616 CN PRINTER User Manual

ND-12.043.1 EN



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ERRATUM - 616 CH PRINTER User Manual ND-12.043.1 EN Hermes DOC-PRINTER-616-NDE

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PRINTER INTERFACE CONNECTOR PIN-OUTS

Switch 24

4 conn to Pin 5 (RTS conn to CTS)	य	on
Pin 4 NC (RTS not connected to CTS)	य	off
Current loop or V24/RS-232-C	1	on
V11/RS-422 (see 2A7 + 2A8)	1	off
8 conn to Pin 20 (DCD conn to DTR)	2	on
Pin 8 NC (DCD NOT conn to DTR)	2	off
6 conn to Pin 20 (CTS conn to RTS)	3	on
Pin 6 NC (CTS NOT conn to RTS)	3	off
Series interface	5	on
Parallel interface	5	off
Series interface	6	on
Parallel interface	6	off
Current loop	7	on
-	7	off
V24/RS-232-C	8 8	on off

1

This multi-mode matrix printer has been designed and manufactured in Switzerland.

Equipped with an 18-needle moving ruby printhead, it allows printing in data and word processing quality as well as graphics (bit-mapping). Up to 13 colours (in automatic) may be obtained by combination from a 4-colour ribbon. Black printing is offered as standard.

Main characteristics

- Word Processing Quality (WPQ) printing at 100 CPS (at 10 CPI).
- Data Quality printing at 400 CPS (at 10 CPI) switchable to 300 CPS (at 10 CPI).
- Down-Line Loading of character generators.
- Set-up memory.
- Conversion table of the ESCape commands.
- Battery back-up of data.
- Standard interfaces.
- Image and graphic modes.
- Teletex option.
- Floating input buffer from 2 K to 26 K bytes.
- Exclusive long life clean-hands ribbon cassette (36 million characters).
- Sound level 52 dB (anti-noise cover).
- Transparent mode: hexadecimal printing of characters and command codes

Mechanism

TYPE : Impact dot matrix / Bidirectional shortest-path
PRINTHEAD : 18 needles with moving ruby in 9 + 9 configuration

Matrix and speed

Speed	Pitch	Quality	Matrix
400 CPS	10 CPI	DATA	9 x 12
480 CPS	12 CPI	DATA	9 x 10
600 CPS	15 CPI	DATA	9 x 8
500 CPS	PROPORTIONAL	DATA	9 x n
			(n = 1/120'')
100 CPS	10 CPI	WPQ	18 x 36
120 CPS	12 CPI	WPQ	18 x 30
150 CPS	15 CPI	WPQ	18 x 24
130 CPS	PROPORTIONAL	WPQ	18 x n
			(n = 1/360'')

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TABULATION: 40 inches/sec. (100 cm/sec.) in all modes.

PAPER SLEW SPEED: LINE FEED 48 millisec. FORM FEED 8.2 inches/sc.

THROUGHPUT at 10 CPI (in lines per minute):

	DATA	WPQ
80 columns	190	62
132 columns	130	39

Paper handling accessories

Tractor:

Sprocket feed tractor for fan-fold. Max. paper width 15.75 inch (400 mm).

Single or double traction depending upon paper thickness.

Automatic sheet feeder:

Double bin Paper trays: US legal vertical only (8.5 x 14 ins) DIN A4 vertical and horizontal (210 x 297 mm)

Print characteristics

Style

Single pass correspondence quality (WPQ = Word-Processing Quality).

Draft or data processing quality.

Graphics

Single and double density bit-mapping (SD and DD) 72× 60 dots/inch (vertical × horizontal) 72× 72 dots/inch (vertical × horizontal) 144×120 dots/inch (vertical × horizontal) 144×144 dots/inch (vertical × horizontal)

Fonts

Each type of font is either resident in the printer (EPROM) or down-line loaded from the system into a RAM memory maintained by batteries.

The following character sets, in T-format, are resident on EPROMS:

- 1. Gothic NLQ (Near Letter Quality) in 10, 12 CPI
- 2. Micro NLQ in 10, 12, 15 CPI
- 3. Courier NLQ in 10, 12 CPI
- 4. Orator NLQ in 10, 12 CPI
- 5. NOTIS NLQ in 10, 12 CPI
- 6. DATA, with National Characters, in 10, 12 CPI

Plus two down-line loadable NLQ sets in 10, 12 CPI.

Options

T-Format either down-loaded or in EPROMS.

Vertical Pitch

Basic increment 1/72 inch or 1/144 inch. 6 or 8 Lines per Inch (LPI). Half Line feeds backwards and forwards. Vertical tabulation.

Horizontal Pitch

T format 10, 12, 15* DATA and NOTIS NLQ (10, 12)

* 15 CPI for Micro NLQ T format font.

Line length

Up to 13.2 inches (335.3 mm). 132 CPL at 10 CPI (CPL: Characters Per Line). (CPI: Characters Per Inch). 158 CPL at 12 CPI. 198 CPL at 15 CPI. 237 CPL at 18 CPI. 264 CPL at 20 CPI.

Internal memory

Up to 80 K EPROM (Firmware + character generators). Up to 32 K RAM (battery maintained). Input buffer: 2 K bytes fixed or floating (10, 18 or 26 K optional). Set-up buffer: 254 bytes. (Maintained by batteries) Buffer for ESCape command conversion table: 512 bytes. (Maintained by batteries)

Interfaces

Parallel (EPSON/CENTRONICS compatible) and/or serial (150 to 9600 Bauds) V24/RS-232-C, RS-422 with Hard and Soft Handshaking (X-ON/X-OFF and ETX/ACK). Current loop.

Diagnostics

Print-out of the configuration and character generators present in the printer.

Automatic self test at switch-on.

Trace mode for error detection (HEXADECIMAL print-out of received data).

Ribbon cassette

Exclusive clean-hands cassette with 1 inch wide fabric ribbon giving extra long-life and easy handling. The type of ribbon loaded is automatically detected by the printer.

Following ribbons are available:

Ribbon A: Black/Cyan/Magenta/Yellow (Ref. No.: ND-110173) Ribbon D: Black (Ref. No.: ND-110174)

Please refer to COLOUR SELECTION section for more details.

Overall dimensions

 Width:
 24.4 ins (620 mm).

 Height:
 11.7 ins (297 mm).

 Depth:
 19.0 ins (482 mm).

 Weight:
 48.4 lbs (22 kg) including tractor.

Electrical data

Switchable 100-120 V (2A fuse) / 220-240 V (1A fuse). 50-60 Hz. Consumption 120 W.

Acoustics

52 dbA at 100 CPS WPQ (bystanders position to ECMA-74).

Unpacking

It is recommended to keep the original packing material for possible re-use.

Remove the printer from the box and unscrew the 4 transport screws situated under the printer near each rubber foot. Install the printer in normal position and remove the packing retaining the print-head and the carriage.

PACKING CONTENTS (PRINTER):

- 1 printer (ND-110143).
- 1 bag with spare fuses.
- 1 mains cable.
- 1 ribbon cartridge.
- 1 manual.
- 1 rear paper support.
- 1 quality check list.

PACKING CONTENTS (SHEET-FEEDER):

- 1 sheet-feeder (ND-110145).
- 1 front stacker guide.
- 1 rear stacker guide.
- 1 paper cassette PA4 (ND-110146).
- 1 paper cassette LA4 (ND-110147).

Electrical connection

The printer can be switched to one of the following AC mains voltage ranges:

100/120 V or 220/240 V

Check that the voltage range marked on the rating plate at the rear of the printer corresponds to your mains voltage.

If it does not, unscrew the plate and change the position of the red voltage selector. Check that the fuse fitted corresponds to the value indicated on the rating plate. Turn over the rating plate and refit it to relock the voltage selector.

Note that the 2A American-sized fuses are used with gray fuseholder cap. The 1A European-sized fuses are used with the black fuseholder cap.

The printer must be connected to a 2 pole + earth AC supply. The earth conductor in the mains cable is coloured GREEN and YELLOW.







PAPER ADVANCE in 1/72 inch increments, even with sheet-feeders



PAPER REVERSE in 1/72 inch increments, even with sheet-feeders



LF (line feed) 1/6 inch line feed when line space is not modified



FF (form feed) corresponding to paper height selected

Remarks:

The above four keys modify the position of the top line of the paper, whatever the paper-handling device used.

These keys are only operative in LOCAL mode (OFF LINE).

They repeat if pressure is maintained.

When paper is loaded through the rear path, a reverse paper movement will slacken the paper. In this case, the paper MUST be RETENSIONED MANUALLY.

FRONT PANEL SET-UP

ON LINE	ON LINE: OFF LINE:	ready to print stops printing
O POWER ON	POWER ON	Lit: printer switched on Out: printer switched off
O READY	READY	 On: Buffer not full (Parallel interface) Buffer not full (25-75%) (Serial interface) Off: Buffer full (Parallel) Buffer full (25-75%) (Serial)
O PAPER EMPTY	PAPER EMPTY	On: no paper present Off: paper is present

Remarks:

When the printer is OFF LINE, it retains data present in the input buffer memory, while continuing to receive data.

The printing of data retained will resume immediately the printer is set ON LINE.

At each power on, the lights PAPER EMPTY and ON LINE will flash for 3 seconds during the automatic self-test.

When the anti-noise cover is open, the printer stops printing. Main switch is on the rear panel (O = 0FF).

Numerous parameters may be modified through the front panel. They are divided into four groups:

PAPER HANDLING DEVICES

PAGE HEIGHT, LINE FEED

CHARACTER FONT

MISCELLANEOUS

The programmable front panel is easy to use. In fact, just 5 keys allow the modification of most working parameters. This is an exclusive feature of the printer.

The keys are used in a logical, easy-to-remember manner: From the LEFT;

- 1st key: type of paper handling device
- 2nd key: paper format
- 3rd key: character type
- 4th key: miscellaneous

The three left-hand keys are so arranged that there is a progression from the largest operation (paper device selection) to the smallest (character type), with the medium (paper format) in the middle.

The method of use may be split into 4 steps:

- Entering the program mode
- Selection of the group to be modified
- Selection of the values to be modified inside the group
- Exiting the program mode

Entering the set-up parameters program mode

Press the ON LINE key for 3 seconds. The printer bleeps twice and the READY light will flash (once per second).

The printer is now in the program mode.

Selection of the group to be modified

The four left-hand keys give access to 4 different groups.

Press one of the 4 keys corresponding to the group selected and while maintaining this key pressed, validate by pressing the ON LINE key. The printer will bleep twice and the READY light will flash (twice per second).

The printer is now ready to receive modifications in the selected group.



PAPER PAGE CHAR- MISCEL- VALI-DEVICES HEIGHT ACTER LANEOUS DATE LINE GENER-FEED ATOR

Modifications inside a given group

The method is the same for any of the groups. Each key corresponds to one "family" (Sheet-feeder, Line Feed, ...). Refer to the tables on following pages to determine the selected "family" inside the group. Proceed as follows:

Press the selected key and, while maintaining the key pressed, validate by pressing the ON LINE key the number of times indicated in the column VALIDATE.

In case of error, start the operation again. The printer bleeps each time a key is pressed.

Example

Modification of the Page Height to 66 Lines (Table on next page):

- Entering the program mode,
- Select the group "Page Height, Line Feed",
- Select the family "Page Height",
- While maintaining the FORM FEED (FF) key pressed, press the ON LINE key 4 times (= 66 lines per page).

Exiting the program mode

Press the ON LINE key briefly to exit. The printer will bleep twice and the READY light stops flashing. A complete RESET of the printer is possible (RIS 1):

Press the ON LINE key for 3 seconds. The printer bleeps twice and the READY light will flash (once per second).

Press all 4 left keys, and while maintaining them pressed, validate by means of the ON LINE key.

Paper devices

1 I	Ļ	LF	FF	ON LINE
PAPER DEVICES	Page Height Line Feed	CHAR- ACTER GENER- ATORS	MISCEL- LANEOUS	VALI- DATE
Î Î		LF	FF	ON LINE
AUTO- MATIC SHEET- FEEDERS	SEMI- AUTO. INSERT- ER	SPROCKET FEED	MISCEL- LANEOUS	VALI- DATE
BIN 1* A4P BIN 2 A4P BIN 1 A4L BIN 2 A4L BIN 3 Envelo	SEMI-AUT. MANUAL	SPR-FD ¹	EJECT	1 2 3 4 5
* Default Para 1 SPR-FD = S	imeter Sprocket Feed			



* Default Parameter

Character generators





* Default Parameter

3 levels of SELF-TEST and a TRANSPARENT mode are currently implemented:

Self-test O (automatic)

At every POWER-ON, the RAM in the CPU, the RAM memory and the CRC of the firmware PROMS are tested automatically. Test duration is 5 seconds, indicated by flashing the ON LINE and PAPER EMPTY lights.

At completion of self-test, the printer bleeps twice when the set-up buffer and/or ESCape commands conversion table buffer are used (refer to COMMAND CODES section). When these buffers are not used, the printer bleeps once.

Failure is indicated by an acoustic signal (pip-pah-pip) and the ON LINE and PAPER EMPTY lights indicate the nature of the defect.

Nature of the defects

	INDICA	TOR LIGHTS
TYPE OF TEST	ON LINE	PAPER EMPTY
Internal RAM memory of processor 8031	OFF	ON
Other RAM memory IC'S	ON	OFF
Printer Firmware ROM 2 EPROMS + character generators (1-3 EPROMS)	ON	OFF

In case of problems, the indicator lights show the kind of error; an acoustic signal is emitted, followed by "n" pips corresponding to the "nth" EPROM or RAM.

Self-test 1

This mode is selected by maintaining the left handpaper inching key pressed at POWER-ON. The SELF-TEST 1 is composed by the SELF-TEST 0+ test of the character generators CRCs. Test duration is 6 seconds, indicated by flashing the ON LINE and PAPER EMPTY LIGHTS. Failure is indicated by an acoustic signal (pippah-pip). If all is OK, the configuration of the printer and the serial interface, if fitted, is printed out (selection of the default mode determined by the position of the internal switches).

There is a third self-test mode available for printer service personnel.

DIAGNOSTICS

Example of configuration (with serial interface) :

RAMS TEST	PASSED !	
EPROMS TEST	PASSED !	
EPROMS PROGRAM :	AE- 1680 M 1	
	AE- 1681 M 1	
INCLUDED CHARACTER SET :	AE- 1407 M 0	
EPROM CHARACTER SET (N.V. 00) :	AE- 1404 M 2	
DOWN LINE LOADING CHARACTER SET :	FREE BYTES	594F H
DLL CHARACTER SET 03 :	STANDARD WPQ	0C09 H
AUTO LINE FEED :	NO	
FORMAT :	VERTICAL	EUROPEAN
HEAD :	С	
AT POWER ON :	WPQ 1	
BUFFER LENGTH :	FIXED	0800 H
AUTO CARRIAGE RETURN :	NO	
SKIP OVER (1") :	NO	
INTERFACE ACTIVE :	SERIAL	ASYNCHRONE
BAUD RATE :	9600	
PARITY :	ON	EVEN
CHARACTER LENGTH :	8 BITS	
HANDSHAKE :	SOFT	XON/XOFF

Transparent mode



In this mode the printer prints ALL the data received as 2-digit HEXADECIMAL codes (from 00 to FF) formatted in lines of 16 codes. No codes are executed. This mode allows rapid fault-find-ing when anomalies occur — for example if apparently identical copies of a sc⁴tware package cause a slightly different printout.

Press the key 5 (ON LINE) for 4 or 5 seconds until the printer replies with a double bleep (bleep-bleep).

While holding the combination of keys 2 and 4 down, briefly press key 5 (ON LINE) again to key the information into the printer. The printer buzzes once.

From this moment, all following data will be printed in HEXADECI-MAL.

To exit from the alternate front-panel mode, press key 5 (ON LINE) again briefly and the printer replies with a double bleep (bleep-bleep).

To stop printing in the transparent mode before the end, it is necessary to switch the printer off.

The printer can be equipped with a large choice of paper handling devices which are described in detail on page 32 et seq.

TRACTOR (for continuous forms)

SHEET-FEEDERS (double bin)

The wide range of accessories that can be fitted to the printer makes it necessary to provide a mechanism by which the function codes required for different accessories may be introduced without major software modifications. This is accomplished by the ESC S n code sequence which adapts the reactions of the printer to suit a given paper handling device. To facilitate selection by systems which cannot generate ESC S codes, selection by ((n)) key sequences is possible; these must be transmitted to the printer as if they were to be printed. They adapt the reactions of the printer to suit a given paper handling device. This explains the presence of commands ESC S n and ((n)) which select the desired device; the sequence is NOT printed. ESC S 00 and ((0)) allows return to the continuous paper mode.

Use of the paper handling commands

ESC S n

Various paper handling devices can be adapted to the printer. The sequence ESC S n allows the selection of the desired device and its support functions.

"n" determines the selected device and must be indicated in HEXADECIMAL value from 00 to FF.

Immediate selection

If n = 00Select tractor. If n = 01Select bin 1 for sheet-feeders (default setting). If n = 02Select bin 2 for sheet-feeders. If n = 03Select envelope-feed mode for sheet-feeders. If n = 04Select manual document insertion mode for sheet-feeders.

Remark:

Immediate selection always starts with the ejection of any sheet present and ends with the introduction of a new sheet up to the first line of printing.

Passive selection

If n = 0APreselect bin 1 for sheet-feeders. If n = 0BPreselect bin 2 for sheet-feeders. If n = 0CPreselect envelope-feed-mode for sheet-feeders. If n = 0DPreselect manual document insertion mode for sheet-feeders.

Remark:

The passive selection is identical to the immediate selection except that there is NO automatic ejection of a possible sheet present and NO immediate introduction of a new sheet from the selected channel. Such paper movements will be induced through the FF, LF or ((Y)) commands, as well as through the arrival in the skip-over zone.

ESC Y

Eject any sheet present and insert new sheet from device already selected by the ESC S n command.

ESC Z

Eject sheet present only.

((n))

This command code, formed with 5 ASCII characters, is identical to the ESC S n command. "n" determines the selected device and its support function. The value of "n" is identical to the ESC S n command for any selection, preselection or sheet ejection, but the commands are in ASCII.

Example:

- ((1)) selects bin 1 of the sheet-feeders.
- ((B)) preselects bin 2 of the sheet-feeders.
- ((Y)) ejects any sheet present and inserts a new sheet from the selected device.

((?))

Cancels the commands ((n)) and ((n;m)) until the next initialization of the printer (see ESC &). This code allows the printer to print the ((n)) sequences which are normally understood like commands.

((n; m)):

This command is very useful as it allows the modifications of the initial printing position (offset defined by m in 1/10 inch) independently from the left margin. With double bin sheet feeders for example, both bins are symetrical to the middle of the platen, as shown below:

n = selection code of the device.

m = new initial printing position



By default, the physical position of the bins is:

BIN 1 — vertical US or A4

BIN 2 — horizontal US or A4

The printer accepts by default the single and double bin sheetfeeders with the offset values selected by the position of the internal switches A6 and A7 according to the selected format of paper (default setting).

The following table shows the default values of "m" in function of the paper formats selected by the internal DIP-switches.

COMMAND	PC US	DSITION EUROPE	FORMAT
ESC S 01 or ((1)) or ((A))	25	26	Vertical
ESC S 02 or ((2)) or ((B))	12	8	Horizontal
ESC S 03 or ((3)) or ((C))	36	36	Envelopes
ESC S 04 or ((4)) or ((D))	25	26	Vertical

The initial printing position can therefore be repositioned at any moment through the sequence ((n;m)) where:

n = selection code of the device

m = new initial printing position expressed in 2 digit decimal number in 1/10 inch (position possible between 01 and 99).

Example:

((2;30)) Eject any sheet present and set sheet-feed mode. Insertion of one sheet from bin 2 and initial printing position at 30/10 inch from the left end of the platen. It is therefore possible to use 2 vertical or 2 horizontal bins together by modifying the initial printing position only.

The modification of the initial printing position is independent for each bin of the sheet-feeder (from 1 to 7 or A to D), but is not usable for the tractor (0).

Remarks:

In some third party sheet-feeders (BDT for example), bins 1, 2 and envelope-feed are positioned on the left side of the platen, with a 1/10 inch offset. These types of feeders are not automatically implemented and it is necessary to link pins 1 and 16 on socket 6F of CPU board to allow their use.



If the first code met is ESC S n, the following codes, of types ((n)) or ((n;m)) are inhibited and printed.

If the first code met is ((n)) or ((n;m)), the commands are executed and not printed. If printing of a sequence is desired, it can be done by interposing a Space and a Backspace. At reception of any ESC S n or the sequence ((?)), the commands will again be inhibited and printed.

The Micro Forward/Backward Paper Feed and LF keys can modify the real print position in all cases. THIS IS AN EXCLUSIVE FEAT-URE OF THIS PRINTER. The possible modifications will automatically continue for all other sheets coming from the same channel. The FF key causes the ejection of any sheet present and the introduction of a new one from the preselected bin.

The slew speed is reduced when a third party sheet feeder is used.

End of paper detection

Two paper empty detectors are fitted on the printer:

1. UNDER THE PLATEN.

This detects end of paper when paper passes around the cylinder (sheed-feeds, roll-feed, single document inserter and with the tractor when it is used in this mode).



2. IN THE REAR CHANNEL.

This detects end of paper when continuous form sets pass via the rear or bottom channel (with the tractor only).

Note that reverse movements of the platen are only authorised when detector 1 signals the presence of paper.

When ESC S n, ((n)) or ((n;m)) commands are sent by error, the printer might be set OFF LINE due to lack of paper. Simply press the FF key and a new sheet will be introduced.

The intersheet gaps are masked providing ESC S n, ((n)) or ((n;m)) commands and Page Height have been set correctly. Then only genuine lack of paper will cause automatic deselection at the end of the page.



The paper brake in the rear channel of the printer acts as a paper tensioner:

- 0. Paper Loading position.
- 1. Light braking (NORMAL POSITION).
- 2. Heavy braking (for THICK form sets ONLY).

COMMANDS	PAPER DEVICES
ESC S 00 or ((0))	tractor selection
ESC S 04 or ((4))	selection of manual bin
ESC S 01 or ((1))	selection of bin 1
ESC S 03 or ((3))	selection of envelope bin
ESC S 02 or ((2))	selection of bin 2
Several paper formats can be used with the different paper handling devices.

Sprocket feed tractor (ND-110144)



The sprocket feed tractor can handle traction hole-to-traction hole paper widths from 1.75 to 15.35 inches (44 to 390 mm) giving edge-to-edge widths of approximately 2.15 to 15.75 inches (54 to 400 mm).

It can be used in two different modes:

DOUBLE TRACTION (Path A), where the paper passes via the rear tractor pins, over the tensioner bar, around the platen and then via the front track pins.

THIS MODE IS RECOMMENDED FOR NORMAL USE.

SINGLE TRACTION (Path B), where the paper enters via the rear channel of the printer or the bottom and is simply pulled up by the front set of tractor pins.

This mode is ONLY recommended for THICK form sets. No reverse paper movements are possible in this position.

MAKE SURE THAT THE FRICTION PLATEN IS DISENGAGED (Set lever on O = O).

4-pin tractor units are mounted as standard. In case of difficulty, 6-pin tractor units may be fitted upon request. This modification takes only a few minutes.

Printing of one original + 3 copies is possible without any difficulty, with:

– Original	: 65 g/m2
– Сору	: 60 g/m2
– Carbon	: 25 g/m2

NOTES

Automatic sheet-feeder (ND-110145)

DOUBLE BIN



Designed as a snap-on replacement for the standard continuousform tractor on the printer, the double channel mechanical sheetfeeder allows vertical and horizontal format paper (or two types of vertical format paper) and envelopes to be used concurrently. Sheets are stacked in collated order in the output hopper.

PAPER HANDLING DEVICES AND SPECIFICATIONS

Paper weight: 80 g/m²

Paper trays:US vertical8.5 x 11 inchUS horizontal11 x 8.5 inchUS legal vert.8.5 x 14 inchA4 vertical210 x 297 mmA4 horizontal297 x 210 mm

US envelope sizes (width x height): 9.31 inch x 4.25 inch (236 x 108 mm).

European envelope sizes (width x height): 6.38 inch x 4.49 inch (162 x 114 mm) C6 8.82 inch x 4.49 inch (224 x 114 mm) C6/5 9.01 inch x 6.38 inch (229 x 162 mm) C5 9.84 inch x 6.38 inch (250 x 176 mm) B5

Limiting envelope dimensions (max width x min height): 9.90 inch x 3.54 inch (250 x 90 mm)

Total thickness for envelopes: 0.012 inch (0.30 mm) minimum 0.020 inch (0.50 mm) maximum

Input tray capacity: Up to 200 sheets (each bin) + 30 to 45 envelopes.

Output bin capacity: Up to 250 sheets.

Installation:

Remove printer top cover and take off the tractor. Fit the sheet-feeder.

Adjust the print-head/platen distance (if envelopes are to be used, set head one notch further back.

Fit the special top cover.

ENGAGE THE FRICTION PLATEN (Set lever on OO)

Load the paper with a software command — ESC S n or ((n)) — or use the front panel.

When defining the page values, it is important to understand how the printer executes the line feed and page height commands.

Line feed command codes

ESC 0	: 8 Lines Per Inch = $1/8$ inch = $9/72$ inch
ESC 1	: 7/72 inch
ESC 2	: 6 Lines Per Inch = 1/6 inch = 12/72 inch (default value)
ESC 3 n	: n/144 inch or n/216 inch (depending upon position of internal switch B7).

Page height command codes

ESC C n	: page height in lines corresponding to the number
	of lines per inch selected
ESC C 00 n	: page height in n inches.

Remark:

If no page height value has been introduced, the printer analyses the position of the internal switches A6 and A7 (48, 51, 66 or 72 lines per page).

Examples of page definitions

With a constant line feed and a constant page height of 72 lines per page:

- ESC 2 = 12/72 inch for one line feed (6 LPI).
- Defined page height = 72 lines x 12/72 inch = 864/72 inch.
- The printer will execute up to the 864/72 inch before provoking an internal FF. All line feeds executed within the page have the 6 Line per Inch value.

With a changing line feed and a constant page height of 72 lines per page:

- ESC 2 = 12/72 inch for one line feed (6 LPI).
- 10 subsequent line feeds = $10 \times 12/72$ inch = 120/72 inch, therefore: 864/72 inch less 120/72 inch = 744/72 inch left before an internal FF.
- Line Feed change: ESC 0 = 9/72 inch (8 LPI).
- 82 subsequent line feeds = 82 x 9/72 inch = 738/72 inch, therefore: 744/72 inch left before line feed change less 738/72 inch = 6/72 inch left before an internal FF.

If the user sends another LF when the value of the ESC 0 command is still valid, the printer WILL NOT EFFECT a 9/72 inch LF, but a 6/72 inch LF: the last printed line will kill the last but one line (6/72 inch shift).

It is important to understand the method of selecting different character generators in order to fully utilize the printer.

A generator is set forth like a table: each HEXADECIMAL address between 00 and FF corresponds one character or none. Four types of character generators are available:

STANDARD GRAPHIC TELETEX EXTENDED

	-0	1	2	3	ų	5	6	7	8	9	A	В	С	D	Е	F
0	NUL			Q	a	۴	`	P	£	0						
1	SOH	DC1	!	1	A	D.	a	q	9	ø						
2	STX	DC2	"	2	в	R	р	r		A						
3	ETX	DC3	#	3	С	S	С	5	0	a						
4	EOT	DC4	\$	4	D	Т	đ	t	à	Æ						
5	ENQ		7.	5	E	U	е	C	é	æ						
6	ACK		8	6	F	V	f	~	è	ì						
7	BEL		7	7	G	ម	g	W	ù	þ						
8	BS	CAN	(8	н	Х	h	х	ç	ß						
9	нт)	9	I	Y.	i	У	-	É						
A	LF		*	:	J	Z	j	z	Ä	i						
В	٧T	ESC	+	;	К	Ε	k	{	ä	ڬ						
С	FF	FS	,	<	L	_ \	1	1	Ö	ដ						
D	CR			=	М]	m)	ö	ñ						
Е	S0	RS	•	>	N		n	~	Ü	Pt						
F	SI		1	?	0		o		ü	O.						

Standard character generator (Access on 7 bits)

There are 128 characters contained between 20 and 9F (HEXA-DECIMAL). Only the characters between 20 and 7E are directly accessible to the user. The 32 others, contained between 80 and 9F are reserved for the various national variants and are accessible in 3 different ways: ESC R n (n = national variant selected).

Internal DIP-Switches A1 to A4 (Selection by default) [In this case, the characters in the addresses 80 to 9F are automatically displaced in the basic table (20 to 7E) in function of the national variant]

ESC R FD n m... (substitution of any character between 21 and 7E by a code from 21 to 9F. In this case, the code 7F generates 3 vertical lines; otherwise, it activates the DELETE function.

The standard generators (96 ASCII type + 32 national) may be divided into 16 different groups. Each group may contain 16 national variants. The differences between each group are the contents of the of the addresses 80 and 9F.

2 groups are presently used:

Group 1 and 2 in the standard versions.

Group 1

HEXADECIMAL	23	24	40	5B	5C	5 D	5E	5F	60	7 B	7C	7 D	7E	ESC
DECIMAL	35	36	64	91	92	93	94	95	96	123	124	125	126	CODE
US ASCII	#	\$	ລ	ſ	١	J	-	_	•	{	1	}	~	R 00
FRANCE	£	\$	à	•	¢	6	-	_	·	é	ú	è		R 01
GER/AUS	#	\$	9	Ä	ö	U		-	•	ä	ö	ü	ß	R 02
U.K.	£	\$	อ	Ľ	١	3	-	_	·	{	I	}	~	R 03
DEN/NOR	#	\$	ລ	Æ	Ø	Å	U	-	•	æ	ø	8	ü	R 04
SWE/FIN	#	\$	É	Ä	ö	8	Ü	_	ė	ä	ö	a	ü	R 05
ITALY	£	\$	9	·	ė	I	-		ù	à	ò	è	ì	R 06
SPAIN	£	\$	9	i	Ñ	i	-		•	•	ñ	ç	~	R 07
FRANCE 2	#	\$	-	C		3	ú	_	Ç	à	ė	ė	£	R 08
DEN 2/NOR 2	#	\$	U	Ā	Ø	Å	ö	-	ü	æ	ø	а	ö	R 09
DEN 3/NOR 3	#	\$	Ä	Æ	Ø	Å	Ü	-	ä	æ	ø	а	ü	R OA
СН 1	#	\$	^	à	¢	è	ė	I	·	ä	ö	ü	£	ROB
СН 2	#	\$	ù	ė	¢	à		_	ė	ä	ö	ü	"	R OC
CH VSM	£	\$	9	á	¢	ė	-	_	·	ä	ö	ü	ė	ROD
SWE 2/FIN 2	6	¤	É	Ä	ö	8	-	_	ė	ä	ö	a	ü	ROE
RESERVED														R OF

Group 2

HEXADECIMAL	23	24	40	5B	5C	5 D	5E	5F	60	7 B	7C	7 D	7E	ESC
DECIMAL	35	36	64	91	92	93	94	95	96	123	124	125	126	CODE
US ASCII	#	\$	ລ	C	١	נ	•		•	{	ł	}	~	R 00
FRANCE	£	\$	à	·	¢	9	•		•	é	ů	ė		R 01
BELGIUM	#	\$	à	•	¢	6	-	_	•	é	ij	è		R 02
U.K.	£	\$	a	C	1]	-	_	· ·	{	1	}	~	R 03
CANADA	#	\$	à	â	¢	ê	î	_	ō	é	ù	ė	û	R 04
PORTUGAL	£	\$	ã	Ă	¢	ð	^		<u>0</u>	ã	¢	õ		R 05
JAPAN	#	\$	ລ	C	¥	3	-	_	·	{	1	}	-	R 06
SPAIN	£	\$	9	i	Ñ	ż	*	_	•	•	ň	¢	~	R 07
FRANCE 2	#	\$	-	Ľ		J	ů		ç	à	ė	é	£	R 08
HOLLAND	£	\$	ລ	Ľ	IJ	נ	-		•	{	· ij	}	-	R 09
СН З	ù	\$	à	é	¢	ê	ì	ė	Ô	ä	ö	ü	û	ROA
CH 1	#	5	-	à	ç	ė	ė		·	ä	ö	ü	£	R OB
CH 2	#	\$	ù	ė`	ç	à	^	_	è	ä	ö	ü		R OC
CH VSM	£	\$	9	à	ç	ė	•		•	ä	ö	ü	é	ROD
RESERVED														R OE
RESERVED														R OF

DATA 10 cpi STANDARD group 1 DATA

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG the quick brown fox jumps over the lazy dog 0123456789£5"°àééòç¯ÄäDöüü0øÅ寿ìòßéi¿ÄÄÆØ %&()*+:;,.-/<=>?[\]^ _{1}~#\$

DATA 12 cpi

STANDARD group 1 DATA

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG the quick brown fox jumps over the lazy dog 0123456789£5^{**}àéèòç^{**}AäööÖÜÜØØA䯿ìòßéi¿Xïñߤ %&()*+:;,--/<=>?E\]* {|}*#\$

GOTHIC PC 10/12 TELETEX WPQ

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG the quick brown fox jumps over the lazy dog i¢£\$¥#§¤ ≪+↑→↓°±²³×µ¶·÷ »¼½¾¿ΩÆÐaĦåIJĿŁØŒo₽ŦDń KædðħιijĿłøœßþŧŋ

```
MICR02T0
PC 10/12
TELETEX
WPQ
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog
i¢£$¥#§¤ «+↑→↓°±*"×µ¶·÷ »%%%¿QÆÐaHåDĽŁØŒgÞ∓D'n
κæσδηιήΓιøœβριη
MICR15T0
15 cpi
TELETEX
WPO
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog
ie£$¥#§¤ «+↑+↓°±**×µ¶+÷ »₩₩24¿QÆÐaHåIJELØŒoÞ∓Dń
Kædðñijlløœ8þtŋ
COURRIER
PC 10/12
TELETEX
WPQ
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog
icf$¥#§¤ «←↑→↓°±²³×µ¶·÷ »%%%¿ΩÆÐªHåDĿŁØŒՉÞŦŊ'n
kædðhijlløœ8ptŋ
```

ORAT02T0 PC 10/12 TELETEX WPQ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG i¢£\$¥#§¤ «←↓→1°±²³×μ୩·÷ »¼⅔¾ℓ ÆÐ⊒HÅULŁØŒΩϷŦΰ'n Kædóñijlløœßþtŋ NOTI02E0 PC 10/12 EXTENDED WPO ●DA »LE1な 18%++3 UX= 12.4«™ 3.00% 0DA 5 Ga +3c }) (1 } 1 1 1 ⊽6∫∖E∥∞ ~≈≡ αβγδεζηθικλμνξοπρστυφχψω

This type of generator contains 96 characters between 20 and 7E (HEXADECIMAL). They are directly accessible by the user; there is no possibility of national variants and the printer does not move any character inside the table. These generators include bar codes, logos, videotex.

	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Е	F
0	NUL				L	Ŧ	0	1								
1	SOH	DC1	1		т	Ŧ	1	\mathbf{X}								
2	STX	DC2	Ļ		т	т	2	1								
3	ETX	DC3	-	I	+	L	3	/								
ų	EOT	DC4	+	4	-	L	4	/								
5	ENQ		1	4	+	г	5	/								
6	ACK		1	1	۲	r	6	•						L		
7	BEL		••	ſ	ŀ	+	7	•								
8	BS	CAN	(٦	L	+	8	0								
9	HT		1	4	r	L	9	►				L		L	ļ	
A	LF			1	T	r	√	4						L		
В	۷T	ESC	7	г	т		Σ	5					L			L
С	FF	FS		L	ł	-	ſ	٨						L		
D	CR		ノ	د	-	1	J	V						ļ		
Е	S0	RS		L	+	I	7	Δ						L		
F	SI			г	1	-	° ∼									

In this type of generator, there are 192 characters contained between 20 and 7E, then between A0 and FE (HEXADECIMAL). The codes between C0 and CF (HEXADECIMAL) are diacritical signs. They do not require any BS (Back Space) and are automatically printed above the next character sent to the printer. Thanks to the SHS command (refer to TELETEX OPTIONS section), this type of generator can be printed with different pitches (10 or 12 CPI). No national variant is possible and characters cannot be moved inside the table.

	0	1	2	3	4	5	6	7	8	9	A	В	С	D	E	F
0	NUL			0	ລ	Р		ρ				•	[ß	к
1	SOH	DC 1	1 L .	1	A	Q	а	q			i	±	•		Æ	æ
2	STX	DC 2		2	в	R	ъ	r			¢	2			Ð	d
3	ETX	DC3		3	С	S	с	s			£	3	^	•	ą	6
4	EOT	DC4		4	D	т	d	t			\$	×	~	1	Ħ	π
5	ENQ		7.	5	E	U	е	u		1	¥	ų	-	Å	å	ι
6	ACK		8,	6	F	v	f	v			#	۹٢	~	-	IJ	ij
7	BEL		•	7	G	¥	g	w			ş	•	•	L	Ŀ	ŀ
8	BS	CAN	(8	н	X	h	×			¤	÷	••	Ŧ	Ł	1
9	HT)	9	I	Y	i	У						L	ø	ø
A	LF		*	:	Э	z	j	z					•	F	Œ	09
В	٧T	ESC	+	;	к	ſ	ĸ				«	»	,	+	Q	B
С	FF	FS		<	L		1	1			+	¥	_	4	Þ	þ
D	CR		-	=	М)	m				t	35	~	r	Ŧ	t
E	SO	RS		>	N		n				+	X		-	a	· ŋ
F	SI		1	?	0		0				Ļ	٤	-	7	ń	·

These generators are composed of 224 characters contained between 20 and FF (HEXADECIMAL). These codes are directly accessible by the user. This type of generator is mainly intended for Personal Computers.

	0	1	2	3	4	5	6	7	8	9	A	В	С	D	E	F
0	NUL			. 6	α	«	۷							Π		π
1	SOH	DC1	_			»					Ξ		А	Ρ	α	Q
2	STX	DC5			0	* -	1				~		В	£	β	σ
3	ETX	DC 3		-	١	TH	1				~		Г	T	۲	τ
4	EOT	DC4		<	÷	\$	1						Δ	Y	δ	υ
5	ENQ		a339	>	n	1.	}		1		~		E	¢	ε	6
6	ACK		55	¥	υ	4	l				11		Z	X	ζ	X
7	BEL			t	с	±)				Э		н	Ψ	η	ψ
8	BS	CAN	圞	[2	ŧ					1		Θ	Ω	8	ω
9	нт		A		e	à			1		ſ		I		L	
A	LF		2	1	h	٦.	1				9		к		к	
В	۷Т	ESC	ç	1	*2	N					V		^		λ	
С	FF	FS	v		Ъ	¢							м		Ч	
D	CR		^	1	×	¢							N		v	
Е	S0	RS	ſ		33	Û	Ι						Ξ		ξ	
F	SI		J		X	\$	I						0		0	

Remarks:

Each type of generator contains two print qualities: WPQ (Word Processing Quality) and Data. Data quality characters generally require half the quantity of dots necessary for a WPQ character. In the case of graphic generators, the same applies for low and high resolution.

Data and WPQ characters may have different pitches. Generators — with fixed pitches are formed by characters which have the same length.

Character generators are memorized in EPROMs or in RAMs. The number of generators that can be memorized in one EPROM depends on type (standard, graphic, etc.) and quality (WPQ, or Data). A single EPROM may contain generators of mixed types and qualities; this is very useful for multi-lingual applications. As a general rule, the following parameters are valid:

TYPE	SELECT CODE	CTRS	BITS	BYTES	EPROM
Wp quality	ESC T 10 TO 1F	128	32K	4K	2
Data	ESC T 20 TO 2F	128	16K	2K	4
High Res	ESC T 40 TO 4F	96	32K	4K	2
Graphics Low Res	ESC T 50 TO 5F	96	16K	- 2K	4
Wp quality	ESC T 60 TO 6F	192	64K	8K	1
Data	ESC T 70 TO 7F	192	32K	4K	2
Wp quality	ESC T 80 TO 8F	224	64K	8K	1
Data	ESC T 90 TO 9F	224	32K	4K	2

EPROM column: note figure is no. of 8K bytes per EPROM

Selection codes of the character generators

The CPU board contains 9 sockets each with 28 pins. These sockets are intended for the printer Firmware, the character generators and the RAMs (buffer, etc.).

The micro-processor used (INTEL 8031) allows 64 K bytes addressing in the EPROM zone (sockets 9B to 9F), and 64 K bytes in the RAM zone (sockets 9G to 11H), of which only 32 K bytes may be used with the existing sockets.

STANDARD CONFIGURATION



Remark:

Maximum capacity of the printer:

- 80 K bytes in EPROMs (4 x 16 + 2 x 8)
- 32 K bytes in RAMs (4 x 8)

Only sockets 10 H and 11 H may be fitted with either RAMs or EPROMs.

At each power-on, the printer verifies the type of the first character generator installed in socket 9 C (standard, graphic, etc.). Depending upon the position of internal switch B2 (B2 = ON: first WPQ / B2 = OFF: first Data), the printer selects by default the type of first generator.

ESC T xy: This command searches a selected generator by scanning of sockets 9 C to 11 H. x and y may be introduced in Hexadecimal or ASCII values.

x = Type of generator:

- 1 = standard WPQ
- 2 = standard DATA
- 4 = Graphic WPQ (high resolution)
- 5 = Graphic DATA (low resolution)
- 6 = Teletex WPQ
- 7 = Teletex DATA
- 8 = Extended WPQ
- 9 = Extended DATA
- y = Exact physical position of the generator in the EPROM or RAM zone:

0 to 9: position number in EPROM zone

A to F: position number in RAM zone.

See also Down-line loading of character generators

Example:

- ESC T 21: 2 corresponds to a Data generator of the standard type
 - 1 corresponds to the second physical position of the generator in the EPROM zone.

The access to a generator through the ESC T xy command must exactly correspond to its physical position in the zone, as well as to the type and quality of this generator.

Following print styles are resident in the standard printer:

– 2 DATA fonts:– WPQ fonts (T format):

DATA-10 and DATA-12 Gothic 10/12 Micro 10/12/15 Courier 10/12 Orator 10/12 NOTIS 10/12

- 1 WPQ Extended Font:

Selection codes:

DATA-10	: ESC T 20 (first standard DATA generator met).
DATA-12	: ESC T 21 (second standard DATA generator met).
GOTHIC 10	: ESC T 60 (first WPQ T format generator met).
MICRO 10	: ESC T 61 (second WPQ T format generator met).
COURIER 10	: ESC T 63 (third WPQ T format generator met)
ORATOR 10	: ESC T 64 (fifth WPQ T format generator met)

Remark:

To ease selection, the ESC T xy command may be sent in ASCII codes:

ESC T 63 (HEXADECIMAL = ESC T 63 (ASCII CODES).

A selected generator is searched as follows:

1/ Type of generator (standard, graphic, etc.). Print quality (Data or WPQ), number requested.

If the printer does not find it:

2/ Same method as in 1/, but selection of the first number.

If the printer does not find it:

3/ Same method as in 1/, but selection of the opposite quality (WPQ or Data) and of the first number.

If the printer does not find it:

4/ Stop search and acoustic signal at each print trial.

Ram zone

Basic differences between the RAM and EPROM zones

RAM zone:

To record information sent from the system and to safeguard this information with batteries.

EPROM zone:

To read information already memorized. This information cannot be erased.

The RAM zone has been designed to give the printer the following operational features:

BIT IMAGE BUFFER. FIXED OR FLOATING INPUT BUFFER. SET-UP BUFFER. BUFFER FOR CONVERSION OF ESC COMMANDS. BUFFER FOR DOWN LINE LOADING OF CHARACTER GENERA-TORS (depending upon size of input buffer).

The 8 K RAM installed on socket 9 G contains:

The BIT IMAGE Memory (approx. 3 K bytes. Refer to BIT IMAGE MODE section)

The capacity of the INPUT BUFFER, defined by the position of switch B3:

If B3 = OFF: fixed capacity of 2 K bytes.

If B3 = ON: floating capacity. The INPUT BUFFER will occupy the whole remaining space in the RAM zone when one or more additional RAMs are installed in sockets 9 H, 10 H or 11 H (10, 18 or 26 K bytes capacity).

The set-up buffer (254 bytes) allows the modification of several parameters set by default (text or command codes automatically executed at each switch-on or initialisation. (Refer to ESC = S 11 hh m, COMMAND CODES section).

The ESC command conversion buffer (512 bytes) allows the creation of a new ESC command table compatible to a system with command codes that cannot be recognised by the printer. (Refer to ESC = E xyxy...y, COMMAND CODES section).

The buffer for Down Line Loading of character generators requires the addition of at least one additional RAM into socket 9 H or subsequent sockets.

Remark

Battery Protection is provided for RAMs fitted in socket location 9 G, 9 H, 10 H and 11 H.

Down line loading of character generators

The Down Line Loading is effected in the RAM zone. One or more additional RAMs starting from socket 9H must be fitted and internal switch B3 must be set OFF to limit the size of the input buffer to 2 K. Down Line Loading (DLL) will then start from the RAM in socket 9 H (maximum capacity 24 K bytes = 3×8 K bytes). The generators will occupy places 1 to 8 according to their physical position in the RAM zone.

To start with, the user must load the file "Character generator" in the memory zone of the system. This file must be structured identically to that of a generator contained in an EPROM. The DLL command in the RAM zone is

ESC T FD n II hh m + 2 CRC bytes (CRC = Checksum).

- n : Number (position in RAM) of the generator between 1 and 8.
- II : Low byte of the m length (HEXADECIMAL).
- hh : High byte of the m length (HEXADECIMAL).
- m : Exact content of the file "Character Generator".
- CRC : 2 control bytes of m.

Possibility to erase the whole zone loaded with n = 0. Example: ESC T FD 00.

Possibility to erase one generator n if II and hh = 0. Example: ESC T FD 01 00 00 (generator 01 erased).

The control of a bad CRC at reception will erase the generator (with acoustic signal).

In order to ease the use of DLL, a library of character generators is available recorded on 5 1/4 inch floppy diskettes in MS-DOS (IBM-PC) format. These generators are formatted to be directly accessible to the printer; they contain:

II : Low byte of the m length (HEXADECIMAL).

hh : High byte of the m length (HEXADECIMAL).

m : Exact contents of the file "Character Generator".

CRC : 2 control bytes of m.

In order to use the DLL mode, internal switch B3 must be OFF (2K bytes fixed buffer)

The Down Line Loading of user special generators is achieved via a software package supplied by the manufacturer. This utility operates under MS-DOS and allows users to create their own characters/graphics for Down Line Loading into the printer RAM zone.

Selection codes for DLL character generators

Down-line loaded character generators are directly accessible by a command taking into account their position in the RAM zone, irrespective of their type.

Example:

ESC T FE n where n is the number (physical position in RAM) of the generator. In this case, the value of n is the same as was used in Down-line loading by command ESC T FD n II hh m.

Choice of interfaces

- PARALLEL type EPSON/CENTRONICS.
- SERIAL (150 to 9600 bauds) RS-232C/V24, RS-422/V11 with hard and soft handshaking and Current Loop.

Remark:

The PARALLEL interface is integrated on the CPU board of the printer.

The SERIAL is an additional board which is connected to the CPU board.

Parallel interface

A 36-pin female connector at the rear of the printer provides the means for connecting the printer to an input device. This connector is not present on machines which are only equipped with the serial interface. The male connector for preparing customer-supplied interface cables is Amphenol Part No. 57-30360. It is recommended that cable length should not exceed 2.5 m (8 ft).

The orientation and pin-outs of the parallel interface connector are shown below.



PRINTER INTERFACE CONNECTOR PIN-OUTS

SIGNAL	PIN	SIGNAL
DATA STROBE	19	TWISTED PAIR GROUND (DATA STROBE)
DATA BIT 1	20	TWISTED PAIR GROUND (DATA BIT 1)
DATA BIT 2	21	TWISTED PAIR GROUND (DATA BIT 2)
DATA BIT 3	22	TWISTED PAIR GROUND (DATA BIT 3)
DATA BIT 4	23	TWISTED PAIR GROUND (DATA BIT 4)
DATA BIT 5	24	TWISTED PAIR GROUND (DATA BIT 5)
DATA BIT 6	25	TWISTED PAIR GROUND (DATA BIT 6)
DATA BIT 7	26	TWISTED PAIR GROUND (DATA BIT 7)
DATA BIT 8	27	TWISTED PAIR GROUND (DATA BIT 8)
ACKNOWLEDGE	28	TWISTED PAIR GROUND (ACKNOWLEDGE)
BUSY	29	TWISTED PAIR GROUND (BUSY)
PAPER EMPTY	30	TWISTED PAIR GROUND (INITIALISE)
ON-LINE (SELECT)	31	INITIALISE (INPUT PRIME)
LOGIC GROUND	32	FAULT
NOT USED	33	TWISTED PAIR GROUND (DEMAND)
LOGIC GROUND	34	PINS 34 AND 35 ARE JOINED TOGETHER
CHASSIS GROUND	35	TO ALLOW PRINTER PRESENT DETECTION
+5V	36	DEMAND
	SIGNAL DATA STROBE DATA BIT 1 DATA BIT 2 DATA BIT 2 DATA BIT 3 DATA BIT 4 DATA BIT 5 DATA BIT 5 DATA BIT 6 DATA BIT 7 DATA BIT 7 DATA BIT 8 ACKNOWLEDGE BUSY PAPER EMPTY ON-LINE (SELECT) LOGIC GROUND NOT USED LOGIC GROUND CHASSIS GROUND +5V	SIGNALPINDATA STROBE19DATA BIT 120DATA BIT 221DATA BIT 322DATA BIT 524DATA BIT 524DATA BIT 625DATA BIT 726DATA BIT 827ACKNOWLEDGE28BUSY29PAPER EMPTY30ON-LINE (SELECT)31LOGIC GROUND32NOT USED33LOGIC GROUND34CHASSIS GROUND35+5V36

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Input/Output signals (parallel interface)

DATA STROBE (from Host)

This signal is a negative-going pulse which is used to transfer the incoming data from the host to the printer. The pulse duration must be a minimum of 1 micro-second. (See timing diagram).

DATA BITS 1 to 8 (from Host)

These contain ASCII character data information. Data bit levels are positive true logic. Each signal is at HIGH level when data is a logical 1 and LOW when logical 0. All data must be stable for 0.5 microseconds before and **after** the negative-going transition (leading edge) of the data strobe signal.

ACKNOWLEDGE (from Printer)

This signal is a negative-going pulse which indicates that the printer has processed the latest data transferred from the host. No new data can be sent to the printer until the trailing edge of the ACKNOWLEDGE pulse has occurred.

BUSY (from Printer)

This is a positive-going signal which indicates the time when the printer cannot accept new data. It goes positive on the leading edge of every data strobe pulse and remains high until the trailing edge of the acknowledge pulse.

DEMAND (from Printer)

This signal is the inverse of the BUSY signal. When high (positive), it indicates that the printer can accept data.

PAPER EMPTY (from Printer)

A high level indicates that the printer is out of paper.

ON LINE (from Printer)

A high level indicates that the printer is selected.

INITIALISE (from Host)

This signal is a negative going pulse at least 50 micro-seconds long.

FAULT (from Printer)

This signal drops to a low level to indicate cover open.

+5V (from Printer)

This signal indictes that the +5V power supply is present in the printer. It may also be used to provide low power to external equipment (100 mA MAX).

Timing diagram

- tA = 0.5 microsec MIN
- tB = 1 microsec MIN
- tC = 0.5 microsec MIN
- tD = 7 microsec APPROX
- tE = 0 microsec MIN



Serial interface

The Serial Interface is an optional interface which may be mounted on the printer, to allow it to be connected to any asynchronous data system using baud rates ranging from 150 to 9600 under RS-232C/V24, RS-422/V11 or 20 mA Current Loop conditions. 2K bytes fixed or floating (up to 26 K bytes) buffer memory are provided. Both hard (busy or ready) and soft handshaking (X-ON/ X-OFF or ETX/ACK) may be used; these are switch-selectable (switch B3).

Important

Supervisedien

Care should be taken when using machines fitted with both serial and parallel interaces. It is essential NOT to use the parallel input connector when the serial interface is selected and vice-versa. In addition, the option switches on the serial interface must be correctly set, even during parallel operation (see later pages). Damage to the host system could otherwise result if drivers with active pull-ups are used.

Asychronous
150, 300, 600, 1200,
2400, 4800, 9600
(selectable by DIP-switch)
1 start bit
7 or 8 data bits
(selectable by DIP-switch)
1 parity bit, tested or not
(selectable by DIP-switch)
1 or more stop bits
(reception)
1 stop bit (transmission)

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Signal Polarity	
RS 232C/V24	MARK = Logic 1 (-3 to -27 V) SPACE = Logic 0 (+3 to +27 V)
Current Loop	MARK= Logic 1 (20 mA) SPACE = Logic 0 (0 mA)
Transmission	Hard or soft handshaking (selectable by switch)
	RS-232C/V24, RS-422/V11 or Current Loop (selectable by DIP-switch)
Buffer Memory	2K bytes fixed or floating up to 26 K bytes (selectable by DIP-switch on the main CPU board).

Possible asynchronous data formats

The data format consists of a START bit, 7 or 8 DATA bits, one or no PARITY bit (checked or not checked) and 1 or more STOP bits.

PRINTER INTERFACE CONNECTOR PIN-OUTS

RECEPTION

TRANSMISSION

START	DATA	PARITY	STOP	PARITY	STOP
BIT	BITS	BIT	BITS	BIT	BITS
1 1 1 1 1	7 7 7 8 8 8 8	NOT CHECKED EVEN ODD NOT PRESENT EVEN ODD	1 or more 1 or more 1 or more 1 or more 1 or more 1 or more 1 or more	NONE EVEN ODD NONE EVEN ODD	2 1 1 1 1 1

NO PARITY BIT PRESENT

START	DATA	PARITY	STOP	PARITY	STOP
BIT	BITS	BIT	BITS	BIT	BITS
1	8 8	EVEN ODD	1	EVEN ODD	1 1

Notes

7-bit data formats restrict the use of some ESCape code sequences.

At baud rates above 600 bauds the data rate of the serial interface may exceed the print rate of the printer. The host must then control the data transfer to the printer buffer using either a hardware or a software handshaking protocol (switch selectable).

RS-232C/V24 and RS-422/V11 (selectable by switches 2A7 and 2A8).

Two protocols are selectable by switch 3A8:
Hard handshaking: The interface signal Data terminal ready (DTR) exists on pin 20 of the serial interface connector; links on the printed circuit board allow DTR to be connected to pins 11 or 14. DTR is normally at logic 0 (approx + 12V), but it goes to logic 1 (approx -12V) when the buffer is 75 per cent full. DTR returns to logic 0 as soon as the buffer has 75 per cent of its character locations free again. The internal switches 2A2 and 2A3 allow the inversion of the DTR signal and its connection to pins 6 and 8 when necessary.

Soft handshaking: (selectable in two kind of modes by means of switch 3A6 and 3A7):

X-ON/X-OFF:

The printer transmits an ASCII DC3 (X-OFF) to the host to indicate when the buffer has 25 per cent of its character locations left and an ASCII DC1 character (X-ON) when more than 75 per cent of its character locations are free again.

ETX/ACK:

The printer replies to each ASCII ETX character received by an ASCII ACK character when the block of data has been transferred to the line buffer. Block size must not exceed 2048 characters for the 2K fixed buffer; for the floating buffer, 1024 times the number of K bytes added in the RAM zone (1, 2 or 3 additional RAMs of 2 or 8 K bytes).

Current loop (selected by switches 2A7 and 2A8)

Two protocols selected by switches S1 and 3A8:

Hard handshaking:

The signal Transmitted Data (TXD) goes to logic 1 (approx 20 mA) during initialisation and then returns to logic 0 (approx 0 mA) for operation.

TXD goes to logic 1 (approx 20 mA) when the buffer is 75 per cent full and returns to logic 0 (approx 0 mA) when more than 75 per cent of the character locations are free again.

Soft handshaking (selectable in two kinds of modes by means of switch 3A7): X-ON/X-OFF:

identical to description of RS-232C/V24 and RS-422/V11. ETX/ACK: identical to description of RS-232C/V24 and RS-422/V11.

Block diagrams

Current Loop:



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Block diagrams

RS-232C/V24, RS-422A/V11:

Soft handshaking:



Block diagrams

Hard handshaking:



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Serial interface connector

If the serial interface is fitted, then a 25-pin Cannon DB-25 type connector to the back panel of the printer provides the means for connecting the printer to a host system.

A choice of male or female connectors is now offered. The pinouts of the printer interface connector are shown below.



<u>RS-2</u>	32C/V24	CONNECTIONS		RS-422/V11	CONNECTIONS
PIN		SIGNAL	SOURCE	+ PIN	- PIN
1 2 3 4 6 7 20	(TXD) (RXD) (RTS) (DSR) (DTR)	Protective Screen Transmitted Data Received Data Request To Send Data Source Ready Signal Ground Data Terminal Ready	Printer Host Printer Host Printer	25 17 18 13	19 15 21 12
PIN		POSSIBLE CONNECTIONS			SUPPL IED
5 6 8 11 14		DIP-Switch 2A4 allows DIP-Switch 2A3 allows DIP-Switch 2A3 allows Jumper 11 allows conner Jumper 14 allows conner	connection of p connection of p connection of p ction of pin 11 ction of pin 14	in 5 to pin 4 in 6 to pin 2 in 8 to pin 2 to pin 20 to pin 20	OPEN (OFF) OPEN (OFF) OPEN (OFF) JUMPERED OPEN

CURRENT LOOP CONNECTIONS

PIN	PASSIVE	ACTIVE	SUPPL IED
16	TXD +	TXD - (return)	PASSIVE
24	TXD - (return)	•TXD +	(switch S2)
9	RXD +	RXD - (return)	PASSIVE
23	RXD - (return)	RXD +	(switch S3)

SERIAL BOARD

Reference HRE-2006A-M7 with Current Loop connectors Reference HRE-2006B-M0 without Current Loop connectors

PRINTER INTERFACE CONNECTOR PIN-OUTS



Switch 3A

Baud rate: Speed selection

150	Switch 3A	1 on	2 on	3 on
300	Switch 3A	1 off	2 on	3 on
600	Switch 3A	1 on	2 off	3 on
1200	Switch 3A	1 off	2 off	3 on
2400	Switch 3A	1 on	2 on	3 off
4800	Switch 3A	1 off	2 on	3 off
9600	Switch 3A	1 on	2 off	3 off
Spare	Switch 3A	1 off	2 off	3 off
Parity Bit Parity Bit	tested: NOT tested:	4 on 4 off		
Even parity: Odd parity:		5 on 5 off		
7 bits: 8 bits:		6 on 6 off		
Handshaking				

DTR Hard handshake	7 on	8 on
Soft ETX/ACK	7 on	8 off
Soft X-ON/X-OFF	7 off	8 off
RESERVED	7 off	8 on

3A switches must all be OFF when PARALLEL interface is selected.

Switch 2A

Reserved (except RS 422)	1 on
Current loop or V24/RS-232-C	2 on
V11/RS-422 (see 2A7 + 2A8)	2 off
Conn to Pin 20 (DCD conn. to DTR)	3 on
Pin 8 NC (DCD NOT connected to DTR)	3 off
Conn to Pin 20 (CTS connected to RTS)	4 on
Pin 6 NC (CTS NOT connected to RTS)	4 off
Series interface	5 on
Parallel interface	5 off
Series interface	6 on
Parallel interface	6 off
Current loop	7 on 7 off
V24/RS-232C	8 on 8 off

SWITCHES 7 AND 8 MUST NEVER BE ON TOGETHER. They must BOTH be OFF when V11/RS-422 is selected (2A1)

SWITCHES 5 and 6 must be OFF when PARALLEL INTERFACE is selected.

SWITCH S-1:

(MUST BE ON WHEN PARALLEL INTERFACE IS SELECTED)

- Hard Handshaking
- Soft Handshaking

SWITCH S-2:

(Only in Current Loop mode)

- Active Transmission
- Passive Transmission

SWITCH S-3: (Only in Current Loop mode)

- Active Transm.
- Passive Transm.

An INDEX, the FUNCTION CODE TABLE, will be found at the back of this manual.

NUL (0 decimal)

(Null) The NUL code effects the termination of the tabulation setting sequence.

Example:

LPRINT CHR\$(27); "D"; CHR\$(10); CHR\$(20); CHR\$(0) Horizontal tabulation at 10, 20, and stop of introduction vector by 00.

BEL (7 decimal)

(Bell) When the BEL code is executed, the buzzer sounds for 3 seconds.

BS (8 decimal)

(Backspace) The backspace is used to allow certain accented characters to be printed. To print an "â", for example, it is necessary for the host device to transmit the following sequence to the printer: LPRINT "a";CHR\$(8);" "" prints â

This code also allows the user to break some commands in order to print them and not to execute them.

Example:

In order to print ((1)), it is necessary to break the command sequence by putting in space/back space, thus: LPRINT "(";CHR\$(8);"(1))" prints ((1)).

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HT (9 decimal)

(Horizontal Tabulation) The execution of the HT code causes the next character input to be printed at the position of the next horizontal tab stop, viewed from left to right. If no tab stop sequence has been input since power-on, then the printer uses the default tab setting, which sets stops every 8 positions at power-on. If no data is to be printed after the HT code, then the tabulation is not executed. If data is to be printed after several consecutive HT codes, then these are executed in a single movement of the print-carriage. An attempt to tabulate to a non-existant tab stop results in a space.

Example:

10 LPRINT CHR\$(27);"D";CHR\$(10);CHR\$(20);CHR\$(30);CHR\$(0) 20 LPRINT CHR\$(9);"T";CHR\$(9);"A";CHR\$(9);"B"

Setting of tab stops at 10, 20, 30 and execution by HT.

Т

A B

LF (10 decimal)

(Line Feed) Each LF code received by the printer causes all data in the line buffer to be printed and the paper to be moved up one line. A series of LF's transmitted consecutively is executed in a single movement at the vertical tab speed. Text following an LF is printed on the next line. If the option "LF + CR" is selected, the horizontal position counter will be reset to zero so printing of the next line will start at the left margin. If the option "LF" is selected, the position counter will not be reset to zero, so printing of the next line will start immediately below the end of the preceding line. Example:

10 LPRINT "LINE 1";CHR\$(10); 20 LPRINT "LINE 2"

LINE 1 LINE 2

If no data precedes the LF code, or if all the preceding data is SPACE or HT codes, then no print-carriage movement occurs. Line spacing at switch-on is 6 lines per inch. The line spacing may be modified as desired by means of control codes ESC 0, ESC 1, ESC 2 or ESC A.

VT (11 decimal)

(Vertical Tabulation) When a VT code is received, all the data in the print buffer is printed and the paper is moved up to the next vertical tab position defined by ESC B. If, since power-on, no tab stop sequence has been input, then the printer uses the default tab setting, which sets stops every 8 lines at power-on. If the option "LF + CR" is selected, the horizontal position counter will be reset to zero so printing of the next line will start at the left margin. If the option "LF" is selected, the position counter will not be reset to zero, so printing of the next line will start immediately below the end of the preceding line.

Example:

10 LPRINT CHR\$(27); "B"; CHR\$(1); CHR\$(3); CHR\$(6); CHR\$(0) 20 LPRINT CHR\$(11); "T"; CHR\$(11); "A"; CHR\$(11); "B" T A

В

Since the CR + LF option has not been selected, printing of the following line starts immediately below the end of the preceding line.

FF (12 decimal)

(Form Feed) When an FF code is received, all the data in the print buffer is printed and the paper is moved up to the next predetermined top of form position. The top of form is the position of the paper at power-on, or set by means of control codes ESC C n, ESC 5, Reset or paper movement selected from the front panel. FF is true for ALL the paper-handling devices that can be fitted. The position counter is reset to zero and printing of the next line will start at the left margin. When a sheet-feeder is fitted and selected, an FF code will cause ejection of the page present in the printer and introduction of a new page from the same bin.

The position of the paper at power-on is considered to be the initial top of form setting. This position may be altered when the machine is not ON LINE by means of the front panel switches; it may also be set by means of control code ESC 5. The form (or page) length setting determines the distance that the paper advances to the top of form position. Form length is set at power-on by the position of the option switches A5 and A7. It may also be changed at any time by means of the ESC C n control code sequence.

CR (13 decimal)

(Carriage Return) When a CR code is received, all data stored in the line buffer is printed. The horizontal position counter is reset to zero so that the printing of the next line will start at the left margin. If no data precedes the CR code, or if all the preceding data is SPACE or HT codes, then no print-carriage movement occurs. If the option "CR + LF" is selected, the paper will advance one line after printing. If the option "CR" is selected, no paper movement will occur after printing and it is necessary to transmit an LF code each time to advance the paper.

Example:

10 LPRINT '' 1 1 1 1";CHR\$(13) 20 LPRINT '' 2 2 2 2" 30 LPRINT '' 1 1 1 1"

12121212

1111

SO or ESC SO (14 decimal)

(Start Title Printing) All characters following this code on the same line will be printed as enlarged (double-width) characters. This command is cancelled by the input of the DC4 code or by CR. It can be input at any position so that normal and enlarged characters can be mixed in the same line. Condensed, title and doubleheight modes may be selected together if required, in Data as well as in WP Quality. (See ESC W n).

Example:

10 LPRINT ''STANDARD PRINTING'' 20 LPRINT CHR\$(27);CHR\$(14); 30 LPRINT ''TITLE'';CHR\$(20) 40 LPRINT ''BACK TO NORMAL MODE''

STANDARD PRINTING T I T L E BACK TO NORMAL MODE

SI (15 decimal)

(Start Condensed Printing) When the SI code is input, all following characters will be printed as condensed characters. This code is cancelled by the input of the DC2 code. It can be input at any position so that normal and condensed characters can be mixed in the same line. Condensed, title and double-height modes may be selected together if required, in Data as well as in WP Quality.

Example:

10 LPRINT ''STANDARD PRINTOUT'' 20 LPRINT CHR\$(15); 30 LPRINT ''CONDENSED PRINTOUT'';CHR\$(18) 40 LPRINT ''BACK TO NORMAL MODE''

STANDARD PRINTOUT CONDENSED PRINTOUT BACK TO NORMAL MODE

DC1 (17 decimal)

(Select printer) The DC1 code places the printer in the selected state, after it has been deselected by DC3 or by ON LINE. It enables the printer to receive data. In this state, the paper movement keys on the printer front panel are inactive.

DC2 (18 decimal)

(Stop Condensed Printing) The DC2 code cancels the condensed character printing mode. (See also SI).

DC3 (19 decimal)

(Deselect Printer) The DC3 mode places the printer in the deselected state. In this state, the paper movement keys on the printer front panel are active. When the printer is thus deselected, it can only be selected by pressing the ON LINE key or by receiving a DC1 code. Data received after a DC3 is not executed by the printer; only the DC1 command is activated.

DC4 (20 decimal)

(Stop Title Printing) The DC4 code cancels the title printing mode. (See also SO).

CAN (25 decimal)

(Cancel Segment Buffer) The characters preceding this code are cancelled.

Example:

10 LPRINT ''1 1 1 1 1 1'' 20 LPRINT CHR\$(25);''2 2 2 2 2''

22222

DEL (127 decimal)

(Delete Segment Buffer) This code causes the segment buffer to be cleared. "Segment" designates alphanumerical string delimited by function codes (may be less than one line).

ESC SOH (1 dot space = 1/60'' - 27 and 1 decimal) **ESC STX** (2 dot space = 1/30'' - 27 and 2 decimal) **ESC ETX** (3 dot space = 1/20'' - 27 and 3 decimal) **ESC EDT** (4 dot space = 1/15'' - 27 and 4 decimal) **ESC ENQ** (5 dot space = 1/12'' - 27 and 5 decimal) **ESC ACK** (6 dot space = 1/10'') These are micro-spaces whose widths are multiples of 1/60 inch which is equal to the horizontal dot spacing on data characters. They are used for producing variable width spaces from 1/60 inch to 1/10 inch (6/60 inch) as required for the justification of the right margin of a text under the control of the host system.

Example:

10 LPRINT ''S'';CHR\$(27);CHR\$(2);''P'';CHR\$(27); 20 LPRINT CHR\$(3);''A'';CHR\$(27);CHR\$(4);''C''; 30 LPRINT CHR\$(27);CHR\$(5);''E'';CHR\$(27); 40 LPRINT CHR\$(6);''S'' S P A C E S

see also ESC 7 n

ESC LF (27 and 10 decimal)

(Full reverse line feed) Reception of an ESC LF code sequence causes all data in the line buffer to be printed and the paper to be moved down one line. Text following an ESC LF is thus printed on line ABOVE the preceding text. The horizontal position counter is not reset to zero so printing of the new line will start immediately above the end of the preceding line unless a CR is input. The option "LF + CR"/"LF" does not modify this function.

A series of ESC LF's transmitted consecutively is executed in a single movement at the vertical tab speed. If no data precedes the ESC LF code, or if all the preceding data is SPACE or HT codes, then no print-head movement occurs.

Use of this function, or an SF, with fan-fold paper in single-traction mode can cause paper problems. (See PAPER HANDLING DEVICES section)

Example:

10 LPRINT ''1 1 1 1 1'' 20 LPRINT CHR\$(27);CHR\$(10); 30 LPRINT ''2 2 2 2 2 2''

2 2 2 2 2 1 1 1 1 1

ESC SO (27 and 14 decimal)

(Start Title Printing) See S0 and ESC W n.

ESC SI (27 and 15 decimal)

(Stop Title Printing) Cancels the title printing mode. See DC4 and ESC W n.

ESC NAK (27 and 21 decimal)

(Select Unidirectional Printing Mode) Useful for obtaining perfect vertical alignment with graphics characters that touch vertically.

ESC SYN (27 and 22 decimal)

(Clears Unidirectional Printing Mode) Allows to return to automatic bidirectional printing (state by default).

ESC FS (27 and 28 decimal)

(Half Forward Line Feed) Reception of an ESC FS code sequence causes all data in the line buffer to be printed and the paper to be moved up one half line feed. Text following an ESC FS is thus printed as a SUB-SCRIPT to the preceding text. The horizontal position counter is not reset to zero, so printing of the new line will start immediately after the end of the preceding line unless a CR is input. The option "LF + CR"/"LF" does not modify this function.

Example:

10 LPRINT ''1 1 1 1 1 1'' 20 LPRINT CHR\$(27);CHR\$(28); 30 LPRINT ''2 2 2 2 2 2''

1111122222

ESC RS (27 and 30 decimal)

(Half Reverse Line Feed) Reception of an ESC RS code sequence causes all data in the line buffer to be printed and the paper to be moved down one half line feed. Text following an ESC RS in thus printed as a SUPER-SCRIPT to the preceding text.

The horizontal position counter is not reset to zero so printing of the new line will start immediately after the end of the preceding line unless a CR is input. The option "LF + CR"/"LF" does not modify this function.

Example:

10 LPRINT ''1 1 1 1 1'' 20 LPRINT CHR\$(27),CHR\$(30); 30 LPRINT ''2 2 2 2 2 2''

1 1 1 1 1 1 2 2 2 2 2

ESC ! n (27, 33 and n decimal)

(Select Colour) This code allows the selection of colours. Characters that follow this code are printed in the colour defined by n. n may be input in ASCII or HEXADECIMAL. 12 colours + black are possible. (n = 00 to 0C, see SELECTION OF COLOURS section.)

ESC - n (27, 45 and n decimal)

(Select Underline) When n = 0: stop underline. This code cancels the underlining function set by ESC-1. See also ESC V. When n = 1: start underline. Receipt of an ESC-1 code causes all following characters to be underlined until the ESC-0 is sent (Epson compatible). See also ESC U.

Example:

10 LPRINT CHR\$(27);"-1"; 20 LPRINT "UNDERSCORE MODE ON" 30 LPRINT CHR\$(27);"-0"; 40 LPRINT "UNDERSCORE MODE OFF"

UNDERSCORE MODE ON UNDERSCORE MODE OFF

ESC / n (27, 47 and n decimal)

(Set Bit-map Horizontal Definition) n is a 2 figure hexadecimal number in the range 03 to 08; it represents the horizontal dotcolumn spacing (expressed in n/360ths of an inch) in single density bit-map mode. In double density bit-map mode, dot-column spacing is half that set for single density bit-map mode. (See BIT IMAGE MODE section).

ESC 0 (27 and 48 decimal)

(Set 8 LPI Line Spacing).

Example:

5 LPRINT "LINE SPACING SET TO : 8LPI" 10 LPRINT CHR\$(27);"0"; 30 LPRINT "LINE 1" 40 LPRINT "LINE 2" LINE SPACING SET TO : 8 LPI

LINE 1 LINE 2

ESC 1 (27 and 49 decimal)

(Set 7/72 inch Line Spacing). This Line Feed is usually used for bit-image printing with 7 needles. (See BIT IMAGE MODE section.)

Example:

5 LPRINT "LINE SPACING SET TO : 7/72" 10 LPRINT CHR\$(27);"1"; 30 LPRINT "LINE 1" 40 LPRINT "LINE 2" LINE SPACING SET TO : 7/72

FINE 5

ESC 2 (27 and 50 decimal)

(Set 6 LPI Line Spacing) Input of codes ESC 0, ESC 1, ESC 2 and ESC A n modifies the subsequent Line Spacing. At power-on, line spacing is automatically set to 6 LPI.

ESC 2 is selected by switch B8:

If B8 is ON: direct selection of 6 LPI line spacing.

If B8 is OFF: validation of the line spacing value defined by ESC A n. (See ESC A n).

Example:

5 LPRINT "LINE SPACING SET TO : 6LPI" 10 LPRINT CHR\$(27);"2"; 30 LPRINT "LINE 1" 40 LPRINT "LINE 2" LINE SPACING SET TO : 6 LPI

LINE SPACING SET TO : 6LPI LINE 1 LINE 2

ESC 3 n (27, 51 and n decimal)

(Set Line Spacing) The ESC 3 n code sequence allows line spacings in n/144ths or n/216ths of an inch to be selected, depending upon the position of internal switch B7 (must be input in HEX-ADECIMAL values).

If B7 is ON: line spacing in n/216 inch.

If B7 is OFF: line spacing in n/144 inch.

Example:

10 LPRINT CHR\$(27);"3";CHR\$(10); 20 LPRINT "LINE SPACING SET TO 10/144"" 30 LPRINT CHR\$(27);"3";CHR\$(20); 40 LPRINT "LINE SPACING SET TO 20/144"" 50 LPRINT CHR\$(27);"3";CHR\$(30); 60 LPRINT "LINE SPACING SET TO 30/144"" 70 LPRINT "TEXT"

LINE SPACING SET TO 28/144 LINE SPACING SET TO 30/144 TEXT

86

ESC 5 (27 and 53 decimal)

(Set Top Of Form) Causes the current paper position to be considered as the top of form (line 1).

ESC 7 n (27, 55 and n decimal)

(Set n micro-spaces in 1/120 inch) DO NOT SEND this code several times if n = 1. ESC S0 to ESC ACK allow the input of micro-spaces of 1/60 inch.

ESC 8 (27 and 56 decimal)

(Inhibit Deselection after PAPER EMPTY Detection) The ESC 8 code makes it possible to transmit data even if there is no paper in the printer. It must be received by the printer before deselection and inhibits deselection of the printer upon the detection of PAPER EMPTY. The PAPER EMPTY interface signal is not modified by the ESC 8 code so that to avoid printing on the empty platen, it is necessary for the system to ensure printing stops at the end of the page once the PAPER EMPTY condition is detected.

ESC 9 (27 and 57 decimal)

(Set right Margin) See Bit-Image Mode.

ESC : (27 and 58 decimal)

(Align Printing on Left Margin) Normal (default) mode.

ESC ; (27 and 59 decimal)

(Set left Margin) See Bit-Image Mode.

ESC ? (27 and 63 decimal)

(Enable Deselection after PAPER EMPTY Detection) This command cancels ESC 8 condition; printer is deselected.

ESC > (27 and 62 decimal)

(Align Printing on Right Margin)

ESC = E n m (27, 61 and 69 decimal)

(ESC command conversion) This code sequence enables the creation of a new adapted command table. It is most valuable when the printer is operating with a system where the program consists of command codes that are either unknown or not able to be executed. It therefore allows the command table to emulate other printers.

n = received code

m = code to execute

n and m must be input in DECIMAL values from 00 to 254.

The ESC = E nmnm...m sequence may contain several pairs, up to a maximum of 512 bytes. It must always be terminated by a pair where the same end is repeated.

Example: ESC = n m mm.

The conversion buffer may be deleted with either ESC = E nn where n may be given any DECIMAL value between 00 AND 254, or by maintaining the ON LINE key pressed for 3 seconds (the printer will beep twice), then, while maintaining the 4 left keys pressed, press the ON LINE key. The printer will beep once and return to the initial ESC command table.

At the end of self test 1, the new ESC command conversion table is printed. At the end of self test 0, the printer will beep once when at least one ESC code conversion has been introduced.

Example:

In the case of a system using ESC U for Double Height and unable to modify it, simply introduce a conversion table at the beginning of a program, so that, at each code ESC U received, the printer will execute its proper command for Double Height, that is ESC G. Therefore, at reception of an ESC U command, the printer will print in Double Height by converting ESC U into ESC G.

Example:

10 REM "THIS PROGRAM CHANGES FIRST THE" 20 REM "FUNCTIONALITY OF <ESCAPE > U TO" 30 REM "SWITCH DOUBLE HEIGHT ON"" 40 REM "THEN IT BRINGS <ESCAPE > U BACK" 50 REM "TO ITS NORMAL FUNCTION:" 60 REM "UNDERSCORE MODE ON"" 70 LPRINT CHR\$(27);"=EUGGG";CHR\$(27);"U"; 80 LPRINT "<ESC > U = DOUBLE HEIGHT ON" 90 LPRINT CHR\$(27);"=EUU";CHR\$(27);"U"; 100 LPRINT "<ESC > U = UNDERSCORE MODE ON" 110 END

< ESC> U = DOUBLE HEIGHT ON < ESC> U = UNDERSCORE MODE ON

ESC = P n (27, 61, 80 decimal) where:

n = 0 Paper speed 11 inch/second 1 Paper speed 18 inch/second

Remark: The default value is ESC = P 1, or 18 inch/sec., except for SF BDT when default value is ESC = P 0, or 11 inch/sec. Further, it should be noted that the command ESC = P n is not active in SF BDT mode.

ESC = S II hh m (27, 61 and 83 decimal)

(Set-Up Command) Where:

- II = Low byte for the "m" length
- hh = High byte for the "m" length
- m = Set-up parameter (254 bytes maximum) May contain text as well as commands.

This command enables the modification of some parameters set up by default. Such parameters (text or execution command) will then be performed at each power-on or reset.

At the end of self test 1, the parameters input are printed.

At the end of self test 0, the printer will beep twice to signal presence of previously introduced parameters.

The original values, peculiar to the printer, defined by internal switches, may be recovered either through initialisation of the set-up buffer by II + hh = 0 or through the front panel keys (see FRONT PANEL SET-UP section).

The printer is set up to work by default with continuous paper handling devices (tractor or roll holder). The use of a sheet-feeder always requires sending of the ((1)) or ((2)) commands (bin 1 or 2). This may be corrected by creating a set-up such as:

10 LPRINT CHR\$(27);"=S"; 20 LPRINT CHR\$(05);CHR\$(0);"((1))"

The ((1)) command consists of 5 characters where hh = 00 and II = 05 (05 DECIMAL = 05 HEXADECIMAL). At each power-on or initialisation, the printer will directly select bin 1 of the sheet feeder installed.

ESC € (27 and 64 decimal)

(Reset Printer) Resets printer to the default conditions without clearing the input or line buffers. (Also reads conversion table).

ESC A n (27, 65 and n decimal)

(Set Line Spacing) If DIP-switch B8 is ON, the ESC A n code sequence allows a line spacing in n/72 inch. n must be introduced in HEXADECIMAL value between 00 and FF. Thus to obtain 8 LPI, a value of n = 09 (HEXADECIMAL) must be input, since 9/72 inch = 1/8 inch.

This code sequence may be entered at any position in a line; once it is entered the specified line spacing will remain set until a code sequence for a new line spacing is sent. At power-on, a line spacing of 6 LPI is set automatically.

If DIP-switch B8 is OFF, the ESC A n sequence allows preselection of line spacing, which is validated by an ESC 2 code sequence introduced for compatibility with LOTUS 1-2-3 Software (Trademark) for example.

Example:

10 REM "SWITCH B8 IS ON." 15 REM "THIS PROGRAM SETS" 20 REM "LINE SPACING TO: 9/72"" 30 LPINT CHR\$(27);"A";CHR\$(9); 40 LPRINT "LINE 1 ";CHR\$(10);"LINE 2";

LINE 1

LINE 2

10 REM "SWITCH B8 IS OFF." 15 REM "THIS PROGRAM SETS" 20 REM "LINE SPACING TO: 16/72"" 30 LPRINT CHR\$(27);"A";CHR\$(16); 35 LPRINT CHR\$(27);"2"; 40 LPRINT "LINE 1 ";CHR\$(10);"LINE 2"

LINE 1

LINE 2

ESC B n... 00 (27, 66, n...0 decimal)

(Set Vertical Tab Stops). This code specifies the vertical tab stop position (in number of lines). Only the first 20 tab stops per page are recognised. A tab stop set at a line exceeding the current form length is not accessible. Tab stops must be set in ascending order, their value is absolute and it is always the 2 figure hexadecimal value of the number of lines from the top of the page at the line spacing that is valid at the moment that the ESC B code sequence is input. Subsequent modification of the line spacing by an ESC A code sequence does not modify the position of the vertical tab stops.

This sequence may be terminated either by 00 or by repeating the last tab stop (compatibility with systems that do not allow the input of 00 to terminate a command).

At power-on, default tab stops are set every 8 lines at 6 LPI up to the default form length set by the option switches A6 and A7.

ESC C n (27, 67 and n decimal)

(Set Form Height in LINES) The ESC C n code sequence specifies the form height which is indicated by n. n corresponds to the number of lines contained in the page height and is input in HEXADECIMAL value from 01 to FF (between 1 and 255 lines). If no value for line spacing has been input, then a default setting of 6 LPI is assumed. As long as no ESC C n code sequence is input, then the default setting given by the option switches A6 and A7 is used (48, 51, 66 or 72 lines at 6 LPI). The paper position at the moment that the ESC C n code sequence is input is considered to be the Top-of-Form. This position may be modified by the front panel keys or by an ESC 5 code.

ESC C 00 n (27, 67, 0 and n decimal)

(Set Form Height in Inches.) If the byte which follows ESC C is 00, then the following byte is considered to be the form height in inches, indicated as a 2-figure Hexadecimal number. Possible page lengths are from 1 to 22 inches.

ESC D n ... 00 (27, 68, n..., 0 decimal)

(Set Horizontal Tab Stops.) This code specifies the horizontal tab stop positions. The first 20 stops per line are recognised. Tab stops must be set in ascending order, their value is absolute, and is always the 2-figure Hexadecimal value of the print position when operating at 10 CPI, so that the range of tab stop positions is from 1 to 132 decimal (01 to 84). Modification of the horizontal spacing does NOT modify the position of the horizontal tab stops. Thus if the character spacing has to be altered to compress information horizontally to fit a table, for example, it is not necessary to redefine the horizontal tab stops.

This sequence may be terminated either by 00 or by repeating the last tab stop (compatibility with systems that do not allow the input of 00 to terminate a command).

ESC E (27 and 69 decimal)

(Start Emphasized Printing). The ESC E code causes the printer to print emphasized characters. Emphasized printing gives the character a stronger impression on the paper by a second passage of the print-head. This code can be input in any column aposition on a line and is cancelled at reception of the ESC F code.

Example:

10 LPRINT ''NORMAL MODE '' 20 LPRINT CHR\$(27);''E''; 30 LPRINT ''EMPHASIZED PRINTOUT !'' 40 LPRINT CHR\$(27);''FBACK TO NORMAL MODE

NORMAL MODE EMPHASIZED PRINTOUT ! BACK TO NORMAL MODE

ESC F (27 and 70 decimal)

(Stop Emphasized Printing) The ESC F code cancels the emphasized printing mode. This code can be at any position on a line.

ESC G (27 and 71 decimal)

(Start Double Height Printing) All characters following this code on the same line will be printed in double height. This command is cancelled by a CR. One line must be left free before using this command since printing first starts with an automatic reverse line feed (8/72 inch) to print the top of the characters, then a line feed to print the lower part of the characters. The paper will then be positioned again on the line where it was when the ESC G command was set. Title and condensed modes may be combined with double height printing, in Data as well as WP Quality.

The ESC G code sequence must be transmitted at the beginning of the line and will automatically terminate at its end. See ESC h n.

Example:

10 LPRINT "NORMAL PRINTING MODE" 20 LPRINT:LPRINT CHR\$(27);"G"; 30 LPRINT "DOUBLE HEIGHT MODE ON ."

NORMAL PRINTING MODE DOUBLE HEIGHT MODE ON

ESC I n (27, 73 and n decimal)

(Print Bar Code) Bar code printing is an option (EPROM AE-82000). Please refer to BAR CODE OPTION section for more details.

ESC I * X Y Y * (27, 75 ... decimal)

(Select Bar code print mode) Please refer to BAR CODE OPTION section for more details.

ESC N n (27, 78 and n decimal)

(Set Skip-Over Height). This code sequence sets the height of the skip-over zone at the end of each page. n corresponds to the number of lines to skip at the current line spacing valid at the time of setting. n must be introduced in HEXADECIMAL value. If an LF, VT or other paper movement code causes the current print line to fall in the skip-over zone, then an FF (Form-Feed) is automatically executed to bring the paper to line 1 on the next page. A fixed skip-over height of 1 inch can be set by internal switch B6.

ESC O (27 and 79 decimal)

(Clear Skip-Over) This code clears the skip-over height set by an ESC N n code sequence or by the internal switch B6.

ESC Q n (27, 81 and n decimal)

(Set line Length) This code sequence allows a line length in the range 5 to 132 decimal (05 to 84 HEXADECIMAL) to be selected. The line length fixes the effective position of the right margin (for left margin setting, see ESC I). Characters overflowing beyond this right margin setting are printed on the next line. When a sheet-feeder is fitted, the printhead is used to guide the sheet.

The position to which the print-head moves for this is: Middle of the platen for manufacturer's sheet feeders SF-31(E) and SF-32(E).

Middle of the line defined by ESC Q n and ESC I n for sheet feeders ASF 541 and ASF 580.

Example:

10 REM "SET LINE LENGTH TO 10 CHARACTERS 20 LPRINT CHR\$(27);"Q";CHR\$(10); 30 LPRINT "LINE LENGTH IS 10 COLUMNS"

LINE LENGT H IS 10 CO LUMNS

ESC R n (27, 82 and n decimal)

(Select national character set.) When the ESC R n code sequence is input, all data that follows will be printed in the national character set specified by n. It will be valid until changed by another ESC R n code sequence or by reset. A default value is set at power-on, determined by the position of internal switches A1, A2, A3 and A4. n may be introduced as a 2-digit HEXADECIMAL number or as 2 ASCII codes. For specific code tables and character fonts, see the NATIONAL CHARACTER CODE TABLES.

Example:

Ŋ

```
10 LPRINT CHR$(27);"R";CHR$(0);
20 LPRINT "NORMAL CHARACTERS (US ASCII):
30 LPRINT "# $ @ [ \ ] ^ - ` { | } ~ "
40 LPRINT CHR$(27);"R";CHR$(11);
50 LPRINT "SWISS NATIONAL VARIANTS :"
60 LPRINT "# $ @ [ \ ] ^ - ` { | } ~ "
70 LPRINT CHR$(27);"R";CHR$(14);
80 LPRINT "SPANISH NATIONAL VARIANTS :
90 LPRINT "# $ @ [ \ ] ^ - ` { | } ~ "
```

NORMAL CHARACTERS (US ASCII) # \$ @ [\] ^ - ` { ¦ } ~ SWISS NATIONAL VARIANTS : # \$ ^ à ç è é - ` ä ö ü £ SPANISH NATIONAL VARIANTS : £ \$ & ; N ¿ ^ - ` º ñ ç ~

ESC R FD n m...00 (27, 82, 253, ... decimal)

(Move Characters in ASCII Table) This escape code sequence is used to construct a custom code table, by the displacement of one or more characters in the basic ASCII table (see ASCII tables, CHARACTER GENERATORS section). n and m are the destination and source addresses, they must be introduced in HEXADECI-MAL.

n = the destination address of characters from 21 to 7E (HEX-ADECIMAL).

m = the source address of characters to move from 21 to 9F (HEXADECIMAL).

The ESC R FD code sequence may contain one or several n m groups; in all cases it must be terminated by a NUL character (00).

Example:

10 LPRINT CHR\$(27); "R"; CHR\$(253); CHR\$(31); CHR\$(32); 20 LPRINT CHR\$(0); "1 1 1 1 1 1 1 1'' 30 LPRINT CHR\$(27); "R"; CHR\$(253); CHR\$(31); CHR\$(31); 40 LPRINT CHR\$(0); "1 1 1 1 1 1 1 1''

22222 11111

Character 1 set by default at the HEXADECIMAL address 31 has been replaced by character 2 set at HEXADECIMAL address 32.

ESC S n (27, 83 and n decimal)

(Select Paper Handling Device) Various paper handling devices may be used with the printer. The ESC S n code sequence allows the specific device and its firmware routines to be selected. "n" must be introduced in HEXADECIMAL (00 to FF). When necessary, each selected device will automatically command the displacement of the first print position according to the paper format (verticalor horizontal) and to the position of the internal switch A7 (EUR or US). See PAPER HANDLING section.

ESC S 00 or ((0)): Select tractor and roll-holder ESC S 01 or ((1)): Select bin 1 of sheet-feeders ESC S 02 or ((2)): Select bin 2 of sheet-feeders ESC S 03 or ((3)): Select envelope bin of sheet -feeders ESC S 04 or ((4)): Select manual insertion for sheet-feeders ESC S 07 or ((7)): Select single document insertion At reception of the above immediate selection commands, the printer will eject any sheet present before passing to the chosen device. The selection commands of these devices will automatically cause, when necessary, the displacement of the first print position. Such displacement depends on the type of device, on the paper format and on the position of the internal switches A6 and A7.

ESC S 0A or ((A)): Preselect bin 1 of sheet feeders

ESC S 0B or ((B)): Preselect bin 2 of sheet feeders

ESC S 0C or ((C)): Preselect envelope bin of sheet feeders

ESC S 0D or ((D)): Preselect manual insertion for sheet feeders

Preselection is identical to selection except that there is NO automatic ejection of any sheet present and NO automatic loading from the selected bin. These sheet movements will be executed by the next FF command, the next ((Y)) command or by arrival in the skip-over zone. See also PAPER HANDLING section.

ESC T n (27, 84 and n decimal)

(Select character sets) When the ESC T n command is sent, all following data will be printed with the font determined by n, n may be introduced in HEXADECIMAL or ASCII from 10 to 9F values (except 3x reserved for ASCII values).

n = xy where: x = 1 =

- 1 = WPQ STD
 - 2 = DATA STD
 - 4 = High Res Graphic
 - 5 = Low Res Graphic
 - 6 = WP Teletex
 - 7 = DATA Teletex
 - 8 = WPQ Extended
 - 9 = DATA Extended

y = Physical position of the generator in the EPROM or RAM zone (0 to 9 = position number in EPROM zone, A to F = position number in RAM zone).

Following standard character generators are resident:

SET	TYPE AND QUALITY	SELECT. CODE
DATA 10	1st standard Data font	ESC T 20
DATA 12	2nd standard Data font	ESC T 21
GOTHIC 10	1st WPQ font	ESC T 60
MICRO 10	2nd WPQ font	ESC T 61

Example:

```
10 LPRINT CHR$(27);"T60";
20 LPRINT "FIRST WPQ FONT: GOTHIC 10"
30 LPRINT CHR$(27);"T61";
40 LPRINT "SECOND WPQ FONT: MICRO 12
50 LPRINT CHR$(27);"T20";
60 LPRINT "FIRST DATA FONT: DATA 10"
70 LPRINT CHR$(27);"T21";
80 LPRINT "SECOND DATA FONT: DATA 12"
```

FIRST WPQ FONT : GOTHIC 10

SECOND WPQ FONT : MICRO 12

FIRST DATA FONT : DATA 10

SECOND DATA FONT : DATA 12

ESC T FD n (27, 84, 253 and n decimal)

(Down-Line Loading of Character Generators). Please refer to CHARACTER GENERATORS section for complete description of this command.

ESC T FE n (27, 84, 254 and n decimal)

(Selection of Down-Line Loading Generators) The selection of a character generator previously loaded in the RAM zone of the printer will be effected no matter what its quality (standard, graphics,...) and type (DATA or WPQ) are.

n corresponds to the position number (used in the ESC T F D... command for DLL) of the loaded generator in the RAM zone. n must be introduced in HEXADECIMAL value (01 to 08).

Example:

10 LPRINT CHR\$(27);"T10"; 20 LPRINT "DOWN-LOADED FONT SELECTION"; 30 LPRINT CHR\$(27);"T";CHR\$(254);CHR\$(1); 40 LPRINT "E I A S R T H M N"

DOWN-LOADED FONT SELECTION

ESC U (27 and 85 decimal)

(Start Underline) Receipt of an ESC U code causes all following characters to be underlined. Underlining is accomplished by driving needle 18 to create a continuous, unbroken line. If descenders are partly formed by the 18th needle, they may touch the underline. Underlining terminated only at reception of the ESC V command. This command has been retained for compatibility reasons; for new developments, it is preferable to use the ESC - n command, which see.

Example:

10 LPRINT CHR\$(27);"U"; 20 LPRINT "UNDERSCORE MODE ON" 30 LPRINT CHR\$(27);"V"; 40 LPRINT "UNDERSCORE MODE OFF"

UNDERSCORE MODE ON UNDERSCORE MODE OFF

ESC V (27 and 86 decimal)

(Stop Underline) Terminates underlining selected by ESC U. Underlining is terminated by the reception of this code anywhere in the line.

See also ESC - n.

ESC W n (27, 87 and n decimal)

(Title Printing) When n = 0: stop Title Printing. This command only cancels Title printing selected by ESC W 1.

When n = 1: start Title Printing. This command allows printing in title mode until the ESC W 0 only is received. Both DC4 and CR have no effect on this code. Title Printing may be combined with double height and condensed modes.

This command has been introduced for EPSON compatibility. See ESC S0.

n may be introduced in odd/even ASCII or HEXADECIMAL values.

Example:

10 LPRINT CHR\$(27);"W";CHR\$(1); 20 LPRINT "TITLE MODE ON" 30 LPRINT CHR\$(27);"W";CHR\$(0); 40 LPRINT "TITLE MODE OFF"

TITLE MODE ON TITLE MODE OFF

ESC [n h (27, 91, ... and 104 decimal)

(Set Graphic Resolution) See Bit-Image Mode.

ESC Y or ((Y)) (27 and 89 decimal)

(Insert Sheet) Eject any sheet present and insert new sheet from device already selected.

ESC Z or ((Z)) (27 and 90 decimal)

(Eject Sheet) Eject sheet present only. Avoids leaving sheet curved around platen at end of job or when job is interrupted.

ESC [N, N₂ N₃ (27, 91, -, -, -, and 96 decimal)

(Set Logical Print Position) See Bit-Image Mode.
ESC [P₁ P₂ I (27, 91, -, -, and 108 decimal)

(Reset Bit-Map Mode) See Bit-Image Mode.

ESC [3 g (27, 91, 51 and 103 decimal)

(Set Default Margins) See Bit-Image Mode.

ESC [n b (27, 91, ... and 98 decimal)

(Repeat Bit-Map Information) See Bit-Image Mode.

ESC f n (27, 102 and n decimal)

(Select Super or Subscript mode) When n = 0: start superscript printing mode. At reception of an ESC f 0 code, all subsequent characters will be printed as superscripts until an ESC g code is sent.

When n = 1: start subscript printing mode. At reception of an ESC f 1 code, all subsequent characters will be printed as subscripts until an ESC g code is sent.

SUPER and SUBSCRIPT MODE PRINTING ARE POSSIBLE ONLY IN DATA.

n may be introduced in odd/even ASCII or HEXADECIMAL values.

Example:

5 LPRINT CHR\$(27);"T20"; 10 LPRINT "NORMAL PRINTOUT"; 20 LPRINT CHR\$(27);"f";CHR\$(0); 30 LPRINT "SUPERSCRIPT" 40 LPRINT CHR\$(27);"g"; 50 LPRINT "NORMAL PRINTOUT"; 60 LPRINT CHR\$(27);"f";CHR\$(1); 70 LPRINT "SUBSCRIPT" 80 LPRINT CHR\$(27);"g";

NORMAL PRINTOUT SUPERSCRIPT NORMAL PRINTOUT SUBSCRIPT

Remarks:

The commands ESC f n and ESC g have been introduced in this manner so that they can be modified, if necessary, for the ESCape command tables for EPSON and IBM emulations.

Example:

10 LPRINT CHR(27);"=ESffSTggTxx" enables the commands ESC S and ESC T to be executed as commands ESC f and ESC g. Note, however, that the previous commands ESC S for paper devices and ESC T for character generators become in this case ESC f for paper devices and ESC g for character generator selection, because the above example has inverted the commands.

ESC c (27 and 99 decimal)

(Return to Initial State-RIS) See Bit-Image Mode.

ESC g (27 and 103 decimal)

(Stop printing in Super or Subscript mode) Superscript or subscript printing modes are cancelled when this command code is sent.

ESC h n (27, 104 and n decimal)

(Select Double Height printing) When n = 0: stop double height printing. This sequence code only cancels double height printing enabled by ESC h 1.

When n = 1: start double height printing. This sequence code commands double height printing. The printing mode is not terminated at the end of a line, but only when an ESC h 0 is sent. See also ESC G.

n may be introduced in odd/even ASCII or HEXADECIMAL values.

Example:

10 LPRINT CHR\$(27);"h";CHR\$(1); 20 LPRINT "DOUBLE HEIGHT MODE ON" 30 LPRINT CHR\$(27);"h";CHR\$(0); 40 LPRINT "DOUBLE HEIGHT MODE OFF"

DOUBLE HEIGHT MODE ON

DOUBLE HEIGHT MODE OFF

ESC I n (27, 108 and n decimal)

(Set Left Margin) This code sequence allows the left margin to be set anywhere in the range 1 to 127 decimal (01 to 7F HEXADECI-MAL). n indicates the position of the margin in tenths of an inch (1/10 inch), and MUST be introduced in HEXADECIMAL.

The margin does NOT change if character sets with other character spacings are selected. This allows information to be compressed horizontally without the need to redefine the left margin.

When a sheet-feeder is fitted, an AUTOMATIC left printing position is selected corresponding to the extreme left side of the page; subsequent ESC I code sequences set the left margin RELATIVE to this point.

Example:

10 LPRINT "THIS PROGRAM SETS THE LEFT 20 LPRINT "MARGIN TO HALF AN INCH 30 LPRINT CHR\$(27);"I";CHR\$(5); 40 LPRINT "QWERTYUIOP0123456789"

THIS PROGRAM SETS THE LEFT MARGIN TO HALF AN INCH . QWERTYUIOP0123456789

ESC s n (27, 115 and n decimal)

(Select Data Quality Printing at 300 or 400 CPS) When n = 0: start Data quality at 400 CPS. At reception of the ESC s 0 code, all subsequent Data characters are printed at 400 characters per second (Default value at 10 CPI).

When n = 1: start Data quality printing at 300 CPS. At reception of the ESC s 1 code, all subsequent Data characters are printed at 300 characters per second until an ESC s 0 is received.

This command code has been introduced for EPSON compatibility.

When working with thick paper forms, it is recommended to select Data printing at 300 CPS.

n may be introduced in odd/even ASCII or HEXADECIMAL values.

Example:

10 LPRINT CHR\$(27);"T20"; 20 LPRINT CHR\$(27);"s";CHR\$(1); 30 LPRINT "DATA PRINTOUT, SPEED: 300 CPS 40 LPRINT CHR\$(27);"s";CHR\$(0); 50 LPRINT "DATA PRINTOUT BACK TO 400 CPS

DATA FRINTOUT, SPEED: 300 CPS DATA FRINTOUT BACK TO 400 CPS

COLOUR SELECTION

The standard printer is intended to print in black as well as in colour. When the ribbon-cassette is fitted, the printer automatically identifies the type of ribbon.

The exclusive clean-hands cassette with 1 inch wide ribbon gives extra-long life and has been designed for easy handling.

The colour version of the printer uses a wide 4-stripe ribbon; different colours are obtained by shifting the ribbon vertically. The key features of the colour version are the rapid ribbon shift to preserve throughput and the wide, precisely guided ribbon to avoid colour fringes.

When printing in black only is preferred, it is recommended to use an all black ribbon as the cost of printing each character is lower.

Selection command:

ESC ! n (27, 33 and n decimal)

All data following this command code is printed in the colour defined by n. n may be introduced in ASCII or HEXADECIMAL (from 00 to 0C) value.

The following ribbon variants are available:

STRIPE	RIBBON A	RIBBON D
top	Black	Black
2nd	Cyan	Black
3rd	Magenta	Black
bottom	Yellow	Black

n	RIBBON A	RIBBON D
00	Black	Black
01	Cyan	Black
02	Magenta	Black
03	Yellow	Black
04	Orange	Black
05	Violet	Black
06	Green	Black
07	Maroon	Black
08	Red	Black
09	Blue	Black
0A	Light green	Black
0B	Dark green	Black
0C	Brown	Black

providing the following colour combinations:

Remark

There is a vertical movement of the ribbon in 0.05 inch (1.2 mm) steps when printing in black; this ensures maximum ribbon life.

With ribbon A, colour mixing produces the following colours automatically:

ESC ! 04 Orange = yellow + magenta ESC ! 05 Violet = magenta + cyan ESC ! 06 Green = yellow + cyan ESC ! 07 Maroon = yellow + magenta + cyan

In case of non-automatic colour-mixing, it is recommended that the lighter colour be always printed first to reduce ribbon contamination and thus extend ribbon life.

Thus, to print in green with Ribbon A, either the automatic command ESC ! 06 should be used, or the same text should be printed twice: firstly in yellow and secondly in cyan. If the colour sequence is inverted, and cyan is printed first, and yellow second, the cyan, which is darker, will leave traces on the yellow band of the ribbon. The conception of the "Clean-Hands" cassette is exclusive. Its print capacity reaches 36 million characters with ribbon D and 4 \times 7 million with ribbon A.

Its installation is very simple:

Pull the lever (1) towards the front of the machine to provide maximum spacing between head and platen.

Push open the wire bar (2) towards the back of the machine as shown.

Place the ribbon cassette in its lodging and thread the ribbon between head and wire guide (2).

Push both levers (3) as shown to block the ribbon cassette.

Close the wire guide (2) and position the lever (1) on the number corresponding to the print-head distance required.



The printer is capable of working in "Bit-Image Mode". This mode enables the user to print special characters and sophisticated graphics.

The user creates the desired characters from a grid map. Each dot making up a character corresponds to a needle in the print-head, and each needle is commanded separately.

The dot "characters" are generally stored in a bit-map table, and are transferred line by line to the printer from left to right and from top to bottom.

To achieve optimal printing speed, the printer skips all leading and trailing empty dot codes. The print-head only moves over graphic areas that contain dots to be printed.

Four bit-map resolutions are supported, achieving the following print designations:

72	×	60 dots/inch	for a higher print
72	×	72 dots/inch	throughput
44	×	120 dots/inch	for a higher bit-
44	×	144 dots/inch	map resolution

Bit-map commands

To set the bit-map mode, it is necessary to start with the following escape sequence. This sequence also selects the required resolution.

ESC [n h (Code 1B 5B 3x 3y 68)

ху	=	n	 25	(32	35)	72V	\times	60H	dpi
хy	=	n	 26	(32	36)	72V	Х	72H	dpi
ху	===	n	 27	(32	37)	144V	×	120H	dpi
ху	=	n	 28	(32	38)	144V	\times	144H	dpi

Remark:

It is important to keep the buffer zone organised. In order to do so, set the left and right margins to define the graphic area.

ESC; (Code 1B 38)

Set Left Margin at the active print position. After the left margin has been set, move the horizontal position to the required right margin:

ESC 9 (Code 1B 39)

Set Right Margin at the active print position.

ESC [N₁ N₂ N₃ ' (Code 1B 5B 3x 3y 3z 60)

Set Active Print Position where x, y and z represent the decimal value of the required column for the active print position.

Example:

ESC [30 30 38 '	Sets active print position on column 8
ESC ;	Sets left margin at column 8
ESC [30 37 36 '	Sets active print position on column 76
ESC 9	Sets right margin at column 76

Dot codes

The dots of a graphic dot map are transferred line by line to the printer. Each line is split up into portions of 6 dots each and embedded in a 7 or 8 bit code respectively, where the 7th bit

is always 1 and the 8th bit is always 0. The first left hand dot location of a graphics line corresponds to the bit 1 and the 6th dot of each portion to the bit 6 of a dot code.



ESC [n b (Code 1B 5B n 62) Compresses repeatedly used dot codes If n = 0 or 1, the code is repeated once

ESC c (Code 1B 63)

Printer is reset to intial state as at power on. All unprocessed data in the buffer is cleared

ESC [n l (Code 1B 5B 3x 3y 6C) Reset Bit Map Mode

DEL (Code 7F) Delete. Must be recognised as data

LF (Code 0A)

Line Feed. The printer terminates the dot line and the active position advances in accordance with the selected resolution to the next dot line. If the dot codes for one print pass are available, the printer prints the contents of the buffer and moves the paper, if the height of 1/8 inch has been printed

FF (Code 0C)

Form Feed. The contents of the buffer will be printed and the active print position advances to the top of form (TOF) for the next page. When continuous forms are used, the paper advances to the next sheet/page, or if a sheet-feeder is used, the sheet will be ejected and the printer demands the insertion of the next sheet

CR (Code 0D)

Carriage Return. Carriage return is not activated in bit-map mode



Print sample in 144 \times 144 dots/inch resolution

Notes

Teletex capability is one of the options available on your printer. The fitting of the teletex EPROM set allows the complete CCITT/S.61 code table to be printed in word processing-quality font at 100/120 characters per second (10 and 12 characters per inch) and at 400/480 characters per second in DATA (10 and 12 CPI).

When the teletex mode is selected (by invoking a Teletex character generator), the character selection and most of the function codes correspond to the CCITT/S.61 standards. The fitting of a sheet feeder allows automatic handling of vertical and horizontal sheets.

This document should be read in conjunction with the various specifications relative to Teletex published by the CCITT, particularly:

- S.60 Terminal Equipment
- S.61 Character Repertory
- S.62 Control Procedures
- S.70 Transport Service
- F.200 Teletex Service

Remark

In addition to the commands specific to the TELETEX mode and described in this document, all other standard ESCape commands are accepted. This is in order that the functions which are not directly CCITT standard may be emulated by the host. Example: Underlining, which should provoke different reactions according to the sequences in which it is sent.

Teletex generator

	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	Е	F
0	NUL			0	ລ	р	•	ρ				•			Ω	к
1	SOH	DC1	ļ	1	A	Q	а	q			i	t	`		Æ	æ
2	STX	DC 2		2	В	R	ь	r			¢	2	•		Ð	đ
3	ETX	DC3	#	Э	с	s	с	s			£	C	-	٠	õ	8
4	ЕОТ	DC4	\$	4	D	т	d	t			\$	×	~	1	Ħ	π
5	ENQ		X.	5	E	U	е	u			¥	Ч	-	Å	å	ι
6	ACK		r	6	F	V	f	v			#	۹١	v	-	IJ	ij
7	BEL		,	7	G	W	g	w			ş		·	L	Ŀ	ľ
8	BS	CAN	(8	н	×	h	×			¤	~		т	Ł	1
9	HT)	9	I	Y	i	У						L	Ø	ø
A	LF		×	:	J	Z	j	z					•	1-	Œ	0 9
В	VT	ESC	÷	;	к	[k	{	·		«	»		+	Q	ß
С	FF	FS	,	<	L	١	1	1			+	x	-	4	Þ	þ
D	CR		-	z	м	1	m	}			1	34	~	г	Ŧ	t
Е	S0	RS		>	N		n	~			+	×		т	a	ŋ
F	SI		1	- ?	0		0			1	1	i	·	٦	ń	

Mnemo	nic	Hex code	Decimal code	Function	
BS		08	08	Backspace	•
LF		0A	10	Full Line Fe	eed
FF		0C	12	Form Feed	
CR		0D	12	Print Comn	nand
PLD		8B	139	Partial Line	Down
PLU		8C	140	Partial Line	e Up
RLF		8D	141	Reverse Li	ne Feed
SCR	9E	3 n _u 155 m _n	109	Select Gran	phic Rendition
		n b	(default value)	Normal	n = 30 m = 48
			· · · ·	Bold	n = 31 m = 49
				Double Und	derlined
					n = 32 m = 50
				Underlined	n = 34 m = 52
				Slashed	n = 39 m = 57
			6	Valid imme	diately
SHS	9E	3 n _H 20 4B 1	55 m _n 109	Select Horiz	zontal
			-	Spacing	
			(default value)	10CPI	n = 30 m = 48
				12CPI	n = 31 m = 49
	(if E	EPROM AE-	80123 present)	15CPI	n = 32 m = 50
SVS	9B	6 n _H 20 4C 1	55 m _p 32 76 🏅	Select Verti	cal Spacing
			(default value)	6LPI	n = 30 m = 48
				4LPI	n = 31 m = 49
				3LPI	n = 32 m = 50
				12LPI	n = 33 m = 51
				8LPI	n = 34 m = 52
				6LP30mm	n = 35 m = 53
				4LP30mm	n = 36 m = 54
				3LP30mm	n = 37 m = 55
				12LP30mm	n=38 m=56
				Valid after r	next CR

Mnemonic	Hex code	Decimal code	Function
ESC	1B	27	Escape
CSI	9B	155	Control Sequence Introducer
SUB	1A	26	Substitute character
TTX `	1B 54 6027	84 96	Select Teletex Mode WPQ
	1B 54 7027	84 112	Select Teletex Mode
RST	1B 54 n _н 27	' 54 m _o	Deselect Teletex Mode by the selection of another character generator

Bar Code printing is one of the options available for the printer. The EPROM AE-82000 contains the bar code character generators and the firmware necessary for printing them. The print modes (Title, Double Height, etc.) remain valid.

ESC I n or

ESC I n m (27, 73, n and m decimal)

(Print Bar Code) Bar code printing with EPROM AE-82000.

Input of ESC I n directly selects the Bar Code mode determined by n. The value of n must be sent as a single byte (2 hexadecimal digits) or as 2 ASCII character codes, m is only used for 2/5Interleaved (where m = I).

Hexadecimal	ASCII	
ESC I 08 or	ESCI08	= Selection of EAN 8 mode
ESCIOD or	ESC I O D	= Selection of EAN 13 mode
ESC I 19 I or	ESC 1 9	 Selection of 2/5 INTERLEAVED mode
ESC I 27 or	ESC 2 7	= Selection of CODE 39 mode

After selection of the desired bar code, send ESC * the characters * where "the characters" are a sequence of ASCII character codes which correspond to the bar code label to be printed (previously selected by ESC I n). The complete bar code label is automatically printed at the current print position. The printer will then exit from bar code mode and return to the character generator previously selected.

Remarks: For EAN 8 and EAN 13 bar code labels, the message to be printed as a label, defined as "the characters" should be no more nor less than 8 characters for EAN 8 and 13 characters for EAN 13.

Example:

To print an EAN 8 bar code label with the figures12345678, proceed as follows:

Bar code selection by ESC I 08H or ESC I 0 8 Printing by ESC * 1 2 3 4 5 6 7 8 *

```
ESC I * X *
```

```
ESCI*YY*
```

ESC I * X Y Y * : (Select Bar code print mode).

These commands allow the possibility of omiting the numerical value of the bar code below the label and/or the choice of different heights, depending on the number of ASCII characters transmitted between the asterisks (1 = X, 2 = Y Y, 3 = X Y Y). By default, the bar codes are printed in the standard height of the bar code mode currently selected.

X = 0:

The numerical value is not printed below the label. X = 1: The numerical value is printed below the label (default value). Y Y = :The number of lines (passages of the print-head) to print label.

Example:

To print an EAN 8 bar code label with the figure 12345678, with no numerical value below the label, proceed as follows: Bar code selection by ESC I 08 or ESC I 0 8 Mode selection by ESC I * 0 * Printing by ESC * 1 2 3 4 5 6 7 8 *

1. PHYSICAL CONDITIONS

- 1.1. TEMPERATURE AND HUMIDITY
- 1.1.1. STORAGE RANGE



1.1.2. WORKING RANGE



1.2. PRESSURE

The machine is designed for transport by pressurized aircraft.

Maximum working altitude: 4000 m. (13,000 ft)

1.3. VIBRATION

Transport (packaged)

* 3.00 mm 10-20 Hz * 5.0 g 20-300 Hz

Working (installed)

* 0.15 mm 10-45 Hz * 1.0 g 45-300 Hz

* logarithmic sweep, 1 octave/min, 3 axes, 30mins/axis.

1.4. SHOCK

National Safety Transport Association drop test.

The packaged printer is dropped from a height of 76 cm on to concrete floor

- on each of the 6 side walls
- one corner

on each of three edges.

1.5. ·NOISE

Test procedure:

ECMA-74 with microphone in bystanders position at 100 cm from front of printer, 150 cm above ground level, machine on table 75 cm above ground level.

Sound pressure level in dB relative to 2 X 10-5 N/m2 on the A weighting scale, integration time 19 sec.

Printer, with tractor	100 CPS WPQ	: 52 dB
and optional anti-	400 CPS DATA	: 54 dB
noise cover	STAND BY	: 22 dB

2. ELECTRICAL CONDITIONS

2.1. MAINS SUPPLY

		Nomin	Effective			
Working rang Frequency	ge:	50 to	60 Hz	48 to	62 Hz	
Voltage 2 r	anges	100 to 220 to	120 V 240 V	85 to 170 to	132 V 264 V	

2.2. ELECTROMAGNETIC INTERFERENCE EMITTED BY PRINTER

2.2.1. Conducted EMI

Electromagnetic energy propagated along mains conductor.

Test procedure: VDE 0871 Class B and VDE 0875.

At the terminals of the printer, the radio frequency noise voltage does not exceed the following limits (0 dB = 1 microvolt):

10	KHz —	150	KHz	79	to	57	dB
150	KHz —	500	KHz			54	dB
500	KHz —	30	MHz			48	dB

2.2.2. Radiated EMI

Electromagnetic field existing at a specified distance from the machine when interface and mains cable are connected.

Test procedure: VDE 0871, Class B.

The radiation field of the printer does not exceed the following limits:

Frequency	Field strength	Distance from machine
150 KHz - 30 MHz	50 uV/m	30 m
30 MHz - 470 MHz	50 uV/m	10 m
470 MHz-1000 MHz	200 uV/m	10 m

2.2.3. Broadband EMI

Test procedure: VDE 0875, Class B

Conducted EMI 150 KHz-30 MHz (LISN = 150 Ohms) level N-12 dB

Radiated EMI 30 MHz-300 MHz (MDS current probe) level N.

2.3. EMI SUSCEPTIBILITY

2.3.1. Conducted EMI

Transient energy loss:

Printer remains fully operational when supply is interrupted for half a cycle once in 10 seconds.

Overvoltage protection: Injection of high voltage pulses into the mains conductors.

Low energy/high frequency Schaffner generator

Pulse characteristics Peak voltage 1 KV Energy 2J

 Symetrical Rise time 5 nanoseconds Duration 50 microsecs

- Assymetrical Rise time 400 nanosecs Duration 50 microsecs

2.3.3. Electrostatic discharge to printer

Test procedure:

IEC draft 654-5, Class 3 without antistatic Carpet relative humidity 30 per cent to 50 per cent

While operating, the printer supports without malfunction or damage discharges having the following characteristics applied to any point of its surface:

Peak voltage	8 KV	without malfunction
	15 KV	without damage
Capacity	150 pF	
Tip resistance	150 ohms	

3. CERTIFICATIONS

Approved by:	Class	Register
CSA	C 22.2 No 145	LR 48079
ASEV	TP 12 B	SI.91/140
UL	114	E 69997
VDE	DBP Verfügung 115/1982	5356-3250-1003
VDE	DIN IEC 380	5356-3250-7003
NEMKO	502.26/74	E 27782

4. **RELIABILITY**

MTBF	Printer	4000 power-on-hours (duty cycle 25 per cent)
MCBF	Printhead	400 X 10 ⁶ characters
MTTR	(by change of modules)	20 minutes

No preventive maintenance of the printer or the print-head is required.



FRONT VIEW:





TOP VIEW:





BOTTOM VIEW:





PRINTER DIMENSIONS (All dimensions in mm)

With automatic sheet-feeder:



	SWITCHE	ES	Γ									ON
	BLOCK A	A .		1 П	2 	3 	4 	5 	6 ∏	7 	8 	
				ا ـــا								OFF
	Block A:	Function de	escr	iption	n							
	National 1 on	Set 00 USA 2 on	3 с	n	4	on						
	National 1 off	Set 01 Fran 2 on	ice 3 c	1 on	4	on						
	National 1 on	Set 02 Gerr 2 off	nan 3 c	iy/Aus on	stria 4	on						
	National 1 off	Set 03 Gt B 2 off	rita 3 c	in on	4	on						
	National 1 on	Set 04 Den 2 on	mar 3 c	k/Nor off	way 4	on						
	National 1 off	Set 05 Swe 2 on	den 3 c	/Finla off	and 4	on						
•	National 1 on	Set 06 Italy 2 off	3 с	off	4	on						
	National 1 off	Set 07 Spai 2 off	n 3 c	off	4	on						
	National 1 on	Set 08 Fran 2 on	ice : 3 c	2 on	4	off						
	National 1 off	Set 09 Den 2 on	mar 3 c	k/Nor on	way 4	2 off						
	National 1 on	Set 10 Den 2 off	mar 3 c	k/Nor	way 4	3 off						

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INTERNAL DIP-SWITCHES

SWITCHES					_				ON
BLOCK A (cont.)		2	$\frac{3}{1}$	4	5 []	6 []	7	8	
									OFF
Block A: Function desc	ription								
National Set 11 Switzer 1 off 2 off 3	land 1 on	4 0	off						
National Set 12 Switzer 1 on 2 on 3	land 2 off	4 (off						
National Set 13 Switzer 1 off 2 on 3	land V off	SM 4 (off						
National Set 14 Sweder 1 on 2 off 3	n/Finlar off	nd 2 4 (off						
National Set 15 RESER 1 off 2 off 3	VED off	4 (off						
CR (Carriage Return) 5 on CR + LF (CR + Line Feed) 5 off									
A4 vertical format 72 lines/page 6 on 7 on A4 horizontal format 48 lines/page 6 off 7 on									
US vertical format 66 lines/page 6 on 7 off US horizontal format 51 lines/page 6 off 7 on									
FORBIDDEN POSITION8 ONRESERVED, must be OFF8 OFF									

,

SWITCHES — BLOCK B

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Block B: Function description

RESERVED, must be ON FORBIDDEN POSITION	1 ON 1 off
Default Print Style WPQ 1 Default Print Style DATA 1	2 on 2 off
Input Buffer size, floating Input Buffer size, 2K bytes fixed	3 on 3 off
RESERVED, must be ON FORBIDDEN POSITION	4 ON 4 off
LF Line Feed LF + CR LF + carriage return	5 on 5 off
Skip over (1 inch) No skip	6 on 6 off
Printer in EPSON mode SO start title mode (cancelled by CR); SI start condensed mode (cancelled by DC2)	7 on
Printer in CENTRONICS mode CAN ignored; SO underline OFF; SI underline ON; switch 7 and 8 should NEVER be off at the same time.	7 off
Line Feed defined by ESC A or ESC 2 Line Feed defined by ESC A	8 on
and validated by ESC 2	8 off (see INTERFACE)

Remark:

Switch B3 (Input Buffer size) should be in the 2K bytes fixed position to allow down-line loading of character generators.

Access to option dip-switches

The internal DIP-switches are reached via an access hole in the bottom cover of the machine. Make sure that the rear paper support is in place and that the machine is switched off before lifting the front of the machine until it rests on the rear paper support bar.

The cover (arrowed) can be removed for access to the sets of DIP-switches (left hand block A, right hand block B).

If the serial interface board is connected to the printer, it is also possible to modify its configuration. Remove cover for access to the sets of DIP-switches. Please refer to INTERFACE section for more details.



FUNCTION	CODE	TABLE
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	MNEMONIC	HEXA	DECIMAL	FUNCTIONS
	NUL	00	00	Ends tab setting sequence
	BEL	07	07	Acoustic signal
	BS	08	08	Backspace
	HT	09	09	Horizontal tabs
	LF	0A	10	Full Line Feed
				forward
	VT	0B	11	Vertical tabs
	FF	0C	12	Form Feed
	CR	0D	13	Print Command
	SO	0E	14	Start Title Print
	SI	0F	15	Start Condensed
				Printing
	DC1	11	17	Select Printer
	DC2	12	18	Stop Condensed
				Printing
	DC3	13	19	Deselect Printer
	DC4	14	20	Stop Title Print
	CAN	18	24	Cancel Segment
		~_	07	Buffer
	DEL	75	27	Clear Segment
		10 01 40	07 01 4-	Buffer
	ESC SUH 10	тв, 01 ю	27,01 to	1 microspace =
		10 06	07 06	1/60 6 mianagang -
•	LOU AUR	IB, 00	27,00	6 microspaces = 1/10''
	FSCIE	1B 0A	27 10	Trill Line Food
-	200 21	1D, 0A	27, 10	Reverse
	ESC SO	18 0E	27 14	Start Title Print
	ESC SI	1B, 0E	27, 15	Stop Title Print
	ESC NAK	1B, 15	27 21	Select Unidirect-
		,		ional printing
	ESC SYN	1B. 16	27.22	Clear Unidirect-
		· ·	,	ional printing
	ESC FS	1B, 1C	27, 28	Half Line Feed
				Forward
FUNCTION CODE TABLE

MNEMONIC	HEXA	DECIMAL	FUNCTIONS
ESC RS	1B, 1E	27, 30	Half Line Feed Reverse
ESC ! n	1B, 21, n	27, 45,n	Preselect Colour
ESC - n	1B, 2D, n	27, 45,n	Stop/Start Under- line
ESC / n	1B, 2F, n	27, 47,n	Set Bit-map Hori- zontal Definition
ESC 0	1B, 30	27, 48	Set 8 LPI Spacing
ESC 1	1B, 31	27, 49	Set 7/72" Spacing
ESC 2	1B, 32	27, 50	Set 6 LPI Spacing
ESC 3 n	1B, 33, n	27, 51,n	Set Line Spacing in n/144" or in n/216"
ESC 5	1B, 35	27, 53	Set Top of Form
ESC 7 n	1B, 37, n	27, 55,n	Set n microspaces of 1/120"
ESC 8	1B, 38	27, 56	Inhibits Deselect- ion after P.E.
ESC:	1B, 3A	27, 58	Left Margin Justification
ESC >	1B, 3B	27, 59	Right Margin Justification
ESC =,	1B, 3D,	27, 61,	Conversion of ESC
Enm	45 n m	69, n, m	commands
ESC = P n	1B, 3D,	27, 61,	Paper Speed 11 -
	50, n	80, n	18 inch/sec
.ESC = S	1B, 3D,	27, 61,	Setup command
FSC	10	00	Posot Printor
ESC A p	1D, 40 1D /1 n	27,04 27,65 p	Sot Line Speeing
LOCATI	10, 41, 11	27, 05,11	in n/72"
ESC B	1B, 42,	27, 66,	Set vertical Tab
n00	n00	n00	Stops
ESC C n	1B, 43, n	27, 67,n	Set Form or Page Height in Lines
ESC C 00 n	1B, 43,00n	27, 67, 00 n	Set Form or Page Height in Inches

MNEMONIC	HEXA	DECIMAL	FUNCTIONS
ESC D n00 ESC E ESC F ESC G	1B, 44, n00 1B, 45 1B, 46 1B, 47	27, 68, n00 27, 69 27, 70 27, 71	Set Horizontal Tab Stops Start Bold Print Stop Bold Print Start Double
ESC I n	1B, 49, n	27, 73,n	Height Printing Select Bar Code
ESC N n	1B, 4E, n	27, 28,n	Set Skip-over Height
ESC O n	1B, 4F 1B, 51, p	27, 79 27, 81 p	Reset Skip-over
ESC R n	1B, 52, n	27, 82,n	Select National character set
ESC S n	1B, 53, n	27, 83,n	Select Paper Hand-
ESC T _. n	1B, 54, n	27, 84,n	Select Character
ESC T FD n ESC T FE n ESC U ESC V ESC V ESC W n	1B, 54, FD n 1B, 54, FE n 1B, 55 1B, 56 1B, 57, n	27, 84, 253 n 27, 84, 254 n 27, 85 27, 86 27, 87,n	Select Down-Line Loading Select Loaded character set n Start Underline Stop Underline Start/Stop Title Printing
ESC Y ESC Z ESC f n	16, 59 1B, 5A 1B, 66 n	27, 89 27, 90 27, 102 n	Insert a Sheet Eject a Sheet Start Sub/Super-
ESC g	1B, 67	27, 103	Stop Sub/Super-
ESC h n	1B, 68 n	27, 104 n	Script Printing Start/Stop Double
ESC I n	1B, 6C n	27, 108 n	Set Left Margin

FUNCTION CODE TABLE

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MNEMONIC	HEXA	DECIMAL	FUNCTIONS
ESC s n	1B, 73 n	27, 115 n	Set DATA Print Speed to 300 or 400 CPS
ESC c ESC 9	1B, 63 1B, 39	27, 99 27	Return to Initial State Set Right Margin at Current Position
ESC ;	1B	27	Set Left Margin at
ESC [h	1B, 5B,	27, 91, 96	Set Graphic Resolution
ESC [I	1B, 5B,	27, 91, 108	Reset Graphic Mode
ESC [3g	1B, 5B, 33	27, 91, 51, 103	Set Default Margins
ESC [nb	1B, 5B, 62	27, 91, 98	Repeat Bit-Map Information
ESC ['	1B, 5B, 60	27, 91, 96	Set logical Print Position

For further details, please consult the FUNCTION CODE EXPLANATIONS section



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