DL9300/9400
DOT MATRIX PRINTER
PRODUCT DESCRIPTION

FUJITSU LIMITED

Communications and Electronics

Tokyo, Japan

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PREFACE

This manual gives the product specifications for the DL9300/9400 dot matrix printers. The manual provides prospective customers with required engineering specifications.

Chapter 1: describes the main features.

Chapter 2: gives the model configuration and equipment structure.

Chapter 3: gives functional, physical, electrical, and environmental specifications. It also covers paper specifications.

Chapter 4: describes the control panel together with basic status indicated by the LED indicators and functions of the push-button switches. It also outlines the printer remote setup utility program, DLMENU.

Chapter 5: gives information on the interface, its hardware specifications, and software specifications. It also summarizes command sets.

Chapter 6: explains maintenance.

Chapter 7: lists options and consumables.

Appendixes: give information on character sets, resident fonts, printer dimensions, and nameplate and label locations.

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ILLUSTRATIONS AND TABLES

CHAPTER 1 FEATURES

The DL9300/9400 printer has a small footprint, is practically maintenance-free, and is designed to provide years of reliable service. This printer uses a 24-wire dot matrix print head. The DL9300 is an 80-column printer and the DL9400 is a 136-column printer.

The printer's major features are detailed in the sections which follow.

1.1 Print Quality and Copy Capability

The DL9300/9400 uses a compact print head containing 24 wires, each 0.2 mm (0.008 inch) in diameter.

Its letter-quality printing nearly equals that of daisy wheel printers, thanks to the 360 (h) × 180 (v) dpi print resolution provided by a single pass of the 24-wire print head. Double-pass unidirectional printing applies up to 360 × 360 dpi for high-resolution graphics. Curves and very fine lines print clearly, enabling bar code printing. Bidirectional printing increases the print speed, while unidirectional printing maintains precise print alignment.

Three types of print quality are available — letter, correspondence, and draft. Letter quality has the highest resolution. Draft quality has the lowest resolution but is easy to read and has the highest speed. Each print quality can be made thicker in multicopy mode which can be easily set from the control panel or by DLMENU. Choose the quality to suit the application.

Quality	Resolution (dpi: h × v)	Speed (cps at 10 cpi)
Letter	360 × 180	100
Correspondence	180 × 180	200
Draft	120 × 180	360

dpi: Dots per inch

cps: Characters per second

Paper type	Paper path	Normal mode	Multicopy mode
Continuous forms or cut sheets	Fed from the front	5 copies	8 copies
Continuous forms	Fed from the rear	5 copies	6 copies
Cut sheets	Fed from the CSF	5 copies	5 copies

Number of copies includes the original.

1.2 Print Modes

Multiple print modes enable word processing with great flexibility.

The DL9300/9400 has the following print modes and line spacing:

Print modes: Bold, shadow, double-width, double-height, condensed, superscript, subscript, underline, justified, and proportional. Other modes, such as italic, multisize, outline, shaded, and overlay are available depending on the emulation used.

Line spacing: 1, 2, 3, 4, 5, 6, 7, or 8 lines per inch
Programmable in 1/360 inch and other increments for image graphics

Both 8-bit and 24-bit graphics are available. The dot density is up to 1/360 × 1/360 inch.

Figure 1.1 shows printing samples.

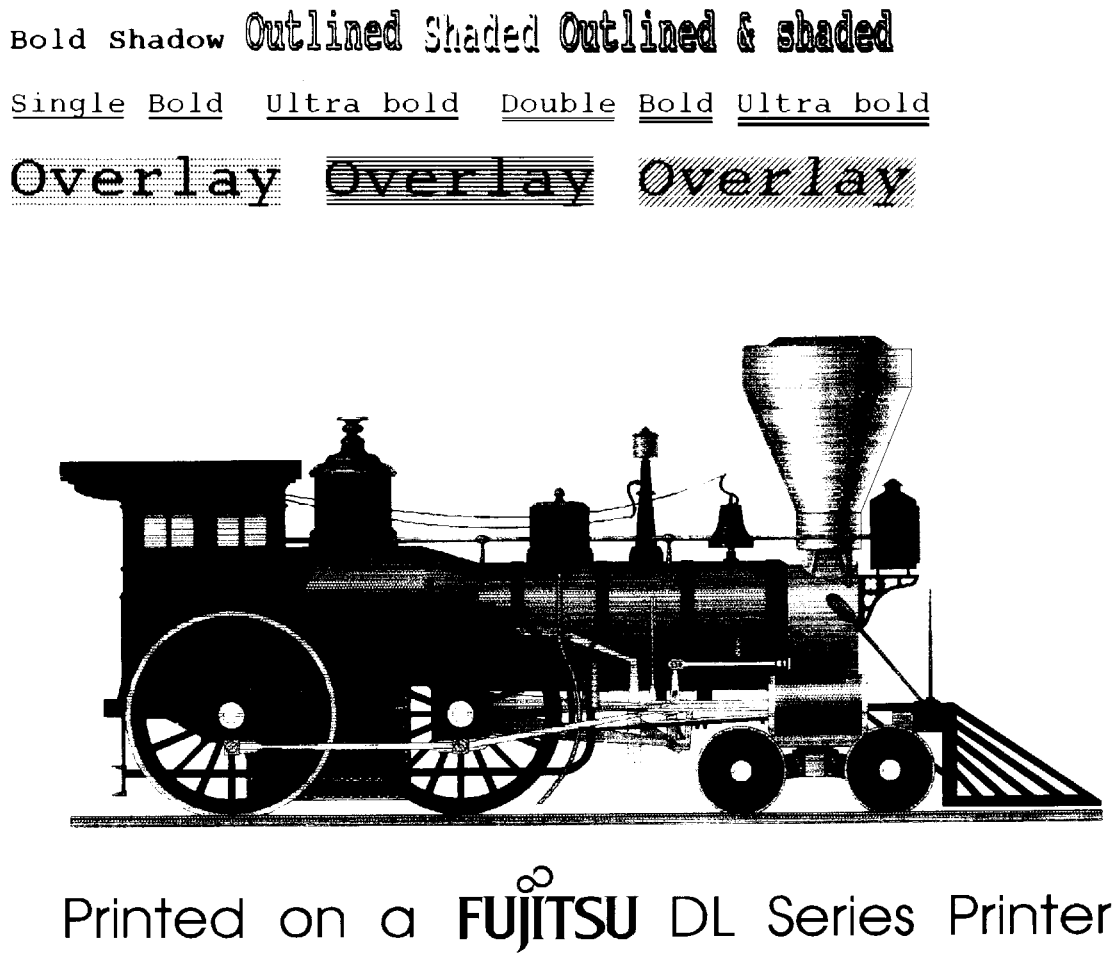


Figure 1.1 Printing samples

1.3 Fonts and Character Sets

The DL9300/9400 has 18 resident fonts which are supported by a maximum of 58 national character sets. See Appendix B for printing samples of resident fonts.

The following 15 resident fonts are letter-quality:

Bit map fonts: Courier 10, Pica 10, OCR-A 10, OCR-B 10, Prestige Elite 12, and Boldface PS

Scalable fonts: Courier (upright, italic, and bold)
Nimbus Sans(*1) (upright, italic, and bold)
Timeless (upright, italic, and bold)

*1 Nimbus Sans is a registered trademark of URW Unternehmensberatung Karow Rubow Weber GmbH, Hamburg.

The following three resident fonts are used for speed or condensed printing:

Correspondence, Draft, and Compressed

For downloadable fonts, up to 96K bytes of user-designed fonts can be downloaded to RAM.

The DL9300/9400 has 56 or 58 national character sets (depending on the emulation) besides the basic character sets. This makes the printer be adaptable to various languages. Note that some character sets cannot be used with some fonts. See Appendix A for details.

1.4 Emulations and Compatibility with IBM PC Printers

The DL9300/9400 has two emulations in addition to the Fujitsu DPL24C PLUS command set. These are all resident in ROM:

Fujitsu DPL24C PLUS, including bar code commands
IBM Proprinter XL24E emulation
Epson ESC/P2 emulation

The user can run many software applications without changing computer or application software, just by selecting an emulation using the printer control panel or the DLMENU.

When the IBM Proprinter XL24E emulation is selected, the command set and aspect ratio of the graphics are exactly the same as the IBM Proprinter when alternate graphics mode (AGM) is selected from the printer control panel in setup mode.

Many 24-wire printers produce graphics having a different aspect ratio than other manufacturers' printers because of different spacing of the print head wires. The DL9300/9400 produces the same aspect ratio as IBM PC printers, including 9-wire printers. This offers the advantage of full compatibility with graphics software for IBM printers.

1.5 Printing Speed and Throughput

The DL9300/9400 prints text at the following speeds:

Quality	Speed at 12 cpi	Speed at 10 cpi
Letter	120 cps	100 cps
Correspondence	240 cps	200 cps
Draft	432 cps	360 cps

cpi: Characters per inch

cps: Characters per second

The DL9300/9400's buffer control enables data reception while other data is being printed. Other features, such as logical seek, bidirectional printing, and horizontal and vertical tabulation also improve printer throughput.

The printer throughput, based on ECMA 132 (letter test pattern), is listed in the following table:

Quality	DL9300	DL9400
Letter	156 pages/h	156 pages/h
Draft	320 pages/h	320 pages/h

1.6 Automatic Paper Loading, Switching, and Tearing-Off

Paper handling is automated as follows:

Paper is loaded or unloaded automatically using the LOAD button on the control panel. The print position can be adjusted for each paper type and path beforehand in setup mode.

Cut sheets can be used without removing continuous forms currently loaded. Pressing the LOAD button moves the loaded continuous forms from the platen to the parking position (forms tractor). After pressing the PAPER PATH button so as to turn on the CUT SHEET indicator, pressing the LOAD button loads a cut sheet up to the platen. After the cut sheet is printed, pressing the PAPER PATH button so as to turn on the FRONT TRACTOR or REAR TRACTOR indicator and pressing the LOAD button reloads the continuous forms from the parking position.

There is no waste of paper in tearing off the continuous forms printed. Pressing the TEAR OFF button on the control panel positions the bottom perforation of the last printed page at the tear-off edge provided at the front cover or upper cover of the printer. After tearing off the last page, pressing any button backs the new first page to the print position. This back-and-forth feeding is called tear-off feeding. Tear-off feeding saves pages. Automatic tear-off feeding can be specified in setup mode; the printer waits for a while between jobs instead of requiring the TEAR OFF button to be pressed. If a job ends and no data is sent from the computer, the printer automatically feeds the last page to the tear-off edge.

1.7 Control Panel

The control panel has nine push-button switches, eight LED indicators, and a buzzer. Indication of functions and statuses are easy to understand.

The control panel operates in two modes: normal and setup.

- Normal mode is used in daily operation such as paper path selection, paper loading and unloading, forms feed, and line feed. It also enables copy control, tear-off feed, and top-of-form adjustment.

- Setup mode is used in customizing the printer to the user environment when first connecting the printer to the computer or when printing special documents. It is also set using the DLMENU. Setup mode enables the user to select printer features such as font settings, line and character spacing, page margins, serial interface parameters, and other infrequently used functions.

See Chapter 4 for details.

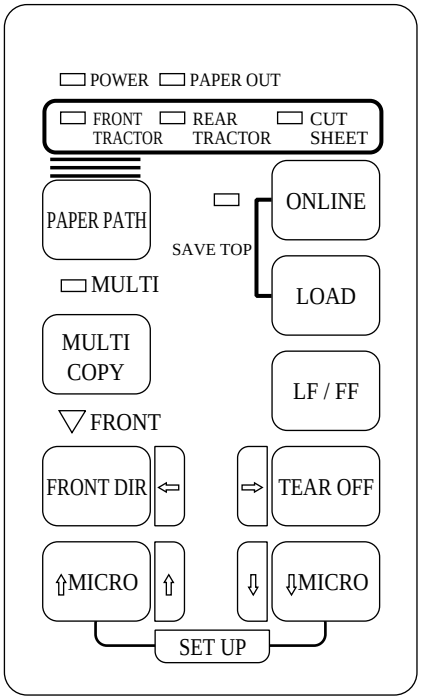


Figure 1.2 Control panel

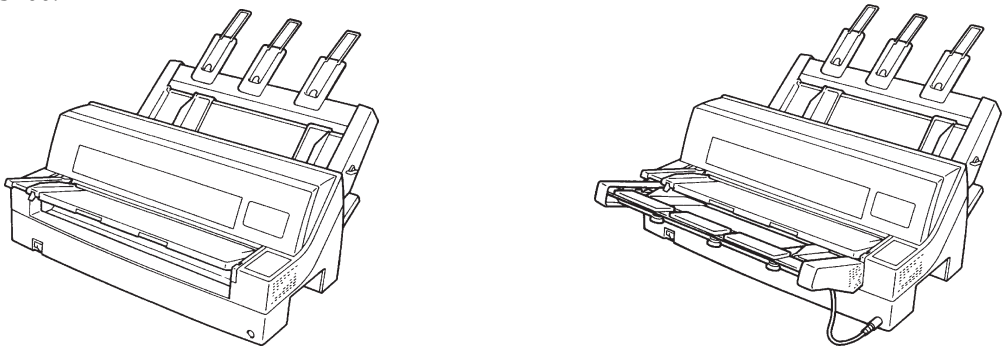
1.8 Multiple Paper Paths and Switching (HCPP)

The DL9300/9400 has a wide variety of paper feed paths for both continuous forms and cut sheets. These paths are almost straight so that the printer can use various types of paper and be adapted to various user environments.

The DL9300/9400 uses a friction feed platen, a standard tractor unit, and an optional tractor unit as the paper feed mechanism for continuous forms. The optional tractor unit is exactly the same with the standard one. The tractor unit is removable and installable at the front or rear of the printer. It pushes continuous forms toward the platen. When the printer is shipped, the tractor unit is installed at the front of the printer.

The 9300/9400 uses a mechanism that switches these three paper paths by a command. This is called host-controlled paper path (HCPP) mechanism. The HCPP mechanism switches power transmission to the tractors. Three states are possible: front tractor selected, rear tractor selected, and cut sheet selected. Switching is possible through software or by the control panel. The paper on the platen is unloaded to the park position or ejected, and then the paper feed path is switched. When switching from a cut sheet to continuous forms, the continuous forms are automatically loaded to the print position.

As the cut-sheet feed mechanism, the DL9300/9400 uses the platen and an optional single-bin cut-sheet feeder which is also installable at the front or rear of the printer. The SF930 is available for the DL9300, and the SF940 for the DL9400.



SF940 mounted at rear of printer

SF940s mounted at both front and rear of printer

Figure 1.3 Cut-sheet feeders

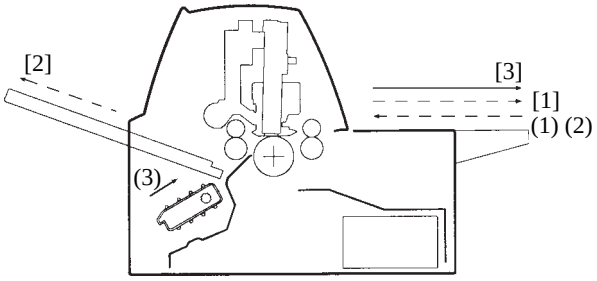
Two tractor units can be used at the same time. Two cut-sheet feeders can be used at the same time. However, at the front of the printer, the tractor unit cannot be used with the cut sheet feeder at the same time.

The 9300/9400 has eight paper feed paths depending on combinations of feed mechanisms. Figure 1.4 shows these paper paths. At the right side of each illustration are listed available paper feed paths.

Legend:

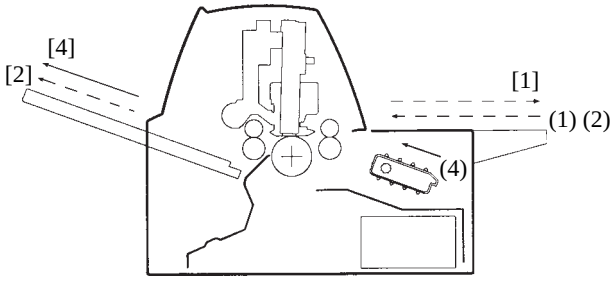
- ----➔ : Cut sheet
- ⟶ : Continuous forms
- (n) : Input
- [n] : Output

a. Rear tractor



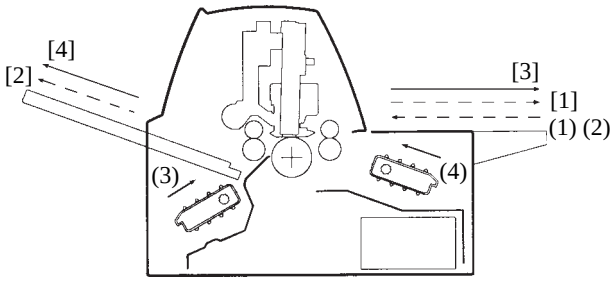
(1) Paper table → Print → Paper table
(2) Paper table → Print → Rear stacker
(3) Rear tractor → Print → Front eject

b. Front tractor



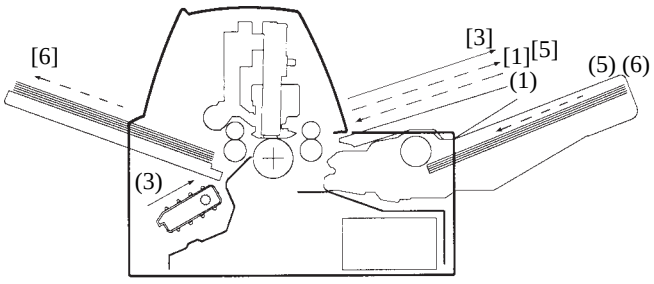
(1) Paper table → Print → Paper table
(2) Paper table → Print → Rear stacker
(4) Front tractor → Print → Rear eject

c. Front and rear tractors



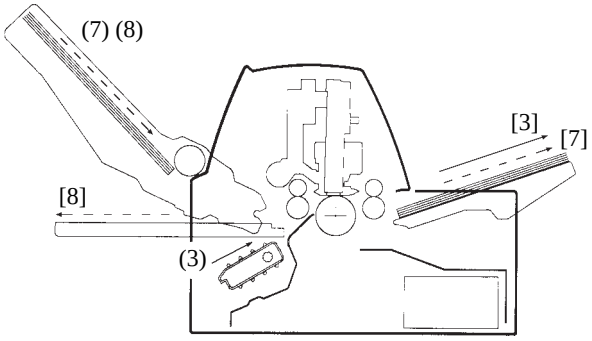
(1) Paper table → Print → Paper table
(2) Paper table → Print → Rear stacker
(3) Rear tractor → Print → Front eject
(4) Front tractor → Print → Rear eject

d. Rear tractor and front cut sheet feeder



(1) Paper table → Print → Paper table
(3) Rear tractor → Print → Front eject
(5) Front cut sheet feeder → Print → Paper table
(6) Front cut sheet feeder → Print → Rear stacker

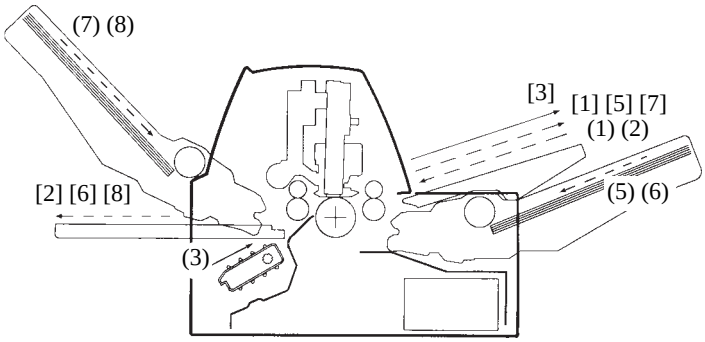
e. Rear tractor and rear cut sheet feeder



(3) Rear tractor → Print → Front eject
(7) Rear cut sheet feeder → Print → Paper table
(8) Rear cut sheet feeder → Print → Rear stacker

Figure 1.4 Multiple paper paths (to be continued)

f. Rear tractor and front and rear cut sheet feeders



(1) Paper table → Print → Paper table
(2) Paper table → Print → Rear stacker
(3) Rear tractor → Print → Front eject
(5) Front cut sheet feeder → Print → Paper table
(6) Front cut sheet feeder → Print → Rear stacker
(7) Rear cut sheet feeder → Print → Paper table
(8) Rear cut sheet feeder → Print → Rear stacker

Figure 1.4 Multiple paper paths (continued)

1.9 Automatic Print Head Gap Adjustment (APTC)

The 9300/9400 automatically adjusts the gap between the print head and the platen for paper thickness when paper is loaded. This function is usually called APTC (abbreviated from automatic paper thickness control). It is useful for users who often change paper types.

The print head carriage has a pressure sensor on the card guide which faces the platen. When paper is loaded, the card guide is first set to the widest gap, pressed against the platen over the paper, and then backed for the proper gap. The gap can be also adjusted by the paper thickness indicator in manual mode (the indicator is accessible at the left of the printer when the front cover is open).

1.10 Automatic Interface Switching

The 9300/9400 has two interfaces: Centronics parallel and RS-232C serial. The dual interface allows the user to connect the printer to both a network environment and a PC environment at the same time. The printer will automatically switch to the proper interface (parallel or serial) when an AUTO option is selected for the <INTRFCE> item by the HARDWRE function in setup mode.

1.11 Printer Driver and DLMENU

The 9300/9400 is delivered with two floppy disks.

One floppy disk contains printer drivers for Windows 3.x and Windows 95. The printer driver is a control program to be installed on the computer for controlling document printing on the user printer. This printer driver allows the application programs to make the best use of the DL9300/9400's functions. The printer driver for Windows 95 has the plug and play detection capability.

The other floppy disk contains the DLMENU. The DLMENU is a printer remote setup utility program which controls printer features in setup mode from the computer display in place of the printer control panel. This greatly releases the user from tedious operation of setting up the printer from the control panel.

CHAPTER 2 MODEL CONFIGURATION AND EQUIPMENT STRUCTURE

This chapter gives the model configuration and equipment structure.

2.1 Model Configuration

The printer model differs with two specifications: print line and power supply.

DL9300/9400
- Basic specification
  - Print line at 10 cpi: 80 columns (DL9300)
    136 columns (DL9400)
- Alternative specification
  - Power supply: 100-120 VAC or 220-240 VAC input
- Add-on installable at factory
  - Front cover (transparent type)
- Add-ons installable by user
  - Cut-sheet feeder
  - Tractor unit

cpi: characters per inch

Notes:

The following three emulations are standard for all versions.

- DPL24C PLUS: Fujitsu proprietary command set for DL-series serial printers
- IBM Proprinter XL24E
- Epson ESC/P2

The following two interfaces are standard and automatically switched for all versions (dual interface).

- Centronics parallel
- RS-232C serial

The printer is shipped with the standard tractor unit installed at the front of the printer.

This manual covers all models. An understanding of equipment structure helps relate the information in this chapter to a particular model.

2.2 Block Diagram

Figure 2.1 is a block diagram of the DL9300/9400 printer.

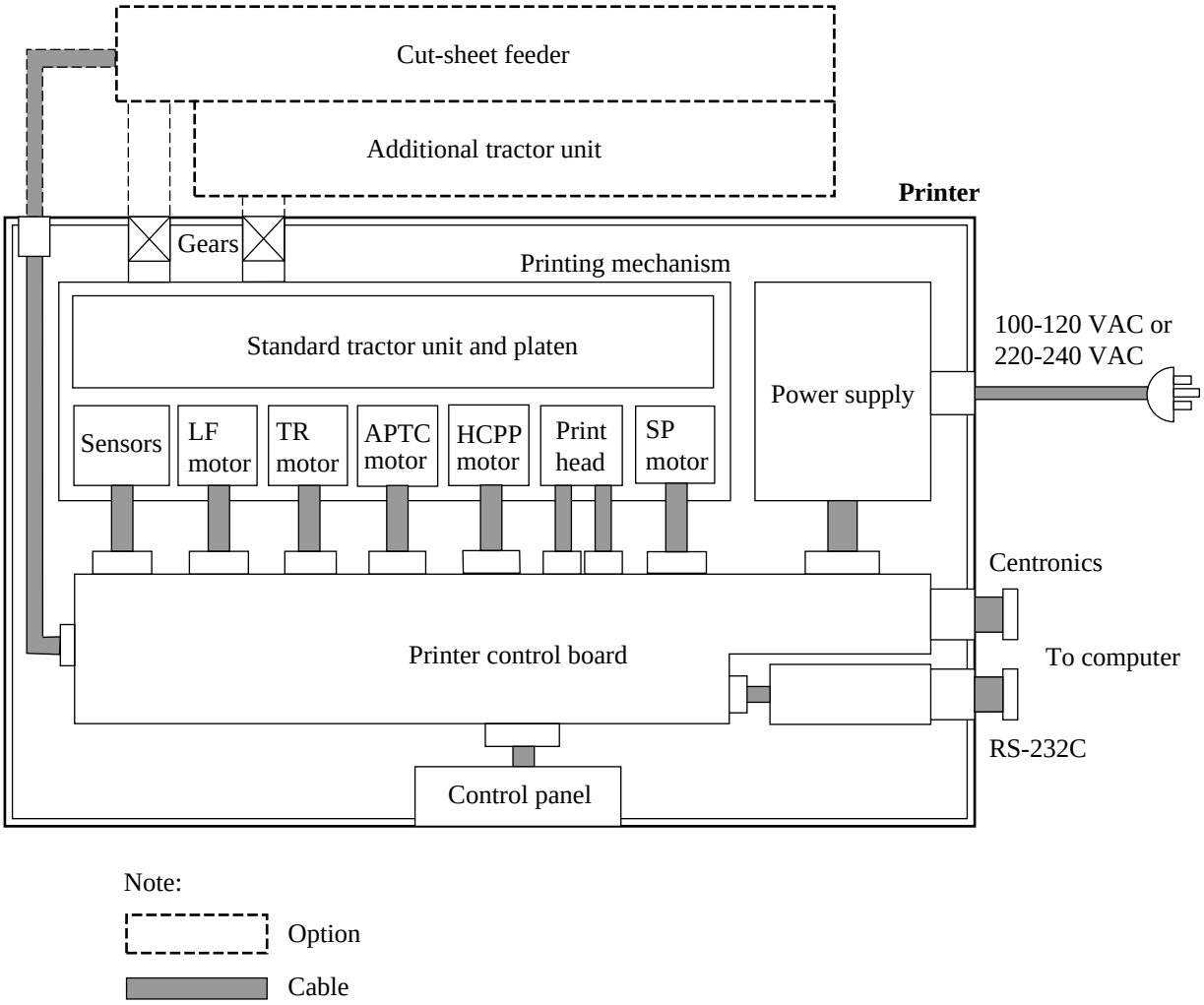


Figure 2.1 Printer block diagram

(1) Printing mechanism

The DL9300/9400 printing mechanism consists of a print head and carriage, a carriage drive mechanism, a paper feed mechanism, a paper path selection mechanism, an automatic print head gap adjustment mechanism, and sensors. The carriage includes a ribbon feed mechanism and the other sensors.

The printing mechanism uses five motors for driving the mechanism components so as to distribute the load. The five motors each correspond to the platen, the tractor unit, the APTC mechanism, the HCPP mechanism, and the print head carriage.

(2) Printer control board

The printer control board consists of a main controller, memory, sensor receivers, drivers, a Centronics parallel interface controller, and an RS-232C serial interface controller. This board governs the computer interface, control panel, and printing mechanism using the main controller and memory that holds resident character patterns and firmware including resident emulation programs.

(3) Control panel

The control panel is used by the user for operations such as changing or feeding paper, resetting the printer, and selecting printer features in setup mode. The control panel indicates the printer status using a buzzer and LED indicators.

(4) Power supply

The power supply provides power for operating the printer. Its specifications depend on the input AC voltage.

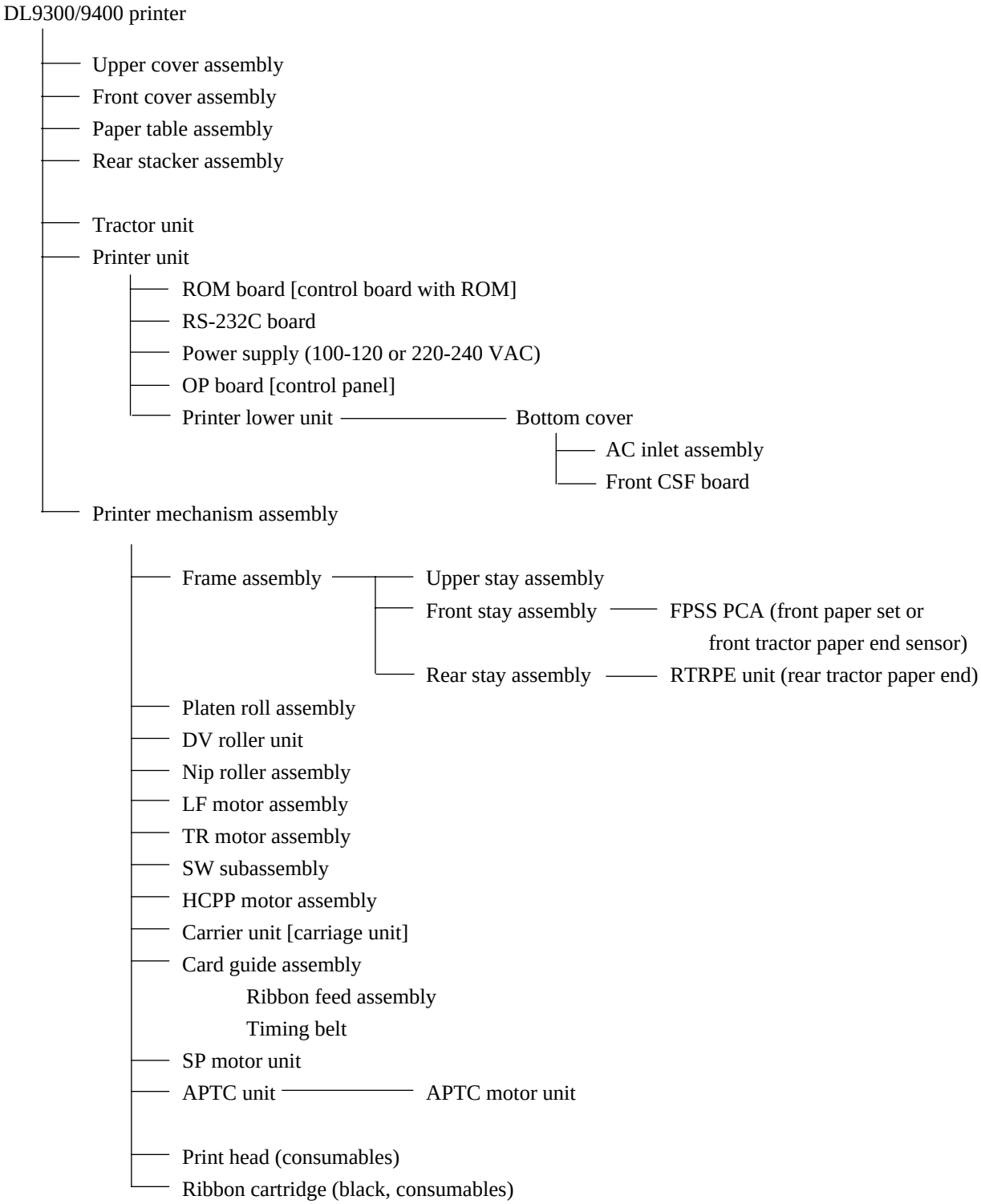
(5) Cut-sheet feeder (user option)

The cut-sheet feeder is driven by a gear on the platen shaft. It has a cable to be connected to the printer for controlling the feed rollers in the cut-sheet feeder. The feeder enables cut sheets to be fed and printed continuously.

(6) Tractor unit (user option)

A second tractor unit can be installed if the user requires dual tractor feeding capability.

2.3 Structure



Notes:

[ ] indicates a general name of the component or the subassembled component referred frequently in this manual or the user's manual.

( ) shows options that determine the specification of the component.

Figure 2.2 shows printer components of the DL9400. (DL9300 is the same except for width.)

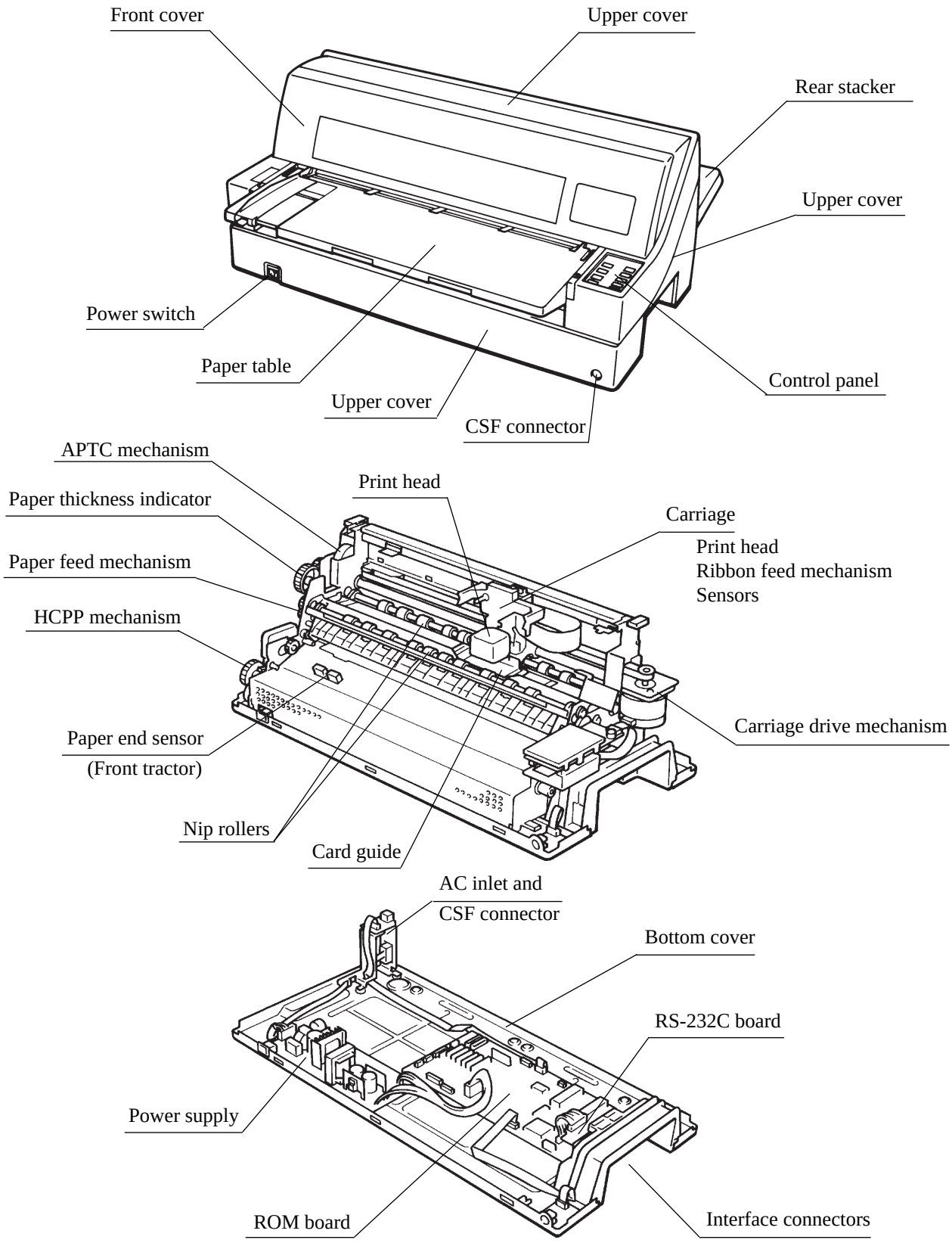


Figure 2.2 Printer components (DL9400 printer)

2.3.1 Exterior components

This section gives information on exterior components of the printer: covers, removable mechanism units, etc. The upper cover is fastened with screws at the back (two for the DL9300 and three for the DL9400).

(1) Upper cover
The interface cable connector is on the right side of the printer, as seen from the front of the upper cover, so the interface cable does not interfere with the paper feed path.

(2) Front cover
The front cover is opened to replace the ribbon cartridge.

(3) Paper table
The paper table guides a cut sheet manually fed by the user. It can also stack printed cut sheets when it is set at the "down" position.

(4) Rear stacker
The rear stacker holds printed cut sheets. It must be set at the "down" position when an optional cut-sheet feeder is installed at the back of the printer.

(5) Control panel
The control panel consists of an LSI, nine push-button switches, eight LEDs, and a buzzer. The switches are used for operations such as loading and feeding paper and controlling printing pressure. Some switches are also used in setup mode in place of the DLMENU. The LEDs indicate printer basic statuses and paper feed path conditions. The buzzer sounds to indicate certain operating and printer statuses.

2.3.2 Printing mechanism

The two screws secure the printing mechanism to the bottom cover. The two hooks on the bottom cover hold the mechanism in position.

(1) Carriage
The carriage supports the print head and ribbon cartridge, and slides left and right on the stay shaft. The ribbon feed gear system moves the ribbon in one direction regardless of carriage movement. It has three sensors: LRES, TOF, and APTC. The LRES detects both left and right ends of the carriage movement. The TOF detects the top edge of paper. The APTC detects the gap between the print head and the platen.

(2) Carriage drive mechanism
The stay shaft and the stay guide support the carriage; the stepping motor and timing belt move the carriage horizontally.

(3) Paper feed mechanism
The stepping motor drives the platen and/or tractors through gears to feed paper. See also the HCPP mechanism.

(4) Host-controlled paper path (HCPP) mechanism

The HCPP mechanism switches power transmission to the tractors. Three states are possible: front tractor selected, rear tractor selected, and cut sheet selected. Switching is possible through software or by the control panel. The paper on the platen is unloaded to the park position or ejected, and then the paper feed path is switched. When switching from a cut sheet to continuous forms, the continuous forms are automatically loaded to the print position.

(5) Paper sensors

There are six paper sensors for controlling paper feeding:

Function	Paper sensed	Sensor type
Front paper set	Cut sheet, continuous forms, and CSF	Lever and transparent type photo-interrupter
Top-of-form	Cut sheet, continuous forms, and CSF	Reflective type photointerrupter
End of paper	Continuous forms on the rear tractor	Lever and transparent type photointerrupter
End of paper	Continuous forms on the front tractor	Lever and transparent type photointerrupter
Paper empty	Cut sheets in the front CSF	Microswitch
Paper empty	Cut sheets in the rear CSF	Microswitch

(6) Automatic paper thickness control (APTC) mechanism

The APTC mechanism adjusts the gap between the print head and the platen. When paper is loaded, the print head is pressed against the platen and the sensor issues a signal when the print head is stopped by the paper. The print head is then returned by a certain distance so that the gap (actually between the print head and the paper) is properly adjusted regardless of the paper thickness.

2.3.3 Bottom cover

(1) Bottom cover

The bottom cover supports the printer mechanism.

(2) ROM board (control board with ROM)

The ROM board controls the host interface, control panel, and printing mechanism using an MPU and an LSI circuit. Memory holds the resident character patterns and firmware, including resident emulation programs. This board also has drivers and receivers for other components. The separate RS-232C serial board is connected to this board through the cable.

(3) Power supply

The power supply outputs a constant voltage, regardless of the input AC line voltage, within ranges of 100 to 120 VAC or 220 to 240 VAC. The power supply is at the front of the printer and includes an AC line switch and noise filter.

(4) AC inlet and CSF connector (rear CSF)
The AC inlet consists of the power input connector, the wiring cable, and the bracket on which the connector for the rear CSF is mounted.

(5) CSF connector (front CSF)
The connector board for the front CSF is mounted at the front right of the bottom cover.

2.3.4 Options and consumables

(1) Cut-sheet feeders
A cut-sheet feeder allows both single-part cut sheets and multi-part cut sheets to be fed automatically.
The SF930 single-bin feeder is available for DL9300, and the SF940 single-bin feeder for DL9400.

(2) Tractor unit
An additional tractor unit can be installed in the printer. Because the standard tractor unit is installed at the front of the printer at shipment, the additional tractor is installed at the rear of the printer. However, both tractor units are the same, and installable at either position.

(3) Front cover (transparent type)
This type of front cover has the transparent window so that printed characters are visible without opening the cover.

(4) Ribbon cartridge
The black ribbon cartridge contains a continuous inked ribbon and is installed on the print head carriage.

(5) Print head
The 24-wire print head is easily installed on and removed from the print head carriage.

CHAPTER 3 SPECIFICATIONS

This chapter details DL9300/9400 specifications.

3.1 General Specifications

3.1.1 Print head and carriage

Printing method: 24-wire dot matrix

Wire diameter: 0.2 mm (0.008 in.)

Wire spacing (vertical): 0.141 mm (1/180 in.)

Printing direction: Bidirectional, logic-seeking or unidirectional seeking

Character cell: (horiz × vert)

Letter quality	36 × 24 (10 cpi)
	30 × 24 (12 cpi)
Correspondence quality	18 × 24
Draft quality	12 × 24

Printing speed:

Print quality	10 cpi	12 cpi
Letter quality	100 cps	120 cps
Correspondence quality	200 cps	240 cps
Draft quality	360 cps	432 cps

Throughput: (ECMA 132, letter test pattern)

Print quality	DL9300	DL9400
Letter quality (continuous forms)	156 pages/h	156 pages/h
Draft quality (continuous forms)	320 pages/h	320 pages/h

Resolution:	Letter quality	360 × 180 dots/inch
(horiz × vert)	Correspondence quality	180 × 180 dots/inch
	Draft quality	120 × 180 dots/inch
	Graphics	360 × 360, 360 × 180, 180 × 180, 120 × 180, 90 × 180, 60 × 180 dots/inch 240 × 72, 120 × 72, 60 × 72 dots/inch 200 × 60, 100 × 60, 90 × 60, 200/3 × 60, 60 × 60, 50 × 60 dots/inch

Character spacing: 2.5, 3, 5, 6, 10, 12, 15, 17.1, 18, and 20 cpi and proportional spacing
Programmable in 1/360-inch and other increments for image graphics

Character expansion: Double or quadruple width and height (control panel or DLMENU)
Multiwidth and height (DPL24C PLUS printer command)

Characters per line:

Characters per inch (cpi) (Character spacing)	Characters per line (cpl)	
	DL9300	DL9400
10	80	136
12	96	163
15	120	204
17.1	136	232
18	144	244
20	160	272

3.1.2 Forms feed

Feeding: Continuous forms:
Standard tractor unit installed at front of printer at shipment, but installable at rear of printer
Optional tractor unit installable at rear or front of printer
Cut sheets:
Friction-feed platen (standard)
Cut-sheet feeder (option) installable at rear and front of printer
Note that front and rear tractor units or front and rear cut-sheet feeders can be used at the same time. However, the front tractor unit cannot be installed with the front cut-sheet feeder at the same time.

Feed direction: Bidirectional (push-feed tractor)

Line spacing: 1, 2, 3, 4, 5, 6, 7, and 8 lines per inch
Programmable in 1/360-inch and other increments for image graphics

Line feed speed: Less than 60 ms/line (at 6 lines per inch)

Forms feed speed: 6 inches per second

Paper detection: 6 sensors: front paper set, top-of-form, end of paper (front and rear tractors), paper empty (front and rear CSFs)

3.1.3 Character sets and fonts

Character sets:	DPL24C+/XL24E	IBM PC character sets 1 and 2 IBM PS/2 character sets (code pages) and other national character sets (56 languages in total) Fujitsu character set (692 characters)
	ESC/P2	Italic character set Graphics character sets 1 and 2 IBM PS/2 character sets (code pages) and other national character sets (58 languages in total)
National character sets: (All emulations)		USA (=code page 437), United Kingdom, German, Swedish, ISO 8859-1, ECMA 94, Code pages 437, 850, 852, 855, 860, 863, 865, and 866, Hungarian, Slovenian, Polish, Mazowian, Latin 2, Kamenicky, Turkish, Cyrillic, IBM 437, IBM 851, ELOT 928, Latin Polish, ISO Latin, Lithuanian 1, Lithuanian 2, MIK, Macedonian, ABG, ABY, Code page MAC, ELOT 927, DEC Greek, Greek 11, Code page 862, Hebrew Old, and Hebrew DEC Note: Some national character sets do not support some resident fonts. See Appendix A for details.
Resident fonts:	Letter quality	
	Bit map fonts	6 fonts Courier 10, Pica 10, Prestige Elite 12, Boldface PS, OCR-B 10, and OCR-A 10
	Scalable fonts	9 fonts Courier (upright, italic, bold) Nimbus Sans (upright, italic, bold) Timeless (upright, italic, bold)
	Correspondence (*1)	1 font
	*1 The correspondence font has the same print quality but higher printing speed compared to letter quality fonts.	
	Draft quality	1 font
	Compressed	1 font
	Note: Italic, shadow, bold, outlined, screened, enlarged, and super/subscript can be specified by commands.	
Downloadable RAM:	0, 64K, 72K, 88K, 94K, 95.75K, or 96K bytes	

3.1.4 Forms

Width:

Forms type	DL9300	DL9400
Continuous forms	102 to 267 mm (4 to 10.5 in.)	102 to 420 mm (4 to 16.5 in.)
Cut sheets (sheet feeder)	102 to 257 mm (4 to 10.1 in.)	102 to 420 mm (4 to 16.5 in.)
Cut sheets (paper table)	55 to 267 mm (2.2 to 10.5 in.)	55 to 420 mm (2.2 to 16.5 in.)

Length:

Forms type	DL9300	DL9400
Continuous forms	102 mm (4 in.) or more	102 mm (4 in.) or more
Cut sheets (sheet feeder)	70 to 364 mm (2.8 to 14.3 in.)	70 to 420 mm (2.8 to 16.5 in.)
Cut sheets (paper table)	70 to 364 mm (2.8 to 14.3 in.)	70 to 420 mm (2.8 to 16.5 in.)

Thickness: Up to 0.65 mm (0.025 in.)

Thickness control: Automatic print head gap control (manual control possible)

Loading: Autoloading for continuous forms and cut sheets

Parking: Cut sheets are loaded without removing continuous forms from the printer; continuous forms are unloaded to the parking position and stand by for the next loading.

Cut-sheet feeder (option):

DL9300	DL9400
SF930	SF940

Forms cutting: 25.4-mm (1-in.) margin tear-off

Paper detection: Left and right edges of paper
Top and bottom edges of paper

Feed path: Nearly flat

See Section 3.7 for details on forms specifications.

3.1.5 Other printing features

Multiple copies:	Original + 4 copies (depending on paper) in normal mode
	Original + 7 copies (depending on paper) in multicopy mode

3.1.6 Acoustic noise

Average:	55 dB (A)
Measurement conditions:	ECMA-74 Section IV, ISO 7779, bystander position-front
Printing conditions:	60 g/m^2 thick, 13 inches wide, continuous paper, and letter quality printing

3.1.7 Interfaces

Types:	Centronics parallel + RS-232C serial
Parallel:	Bi-directional, complying with the IEEE 1284 standard
RS-232C:	150, 300, 600, 1200, 2400, 4800, 9600, and 19200 baud X-ON/X-OFF (DC1/DC3), DTR, and RC protocols. The ETX/ACK protocol is not applicable to IBM character set 2.
Input buffer:	0, 256, 2K, 8K, 24K, 32K or 96K bytes

3.1.8 Emulations

Resident:	Fujitsu DPL24C PLUS
	IBM Proprinter XL24E
	Epson ESC/P2

3.1.9 Control panel

Switches:	Nine push-button switches: ONLINE, PAPER PATH, FRONT DIR, LOAD, LF/FF, TEAR OFF, MULTI COPY, ⇑MICRO, and ⇓MICRO
Indicators:	Three LEDs for basic status: POWER, PAPER OUT, and ONLINE
	Five LEDs indicating the currently selected paper path and multicopy mode

See Chapter 4 for details.

3.2 Electrical Conditions

Input voltage: 100 to 120 VAC ±10% (100 V models)
220 to 240 VAC –10%, +6% (200 V models)

Frequency: 50 or 60 Hz +2%, – 4%

Insulation resistance: AC-FG 10 MΩ or more

Dielectric strength: AC-FG 1 min. at 1.25 kVAC (100 V models)
1 min. at 1.5 kVAC (200 V models)

Power consumption: (average)

Condition	Input voltage		Remarks
	100–120	220–240	
Operating	60 W	70 W	Printing letter quality H
Standby	15 W	15 W	

3.3 Environmental Conditions

Temperature:

Operating	5 to 38°C (41 to 100°F)
Storage	–15 to 60°C (–4 to 140°F)
In transit	–25 to 60°C (–13 to 140°F)
Gradient	15°C/h or less

Note:
Print quality is guaranteed from 10 to 30°C.

Humidity:

Operating	30 to 80% RH
Storage	10 to 95% RH (no condensation)
Gradient	30% RH/day or less
Maximum wet bulb	29°C (84°F)

Note:
Print quality is guaranteed from 30 to 70% RH.

Vibration:

Operating	0.2 G. The printer is not damaged, but printing quality is not guaranteed.
Storage	0.5 G
Packaged	1.25 G (5 to 55 Hz, vertical; 2 min./cycle, 10 min.) 0.75 G (5 to 55 Hz, horizontal; 2 min./cycle, 10 min.)

Shock:

Operating	3 G. The printer is not damaged, but printing quality is not guaranteed.
Storage	10 G
Packaged	Withstanding a 60 cm (23.6 in.) drop test

Tilt: Operating 5° (left and right)
7° (back and front)

Electrostatic strength: 9 kV minimum, no errors during test printing under the following conditions:
Contact cycle and period: 10 Hz and 3 min.
Capacitor-resistor circuit: 150 pF and 150 Ω

Safety:

Model	Regulation	Region
100-120 VAC	UL 1950-D3	United States
	CSA C22.2/950	Canada
220-240 VAC	TÜV EN 60 950	Germany

RFI regulation:

Model	Regulation	Region
100-120 VAC	Class B, FCC Part 15B	United States

3.4 Physical Specifications

Dimensions:

	DL9300	DL9400
Width	456 mm (17.9 in.)	598 mm (23.5 in.)
Depth (*)	300 mm (11.8 in.)	300 mm (11.8 in.)
Height	250 mm (9.8 in.)	250 mm (9.8 in.)

* Excluding the paper table and the rear stacker

Weight:

	DL9300	DL9400
	12 kg (26.4 lb)	14 kg (30.8 lb)

3.5 Reliability

MTBF:	8,000 hours using a 25% duty cycle, 25% page density, and three hours of power-on operation per day.	
MTTR:	0.5 hours	
Printer service life:	5 million lines or 5 years	
Consumables	Print head	300 million strokes for each wire (90% confidence level) This corresponds to about 110 million characters for draft quality or 70 million characters for letter quality.
	Ribbon	5.0 million characters for draft quality (black ribbon cartridge)

3.6 Protection and Restrictions

3.6.1 Protection

To protect the print head, controller, and power supply, the printer checks for the following conditions:

- High temperature of the print head
- Damage to the carriage motor driver and the line feed motor driver or a short circuit in the motors
- Overvoltage of +34 V

To ensure printing quality, the 24 dot wires of the print head are divided into three groups and 3-pass unidirectional printing is done when one of the following overload conditions is detected:

- +34 V power falls below the predetermined voltage.
- The print head’s thermal sensor detects a high temperature.
- Image data has a dot density higher than the prescribed printing duty.

Note:
No overload condition occurs when the printing load is smaller than printing 66 lines at 33% duty.

3.6.2 Restrictions

To avoid damaging the printer, do not:

- Feed lines continuously more than 3 minutes.
- Continue character spacing without printing more than 5 minutes.
- Continuously print lines of 5 characters or less (at 10 cpi) more than 5 minutes.
- Continuously print at 50% duty more than 1 minute.

Note:
If the above limits are exceeded, the printer’s service life may be greatly shortened.

3.7 Details on Forms Specification

The DL9300/9400 processes a variety of forms: letter paper, typewriter paper, copy paper, business stock forms, labels, and ordinary envelopes. This section gives general specifications for continuous forms and cut sheets. Before using paper, check that it satisfies the requirements below. For nonstandard forms such as envelopes and labels, paper of nonstandard size or thickness, or cut sheets for autofeeding using cut-sheet feeders, consult your Fujitsu representative.

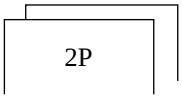
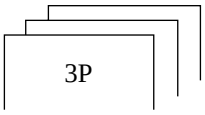
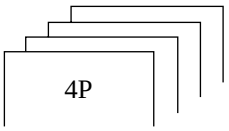
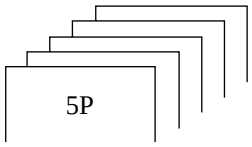
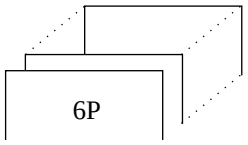
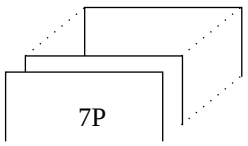
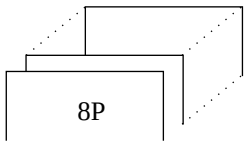
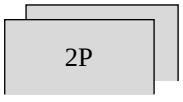
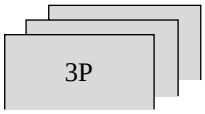
3.7.1 Size and thickness

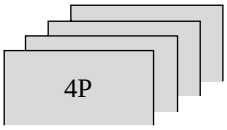
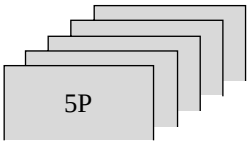
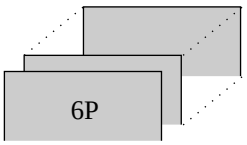
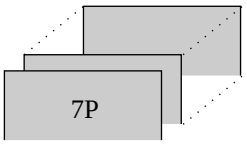
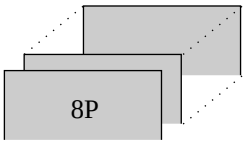
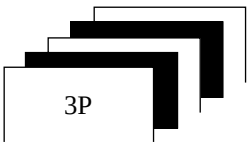
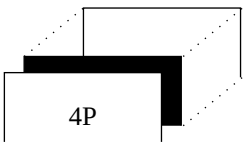
Table 3.1 Forms size and thickness

Item		Requirements	
		DL9300	DL9400
Width	Cut sheets (paper table) Cut sheets (sheet feeder) Continuous forms:	55 to 267 mm (2.2 to 10.5 in.) 102 to 257 mm (4 to 10.1 in.) 102 to 267 mm (4 to 10.5 in.)	55 to 420 mm (2.2 to 16.5 in.) 102 to 420 mm (4 to 16.5 in.) 102 to 420 mm (4 to 16.5 in.)
Length	Cut sheets (paper table) Cut sheets (sheet feeder) Continuous forms:	70 to 364 mm (2.8 to 14.3 in.) 70 to 364 mm (2.8 to 14.3 in.) 102 mm (4 in.) or greater	70 to 420 mm (2.8 to 16.5 in.) 70 to 420 mm (2.8 to 16.5 in.) Same as left
Thickness (*1)	Up to 0.65 mm (0.025 in.) See Table 3.2 for details. Notes: 1. The total thickness of multipart paper must not exceed 0.65 mm (0.025in.), with each part the same size and the part thickness uniform. 2. Multipart paper with a thickness or part count differing from specifications must be tested before use. 3. The accuracy of line spacing cannot be guaranteed when using multipart paper. 4. Carbon interleaving is used for continuous forms only. 5. Because the carbon inserted between sheets of paper counts as one part, the number of copies necessarily becomes 3 (in normal mode) or 4 (in multicopy mode) including the original.		

*1 The thickness is indicated by the paper weight in grams per square meter or in pounds per bond.

Table 3.2 Paper thickness by part

Type of copy	Part	Thickness
One-part	Single	47-81 g/m² (40-70 kg or 12-22 lb)
Carbonless multipart		
 2P	Top Bottom	40-64 g/m² (34-55 kg or 11-17 lb) 40-81 g/m² (34-70 kg or 11-22 lb)
 3P	Top Middle Bottom	40-50 g/m² (34-43 kg or 11-13 lb) 40-50 g/m² (34-43 kg or 11-13 lb) 40-81 g/m² (34-70 kg or 11-22 lb)
 4P	Top Middle, 2P to 3P Bottom	40 g/m² (34 kg or 11 lb) 40 g/m² (34 kg or 11 lb) 40-81 g/m² (34-70 kg or 11-22 lb)
 5P	Top Middle, 2P to 4P Bottom	40 g/m² (34 kg or 11 lb) 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
 6P	Top Middle, 2P to 5P Bottom	40 g/m² (34 kg or 11 lb) 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
 7P	Top Middle, 2P to 6P Bottom	40 g/m² (34 kg or 11 lb) 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
 8P	Top Middle, 2P to 7P Bottom	40 g/m² (34 kg or 11 lb) 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
Carbon-backed	*Do not use in high-humidity environments.*	
 2P	Top Bottom	40-64 g/m² (34-55 kg or 11-17 lb) 40-81 g/m² (34-70 kg or 11-22 lb)
 3P	Top Middle Bottom	40-52 g/m² (34-45 kg or 11-14 lb) 40-52 g/m² (34-45 kg or 11-14 lb) 40-81 g/m² (34-70 kg or 11-22 lb)

Type of copy	Part	Thickness
	Top Bottom	40 g/m² (34 kg or 11 lb) Middle, 2P to 3P 40 g/m² (34 kg or 11 lb) 40-81 g/m² (34-70 kg or 11-22 lb)
	Top Bottom	40 g/m² (34 kg or 11 lb) Middle, 2P to 4P 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
	Top Bottom	40 g/m² (34 kg or 11 lb) Middle, 2P to 5P 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
	Top Bottom	40 g/m² (34 kg or 11 lb) Middle, 2P to 6P 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
	Top Bottom	40 g/m² (34 kg or 11 lb) Middle, 2P to 7P 40 g/m² (34 kg or 11 lb) 40-64 g/m² (34-55 kg or 11-17 lb)
Carbon-interleaved	*Avoid using carbon-interleaved single sheets.*	
	Top Carbon Bottom, 2P	35-52 g/m² (30-45 kg or 9-14 lb) Counted as one sheet 35-81 g/m² (30-70 kg or 9-22 lb)
	Top Carbon Middle, 2P Carbon Bottom, 3P	35-46 g/m² (30-40 kg or 9-12 lb) Counted as one sheet 35-46 g/m² (30-40 kg or 9-12 lb) Counted as one sheet 35-64 g/m² (30-55 kg or 9-17 lb)
	Top Carbon Middle, 2P Carbon Middle, 3P Carbon Bottom, 4P	35-46 g/m² (30-40 kg or 9-12 lb) Counted as one sheet 35-46 g/m² (30-40 kg or 9-12 lb) Counted as one sheet 35-46 g/m² (30-40 kg or 9-12 lb) Counted as one sheet 35-64 g/m² (30-55 kg or 9-17 lb)

P: Abbreviation for part. 3P, for example, means 3-part copy paper.

kg: Kilogram weight of 1000 sheets of 788 × 1091 mm paper (1.16 g/m²)

lb: Pound weight of 500 sheets of 17 × 22 inch paper (3.76 g/m²)

3.7.2 Printing areas

Figures 3.1 and 3.2 detail valid printing areas.

Continuous forms:

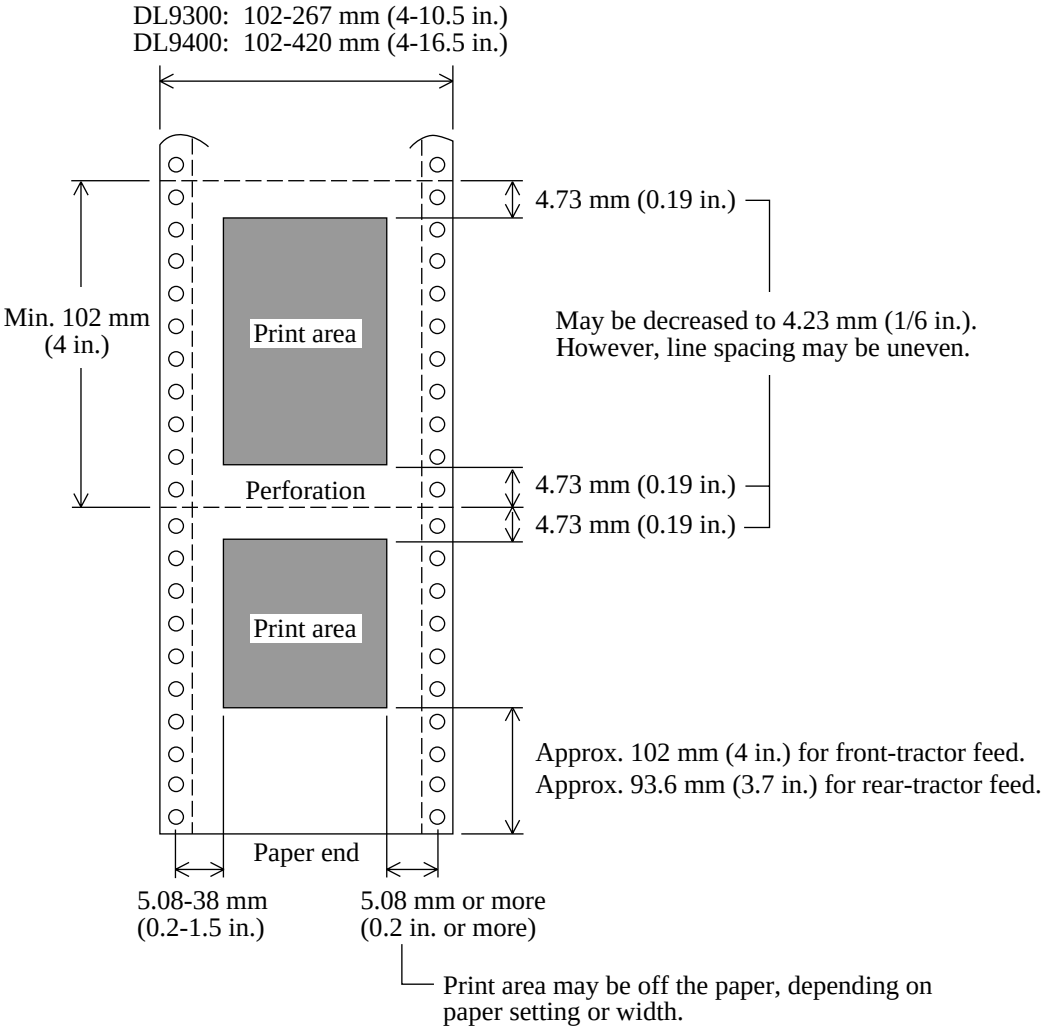


Figure 3.1 Printing area for continuous forms

Cut sheet paper:

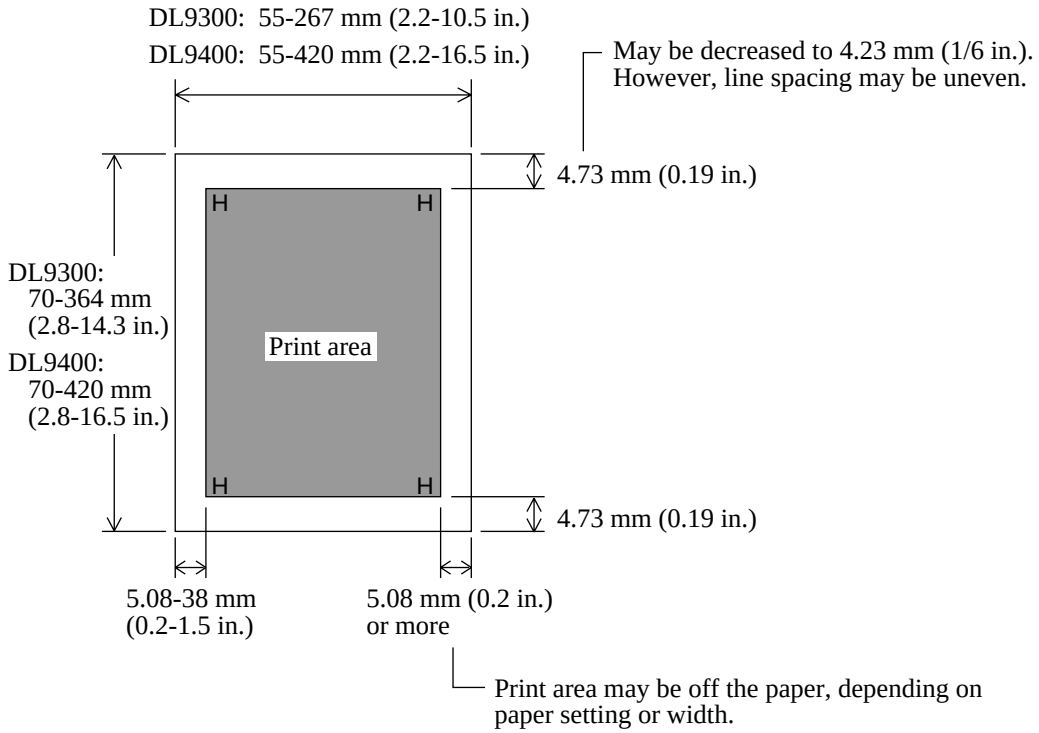


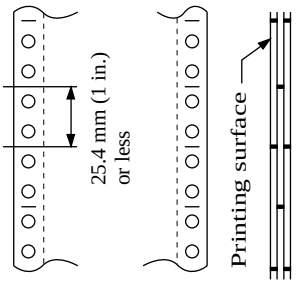
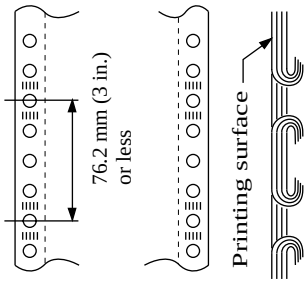
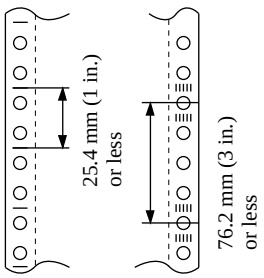
Figure 3.2 Printing area for cut sheets

3.7.3 Multipart binding and perforations

To avoid paper jams when using multipart paper, note the following:

Binding continuous forms:

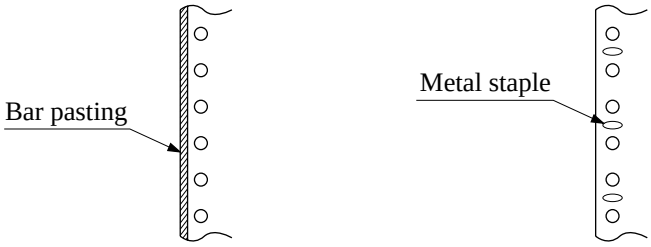
Multipart paper must be pasted or crimped (paper-stapled) at margins only. Metal staples and bar pasting must not be used. Incorrect multipart paper may reduce print quality and make forms difficult to fold.

Procedure	Pros and cons
(1) Point-pasting on two sides (zigzag pasting) 	Preferred because: • Forms remain flexible. • Copy parts do not displace each other.
(2) Crimping on both sides (double-gathered) 	The greater the number of copies, the greater the displacement.
(3) Point-pasting on one side and crimping on the other side 	Combination of (1) and (2)

Notes:

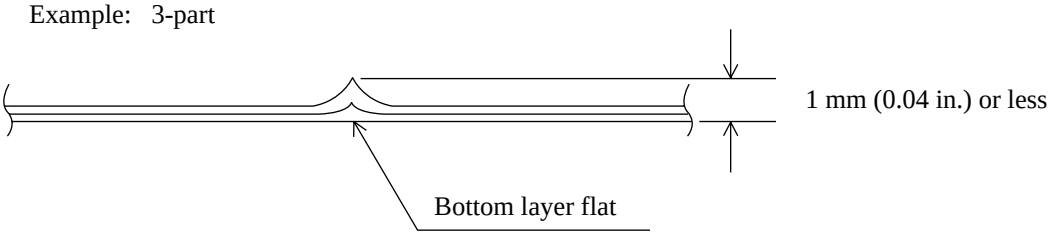
1. To prevent paper jams, avoid the following:

    - Bar-pasting that makes forms stiff.
    - Metal staples that cause forms to catch in the paper feed path. The print head may also be damaged in printing on staples.

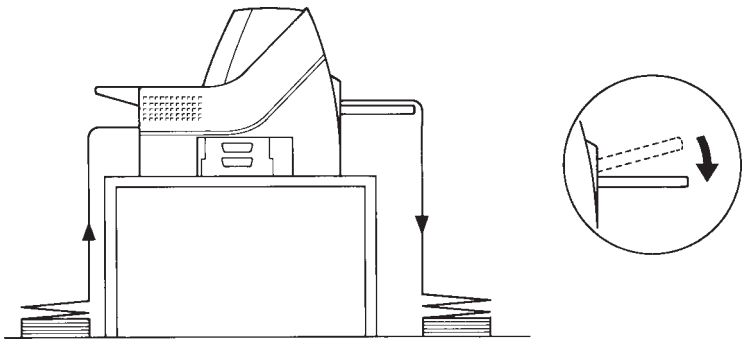


2. The raised fold of the top part at the perforation (fold) must be 1 mm (0.04 in) or less, with the bottom layer flat as shown below.

Example: 3-part



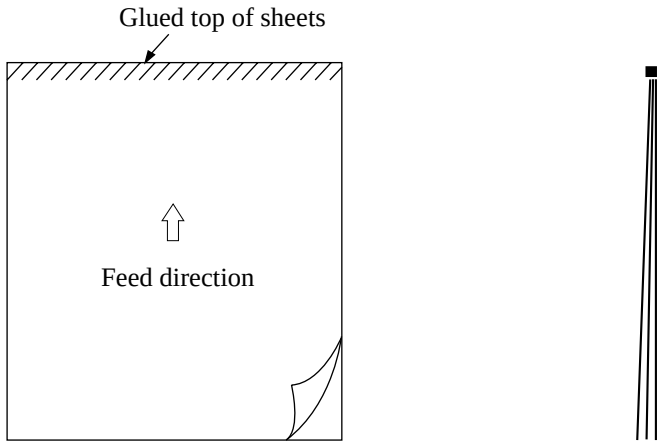
3. When using continuous forms, the rear stacker must be down as shown below.



Rear stacker position for continuous forms

Binding cut sheets:

When using carbonless or carbon-backed paper, be sure forms are pasted at the top. Paste must be applied evenly and must not cause wrinkles, creases, or discoloration.



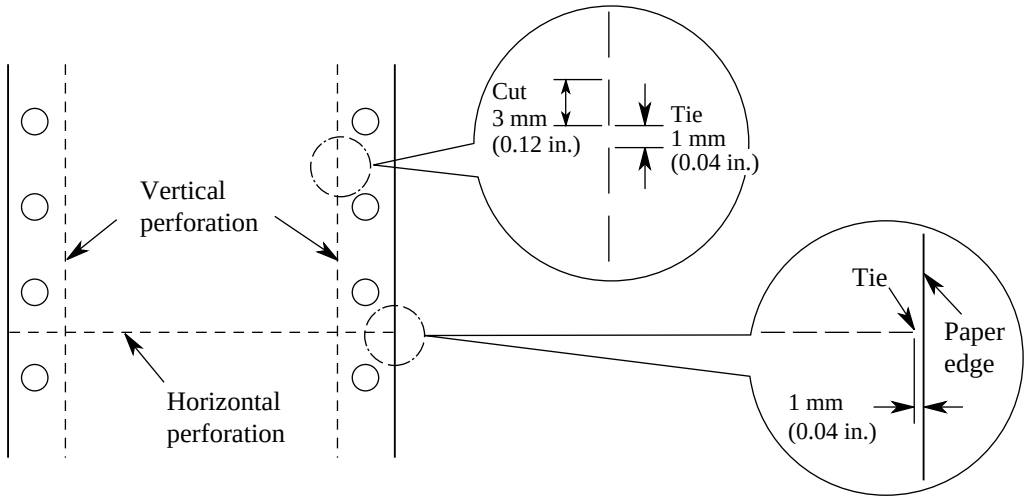
Binding carbon-interleaved multipart paper (continuous forms only):

Process carbon-interleaved multipart paper as follows:

- Paste each carbon to the paper at the left and right margins at spots other than sprocket hole areas.
- Paste each carbon to the paper at the left and right margins including the sprocket hole areas while aligning the carbon's sprocket holes with those of the paper.

Perforations:

Poor or incomplete horizontal and vertical perforations cause paper jams. The tie-to-cut ratio for both types of perforation must be 1 to 3.



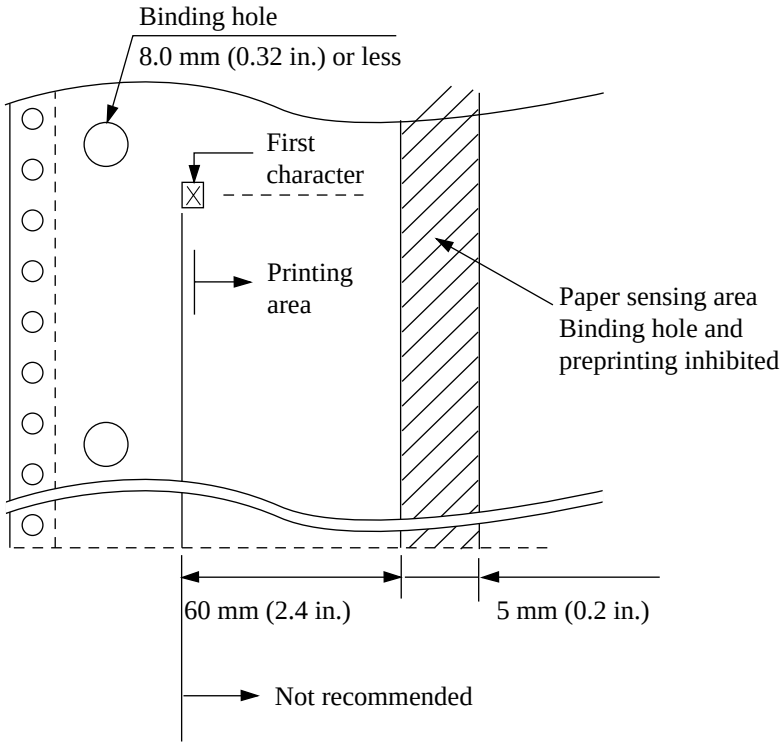
The paper edge must be tied.

3.7.4 Binding holes and preprinting

To ensure that paper is detected, do not let binding holes enter the paper sensing area.

Binding holes must be less than 8 mm (0.32 in.) in diameter.

Preprinting in the paper sensing area should be avoided.



3.7.5 Other precautions

- Use high-quality paper.
- Make sure that cut sheets are not curled.
- Handle and store forms carefully. Make sure that they are not wrinkled or damaged.
- Never store forms where humidity is high.
- When using multipart forms, envelopes, or labels, test-print before actual use.

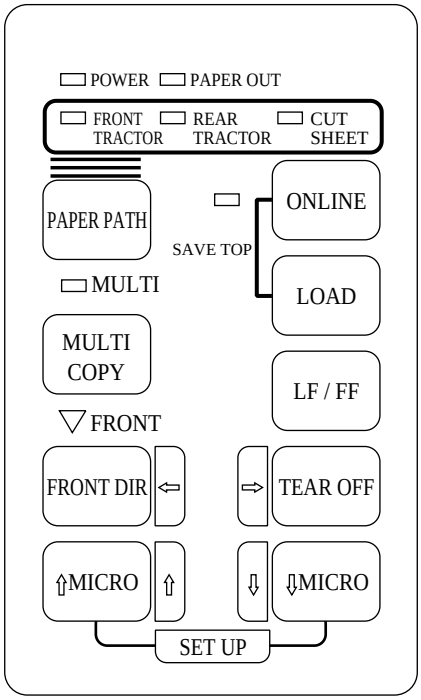
CHAPTER 4 CONTROL PANEL AND DLMENU

The control panel is mainly concerned with printer basic status display and paper feeding in normal mode. The DLMENU is used for remotely setting up the printer in setup mode.

4.1 Control Panel

The control panel has nine push buttons and eight LED indicators as shown in Figure 4.1. Except paper handling, capability of copying can be changed by a touch of a button.

In setup mode, the four arrow buttons can be used to set up the printer in place of DLMENU. The printer prints the setup menu and the help menu that shows how to use the buttons to select parameters for printer operating conditions. The red cursor engraved on the paper guide of the print head carriage indicates the active position.



▭ and ▽: LED indicators

▭ : Push buttons

Indicators

POWER, PAPER OUT, and ONLINE: Printer basic status

FRONT TRACTOR, REAR TRACTOR, and CUT SHEET: Paper path currently selected

MULTI: Multicopy mode (high printing pressure)

FRONT: Selected direction of ejecting paper

Buttons

ONLINE: Selecting online or offline

LOAD, LF/FF, and TEAR OFF: Controlling paper feed

PAPER PATH and FRONT DIR: Selecting paper path and paper eject direction

MULTI COPY: Selecting multicopy mode

⇑MICRO and ⇓MICRO: Feeding paper in 1/180 inch for fine-adjusting TOF position

SAVE TOP (ONLINE and LOAD): Storing TOF position in permanent memory

SETUP (⇑MICRO and ⇓MICRO): Setting printer in setup mode

⇐, ⇒, ⇑, and ⇓: Moving cursor in setup mode

Figure 4.1 Control panel

4.2 DLMENU

Generally, the printer features are controlled by the printer driver through application programs. These are also controlled by the remote setup utility program, DLMENU, stored in the DLMENU floppy disk which is furnished with the printer.

The DLMENU allows the user to change printer’s features directly from the computer display and keyboard. Operations are easy enough that the user's manual need not be referenced once the user is familiar with the printer.

The DLMENU is useful to configure the printer to suit the requirements of user's computer, software, and documents to be printed. It also has maintenance-aid functions which allows the user to print self-test reports and print commands and data in hexadecimals.

The parameters changed using the DLMENU affect page layout, font, and printer control. If software programs have printer drivers, the printer drivers control these parameters for the user. The user may never need to change the settings manually using the DLMENU.

The DLMENU first displays the opening screen then the main menu. The main menu offers functions to select print options for user documents. It also offers an operation guide of some keys and a help message line. If the printer is not ready or has an error, a status message is displayed. The top menu bar offers pull-down menus for file functions, emulation selection and interface setting, and maintenance. The user can select options or perform a function by using the main menu and top menu bar accessed through the mouse or keyboard. One of the six languages is selectable for messages when installing the DLMENU.

To use the DLMENU, the following are required:

- IBM PC/AT or compatible or PS/2
- PC DOS 5.02, MS-DOS 3.3, or higher
- VGA (640 x 400) or higher display
- Hard disk driver installed (1 MB essential for DLMENU)
- 3.5-inch 2HD floppy disk drive (1.44 MB)

The following main menu is displayed if the printer has no error after the opening screen is displayed.

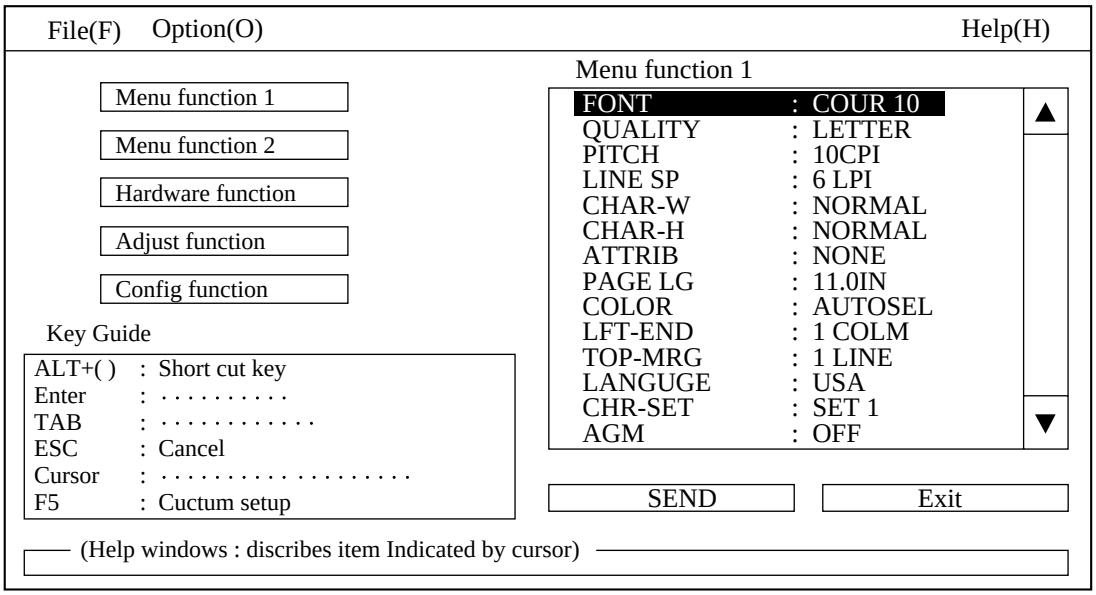


Figure 4.2 Main menu of the DLMENU

Table 4.1 Setup functions

Function	Description
SAVE & END	Stores selected options in nonvolatile memory and exits setup mode.
MENU 1 or 2	Selects options for font styles, page format, command compatibility, etc. See the description below. Two menus enable setting different options for two applications.
HARDWARE	Selects options for hardware conditions such as input buffer capacity selection. See the description below.
ADJUSTMENT	Adjusts the top-of-form location where paper is loaded.
CONFIGURATION	Defines the printer's primary condition such as tearing off continuous forms.
DEFAULT	Restores printer features to their factory defaults.
LIST	Prints out currently saved setup options in table form.
SELF-TEST	Prints firmware versions and self-test pages.
HEX DUMP	Prints received data and commands in hexadecimal.
V-ALIGNMENT	Prints vertical bars for aligning printing locations between odd and even lines in bidirectional printing.

MENU 1 and 2 functions:

Emulation, font style, print quality, character spacing, line spacing, character width, character height, character attribute, page length, left-end offset, top margin, language, character set, perforation skip, paper width, zero character typeface, DC1/DC3 code specification, CR code definition, LF code definition, and right-end auto CR

HARDWARE functions:

Paper-outage detection, print direction, buzzer activation, interface data word length, print data/download data buffer allocation, parallel interface +5V source pin assignment, interface type, serial data format, baud rate, protocol, DSR signal control, and duplex mode

CHAPTER 5 INTERFACE INFORMATION

5.1 Overview

The DL9300/9400 has a dual interface feature which allows the printer to communicate with a host through Centronics parallel and RS-232C serial interfaces. The printer automatically selects the interface proper to the occation.

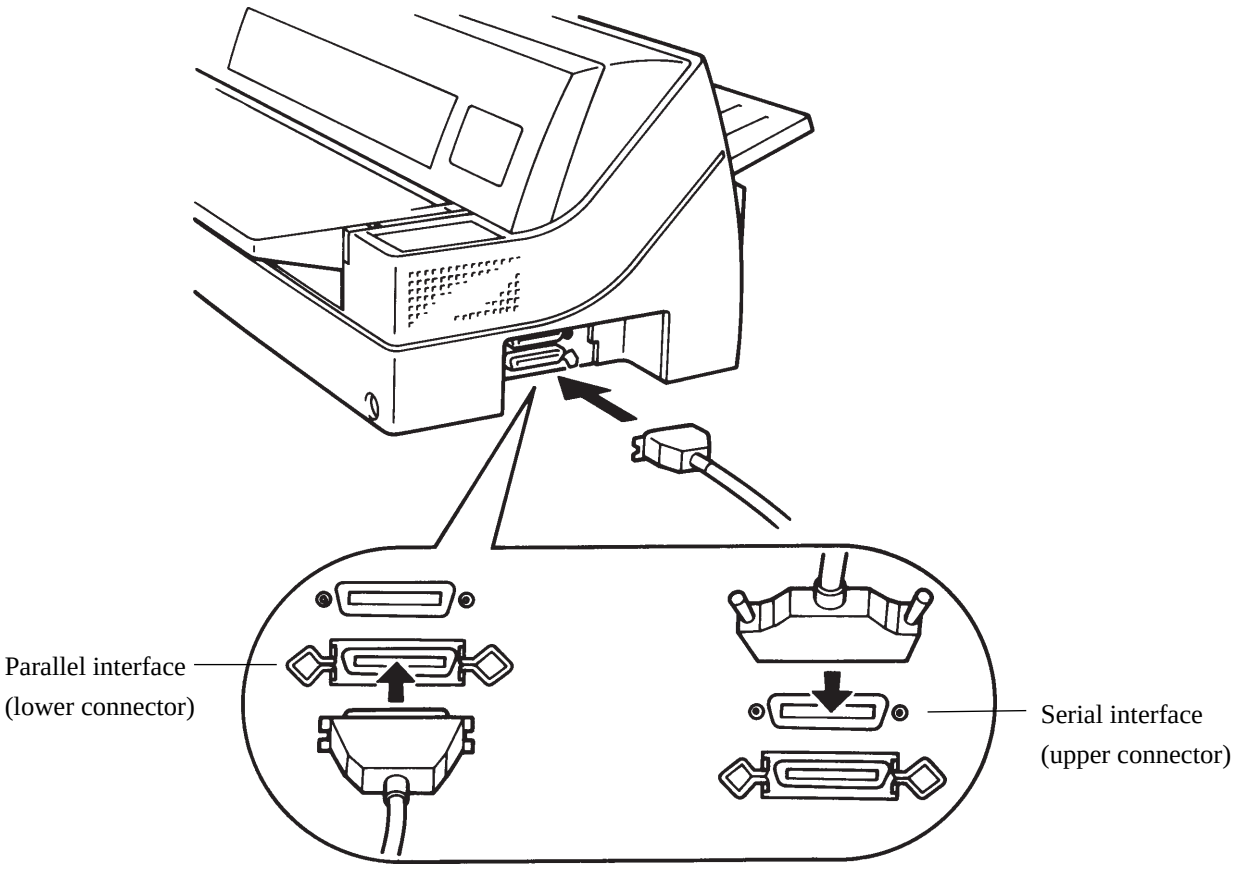


Figure 5.1 Interface connectors

5.2 Parallel Interface Specifications

This parallel interface supports the bi-directional data transfer in nibble mode of the IEEE 1284 standard. It is also compatible with the conventional Centronics interface.

5.2.1 Hardware requirements

Signal levels:

TTL-compatible
0.0 to +0.4 V for low level
+2.4 to +5.0 V for high level

Output circuit:

SN74LS07 or equivalent

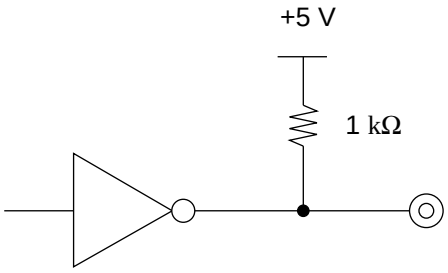
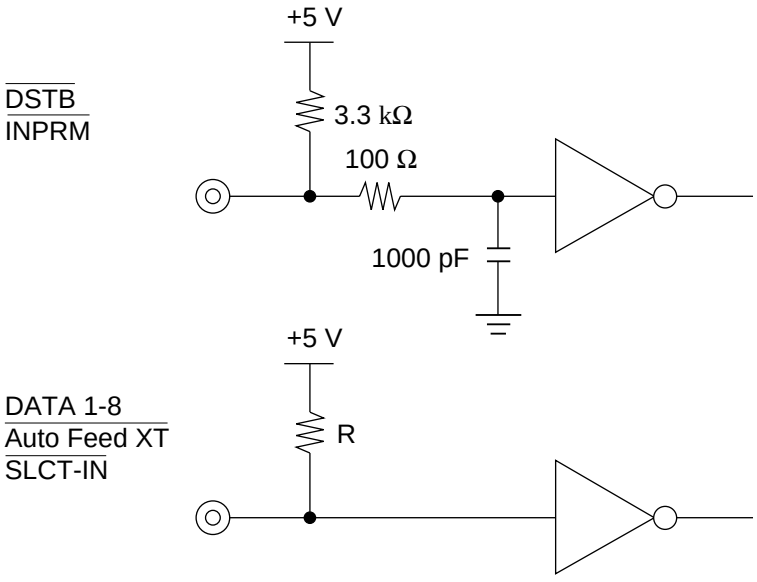


Figure 5.2 Parallel interface output circuit

Input circuit:

SN74LS14 or equivalent



Signal	R
DATA 1-8	3.3 kΩ
Auto Feed XT	1 kΩ
SLCT-IN	3.3 kΩ

Figure 5.3 Parallel interface input circuits

5.2.2 Connector pin assignment

Connector (cable):

Amphenol DDK 57FE-30360 shielded male connector or equivalent

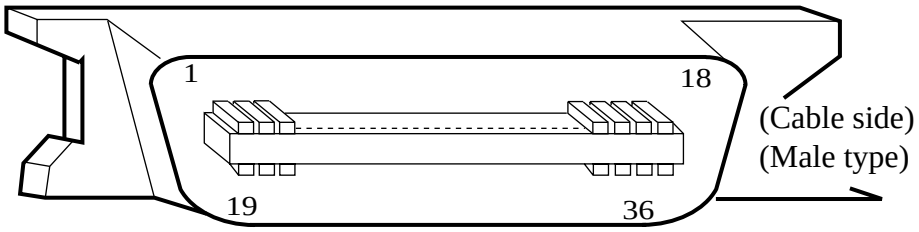


Figure 5.4 Parallel interface connector

Signals:

Table 5.1 Parallel interface signals

Connector pin number	Return line pin number	Signal Compati mode Nibble mode	Direction	Description
1	19	$\overline{\text{Data Strobe}}$ ($\overline{\text{DSTB}}$)	Input	• Strobe pulse for reading data (Data 1 to Data 8). The printer reads data when this signal is low. • The pulse width must be 1 µs or more at the printer's receiving terminal.
		Host Clock		This signal is set high when the host requests the reverse data transfer phase (nibble mode).
2	20	Data 1	Input	• Data 1 to Data 8 signals correspond to parallel data bits 1 to 8. • Data 8 is the most significant bit, but is not used in the 7-bit ASCII mode. • All signals must go high at least 1 µs before the falling edge of the $\overline{\text{Data Strobe}}$ signal, and must stay high for at least 1 µs after the rising edge.
3	21	Data 2	Input	
4	22	Data 3	Input	
5	23	Data 4	Input	
6	24	Data 5	Input	
7	25	Data 6	Input	
8	26	Data 7	Input	
9	27	Data 8	Input	
10	28	$\overline{\text{Acknowledge}}$ ($\overline{\text{ACK}}$)	Output	• Pulse signal indicating data reception completed (or data reception enabled) status • Issued when the printer switches from offline to online
		Printer Clock		Reverse data transfer phase: This signal goes high when data being sent to the host is established. Reverse idle phase: This signal is set low then goes high to interrupt the host, indicating that data is available.

Table 5.1 Parallel interface signals (continued)

Connector pin number	Return line pin number	Signal Compati mode Nibble mode	Direction	Description
11	29	Busy	Output	Data cannot be received when this signal is high, e.g., if the buffer is full or an error occurs.
		Printer Busy		Reverse data transfer phase: Data bit 3, data bit 7, then forward path (host to printer) busy status
12	30	Paper Empty (PE)	Output	This signal goes high if paper runs out.
		Ack Data Req		Reverse data transfer phase: Data bit 2, then data bit 6 Reverse idle phase: This signal is set high until the host requests data and, after that, follows the $\overline{\text{Data Available}}$ signal.
13	–	Select (SLCT)	Output	This signal goes high when the printer is selected (online), and goes low when the printer is deselected (offline).
		X Flag		Reverse data transfer phase: Data bit 1, then data bit 5
14	–	$\overline{\text{Auto Feed XT}}$	Input	Not used
		Host Busy		Reverse data transfer phase: This signal is set low when the host can receive data, and goes high when the host has received data. Following a reverse data transfer, the interface enters the reverse idle phase when the Host Busy signal goes low and the printer has no data. Reverse idle phase: This signal goes high when the Printer Clock signal goes low so that the interface re-enters the reverse data transfer phase. If it goes high with the 1284 Active signal low, the 1284 idle phase is aborted and the interface returns to the compatibility mode.
15	–	–	–	No connection
16	–	Signal Ground (SG)	–	Logic ground level (0 V)
17	–	Frame Ground (FG)	–	Printer chassis ground line FG and SG are connected.
18	–	+5V	Output	+5 V source (up to 50 mA) No output in default Output is available when the +5V option is selected for the <PIN-18> item by the HARDWRE function in setup mode.
		–		No connection
19 to 30	–	Signal Ground (SG)	–	Twisted-pair return lines
31	–	$\overline{\text{Input Prime}}$ ($\overline{\text{IN PRM}}$)	Input	If this signal is low for more than 50 µs, the printer is reset to initial status and placed online.

Table 5.1 Parallel interface signals (continued)

Connector pin number	Return line pin number	Signal Compati mode Nibble mode	Direction	Description
32	–	$\overline{\text{Fault}}$	Output	This signal goes low under the following printer conditions: (1) Offline (2) Paper out (3) Cut-sheet feeder error (4) Other printer error
		$\overline{\text{Data Available}}$		Reverse data transfer phase: This signal is set low when the printer is ready to send data to the host. During the data transfer, it is used as data bit 0 (LSB), then data bit 4. Reverse idle phase: This signal is used to indicate that data is available.
33	–	Signal Ground (SG)	–	Logical ground level (0 V)
34	–	–	–	No connection
35	–	+5 VR	Output	Pulled up to +5 V through a 3.3 kΩ resistor
36	–	$\overline{\text{SLCT-IN}}$	Input	Not used
		1284 Active		This signal goes high to cause the printer to enter the reverse data transfer phase (nibble mode).

Notes:

1. Left-aligned signal names are in compati mode and right-aligned ones are in nibble mode.
2. The direction (input and output) refers to the printer.
3. Return line: Twisted-pair return line connected to the signal ground level

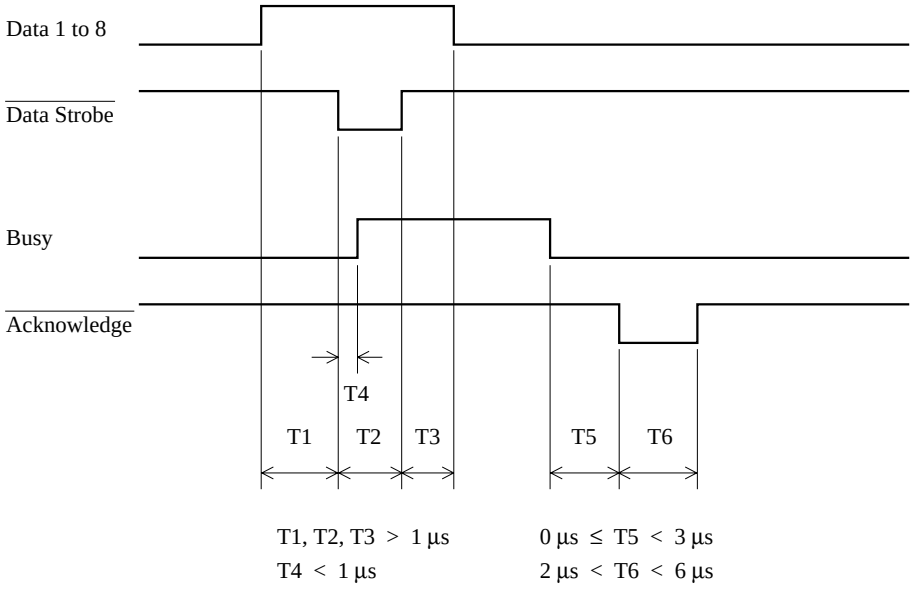
5.2.3 Data transmission timing

The 9300/9400 uses a bi-directional parallel interface complying with IEEE 1284. This interface is also compatible with the conventional Centronics interface. Data transfer from host to printer is performed according to Centronics standard, called compatible mode. Data transfer from printer to host, it is performed according to the IEEE 1284 standard, called nibble mode.

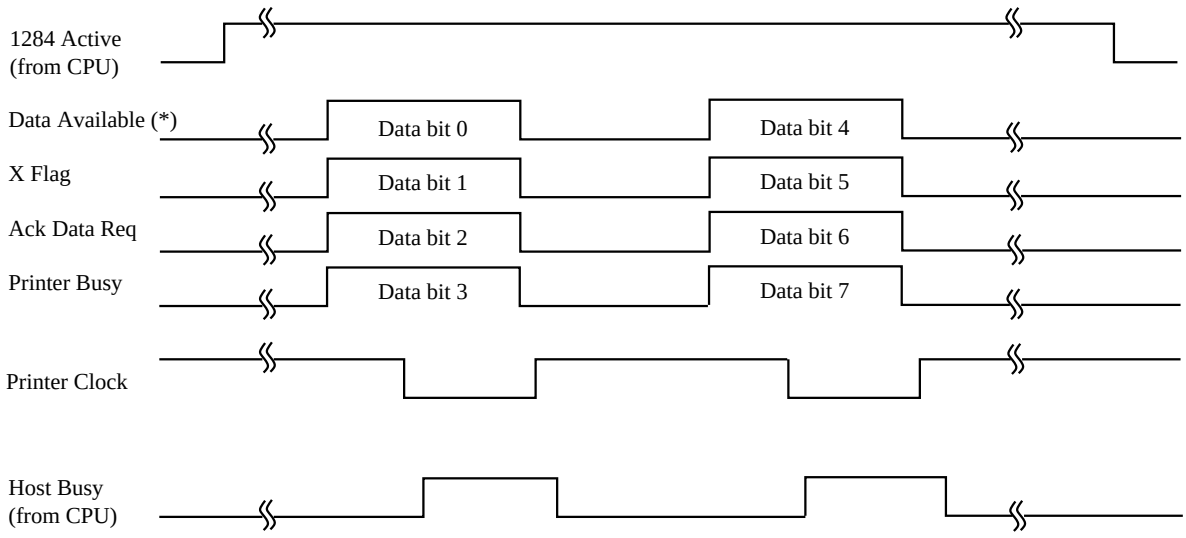
In compatible mode, the printer receives data from the computer in handshaking mode based on the Busy and $\overline{\text{Acknowledge}}$ signals from the printer and the $\overline{\text{Data Strobe}}$ signal from the computer. For the $\overline{\text{Data Strobe}}$ and $\overline{\text{Acknowledge}}$ signals, the timing of the Busy signal must be as shown in the compatible mode of Figure 5.5.

To send data from the printer to the host, the interface enters the nibble mode where data is sent in units of four bits (nibble) using four output signal lines as data paths. The data transfer sequence in nibble mode involves negotiation phase, reverse iddle phase, reverse data transfer phase, and termination phase. Figure 5.5 shows the reverse data transfer phase where data is sent.

Compatible mode (data transfer from host to printer)



Reverse data transfer phase in nibble mode (data transfer from printer to host)



* Data Available is assigned for the cable.

Figure 5.5 Data transmission timing

5.3 Serial Interface Specifications

Transmission mode:

Asynchronous

Full-duplex or half-duplex (selectable)

Speed:

150, 300, 600, 1200, 2400, 4800, 9600, or 19200 baud (selectable)

Data bits:

7 or 8 bits (selectable)

Parity bit:

Odd, even, mark, space, or none (selectable)

Start bit:

1 bit

Stop bit:

1 or 2 bits (selectable)

Protocol:

- XON/XOFF (DC1/DC3)
- Data Terminal Ready (DTR)
- Reverse Channel (RC)

Buffer size:

0, 256, 2K, 8K, 24K, 32K or 96K bytes (selectable)

5.3.1 Hardware requirements

Signal levels:

–3 V or lower for a mark condition (logical 1)

+3 V or higher for a space condition (logical 0)

Input circuit:

A μPD4712 is used to convert signals from the RS-232C level to the TTL level.

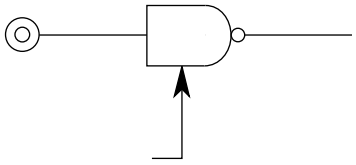


Figure 5.6 Serial interface input circuit

Output circuit:

A μPD4712 is used to convert signals from the TTL level to the RS-232C level. A 1000 pF capacitor suppresses noise on the output signal line.

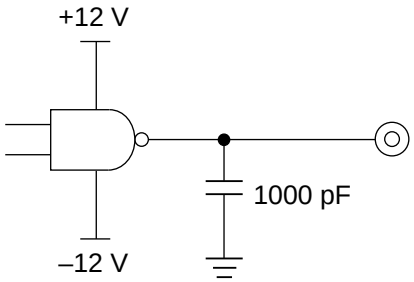


Figure 5.7 Serial interface output circuit

5.3.2 Connector pin assignment

Connector (cable):

D-subminiature Canon or Cinch DB-25 male connector or equivalent that conforms to EIA standards

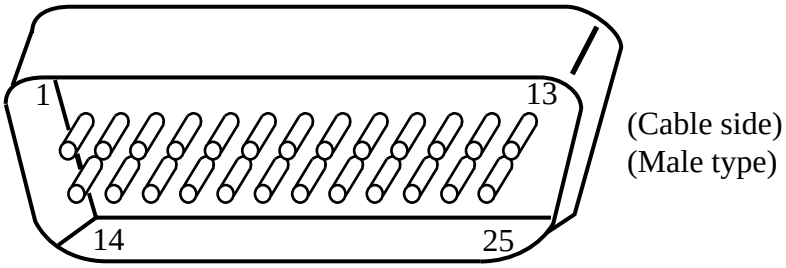


Figure 5.8 Serial interface connector

Table 5.2 Serial interface signals

Pin number	Designation	Direction	Description
1	FG	–	Frame/chassis Ground This pin is the safety/protective ground.
2	TD	Output	Transmitted Data This pin carries information from the printer to the computer.
3	RD	Input	Received Data This pin carries information from the computer to the printer.
4	RTS	Output	Request to Send Spaces are sent when the printer is ready to transmit data.
5	CTS	Input	Clear to Send Spaces are sent when the computer is ready to receive data.
6	DSR	Input	Data Set Ready Spaces are sent when the computer is ready (the printer can receive or transmit data).
7	SG	–	Signal Ground This pin is the common return.
8	CD	Input	Carrier Detect Spaces are sent when the computer lets the printer receive data.

Table 5.2 Serial interface signals (continued)

Pin number	Designation	Direction	Description
11	RC	Output	Reverse Channel This signal is used instead of the DTR signal in the RC protocol. Spaces are sent when the printer is ready to receive or transmit data.
20	DTR	Output	Data Terminal Ready Spaces are sent when the printer is on and ready to receive or transmit data.

Notes:

1. The space state corresponds to the high level of the interface signal.
2. The direction (output or input) refers to the printer.

5.3.3 Serial data format

The serial data format -- 10 or 11 bits long -- consists of a start bit, data bits, a parity bit, and stop bits. A bit is in the mark state when not in transmission. Data bits start with the least significant bit (LSB). The character K (hexadecimal 4B), for example, is transmitted as shown below (7 data bits, even parity).

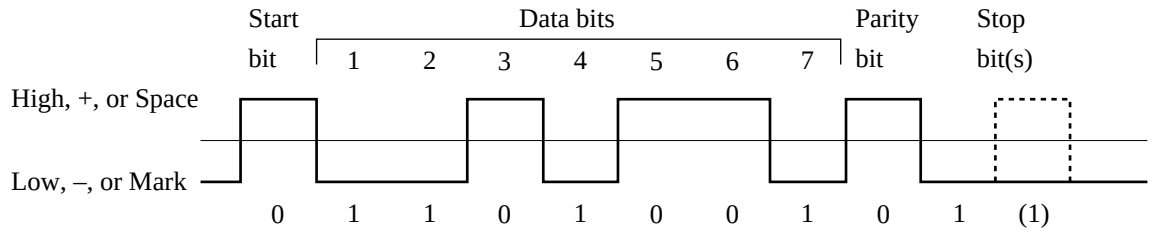


Figure 5.9 Serial data format

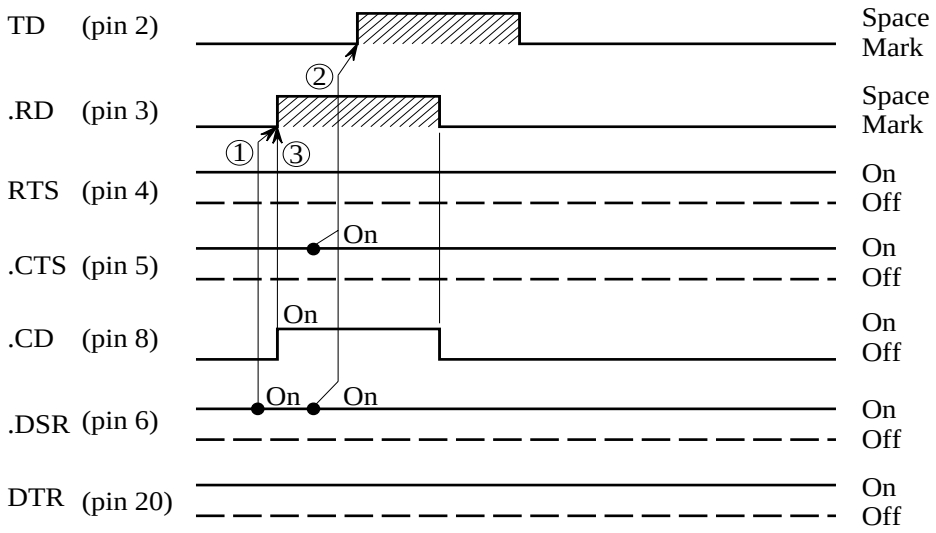
5.3.4 Timing diagram and cable configuration

The printer enables or disables input control signals for the printer linked with the RS-232C interface, enabling communication via the RS-232C interface as well as more simple communication.

There are mainly two ways to connect the RS-232C interface:

- Full-wire
- 3-wire

(1) Full-duplex full-wire control mode
Timing diagram:



Notes:
Signals prefixed by a dot (.) are input to the printer.

① DSR must be high (on) when the printer receives data in this mode. Otherwise, received data is ignored.

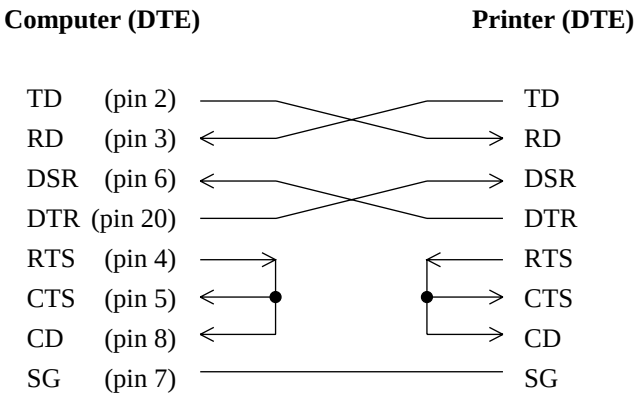
② If both DSR and CTS are on when the printer has data to be transmitted to the computer in this mode, the printer transmits the data immediately. If either DSR or CTS is off, data is not transmitted until both signals go high (on).

③ In this mode, CD is “don’t care.”

Example of cable configuration:

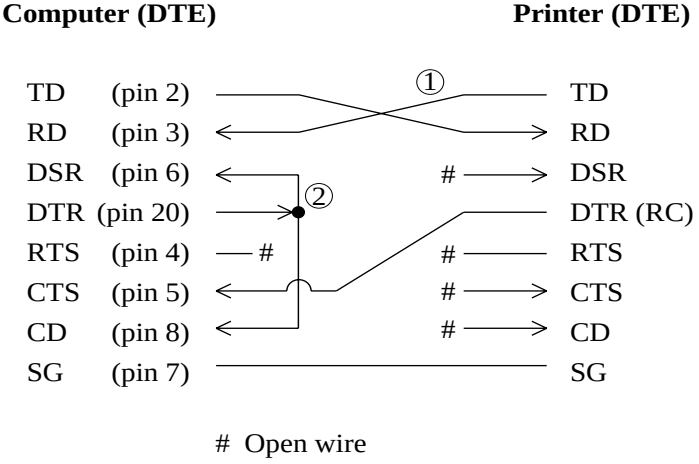
- To DCE (data circuit terminating equipment)
  Use the “straight-through” cable.

- To DTE (data terminal equipment)
  Use the “cross-patched” cable below.



(2) Full-duplex 3-wire control mode

This mode enables more simple communication than the above mode.
Example of cable configuration:



Open wire

Notes:
1. Wire ① is not necessary for the DTR (or RC) protocol.
2. Some computers may not require wire ②.

5.3.5 Data protocols

The following four protocols are used for the RS-232C serial interface, depending on the computer hardware.

- XON/XOFF or DC1/DC3
- DTR
- RC

These protocols prevent overflow of the print data receive buffer when interface data transmission is faster than buffer data printing. The printer uses specific character codes or an interface signal for each protocol to inform the computer of buffer status.

Selecting IBM character set 1 validates the ETX/ACK protocol, regardless of the emulation used.

(1) XON/XOFF or DC1/DC3 protocol

The XOFF (DC3) code (hexadecimal 13) is transmitted from the printer when less than 255(*1) bytes remains in the buffer. The XON (DC1) code (hexadecimal 11) is transmitted when less than 255 bytes of data remains in the buffer.

*1 This value is 63 bytes when the print buffer is configured for 256 BYTE in setup mode.

Data processing cannot be guaranteed if data is transmitted to the printer but sufficient buffer space is not available after the XOFF code has been transmitted.

When the printer is first turned on, the DTR signal is set to the space state (ready) and an XON (DC1) code is transmitted from the printer. When the printer is placed offline, the XOFF code is transmitted even if the buffer is not full. The XON code is transmitted when the printer is placed online again.

If paper runs out, a NAK code (hexadecimal 15) is sent from the printer.

(2) DTR protocol

The DTR signal (pin 20) is set off (low). That is, the Busy signal is issued when 255(*1) bytes of data remain in the buffer. When the printer is placed offline, the DTR signal becomes inactive.

*1 This value is 63 bytes when the print buffer is configured for 256 BYTE in setup mode.

The computer must stop transmission within 255 bytes after the DTR signal is set off (low).

Valid data cannot be guaranteed if data exceeding the buffer capacity is transmitted without regard to the DTR signal.

Buffer-full recovery timing:

Data transmission is suspended when the DTR signal is set off (low). Even in this state, printing continues. When the data length of the available area in the buffer exceeds 255 bytes, the DTR signal is on (high). That is, a “ready” signal is issued.

(3) RC protocol

The RC protocol is the same as the DTR protocol, except that it uses the Reverse Channel signal (pin 11) instead of the Data Terminal Ready signal (pin 20).

5.4 Command Sets

5.4.1 Overview

This section gives an overview of the DL9300/9400 printer's command sets. It may not provide the command details and programming examples need to modify software packages or writing user programs.

This printer uses three types of command set for resident emulation for the following models:

DPL24C PLUS command set: Fujitsu DL series printers
IBM Proprinter XL24E emulation: IBM Proprinters X24, XL24, and XL24E
Epson ESC/P2 (LQ-1170) emulation: Epson printers using the ESC/P2 command set

The next three sections list commands for each emulation.

Note:
Values or small letters in parentheses are represented by one byte of data. (1) and (0) are represented by 01 and 00 in hexadecimal and by ASCII 1 (31 hex) and 0 (30 hex). (n) is a value whose effective range is also shown.

5.4.2 DPL24C PLUS command set

This section lists command codes used for Fujitsu DL series printers.

	Function	Command
1.	Print mode control	
	Double-strike (bold) printing on	ESC G
	Double-strike (bold) printing off	ESC H
	Emphasized (shadow) printing on	ESC E
	Emphasized (shadow) printing off	ESC F
	Italic printing on	ESC 4
	Italic printing off	ESC 5
	Select character style and screenin	ESC e S (n1) (n2)
	n1 = 0: Normal	
	1: Outlined	
	2: Shaded	
	3: Outlined and shaded	
	4: Thin outlined	
	5: Thin shaded	
	6: Thin outline and shaded	
	n2 = 0: Transparent	
	1: Light dot matrix	
	2: Heavy dot matrix	
	3: Vertical bars	
	4: Horizontal bars	
	5: Slants	
	6: Back slants	
	7: Lattice	
	One-line double-width characters on	SO or ESC SO
	One-line double-width characters off	DC4
	Double-width characters on/off	ESC W (n)
	(on: n = 1, off: n = 0)	
	Double-height characters on/off	ESC V (n)
	(on: n = 1, off: n = 0)	
	This command does not adjust line spacing.	
	Multiple width and height printing	ESC u (n) (h1) (h2) (v1) (v2)
	n = 0: Not adjusted	
	1: Character pitch multiplied	
	2: Line spacing multiplied	
	3: Character pitch and line spacing multiplied	
	h1: Tens digit of horizontal multiple	
	h2: Units digit of horizontal multiple	
	v1: Tens digit of vertical multiple	
	v2: Units digit of vertical multiple	
	($0 \leq$ h1 h2 or v1 v2 ≤ 16)	
	Condensed characters on	SI or ESC SI
	Condensed characters off	DC2

	Function	Command
1.	Subscript or superscript printing on (subscript: n = 1, superscript: n = 0)	ESC S (n)
	Subscript and superscript printing off	ESC T
	Select underline type n = 0: Single line 1: Bold single line 2: Extremely bold single line 3: Double line 4: Bold double line 5: Extremely bold double line	ESC e U (n)
	Underline on/off (on: n = 1, off: n = 0)	ESC – (n)
	Overline on/off (on: n = 1, off: n = 0)	ESC e o (n)
	Select printing style This command combines printing styles. The value of n is the sum of the values of the styles to be combined. n = 0: Pica pitch 1: Elite pitch 4: Condensed 8: Shadow 16: Bold 32: Double width 64: Proportional	ESC ! (n)
	Select image overlay type This command overlays a pattern on characters. n = 1: Light dot matrix 2: Heavy dot matrix 3: Vertical bars 4: Horizontal bars 5: Slants 6: Back slants 7: Lattice	ESC e I (n)
	Image overlay printing on/off (on: n = 1, off: n = 0)	ESC e L (n)
2.	Horizontal control	
	Space	SP
	Backspace	BS
	Carriage return	CR
	Elite pitch (12 cpi)	ESC M
	Pica pitch (10 cpi)	ESC P
	Proportionally spaced characters on/off (on: n = 1, off: n = 0)	ESC p (n)
	Set character pitch to (n-1)/120 inch ($1 \leq n \leq 127$)	ESC US (n)
	Set character pitch to n/180 inch ($0 \leq n \leq 255$)	ESC h (n)
	Set intercharacter offset to n/120 inch Canceled by CR or ESC x. ($0 \leq n \leq 63$) ($64 \leq n \leq 127$)	ESC DC1 (n)
	Set character pitch to n/360 inch ($1 \leq n1\ n2\ n3 \leq 999$) n1, n2, and n3 are the hundreds, tens, and ones digits.	ESC e H (n1) (n2) (n3)

	Function	Command
3.	Vertical control	
	Line feed	LF
	Reverse line feed	ESC LF
	Form feed	FF
	Advance paper n/180 inch ($0 \leq n \leq 255$)	ESC J (n)
	Reverse paper n/180 inch ($0 \leq n \leq 255$)	ESC j (n)
	Advance paper n/360 inch ($1 \leq n1\ n2\ n3 \leq 999$) n1, n2, and n3 are the hundreds, tens, and ones digits.	ESC e J (n1) (n2) (n3)
	Reverse paper n/360 inch ($1 \leq n1\ n2\ n3 \leq 999$) n1, n2, and n3 are the hundreds, tens, and ones digits.	ESC e j (n1) (n2) (n3)
	Set line spacing to 1/8 inch (8 lpi)	ESC 0
	Set line spacing to n/180 inch ($0 \leq n \leq 255$)	ESC 3 (n)
	Set line spacing to 7/60 inch	ESC 1
	Set line spacing to n/60 inch ($0 \leq n \leq 127$)	ESC A (n)
	Set line spacing to 1/6 inch (6 lpi) or to the value preset with the ESC A command The preset line spacing command is ESC A (n).	ESC 2
	Set line spacing to n/360 inch ($1 \leq n1\ n2\ n3 \leq 999$) n1, n2, and n3 are the hundreds, tens, and ones digits.	ESC e V (n1) (n2) (n3)
	Set line spacing to n/360 inch ($1 \leq n \leq 255$)	FS 3 (n)
4.	Tabulation	
	Horizontal tab execution	HT
	Set horizontal tabs The values of n1 to nk in this command are the ASCII values of the print columns (at the current character width) where tabs are to be set. ($1 \leq n \leq 255$) ($1 \leq k \leq 255$)	ESC D (n1)...(nk) NUL
	Move to print column n ($1 \leq n \leq 255$)	ESC HT (n)
	Move to dot column n/360 inch ($n = n1 + n2 \times 256$) The value below is for 136-column printers. ($0 \leq n1 \leq 255$) ($0 \leq n2 \leq 19$) ($0 \leq (n2 \times 256 + n1) \leq 4895$)	ESC $ (n1) (n2)
	Horizontal relative move by n/360 inch ($-999 \leq n1\ n2\ n3 \leq +999$) n1, n2, and n3 are the hundreds, tens and ones digits of the distance. s is a plus or minus (+ or -) sign.	ESC e R (s) (n1) (n2) (n3)
	Vertical tab execution	VT
	Set vertical tabs The values of n1 to nk, etc., in this command are the ASCII values of the lines (at the current line spacing) where tabs are to be set. ($1 \leq n \leq 255$) ($1 \leq k \leq 64$)	ESC B (n1) ...(nk) NUL
	Move to line n ($1 \leq n \leq 255$)	ESC VT (n)

	Function	Command
5.	Page formatting	
	Set right margin ($0 \leq n \leq 255$)	ESC Q (n)
	Set left margin ($0 \leq n \leq 255$)	ESC ℓ (n)
	Set perforation skip by n lines ($1 \leq n \leq 127$)	ESC N (n)
	Perforation skip off	ESC O
	Set page length to n lines ($1 \leq n \leq 127$)	ESC C (n) or ESC e C (n) or ESC FF (n)
	Set page length to n inches ($1 \leq n \leq 22$)	ESC C NUL (n) or ESC e C NUL (n) or ESC FF NUL (n)
	Set page length to n/360 inch ($n = n1 \times 256 + n2$) ($0 \leq n1, n2 \leq 255$) ($1 \leq n1 \times 256 + n2 \leq 7920$)	ESC e f (n1) (n2)
6.	Character set control	
	Select character set 1 See Appendix A.	ESC 7
	Select character set 2 See Appendix A.	ESC 6
	Select international character set n = 0: USA 1: France 2: Germany 3: United Kingdom 4: Denmark 1/Norway 5: Sweden/Finland 6: Italy 7: Spain 8: Denmark 2	ESC R (n)
	Clear input buffer	CAN
	Select printer	DC1
	Deselect printer (ignore input)	DC3
	Force most significant bit to 1	ESC >
	Force most significant bit to 0	ESC =
	Cancel control over most significant bit	ESC #
	Select code table n = 0: Code page 437 1: Code page 850 2: Code page 860 3: Code page 863 4: Code page 865 5: ISO 8859-1/ECMA 94	ESC e C (n)
	Select extended character by character number ($0 \leq n1$ n2 n3 ≤ 664) n1, n2, and n3 are the hundreds, tens, and ones digits.	ESC e E (n1) (n2) (n3)

<table>
<tr><th></th><th>Function</th><th>Command</th></tr>
<tr><td>7.</td><td>Wordprocessing

Line justification on
Automatic center printing
Reset all wordprocessing features</td><td>

EXC m
ESC c
ESC x</td></tr>
<tr><td>8.</td><td>Font selection and downloading

Select font m with source and style set by n
• m (bits 0 and 1: Font device select)
<table>
<tr><th>Bit 1</th><th>Bit 0</th><th>Selection of font</th></tr>
<tr><td>0</td><td>0</td><td>Resident font</td></tr>
<tr><td>0</td><td>1</td><td>Download font</td></tr>
<tr><td>1</td><td>0</td><td>Resident font</td></tr>
</table>
• m (bits 2 and 3: Specification of print quality)
<table>
<tr><th>Bit 3</th><th>Bit 2</th><th>Print quality</th></tr>
<tr><td>0</td><td>0</td><td>Original quality of font</td></tr>
<tr><td>0</td><td>1</td><td>Letter quality (360 dpi)</td></tr>
<tr><td>1</td><td>0</td><td>Correspondence quality (180 dpi)</td></tr>
<tr><td>1</td><td>1</td><td>Draft quality (120 dpi)</td></tr>
</table>
• n (bit 0 to 2: Specification of font number)

(1) Resident fonts
<table>
<tr><th>n</th><th>m = 0, 0</th><th>m = 1, 0</th></tr>
<tr><td>0</td><td>Courier 10</td><td>OCR-B</td></tr>
<tr><td>1</td><td>Prestige elite 12</td><td>OCR-A</td></tr>
<tr><td>2</td><td>Draft</td><td></td></tr>
<tr><td>3</td><td>Compression</td><td></td></tr>
<tr><td>4</td><td>Boldface PS</td><td></td></tr>
<tr><td>5</td><td>Pica 10</td><td></td></tr>
<tr><td>6</td><td>Correspondence</td><td></td></tr>
<tr><td>7</td><td>High-speed draft</td><td></td></tr>
</table>
(2) Download fonts
n = 0: Download font 0
1: Download font 1

Select print quality (font attributes)
n = 0: Letter (360 × 180 dpi)
1: Correspondence (180 × 180 dpi)
2: Draft (120 × 180 dpi)
3: High-speed draft (90 × 180 dpi)</td><td>

ESC % (m) (n)

ESC e q (n)</td></tr>
</table>

	Function	Command
8.	Select spacing mode (font attributes) n = 0: Fixed pitch font 1: Proportional spacing font	ESC e s (n)
	Select character pitch (n/360 inch font attributes) (0 ≤ n1 ≤ 255) (0 ≤ n2 ≤ 255) (n = n1 × 256 + n2) Ex. n = 36: 10 pitch 30: 12 pitch 24: 15 pitch 21: 17 pitch	ESC e p (n1) (n2)
	Condense/enlarge vertically (font attributes) n = 1: Executed 0: Not executed	ESC e A (n)
	Select point size (n/1200 inch font attributes) (0 ≤ n1 ≤ 255) (0 ≤ n2 ≤ 255) (n = n1 × 256 + n2) Ex. n = 166: 10 point	ESC e v (n1) (n2)
	Select character style (font attributes) n = 0: Upright 1: Italic	ESC e i (n)
	Select stroke weight (font attributes) n = 249: –7 (Reserved) 251: –5 (Reserved) 253: –3 (Light) 0: 0 (Medium) 3: 3 (Bold) 5: 5 (Black) 7: 7 (Ultra black)	ESC e w (n)
	Select type-face (font attributes) n = 1: Pica 3: Courier (bit map) 4: Nimbus Sans® 5: Timeless 6: Gothic 8: Prestige 23: Boldface 130: OCR A 131: OCR B 134: Courier (scalable)	ESC e t (n)
	Select font by ID (font attributes)	ESC e F (n)

n	Quality	Spacing	Pitch	Point	Typeface
1	LQ	Fixed	10 cpi	12 pt	Courier (bitmap)
2	LQ	Fixed	12 cpi	10 pt	Prestige
3	LQ	PS	—	12 pt	Boldface
4	LQ	Fixed	10 cpi	12 pt	Pica
9	LQ	Fixed	10 cpi	12 pt	OCR-A
10	LQ	Fixed	10 cpi	12 pt	OCR-B
32	CQ	Fixed	10 cpi	12 pt	Courier (bitmap)
34	DQ	Fixed	12 cpi	11 pt	Gothic
128	LQ	PS	—	10 pt	Timeless
132	LQ	PS	—	10 pt	Nimbus Sans®
140	LQ	Fixed	10 cpi	10pt	Courier (scalable)

LQ: Letter quality
CQ: Correspondence quality
PS: Proportional spacing
DQ: Draft quality

<table>
<tr><th></th><th>Function</th><th>Command</th></tr>
<tr><td>8.</td><td>Copy resident font to download area
m = 0: Courier 10
1: Prestige Elite 12
2: Draft
3: Compression
4: Boldface PS
5: Pica 10
6: Correspondence
7: High-speed draft
n = 0: Download font 0
1: Download font1</td><td>ESC : NUL (m) (n)</td></tr>
<tr><td></td><td>Create download font
• m (bits 4 and 5: Specifies the quality of characters to be registered)
<table>
<tr><th>Bit 5</th><th>Bit 4</th><th>Selection of font quality</th></tr>
<tr><td>0</td><td>1</td><td>Letter (360 dpi)</td></tr>
<tr><td>1</td><td>0</td><td>Correspondence (180 dpi)</td></tr>
<tr><td>1</td><td>1</td><td>Draft (120 dpi)</td></tr>
</table>
• m (bit 0: Specifies external font number to be registered)
<table>
<tr><th>Bit 0</th><th>Font number selection</th><th>Remarks</th></tr>
<tr><td>0</td><td>Download font 0</td><td>At power-on, resident font 0 is automatically downloaded.</td></tr>
<tr><td>1</td><td>Download font 1</td><td>At power-on, resident font 1 is automatically downloaded.</td></tr>
</table>
• m (bits 1, 2, 3, 6, 7) Not used (don't care)
• Cs (Download start character of ASCII code)
• Ce (Download end character of ASCII code)
<table>
<tr><td>Decimal</td><td>0 ≤ Cs, Ce ≤ 255</td></tr>
<tr><td>Hex</td><td>00 ≤ Cs, Ce ≤ FF</td></tr>
</table>
Precaution: Ce ≥ Cs
• data (Data of more than one byte containing bit map data)</td><td>ESC & (m) (Cs) (Ce) (data)</td></tr>
<tr><td></td><td>(Reserved function)</td><td>ESC e D (data);</td></tr>
</table>

	Function	Command
9.	Bit image graphics	
	Graphics type m graphics	ESC * (m) (n1) (n2) (data)
	Graphics type m graphics	ESC e b (m) (n1) (n2) (data) or ESC e B (m) (n1) (n2) (data)
	Single-density graphics	ESC K (n1) (n2) (data)
	Double-density graphics	ESC L (n1) (n2) (data)
	High-speed double-density graphics	ESC Y (n1) (n2) (data)
	Quadruple-density graphics	ESC Z (n1) (n2) (data)
	360 dot per inch 24-pin graphics	FS Z (n1) (n2) (data)
10.	Cut-sheet feeder control	
	Feed a sheet from bin 1	ESC EM 1
	Feed a sheet from bin 2	ESC EM 2
	Feed a sheet from bin 3	ESC EM E
	Eject a page from the printer	ESC EM R
	Select bin 1 for following pages	/ / 1 / /
	Select bin 2 for following pages	/ / 2 / /
	Select bin 3 for following pages	/ / E / /
	Eject sheet at end of current page	/ / R / /
	Change bins at next page	/ / C / /
11.	Initialize printer	
	Reset printer	ESC @
	Reset printer	ESC CR P
	Initialize printer	ESC SUB I
12.	Bar code printing	
	Bar code printing	ESC DC4 (b) R (c) (w) (h) (a) (ch1) ... (chn)
13.	Printer option control	
	Select friction feed	/ / F / /
	Select reat-tractor feed	/ / T / /
	Select front-tractor feed	/ / M / /
	Select paper path by HCPP (host controlled paper path) n = F: Friction (platen) T: Rear tractor M: Front tactor	ESC e T (n)
	Fix print head gap for APTC (automatic paper thickness control)	ESC e P (n1) (n2) (n3) (n4)

	Function	Command
14.	Miscellaneous	
	Sound bell	BEL
	Enable paper-outage detector	ESC 9
	Ignore paper-outage detector	ESC 8
	Typewriter mode on/off (on: n = 1, off: n = 0)	ESC i (n)
	Move print head to home position	ESC <
	Unindirectional printing on/off (on: n = 1, off: n = 0)	ESC U (n)
	Select CR code definition n = 0: CR = CR only 1: CR = CR + LF	ESC e r (n)
	Select LF code definition n = 0: LF = LF only 1: LF = LF + CR	ESC e ℓ (n)
	Enter online setup mode	ESC e ONLINE (data)
	Move print head (unit: 1/180 inch) (0≤ n1≤ 255) (0≤ n2≤ 255)	ESC e h (n1) (n2)

5.4.3 IBM Proprinter XL24E emulation command set

This section lists command codes for IBM Proprinter XL24E emulation.

Asterisks in the “Function” column indicate extended commands not supported by the original printer.

	Function	Command
1.	Print mode control	
	Double-strike (bold) printing on	ESC G
	Double-strike (bold) printing off	ESC H
	Emphasized (shadow) printing on	ESC E
	Emphasized (shadow) printing off	ESC F
	One-line double-width characters on	SO or ESC SO
	One-line double-width characters off	DC4
	Double-width characters on/off (on: n = 1, off: n = 0)	ESC W (n)
	Double-height/double-width characters n1 = 4, n2 = 0, m1 = 0, m2 = 0 m3 controls character height and line spacing.	ESC [@ (n1) (n2) (m1) ... (m4)

m3	Height	Spacing
0	Unchanged	Unchanged
1	Normal	Unchanged
2	Double	Unchanged
16	Unchanged	Single
17	Normal	Single
18	Double	Single
32	Unchanged	Double
33	Normal	Double
34	Double	Double

m4 controls character width.

m4	Width
0	Unchanged
1	Normal
2	Double

	Function	Command
	Condensed characters on	SI or ESC SI
	Condensed and elite characters off	DC2
	Subscript or superscript printing on (subscript: n = 1, superscript: n = 0)	ESC S (n)
	Superscript and subscript printing off	ESC T
	Underline on/off (on: n = 1, off: n = 0)	ESC - (n)
	Overline on/off (on: n = 1, off: n = 0)	ESC _ (n)

	Function	Command
2.	Horizontal control	
	Space	SP
	Backspace	BS
	Carriage return	CR
	Elite characters on	ESC :
	Proportionally spaced characters on/off (on: n = 1, off: n = 0)	ESC P (n)
3.	Vertical control	
	Line feed	LF
	Form feed	FF
	Advance paper n/216 inch ($1 \leq n \leq 255$)	ESC J (n)
	Advance paper n/180 inch ($1 \leq n \leq 255$) [in AG mode]	ESC J (n)
	Set line spacing to 1/8 lines	ESC 0
	Set line spacing to 7/72 inch	ESC 1
	Set line spacing to n/216 inch ($0 \leq n \leq 255$)	ESC 3 (n)
	Set line spacing to n/180 inch ($0 \leq n \leq 255$) [in AG mode]	ESC 3 (n)
	Preset line spacing to n/72 inch ($1 \leq n \leq 255$)	ESC A (n)
	Preset line spacing to n/60 inch ($1 \leq n \leq 255$) [in AG mode]	ESC A (n)
	Set line spacing to 1/6 inch or to the value preset by line spacing command ESC A (n)	ESC 2
	Change graphics line spacing base to 1/216 or 1/180 inch (for ESC J and ESC 3) m1 = 4, m2 = 0 $0 \leq t, \leq 255$, $0 \leq t2 \leq 255$, t3=0 t4 = 180 or 216	ESC [\ (m1) (m2) (t1) ... (t4)
4.	Tabulation	
	Horizontal tab execution	HT
	Set horizontal tabs The values of n1 to nk in this command are the ASCII values of the print columns (at the current character width) where tabs are to be set. ($1 \leq n \leq 255$) ($1 \leq k \leq 28$)	ESC D (n1)... (nk) NUL
	Clear all horizontal tabs	ESC D NUL
	Move print position right by n/120 inch ($0 \leq n1, n2 \leq 255$) ($n = n1 + n2 \times 256$)	ESC d (n1) (n2)
	Vertical tab execution	VT
	Set vertical tabs The values of n1 to nk in this command are ASCII values of the lines (at the current line spacing) where tabs are to be set. ($1 \leq n \leq 255$) ($1 \leq k \leq 64$)	ESC B (n1)... (nk) NUL
	Clear all vertical tabs	ESC B NUL
	Reset tabs to default values	ESC R

	Function	Command
5.	Page formatting	
	Set left margin at column n and right margin at column m (0 ≤ n, m ≤ 255)	ESC X (n) (m)
	Set perforation skip by n lines (1 ≤ n ≤ 255)	ESC N (n)
	Perforation skip off	ESC O
	Set page length to n lines (1 ≤ n ≤ 255)	ESC C (n)
	Set page length to n inches (1 < n < 22)	ESC C NUL (n)
	Set top of form	ESC 4
6.	Character set control	
	Select character set 1 See Appendix A.	ESC 7
	Select character set 2 See Appendix A.	ESC 6
	Print n1 + n2 × 256 characters from all-character set (chars.: codes of characters to print, 0 ≤ chars, ≤ 255)	ESC \ (n1) (n2) (chars.)
	Print a character from all-character set (char.: a code of character to print, 0 ≤ chars, ≤ 255)	ESC ^ (char.)
	Select code page table n (0 ≤ n1, n2 ≤ 255) (n = n1 + n2 × 255)	ESC [T (n1) (n2) 0 0 (c1) (c2)
	Clear input buffer	CAN
	Select printer	DC1
	Deselect printer (ignore input)	ESC Q #
7.	Downloading	
	Select resident or downloaded font Ex. n = 0: Resident normal 2: Resident bold 4: Downloaded normal 6: Downloaded bold	ESC I (n)
	Create download font	ESC = (n1) (n2) ID (m1) (m2) (data)
8.	Bit image graphics	
	Single-density graphics	ESC K (n1) (n2) (data)
	Double-density graphics	ESC L (n1) (n2) (data)
	High-speed double-density graphics	ESC Y (n1) (n2) (data)
	Quadruple-density graphics	ESC Z (n1) (n2) (data)
	High-resolution graphics	ESC [g (n1) (n2) (m) (data)
	Select graphics mode [in AG mode only]	ESC * (m) (c1) (c2) (data)

c1	c2	Code page ID
0	0	Ignore command
1	181	Code page 437
3	82	Code page 850
3	92	Code page 860
3	95	Code page 863
3	97	Code page 865

	Function	Command
9.	Cut-sheet feeder control*	
	Feed a sheet from bin 1*	ESC EM 1
	Feed a sheet from bin 2*	ESC EM 2
	Feed a sheet from bin 3*	ESC EM E
	Eject a page from the printer*	ESC EM R
	Select bin 1 for following pages*	/ / 1 / /
	Select bin 2 for following pages*	/ / 2 / /
	Select bin 3 for following pages*	/ / E / /
	Eject sheet at end of current page*	/ / R / /
	Change bins at next page*	/ / C / /
10.	Printer option control	
	Select friction feed	/ / F / /
	Select reat-tractor feed	/ / T / /
	Select front-tractor feed	/ / M / /
11.	Miscellaneous	
	Sound bell	BEL
	Unidirectional printing on/off (on: n = 1, off: n = 0)	ESC U (n)
	Add a carriage return to all line feeds (on: n = 1, off: n = 0)	ESC 5 (n)
	Printer offline	ESC j
	Enter online setup mode*	ESC e ONLINE (data)
	Select default settings	ESC [K (n1) (n2) (i) (ID) (p1)(p2)

5.4.4 Epson ESC/P2 emulation command set

This section lists command codes for Epson ESC/P2 printer emulation.

Asterisks in the "Function" column indicate extended commands not supported by the original printer.

	Function	Command
1.	Print mode control	
	Double-strike (bold) printing on	ESC G
	Double-strike (bold) printing off	ESC H
	Emphasized (shadow) printing on	ESC E
	Emphasized (shadow) printing off	ESC F
	Italic printing on	ESC 4
	Italic printing off	ESC 5
	Select character style n = 0: Normal 1: Outlined 2: Shaded 3: Outlined and shadowed	ESC q (n)
	One-line double-width characters on	SO or ESC SO
	One-line double-width characters off	DC4
	Double-width characters on/off (on: n = 1, off: n = 0)	ESC W (n)
	Double-height characters on/off (on: n = 1, off: n = 0)	ESC w (n)
	Condensed characters on	SI or ESC SI
	Condensed characters off	DC2
	Subscript or superscript printing on (subscript: n = 1, superscript: n = 0)	ESC S (n)
	Subscript and superscript printing off	ESC T
	Underline on/off (on: n = 1, off: n = 0)	ESC - (n)
	Select line n1 = 3, n2 = 0, d1 = 1 d2 = 0: Ignore command 1: Underline 2: Strike through 3: Overscore d3 = 0 or 4: Cancel line selection 1: Single line 2 or 3: Double line 5: Single-dotted line 6 or 7: Double-dotted line	ESC (- (n1) (n2) (d1) (d2) (d3)
	Select printing style This command combines printing styles. The value of n is the sum of the values of the styles to be combined. n = 0: Pica pitch 1: Elite pitch 2: Proportional space 4: Condensed 8: Shadow 16: Bold 32: Double-width 64: Italics 128: Underline	ESC ! (n)

	Function	Command
2.	Horizontal control	
	Space	SP
	Backspace	BS
	Carriage return	CR
	Set elite pitch	ESC M
	Set pica pitch	ESC P
	Set 15 CPI	ESC g
	Proportionally spaced characters on/off (on: n = 1, off: n = 0)	ESC p (n)
	Set inter-character space to n/120 inch (for draft) or n/180 inch (for letter and proportional) (0 < n < 127)	ESC SP (n)
	Set character pitch to (n1 + n2 × 256)/360 inch (0 ≤ n1 ≤ 255) (0 ≤ n2 ≤ 4)	ESC c (n1) (n2)
	Select character pitch (specify unit pitch) n1 = 1, n2 = 0 d = 10 to 19: 10/3600 inch = 1/360 inch d = 20 to 29: 20/3600 inch = 1/180 inch d = 30 to 39: 30/3600 inch = 1/120 inch d = 40 to 49: 40/3600 inch = 1/90 inch d = 50 to 59: 50/3600 inch = 1/72 inch d = 60 to 69: 60/3600 inch = 1/60 inch	ESC (U (n1) (n2) (d)
3.	Vertical control	
	Line feed	LF
	Form feed	FF
	Advance paper n/180 inch (1 ≤ n ≤ 255)	ESC J (n)
	Set line spacing to 1/8 inch	ESC 0
	Set line spacing to n/180 inch (0 ≤ n ≤ 255)	ESC 3 (n)
	Set line spacing to n/60 inch (0 ≤ n ≤ 127)	ESC A (n)
	Set line spacing to 1/6 inch	ESC 2
	Set line spacing to n/360 inch (0 ≤ n ≤ 255)	ESC + (n)
4.	Tabulation	
	Horizontal tab execution	HT
	Set horizontal tabs The values of n1 to nk in this command are the ASCII values of the print columns (at the current character width) where tabs are to be set. (1 ≤ n ≤ 255) (1 ≤ k ≤ 32)	ESC D (n1)... (nk) NUL
	Move print position n/120(*1) inch (for draft) or n/180(*1) inch (for letter) right from left margin. (n = n1 + n2 × 256)	ESC $ (n1) (n2)
	Move print position n/120(*1) inch (for draft) or n/180(*1) inch (for letter) left or right from the current position (n = n1 + n2 × 256)	ESC \ (n1) (n2)
	Vertical tab execution	VT
	Set vertical tabs The values of n1 to nk in this command are the ASCII values of the lines (at the current line spacing) where tabs are to be set. (1 ≤ n ≤ 255) (1 ≤ k ≤ 16)	ESC B (n1)... (nk) NUL

*1 The valve depends on the pitch set by the ESC (U command.

	Function	Command
4.	Move to dot line $(d_1 + d_2 \times 256)/360$(*1) inch n1 = 2, n2 = 0 (0 ≤ d1 ≤ 255) (0 ≤ d2 ≤ 127) Vertical relative move by (d1 + d2 × 256)/360(*1) inch n1 = 2, n2 = 0 (0 ≤ d1 ≤ 255) (0 ≤ d2 ≤ 127) –32768 ≤ d1 + d2 × 256 ≤ 32768	ESC (V (n1) (n2) (d1) (d2) ESC (v (n1) (n2) (d1) (d2)
5.	Page formatting Set right margin to column n (1 ≤ n ≤ 255) Set left margin to column n (0 ≤ n ≤ 255) Set top and bottom margins from top of page n1 = 4, n2 = 0 • Top margin = (t1 + t2 × 256)/360(*1) inch (0 ≤ t1 ≤ 255) (0 ≤ t2 ≤ 127) • Bottom margin = (b1 + b2 × 256)/360(*1) inch (0 ≤ b1 ≤ 255) (0 ≤ b2 ≤ 127) Set perforation skip by n lines (1 ≤ n ≤ 127) Perforation skip off Set page length to n lines (1 ≤ n ≤ 127) Set page length to n inches (1 ≤ n ≤ 22) Set page length to (d1 + d2 × 256)/360(*1) inch n1 = 2, n2 = 0 (0 ≤ d1 ≤ 255) (0 ≤ d2 ≤ 127)	 ESC Q (n) ESC ℓ (n) ESC (c (n1) (n2) (t1) (t2) (b1) (b2) ESC N (n) ESC O ESC C (n) ESC C NUL (n) ESC (C (n1) (n2) (d1) (d2)
6.	Character set control Select character set 1 Select character set 2 Select character set table n = 0: Italics character set 1: Graphics character set 2: Download character set 3: Graphics character set Select international character set n = 0: USA 1: France 2: Germany 3: United Kingdom 4: Denmark 1 5: Sweden 6: Italy 7: Spain 1 8: Japan 9: Norway 10: Denmark 2 11: Spain 2 12: Latin America	 ESC 7 ESC 6 ESC t (n) ESC R (n)

*1 The value depends on the pitch set by the ESC (U command.
The default is 1/360 inch.

	Function	Command
6.	Assign a character set to active character set number 0 to 3 n1 = 3, n2 = 0 d1 = 0: Active character set no. 0 1: Active character set no. 1 2: Active character set no. 2 3: Active character set no. 3 d2 = 0: Italic 1: PC 437 (USA) 3: PC 850 (Multilingual) 7: PC 860 (Portugal) 8: PC 863 (Canada-French) 9: PC 865 (Norway) d3 = 0	ESC (t (n1) (n2) (d1) (d2) (d3)
	Print n1 + n2 × 256 characters from all-character set (0 ≤ n1 ≤ 255) (0 ≤ n2 ≤ 127) (0 ≤ n1 + n2 × 256 ≤ 255)	ESC (^ (n1) (n2) (character codes)
	Clear input buffer	CAN
	Delete a character	DEL
	Force most significant bit to 1	ESC >
	Force most significant bit to 0	ESC =
	Cancel control over most significant bit	ESC #
7.	Font selection and downloading	
	Select font n = 0: Resident character set 1: Download character set	ESC % (n)
	Select letter or draft quality n = 0: Draft 1: Letter	ESC x (n)
	Select type style • Bitmap font: n = 0: Courier 1: Courier 2: Courier 3: Prestige 4: Courier 5: OCR-B 7: Courier 8: Courier 9: Courier • Scalable font: n = 0: Timeless 1: Nimbus Sans® 2: Courier 3: Timeless 4: Timeless 5: Timeless 7: Timeless 8: Timeless 9: Timeless	ESC k (n)

	Function	Command
7.	Set scalable font mode • m sets character pitch. m = 0: Keep previous pitch 1: Set proportional space mode m ≥ 5: Select character pitch (m/360 inch) (Reset proportional space mode) • n1 and n2 set point size of font. Point size = (n1 + n2 × 256) × 0.5 point (0 ≤ n1 ≤ 255) (0 ≤ n2 ≤ 127) Copy resident character set to download area Create download font	ESC X m (n1) (n2) ESC : NUL (n) (s) ESC & NUL (n1) (n2) (d0) (d1) (d2) (data)
8.	Bit image graphics Graphics type m graphics Bit image mode definition Single-density graphics Double-density graphics High-speed double-density graphics Quadruple-density graphics Select raster image graphics n1 = 1, n2 = 0 d = 1: Raster image graphics mode Print raster image graphics	 ESC * (m) (n1) (n2) (data) ESC ? (s) (n) ESC K (n1) (n2) (data) ESC L (n1) (n2) (data) ESC Y (n1) (n2) (data) ESC Z (n1) (n2) (data) ESC (G (n1) (n2) (d) ESC . (c) (v) (h) (m) (n1) (n2) (data)
9.	Cut-sheet feeder control Feed a sheet from bin 1 Feed a sheet from bin 2 Feed a sheet from bin 3* Eject a page from the printer Select bin 1 for following pages* Select bin 2 for following pages* Select bin 3 for following pages* Eject sheet at end of current page* Change bins at next page*	 ESC EM 1 ESC EM 2 ESC EM E ESC EM R / / 1 / / / / 2 / / / / E / / / / R / / / / C / /
10.	Printer option control Select friction feed Select reat-tractor feed Select front-tractor feed	 / / F / / / / T / / / / M / /
11.	Miscellaneous Sound bell Move print head to home position Unidirectional printing on/off (on: n = 1, off: n = 0) Initialize printer Enter online setup mode*	 BEL ESC < ESC U (n) ESC @ ESC e ONLINE (data)

* Indicates extended commands not supported by the original printer.

CHAPTER 6 MAINTENANCE

6.1 Overview

The DL9300/9400, with its simple mechanism, is highly reliable and easy to maintain. Components need very little adjustment and are easy to replace.

6.2 Preventive Maintenance

No scheduled maintenance is required beyond keeping the printer clean, which helps ensure the service life and MTBF.

6.3 Maintenance Philosophy

The printer is designed and built to minimize maintenance.
No periodic lubrication is required.
To ensure printing quality, the following are done at the plant:

- Every unit is checked and tested before assembly.
- All products go through a full final inspection.

6.4 Diagnostics

6.4.1 ROM/RAM checking

When power is turned on, ROM sum and RAM write/read are checked automatically.

6.4.2 Error display

Operating conditions are checked during printer operation and, when an error is detected, the error status is displayed by flashing the PAPER OUT indicator.

6.5 Test and Adjustment Functions for Maintenance

The DL9300/9400 provides the following test functions for adjustment and checking at maintenance:

6.5.1 Self-diagnostics

Self-diagnostics prints test pattern pages without using the computer. The operator or maintenance personnel can easily check electrical and mechanical states of the printer. If there are printing errors, self-diagnostics distinguishes between printer errors and computer errors. It is also used to confirm correct operation after error recovery.

6.5.2 Hexadecimal dump

The DL9300/9400 prints received data, including commands, in hexadecimal, which is especially helpful if a software problem occurs.

6.5.3 Vertical alignment

Full lines of vertical bars are printed bidirectionally. This enables fine adjustment between forward and backward printing so that vertical bars of each print line form straight lines. This adjustment is necessary for printing vertical ruled lines or graphics.

6.5.4 Print position adjustment

The top of the paper, left print start position, and line spacing pitch (when using cut sheets) are adjusted for the first print line when paper is loaded on the platen. This adjustment depends on the top margin specified by application software. The fine adjustment is necessary for formatted or ruled paper.

6.6 Recommended Spare Parts

The following parts can be replaced in the field:

(1) PR mechanism subassembly (printer mechanism)
  DL9300
  DL9400
(2) Power supply
  100 to 120 VAC
  220 to 240 VAC
(3) Serial board (RS-232C serial interface)
(4) ROM board SK (control board with ROM)
(5) OP board (control panel)
(6) LF motor unit (platen line-feeding motor)
(7) Platen roll assembly
  DL9300
  DL9400
(8) SP motor subassembly (print head carriage spacing motor)
(9) Carrier unit (print head carriage)
  DL9300
  DL9400
(10) Tractor unit
  DL9300
  DL9400
(11) Card guide assembly
(12) APTC motor unit (for automatic print head gap adjustment)
  DL9300
  DL9400
(13) TR motor unit (tractor drive motor)
  DL9300
  DL9400
(14) HCPP motor unit (for paper path selection by host command)
  DL9300
  DL9400
(15) Timing belt (for print head carriage)
  DL9300
  DL9400
(16) FPSS PCA (front paper set sensor board)
(17) SW subassembly (paper path detection switch)
(18) RTRPE unit (for rear tractor paper end detection)
(19) Fuse
  125 V
  250 V

CHAPTER 7 OPTIONS, CONSUMABLES, AND PUBLICATIONS

7.1 Options

(1) Cut-sheet feeders

Type	Model	Order number
For 80-column printers (DL9300)	SF930	CA02892-D750
For 136-column printers (DL9400)	SF940	CA02790-D750

(2) Tractor unit

Type	Order number
For 80-column printers (DL9300)	CA02892-E650
For 136-column printers (DL9400)	CA02790-E650

7.2 Consumables

(1) Ribbon cartridge
Black ribbon (CA02374-C104)

(2) Ribbon subcassette
Blcak ribbon (CA02374-C204)

(3) Print head (CA02281-E622)

7.3 Publications

User’s manual (C147-E031-**EN)
Programmer’s manuals
DPL24C PLUS command set (B-69518E)
Maintenance manual (C147-F015-**EN)
Illustrated parts catalog (C147-G008-**EN)
Schematic diagrams (C147-F016-**EN)

APPENDIX A CHARACTER SETS

(1) Basic character sets for DPL24C PLUS and IBM XL24E emulation

Below are the two basic character sets for the DPL24C PLUS command set and the IBM Proprinter XL24E emulation. These are USA character sets. Character set 2 is the same as code page 437 in IBM PS/2 character sets. Characters in boxes differ for sets 1 and 2. Those of set 2 also vary with the national character set.

IBM PC character set 1

L\H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	NUL	DLE	á	▒	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	SOH	DC1	í	┴	╤	ß	±
2	STX	DC2	"	2	B	R	b	r	STX	DC2	ó	┬	╥	Γ	≥
3	ETX	DC3	#	3	C	S	c	s	ETX	DC3	ú	├	╙	π	≤
4	EOT	DC4	$	4	D	T	d	t	EOT	DC4	ñ	─	╘	Σ	⌠
5	ENQ	NAK	%	5	E	U	e	u	ENQ	NAK	Ñ	┼	╒	σ	⌡
6	ACK	SYN	&	6	F	V	f	v	ACK	SYN	ª	╞	╓	µ	÷
7	BEL	ETB	'	7	G	W	g	w	BEL	ETB	º	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	╚	╪	Φ	°
9	HT	EM	)	9	I	Y	i	y	HT	EM	⌐	╔	┘	Θ	∙
A	LF	SUB	*	:	J	Z	j	z	LF	SUB	¬	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	╦	█	δ	√
C	FF	FS	,	<	L	\	l	|	FF	FS	¼	╠	▄	∞	ⁿ
D	CR	GS	-	=	M	]	m	}	CR	GS	¡	═	▌	ø	²
E	SO	RS	.	>	N	^	n	~	SO	RS	«	╬	▐	ε	■
F	SI	US	/	?	O	_	o	DEL	SI	US	»	╧	▀	∩	SP

IBM PC character set 2

L\H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ü	æ	í	┴	╤	ß	±
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó	┬	╥	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	├	╙	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	┼	╒	σ	⌡
6	♠	SYN	&	6	F	V	f	v	å	û	ª	╞	╓	µ	÷
7	BEL	ETB	'	7	G	W	g	w	ç	ù	º	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╚	╪	Φ	°
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╔	┘	Θ	∙
A	LF	SUB	*	:	J	Z	j	z	è	Ü	¬	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	ç	½	╦	█	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	╠	▄	∞	ⁿ
D	CR	GS	-	=	M	]	m	}	ì	¥	¡	═	▌	ø	²
E	SO	RS	.	>	N	^	n	~	Ä	₧	«	╬	▐	ε	■
F	SI	US	/	?	O	_	o	DEL	Å	ƒ	»	╧	▀	∩	SP

(2) Basic character sets for ESC/P2 emulation

Below are the three basic character sets available for ESC/P2 emulation. The characters for decimal codes 128 to 255 (hex 80 to FF) differ for each set.

Italic Character Set

L/H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	NUL	DLE	SP	*0*	*@*	*P*	*`*	*p*
1	SOH	DC1	!	1	A	Q	a	q	SOH	DC1	*!*	*1*	*A*	*Q*	*a*	*q*
2	STX	DC2	"	2	B	R	b	r	STX	DC2	*"*	*2*	*B*	*R*	*b*	*r*
3	ETX	DC3	#	3	C	S	c	s	ETX	DC3	*#*	*3*	*C*	*S*	*c*	*s*
4	EOT	DC4	$	4	D	T	d	t	EOT	DC4	*$*	*4*	*D*	*T*	*d*	*t*
5	ENQ	NAK	%	5	E	U	e	u	ENQ	NAK	*%*	*5*	*E*	*U*	*e*	*u*
6	ACK	SYN	&	6	F	V	f	v	ACK	SYN	*&*	*6*	*F*	*V*	*f*	*v*
7	BEL	ETB	'	7	G	W	g	w	BEL	ETB	*'*	*7*	*G*	*W*	*g*	*w*
8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*
9	HT	EM	)	9	I	Y	i	y	HT	EM	*)*	*9*	*I*	*Y*	*i*	*y*
A	LF	SUB	*	:	J	Z	j	z	LF	SUB	*	*:*	*J*	*Z*	*j*	*z*
B	VT	ESC	+	;	K	[	k	{	VT	ESC	*+*	*;*	*K*	*[*	*k*	*{*
C	FF	FS	,	<	L	\	l	|	FF	FS	,	<	*L*	**	*l*	*|*
D	CR	GS	-	=	M	]	m	}	CR	GS	-	=	*M*	*]*	*m*	*}*
E	SO	RS	.	>	N	^	n	~	SO	RS	.	>	*N*	^	*n*	~
F	SI	US	/	?	O	_	o	DEL	SI	US	*/*	*?*	*O*	_	*o*	SP

Graphics Characer Set 1

L/H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	NUL	DLE	á	▒	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	SOH	DC1	í	▒	┴	╤	ß	±
2	STX	DC2	"	2	B	R	b	r	STX	DC2	ó	▒	┬	╙	Γ	≥
3	ETX	DC3	#	3	C	S	c	s	ETX	DC3	ú	▒	├	╘	π	≤
4	EOT	DC4	$	4	D	T	d	t	EOT	DC4	ñ	▒	─	╒	Σ	⌠
5	ENQ	§	%	5	E	U	e	u	ENQ	NAK	Ñ	▒	┼	╓	σ	⌡
6	ACK	SYN	&	6	F	V	f	v	ACK	SYN	ª	▒	╞	╫	µ	÷
7	BEL	ETB	'	7	G	W	g	w	BEL	ETB	º	▒	╟	╪	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	▒	╚	┘	Φ	°
9	HT	EM	)	9	I	Y	i	y	HT	EM	⌐	▒	╔	┌	Θ	∙
A	LF	SUB	*	:	J	Z	j	z	LF	SUB	¬	▒	╩	█	Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	▒	╦	▄	δ	√
C	FF	FS	,	<	L	\	l	|	FF	FS	¼	▒	╠	▌	∞	ⁿ
D	CR	GS	-	=	M	]	m	}	CR	GS	¡	▒	═	▐	Ø	²
E	SO	RS	.	>	N	^	n	~	SO	RS	«	▒	╬	▀	ε	■
F	SI	US	/	?	O	_	o	DEL	SI	US	»	▒	╧	▀	∩	SP

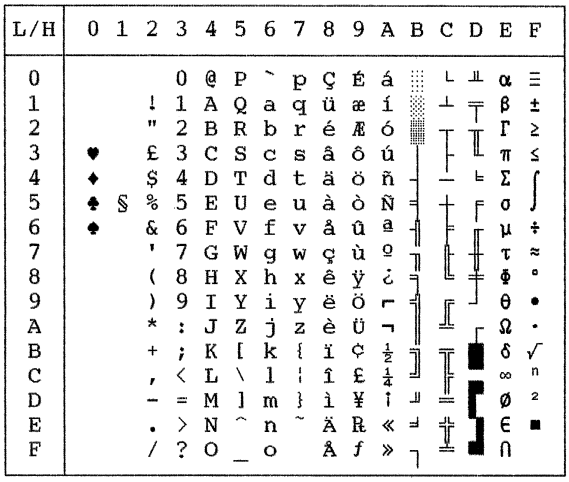
Graphics Character Set 2

L/H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó	▒	┬	╙	Γ	≥
3	ETX	DC3	#	3	C	S	c	s	â	ô	ú	▒	├	╘	π	≤
4	EOT	DC4	$	4	D	T	d	t	ä	ö	ñ	▒	─	╒	Σ	⌠
5	ENQ	§	%	5	E	U	e	u	à	ò	Ñ	▒	┼	╓	σ	⌡
6	ACK	SYN	&	6	F	V	f	v	å	û	ª	▒	╞	╫	µ	÷
7	BEL	ETB	'	7	G	W	g	w	ç	ù	º	▒	╟	╪	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	▒	╚	┘	Φ	°
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┌	Θ	∙
A	LF	SUB	*	:	J	Z	j	z	è	Ü	¬	▒	╩	█	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	ç	½	▒	╦	▄	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	▒	╠	▌	∞	ⁿ
D	CR	GS	-	=	M	]	m	}	ì	¥	¡	▒	═	▐	Ø	²
E	SO	RS	.	>	N	^	n	~	Ä	₧	«	▒	╬	▀	ε	■
F	SI	US	/	?	O	_	o	DEL	Å	ƒ	»	▒	╧	▀	∩	SP

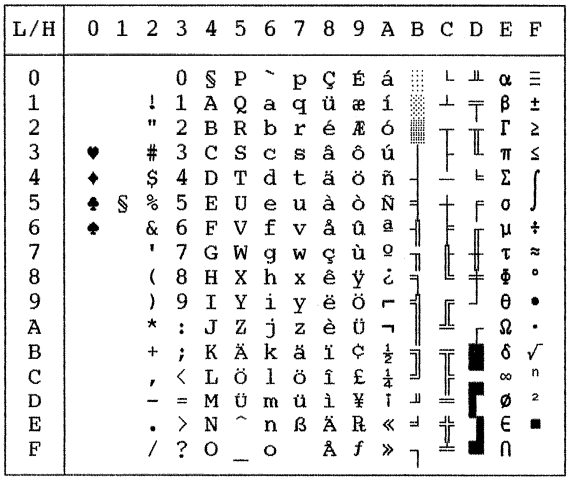
(3) National character sets available for all emulations

Below are the 49 national character sets available for all emulations. They support different characters and symbols specific to different languages. Note that these tables are for a resident Courier 10 font. Some national character sets do not have some characters and symbols and may not be usable depending on resident fonts. See Item (6) for details.

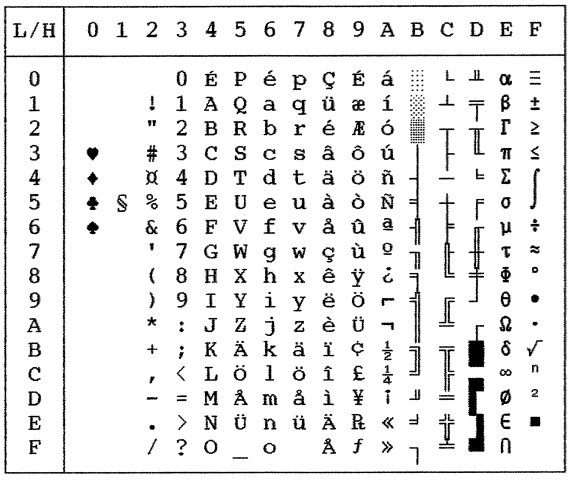
UK (British English)



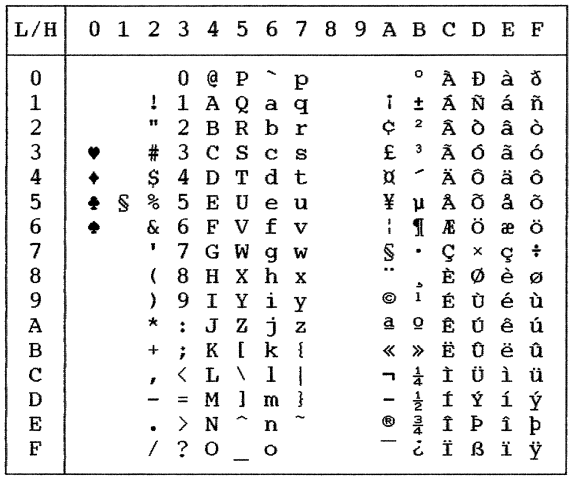
GERMAN (German)



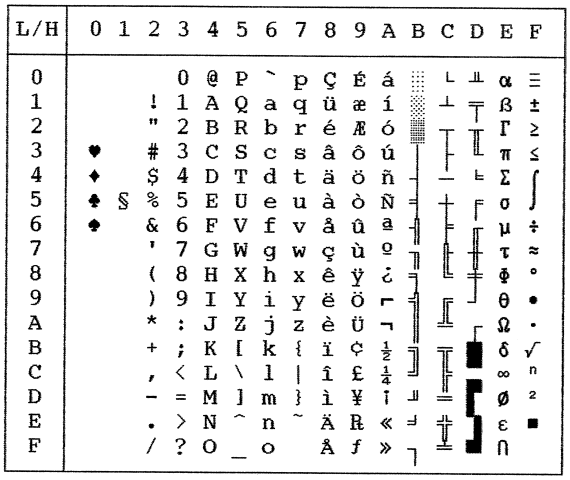
SWEDISH (Swedish)



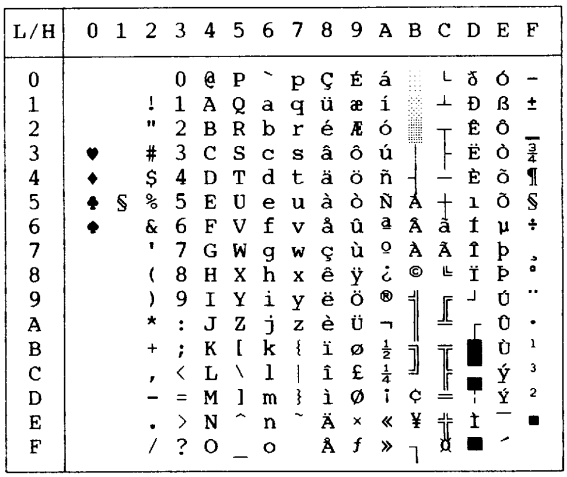
ISO8859/ECMA94 (ISO 8859-1/ECMA94)



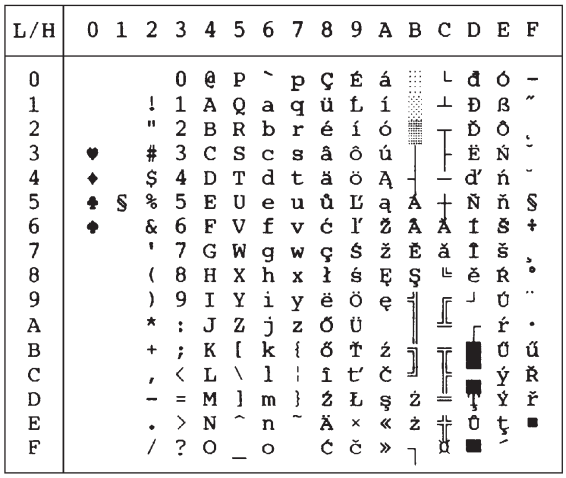
PAGE437/USA (Code Page 437/USA)



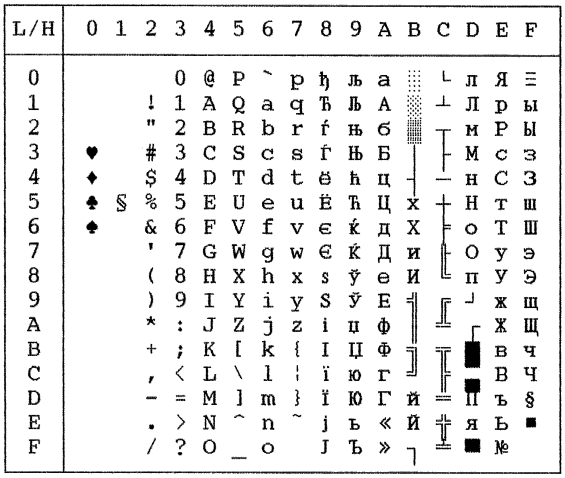
PAGE850 (Code Page 850 (Multilingual))



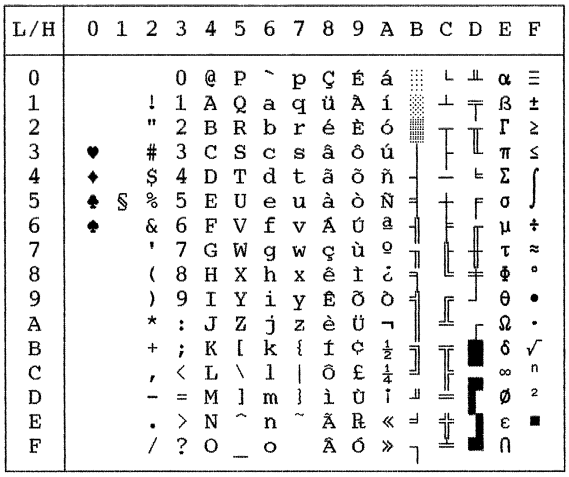
PAGE852/PAGE852-T (Code Page 852)



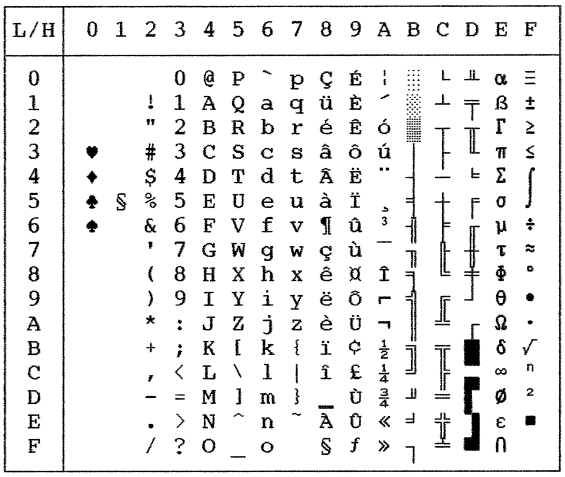
PAGE855 (Code Page 855)



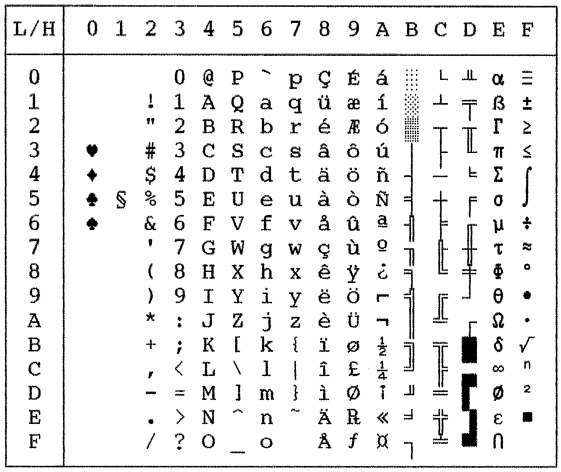
PAGE860 (Code Page 860 (Portugal))



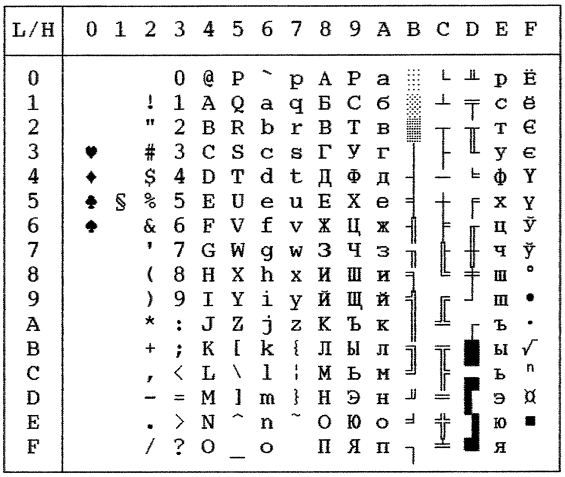
PAGE863 (Code Page 863 (Canada-French))



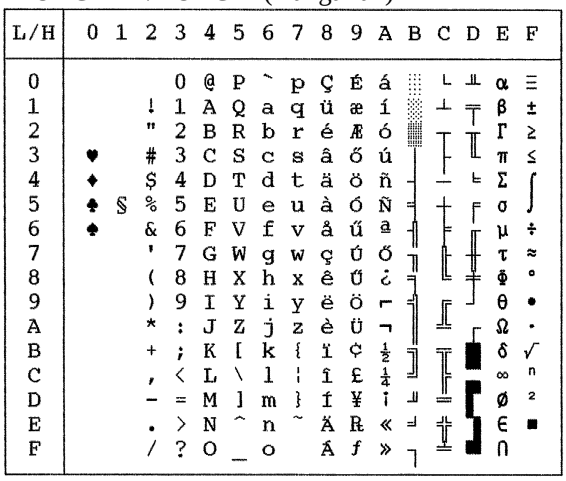
PAGE865 (Code Page 865 (Nordic))



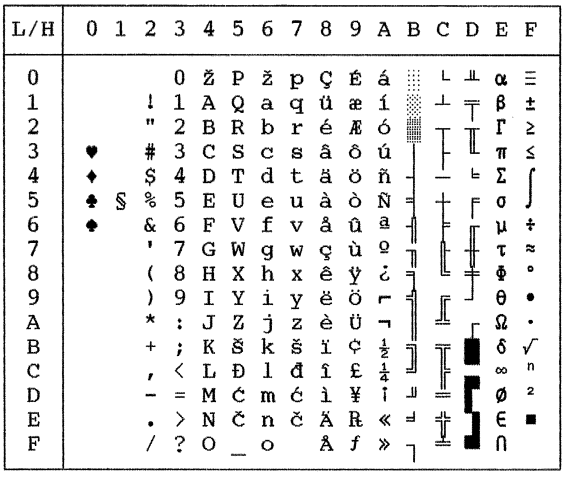
PAGE866 (Code Page 866 (Cyrillic))



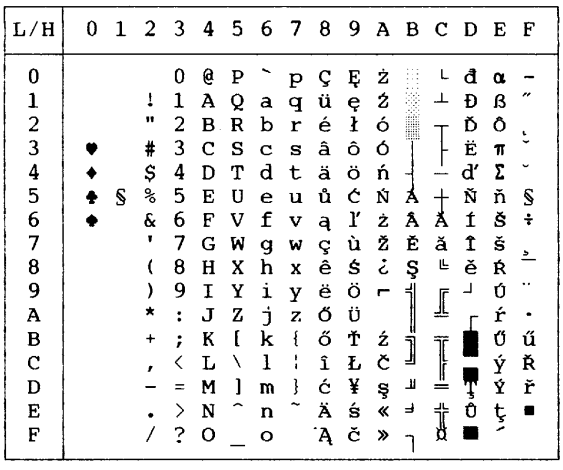
HUNGARY/HUNG-T (Hungarian)



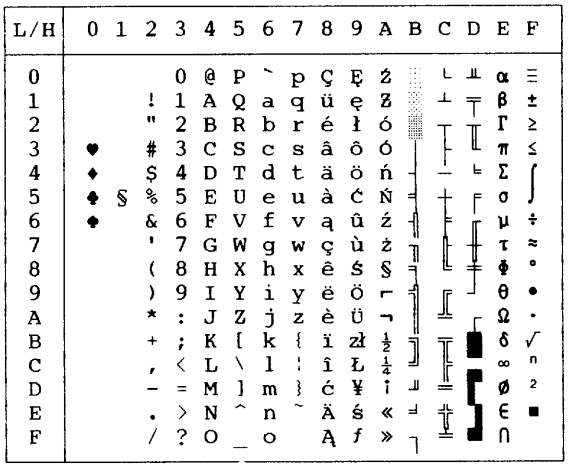
SLOV/SLOV-T (slovenian)



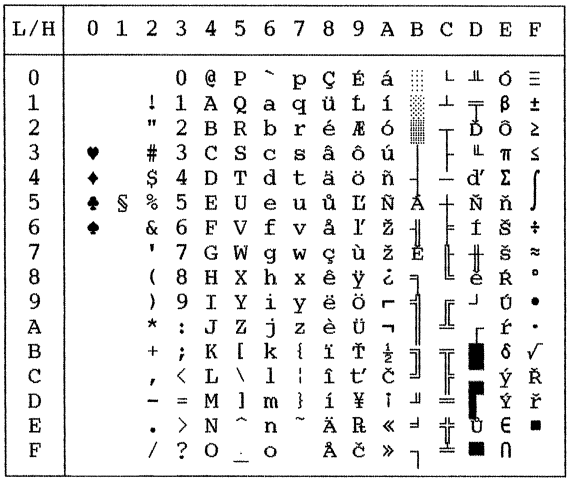
POLISH/POLISH-T (Polish)



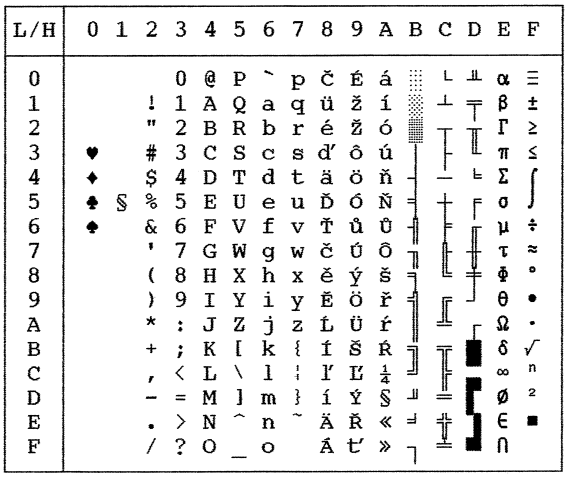
MAZOWIA/MAZOW-T (Mazowian)



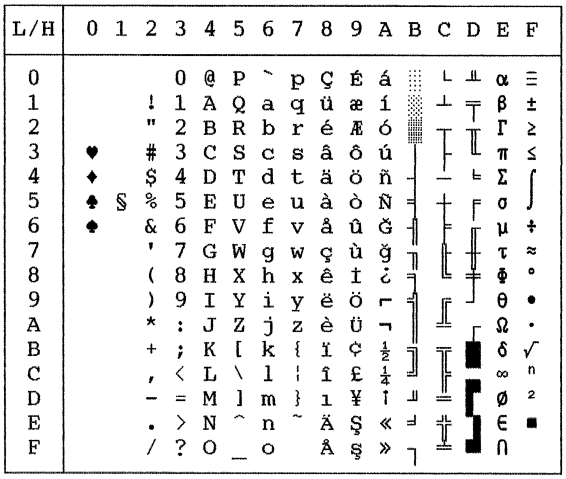
LATIN2/LATN2-T (Latin2)



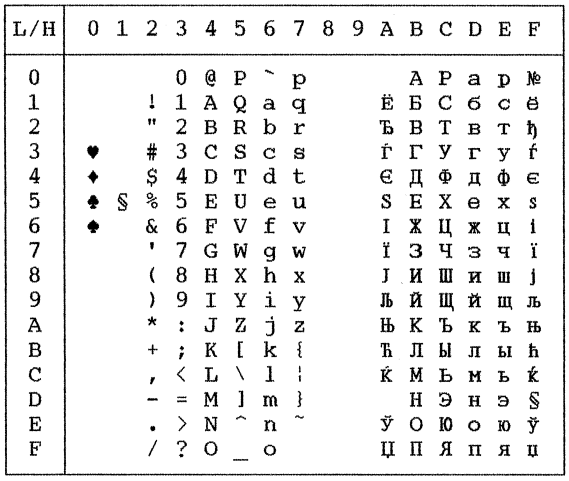
KAMENIC/KAMEN-T (Kamenicky)



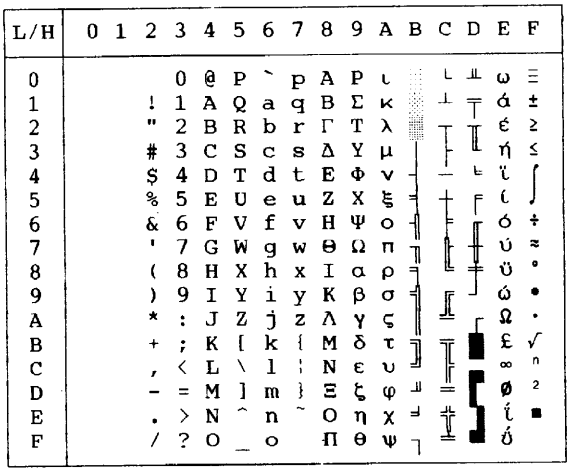
TURKY/TURKY-T (Turkish)



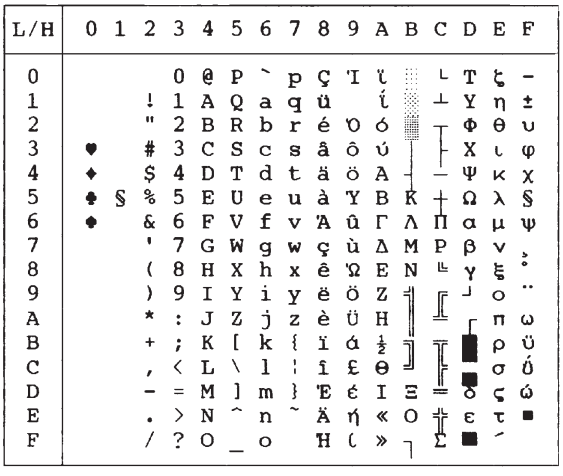
CYRILIC (Cyrillic)



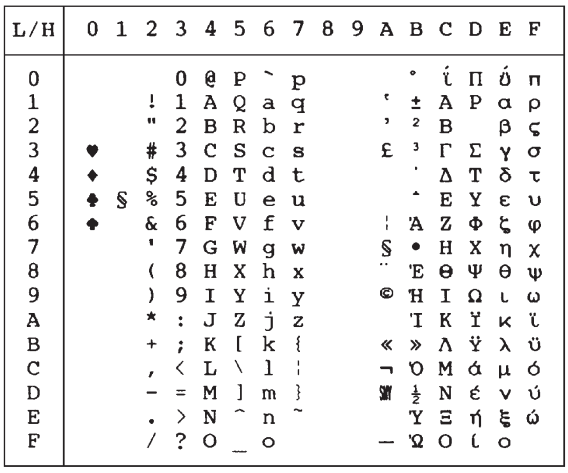
IBM437 (IBM 437)



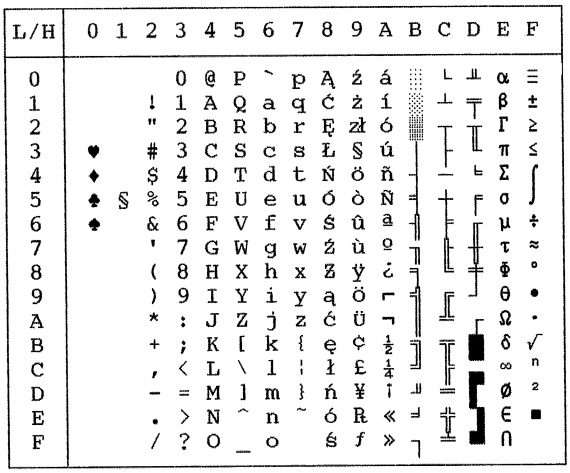
IBM851 (IBM 851)



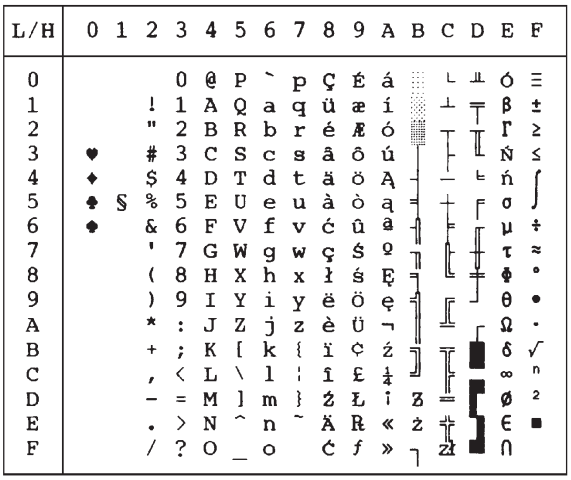
ELOT928 (ELOT 928)



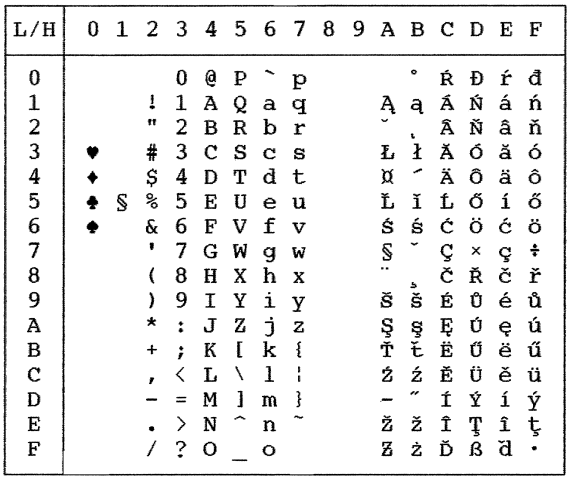
PG-DHN (Code Page DHN)



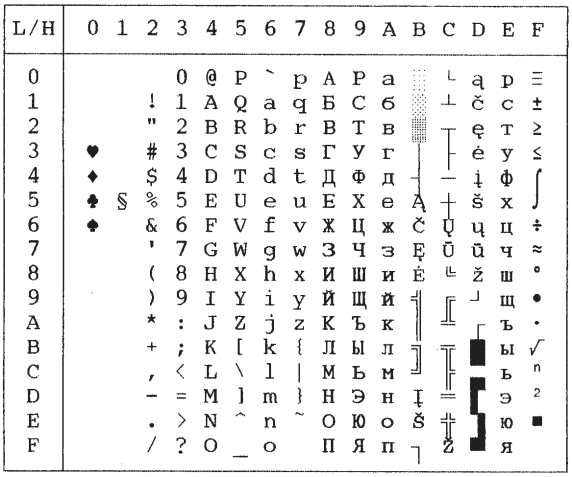
LATIN-P (Latin Polish)



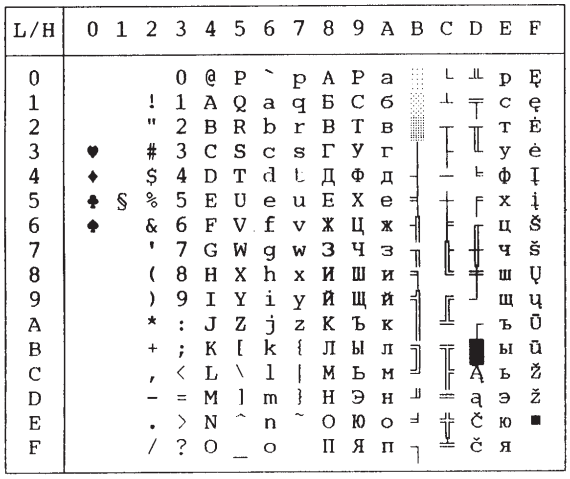
ISO-LTN (ISO Latin)



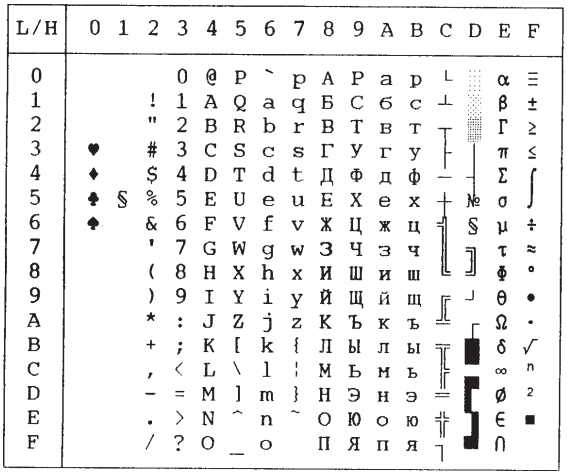
LITHUA1 (Lithuanian1)



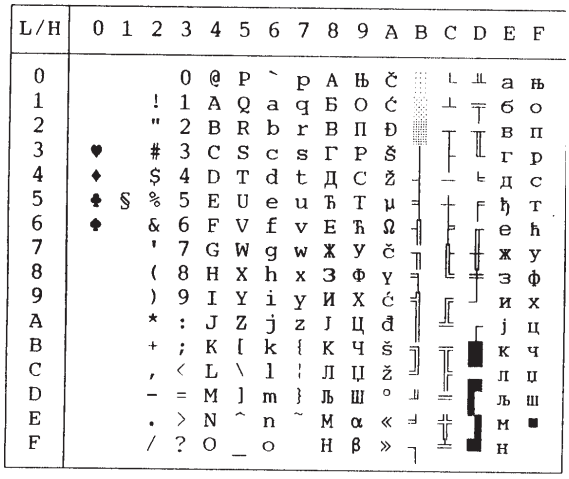
LITHUA2 (Lithuanian2)



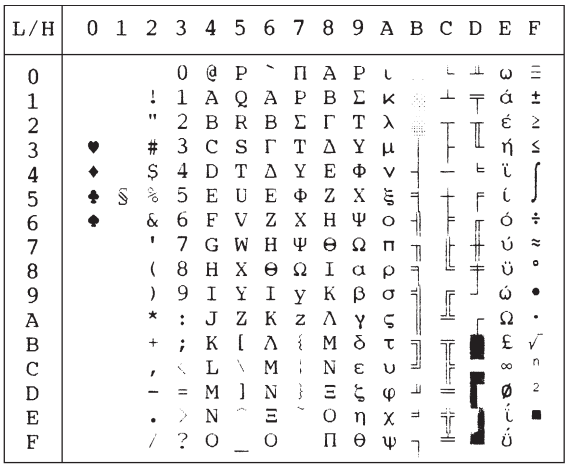
MIK



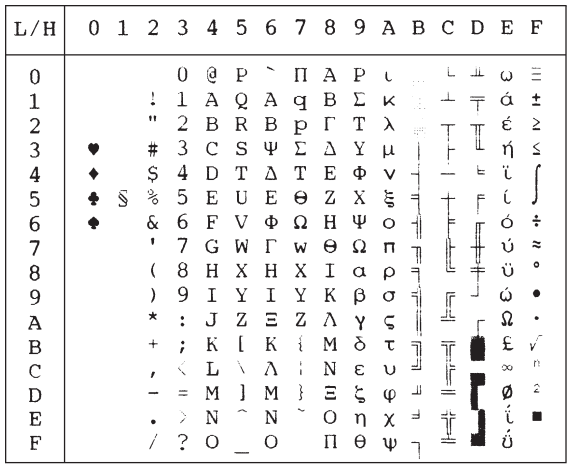
MACEDON (Macedonian)



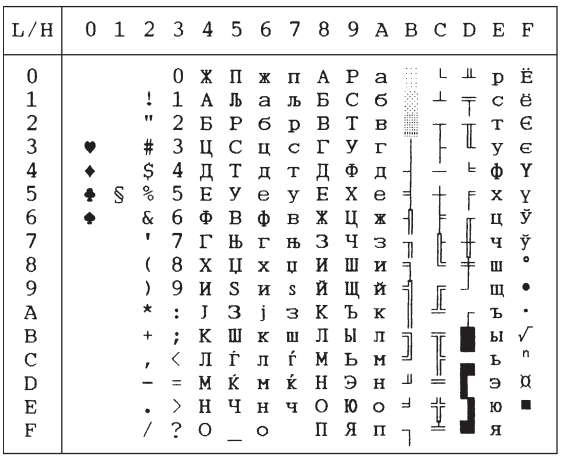
ABG



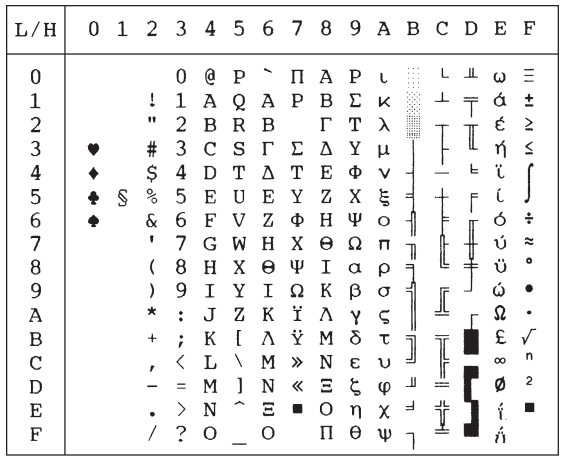
ABY



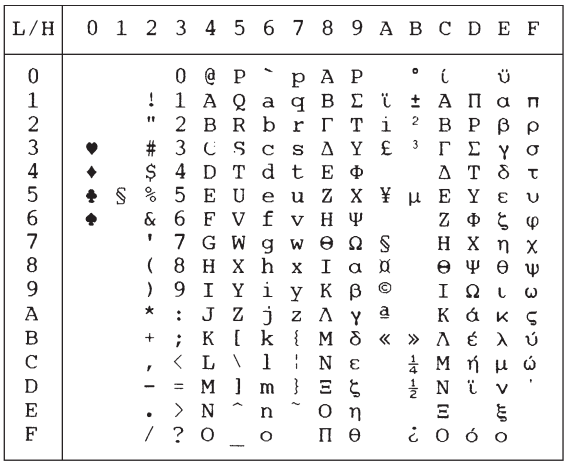
PG-MAC (Code Page MAC)



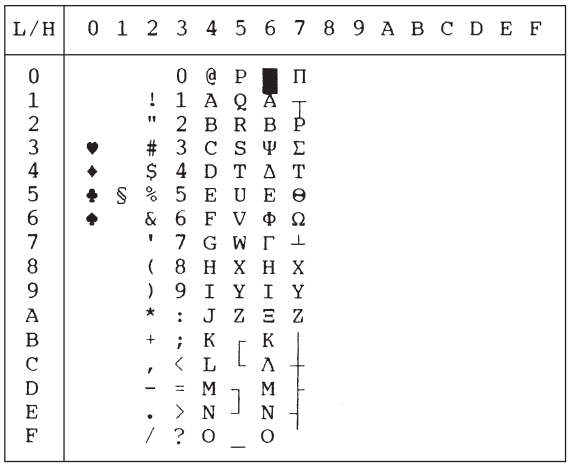
ELOT 927



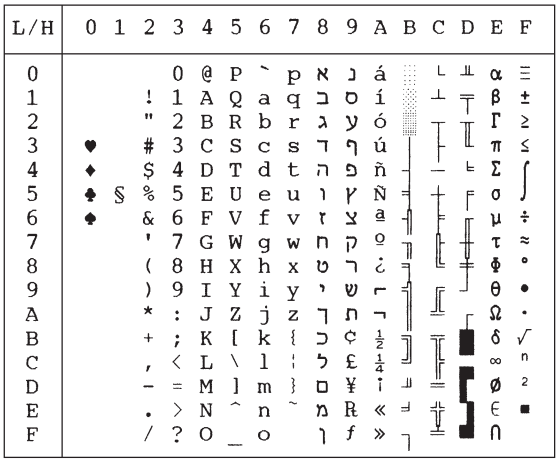
DEC GR (DEC Greek)



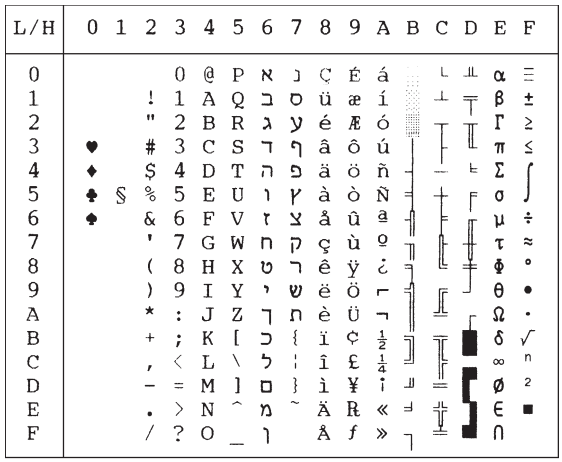
GREEK 11 (Greek 11)



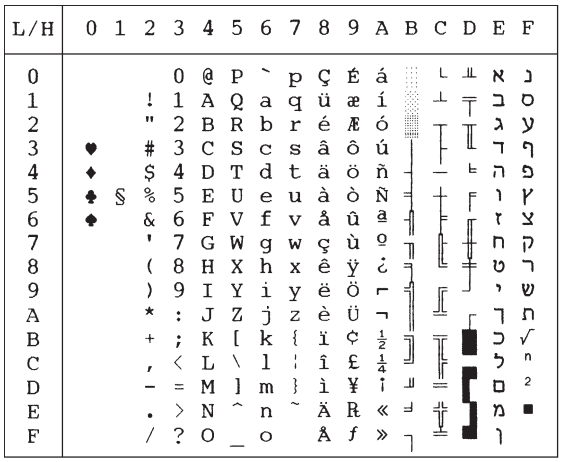
Page 862 (Code Page 862)



HBR OLD (Hebrew Old)



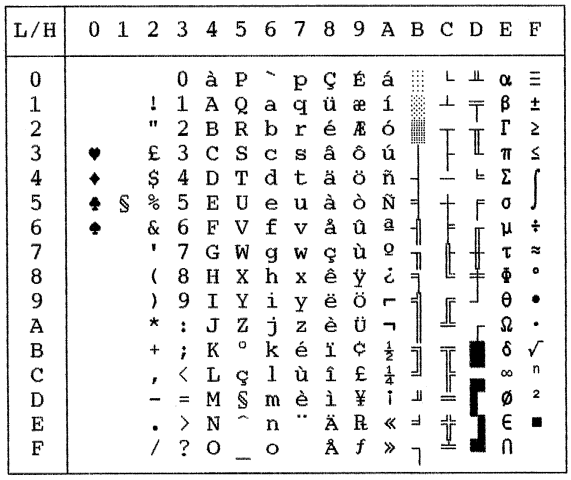
HBR DEC (Hebrew DEC)



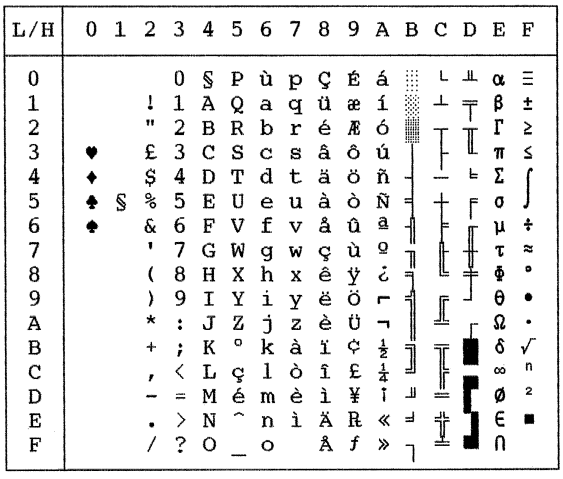
(4) National character sets available for DPL24C PLUS and IBM XL24E emulation

Below are national character sets available in the DPL24C PLUS command set and the IBM Proprinter XL24E emulation. These are based on Code Page 437 (USA) and modified proper for the language.

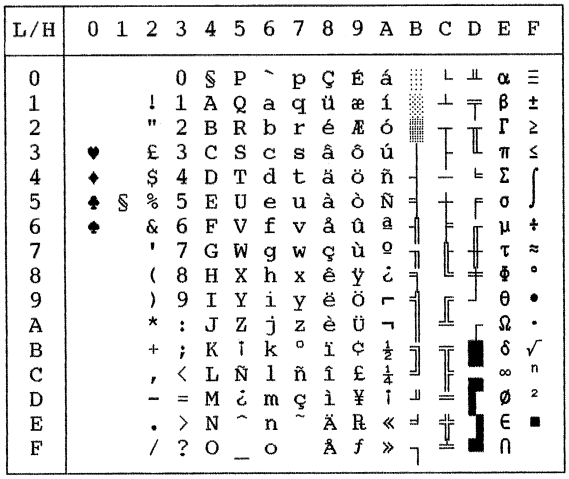
FRENCH (French)



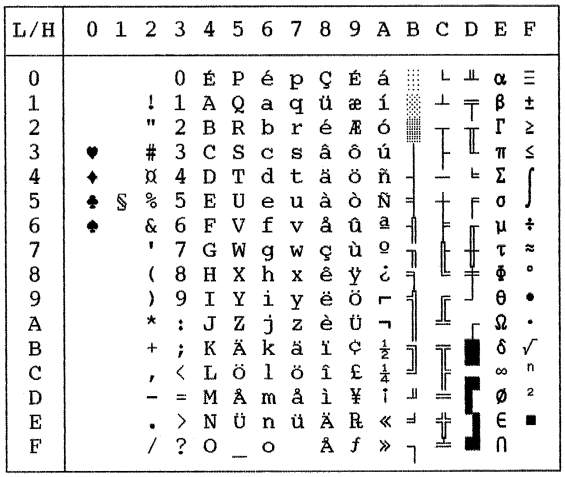
ITALIAN (Italian)



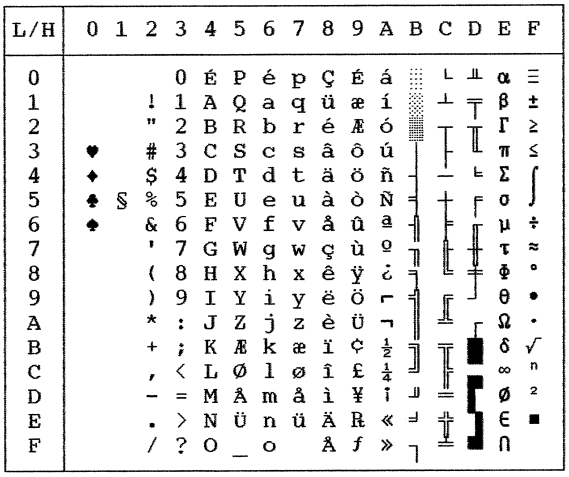
SPANISH (Spanish)



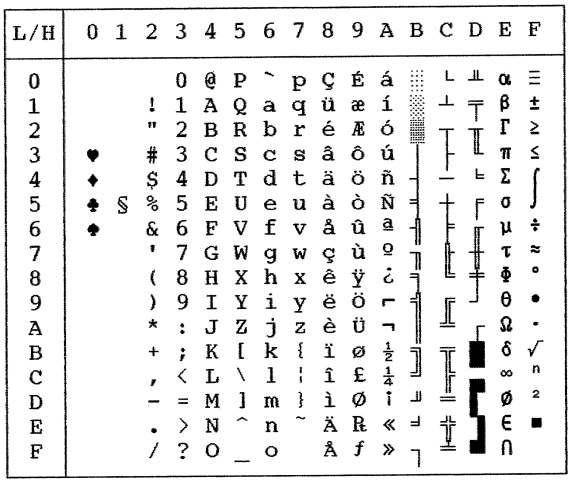
FINNISH (Finnish)



DANISH1/NORWEGN (Danish1/Norwegian)



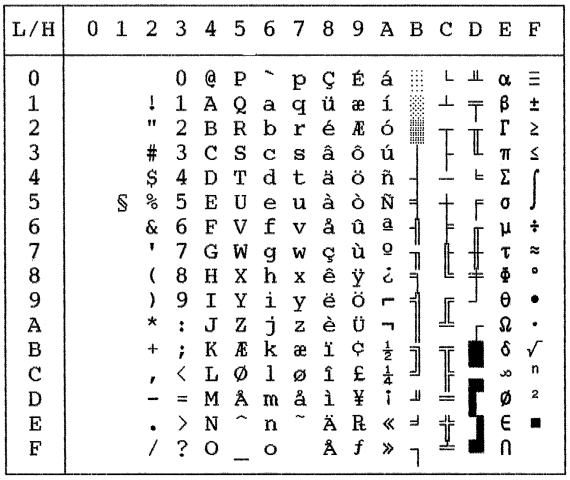
DANISH2 (Danish2)



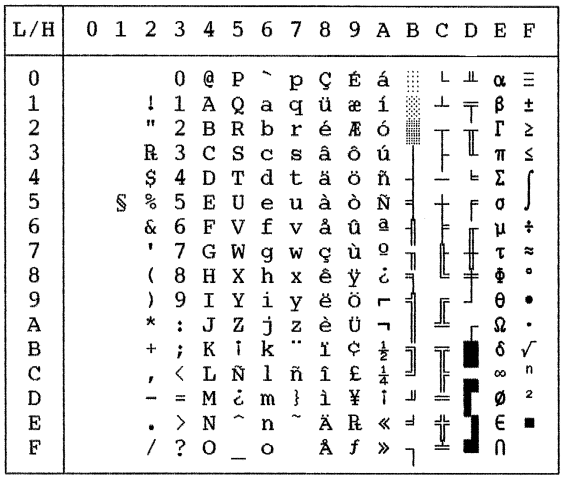
(5) National character sets available for ESC/P2 emulation

Below are the national character sets available for the Epson ESC/P2 emulation. These are are based on Graphics character set 2 and modified proper for the language.

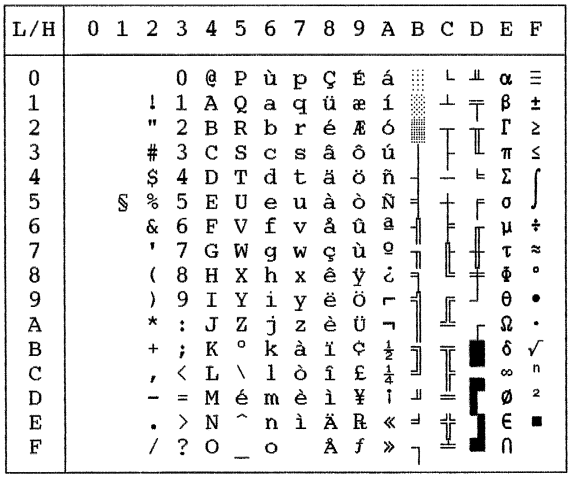
DANISH1 (Danish1)



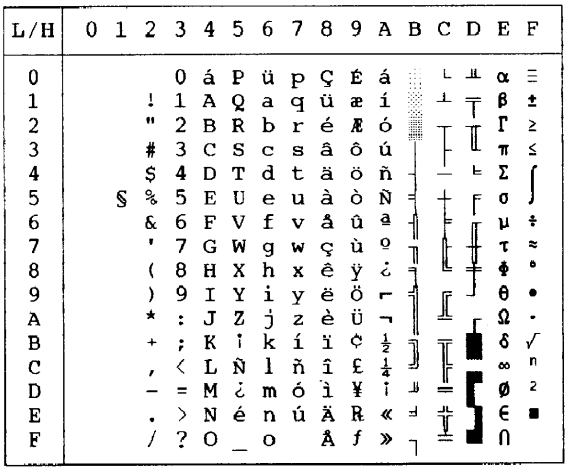
SPANISH1 (spanish1)



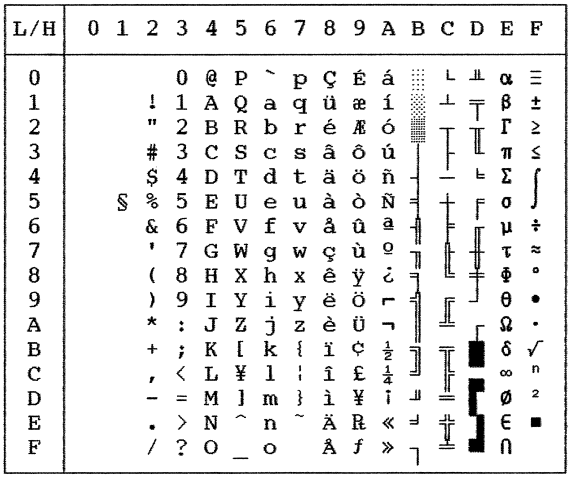
ITALIAN (Italian)



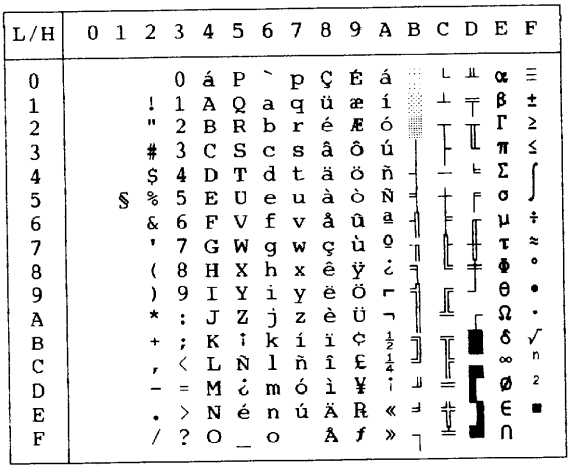
SPANISH2 (Spanish2)



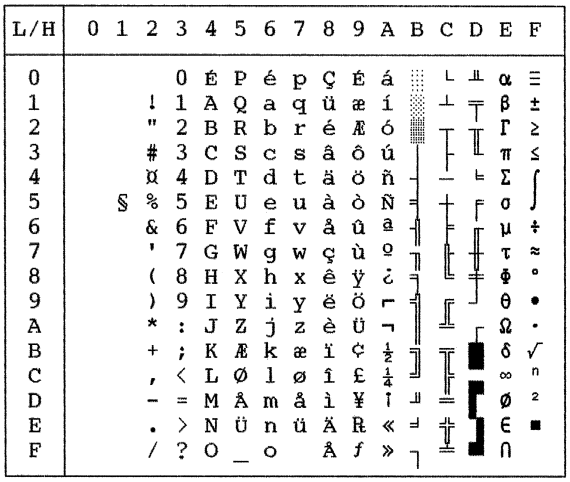
JAPAN (Japanese)



LATIN A (Latin American)

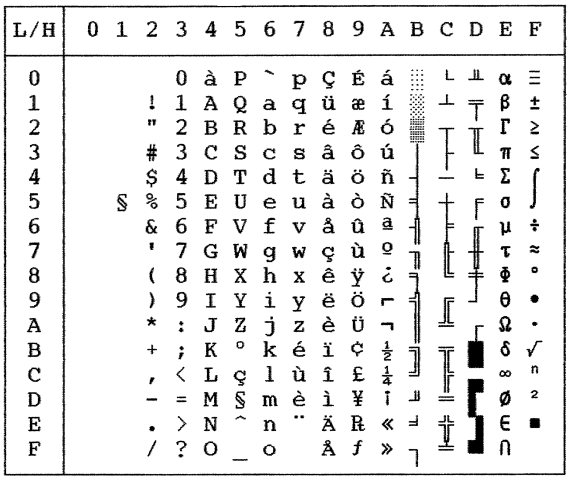


NORWEGN (Norwegian)



L/H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	É	P	é	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	▒	├	╙	π	≤
4			¤	4	D	T	d	t	ä	ö	ñ	▒	─	╘	Σ	⌠
5		§	%	5	E	U	e	u	à	ò	Ñ	▒	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	▒	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	▒	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	▒	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┘	θ	•
A			*	:	J	Z	j	z	è	Ü	¬	▒	╩	┌	Ω	·
B			+	;	K	Æ	k	æ	ï	¢	½	▒	╦	■	δ	√
C			,	<	L	Ø	l	ø	î	£	¼	▒	╠	▄	∞	ⁿ
D			-	=	M	Å	m	å	ì	¥	¡	▒	═	▌	ø	²
E			.	>	N	Ü	n	ü	Ä	₧	«	▒	╬	▐	Є	■
F			/	?	O	_	o		Å	ƒ	»	▒	╧	▀	∩	

FRENCH (French)



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5		§	%	5	E	U	e	u	à	ò	Ñ	▒	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	▒	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	▒	╟	╫	τ	≈
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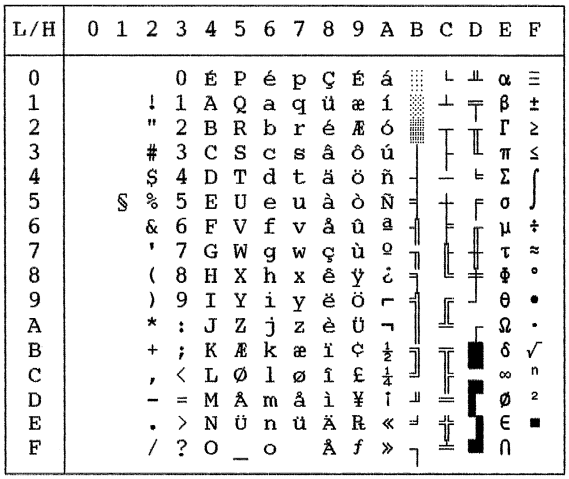
DANISH2 (Danish2)



L/H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	É	P	é	p	Ç	É	á	▒	└	╨	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	▒	├	╙	π	≤
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6			&	6	F	V	f	v	å	û	ª	▒	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	▒	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	▒	╚	╪	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	▒	╔	┘	θ	•
A			*	:	J	Z	j	z	è	Ü	¬	▒	╩	┌	Ω	·
B			+	;	K	Æ	k	æ	ï	¢	½	▒	╦	■	δ	√
C			,	<	L	Ø	l	ø	î	£	¼	▒	╠	▄	∞	ⁿ
D			-	=	M	Å	m	å	ì	¥	¡	▒	═	▌	ø	²
E			.	>	N	Ü	n	ü	Ä	₧	«	▒	╬	▐	Є	■
F			/	?	O	_	o		Å	ƒ	»	▒	╧	▀	∩	

(6) Restrictions on national character sets supported in all emulations

In all emulations, this printer supports 49 national character sets for characters and symbols specific to different languages. Some national character sets, however, do not have specific characters and symbols and may not be usable, depending on resident fonts. The following table shows which resident fonts are supported for each national character set:

Resident font / **National character set**	**Name in setup menu**	**Courier 10**	**Elite 12**	**Compress**	**Draft**	**Bold PS**	**Pica 10**	**Courier** (*1)	**Timeless** (*1)	**Nimbus Sans** (*1)	**Correspondence**	**OCR-B**	**OCR-A**
USA (*2)	USA	√	√	√	√	√	√	√	√	√	√	√	√
United Kingdom	UK	√	√	√	√	√	√	√	√	√	√	√	
German	GERMAN	√	√	√	√	√	√	√	√	√	√	√	
Swedish	SWEDISH	√	√	√	√	√	√	√	√	√	√	√	
ISO 8859-1	ISO8859	√	√	√	√	√	√	√	√	√	√	√	
ECMA 94	ECMA94	√	√	√	√	√	√	√	√	√	√	√	
Code Page 437 (*2)	PAGE437	√	√	√	√	√	√	√	√	√	√	√	√
Code Page 850	PAGE850	√	√	√	√	√	√	√	√	√	√	√	
Code Page 852	PAGE852	√	√	√	√	√	√	√	√	√	√		
Code Page 852 two-pass	PAGE852-T	√	√	√	√	√	√	√	√	√	√		
Code Page 855	PAGE855	√	√	√	√			√	√	√			
Code Page 860	PAGE860	√	√	√	√	√	√	√	√	√	√	√	
Code Page 863	PAGE863	√	√	√	√	√	√	√	√	√	√	√	
Code Page 865	PAGE865	√	√	√	√	√	√	√	√	√	√	√	
Code Page 866	PAGE866	√	√	√	√			√	√	√			
Hungarian	HUNGARY	√	√	√	√	√	√	√	√	√	√		
Hungarian two-pass	HUNG-T	√	√	√	√	√	√	√	√	√	√		
Slovenian	SLOV	√	√	√	√	√	√	√	√	√	√	√	
Slovenian two-pass	SLOV-T	√	√	√	√	√	√	√	√	√	√		
Polish	POLISH	√	√	√	√	√	√	√	√	√	√		
Polish two-pass	POLSH-T	√	√	√	√	√	√	√	√	√	√		
Mazowian	MAZOWIA	√	√	√	√	√	√				√		
Mazowian two-pass	MAZOW-T	√	√	√	√	√	√				√		
Latin 2	LATIN2	√	√	√	√	√	√	√	√	√	√		
Latin 2 two-pass	LATN2-T	√	√	√	√	√	√	√	√	√	√		
Kamenicky	KAMENIC	√	√	√	√	√	√	√	√	√	√		
Kamenicky two-pass	KAMEN-T	√	√	√	√	√	√	√	√	√	√		
Turkish	TURKY	√	√	√	√	√	√	√	√	√	√		
Turkish two-pass	TURKY-T	√	√	√	√	√	√	√	√	√	√		
Cyrillic	CYRILIC	√	√	√	√			√	√	√			
IBM 437	IBM437	√	√	√	√			√	√	√			
IBM 851	IBM851	√	√	√	√			√	√	√			
ELOT 928	ELOT928	√	√	√	√								
Code Page DHN	PG-DHN	√	√	√	√	√	√				√		
Latin Polish	LATIN-P	√	√	√	√	√	√				√		
ISO Latin	ISO-LTN	√	√	√	√	√	√				√		
Lithuanian 1	LITHUA1	√	√	√	√								
Lithuanian 2	LITHUA2	√	√	√	√								
MIK	MIK	√	√	√	√			√	√	√			
Macedonian	MACEDON	√	√	√	√			√	√	√			

*1 These are scalable and provided with upright, italic, and bold as resident fonts.
*2 USA is the same as Code Page 437.
√ Supported

Resident font														
National character set	**Name in setup menu**	**Courier 10**	**Elite 12**	**Compress**	**Draft**	**Bold PS**	**Pica 10**	**Courier (*1)**	**Timeless (*1)**	**Nimbus Sans (*1)**	**Correspondence**	**OCR-B**	**OCR-A**
ABG	ABG	√	√	√	√			√	√	√			
ABY	ABY	√	√	√	√			√	√	√			
Code Page MAC	PG-MAC	√	√	√	√			√	√	√			
ELOT 927	ELOT 927	√	√	√	√			√	√	√			
DEC Greek	DEC GR	√	√	√	√			√	√	√			
Greek 11	GREEK 11	√	√	√	√			√	√	√			
Code Page 862	PG 862	√	√	√	√	√	√						
Hebrew Old	HBR-OLD	√	√	√	√	√	√						
Hebrew DEC	HBR-DEC	√	√	√	√	√	√						

*1 These are scalable and provided in upright, italic, and bold as resident fonts.
√ Supported

APPENDIX B RESIDENT FONTS

The DL9300/9400 has the following 18 fonts resident in ROM. The last three fonts print faster than the letter-quality fonts but have lower resolution.

This appendix gives printing samples of resident fonts.

- 15 letter-quality fonts
  - 6 bit map fonts
    - Courier 10
    - Pica 10
    - OCR-B 10
    - OCR-A 10
    - Prestige Elite 12
    - Boldface PS
  - 9 scalable fonts
    - Courier (upright, italic, bold)
    - Nimbus Sans (upright, italic, bold)
    - Timeless (upright, italic, bold)
- Correspondence font
- Compression font
- Draft-quality font

These fonts can be printed in italic, bold, condensed, shaded, outlined, and overlay modes by specifying print modes from the control panel or DLMENU in setup mode. Various print modes are also available using printer commands.

Courier 10

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Pica 10

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Prestige Elite 12

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Bold face PS

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

OCR-B 10

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

OCR-A 10

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Courier Upright

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Courier Italic

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Courier Bold

The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.

Nimbus Sans Upright

The 24–wire dot–matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Nimbus Sans Italic

The 24–wire dot–matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Nimbus Sans Bold

The 24–wire dot–matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Timeless Upright

The 24-wire dot-matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Timeless Italic

The 24-wire dot-matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Timeless Bold

The 24-wire dot-matrix printer prints quality characters and symbols using a variety of sizes and fonts.

Correspondence

```
The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.
```

Draft

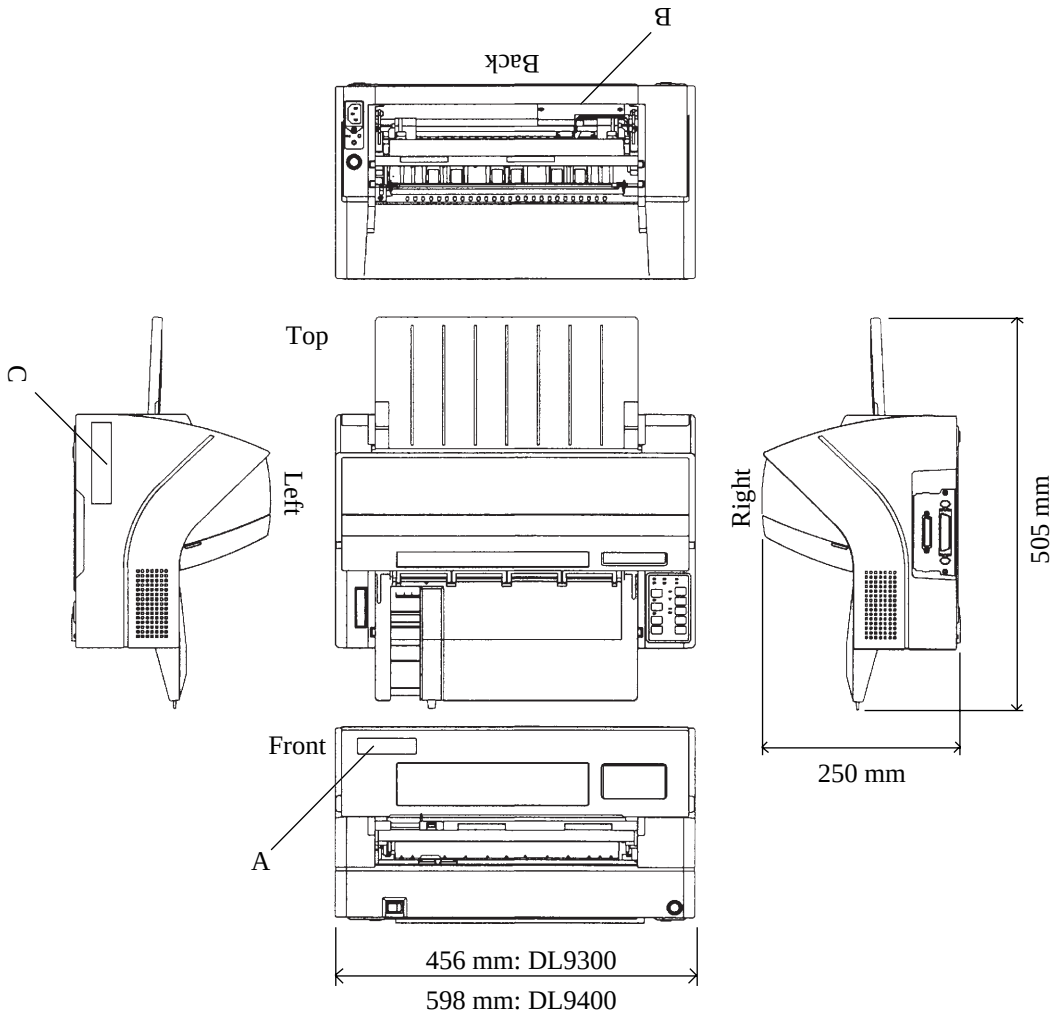
```
The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.
```

Compressed

```
The 24-wire dot-matrix printer prints
quality characters and symbols using
a variety of sizes and fonts.
```

APPENDIX C PRINTER DIMENSIONS AND LABELS

(1) Dimensions and label location



(2) Labels

Location	Label
A (left front)	Logo (printer model)
B (lower surface of upper cover)	EC level (specification, revisions, serial number, and date)
C (left side)	Ratings (input AC voltage and power consumption) Safety (UL, CSA, and TÜV) Radio frequency interference regulation (FCC)