibility:
 - ML1190: EPSON LQ/IBM/PPR/IBM AGM

ML1120: EPS FX/IBM III/PPR/IBM AGM

> Function:

Sets line spacing to: $n/60$ in Epson LQ, $n/60$ in IBM AGM, $n/72$ in IBM PPR

> Range:

Range

$n = 0 - 127$ Number of $1/60$ in increments – Epson

$n = 1 - 255$ Number of $1/60$ in ($1/72$ in) increments – IBM

> Out of range:

Values of n not within the allowable range will be ignored.

> Additional details:

No line feed will occur when $n = 0$ in Epson mode. In IBM mode if $n = 0$ this command is ignored, and the line spacing is not changed.

Power on default or I-Prime signal resets the value set by this command and sets the value determined by the Menu.

Top of form will not be set.

> Related functions:

ESC 2 is used to initiate the selected line spacing for IBM PPR mode.

SET $n/180$ INCH LINE SPACING

> Code: ESC 3 n

> Compatibility:

ML1190: EPSON LQ/IBM/PPR/IBM AGM

ML1120: EPS FX/IBM III/PPR/IBM AGM

> Function:

Sets line spacing to: $n/180$ in Epson, $n/216$ in IBM PPR, and $n/180$ in IBM AGM.

> Range:

Range

$n = 0 - 255$ Number of $1/180$ in increments – Epson, IBM

AGM

n = 1 – 255 Number of 1/216 in increments – IBM PPR

> Additional details:

Power-on default or I-Prime signal resets the value set by this command and sets the value which is determined by the Menu.

No line feed occurs when n = 0 in Epson, IBM AGM mode. In IBM PPR mode if n = 0 this command is ignored.

Top of form will not be set.

> (f) Related functions:

LF, VT, or CR (and when Auto LF is on) executes predetermined LF.

ESC [\ sets the spacing increment in IBM mode.

SET N/360 INCH FINE LINE SPACING

> Code: ESC [n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Sets line spacing to n/360 in.

> Range:

Range n = 0 – 255 Number of 1/360 in increments.

> Additional details:

Power on default or I-Prime signal resets the value set by this command and sets the value which is determined by the Menu.

No line feed occurs when n = 0.

Top of form will not be set.

> Related functions:

LF, VT, or CR (and the condition that Auto LF is on) precedes predetermined LF.

SET N/360 INCH LINE SPACING

- > Code: ESC % 8 n
- > Compatibility: I
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Sets line spacing to $n/360$ in.
- > Range:
Range $n = 1 - 255$, Number of $1/360$ in increments.
- > Additional details:
Power on default or I-Prime signal resets the value set by this command and sets the value which is determined by the Menu.

This command is ignored when $n = 0$.

Top of form will not be set.
- > Related functions:
LF, VT, or CR (and the condition that Auto LF is on) precedes predetermined LF.

LINE FEED

- > Code: LF
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
This command causes the data in the print buffer to be printed followed by a movement to the next print line based on the current line spacing.

> Additional details:

A carriage return will also be executed; in IBM PPR mode auto CR must be set for CR to be executed.

Line spacing pitch will be set by ESC A n, ESC 0, ESC 2, ESC 3 n, and ESC [n. Otherwise, the LF pitch will be set by Menu when power is on or an I-Prime signal is received.

This code will cancel enlarged character mode set by the ESC SO (Epson mode only) and SO code. If there is no data before the LF code or only spaces before this code, only line feed is performed.

SET/RESET AUTOMATIC LINEFEED

> Code: ESC 5 n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Enables/disables automatic line feed. The printer performs an automatic LF each time it receives a carriage return (CR).

> Range:

If n = ODD, SET automatic LF.

If n = EVEN, RESET automatic LF.

> Out of range:

The line feed is executed for the current line spacing setting.

FINE LINE FEED (N/180 INCH)

> Code: ESC J n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Immediate line feed is executed without changing the current line spacing.

n/180 in Epson LQ

n/180 in IBM AGM

n/216 in IBM PPR

> Range:

n = 0 – 255, Number of 1/180 in increments – Epson
n = 1 – 255, Number of 1/180 in (1/216 in) increments – IBM

> Additional details:

The contents of the buffer are printed without a Carriage Return. (The printhead does not move to the left margin.) In IBM mode if auto CR is selected by Menu a carriage return will be performed.

This command does not need a cancel code, since it is executed only once.

No feed is performed when n = 0. (Ignored in IBM mode)

> Related functions:

Double width set by SO (or ESC SO in Epson mode) will not be reset.

ESC [\ sets the spacing increment for IBM mode.

FINE LINE FEED (N/360 INCH)

> Code: ESC] n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

A n/360 in immediate line feed is executed without changing the current line spacing.

> Range:

Range n = 0 – 255, Number of 1/360 in increments.

> Additional details:

The contents of the buffer will be printed without a CR.
(Carriage does not move to the home position.)

No line feed occurs when $n = 0$.

Top of form will not be set.

> Related functions:

Double width set by SO (or ESC SO in Epson mode) will not be reset.

FINE LINE FEED (N/360 INCH)

> Code: ESC % 4 n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

A n/360 in immediate line feed is executed without changing the current line spacing.

> Range:

Range $n = 0 - 255$, Number of 1/360 in increments.

> Additional details:

The contents of the buffer will be printed without a CR.
(Carriage does not move to the home position.)

No line feed occurs when $n = 0$.

Top of form will not be set.

> Related functions:

Double width set by SO will not be reset.

REVERSE LINE FEED

> Code: ESC j n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Once this command is received the printer will execute an immediate reverse line feed, which will be executed only once for each time this command is sent.

> Range:

Range n = 0 – 255

> Additional details:

The printer will perform an n/180 in reverse line feed each time this command is sent.

The current line spacing will not be changed.

It must not exceed TOF whether or not there is perforation skip.

NOTE

It is not recommended to use the pull tractor option feed unit when reverse line feeds are required.

REVERSE LINE FEED

> Code: ESC]

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Prints data in the print buffer, then performs reverse line feed. Reverse line feed is also performed when no print data is stored in the buffer.

Linefeed amounts conform to those which are set using ESC 0, ESC 1, ESC 2, ESC 3 Pn, ESC A Pn, and ESC % 8 Pn. When not set after the power is turned on, the amount of line feed equates to a menu-set value.

> Additional Details

Printing and line feed are performed irrespective of AUTO CR in the menu (a carriage return is not inserted).

One-line horizontal expansion by SO and ESC SO is not cancelled (also it is not cancelled when AUTO CR is valid).

When the amount of line feed is doubled by setting using the ESC [@ command, a single reverse line feed is performed.

A new line does not start beyond the TOF position.

Page length is controlled.

FORM FEED

> Code: FF

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this command the printer prints the data in the print buffer and carries out a carriage return, then feeds the paper to the next TOF position.

> Additional details:

Factory setting of form length is eleven (11) in. (Menu).

Pressing the FORM FEED button on the operator panel always feeds the paper forward to the next top of form position.

FF will be performed to the next top of form position even when the FF is received at the top of form position.

Double width set by SO (or ESC SO in Epson mode) will be reset.

> Related functions:

TOF will be set on power-up or I-Prime (or ESC 4 in IBM mode).

Receiving ESC } NULL signal.

Receiving ESC { n signal.

Executing Menu setting.

VERTICAL TAB

- > Code: VT
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Upon receipt of this command the printer will print out what is in the buffer then move the paper to the next preprogrammed tab stop.
- > Additional details:

If vertical tabs are not set this command will function the same as: CR in Epson mode, LF in IBM mode.

Executing more than the number of vertical tabs set will cause execution of the first vertical tab of the channel on the next page.
- > Related functions:

Double width set by SO (or ESC SO in Epson mode) will be reset.

SET VERTICAL TAB STOPS

- > Code: ESC B n1 n2 ... nk NUL
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Upon receipt of this command the printer will set the specified number of vertical tabs.
- > Range:

k specifies the number of vertical tabs set.
Range k = 1 - 16 (Epson), 1 - 64 (IBM)

n is the specific line number at which each vertical tab is to be set.

Range n = 0 – 255

> Out of range:

Values of k and n which exceed the maximum will be ignored.

The n value can be set regardless of form length.

> Additional details:

The distance is determined by the current line spacing.

To use an n setting of 255 the line spacing must be set at less than 3/72 in.

Vertical tab stops are absolute. They are not changed by setting the line spacing. (Epson mode)

The tab sequence must be terminated by CHR\$(0) or any number less than the last tab or nk. (Epson mode)

The vertical tabs set by this command correspond to channel no. 0 in Epson mode.

The n value must be increasing: n > n2 > n3 > ... > nk

> Related functions:

ESC B NUL will reset the tab.

SET VERTICAL FORMAT UNIT (VFU)

> Code: ESC b n m1 m2 ... mk NUL

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer sets up m vertical tabs for each channel n.

> Range:

m = 0 – 255, Tab stop value
n = 0 – 7, Vertical tab stop channel number
k = 1 – 16, Number of tab stops

> Out of range:

If n > 7, the VFU setting ESC sequence will be ignored.

> Additional details:

The VFU has 8 channels (n = 0 to 7), and up to 16 stops (m = 1 to 16) which can be set within the page length in each channel.

This sequence must be terminated by CHR\$(0), or any number less than mk.

Tab settings are not affected by subsequent changes in line spacing.

> Related functions:

On power up, n is set to channel no. 0. This means the same as ESC B.

SELECT VERTICAL TAB CHANNEL

> Code: ESC / n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this code the printer selects a Vertical Tab channel specified by n.

> Range:

Range n = 0 – 7, Number of tab channel

> Out of range:

If n > 7, the VFU value will be ignored.

> Additional details:

Within each channel there can be up to 16 vertical tabs which are independently set.

In order to access the vertical tabs within each channel VT or CHR\$(11) can be used.

Tabs set by the ESC B command correspond to channel no. 0.

FORM LENGTH SET BY INCHES

- > Code: ESC C NUL n
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Upon receipt of this command the printer sets the form length to n in.
- > Range:
n = 1 – 22 (Epson), Number of inches
n = 1 – 255 (IBM)
- > Out of range:
n = 0 (or n > 22 in Epson mode) this command will be ignored.
- > Additional details:
The skip perforation will be cleared when the n is valid data.
Top of form position is set by this command.
- > Related functions:
Line pitch is based on the value set by ESC 0, ESC 2, ESC A n or ESC 3 n.

FORM LENGTH SET BY LINES

- > Code: ESC C n
- > Compatibility:
ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this command the printer sets the form length to n lines.

> Range:

n = 1 – 127 (Epson), Number of lines

n = 1 – 255 (IBM).

> Out of range:

If n = 0 (or 128 for Epson mode) this command is treated as ESC C NUL n.

> Additional details:

Top of form will be set.

The value of the skip over perforation will be cleared when valid n data is received.

Bit 7 is cleared and set to that value in Epson mode.

In Epson mode if the line spacing is set to 0 this command is ignored.

SET PERFORATION AUTO SKIP

> Code: ESC N n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this command the printer sets the skip over perforation to n lines.

> Range:

n = 1 to 127 (Epson), Number of lines to skip

n = 1 to 255 (IBM)

> Out of range:

If n is equal to or greater than the current form length, in lines, this command will be:

- Set to form length (Epson mode).
- Ignored (IBM mode).

If n = 0 (or n > 127 in Epson mode), the last value will remain set.

> Additional details:

Skip over perforation value will not be changed by the line pitch change.

Entering the area of skip over perforation by LF, VT, CR (with LF), ESC J n and auto line feed will cause skip over perforation and feed to the top of form.

> Related functions:

Line spacing value is based on ESC 0, ESC 2, ESC A n, ESC [n or ESC 3 n.

ESC O resets skip over perforation.

RESET PERFORATION AUTO SKIP

> Code: ESC O

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this code the printer resets the skip over perforation value to the default value.

> Additional details:

Skip over perforation is set to default when power-down, power-up or I-Prime (or ESC @ in Epson mode) occurs.

Skip over perforation is cleared when the form length is changed by the following codes: ESC C n and ESC C NUL n.

TOP OF FORM SET

- > Code: ESC 4
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Top of form setting will be set to the current position.
- > Additional details:
This command does not affect the CSF or SASF.

SET VERTICAL UNITS

- > Code: ESC [\ 4 0 0 0 n1 n2
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
This command changes the base units for the line spacing command.
- > Range:
n1 = 0, n2 = 180 for n/180 in units
n1 = 0, n2 = 216 for n/216 in units
- > Out of Range:
Any value of n1, n2 other than those above will be ignored.

SET N/360 INCH FINE LINE SPACING

- > Code: ESC + n
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III

- > **Function:**
Sets line spacing to $n/360$ in.
- > **Range:**
Range $n = 0 - 255$, Number of $1/360$ in increments.
- > **Additional details:**
Power-on default or I-Prime signal resets the value set by this command and sets the value which is determined by the Menu.
This command is valid in any group of lines.
No line feed occurs when $n = 0$.
Top of form will not be set.
- > **Related functions:**
This command is identical to the ESC [n command.
LF, VT, or CR (and Auto LF set on) precedes predetermined LF.

SET N/360 INCH LINE SPACING

- > **Code:** FS 3 n
- > **Compatibility:**
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > **Function:**
Set line spacing to $n/360$ in.
- > **Range:**
Range $n = 0 - 255$, Number of $1/360$ in increments.
- > **Additional details:**
No line feed will occur when $n = 0$.
Power-on default or I-Prime signal resets the value set by this command and sets the value which is determined by the Menu.

Top of form will not be set.

SET FORWARD LINE SPACING

- > Code: FS F
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Set forward line spacing.

SET REVERSE LINE SPACING

- > Code: FS R
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Set reverse line spacing.

CHARACTER SET

COPIES ROM CG TO RAM CG

- > Code: ESC : 00 n 00
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Upon receipt of this command, the printer copies the ROM CG to user defined characters set in RAM.
- > Range:
n = 00H, 30H, 80H, B0H – Roman
n = 01H, 31H, 81H, B1H – Swiss

n = 02H, 32H, 82H, B2H – Courier (Default font)
 n = 03H, 33H, 83H, B3H – Prestige
 n = 04H, 34H, 84H, B4H – Reserve
 n = 05H, 35H, 85H, B5H – Reserve
 n = 06H, 36H, 86H, B6H – Reserve
 n = 07H, 37H, 87H, B7H – Orator
 n = 08H, 38H, 88H, B8H – Reserve
 n = 09H, 39H, 89H, B9H – Reserve
 n = 0AH, 3AH, 8AH, BAH – Reserve
 n = 0BH, 3BH, 8BH, BBH – Reserve
 n = 0CH, 3CH, 8CH, BCH – Reserve
 n = 0DH, 3DH, 8DH, BDH – Reserve
 n = 0EH, 3EH, 8EH, BEH – Reserve
 n = 0FH, 3FH, 8FH, BFH – Reserve
 n = 10H – 2FH, 90H – AFH – Reserve
 n = 40H – 79H, C0H – F9H – Reserve
 n = 7AH, FAH – Reserve
 n = 7BH, FBH – Reserve
 n = 7CH, FCH – Letter Gothic
 n = 7DH, FDH – Reserve
 n = 7EH, FEH – Conformed to Menu
 n = 7FH, FFH – Reserve

> Additional details:

Address 20H – 7FH of ROM CG data will be transferred to the same address of RAM CG area.

This command overwrites the previous DLL data.

CHARACTER DEFINITION

> Code: ESC & m n1 n2 d0 d1 d2 <DLL data>

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this command the printer defines user characters in RAM.

Mode of DLL data depends on the current print mode which is LQ, Utility or Proportional.

> Range:

m selects the available area in RAM. Only available area is
m = 0 or 128.

n1 = 00 - 127, Starting character location

n2 = n1 - 127, Ending character location

Character width limits are shown as follows:

d0: leading space width

d1: character width

d2: trailing space width

MODE	D1 (MAX)	D0 + D1 + D2 (MAX)
UTILITY	15	18
LQ	37	42
PROPORTIONAL	37	42

> Out of range:

n1 = n2: One character loaded.

n1 > n2: Data up to n2 is dumped and this command is ignored.

80H <= n1, n2: Ignored from ESC to n2.

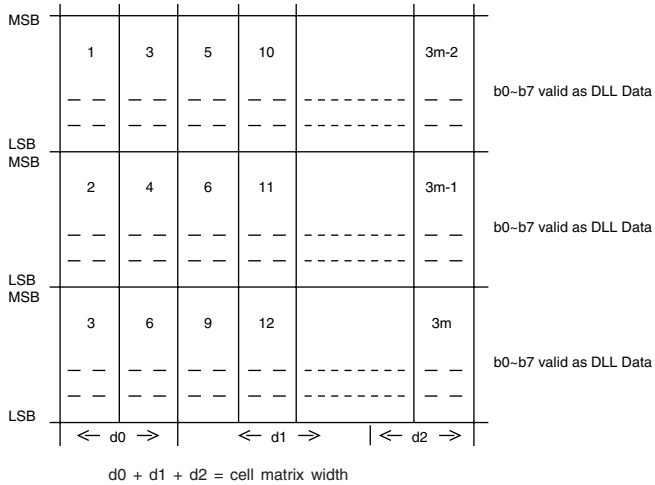
> Additional details:

To define a character, a grid that is 24 dots high is used, one dot for each wire. The width of the character matrix is dependent upon the character set in use (i.e. LQ, Utility or Proportional).

Dots in the same row may not print in adjacent columns. There must be an empty dot position to the left and to the right of each dot that prints. This is true for Utility, LQ, and Proportional. (See illustrations for character print positioning).

Each vertical column (which has a maximum of 24 dots) is first divided into three groupings of 8 dots. Each group of 8 dots is represented by one byte.

DLL Data format is be sent in the following manner:



At loading time, if printer is in Super/Sub mode then only two bytes of data are required for each column.

LOAD DLL CHARACTER

- > Code: ESC = n1 n2 # a1 a2 a3 m ad1 ad2 id1 id2 d1 d2 d3 d4 d5 [data]
- > Compatibility:
 - ML1190: IBM
 - ML1120: IBM III
- > Function:
 - This sequence initiates character downloading.
- > Range:
 - n1 = 0 - 255, Number of bytes in command string.
 - n2 = 0 - 255, N1 + n2 × 256
 - a1 = 0 - 255, Data starting address.
 - a2 = 0 - 255
 - a3 = 0 - 255

Character Pitch and mode.

m b0 – b3: 0X00 UTLALL, 0X01 LQ 10CPI, 0X10 LQ 12CPI,
0X11 LQ Proportional

m b6 = 0, last table

m b6 = 1, another table follows

ad1 = 0 – 255, character starting address.

ad2 = 0 – 255

id1 b0 – b5, 1 – 63, Number of loading columns.

id1 b6 = 0 (RAM), b6 = 1 (ROM-CG copy)

id1 b7 = 0, Normal

id1 b7 = 1, Elongated

id2 b0 – b5, 0 – 63 character Width (Valid in proportional)

id2 b6 – b7, 0 – 0, Data for pins 19-24, copy 25-30 pins

id2 b6 – b7, 0 – 1 = Data for pins 23, 24, duplicated for
pins 25, 26, 27,28, 29, 30

id2 b6 – b7 1 – 0, Underline

id2 b6 – b7 1 – 1, No Elongation.

d1 = Repetition data for columns 1 – 8

d2 = Repetition data for columns 9 – 16

d3 = Repetition data for columns 17 – 24

d4 = Repetition data for columns 25 – 32

d5 = Repetition data for columns 33 – 40

0 = new data

1 = repeat previous column data.

> Additional details:

If fewer than 256 characters are loaded, all character codes must be consecutive from the starting code point.

DLL characters are not saved after power is turned off.

This command makes a print block.

This command is broken into three parts:

1) ESC = n1 n2 # a1 a2 a3 m – once for each DLL sequence.

2) ad1 ad2 id1 id2 d1 d2 d3 d4 d5 – repeated for each character.

3) Data – repeated for each character.

DLL FONT SELECT

- > Code: ESC % n
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:

Selects the character set to be used.
- > Range:
 - When n = 01H, 31H, 81H, B1H, DLL character set selected.
 - When n = 00H, 30H, 80H, B0H, DLL character set cancel.
- > Out of range:

When n does not equal any of the values above, this command will be ignored.
- > Additional details:
 - DLL character areas are 00H – 7FH.
 - If LQ DLL is loaded, LQ DLL will be selected.
 - If Utility DLL is loaded, Utility DLL will be selected.

FOREIGN CHARACTER SET SELECT

- > Code: ESC R n
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:

Sets international character sets and code page.
"n" is defined in the table below.

> Range:

PN	INTERNATIONAL CHARACTER SET	PN	INTERNATIONAL CHARACTER SET
0 (00H)	American (ODA/INT) ASCII (OEL)	11 (0BH)	Spanish II
1 (01H)	French	12 (0CH)	Latin American
2 (02H)	German	13 (0DH)	French Canadian
3 (03H)	British	14 (0EH)	Dutch
4 (04H)	Danish I	15 (0FH)	Swedish II
5 (05H)	Swedish I	16 (10H)	Swedish III
6 (06H)	Italian	17 (11H)	Swedish IV
7 (07H)	Spanish I	18 (12H)	Turkish
8 (08H)	Japanese	19 (13H)	Swiss I
9 (09H)	Norwegian	20 (14H)	Swiss II
10 (0AH)	Danish II	64 (40H)	Publisher

PN	CODE PAGE SET	PN	CODE PAGE SET
21 (15H)	Cyrillic II-866	50 (32H)	Windows Greek
22 (16H)	Polska Mazovia	51 (33H)	Latin 5 (Windows Turkey)
23 (17H)	ISO Latin2	52 (34H)	Windows Cyrillic
24 (18H)	Serbo Croatic I	54 (36H)	Hungarian CWI
25 (19H)	Serbo Croatic II	55 (37H)	Kamenicky (MJK)
26 (1AH)	Multilingual 850	57 (39H)	Turkey 857
27 (1BH)	Norway 865	58 (3AH)	Roman-8
28 (1CH)	Portugal 860	60 (3CH)	Hebrew NC (862)
29 (1DH)	Turkey	61 (3DH)	Hebrew OC
30 (1EH)	Greek ABG (Reserve)	62 (3EH)	Windows Hebrew
31 (1FH)	Greek ABC (Reserve)	63 (3FH)	KBL-Lithuanian

PN	CODE PAGE SET	PN	CODE PAGE SET
32 (20H)	Greek DEG (Reserve)	65 (41H)	Arabic 864
33 (21H)	Greek Quattro (Reserve)	66 (42H)	Ukrainian
34 (22H)	Greek SYS 25 (Reserve)	67 (43H)	ISO Latin 6 (8859/10)
35 (23H)	Greek ME 29 (Reserve)	68 (44H)	Windows Baltic
36 (24H)	Greek 927 mod (Reserve)	69 (45H)	Cyrillic Latvian
37 (25H)	Greek 927 (Reserve)	72 (48H)	Bulgarian
38 (26H)	Greek 437	73 (49H)	Icelandic-861
39 (27H)	Greek 928	74 (4AH)	Baltic 774
40 (28H)	Greek 851 (Reserve)	78 (4EH)	Asmo 708
41 (29H)	Greek 437 CYPRUS	79 (4FH)	Asmo 449+
42 (2AH)	ECMA-94	80 (50H)	BRASCI (ODA only)
43 (2BH)	Canada French	81 (51H)	Abicomp (ODA only)
44 (2CH)	Cyrillic I - 855 (OEL only)	82 (52H)	ISO8859-15
45 (2DH)	Cyrillic II - 866	83 (53H)	Multilingual858
46 (2EH)	East europe Latin II - 852	84 (54H)	Windows Arabic
47 (2FH)	Greek 869	85 (55H)	Greek_737
49 (31H)	Windows East Europe	86 (56H)	POL 1

> **Out of range:**

If n does not equal one of the values above this command will be ignored and the last setting will remain.

> **Additional details:**

Once you have selected a specific language you can use its special characters.

Each language has a set of 15 characters which can be accessed through the following decimal numbers:

35 36 38 64 79 91 92 93 94 95 96 123 133 124 125 126

In the following cases, the international character set and code page selected by Menu are set.

- ESC @ is received.
- I-Prime is received.
- Power-up or Menu
- Software I-Prime command (ESC } NUL) is received.
- Emulation change command (ESC { Pn) is received. (except same emulation)
- See below for exact substitution character sets.

SELECT INTERNATIONAL CHARACTER SET

> Code: ESC ! n

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

The foreign language character set designated by n is substituted for the standard characters on receiving this command.

> Range:

NO.	N(H)	N(H)	FOREIGN LANGUAGE
1	40	64	American Slashed Zero
2	41	65	American
3	42	66	British
4	43	67	German
5	44	68	French
6	45	69	Swedish
7	46	70	Danish
8	47	71	Norwegian

NO.	N(H)	N(H)	FOREIGN LANGUAGE
9	48	72	Dutch
10	49	73	Italian
11	4A	74	French Canadian
12	4B	75	Spanish
13	4C	76	Latin American
14	5A	90	Publisher

SELECT CHARACTER TABLE

- > Code: ESC t n
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:

Upon receipt of this code, the printer selects a character table in address 128D to 255D, either line graphics, italics characters or DLL.
- > Range:
 - n = 00, 30, 80, B0H ... selects Italics character table.
 - n = 01, 31, 81, B1H ... selects Epson Graphics character table.
 - n = 02, 32, 82, B2H ... remaps DLL 0 – 127 into 128 – 255.
- > Out of range:

Values other than above will be ignored.
- > Additional details:

ESC 4 also selects italics printing.

ENABLE UPPER ASCII CHARACTERS

- > Code: ESC 6
- > Compatibility:

ML1190: EPSON LQM

ML1120: EPS FX

> Function:

To assign characters to the upper ASCII region 80H – 9FH.

> Additional details:

80H – 9FH will not be treated as control codes. Characters are assigned.

> Related functions:

ESC t 1 must be used prior to this command to select IBM character set II from Epson mode.

SELECT CHARACTER SET II

> Code: ESC 7

> Compatibility:

ML1190: EPSON LQM

ML1120: EPS FX

> Function:

To enable the upper ASCII region to function in the same manner as the lower ASCII control codes.

> Additional details:

80H – 9FH will be treated as control codes 00H – 1FH.

> Related functions:

ESC t 1 must be used prior to this command to select IBM character set II.

PRINT CONTINUOUSLY FROM ALL CHARACTERS CHART

> Code: ESC \ n1 n2

> Compatibility:

ML1190: IBM

ML1120: IBM III

- > **Function:**
This command allows the printing of all codes received including control codes.
- > **Range:**
n1 and n2 are equal to the total number of characters.
i.e. total count = $n1 + (n2 * 256)$

PRINT ONE CHARACTER FROM ALL CHARACTERS CHART

- > **Code:** ESC ^ n
- > **Compatibility:**
ML1190: IBM
ML1120: IBM III
- > **Function:**
This command will allow the printing of the next character in the all characters chart.
- > **Additional details:**
Only one character is printed.
This command can be used to print control codes.

SELECT CHARACTER SET I

- > **Code:** ESC 7
- > **Compatibility:**
ML1190: IBM
ML1120: IBM III
- > **Function:**
Selects IBM character set I.

SELECT CHARACTER SET II

- > **Code:** ESC 6
- > **Compatibility:**

ML1190: IBM

ML1120: IBM III

> Function:

Upon receipt of this code, the printer selects character set II

> Additional details:

80H – 9FH will not be treated as control codes. Characters are assigned.

> Related functions:

ESC t 1 must be used prior to this command to select IBM character set II from Epson mode.

CODE PAGE SELECT

> Code: ESC [T Ln Hn NUL NUL Hcp Lcp NUL

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

Sets code page.

> Range:

Ln and Hn designate the data quantity after Ln and Hn.

Ln: 0 – 255

Hn: 0 – 255

Data quantity = (Ln + Hn x 256)

(Ln + Hn x 255) <= 3: The command is ignored and data is dumped.

NUL 0 – 255

Hcp and Lcp designate ID No. of code page.

Hcp: 0 – 255

Lcp: 0 – 255

ID No. = (Hcp x 256 + Lcp)

ID Nos. and code pages are as listed below:

ID (HCP, LCP)	CODE PAGE	REMARK
437 (1B5H)	USA	
449 (1C1H)	Asmo 449+	
708 (2C4H)	Asmo 708	
737 (2E1H)	Greek_737	
774 (306H)	Baltic 774	
850 (352H)	Multilingual	
852 (354H)	East Europe Latin II - 852	
855 (357H)	Cyrillic I - 855	
857 (359H)	Turkey 857	
858 (35AH)	Multilingual858	
860 (35CH)	Portugual	
861 (35DH)	Icelandic-861	
862 (35EH)	Hebrew NC (862) (same as 406)	
863 (35FH)	Canada French	
864 (360H)	Arabic 864	
865 (361H)	Norway	
866 (362H)	Cyrillic II - 866	
869 (365H)	Greek 869	
895 (37FH)	Kamenickey (MJK)	
1000 (3E8H)	Greek ABG	(Reserve)
1001 (3E9H)	Greek ABC	(Reserve)
1002 (3EAH)	Greek DEC	(Reserve)
1003 (3EBH)	Greek Quattro	(Reserve)
1004 (3ECH)	Greek SYS 25	(Reserve)
1005 (3EDH)	Greek ME 29	(Reserve)
1006 (3EEH)	Greek 927 mod	(Reserve)

ID (HCP, LCP)	CODE PAGE	REMARK
1007 (3EFH)	Greek 927	(Reserve)
1008 (3F0H)	Greek 437	
1009 (3F1H)	Greek 928	
1010 (3F2H)	Greek 851	(Reserve)
1011 (3F3H)	Greek 437 CYPRUS	
1012 (3F4H)	Turkey	
1013 (3F5H)	Cyrillic II - 866 (same as 866)	
1014 (3F6H)	Polska Mazovia	
1015 (3F7H)	ISO Latin 2	
1016 (3F8H)	Serbo Croatian I	
1017 (3F9H)	Serbo Croatian II	
1018 (3FAH)	ECMA-94	
1019 (3FBH)	Windows East Europe	
1020 (3FCH)	Windows Greek	
1021 (3FDH)	Windows Turkey	
1022 (3FEH)	Windows Cyrillic	
1024 (400H)	Hungarian CWI	
1027 (403H)	Ukrainian	
1028 (404H)	Roman-8	
1029 (405H)	ISO Latin6 (8859/10)	
1030 (406H)	Hebrew NC	
1031 (407H)	Hebrew OC	
1032 (408H)	Windows Hebrew	
1033 (409H)	KBL-Lithuanian	
1034 (40AH)	Windows Baltic	
1035 (40BH)	Cyrillic Latvian	
1040 (410H)	BRASCI	(ODA only)

ID (HCP, LCP)	CODE PAGE	REMARK
1041 (411H)	Abicomp	(ODA only)
1072 (430H)	Bulgarian	
1081 (439H)	ISO8859-15	
1256 (4E8H)	Windows Arabic	
1086 (43EH)	POL 1	

The command is ignored and data is dumped if there is no code page for the ID No. selected by Hcp and Lcp.

> Additional details:

A code page other than USA is not converted into international characters.

ASSIGN CHARACTER TABLE

> Code: ESC (t Ln Hn Pn1 Pn2 Pn3

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

This command stores the character table selected by Pn2 and Pn3 in the area stipulated by Pn1.

> Range:

Range of Ln, Hn

Ln: 0 - 255

Hn: 0 - 255

Data quantity = Ln + (Hn x 256)

Pn1: 0 - 255

With Pn1, maximum of 4 tables may be selected.

Pn1 = Pn of ESC t Pn.

Pn2: 0 - 255

Pn3: 0 - 255

For combinations of Pn2 and Pn3, specific character tables are selected.

PN2	PN3	CHARACTER TABLE
0	0	Italic
1	0	PC437 (USA)
3	0	PC850 (Multilingual)
7	0	PC860 (Portugal)
8	0	PC863 (Canada-French)
9	0	PC865 (Norway)
25	0	BRASCI
26	0	Abicomp

SELECT CHARACTER TABLE

- > Code: FS I n
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Upon receipt of this code, the printer selects a character table in address 128D to 255D, either line graphics or italics characters.
- > Range:
n = 00H, 30H, 80H, B0H ... selects Epson italics character table.
n = 01H, 31H, 81H, B1H ... selects Epson graphics character table.
- > Out of range:
Values other than above will be ignored.
- > Additional details:
ESC 4 also selects italics printing.

SELECT FONT

- > Code: ESC y Pn
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:
 - Selects HSD font or UTL font.
- > Range:
 - 00Hf"Pnf"FFH
- > Detail:
 - When Pn = 00H, 30H, 80H, B0H, selects UTL (normal) font.
 - When Pn = 01H, 31H, 81H, B1H, selects HSD (high speed) font.
 - This command is only valid in UTL and HSD mode and is suppressed in LQ mode.

PRINT QUALITY – SELECT HSD

- > Code: ESC # 0
- > Compatibility:
 - ML1190: IBM
 - ML1120: IBM III
- > Function:
 - Select High Speed Draft Character Set.
- > Details:
 - If inter-character clearance is defined while the High Speed Draft (HSD) mode is selected, additional blank dot columns will be suppressed.
 - The HSD mode will be suppressed during proportional print mode.
 - Accessible addresses:

03H – 06H

15H

20H – 7FH

80H – AFH

E0H – F3H

F6H – FFH

Other areas will not be printed in High Speed draft mode.

See ["Appendix B – Print modes/features" on page 178](#) for UTL & LQ Print Mode/Features Combination Priority Charts.

PRINT QUALITY – SELECT HSD

> Code: ESC (n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Select High Speed Draft Character Set.

> Range: n = 00H, 30H, 80H, or B0H HSD is selected.

If n has any other value, the current mode will remain effective.

> Details:

If inter-character clearance is defined while the High Speed Draft (HSD) mode is selected, additional blank dot columns will be suppressed.

The HSD mode will be suppressed during the proportional print mode.

Accessible addresses:

03 – 06H

15H

20H – 7FH

80H – AFH

E0H – F3H

F6H – FFH

Other addresses will not be printed in High Speed draft mode.

See ["Appendix B – Print modes/features" on page 178](#) for UTL & LQ Print Mode/Features Combination Priority Charts.

FONT DESCRIPTION

SELECT CHARACTER FONT

- > Code: ESC x n
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Selects the print quality mode to be used.
- > Range:
Range n = 01H, 31H, 81, B1H selects LQ character font.
Range n = 00H, 30H, 80H, B0H selects Utility character font.
- > Out of range:
This command will be ignored when the value n is not one of the values above.
- > Additional details:
LQ and Utility modes are printed in 10, 12, 15, 17.1, and 20 CPI.

Proportional mode does not work in any mode but LQ.

If Utility, DLL, or Proportional modes are selected the result will be LQ, proportional printing, based on the Priority chart.

SELECT TYPE STYLES

- > Code: ESC k n
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III

> Function:

Upon receipt of this command the printer will select an LQ type style.

> Range:

00H, 30H, 80H, B0H	Roman
01H, 31H, 81H, B1H	Swiss
02H, 32H, 82H, B2H	Courier
03H, 33H, 83H, B3H	Prestige
04H, 34H, 84H, B4H	[Reserve]
05H, 35H, 85H, B5H	[Reserve]
06H, 36H, 86H, B6H	[Reserve]
07H, 37H, 87H, B7H	Orator
08H, 38H, 88H, B8H	[Reserve]
09H, 39H, 89H, B9H	[Reserve]
0AH, 3AH, 8AH, BAH	[Reserve]
0BH, 3BH, 8BH, BBH	[Reserve]
0CH, 3CH, 8CH, BCH	[Reserve]
0DH, 3DH, 8DH, BDH	[Reserve]
0EH, 3EH, 8EH, BEH	[Reserve]
0FH, 3FH, 8FH, BFH	[Reserve]
10H – 2FH, 90H – AFH	[Reserve]
40H – 79H, C0H – F9H	[Reserve]
7AH, FAH	[Reserve]
7BH, FBH	[Reserve]
7CH, FCH	Gothic
7DH, FDH	[Reserve]
7EH, FEH	Menu Setting
7FH, FFH	[Reserve]

- > Additional details:
The default LQ font is Courier.
Typestyles can also be selected through the Menu or operator panel.
All typestyles are available in all pitches and features.

SET/RESET PROPORTIONAL SPACING

- > Code: ESC p n
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Sets/resets the character pitch to proportional mode in LQ print quality mode.
- > Range:
Range n = 01H, 31H, 81H, or B1H SET Proportional Spacing
Range n = 00H, 30H, 80H, or B0H RESET Proportional Spacing
- > Out of range:
If n does not equal any of the above values this command is ignored.
- > Additional details:
Proportional printing is only available in LQ print quality.
The previous print mode (print quality and pitch) will be maintained and restored on resetting proportional spacing.
Proportional spacing can also be designed by ESC ! n, the master select command. Proportional spacing set by ESC ! n can be reset by ESC p 0.

SET/RESET PROPORTIONAL SPACING

- > Code: ESC P n

- > Compatibility:
ML1190: IBM
ML1120: IBM III
- > Function:
This command sets/resets LQ proportional width characters.
- > Range:
n = ODD, SET proportional spacing.
n = EVEN, RESET proportional spacing.
- > Additional details:
Proportional spacing is only available in LQ mode.
LQ Proportional mode has priority over other print qualities and character pitches.
Upon cancellation of Proportional mode, the printer is set to the previous pitch in LQ mode.

SET PICA CHARACTER PITCH (10 CPI)

- > Code: ESC P
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Change character pitch to 10 CPI.
- > This command will not cancel double width mode.
Pitch changes can be allowed within a line
10 CPI is the factory default for character pitch.
In the compress mode, 17.1 CPI is selected.

SET 10 CPI

- > Code: DC2

- > Compatibility:
ML1190: IBM
ML1120: IBM III
- > Function:
This command will turn on the 10 CPI mode.
- > Additional details:
Upon receiving another pitch command this mode will be turned off.

Printing does not start if DC2 is received during 10 CPI mode.

Character pitch commands become effective immediately upon receipt, thereby allowing a pitch change within a line.

This command will not cancel double width mode.

SET ELITE CHARACTER PITCH (12 CPI)

- > Code: ESC M
- > Compatibility:
ML1190: IBM
ML1120: IBM III
- > Function:
Change character pitch to 12 CPI.
- > Related functions.
Factory default setting is 10 CPI.
This command does not cancel double width mode.
A pitch change command is allowed at any point in the line.
In the compress mode, 20 CPI is selected.

SET 12 CPI

- > Code: ESC :
- > Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This command will turn on the 12 CPI mode.

> Additional details:

Upon receiving another pitch command, this mode will be turned off.

Printing does not start if ESC : is received during 12 CPI mode.

Character pitch commands become effective immediately upon receipt, thereby allowing pitch change within a line.

This command will not cancel double width mode.

SET 15 CHARACTER PER INCH

> Code: ESC g

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Change character pitch to 15 CPI.

> Additional details:

Factory default setting is 10 CPI.

This command does not cancel double width mode.

A pitch change command can be allowed at any point in the line.

> Related function:

Compress command is ignored (SI and ESC SI).

SET COMPRESSED CHARACTER PITCH (17.1/20 CPI)

> Code: SI

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function

The character pitch becomes 17.1 CPI or 20 CPI after receiving this command.

EPSON:

17.1 CPI = compressed + 10 CPI

20 CPI = compressed + 12 CPI

IBM

10 CPI active 17.1 CPI

12 CPI active 12 CPI

15 CPI active 17.1 CPI

17.1 CPI active 17.1 CPI

20 CPI active 17.1 CPI

> Additional details:

Factory default setting is 10 CPI.

This command does not cancel double width mode.

A pitch change command can be allowed at any point in the line.

> Related functions:

ESC SI and SI are identical in function for Epson mode.

SET COMPRESSED CHARACTER PITCH (17.1/20 CPI)

> Code:ESC SI

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

The character pitch becomes 17.1 CPI or 20 CPI after receiving this command.

EPSON

17.1 CPI = compressed + 10 CPI

20 CPI = compressed + 12 CPI

IBM

20 CPI

> Additional details:

Factory default setting is 10 CPI.

This command does not cancel double width mode.

A pitch change command can be allowed at any point in the line.

> Related functions:

ESC SI and SI are identical in function for Epson.

RESET COMPRESSED CHARACTER PITCH

> Code: DC2

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this code, the printer turns Compressed mode off.

Pitch will reset to 10 CPI when in 17.1 CPI.

Pitch will reset to 12 CPI when in 20 CPI.

SET CHARACTER SPACING

> Code: ESC SP n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer determines the amount of space to be added to the right of each character (specified in dots).

> Range:

Range $n = 0 - 255$. Bit 7 is ignored.

> Additional details:

n is the number of dots to be added to the right of each character.

In double width mode, the value of clearance will be automatically doubled.

Dots width of clearance depends on DPI in each Print Quality.

SET ITALIC CHARACTERS

> Code: ESC 4

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Select the alternate character set and print all characters in Italics mode.

> Additional details:

Italics characters are printed using a slant algorithm.

See priority table for detail command combination.

Italic characters may be overlapped on the next character cell.

Base of each italics cell is pin no. 24.

> Related functions:

This mode can also be selected by the ESC ! n command.

RESET ITALIC CHARACTERS

- > Code: ESC 5
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:

Italics mode is turned off upon receipt of this command.
- > Related functions:

This mode can also be reset by the ESC ! n command.

SET ITALIC CHARACTER

- > Code: ESC % G
- > Compatibility:
 - ML1190: IBM
 - ML1120: IBM III
- > Function:

Prints italics characters on receiving this command.

For details of italics characters printed by this command, see ["Appendix B – Print modes/features" on page 178.](#)
- > Additional details:

Fifty patterns, (B0)H – (DF)H and (F4)H(F5), structured by vertical 30 dots and line graphics, cannot be italicised.

RESET ITALIC CHARACTERS

- > Code: ESC % H
- > Compatibility:
 - ML1190: IBM
 - ML1120: IBM III
- > Function:

Releases Italic character printing on receiving this command.

TEXT PRINT FEATURES

SET/RESET UNDERLINING

> Code: ESC — n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Starts/stops underlining of all text, including spaces and punctuation, received after this command.

> Range:

Range n:

EPSON	IBM	ACTION
01H, 31H, 81H, B1H	ODD	SET underline
00H, 30H, 80H, B0H	EVEN	RESET underline

> Out of range:

This command will be ignored if n has any value other than the values mentioned above.

> Additional details:

The underline is printed at the same time as the character is printed.

Underline prints using:

pins 23 and 24 for Normal/Sup/Sub text modes

pins 22 – 24 for double height.

Graphics printing and line graphics symbols are not underlined.

Space by HT will not be underlined.

SET SUBSCRIPT/SUPERSCRIPT

- > Code: ESC S n
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
The characters received after the set command will be printed in Super/Subscript position.
- > Range:
Range n:

EPSON	IBM	ACTION
01H, 31H, 81H, B1H	ODD	SET subscript
00H, 30H, 80H, B0H	EVEN	SET superscript

- > Out of range:
This command will be ignored if n has any value other than the values mentioned above.
- > Additional details:
Super/Subscripts can be printed in double height mode.
- > Related functions:
Super/Subscripts printing will be cancelled by receiving a reset command ESC T.

RESET SUPER/SUBSCRIPT

- > Code: ESC T
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Cancels the Super/Subscript printing command.

SET EMPHASISED PRINT MODE

- > Code: ESC E
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Characters will be printed in horizontally shifted double dot print mode.
- > Additional details:

Emphasised mode is printed at half speed.

Emphasised printing can be selected at the same time as enhanced printing.

This command does not start the printer printing.
- > Related functions:

Emphasised printing can also be selected by the ESC ! n command in the Epson mode.

RESET EMPHASISED PRINT MODE

- > Code: ESC F
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Emphasised printing mode is cancelled on receiving this command.
- > Additional details:

Emphasised mode stays on until it is turned off by this command.
- > Related functions:

This command also resets Emphasised mode set by ESC ! n, in Epson mode.

SET DOUBLE STRIKE PRINT MODE

- > Code: ESC G
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Characters will be printed with each dot double struck.
- > Additional details:

Double strike printing can be selected at the same time as emphasised printing.

This command does not make the printer start to print.

Enhanced print mode is printed in two-pass printing.
- > Related functions:

Enhanced printing can also be set by the ESC ! n command, for Epson mode.

RESET DOUBLE STRIKE MODE

- > Code: ESC H
- > Compatibility:
 - ML1190: EPSON LQ/IBM
 - ML1120: EPS FX/IBM III
- > Function:

Double strike print mode is cancelled on receiving this command.
- > Related functions:

Enhanced mode set by ESC ! n will be reset by ESC H (Epson mode).

SET DOUBLE OR EXPANDED CHARACTERS

- > Code: ESC W n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

This command sets/resets double width printing.

> Range:

Range n:

EPSON	IBM	ACTION
01H, 31H, 81H, B1H	ODD	SET double width
00H, 30H, 80H, B0H	EVEN	RESET double with

> Out of range:

This command will be ignored if n equals any value other than the values mentioned above.

> Additional details:

Can be used with any character pitch.

Although dot spacing remains unchanged, double width mode produces half as many characters per inch for any pitch.

> Related functions:

This mode can also be set by the ESC ! n command (Epson mode).

SET IMMEDIATE DOUBLE WIDTH CHARACTERS

> Code: SO

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Characters received after this command will be printed in double width for the length of the line.

> Additional details:

The double width characters are only printed for the length of one line and then the printer returns to the previous mode.

> Related functions:

If SO and ESC W 1 are active, ESC W 1 will take precedence.

SO can be cancelled by DC4, ESC W 0, ESC ! n, LF or CR + FF.

SET IMMEDIATE DOUBLE WIDTH CHARACTERS

> Code: ESC SO

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Characters received after this command will be printed in double width for the length of the line.

> Additional details:

The double width characters are only printed for the length of one line and then the printer returns to the previous mode.

> Related functions:

This function duplicates the SO command.

RESET IMMEDIATE DOUBLE WIDTH CHARACTERS

> Code: DC4

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Double width characters print mode is cancelled by this command.

> Related functions:

Does not cancel double width set by ESC W n or ESC ! n.

Only cancels double width mode set by SO or ESC SO (Epson mode only).

SET/RESET DOUBLE HEIGHT CHARACTERS

> Code: ESC US n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Characters will be printed twice as high after receiving this command.

> Range:

n = 00H, 30H, 80H, B0H – RESET double height printing.

n = 01H, 31H, 81H, B1H – SET double height printing.

> Additional details:

This command applies to all characters.

Double height can be mixed with standard height characters in the same line. The Double height characters will be printed two times as high from the same base line as the standard height.

Double height characters are printed unidirectionally in two passes.

Underline in double height will be 4 dots below.

This command duplicates the ESC w n command.

SET/RESET DOUBLE HEIGHT CHARACTERS

> Code: ESC w n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Characters will be printed twice as high after receiving this command.

> Range:

n = 00H, 30H, 80H, B0H – RESET double height printing.
n = 01H, 31H, 81H, B1H – SET double height printing.

> Additional details:

This command applies to all characters.

Double height can be mixed with standard height characters in the same line. The double height characters will be printed twice as high from the same base line as the standard height.

Double height characters are printed unidirectionally in two passes.

Underline in double height will be 3 dots high.

SET/RESET DOUBLE HEIGHT CHARACTERS

> Code: ESC [@ n1 n2 m1 m2 m3 m4

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

Upon receipt of this command, characters will be printed twice as high as standard characters.

> Range:

The variables n1 and n2 specify the number of mode bytes in the command. Normally n1 = 4 and n2 = 0.

The variables "m" control the mode: m1 = 0 m2 = 0

The values of m3 and m4 are defined as follows:

m3 = 0 0 N N 0 0 N N, m4 = 0 0 0 0 0 0 N N

line spacing/height, m4 = 0/character width

NN = 00, no change
NN = 01, standard
NN = 10, double

> Additional details

This command can be used with a double width command to print double size characters.

Double height can be mixed with standard height characters in the same line. The double height characters will be printed twice as high from the same base line as the standard height characters.

OVERSCORE SET/RESET

> Code: ESC _ n

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

Prints a continuous line (overscore) above the characters designated.

> Range:

n = ODD, SET overscore mode

n = EVEN, RESET overscore mode

> Additional details:

Spaces specified by HT will not be overscored.

SELECT CHARACTER STYLE

> Code: ESC q n

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Characters will be printed with the style defined by the variable n. These styles include outline and shadow print.

- > Range:
 - n = 00H, 30H, 80H, B0H, SET Normal style.
 - n = 01H, 31H, 81H, B1H, SET Outline style.
 - n = 02H, 32H, 82H, B2H, SET Shadow style.
 - n = 03H, 33H, 83H, B3H, SET Outline with Shadow style.
- > Out of range:

Values other than those specified will be ignored.
- > Additional details:

This feature does not work with line graphics.
Characters are algorithmically produced.

SET DOUBLE WIDTH OR EXPANDED CHARACTERS

- > Code: FS E n
- > Compatibility:
 - ML1190: EPSON LQ
 - ML1120: EPS FX
- > Function:

This command sets/resets double width printing.
- > Range n:

N	ACTION
01H, 31H, 81H, B1H	SET double width
00H, 30H, 80H, B0H	RESET double width

- > Out of range:

This command will be ignored if n has a value other than the values mentioned above.
- > Additional details:

Can be used with any character pitch.

Although dot spacing remains unchanged, double width mode produces half as many characters per inch for any pitch.

Double width characters are algorithmically produced.

When Helvetia typestyle is selected with both double width and double height set, a separate bitmap will be used for the standard ASCII characters (20H – 7FH).

> Related functions:

This mode can also be set by the ESC ! n command (Epson mode).

SET/RESET DOUBLE HEIGHT CHARACTERS

> Code: FS V n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Characters will be printed twice as high after receiving this command.

> Range:

n = 00H, 30H, 80H, B0H, RESET double height printing.
n = 01H, 31H, 81H, B1H, SET double height printing.

> Additional details:

This command is available in the following print modes only:

- Utility/DLL Utility
- Emphasised/Enhanced
- Double Width
- LQ

NOTE

Enhanced will print as Emphasised.

Double height can be mixed with standard height characters in the same line. The double height characters

will be printed two times as high from the same base line as the standard height.

Double height characters are printed unidirectionally in two passes.

Characters are algorithmically produced.

When Helvetica typestyle is selected with both double width and double height set, a separate bitmap will be used for the standard ASCII characters (20H – 7FH).

Underline in double height will be 3 dots high.

GRAPHICS MODE

ENTER/EXIT BIT IMAGE GRAPHICS

> Code: ESC * m n1 n2 <graphics data>

> Compatibility:

ML1190: EPSON LQ/IBM/IBM AGM

ML1120: EPS FX/IBM III/IBM AGM

> Function:

Selects the graphics mode specified by m and prints graphics data. Not valid in IBM PPR mode.

> Range:

n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics.

n1 = 0 – 255, Remainder of dot columns

n2 = 0 – 255, Number of groups of 255 dot columns

m selects the graphic mode. The value of "m" determines whether 8 pin or 24 pin graphics is used. See table below:

MODE	PINS	M	DPI	WIDE BYTES/ LINE	NARROW BYTES/ LINE
Single density	8	0	60	816	480
Double density	8	1	120	1632	960
Fast double density	8	2	120 *	1632	960

MODE	PINS	M	DPI	WIDE BYTES/ LINE	NARROW BYTES/ LINE
Quadruple density	8	3	240 *	3264	1920
CRT I	8	4	80	1088	640
CRT II	8	6	90	1224	720
Single density	24	32	60	816*3	480 *3
Double density	24	33	120	1632*3	960 *3
CRT III	24	38	90	1224*3	720 *3
Triple density	24	39	180	2448*3	1440 *3
Hex density	24	40	360 *	4896*3	2880 *3

NOTE

Modes marked "" are printed in Quasi density.*

> Out of range:

If m is specified in the above table, "ESC*m" is ignored and data is not printed as graphics data.

> Additional details:

When using 8 pin graphics, only one byte per column needs to be sent to the printer. When 24 pin graphics is used, three bytes per column need to be sent to the printer.

Pin numbering system

Pin #	24 Pins	IBM PPR	8 Pin-EPSON/ IBM AGM
Top pin	1	128	} 128
	2	64	
	3	32	} 64
	4	16	
	5	8	} 32
	6	4	
	7	2	} 16
	8	1	
	9	128	} 8
	10	64	
	11	32	} 4
	12	16	
	13	8	} 2
	14	4	
	15	2	} 16
	16	1	
Bottom pin	17	128	} 8
	18	64	
	19	32	} 4
	20	16	
	21	8	} 2
	22	4	
	23	2	} 1
	24	1	

The decimal value used for the data elements can be calculated by adding the equivalent decimal values of the dots that need to be printed.

The following example uses X to denote Print and O to denote Not Print:

128	X	128
64	O	
32	X	32
16	O	
8	X	8
4	O	
2	X	2
1	O	
Total		170

This value corresponds to one byte of data. Three bytes are needed for 24 pin graphics.

The values for n1, n2 can be calculated as follows:

$n = \text{total number of dots to be printed.}$

$n2 = \text{INT}(n/256)$

$n1 = n - (n2 \times 256).$

SINGLE DENSITY GRAPHICS

> Code: ESC K n1 n2 <graphics data>

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Selects normal speed single density graphics (60 DPI horizontal) for the number of columns specified by n1 and n2.

> Range:

n1 = 0 – 255, Remainder of dot columns

n2 = 0 – 255, Number of groups of 255 dot columns

n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics. $\text{Dots} = n1 + (n2 \times 256).$

Number of dots/line

	DOTS/LINE	N1	N2
Value	636	124	2

> Additional details:

The values for n1, n2 can be calculated as follows:

$n = \text{total number of dots to be printed.}$

$n2 = \text{INT}(n/256)$

$n1 = n - (n2 \times 256)$

> Related functions:

This command is equivalent to the 8 pin graphics mode command specified by ESC* "0" n1 n2.

DOUBLE DENSITY GRAPHICS

- > Code: ESC L n1 n2 <graphics data>
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Selects normal speed double-density graphics (120 DPI horizontal) for the number of columns specified by n1 and n2.
- > Range:
n1 = 0 – 255, Remainder of dot columns.
n2 = 0 – 255, Number of groups of 255 dot columns.
n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics. Dots = n1 + (n2*256)
Number of dots/line

	DOTS/LINE	N1	N2
Value	1272	248	4

- > Additional details:
The values for n1, n2 can be calculated as follows:
n = total number of dots to be printed.
n2 = INT (n/256)
n1 = n - (n2 × 256)
- > Related functions:
This command is equivalent to the 8 pin graphics mode command specified by ESC* "1" n1 n2.

QUASI-DOUBLE-DENSITY GRAPHICS

- > Code: ESC Y n1 n2 <graphics data>
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III

> Function:

Selects high speed double-density graphics (120 DPI horizontal) for the number of columns specified by n1 and n2.

> Range:

n1 = 0 – 255, Remainder of dot columns

n2 = 0 – 255, Number of groups of 255 dot columns

n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics. Dots = n1 + (n2*256)

Number of dots/line

	DOTS/LINE	N1	N2
Value	1272	248	4

> Additional details:

The values for n1, n2 can be calculated as follows:

n = total number of dots to be printed.

n2 = INT (n/256)

n1 = n - (n2 × 256)

High speed double-density graphics prints at 120 DPI. This is the same density as low speed double-density graphics, but the printer cannot place two adjacent dots in the same row (quasi-density).

> Related functions:

This command is equivalent to the 8 pin graphics mode command specified by ESC* "2" n1 n2.

SET QUADRUPLE DENSITY GRAPHICS

> Code: ESC Z n1 n2 <graphics data>

> Compatibility:

ML1190: EPSON LQ/IBM

ML1120: EPS FX/IBM III

> Function:

Upon receipt of this code the printer switches to quadruple-density graphics (240 DPI horizontal) for the number of columns specified by n1 and n2.

> Range:

n1 = 0 – 255, Remainder of dot columns

n2 = 0 – 255, Number of groups of 255 dot columns.

n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics. Dots = n1 + (n2*256)

Number of dots/line

	DOTS/LINE	N1	N2
Value	2544	240	9

> Additional details:

The values for n1, n2 can be calculated as follows:

n = total number of dots to be printed.

n2 = INT (n/256)

n1 = n - (n2 × 256)

As quad-density graphics are printed in a quasi-density, the printer does not print consecutive dots in any one row.

> Related functions:

This command is equivalent to the 8 pin graphics mode command specified by ESC* "3" n1 n2.

REASSIGN ALTERNATE GRAPHICS CODES

> Code: ESC ? m n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer reassigns one of the alternate graphics modes ("m"), so that it represents any other of the eleven graphics modes ("n").

> Range:

"m" represents one of the following four graphics modes:

K – Single-density

L – Low speed double-density

Y – High speed double-density

Z – Quadruple-density

n is a decimal value.

MODE	PINS	N	HOR. DENS (DOTS/IN.)	BYTES/LINE
Single-density	8	0	60	636
Double-density	8	1	120	1272
HS Double-density	8	2	120	1272
Quadruple-density	8	3	240	2544
CRT I	8	4	80	848
CRT II	8	6	90	954
Single-density	24	32	60	636 *3
Double-density	24	33	120	1272 *3
CRT III	24	38	90	954 *3
Triple-density	24	39	180	1908 *3
Hex-density	24	40	360	3816 *3

> Out of range:

If n does not equal a value specified in the above table, {ESC ? m n" is ignored and data is not printed as graphics data.

GRAPHICS RESOLUTION

> Code: ESC [g n1 n2 m data

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This command selects the graphics resolution and sends the graphics data.

> Range:

n1 = 0 – 255, Remainder of dot columns

n2 = 0 – 255, Number of groups of 256 dot columns

n1 in conjunction with n2 specifies the total number of dot columns to be printed in graphics.

Graphic data quantity +1 = n1 + (n2*256)

M	DPI (H)	WIRES	COMMAND
0	60	8	Same as ESC K command
1	120	8	Same as ESC L command
2	120	8	Same as ESC Y command
3	240	8	Same as ESC Z command
8	60	24	High resolution for ESC K
9	120	24	High resolution for ESC L
11	180	24	
12	360	24	

> Out of range:

Any value of n1, n2, m other than those above will be ignored.

> Additional details:

If the value of n1, n2 is zero (0) the current value is maintained.

SELECT ASPECT RATIO

> Code: ESC n Pn

> Compatibility:

ML1190: IBM/PPR

ML1120: IBM III/PPR

> Function:

Sets vertical-to-horizontal ratio in density of bit image graphics.

> Range:

Pn = 0 – 1, Sets aspect ratio 5:6 in bit image graphics mode.

Pn = 2, Sets aspect ratio 1:1 in bit image graphics mode.

Pn >= 3, Data up to ESC n Pn is dumped.

> Additional details:

This command is active for commands ESC K, ESC L, ESC Y and ESC Z.

COMPOSITE COMMANDS

PRINT MODE SELECT

> Code: ESC ! n

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer selects one of the unique print mode combinations.

> Range:

BIT	BR (R = 0 – 7) OF "N"	
	1	0
b7	Set Underline	Reset Underline
b6	Set Italics	Reset Italics
b5	Set Double Width	Reset Double Width
b4	Set Enhanced	Reset Enhanced
b3	Set Emphasised	Reset Emphasised
b2	Set Compressed	Reset Condensed

BIT	BR (R = 0 – 7) OF "N"	
	1	0
b1	Set Proportional	Reset Proportional
b0	Set 12 CPI	Set 10 CPI

> Additional details:

With this code you can quickly produce any possible combination of the modes in the following section.

There is no need to reset each mode separately when you use this code; when you select a new combination the printer takes care of all resets.

The selectable modes are given in the following section.

PRINT MODE SELECT

> Code: ESC I n

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This command controls the current print mode according to the value of n.

> Range:

N	PRINT MODE	CPI
0	Utility	10 CPI
2	LQ	10 CPI
3	LQ	PROP
8	Utility	12 CPI
10	LQ	12 CPI
16	Utility	17.1 CPI

N	PRINT MODE	CPI
18	LQ	17.1 CPI
24	Utility	15 CPI
26	LQ	15 CPI
32	Utility	20 CPI
34	LQ	20 CPI

GENERAL CONTROL

PRINTER INITIALISATION

- > Code: ESC @
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:
Upon receipt of this code the printer will be initialised to all its menu default settings. This command is enabled or disabled by a Menu selection.
- > Additional details:
All data in the buffer will be cleared and the current printhead position becomes top of page.
DLL data will not be deleted.

CANCEL CODE

- > Code: CAN
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:

Upon receipt of this command the printer will clear all data from the print buffer.

> Additional details:

This code does not clear or affect the control codes which are resident in the buffer.

SET BIT 7 CODE TO 1

> Code: ESC >

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer will set bit 7 of the data to 1.

> Additional details:

This code limits the range codes from 80H to FFH.

SET BIT 7 CODE TO 0

> Code: ESC =

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer will set bit 7 of the data to 0.

> Additional details:

This code limits the range codes from 00H to 7FH.

RESET 8 BIT MODE

> Code: ESC #

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer cancels the mode set by either ESC ">" or ESC "=".

> Additional details:

The printer accepts the eighth bit "as is" from the computer (8-bit mode).

SET PRINT SUPPRESS

> Code: DC3

> Compatibility:

ML1190: EPSON LQ

ML1120: EPS FX

> Function:

Upon receipt of this command the printer is placed in the inactive state.

> Additional details:

All data is unavailable after receiving this code.

The SEL/BUSY signal will not be changed by this command.

PRINT SUPPRESS

> Code: ESC Q n

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This printer mode will not allow the printer to receive any data except DC1.

> Range:

n = 36

> Additional details:

The printer cannot be reselected by using the Select key.

The SEL lamp will flash while in Print Suppress mode.

RESET PRINT SUPPRESS MODE

> Code: DC1

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

Upon receipt of this command the printer is placed in the active state.

> Additional details:

The printer processes all the data sent to it.

STOP PRINTING

> Code: ESC j

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This command places the printer in deselect status.

> Additional details:

To cancel the deselect status, press the SEL switch or load paper (Menu "Auto Select" set to "Yes").

Data received before ESC j is printed.

ENABLE PAPER OUT SENSOR

> Code: ESC 9

> Compatibility:

ML1190: IBM

ML1120: IBM III

> Function:

This command enables the printer function which detects whether less than approximately 1 in of paper remains. Upon detection, the alarm lamp is lit and the printer is deselected.

Manual paper override.

Bottom margin:

Rear Feed: Approximately 1 in

Bottom Feed: Approximately 1 in

Top Feed: Approximately 1 in

> Additional details:

The paper out detector can also be enabled by MENU.

Manual Paper Out Override

While the paper end lamp is on, if the SEL switch is depressed, 1 line of data is printed, and a line feed follows (paper override). During the processing of 1 line of data, select mode returns.

The paper override function is effective after paper end is turned on until the next TOF position. The paper override function becomes invalid when it reaches the TOF position.

After the override function is processed to TOF position, paper is reset at TOF position. When the SEL switch is depressed, data is normally printed from the TOF position.

When the SEL switch is depressed after paper is reset (paper end switch off), the following states return and the printer is in the select mode:

- SEL lamp on.
- Paper lamp off.
- I/F assumes select (receivable) state.

During the paper override, if continuous line feed exceeding the TOF position is input, line feed proceeds until the TOF position. The remaining amount of line feed is held until new paper is installed and printing executed.

Unprinted data will be saved in the buffer and printed after paper is replaced and the SEL switch is depressed.

DISABLE PAPER OUT SENSOR

- > Code: ESC 8
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
This command disables the paper out detecting function.
- > Additional details:
Paper out detector can also be disabled by MENU.
Printer prints up to TOF, then stops print and the Paper End Signal is active.

SELECT EMULATION

- > Code: ESC { n
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
This command allows the software developer to change the printer emulation to access the features that match his requirements.
- > Additional details:
This command is not documented for public use.
This command duplicates the MENU selection.
When emulation is changed DLL will be cleared.

PRINTER INITIALISATION

- > Code: ESC } NUL

- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Upon receipt of this code the printer will be initialised to all its menu default settings. This command is always active regardless of the menu "Reset Inhibit".
- > Additional details:
All data in the buffer will be cleared and the current printhead position becomes top of page.
DLL data will be deleted (EPSON).

PRINTER INITIALISATION

- > Code: FS @
- > Compatibility:
ML1190: EPSON LQ/IBM
ML1120: EPS FX/IBM III
- > Function:
Upon receipt of this code the printer will be initialised to all its menu default settings. Also all data in the buffer will be cleared and the current printhead position becomes top of page.
DLL data will not be deleted.

BARCODE

PRINT BARCODE

- > Code: ESC (B Ln Hn k m S v1 v2 c [DATA]
- > Compatibility:
ML1190: EPSON LQ
ML1120: EPS FX
- > Function:

Prints barcode data.

> Valid range and meaning of Ln and Hn

0(00H) <= Ln <= 255(FFH)

0(00H) <= Hn <= 255(FFH) MSB is invalid

Indicates number of further parameter bytes.

Number of parameter bytes = Ln + Hn x 256

This parameter will be valid only when set by further parameter bytes (6 bytes) + number of data (differs depending on barcode type). For settings other than this, this command is invalid and the data after the number of bytes designated by this parameter will be received and discarded.

Sets barcode type by parameter k (MSB valid):

K (HEX)	BARCODE TYPE
00	EAN-13
01	EAN-8
02	Interleaved 2 of 5
03	UPC-A
04	UPC-E
05	Code 39
06	Code 128
07	POSTNET

When a barcode type other than above is designated, this command will be invalid and the number of bytes indicated by Ln and Hn will be received and discarded.

Sets module (black bar and SP bar) width by parameter m (MSB valid).

M	MODULE WIDTH (1/180 IN UNIT)
02	2 dots
03	3 dots

M	MODULE WIDTH (1/180 IN UNIT)
04	4 dots
05	5 dots

For settings other than above, width is 2 dots.

Sets SP bar width on the basis of parameter m, setting by parameter S (MSB valid).

S	ADJUSTMENT VALUE FOR THE STANDARD WIDTH OF SP BAR (1/360 IN UNIT)
FDH	-3
FEH	-2
FFH	-1
00H	0 (default)
01H	+1
02H	+2
03H	+3

For settings other than above, the value is set to 0.

Sets height (1/180 in unit) of black bar by parameter v1 and v2.

Black bar height = $v1 + v2 \times 256$

$0(00H) \leq v1 \leq 255(FFH)$

$0(00H) \leq v2 \leq 255(FFH)$

The maximum setting value for height is 2 in. This can be set in units of 15/180 in as follows:

SETTING RANGE	SET VALUE (IN)	SETTING RANGE	SET VALUE (IN)
$1 \leq v1.v2 \leq 15$	15/180	$196 \leq v1.v2 \leq 210$	210/180
$16 \leq v1.v2 \leq 30$	30/180	$211 \leq v1.v2 \leq 225$	225/180
$31 \leq v1.v2 \leq 45$	45/180	$226 \leq v1.v2 \leq 240$	240/180

SETTING RANGE	SET VALUE (IN)	SETTING RANGE	SET VALUE (IN)
46 <= v1.v2 <= 60	60/180	241 <= v1.v2 <= 255	255/180
61 <= v1.v2 <= 75	75/180	256 <= v1.v2 <= 270	270/180
76 <= v1.v2 <= 90	90/180	271 <= v1.v2 <= 285	285/180
91 <= v1.v2 <= 105	105/180	286 <= v1.v2 <= 300	300/180
106 <= v1.v2 <= 120	120/180	301 <= v1.v2 <= 315	315/180
121 <= v1.v2 <= 135	135/180	316 <= v1.v2 <= 330	330/180
136 <= v1.v2 <= 150	150/180	331 <= v1.v2 <= 345	345/180
151 <= v1.v2 <= 165	165/180	346 <= v1.v2 <= 360	360/180
166 <= v1.v2 <= 180	180/180	361 <= v1.v2	360/180
181 <= v1.v2 <= 195	195/180		

c: Sets control information.

C	MODULE WIDTH
bit 0	Sets check digit 0: Does not add check digit 1: Adds check digit
bit 1	Sets human readable characters 0: Prints 1: Does not print
bit 2	Sets flag character print position (Setting invalid) 0: Prints in centre 1: Prints in lower line
bit 3	(reserved)
bit 4	(reserved)
bit 5	(reserved)
bit 6	(reserved)
bit 7	(reserved)

DATA: Transmits barcode data.

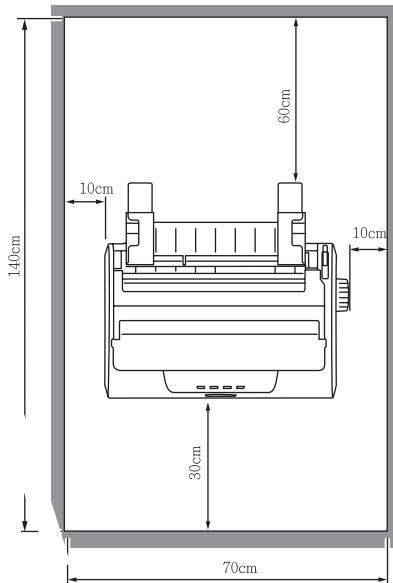
The following table shows the barcode data number.

BARCODE TYPE	CHECK DIGIT NOT ADDED	CHECK DIGIT ADDED
EAN-13	0DH	0CH
EAN-8	08H	07H
Interleaved 2 of 5	01H – 32H	01H – 32H
UPC-A	0CH	0BH
UPC-E	06H	06H
Code 39	01H – 32H	01H – 32H
Code 128	02H – 32H	02H – 32H
POSTNET	06H or 0AH or 0CH	05H or 09H or 0BH

SPECIFICATIONS

ML1120

PHYSICAL SPECIFICATION



- > Outside dimensions
349 mm (13.8 in) (W) × 232 mm (9.1 in) (H) × 150 mm (5.9 in) (D).
These dimensions include the platen knob and tray.
- > Weight
Approximately 4.2 kg.
- > Colour
7PB 8.5/0.5
- > Texture
TH114

POWER REQUIREMENTS

- > Input power
Single-phase AC
Voltage: 220-240V \pm 10%
Frequency: 50/60 Hz \pm 2%.
- > Power consumption
Operation: Typ. 33W (ISO10561 letter pattern)
Idle: Max. 2.5W (ENERGY STAR compliant).
- > AC power cable
Length: Approximately 5.9 ft (1.8 m)

ELECTRICAL INSULATION

- > Insulation resistance
5 megohms or more when measured between AC input line and frame using 500-VDC megohmmeter.
- > Dielectric strength
3000 VAC (50/60 Hz)
(No damage will result when the above voltage is applied between the AC input line and frame for 1 minute.)

ENVIRONMENTAL CONDITIONS

- > Ambient temperature and relative humidity

CONDITION	TEMPERATURE	REL. HUMIDITY
Operating	5 – 95°F (5 – 35 °C)	20 – 80% RH
Storage	14 – 122 °F (-10 – 50 °C)	5 – 95% RH

The printer must be packaged during storage.
Avoid condensation at all times.

- > Vibration
Operating: 0.3G (5 – 150 Hz) or less (except at resonant frequency).

Non-operating: 1G (5 – 150 Hz) or less (except at resonant frequency).

Packing: 1.05G (5 -150 Hz) or less (except at resonant frequency).

> Impact (Drop)

Packing: 0.762 m (30 in) (one angle, three edges and six sides)

NOISE

> Measurement method

The printer is placed 2.46 ft (0.75 m) above the floor and the microphone is set 3.28 ft (1 m) and 4.92 ft (1.5 m) above the floor (in compliance with ISO 7779).

> Printing operation

The printer is measured in the ECMA Standard pattern of 40 characters/line and rear path on one-part paper of 15 lbs (57 gsm).

> Noise value

Average of the three-page printing noise is less than 53 dBA log average of the front and back and right and left of the printer when measured under the above conditions with the printer fitted with the top cover.

AGENCY APPROVALS

> CE

EN55022; 1998 (class B)
EN61000-3-2; 1995
EN61000-3-3; 1995

> EN55024; 1998

> GS

EN60950; 2000

PRINT SPECIFICATION

- > Print method: Impact dot matrix
- > Number of dot wires: 9
- > Dot wire diameter: 0.012 in (0.30 mm)
- > Print direction
Bi-directional, short-line-seeking printing
Unidirectional printing specifiable
- > Print speed:

CHARACTER PITCH	HSD	NLQ	UTILITY	SSD
10 CPI	333 CPS	62.5 CPS	250 CPS	-
12 CPI	333 CPS	62.5 CPS	250 CPS	375 CPS
15 CPI	333 CPS	62.5 CPS	250 CPS	-
17.1 CPI	333 CPS	62.5 CPS	250 CPS	-
20 CPI	333 CPS	62.5 CPS	250 CPS	-

- > Character sets
Standard ASCII
Epson Character Set (Italics/Graphics)
IBM Character Set (Set1/Set2)
ML Character Set (Standard/Line Graphics/Block Graphics)
Foreign Character Set (22 types)
Code Page Character Set (42 types)
- > Selectable character pitches
5 CPI: 0.2 in (5.08 mm)
6 CPI: 0.167 in (4.23 mm)
6.7 CPI: 0.15 in (3.81 mm)
7.5 CPI: 0.133 in (3.39 mm)
8.5 CPI: 0.117 in (2.96 mm)
10 CPI: 0.1 in (2.54 mm)
12 CPI: 0.083 in (2.12 mm)
15 CPI: 0.067 in (1.69 mm)
17.1 CPI: 0.058 in (1.48 mm)
20 CPI: 0.05 in (1.27 mm)

- > Maximum number of dot columns per line in graphics:

Graphics

	SINGLE DENSITY	DOUBLE DENSITY	QUADRUPLE DENSITY
ML1120	480	960	1,920

Text

CHARACTER PITCH (CPI)	UTILITY MODE	NLQ MODE	HSD MODE	SSD
10	960	1,920	720	-
12	1,152	2,304	864	768
15	1,440	2,880	1,080	-
17.1	1,646	3,292	1,234	-
20	1,920	3,840	-	-

- > Maximum number of characters per line:

CHARACTER PITCH (CPI)	NO OF CHARACTERS
5	40
6	48
7.5	60
8.5	68
10	80
12	96
15	120
17.1	137
20	160

- > Line feed pitches

6 LPI: 0.167 in (4.23 mm)

8 LPI: 0.125 in (3.175 mm)

A variable line feed pitch of n/216, 7/72 and n/72 in can also be specified.

- > Line feed speed
6 LPI spacing: One LF = 52 ms
Continuous paper feed rate is 4.0 in per second.

PAPER SPECIFICATION

- > Cut-sheet Paper (standard)
Paper width: 100 – 254 mm (3.9 – 10 in)
Paper length: 100 – 254 mm (3.9 – 10 in)
Weight: 12 - 15 lbs (40 - 58 gsm) standard
Thickness: 0.06 - 14 mm
- > Cut-sheet multipart forms
Paper width: 100 – 254 mm (3.9 – 10 in)
Paper length: 100 – 254 mm (3.9 – 10 in)
Weight: 12 - 15 lbs (40 - 58 gsm) standard
Number of copies: Original plus 4 copies
Thickness: 0.36 mm max. (0.014 in max.)
Binding: Line glued to the top of form.
- > Continuous Paper
Tractor feed unit can handle sprocket paper a width of 101.6 to 254 mm (4 to 10 in).
Ream weight: 14 - 22 lbs (52 - 82 gsm)
Multipart paper: Max. 0.39 mm (0.015 in) total thickness (rear and bottom).

PAPER TYPE	REAM WEIGHT	NUMBER OF SHEETS
Carbon-lined paper	9 - 11 lbs (35 - 40 gsm)	5 sheet maximum including original (with rear feed)
Pressure sensitive paper	9 - 11 lbs (35 - 40 gsm)	5 sheet maximum including original (with bottom feed)
Interleaf paper (standard)	10 - 11 lbs (38 - 45 gsm)	4 sheet maximum including original (with rear feed)
Interleaf paper (carbon-lined)	9 lbs (34 gsm)	4 sheet maximum including original (with bottom feed)

Multiple-part paper should be held together by spot-pasting or crimping on both sides and should be free of wrinkles.

> Cut form envelope

Weight: 24 lbs max. (90 gsm max.)

Thickness:

0.41 mm max. (0.016 in max.)

6-1/2 x 3-5/8 in

8-7/8 x 3-7/8 in

9-1/2 x 4-1/8 in

> Continuous envelope

Weight: 24 lbs max. (90 gsm max.)

Thickness: 0.36 mm max. (0.014 in max.)

Width: 76.2 - 254 mm (3 - 10 in)

Media supply: Bottom paper feed only

For detailed media specifications see ["Appendix D – Media specifications" on page 188](#).

RIBBON SPECIFICATION

> Original OKI cartridge ribbon:

Ink colour: Black

Ribbon life: 4 million characters (Utility Mode)

RELIABILITY

> MBTF (mean time between failures)

10,000 hours of power-on time

Page density: 35%

Duty cycle: 25%

> Printhead life

200 million characters (average) in 10 CPI Utility print quality.

Page density: 35%

Duty cycle: 25%

> Printer life

12,000 hours of power-on time or 5 years

Page density: 35%

Duty cycle: 25%

> MTTR

15 minutes Major Sub-assembly level.

Definition of terms:

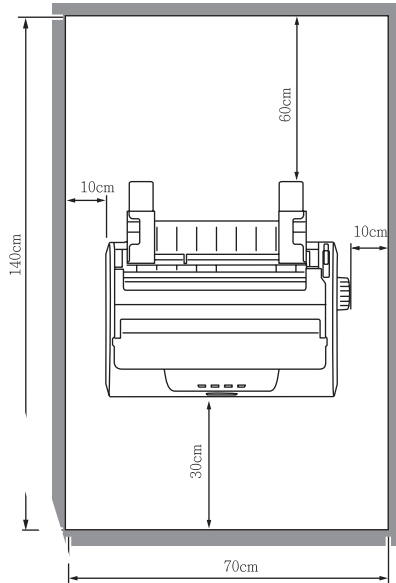
> Page density: The proportion in area of characters and spaces within printhead movable area.

> Duty cycle: Actual operation rate

> Power on time: 8H/day 25 days/month and 12 months/year

ML1190

PHYSICAL SPECIFICATION



- > Outside dimensions
349 mm (13.8 in) (W) × 232 mm (9.1 in) (H) × 150 mm (5.9 in) (D).
These dimensions include the platen knob and tray.
- > Weight
Approximately 4.2 kg.
- > Colour
7PB 8.5/0.5
- > Texture
TH114

POWER REQUIREMENTS

- > Input power
Single-phase AC
Voltage: 220-240V \pm 10%
Frequency: 50/60 Hz \pm 2%.
- > Power consumption
Operation: Typ. 41W (ISO10561 letter pattern)
Idle: Max. 2.5W (ENERGY STAR compliant).
- > AC power cable
Length: Approximately 5.9 ft (1.8 m)

ELECTRICAL INSULATION

- > Insulation resistance
5 megohms or more when measured between AC input line and frame using 500-VDC megohmmeter.
- > Dielectric strength
3000 VAC (50/60 Hz)
(No damage will result when the above voltage is applied between the AC input line and frame for 1 minute.)

ENVIRONMENTAL CONDITIONS

- > Ambient temperature and relative humidity

CONDITION	TEMPERATURE	REL. HUMIDITY
Operating	5 – 95°F (5 – 35 °C)	20 – 80% RH
Storage	14 – 122 °F (-10 – 50 °C)	5 – 95% RH

The printer must be packaged during storage.
Avoid condensation at all times.

- > Vibration
Operating: 0.3G (5 – 150 Hz) or less (except at resonant frequency).

Non-operating: 1G (5 – 150 Hz) or less (except at resonant frequency).

Packing: 1.05G (5 -150 Hz) or less (except at resonant frequency).

> Impact (Drop)

Packing: 1 m (39.4 in) (one angle, three edges and six sides)

NOISE

> Measurement method

The printer is placed 2.46 ft (0.75 m) above the floor and the microphone is set 3.28 ft (1 m) and 4.92 ft (1.5 m) above the floor (in compliance with ISO 7779).

> Printing operation

The printer is measured in the ECMA Standard pattern of 40 characters/line and rear path on one-part paper of 15 lbs (57 gsm).

> Noise value

Average of the three-page printing noise is less than 53 dBA log average of the front and back and right and left of the printer when measured under the above conditions with the printer fitted with the top cover.

AGENCY APPROVALS

> CE

EN55022; 1998 (class B)
EN61000-3-2; 1995
EN61000-3-3; 1995

> EN55024; 1998

> GS

EN60950; 2000

PRINT SPECIFICATION

> Print method: Impact dot matrix

- > Number of dot wires: 24
- > Dot wire diameter: 0.012 in (0.30 mm)
- > Print direction
Bi-directional, short-line-seeking printing
Unidirectional printing specifiable
- > Print speed:

CHARACTER PITCH	HSD	LQ	UTILITY
10 CPI	333 CPS	62.5 CPS	250 CPS
12 CPI	333 CPS	62.5 CPS	250 CPS
15 CPI	333 CPS	62.5 CPS	250 CPS
17.1 CPI	333 CPS	62.5 CPS	250 CPS
20 CPI	333 CPS	62.5 CPS	250 CPS

- > Character sets
Standard ASCII
Epson Character Set (Italics/Graphics)
Foreign Character Substitution (15 types)
Bar Code
- > Selectable character pitches
5 CPI: 0.2 in (5.08 mm)
6 CPI: 0.167 in (4.23 mm)
6.7 CPI: 0.15 in (3.81 mm)
7.5 CPI: 0.133 in (3.39 mm)
8.5 CPI: 0.117 in (2.96 mm)
10 CPI: 0.1 in (2.54 mm)
12 CPI: 0.083 in (2.12 mm)
13.8 CPI: 0.072 in (1.83 mm)
15 CPI: 0.067 in (1.69 mm)
17.1 CPI: 0.058 in (1.48 mm)
20 CPI: 0.05 in (1.27 mm)
- > Maximum number of dot columns per line in graphics:

Graphics

	SINGLE DENSITY	DOUBLE DENSITY	QUADRUPLE DENSITY
60 DPI	480	960	1,920
80 DPI	640		
90 DPI	720	1,440	2,880

ANK Text

CHARACTER PITCH (CPI)	UTILITY MODE	LQ MODE	HSD MODE
10	960	2,880	720
12	960	2,880	-
15	960	2,880	-
17.1	1,920	2,880	-
20	1,920	2,880	-

> Maximum number of characters per line:

CHARACTER PITCH (CPI)	NO OF CHARACTERS
5	40
6	48
6.7	53
7.5	60
8.5	68
10	80
12	96
13.8	120
15	120
17.1	137
20	160

- > Line feed pitches
 - 6 LPI: 0.167 in (4.23 mm)
 - 8 LPI: 0.125 in (3.175 mm)
 - A variable line feed pitch of n/60, n/72, n/180, n/216, or n/360 in can also be specified.
- > Line feed speed
 - 6 LPI spacing: One LF = 47 ms
 - Continuous paper feed rate is 4.3 in per second.

PAPER SPECIFICATION

- > Cut-sheet Paper (standard)
 - Paper width: 100 – 254 mm (3.9 – 10 in)
 - Paper length: 100 – 254 mm (3.9 – 10 in)
 - Weight: 12 - 15 lbs (40 - 58 gsm) standard
 - Thickness: 0.06 - 14 mm
- > Cut-sheet multipart forms
 - Paper width: 100 – 254 mm (3.9 – 10 in)
 - Paper length: 100 – 254 mm (3.9 – 10 in)
 - Weight: 12 - 15 lbs (40 - 58 gsm) standard
 - Number of copies: Original plus 4 copies
 - Thickness: 0.36 mm max. (0.014 in max.)
 - Binding: Line glued to the top of form.
- > Continuous Paper
 - Tractor feed unit can handle sprocket paper a width of 101.6 to 254 mm (4 to 10 in).
 - Ream weight: 14 - 22 lbs (52 - 82 gsm)
 - Multipart paper: Max. 0.39 mm (0.015 in) total thickness .
 - Ream weight (one sheet of multipart): 12 - 15 lbs (40 - 58 gsm).

PAPER TYPE	REAM WEIGHT	NUMBER OF SHEETS
Carbon-lined paper	9 - 11 lbs (35 - 40 gsm)	5 sheet maximum including original (with rear feed)
Pressure sensitive paper	9 - 11 lbs (35 - 40 gsm)	5 sheet maximum including original (with bottom feed)

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> Continuous envelope

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Duty cycle: 25%

> Printhead life

200 million characters (average) in 10 CPI Utility print quality.

Page density: 35%

Duty cycle: 25%

> Printer life

12,000 hours of power-on time or 5 years

Page density: 35%

Duty cycle: 25%

> MTTR

15 minutes Major Sub-assembly level.

Definition of terms:

> Page density: The proportion in area of characters and spaces within printhead movable area.

> Duty cycle: Actual operation rate

> Power on time: 8H/day 25 days/month and 12 months/year

APPENDIX A – COMMAND SUMMARY

COMMAND SUMMARY BY INITIATOR

ASCII CODE	FUNCTION NAME	COMPATIBILITY
BS	BACKSPACE	EPSON LQ/IBM
CAN	CANCEL CODE	EPSON LQ/IBM
CR	CARRIAGE RETURN	EPSON LQ/IBM
DC1	RESET PRINT SUPPRESS MODE	EPSON LQ/IBM
DC2	RESET COMPRESSED CHARACTER PITCH	EPSON LQ
DC2	SET 10 CPI	IBM
DC3	SET PRINT SUPPRESS	EPSON LQ
DC4	RESET IMMEDIATE DOUBLE WIDTH CHARACTERS	EPSON LQ/IBM
DEL	ONE CHARACTER DATA DELETE	EPSON LQ
ESC ! n	PRINT MODE SELECT	EPSON LQ
ESC ! n	SELECT INTERNATIONAL CHARACTER SET	IBM
ESC #	RESET 8 BIT MODE	EPSON LQ
ESC # 0	PRINT QUALITY-SELECT HSD	IBM
ESC \$ n1 n2	EXECUTE ABSOLUTE HORIZONTAL DOT POSITION	EPSON LQ
ESC % 4 n	FINE LINE FEED (n/360 INCH)	IBM
ESC % 8 n	SET n/360 INCH LINE SPACING	IBM
ESC % G	SET ITALICS CHARACTER	IBM

ASCII CODE	FUNCTION NAME	COMPATIBILITY
ESC % H	RESET ITALICS CHARACTERS	IBM
ESC % n	DLL FONT SELECT	EPSON LQ
ESC & m n1 n2 d0 d1 d2 <DLL data>	CHARACTER DEFINITION	EPSON LQ
ESC C -	SELECT SCORE STYLE	EPSON LQ
ESC * m n1 n2 <graphics data>	ENTER/EXIT BIT IMAGE GRAPHICS	EPSON LQ/IBM XL24 AGM
ESC - n	SET/RESET UNDERLINING	EPSON LQ/IBM
ESC / n	SELECT VERTICAL TAB CHANNEL	EPSON LQ
ESC 0	SET 1/8 INCH FIXED LINE SPACING	EPSON LQ/IBM
ESC 1	SET 7/72 INCH FIXED LINE SPACING	IBM
ESC 2	SET 1/6 INCH LINE SPACING	EPSON LQ
ESC 2	START LINE SPACING	IBM
ESC 3 n	SET n/180 INCH LINE SPACING	EPSON LQ/IBM PPR/IBM XL24
ESC 4	SET ITALIC CHARACTERS	EPSON LQ
ESC 4	TOP OF FORM SET	IBM
ESC 5	RESET ITALIC CHARACTERS	EPSON LQ
ESC 5 n	SET/RESET AUTOMATIC LINEFEED	IBM
ESC 6	SELECT CHARACTER SET II	IBM
ESC 7	SELECT CHARACTER SET I	IBM
ESC :	SET 12 CPI	IBM

ASCII CODE	FUNCTION NAME	COMPATIBILITY
ESC : NUL n NUL	COPIES ROM CG TO RAM CG	EPSON LQ
ESC <	ONE LINE UNIDIRECTIONAL PRINTING	EPSON LQ
ESC =	SET BIT 7 CODE TO 0	EPSON LQ
ESC = n1 n2 ... <data>	LOAD DLL CHARACTER	IBM
ESC >	SET BIT 7 CODE TO 1	EPSON LQ
ESC ? m n	REASSIGN ALTERNATE GRAPHICS CODES	EPSON LQ
ESC @	PRINTER INITIALISATION	EPSON LQ
ESC A n	SET N/60 INCH LINE SPACING	EPSON LQ/IBM PPR/IBM XL24
ESC B n1 n2 ... nk NUL	SET VERTICAL TAB STOPS	EPSON LQ/IBM
ESC C NUL n	FORM LENGTH SET BY INCHES	EPSON LQ/IBM
ESC C n	FORM LENGTH SET BY LINES	EPSON LQ/IBM
ESC D n1 n2 ... nj nk NUL	HORIZONTAL TAB SET	EPSON LQ/IBM
ESC E	SET EMPHASISED PRINT MODE	EPSON LQ/IBM
ESC F	RESET EMPHASISED PRINT MODE	EPSON LQ/IBM
ESC G	SET ENHANCED/DOUBLE STRIKE PRINT MODE	EPSON LQ/IBM
ESC H	RESET ENHANCED/DOUBLE STRIKE PRINT MODE	EPSON LQ/IBM
ESC I n	PRINT MODE SELECT	IBM
ESC J n	FINE LINE FEED (n/180 INCH)	EPSON LQ/IBM PPR/IBM XL24

ASCII CODE	FUNCTION NAME	COMPATIBILITY
ESC K n1 n2 <graphics data>	SINGLE DENSITY GRAPHICS	EPSON LQ/IBM
ESC L n1 n2 <graphics data>	DOUBLE DENSITY GRAPHICS	EPSON LQ/IBM
ESC M	SET ELITE CHARACTER PITCH (12 CPI)	EPSON LQ
ESC N n	SET PERFORATION AUTO SKIP	EPSON LQ/IBM
ESC O	RESET PERFORATION AUTO SKIP	EPSON LQ/IBM
ESC P	SET PICA CHARACTER PITCH (10 CPI)	EPSON LQ
ESC P n	SET/RESET PROPORTIONAL SPACING	IBM
ESC Q n	PRINT SUPPRESS	IBM
ESC Q n	RIGHT MARGIN SET	EPSON LQ
ESC R	RESET TABLE SETTINGS TO POWER-ON DEFAULT VALUES	IBM
ESC R n	FOREIGN CHARACTER SET SELECT	EPSON LQ
ESC S n	SET SUBSCRIPT/SUPERSCRIPT	EPSON LQ/IBM
ESC SI	SET COMPRESSED CHARACTER PITCH	EPSON LQ/IBM
ESC SI	SET 20 CPI	IBM
ESC SO	SET IMMEDIATE DOUBLE CHARACTERS	EPSON LQ
ESC SP n	SET CHARACTER SPACING	EPSON LQ/IBM
ESC T	RESET SUPER/SUBSCRIPT	EPSON LQ/IBM
ESC U n	SET/RESET UNIDIRECTIONAL PRINTING	EPSON LQ/IBM

ASCII CODE	FUNCTION NAME	COMPATIBILITY
ESC US n	SET/RESET DOUBLE HEIGHT CHARACTERS	EPSON LQ
ESC W n	SET DOUBLE WIDTH OR EXPANDED CHARACTERS	EPSON LQ/IBM
ESC X n1 n2	SET LEFT/RIGHT MARGIN	IBM
ESC Y n1 n2 <graphics data>	QUASI-DOUBLE DENSITY GRAPHICS	EPSON LQ/IBM
ESC Z n1 n2 <graphics data>	SET QUADRUPLE DENSITY GRAPHICS	EPSON LQ/IBM
ESC [@ n1 n2 m1 m2 m3 m4	SET/RESET DOUBLE HEIGHT CHARACTERS	IBM
ESC [T	SET CODE PAGE	IBM
ESC [\ 4 0 0 0 n1 n2	SET VERTICAL UNITS	IBM
ESC [g n1 n2 m data	GRAPHICS RESOLUTION	IBM XL24
ESC [n	SET n/360 INCH FINE LINE SPACING	EPSON LQ
ESC \ n1 n2	EXECUTE RELATIVE DOT POSITION	EPSON LQ
ESC \ n1 n2	PRINT CONTINUOUSLY FROM ALL CHARACTERS CHART	IBM
ESC] n	FINE LINE FEED (n/360 INCH)	EPSON LQ
ESC]	REVERSE LINE FEED	IBM
ESC *	PRINT ONE CHARACTER FROM ALL CHARACTERS CHART	IBM
ESC _ n	OVERSCORE SET/RESET	IBM
ESC a n	AUTO JUSTIFICATION	EPSON LQ
ESC b n m1 m2 ... mk NUL	SET VERTICAL FORMAT UNIT (VFU)	EPSON LQ

ASCII CODE	FUNCTION NAME	COMPATIBILITY
ESC d n1 n2	MOVE RIGHT RELATIVE DOT POSITION	IBM
ESC e	RELATIVE MOVE INLINE BACKWARD	IBM
ESC g	SET 15 CHARACTER PER INCH	EPSON LQ/IBM
ESC j	STOP PRINTING	IBM
ESC j n	REVERSE LINE FEED	EPSON LQ
ESC k n	SELECT TYPESTYLES	EPSON LQ/IBM
ESC I n	LEFT MARGIN SET	EPSON LQ
ESC n	SET ASPECT RATIO	IBM
ESC p n	SET/RESET PROPORTIONAL SPACING	EPSON LQ
ESC q n	SELECT CHARACTER STYLE	EPSON LQ/IBM
ESC s n	SET/RESET HALF SPEED PRINTING	EPSON LQ
ESC t n	SELECT CHARACTER TABLE	EPSON LQ
ESC w n	SET/RESET DOUBLE HEIGHT CHARACTERS	EPSON LQ
ESC x n	SELECT CHARACTER FONT	EPSON LQ
ESC y n	SELECT FONT	EPSON LQ
FF	FORM FEED	EPSON LQ/IBM
HT	HORIZONTAL TAB	EPSON LQ/IBM
LF	LINE FEED	EPSON LQ/IBM
SI	SET COMPRESSED CHARACTER PITCH	EPSON LQ/IBM
SO	SET IMMEDIATE DOUBLE WIDTH CHARACTERS	EPSON LQ/IBM

ASCII CODE	FUNCTION NAME	COMPATIBILITY
VT	VERTICAL TAB	EPSON LQ/IBM
ESC +	SELECT N/360 m LINE SPACING	EPSON LQ
ESC 6	DISABLE UPPER ASCII CONTROL CODES	EPSON LQ
ESC 7	ENABLE UPPER ASCII CONTROL CODES	EPSON LQ
ESC 8	DISABLE PAPER OUT SENSOR	EPSON LQ/IBM
ESC 9	ENABLE PAPER OUT SENSOR	EPSON LQ/IBM
ESC } NUL	SOFTWARE I-PRIME	EPSON LQ/IBM
ESC (0	PRINT QUALITY-SELECT HSD	EPSON LQ
ESC (B	PRINT BARCODE	EPSON LQ
ESC (t	ASSIGN CHARACTER TABLE	EPSON LQ
ESC]	FINE LINE FEED EXECUTE (n/360")	EPSON LQ
ESC { n	SELECT EMULATION MODE	EPSON LQ/IBM
FS 3 n	SET n/360 INCH LINE SPACING	EPSON LQ
FS @	PRINTER INITIALISING	EPSON LQ
FS E n	SET DOUBLE WIDTH OR EXPANDED CHARACTER	EPSON LQ
FS F	SET FORWARD LINE SPACING	EPSON LQ
FS I	SELECT CHARACTER TABLE	EPSON LQ
FS R	SET REVERSE LINE SPACING	EPSON LQ
FS V	SET/RESET DOUBLE HEIGHT CHARACTERS	EPSON LQ

ASCII CODE	FUNCTION NAME	COMPATIBILITY
FS Z n1 n2	SET HEX-DENSITY GRAPHICS	EPSON LQ

COMMAND SUMMARY BY FUNCTION

FUNCTION NAME	ASCII CODE	COMPATIBILITY
AUTO JUSTIFICATION	ESC a n	EPSON LQ
BACKSPACE	BS	EPSON LQ/IBM
CANCEL CODE	CAN	EPSON LQ/IBM
CARRIAGE RETURN	CR	EPSON LQ/IBM
CHARACTER DEFINITION	ESC & m n1 n2 d0 d1 d2 <DLL data>	EPSON LQ
COPIES FROM CG TO RAM CG	ESC : NUL n NUL	EPSON LQ
DLL FONT SELECT	ESC % n	EPSON LQ
DOUBLE DENSITY GRAPHICS	ESC L n1 n2 <graphics data>	EPSON LQ/IBM
ENABLE UPPER ASCII CONTROL CODES	ESC 7	EPSON LQ/IBM
ENTER/EXIT BIT IMAGE GRAPHICS	ESC * m n1 n2 <graphics data>	EPSON LQ/IBM XL24 AGM
EXECUTE ABSOLUTE HORIZONTAL DOT POSITION	ESC \$ n1 n2	EPSON LQ
EXECUTE RELATIVE DOT POSITION	ESC \ n1 n2	EPSON LQ
FINE LINE FEED (n/180 INCH)	ESC J n	EPSON LQ/IBM PPR/IBM XL24
FINE LINE FEED (n/360 INCH)	ESC] n	EPSON LQ
FINE LINE FEED (n/360 INCH)	ESC % 4 n	IBM
FOREIGN CHARACTER SET SELECT	ESC R n	EPSON LQ
FORM FEED	FF	EPSON LQ/IBM
FORM LENGTH SET BY INCHES	ESC C NUL n	EPSON LQ/IBM
FORM LENGTH SET BY LINES	ESC C n	EPSON LQ/IBM

FUNCTION NAME	ASCII CODE	COMPATIBILITY
GRAPHICS RESOLUTION	ESC [g n1 n2 m data	IBM PPR
HORIZONTAL TAB	HT	EPSON LQ/IBM
HORIZONTAL TAB SET	ESC D n1 n2 ... nj nk NUL	EPSON LQ/IBM
LEFT MARGIN SET	ESC I n	EPSON LQ
LINE FEED	LF	EPSON LQ/IBM
LOAD DLL CHARACTER	ESC = n1 n2 ... <data>	IBM
MOVE RIGHT RELATIVE DOT POSITION	ESC d n1 n2	IBM
ONE CHARACTER DATA DELETE	DEL	EPSON LQ
ONE LINE UNIDIRECTIONAL PRINTING	ESC <	EPSON LQ
OVERSCORE SET/ RESET	ESC _ n	IBM
PRINT BARCODE	ESC (B	EPSON LQ
PRINT CONTINUOUSLY FROM ALL CHARACTERS CHART	ESC \ n1 n2	IBM
PRINT MODE SELECT	ESC ! n	EPSON LQ
PRINT MODE SELECT	ESC I n	IBM
PRINT ONE CHARACTER FROM ALL CHARACTERS CHART	ESC *	IBM
PRINT QUALITY-SELECT HSD	ESC # 0	IBM
PRINT QUALITY-SELECT HSD	ESC (0	EPSON LQ
PRINT SUPPRESS	ESC Q n	IBM
PRINTER INITIALISATION	ESC @	EPSON LQ

FUNCTION NAME	ASCII CODE	COMPATIBILITY
PRINTER INITIALISATION	FS @	EPSON LQ
QUASI-DOUBLE DENSITY GRAPHICS	ESC Y n1 n2 <graphics data>	EPSON LQ/IBM
REASSIGN ALTERNATE GRAPHICS CODES	ESC ? m n	EPSON LQ
RESET 8 BIT MODE	ESC #	EPSON LQ
RESET COMPRESSED CHARACTER PITCH	DC2	EPSON LQ
RESET EMPHASISED PRINT MODE	ESC F	EPSON LQ/IBM
RESET ENHANCED/DOUBLE STRIKE PRINT MODE	ESC H	EPSON LQ/IBM
RESET IMMEDIATE DOUBLE WIDTH CHARACTERS	DC4	EPSON LQ/IBM
RESET ITALIC CHARACTERS	ESC 5	EPSON LQ
RESET ITALICS CHARACTERS	ESC % H	IBM
RESET PERFORATION AUTO SKIP	ESC 0	EPSON LQ/IBM
RESET PRINT SUPPRESS MODE	DC1	EPSON LQ/IBM
RESET SUPER/SUBSCRIPT	ESC T	EPSON LQ/IBM
RESET TAB SETTINGS TO POWER-ON DEFAULT VALUES	ESC R	IBM
REVERSE LINE FEED	ESC j n	EPSON LQ
REVERSE LINE FEED	ESC]	IBM
RIGHT MARGIN SET	ESC Q n	EPSON LQ
SCORE SELECT	ESC L - Ln Hn P1 P2	IBM
SELECT CHARACTER SET II	ESC 6	EPSON LQ/IBM

FUNCTION NAME	ASCII CODE	COMPATIBILITY
SELECT CHARACTER TABLE	ESC t n	EPSON LQ
SELECT CHARACTER TABLE	FS I n	EPSON LQ
SELECT FONT	ESC y n	EPSON LQ/IBM
SELECT INTERNATIONAL CHARACTER SET	ESC ! n	IBM
SELECT TYPESTYLES	ESC k n	EPSON LQ/IBM
SELECT VERTICAL TAB CHANNEL	ESC / n	EPSON LQ
SET/RESET DOUBLE HEIGHT CHARACTERS	ESC US n	EPSON LQ
SET/RESET DOUBLE HEIGHT CHARACTERS	ESC w n	EPSON LQ
SET/RESET DOUBLE HEIGHT CHARACTERS	ESC [@ n1 n2 m1 m2 m3 m4	IBM
SET 1/6 INCH LINE SPACING	ESC 2	EPSON LQ
SET 1/8 INCH FIXED LINE SPACING	ESC Ø	EPSON LQ/IBM
SET 10 CPI	DC2	IBM
SET 12 CPI	ESC :	IBM
SET 15 CHARACTER PER INCH	ESC g	EPSON LQ/IBM
SET 20 CPI	ESC SI	IBM
SET 7/72 INCH FIXED LINE SPACING	ESC 1	IBM
SET BIT 7 CODE TO 0	ESC =	EPSON LQ
SET BIT 7 CODE TO 1	ESC >	EPSON LQ
SET CHARACTER SPACING	ESC SP n	EPSON LQ
SET COMPRESSED CHARACTER PITCH	ESC SI	EPSON LQ/IBM

FUNCTION NAME	ASCII CODE	COMPATIBILITY
SET COMPRESSED CHARACTER PITCH	SI	EPSON LQ/IBM
SET DOUBLE HEIGHT CHARACTER	FS V n	EPSON LQ
SET DOUBLE WIDTH OR EXPANDED CHARACTERS	ESC W n	EPSON LQ/IBM
SET DOUBLE WIDTH OR EXPANDED CHARACTERS	FS E n	EPSON LQ
SET ELITE CHARACTER PITCH (12 CPI)	ESC M	EPSON LQ
SET EMPHASISED PRINT MODE	ESC E	EPSON LQ/IBM
SET ENHANCED/DOUBLE STRIKE PRINT MODE	ESC G	EPSON LQ/IBM
SET FORWARD LINE SPACING	FS F	EPSON LQ
SET IMMEDIATE DOUBLE WIDTH CHARACTERS	ESC S0	EPSON LQ
SET IMMEDIATE DOUBLE WIDTH CHARACTERS	SO	EPSON LQ/IBM
SET HEX-DENSITY GRAPHICS	FS Z n1 n2	EPSON LQ
SET ITALIC CHARACTERS	ESC 4	EPSON LQ
SET ITALICS CHARACTER	ESC % G	IBM
SET LEFT/RIGHT MARGIN	ESC X n1 n2	IBM
SET PERFORATION AUTO SKIP	ESC N n	EPSON LQ/IBM
SET PICA CHARACTER PITCH (10 CPI)	ESC P	EPSON LQ
SET PRINT SUPPRESS	DC3	EPSON LQ

FUNCTION NAME	ASCII CODE	COMPATIBILITY
SET QUADRUPLE DENSITY GRAPHICS	ESC Z n1 <graphics data>	EPSON LQ/IBM
SET REVERSE LINE SPACING	FS R	EPSON LQ
SET SUBSCRIPTS/ SUPERSCRIPT	ESC S n	EPSON LQ/IBM
SET VERTICAL FORMAT UNIT (VFU)	ESC b n m1 m2 ... mk NUL	EPSON LQ
SET VERTICAL TAB STOPS	ESC B n1 n2 ... nk NUL	EPSON LQ/IBM
SET VERTICAL UNITS	ESC [\ 4 0 0 0 n1 n2	IBM
SET n/180 INCH LINE SPACING	ESC 3 n	EPSON LQ/IBM PPR/IBM XL24
SET n/360 INCH FINE LINE SPACING	ESC [n	EPSON LQ
SET n/360 INCH LINE SPACING	ESC % 8 n	IBM
SET n/360 INCH LINE SPACING	FS 3 n	EPSON LQ
SET n/60 INCH LINE SPACING	ESC A n	EPSON LQ/IBM PPR/IBM XL24
SET/RESET AUTOMATIC LINEFEED	ESC 5 n	IBM
SET/RESET HALF SPEED PRINTING	ESC s n	EPSON LQ
SET/RESET PROPORTIONAL SPACING	ESC p n	EPSON LQ
SET/RESET PROPORTIONAL SPACING	ESC P n	IBM
SET/RESET UNDERLINING	ESC — n	EPSON LQ/IBM
SET/RESET UNIDIRECTIONAL PRINTING	ESC U n	EPSON LQ/IBM

FUNCTION NAME	ASCII CODE	COMPATIBILITY
SINGLE DENSITY GRAPHICS	ESC k n1 n2 <graphics data>	EPSON LQ/IBM
START LINE SPACING	ESC 2	IBM
STOP PRINTING	ESC j	IBM
TOP OF FORM SET	ESC 4	IBM
VERTICAL TAB	VT	EPSON LQ/IBM
SET n/360 INCH LINE SPACING	ESC + n	EPSON
DISABLED PAPER END SENSOR	ESC 8	EPSON/IBM
ENABLED PAPER END SENSOR	ESC 9	EPSON/IBM
SELECT CHARACTER STYLE	ESC q n	EPSON LQ/IBM
SELECT UTL/LQ PRINT QUALITY	ESC x n	EPSON LQ
SELECT EMULATION MODE	ESC { n	EPSON LQ/IBM
SOFTWARE I-PRIME	ESC } NUL	EPSON LQ/IBM
ASSIGN CHARACTER TABLE	ESC (t	EPSON LQ
SELECT CODE PAGE	ESC [T	IBM
RELATIVE MODE INLINE BACKWARD	ESC e	IBM
SELECT ASPECT RATIO	ESC n	IBM

APPENDIX B – PRINT MODES/FEATURES

IBM MODE

Priority		1						2	3	4	5	6						
Priority	M1	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI	Proportional	Line Graphics	Super/Sub	UTL - ROM / RAM	LQ - ROM / RAM	Italics	Horizontal Enhancement	Double Strike	Horizontal Expansion	Vertical Expansion	Outline/Shadow	Score
	M2																	
1	10 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.1 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Proportional	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Line Graphics								x			x					x	x
3	Super/Sub							x										
4	UTL - ROM / RAM																	
	LQ - ROM / RAM																	
5	Italics							x										
6	Horizontal Enhancement																	
	Double Strike																	
	Horizontal Expansion																	
	Vertical Expansion																	
	Outline/Shadow								x									
	Score								x									

- : Combination is not provided.

x : Combination is impossible. A mode with lower priority is suppressed.

No marking : Combination is possible.

Combinations are given for the case where modes are sent in the order, M1 → M2

NOTE

- The following modifications are not made to Integral (F4H, F5H) characters:
Super/Sub Script
Italics
Outline/Shadow
Score
- The following modifications are not made to an under-bar (5FH) character and double under-bar (multilingual F2H) character:
Super/Sub Script
Italics
Outline/Shadow

EPSON MODE

	Priority	1					2	3	4	5	6									
Priority	M1																			
	M2	10 CPI	12 CPI	15 CPI	17.1 CPI	20 CPI	Proportional	Line Graphics	Super/Sub	UTL - ROM / RAM	LQ - ROM / RAM	Italics	Horizontal Enhancement	Double Strike	Horizontal Expansion	One-line Horizontal Expansion	Vertical Expansion	Outline/Shadow	Score	Clearance
1	10 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.1 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20 CPI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Proportional	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Line Graphics									x		x						x	x	
3	Super/Sub									x										
4	UTL - ROM / RAM										-									
	LQ - ROM / RAM										-									
5	Italics									x										
6	Horizontal Enhancement																			
	Double Strike																			
	Horizontal Expansion																			
	One-line Horizontal Expansion																			
	Vertical Expansion																			
	Outline/Shadow										x									
	Score										x									
	Clearance																			

- : Combination is not provided.

x : Combination is impossible. A mode with lower priority is suppressed.

No marking : Combination is possible.

Combinations are given for the case where modes are sent in the order, M1 → M2

NOTE

1. The following modifications are not made to Integral (F4H, F5H) characters:

Super/Sub Script

Italics

Outline/Shadow

Score

2. The following modifications are not made to an under-bar (5FH) character and double under-bar (multilingual F2H) character.

Super/Sub Script

Multilingual 850

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

Norway 865

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

Portugal 860

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

Turkey

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

Greek_437

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

Greek_928

0 1 2 3 4 5 6 7 8 9 : ; < = > ?
! " # \$ % & ' () * + , - . /
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [\] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~
À Á Â Ã Ä Å Æ Ç È É Ê Ë
Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú
Û Ü Ý Þ à á â ã ä å æ ç è é
ê ë ì í î ï ð ñ ò ó ô õ ö
÷ ø ù ú û ü ý þ ÿ

ISO Latin 6 (8859/10)

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

Windows Baltic

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

Baltic_774

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

KBL-Lithuanian

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

Cyrillic Latvian

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

Roman-8

0	1	2	3	4	5	6	7	8	9	:	<	=	>	?	
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

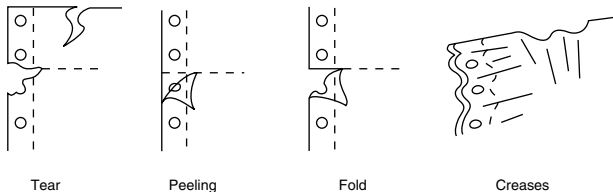
APPENDIX D – MEDIA SPECIFICATIONS

GENERAL

UNSUITABLE PAPER

The following paper is not to be used as paper feed instability may result, causing paper jamming, paper folding, print misalignment or, at worst, printhead pin breaking.

- > Ultra light or heavy paper (not meeting media specifications)
- > Too small or too large paper (not meeting media specifications)
- > Paper with cutouts or windows
- > Paper with pins, clips and staples
- > Creased or wrinkled paper
- > Paper with exposed glue or with peeling areas
- > Paper with embossed surfaces
- > Continuous paper folded at places other than along horizontal perforations
- > Multipart forms where not all parts are of the same size, or multipart continuous forms where the number of parts varies along the length of the form
- > Paper with torn or folded ends, sides or corners
- > Paper bearing postage stamps or seals

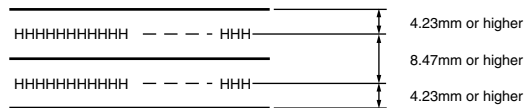


PRE-PRINTED PAPER

When printing on paper with pre-printed lines and tables, the print may not appear where expected within the lines and table frames due to paper feed effects or misaligned paper setting. Note the following points when using pre-printed paper.

- > Carry out adequate test prints initially to ensure that there is no problem with the print quality.
- > Make sure that there is no wet ink or ink that has not completely dried on the pre-printed sheets, to prevent pieces of paper from sticking to each other.
- > Do not use pre-printed sheets with print margins at the maximum possible printable margin positions.

Horizontal Lines (Rows)

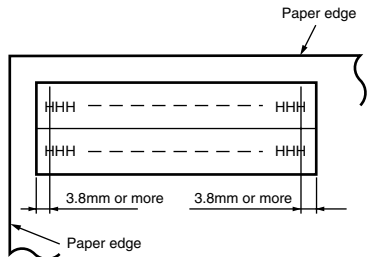


NOTE

Maintain a line spacing between characters of 8.47 mm (1/3 in) or more.

Maintain a 4.23 mm or more distance from the centre of a character to the line.

Vertical Lines (Columns)



NOTE

Maintain a 3.8 mm margin from the centre of the character for vertical lines

Maintain a parallelism of 0.1 degree or better as standard between the edges of the paper and pre-printed lines.

PAPER STORAGE CONDITIONS

Paper is to be stored under environmental conditions of temperature 10 – 30°C and humidity 30 – 70%. Also, when there is a difference in environmental conditions between the storage area and where the paper is used, allow time for the paper to reach the environmental conditions of where it is to be used before using it.

USABLE PAPER TYPES AND ASSURANCE RANGE

In the following table, “assurance” means that printer specifications, including print specifications and paper feeding characteristics, are met. The symbols in the Assurance column have the following meanings:

A: paper types usable, with assurance

B: paper types conditionally usable, but without assurance.

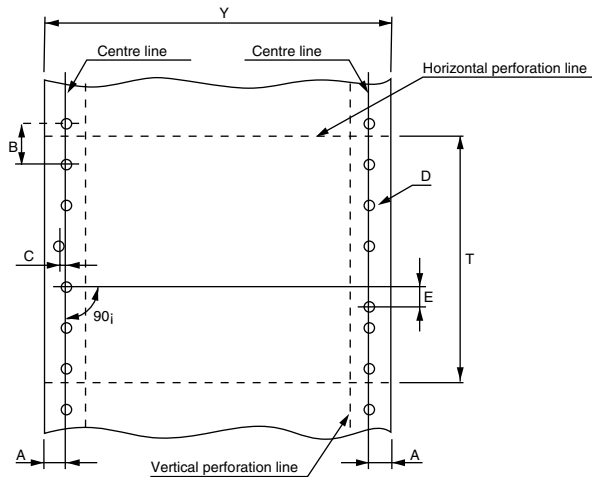
X: not to be used

PAPER TYPE	ASSURANCE	CONDITIONS
Continuous paper	A	See “Continuous paper (continuous forms)” on page 191.
Continuous paper with binding holes	B	See “Binding holes” on page 203.
Continuous paper with corner cut	B	See “Corner cuts” on page 204.
Cut-Sheet paper	A	See “Cut-sheet paper” on page 206.
Cut-Sheet paper with binding holes	B	See “Binding holes” on page 203.
Cut-Sheet paper with Perforations	B	See “Perforations” on page 211.
Envelopes	A	See “Envelopes (individual)” on page 213.

PAPER TYPE	ASSURANCE	CONDITIONS
Label Paper (continuous form)	B	See "Label paper" on page 214.
Label Paper (single sheets)	B	See "Label paper" on page 214.
Package delivery slips	B	See "Package delivery slips" on page 218.
Transparency	X	
Passbook	X	
Removed cheque	X	

CONTINUOUS PAPER (CONTINUOUS FORMS)

Continuous paper must be fanfold paper with feed holes.



VERTICAL AND HORIZONTAL DIMENSIONS

(Measurement Condition: Temperatures 20 ± 2 °C, Relative Humidity: $65 \pm 2\%$.)

Vertical dimension

The following is standard for the vertical dimension T.

TYPE (NAME)	DIMENSION (MM)	TOLERANCE (MM)
T11	279.4	-0.5

For usable areas, see ["Paper size and printing areas" on page 196](#).

Horizontal dimension

The following two types are standards for the horizontal dimension Y.

TYPE (NAME)	DIMENSION (MM)	TOLERANCE (MM)
Y10	254.0	+1.5, -0.5
Y12	304.8	

For usable areas, see ["Paper size and printing areas" on page 196](#).

Folding dimension

The following is a standard folding dimension. Paper is to be fan-folded along perforations.

TYPE (NAME)	DIMENSION (MM)	CORRESPONDING VERTICAL DIMENSION TYPE
F11	279.4	T11

FEED HOLE (SPROCKET HOLE) POSITIONS AND SIZES

Sprocket hole positions and sizes are shown below. For this section, a centre line is defined as a centre-to-centre line

between any two sprocket holes approximately 254 mm apart in the direction of paper feed.

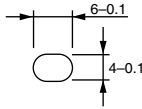
ITEM	DIMENSION (MM)		REMARKS
Distance between centre line and paper edge on same side	A	6.35 ±0.7	6.35 mm is standard.
Sprocket hole diameter	D	4.0 ±0.1	The diameters of sprocket holes with a dentate edge must be a minimum of D and a maximum of 4.5 mm.
Centre-to-centre distance between sprocket holes	B	12.70 ± 0.05	Centre-to-centre distance between adjacent sprocket holes.
Cumulative error in centre-to-centre distance between sprocket holes	-	Within ±0.3	Distance between any two sprocket holes within 254 mm.
Deviation of sprocket hole centre from its position	C	Within 0.1	Deviation of sprocket hole from centre line on that hole side.
Vertical misalignment between horizontally corresponding sprocket holes	E	Within 0.15	Amount of misalignment between a line that is drawn through the centre of any left-side sprocket hole and vertically to that-side centre line, and the centre of its corresponding right-side sprocket hole.
Inclination of centre line on each side	-	Within 0.15	When both centre lines are moved parallel to themselves to overlap each other at one end, distance between the other ends.

NOTE

The shape of sprocket holes must be a complete circle on both sides of the paper, or a complete circle on the left and an oval on the right. Also, dentate edges of the holes are allowable.

Ensure that sprocket hole edges do not turn down.

Oval hole size is shown below, dimensions in mm:



Make sure that chad arising from sprocket hole punching does not remain on the paper.

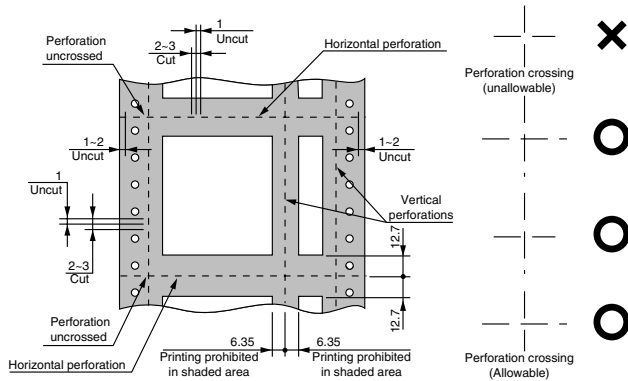
PERFORATION DIMENSIONS

- > Perforations must be able to withstand full-speed paper feed and be easy to tear.
- > Uncuts (i.e. uncut segments) of perforations must be uncut securely, and not be torn at any position. Note that uncuts particularly on folding lines are apt to tear.
- > For proper proportion of cut to uncut for perforations, which is determined according to paper quality, weight and the number of form parts, the following is recommended:

	NUMBER OF FORM PARTS	CUT LENGTH	UNCUT LENGTH
Horizontal perforation Rear tractor	1 – 6	2 – 3 mm	1 mm
Vertical perforation Rear tractor	1 – 6	3 mm	1 mm

- > Horizontal perforations
1 – 2 mm of each side edge is to be uncut. Printing is not to be performed within 12.7 mm (1/2 in) of each horizontal perforation.
- > Vertical perforations

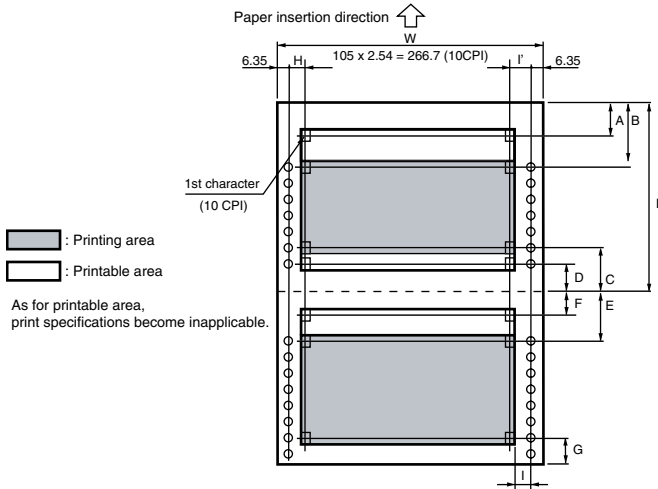
Printing is not to be performed within 6.35 mm (1/4 in) of any vertical perforation that runs in printing areas. The cuts of vertical and horizontal perforations are to uncross each other at the points the perforations cross each other, to prevent paper peeling.



NOTE

Paper may float at any perforation cuts of its right or left side or of any crosspoints of perforations and cause the carriage to snag on it.

PAPER SIZE AND PRINTING AREAS



DIMENSION	NAME	SPECIFICATION VALUE
W	Paper width	76.2 to 304.8 mm (3 to 12 in)
L	Paper length	76.2 to 355.6 mm (3 to 14 in). However, 279.4 mm (11 in), an integral multiple of 25.4 mm (1 in), is standard.
A	Positioning start position	Variable by menu setting. 2.12 mm (1/12 in), 6.35 mm (1/4 in), 10.58 mm (5/12 in), 23.28 mm (11/12 in), 25.4 mm (1 in) or 27.52 mm (13/12 in).
B	Upper edge of printing area (first sheet)	26.5 mm
C	Lower edge of printing area	19.05 mm (3/4 in)
D	Lower edge of printable area	6.35 mm (1/4 in)

DIMENSION	NAME	SPECIFICATION VALUE
E	Upper edge of printing area	19.05 mm (3/4 in)
F	Upper edge of printable area	6.35 mm (1/4 in)
G	Paper end detecting position	Approx. 72 mm (2.84 in)
H	Left printing prohibition area	12.7 to 22.2 mm (1/2 to 7/8 in) for paper widths between 3 and 11 in. 14.0 to 22.2 mm (0.55 to 7/8 in) for paper width 12 in.
I	Right printing prohibition area	11.43 mm (9/20 in) [I': 12.7 mm (1/2 in)].

NOTE

Printing data in the light-grey filled areas is possible, but may affect paper feed accuracy.

Print specifications do not apply to the last sheet of paper.

In setting print formats, take note that printing data beyond printing areas may impair print quality or adversely affect the printer.

Each horizontal perforation is to be accurately at the centre of the space between paper feed holes. Placing horizontal perforations close to paper feed holes causes the paper to peel, and carriage snagging on the paper may occur.

Do not attempt to save paper by allowing the sprocket holes in the last page to come off the pin tractor sprockets.

PAPER QUALITY

The following paper quality is usable:

TYPE	PAPER QUALITY
Single-part Form	White, high quality paper
Multipart Form	Pressure-sensitive paper, carbon-backed paper or interleaved paper (Note 1)

NOTE

- 1.** *Interleaved paper is a multipart form with carbon paper interleaved.*

Paper smoothness is within 100 seconds.

For paper other than the above, it is advised that adequate prior testing is performed to ensure the paper does not present problems.

PAPER WEIGHT AND MAX. NO. OF FORM PARTS

The following table shows usable paper weights and the maximum number of printing form parts:

TYPE	PAPER QUALITY	WEIGHT (NOTE 1)	MAXIMUM NUMBER OF FORM PARTS	TOTAL PAPER THICKNESS
Single-part form	High quality paper	45 to 110 kg (52 to 128 gsm)	–	–
Multipart form for rear tractor	Pressure-sensitive paper	26 to 34 kg (30 to 40 gsm) is standard.	Six parts (original + five parts)	0.36 mm or less
	Carbon-backed paper		Four parts (original + three parts)	
	Interleaved paper (Note 2)			

NOTE

- 1.** *Paper weight is that of 1,000 sheets, each having a unit area (788 x 1,091 mm), and is expressed in kg.*
- 2.** *The thickness of carbon paper used as interleaved paper must be 0.03 mm or less.*

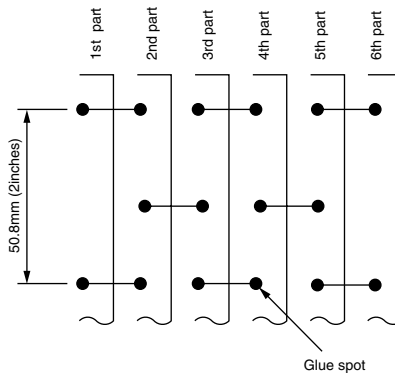
METHODS FOR JOINING PARTS OF MULTIPART FORMS

Spot gluing or stapleless stapling is used for joining the parts of each multipart form. To prevent misalignment between parts, gluing is required. Stapleless stapling may cause a misalignment

of about 3 mm between parts. Stapling with metal staples is strictly prohibited.

Spot gluing

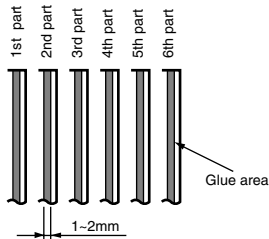
- > Forms are to be spot glued at both sides (single-side spot gluing is not allowed).
- > Each glue application spot must be glued evenly, and be of 3 to 5 mm in size. The glue spot is to be accurately pressed to prevent its floating and there is to be no significant creasing.
- > For positioning of glue spots, see the illustration below.
- > Spot gluing is to be applied in a staggered format.



Gluing the lines

- > The glue line area should be even, with a width of 1 – 2 mm.
- > Always press the glue line area to prevent any lifting. Further, do not use any paper which has significant wrinkling.
- > Ensure that the glue does not extend outside the margins of the paper.

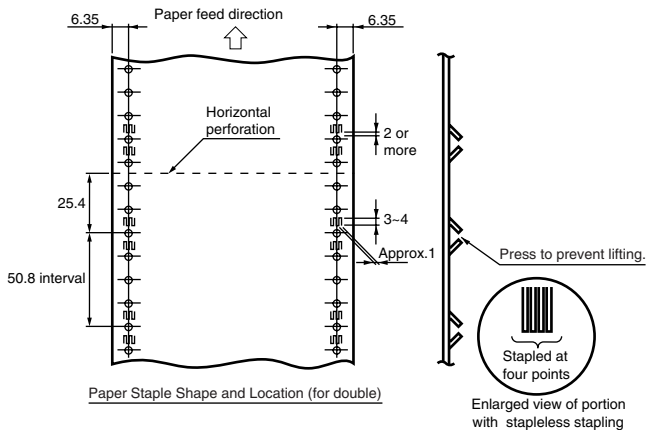
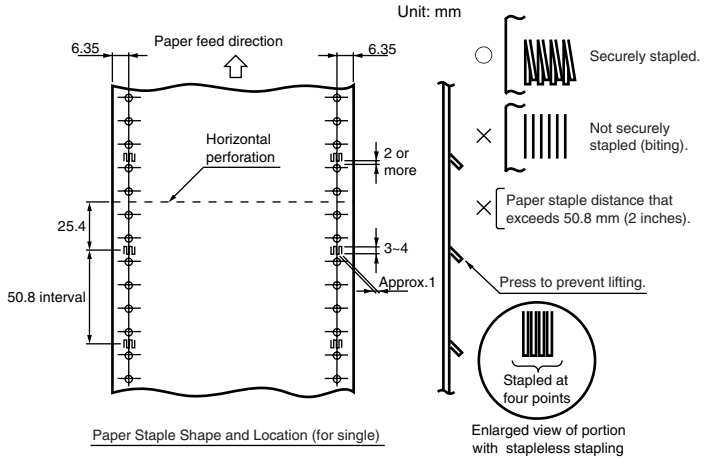
- > Be careful if the glue area is on thick (hard) paper, since this can affect paper feed precision.



Paper stapling

- > Stapling of both sides of the paper is allowed. Stapling on only one side is not allowed.
- > The paper must always be stapled from the front of the paper. Ensure that the staple does not emerge from the front page.
- > The paper must be stapled with double staples in the paper feed direction. It is also recommended that the staples are applied in order in the paper feed direction.
- > Make sure that the paper is securely stapled without any lifting being evident.
- > After the paper is stapled, it should be pressed to prevent any lifting.

Paper that does not comply with the specifications shown in the diagram below will not be guaranteed. It may suffer from slipping between layers and compromise paper feed quality.



Combinations of part weights of multipart forms

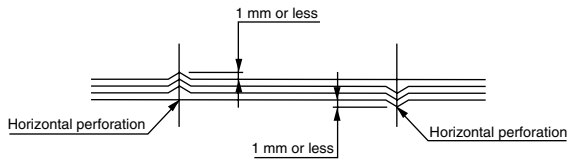
The following table shows usable combinations of paper weights for multipart forms. In each combination, its base (last) part is equal to or more than the other part(s) in weight. Weights not

within the usable ranges listed below impair paper feed accuracy and are not assured.

MAX. NO. OF FORM PARTS	2 PT	3 PT	4 PT	5 PT	6 PT
1st part	34-55 kg	34-43 kg	34 kg	34 kg	34 kg
2nd part	34-70 kg	34-43 kg	34 kg	34 kg	34 kg
3rd part		34-70 kg	34 kg	34 kg	34 kg
4th part			34-70 kg	34 kg	34 kg
5th part				34-70 kg	34 kg
6th part					34-70 kg

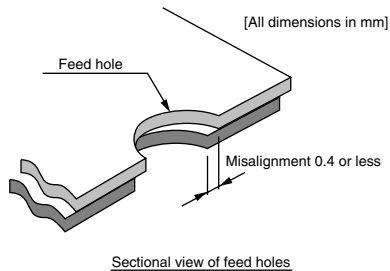
HORIZONTAL PERFORATION RISING

Horizontal perforation rising on multipart forms is likely to cause print quality reduction, paper feed instability or paper jamming. The height of any such rising must be within 1 mm.



MISALIGNMENT BETWEEN FEED HOLES

Misalignment between feed holes of parts (resulting from misalignment between the parts when being joined) must be less than 0.4 mm.



BINDING HOLES

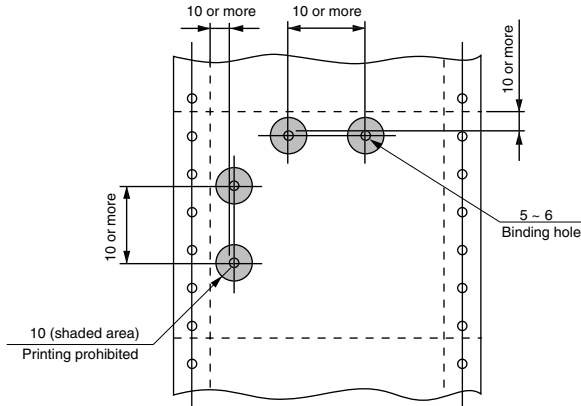
The use of paper that contains binding holes is not assured. (If any problems occur with the use of such paper, equipment or performance is not assured.)

When paper with binding holes is used in cases of absolute necessity, adequate prior testing must be performed to check that problems do not occur. Some precautions for using paper with binding holes are as follows:

- > Do not print data within 5 mm of each binding hole.
- > Ensure that the paper is free of any chad resulting from the punching of binding holes.
- > Binding holes falling on the printer's paper detection switch are taken as paper ends.
- > Ensure binding hole edges do not rise as hole edge rising may cause the carriage to snag.

- > The locations of binding holes are shown below:

[All dimensions in mm]



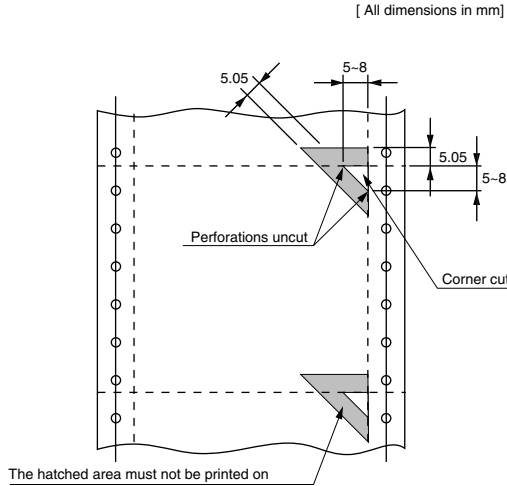
CORNER CUTS

The use of paper with corner cuts is not assured. (If any problems occur with the use of such paper, equipment or performance is not assured.)

When paper with corner cuts is used in cases of absolute necessity, adequate prior testing must be performed to check that problems do not occur. Some precautions for using paper with corner cuts are as follows:

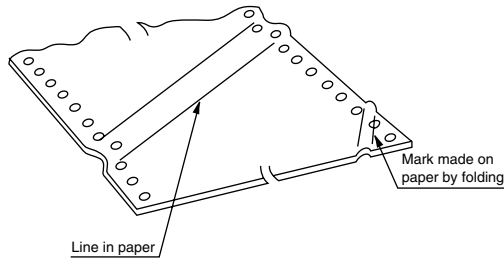
- > Do not print data in the hatched areas illustrated below.
- > Be sure that paper is free of any chad resulting from corner cutting.
- > To prevent paper peeling and possible carriage snagging, do not connect the cuts of vertical or horizontal perforations to corner cuts.
- > Corner cuts falling on the printer's paper detection switch are taken as paper ends or paper jams.

> The locations of corner cuts are shown below:



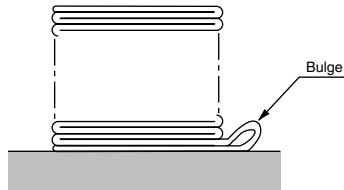
PAPER CONDITION

Paper should be without creases and be zigzag-folded along horizontal perforations. In particular, paper newly taken from its wrapping is likely to have creases in its first and last few sheets. Do not use such sheets.



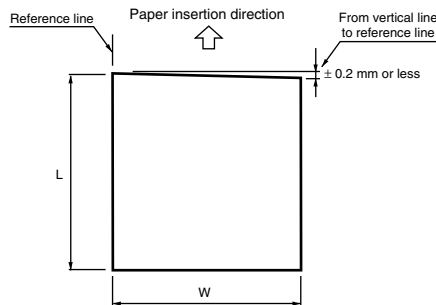
Do not use paper that exhibits wrinkling, curling or folds or paper that turns upward at the top or bottom since this may compromise print quality or cause paper jams. Note that the first few sheets of new paper have a tendency to curl easily and it may be advisable not to use them.

Do not use paper bulging around folds as illustrated below as this can adversely affect paper feed.



CUT-SHEET PAPER

VERTICAL AND HORIZONTAL DIMENSIONS

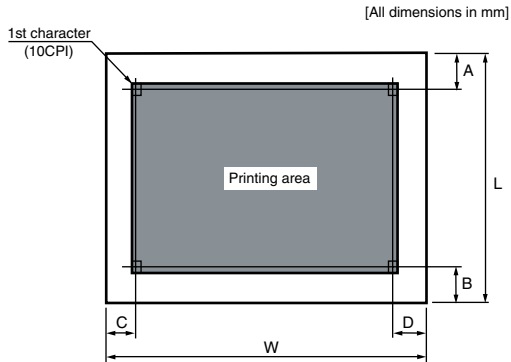


The standard vertical and horizontal dimensions of paper are those of A4. For usable areas, see ["Paper size and printing areas" on page 207](#).

PAPER SIZE AND PRINTING AREAS

Single-part forms

The standard paper size is A4.



DIMENSION	NAME	SPECIFICATION VALUE
W	Paper width	90 – 304.8 mm (3.54 – 12 in)
L	Paper length	70 – 364 mm (2.8 – 14.3 in) (Note 1)
A	Printing start position	Variable by menu setting (Note 6). 2.12 mm (1/12 in)–27.52 mm (13/12 in) Set by 1/12 in.
B	Lower end of printing area	6.35 mm (1/4 in)
C	Left end of printing area	6.35 – 28.6 mm (1/4 – 9/8 in) for paper width within 279.4 mm (11 in) 19.05 – 28.6 mm (3/4 – 9/8 in) for paper width 304.8 mm (12 in)
D	Right end of printing area	6.35 mm (1/4 in).

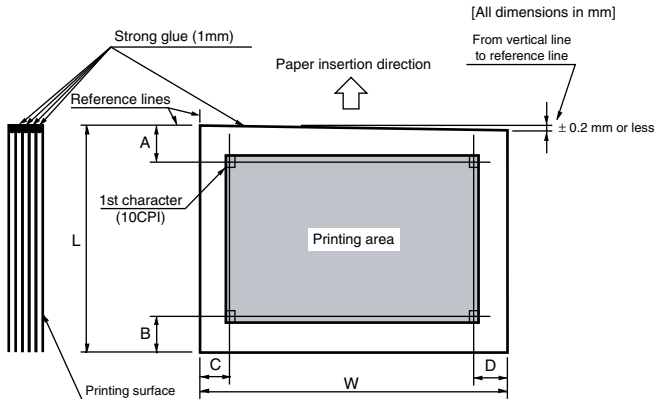
NOTE

1. Paper longer than A4 paper (297 mm) exhibits reduced paper loading performance.
2. Stacking less rigid 45 kg (52 gsm) paper is not assured.
3. The length-to-width ratio of paper is 1 : 2/3 – 2.
4. Use paper that is neither folded nor distorted.

5. For paper with binding holes, see "[Binding holes](#)" on page 211.
6. Printing accuracy is assured from 6.35 mm (1/4 in) (inclusive) from each edge.

Multipart forms

B5, B4 and A4 are the standard paper sizes.



DIMENSION	NAME	SPECIFICATION VALUE
W	Paper width	90 – 304.8 mm (3.54 – 12 in)
L	Paper length	70 – 364 mm (2.8 – 14.3 in) (Note 1)
A	Printing start position	Variable by menu setting (Note 6). 2.12 mm (1/12 in) – 27.52 mm (13/12 in). Specify by 1/12 in.
B	Lower end of printing area	6.35 mm (1/4 in)
C	Left end of printing area	6.35 – 28.6 mm (1/4 – 9/8 in) for paper width within 279.4 mm (11 in) 19.05 – 28.6 mm (3/4 – 9/8 in) for paper width 304.8 mm (12 in)
D	Right end of printing area	6.35 mm (1/4 in). 106th character within specifications for dimension C.

NOTE

1. Paper longer than A4 paper (297 mm) exhibits reduced paper loading performance.

2. The length-to-width ratio of paper is 1 : 2/3 – 2.
3. Use paper that is neither folded nor distorted.
4. Glue should be applied to the insertion end of each form.
5. For paper with binding holes, see "[Binding holes](#)" on page 203.
6. Printing accuracy is assured from 6.35 mm (1/4 in) (inclusive) from each edge.
7. NEVER process and use continuous paper as single paper/ cut-sheet.

PAPER QUALITY

The following paper quality is usable:

TYPE	PAPER QUALITY
Single-part form	White, high quality paper
Multipart form	Pressure-sensitive paper, carbon-backed paper

NOTE

Paper smoothness is between 90 and 7 seconds.

For paper types other than the above, adequate prior testing should be carried out to ensure that the paper types do not create problems.

PAPER WEIGHT AND MAX. NO. OF FORM PARTS

The following table shows usable paper weights and the maximum number of form parts:

TYPE	PAPER QUALITY	WEIGHT (NOTE 1)	MAXIMUM NUMBER OF FORM PARTS	TOTAL PAPER THICKNESS
Single-part form	High quality paper	45 to 180 kg (52 to 209 gsm)	–	–

TYPE	PAPER QUALITY	WEIGHT (NOTE 1)	MAXIMUM NUMBER OF FORM PARTS	TOTAL PAPER THICKNESS
Multipart form	Pressure-sensitive paper	34 kg (40 gsm) is standard.	Six parts (original + five parts)	0.36 mm or less
	Carbon-backed paper			

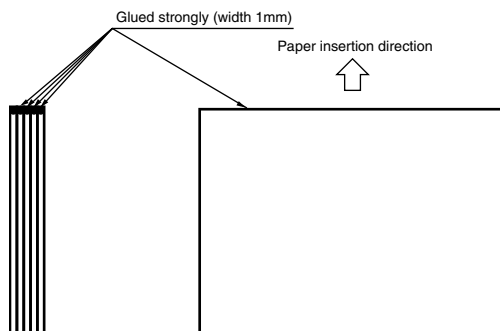
NOTE

1. Paper weight is that of 1,000 sheets, each having a unit area 788 x 1,091 mm, and is expressed in kg.

JOINING OF PARTS OF MULTIPART FORMS

Joining method

- > The parts of each multipart form are to be joined by line-gluing 1 mm wide at the insertion end of the form.
- > Glue lines are to be strongly glued and accurately pressed to prevent float.
- > Glue must not overlap the edges of forms.
- > Glue areas must be free of significant creases.



Combinations

The following table shows usable combinations of paper weights for multipart forms. In each combination, its base (last) part is equal to or more than the other part(s) in weight. Weights not within the ranges given in the table impair paper feed accuracy and do not carry assurances.

MAX. NO. OF FORM PARTS	2 PT	3 PT	4 PT	5 PT	6 PT
1st part	43–55 kg (34 kg)	43–55 kg (34 kg)	43–55 kg (34 kg)	43–55 kg (34 kg)	43–55 kg (34 kg)
2nd part	43–70 kg (34 kg)	34 kg	34 kg	34 kg	34 kg
3rd part		43–55 kg (34 kg)	34 kg	34 kg	34 kg
4th part			43–55 kg (34 kg)	34 kg	34 kg
5th part				43–55 kg (34 kg)	34 kg
6th part					43–55 kg (34 kg)

NOTE

Weights shown parenthesised, although usable, impair paper feed accuracy and are not assured.

BINDING HOLES

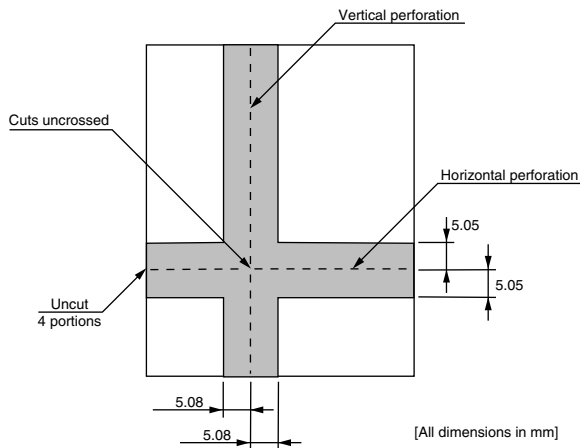
For paper with binding holes, see ["Binding holes" on page 203](#).

PERFORATIONS

The use of paper that contains out-of-specification perforations is not assured. (If any problems occur with the use of such paper, equipment or performance is not assured.)

When paper with such perforations is used in cases of absolute necessity, adequate prior testing must be performed to check that problems do not occur. Some precautions for using paper with perforations outside the assurance range are as follows:

- > The specifications for perforations conform to those defined in ["Perforation dimensions" on page 194](#).
- > An example of paper with perforations is illustrated below.
- > Printing data in the hatched area (illustrated below) around perforations is not allowed.
- > Perforations should not have any rough edges.
- > Paper should be smooth on the cut edge.
- > Perforations should be evenly applied.



The hatched area must not be printed on.

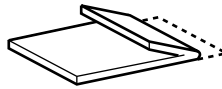
FOLDS, BENDS AND CURLS OF CUT-SHEET PAPER

Cut-sheet paper is likely to have folds, bends or curls through handling, carrying or stacking, or depending on storage conditions. To avoid such effects interfering with paper feed, suggestions are offered below.

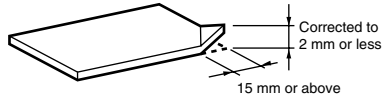
Do not use cut-sheet paper which is out-of-specification as this can have a detrimental effect on its feed. If any problems occur with using such paper, equipment or performance is not assured.

Folds

- > Cut sheets folded all the way from side to side are unusable.
- > Cut sheets with corner folds more than 2 mm high, as shown below, are usable.



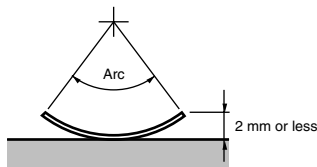
Paper folded completely across its width is unusable.



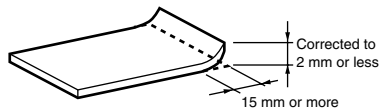
Corner fold

Bends, curls

- > Cut sheets curled in an arc are usable, when the amount of curling is within 2 mm (see below).
- > Cut sheets with bends of more than 2 mm high within less than 15 mm of any bend point (see below) cannot be used.



Curled paper



Bent paper

ENVELOPES (INDIVIDUAL)

- > Weight:
24 lb. max.
- > Thickness:

0.406 mm (0.016 in max.)

> Dimensions:

165 mm × 92 mm (6 1/2 in × 3 5/8 in)

225.4 mm × 98.4 mm (8 7/8 in × 3 7/8 in)

241.3 mm × 104.8 mm (9 1/2 in × 4 1/8 in)

LABEL PAPER

The use of label paper is not assured. If any problems occur with the use of it, equipment or performance is not assured.

When label paper is used in cases of absolute necessity, adequate prior testing must be performed to check that problems do not occur. Some precautions for using label paper are given below.

NOTE

Label paper is paper stock that has labels (facestock) placed on coated single-part continuous form paper used as its substrate. Label paper must have a low shrinkage difference between its facestock and substrate, and have labels distributed evenly over all of the substrate. Also, label paper must have strong label adhesion and high durability.

> Dimensions

Dimensions conform to those of continuous paper specified in "[Vertical and horizontal dimensions](#)" on page 191. The size of each label must be 50 mm or more horizontally and 25 mm or more vertically.

> Paper quality

Labels

Paper Quality: High quality paper

Weight: 55 kg

Thickness: 0.1 mm or less

Substrate

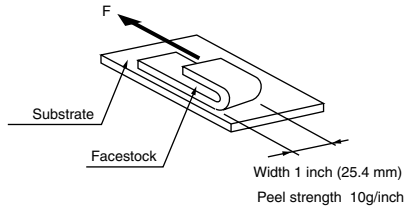
Paper Quality: Peel-off paper

Thickness: 0.06 to 0.08 mm

> Adhesive

Adhesive adhesion must be 10 g/in or more in peel strength. Also, when label paper is wound a half turn

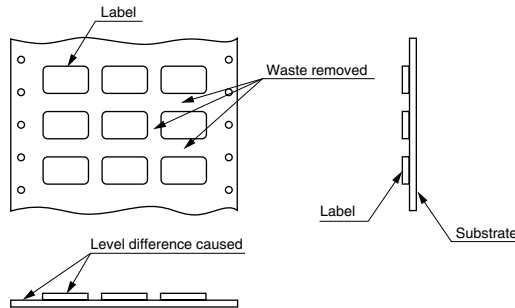
around a 27 mm-diameter core, adhesion must be such that the labels do not peel off the substrate.



The adhesive strength is given as a guideline. It is essential that label paper is kept in a condition which does not allow labels to peel during printing or paper feeding.

> Waste Removal

Waste facestock around labels is not to be removed. Label paper from which waste is removed as illustrated below is not to be used as it results in surface level differences.



Label corners must be rounded (R4 to R5 mm).

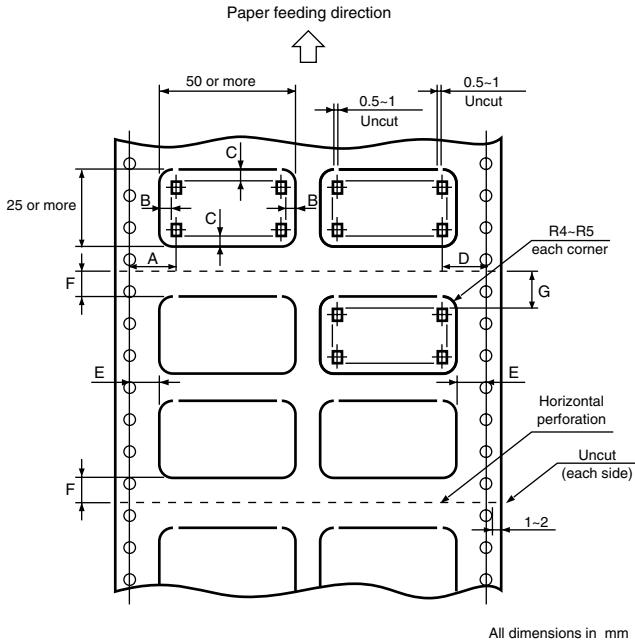
> Cuts

Label cuts are to be made only in the facestock.

Label cuts corresponding to substrate horizontal perforations are to coincide with those perforations, with an uncut within 1 to 2 mm of each side.

An uncut (approx. 0.5 – 1 mm) is to be provided around both upper corners of each label.

- > Label adhesive squeeze-out must not be allowed onto the front surface of label paper.
- > The use of label paper with cloth facestock is prohibited.



Dimensions conform to those of continuous paper specified in ["Vertical and horizontal dimensions"](#) on page 191.

DIMENSION	VALUE
A	14 – 22.2 mm (11/20 – 7/8 in) for paper width 304.8 mm (12 in) 12.7 – 22.2 mm (1/2 – 7/8 in) for paper width 279.4 mm (11 in) or less
B	2.54 mm
C	2 mm or more
D	12.7 mm (1/2 in) or more

DIMENSION	VALUE
E	6.35 mm (1/4 in) or more
F	6.35 mm (1/4 in) or more (12.7 mm or more is desirable)
G	8.47 mm (1/3 in) or more (line feed accuracy assurance range)

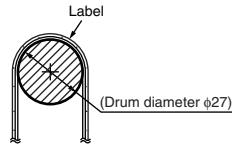
NOTE

The total thickness of the label and the substrate must be 0.2 mm or less. The label paper and the substrate paper must each be 0.1 mm or less.

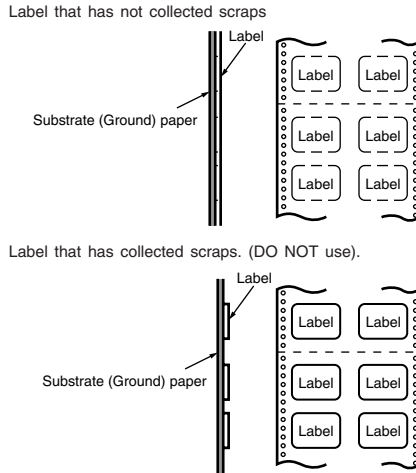
When wrapped on the surface of a 27 mm diameter cylinder, label paper must be such that the labels do not peel off.

Label glue strength: use a label that does not peel off under the following conditions.

Wrap Drum Diameter	φ27mm
Wrap angle	180°
Wrap time	24 hours
Ambient temperature	40°C
Ambient humidity	30%



Use label paper that is free of paper scraps i.e. paper other than labels that has peeled off the glue and may have attached itself to labels or elsewhere.



Use only high quality label and substrate paper.

As far as possible, use a soft label paper.

Do not remove the label scraps.

Ensure that the label paper is not skewed as it is fed into the printer.

Cut details:

Cuts must be in the labels only (to the bottom of the facestock).

The cut-lines of the substrate and facestock must coincide. Do not cut both edges in the 1 – 2 mm margin area.

Provide an uncut margin (approximately 0.5 – 1 mm) around the left/right edges at the top of the label.

PACKAGE DELIVERY SLIPS

The paper sizes and printing areas of package delivery slips conform to those of continuous paper (specified in "[Continuous paper \(continuous forms\)](#)" on page 191) or cut-sheet paper (specified in "[Cut-sheet paper](#)" on page 206), whichever format is applicable.

In this document, package delivery slips means 5- to 13-part form slips that have a thickness of 0.3 – 0.78 mm. The multipart copying capability and printing accuracy for package delivery slips, which depend on each form's thickness and middle-part quality (including thickness), are not assured. Slips that are non-uniform in thickness must not be used.

RECYCLED PAPER

As recycled paper tends to generate more paper dust than normal paper, clean the printer on a shorter cleaning cycle than that recommended in the User's Guide.

As recycled paper may be easily affected by humidity, do not use recycled paper in very humid environments.

INDEX

A

- alarm/error indications 40
- auto loading
 - continuous paper 60
 - cut sheet 61
- auto parking 61

C

- code pages 180
- commands
 - barcode 144
 - character set 92
 - composite 137
 - font description 109
 - general control 138
 - graphics mode 128
 - horizontal control 63
 - summary 163
 - text print features 118
 - vertical control 76
- configuration 12

F

- form tear off 62

H

- hex dump mode 59

I

- indicator lamps 39
- interface details
 - parallel 19
 - USB 21

M

- media
 - continuous paper 191
 - cut sheet paper 206
 - delivery slips 218
 - envelopes 213
 - general 188
 - label paper 214
 - recycled paper 219
- menu settings
 - initialising 53, 54
 - list 45
- menus
 - general 43
 - items 45
 - registration 56
- mode
 - hex dump 37
 - maintenance 1 38
 - maintenance 2 38
 - menu 37

- print 35
- test 37

N

- normal speed printing 56

O

- operator panel 34

P

- print mode
 - EPSON 179
 - IBM 178
- printer
 - parts 13
- printer features 11

Q

- quiet printing 56

R

- reference guide
 - printing 17

S

- self test
 - print 57
 - rolling ASCII 58
- specifications
 - electrical insulation 149, 156
 - environmental 149, 156
 - noise 150, 157
 - paper 153, 160
 - physical 148, 155
 - power 149, 156
 - print 151, 157
 - ribbon 153, 154, 160, 161

T

- TOF
 - saving 56
 - setting 55

U

- user documentation 16

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