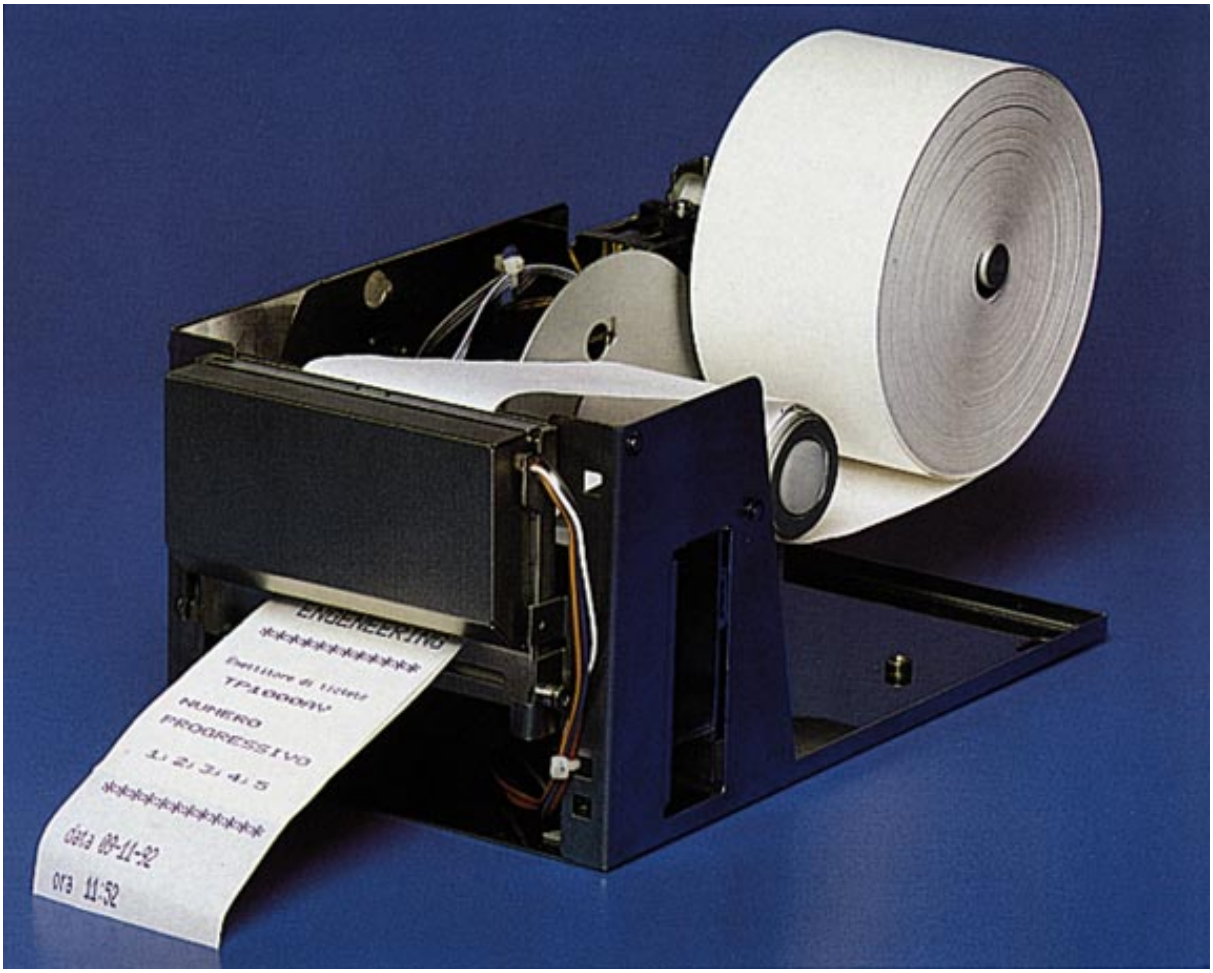
TP1000

User's Manual



COD. DOME-TP1000 Revision 1.10

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"CE" Declaration of conformity

In accordance with standards ISO/IEC Guide 22 and EN 45014 N°: DC0100196

Manufacturer's name: Custom Engineering s.r.l.

Manufacturer's address: Strada Berettine 2
Fontevivo (Parma)
Italy

Declares that the product

Product name: Ticket receipt dispenser

Product type: TP1000

Model: TP1000

is in conformity with the following directives:

Electromagnetic Compatibility Directive 89/336/CEE; 92/31/CEE; 93/68/CEE

In accordance with the following standards:

EN 55022 Class B	Limits and methods of measuring the characteristics of radio disturbance produced by information technology equipment	1994
EN 50082-1	Electromagnetic Compatilbility - General immunity requirements. Part 2: Industrial environments.	1992
EN 61000-4-2	Electrostatic discharge immunity tests. 4KV contact discharge, 8KV air discharge	1995
EN 61000-4-4	Electrical fast transient/burst immunity tests. Signal lines DC 0.5KV	1995
ENV 50140	Radio-frequency irradiated electromagnetic fields - Immunity test. 3V/m, 80MHz-1000MHz, 80% 1KHz AM	1993

January 1996

GENERAL INFORMATION REGARDING SAFETY

- Read and keep the following instructions.
- Observe all warnings and follow all instructions attached to the printer.
- Before cleaning the printer, disconnect the feed cable.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near to water.
- Do not place the printer on unsteady surfaces. It could fall and get seriously damaged.
- Use the type of electricity supply marked on the printer label. In the event of uncertainty, contact the seller.
- Position the printer in such a way as to ensure that the cables connected to it will not be damaged.
- Ensure that the maximum absorbed current of the printer does not exceed the maximum acceptable current for the type of feed cable used.
- Do not put objects of any kind inside the printer as they could cause a short circuit or damage parts which could affect its performance.
- Do not spill liquids on the printer.
- Do not carry out technical operations on the printer with the exception of the scheduled maintenance operations specifically indicated in the user's manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician should any of the following conditions occur:
    A. The feed connector has been damaged.
    B. Liquid has penetrated to the inside of the printer;
    C. The printer has been exposed to rain or water;
    D. The printer is not operating normally despite the instructions in the user's manual having been followed.
    E. The printer has been dropped and its case damaged.
    F. The performance of the printer is poor.
    G. The printer does not work.

Power supply

Supply voltage:	12Vdc (±5%)
Current on standby:	130mA
Current when printing:	3.5A (peak)

Absorption

Medium when on standby	38 mA
Medium when printing	880 mA
Impulse when printing	3,5 A (600 µSec)

Environmental conditions

Operating temperature	0°C - +50°C
Operating humidity	35% - 85%
Storage temperature /humidity	-20°C - +70°C / 10%-90%

Printer model:

No. of columns:	24 columns / 40 columns
Print mode:	text mode graphic mode (144 dots for the 24 column- and 240 dots for the 40-column version)
Print options:	small character printing double height printing double width printing expanded printing “normal” or “reverse” print direction

User interface:

Serial interface:	RS232 Standard
Parallel interface:	CENTRONICS

The user must request the type of interface required when ordering, specifying whether it is to be serial or parallel, and the type of connector necessary.

If the serial interface is used, the following baud rates can be set:

Baud rate
9600
4800
2400
1200
600
300

while the choice of protocol is as follows:

No. bits	Parity	stop bit
8	None	1
8	Even	1
8	odd	1
7	none	2
7	even	1
7	odd	1

CONNECTIONS WITH THE INTERFACES

9-pin serial connector:

Pin no.	Description	<IN / OUT>
1	DCD	OUT
2	TX	OUT
3	RX	IN
4	N.C.	
5	GND	POWER
6	DSR	OUT PAPER END
7	N.C.	
8	CTS	OUT
9	N.C.	

25-pin centronics connector:

Pin no.	Description	<IN / OUT>
1	-STROBE	IN
2	+DB0	IN
3	+DB1	IN
4	+DB2	IN
5	+DB3	IN
6	+DB4	IN
7	+DB5	IN
8	+DB6	IN
9	+DB7	IN
10	-ACK	OUT
11	+BUSY	OUT
12	+PE	OUT PAPER END
13	+SELECT	OUT
14	N.C.	
15	+SELECT	OUT
16	-INIT	IN
17	GND	POWER
18	N.C.	
19-25	GND	POWER

Centronics ribbon connector:

Bit no.	Description	<IN / OUT>
1	-STROBE	IN
2	+DB0	IN
3	+DB1	IN
4	+DB2	IN
5	+DB3	IN
6	+DB4	IN
7	+DB5	IN
8	+DB6	IN
9	+DB7	IN
10	-ACK	OUT
11	+BUSY	OUT
12	+PE	OUT PAPER END
13	+SELECT	OUT
14	N.C.	
15	N.C.	
16	GND	POWER
17	N.C.	
18	N.C.	
19/30	GND	POWER
31	-INIT	IN
32	+SELECT	OUT
33	GND	POWER
34	N.C.	
35	+SELECT	OUT
36	N.C.	

KEYBOARD

The FEED and PRINT keys are located on the side of the printer;
if the PRINT key is pressed, the printer starts making line feeds and stops when the nick photocell is darkened by a dark mark on the paper. If the paper does not have dark reference marks, or there is no nick photocell, the printer will stop after a time interval settable through the P190's programming software.
Next to the keys there are dip switches which select the baud rate if the serial interface is being used or enable the printer reset input if the parallel interface is being used.
There are also 3 red LEDs: the first of these signals that power is being supplied to the printer, the second that the nick photocell is reading the reference mark on the paper and the third that the paper is finished.

CONTROL CHARATERS

Table 1, lists all the commands for function management of the TP1000 printer. These commands can be transmitted to the printer with either the serial or parallel interface; if, however, the parallel interface is used, the user will not be able to receive the data required, since this interface is unidirectional.
The commands can be transmitted to the printer at any moment, but they will only be carried out when the characters previously tramsitted have been printed or the commands previously transmitted have been carried out. There are no commands with priority status; all the commands are carried out when the circular buffer is free to do so. They can be one-, two- or three-byte commands.

The table describes each control character in detail (the table lists the page on which the command is described).

Table 1

Com. ASCII	Com. HEX	Description
-	$00(1)	Printing in small characters
-	$01(1)	Printing in double width
-	$02(1)	Printing in double height
-	$03(1)	Expanded printing
-	$04(1)	Restores small characters printing
-	$0A	Forward feeds one line
-	(n) $0B(1)	Forward feeds (n) lines
-	$0D	Prints line buffer
-	$0F	Sets CRLF mode
-	$11	Graphic mode
-	$12	Prints time and date
-	$13	Sets time and date in serial
-	$14	Trasmits time and date in serial
-	$17	Prints 1st programmable character
-	$18	Prints 2nd programmable character
-	$19	Prints 3rd programmable character
-	$1A	Prints 4th programmable character
-	$1C	Prints 5th programmable character
-	$1D	Prints 6th programmable character
-	$1E	Prints 7th programmable character
-	$1F	Prints 8th programmable character
ESC R	$1B $52	Sets REVERSE mode printing
ESC N	$1B $4E	Sets NORMAL mode printing
ESC @	$1B $40	Resets printer
ESC C	$1B $43	Makes complete cut
ESC P	$1B $50	Makes partial cut
ESC D	$1B $44	Enters date in print buffer
ESC T	$1B $54	Enters time in print buffer
ESC U	$1B $55	Enters date (mm:dd:yy) in print buffer
ESC S	$1B $53	Enables printing of second
ESC O	$1B $4F	Transmits operating hours in serial

ESC H	$1B $48	Zero-sets total operating hours
ESC o	$1B $6F	Prints total operating hours
ESC B	$1B $42	Sets character font 1
ESC b	$1B $62	Sets character font 2
(aa) ESC r	(aa)$1B $72	Reads a piece of data at an address
(aadd)ESC w	(aadd)$1B $77	Writes a piece of data (dd) in an address (dd)
(dd) ESC G	(dd) $1B $47	Writes value (dd) in option register
(dd) ESC M	(dd) $1B $4D	Writes value (dd) in printing mode
ESC p	$1B $70	Transmits option register in serial
ESC m	$1B $6D	Transmits print mode in serial
ESC F	$1B $46	Look for the notch on the paper
ESC s	$1B $73	Transmits next character in serial
ESC W (n)	$1B $57 (n)	Starts saving block (n)
ESC V (n)	$1B $56 (n)	Prints block (n)
ESC E (n)	$1B $45 (n)	Transmits block (n) in serial
ESC Z	$1B $5A	Block saving completed
ESC J (n)	$1B $4A (n)	Loads programmable character (n)

Notes to table 1 :
(1) This command clears the line buffer and for this reason, it must not sent after an ASCII string not ended with CR or LF character, therefore this string will be deleted.

ASCII: - Hex: $00

Printing in small characters

The command $00 is used for reverting to printing in small characters. If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code $00. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string, otherwise the string will be erased. It is better, therefore, to transmit the command after a (CR) $0D so that the string is printed first and, on clearing the buffer, small character printing is restored. In many user applications the character $00 is transmitted as a piece of calculation data or as a numerical value, automatically erasing the string preceding it. A small character is 6 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $17 to code $1F.

ASCII: - Hex: $01

Double width printing

The command $01 is used to activate double width printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $01 after a (CR) $0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 40-column printer contains 20. Double width characters are 12 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $17 to code $1F.

ASCII: - Hex: $02
Double height printing
The command $02 is used to activate double height printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $02 after a (CR) $0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set, the number of characters per line remains 24 for the 24-column printer and 40 for the 40-column printer. Double height characters are 6 dots wide and 20 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $17 to code $1F.

ASCII: - Hex: $03
Expanded printing
The command $03 is used to activate expanded printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command $03 after a (CR) $0D so that the string is printed first and, on clearing the buffer, expanded printing is enabled. When this printing mode is set, the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 40-column printer contains 20. Expanded characters are 12 dots wide and 20 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $17 to code $1F.

ASCII: - Hex: $04
Restores normal printing
The command $04 is used for reverting to printing in small characters (it is identical to $00 and is used when it is impossible to use the latter). If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code $04. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string , otherwise the string will be erased. It is better, therefore, to transmit the command $04 after a (CR) $0D so that the string is printed first and, on clearing the buffer, small character printing is restored. A small character is 6 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code $17 to code $1F.

ASCII : - Hex: $0A
Forward feeds one line
The command $0A forward feeds the printer by one line. If there are any characters in the line buffer, the buffer itself is automatically printed. A line feed is equivalent to 10 dots of normal printing, the paper moves faster than it would when printing due to the automatic activation of a magnet which speeds up the paper feed.

ASCII : - Hex: (n) $0B
Forward feeds (n) lines
The command $0B forward feeds the printer by the number of lines previously set. This must be an ASCII number from 0-9; obviously if the number is zero, nothing will happen. Take care because the code $0B erases the line buffer and so, if there are any characters in it, they will automatically be erased. If, for example, you want the paper to forward feed by 5 lines, transmit:
$35 $0B (or, alternatively, 5 and the command $0B).

ASCII: - Hex: $0D
Prints line buffer
The command $0D (carriage return) prints the line buffer. If the buffer is empty, nothing happens. If the CRLF option is set, the code $0D is ignored and printing only takes place if the command $0A is transmitted. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer or through the programme from the PC.

ASCII: - Hex: $0F
Sets CRLF mode
The command $0F enables the CRLF option. It inhibits the action of the command $0D, and keeping only the command $0A as a print command. This function can be useful in cases where the RETURN key is associated with the $0D and $0A commands, thus causing the DP 24 - 40 to print in double spacing. To disable this option, the printer has to be reset, either by switching it off or by transmitting the reset command. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer or through the programme from the PC.

ASCII: - Hex:$11
Graphic mode
The command $11 enables the DP 24 - 40 printer graphic mode, i.e. to print in graphic mode transmit the commamd $11 at the beginning of each line. One line for the DP 24 - 40 printer (24 column model) corresponds to 144 horizontal points divided in 24 6-point blocks. For the DP 24 - 40 printer (40 column model) one line corresponds to 240 horizontal points divided into 40 6-point blocks. For byte format in graphic configuration, see paragraph 3.2 (Graphics).

ASCII: - Hex: $12
Prints the time and date
This command prints the time and date in the following format:

hh : mmdd - mm - yy

If the expanded or double width formats are selected (i.e. with less than 15 characters per line), only the time will be printed. If seconds printing is enabled, the format will be:

hh : mm : ss dd - mm - yy

In any event this command resets the line.

ASCII: - Hex $13
Sets the time and date in serial
The command $13 sets the time and date of the clock installed inside the DP 24 - 40. There are two ways of setting it: the first uses the 24-hour clock and the second the 12 hour a.m., p.m. clock. In the first case the 10 ASCII characters corresponding to the time and date have to be transmitted, followed by the command $13. If, for example, we wish to enter 12.45 of 19.01.93, we have to send the following sequence:

1, 2, 4, 5, 1, 9, 0, 1, 9, 3, $13

i.e.

$31, $32, $34, $35, $31, $39, $30, $31, $39, $33, $13

In the second case the 10 ASCII characters corresponding to the time and date preceded by “A” or “P”, to indicate ante- or post-meridian, are sent to the printer followed by the command $13. If, for example, we wish to enter A12.45 of 19.01.93, we have to send the following sequence:

A, 1, 2, 4, 5, 1, 9, 0, 1, 9, 3, $13

i.e.

$41, $31, $32, $34, $35, $31, $39, $30, $31, $39, $33, $13

It is advisable to send the command $00 first (normal printing mode) in order to erase the print buffer so as to ensure that there were no old characters still in it.

ASCII: - Hex: $14

Transmits the time and date in serial

The command $14 transmits the contents of the Real Time Clock to the printer’s serial port in the format of 11 ASCII characters:

hour / minutes / day / month / year + CR $0D

If the seconds option is enabled, the seconds will be transmitted after the minutes. This command can only be used if the serial port is being used; if the parallel port is being used, the printer will not be able to print anything.

ASCII: - Hex: $17, $18, $19, $1A, $1C, $1D, $1E, $1F

Prints the 1st (…8th) programmable character

If the hexadecimal character $17 (...$1F) is transmitted to the DP24 printer, it will print the corresponding programmable character. In fact, it is possible to programme eight characters which can be printed at any time with the codes from $17 to $1F. There are two ways of programming the characters; the can be saved in a non volatile memory which stores all the data, even when the printer is switched off, or alternatively, in a memory which is automatically erased when the power is switched off. In the first case, the user can ask the technicians responsible to programme the eight characters, depending on his requirements, or the user himself can programme them by using the personalized software supplied by Custom Engineering. In the second case, the user can form the characters at the same time as he is transmitting the text to be printed; the advantage of this approach is that an infinite number of symbols can be associated to a character, exactly as the user pleases, which he can print and modify as he sees fit. If the printer is new (or if the characters have not been manipulated), the following symbol ||| will be associated with codes $17, ..., $1F; each time the printer is switched on, the above mentioned codes will contain the last characters programmed in the non volatile memory.

ASCII: ESC R Hex: $1B $52

Sets the printer in reverse mode

The command “ESC” R selects reverse mode printing. In reverse mode printing, the ticket comes out of the printer with the writing right side up and running from left to right. When the printer is switched on, the default value is selected by the flag of a location called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

ASCII: ESC N Hex: $1B $4E
Sets the printer in normal mode
The command "ESC" N selects normal mode printing. In normal mode printing, the ticket comes out of the printer with the writing upside down and running from right to left. When the printer is switched on, the default value is selected by the flag of a location called the "option register"; this flag can be manipulated by programming, using the the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

ASCII: ESC @ Hex: $1B $40
Resets the printer
The command "ESC" @ resets the printer software. This command is identical to the hardware reset command and can be used for re-initializing the printer's parameters. Obviously, after this command the receiving buffer is zero-set and all the data transmitted to the printer is lost. Once the command has been transmitted, approximately 1.5 seconds pass before the printer becomes active again. The reset command can be useful when the system is switched on in order to avoid false characters, which would corrupt the printer's receiving buffer, from being sent during the master device's initializing phases.

ASCII: ESC C Hex: $1B $43
Makes the complete cut
The cutter must be installed: if it isenabled, this command prompts the complete cut of paper. The FEED motor is stopped to ensure that the paper does not jam during cutting.

ASCII: ESC P Hex: $1B $50
Makes the partial cut
The cutter must be installed: if it isenabled, this command prompts partial cutting of the paper, i.e. the receipt remains loosely attached. The FEED motor is stopped to ensure that the paper does not jam during cutting.

ASCII: ESC D Hex: $1B $44
Enters the date in the buffer
The command "ESC" D is used for entering the date of the Real Time Clock fitted inside the printer in the line buffer. The format of the date is dd-mm-yy. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

DATA : 11-09-93 TEST OK

you will send:

DATA : $1B$44 TEST OK $0D

If you only wish to print the date, it is enough to transmit $1B$44$0D. The date is transmitted in 8 characters and, if there is not sufficient space left in the line buffer, it is not printed.

ASCII: ESC T Hex: $1B $54

Enters the time in the line buffer

The command “ESC” T is used for entering the time of the Real Time Clock fitted inside the printer in the line buffer. The format of the time is hh-mm. This command can be used for entering the time in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

TIME : 16.45 TEST OK

you will send:

TIME : $1B$54 TEST OK $0D

If you only wish to print the time, it is enough to transmit $1B$54$0D. The time is transmitted in 5 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

ASCII: ESC U Hex: $1B $55

Enters the date (mm-dd-yy) in the buffer

The command “ESC” U is used for entering the date, American.style mm-dd-yy, of the Real Time Clock fitted inside the printer in the line buffer. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

DATE : 09-11-93 TEST OK

you will send:

DATE : $1B$55 TEST OK $0D

If you only wish to print the date, it is enough to transmit $1B$55$0D. The date is transmitted in 8 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

ASCII: ESC S Hex: $1B $53

Enables the printing of seconds

The command “ESC” S enables the printing of seconds when the time is requested with command “ESC” T. When the printer is switched on the default value, which determines whether or not the seconds are to be printed, is contained in the flag of a byte called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer.

ASCII: ESC O Hex: $1B $4F

Transmits operating hours in serial

The command “ESC” O (option of software release 5.3) transmits the total operating hours of the printer to the serial port. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect. In addition, if the user utilizes the parallel port, the operating hours will not be transmitted since the parallel port is unidirectional. The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours. The transmission format is in ASCII standard and four characters are transmitted: in order of importance. The transmission protocol is the same as that set by by the user on the serial interface. As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting.

ASCII: ESC T Hex: $1B $48
Zero-sets total operating hours
The command "ESC" T zero-sets the printer's total operating hours. If you are using the total hours option, it is advisable to use this command immediately after switching on the printer so as to synchronize the operating hours of the printer itself with those of the master device.

ASCII: ESC o Hex: $1B $6F
Prints total operating hours
The command "ESC" o enters the total operating hours in the line buffer. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect. The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours. As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting. If, for example, you wish to write:
TOTAL HOURS: 0123 TEST OK
you will send:
TOTAL HOURS: $1B$6F TEST OK
The hours are printed in four characters and if there is not enough space in the line buffer, they will not be printed.

ASCII: ESC B Hex: $1B$42
Sets character font 1
The command "ESC" B selects the first character font. The complete font is printed during the self-test. Some codes are not standard and are as follows:
$60, $7B, $7C, $7D, $7E, $7F, $8D, $ED, $FA and $FF.
These characters are compatible with earlier printer models. The font may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the "option register"; this flag can be manipulated by programming, using the the two keys on the front panel of the printer, by means of which the default values can be changed.

ASCII: ESC b Hex: $1B $62
Sets character font 2
The command "ESC" b selects the second character font. The complete font is printed during the self-test. This font contains Cyrillic characters. It may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the "option register"; this flag can be manipulated by programming, using the the two keys on the front panel of the printer, by means of which the default values can be changed.

ASCII: (aa) ESC r Hex: (aa) $1B $72
Reads a piece of data at an address
The command "ESC" r makes it possible to read in a location of the non volatile memory (EEPROM). This command can only be used with the serial port as it is bi-directional. The communication protocol is defined by the dip-switches on the serial interface. There are 256 legible locations, starting from the $00 location up to the $FF location. The address of the location to be read must be defined before the "ESC" r command is transmitted, i.e. if we wish to read address $01, we have to transmit in ASCII:

0 1 "ESC" r or $30 $31 $1B $72

In reply to this reading, the printer tranmits the data of address $01. The reply also is given in ASCII; thus if, for example, address $01 contains $A5, we will receive:

A 5 or $ 41 $35

The entire memory bank contains the value $20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.

ASCII: (aadd) ESC w Hex: (aadd) $1B $77
Writes a piece of data (dd) in an address (aa)
The command "ESC" w makes it possible to save a piece of data in a non volatile memory. There are 256 locations in which to write, starting from $00 to $FF. The pieces of data too cannot exceed $FF (255) and both the addresses and the data must be expressed in ASCII on two bytes. To save a piece of data, first transmit the address, then the data followed by the command "ESC" w. If, for example, you wish to save the data $A5 in address $01, you will transmit:

0 1 A 5 " ESC" w or $30 $31 $41 $35 $1B $77

The entire memory bank contains the value $20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.

ASCII: (dd) ESC G Hex: (dd) $1B $47
Writes value (dd) in option register
By means of the command "ESC" G the printer configuration can be manipulated. To do so, a byte in ASCII containing the configuration must be transmitted to the printer, followed by "ESC" G. The setting byte contains the following bits:

d7, d6, d5, d4, d3, d2, d1, d0

where:

d0: is used to enable the setting of the Real Time Clock using the keys on the front of the printer. If this bit is 0, it disables setting; if it is 1 it enables it. If the user disables this function the clock will not be affected by variations made either accidentally or deliberately by persons not qualified to do so.

d1: is used for setting the printing mode: normal or reverse. If this bit is 0 printing is in normal mode; if it is 1 it is in reverse mode.

d2: is used in parallel communication and enables the 7 or 8 data bit protocol. If this bit is 0 the parallel port accepts 8 bit data; if it is 1 the port accepts 7 bit data. If the 7-bit protocol is enabled, the printer will only be able to print non extended characters, i.e. those from code $0E to code $7F.

d3: its purpose is to enable the printing of seconds in the clock commands. If the bit is 0 the seconds will not be printed; otherwise during the printing phase of the time the seconds will be printed too.

d4: if the bit is 0 command $0D is carried out; if it is 1 the printer ignores the carriage return command.

d5: this bit enables the printing of the first block (heading) as soon as the printer is switched on. If the bit is 0 this function is disabled; if it is 1 the function is enabled.

d6: selects the character fonts during printing. A logic state 0 selects font 1, while a logic state 1 selects font 2.

d7: from software release 5.3 on, 0 disables the lapsed time meter while 1 enables it.

Once the printer has been configured, the above described byte in ASCII is transmitted; for example byte = 00001001 corresponds to $09, the whole string would therefore be:

0 9 "ESC" G or in Hex $30 $39 $1B $47

All these bits, with the exception of bit 7, can be manipulated by programming using the front keys of the printer.

ASCII: (dd) ESC M Hex: (dd) $1B $4D

Writes value (dd) in printing mode

Using the command "ESC" M it is possible to manipulate the printing mode by default. To do this a byte in ASCII containing the printing mode must be transmitted followed by "ESC" M. The type of writing which can be defined is described in the following table:

$00	small character printing
$01	double width printing
$02	double height printing
$03	expanded printing

If, for example, you wish to print in double height characters, you will send:

0 2 "ESC" M (or $30 $32 $1B $4D)

Automatically the printing mode is changed to the one selected and is stored in the non volatile memory.

ASCII: ESC p Hex $1B $70

Transmits the option register in serial

The command "ESC" p transmits the "option register" byte to the serial port of the printer. Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

0 9 (or $30 $39)

this means that the configuration will be 00001001.

ASCII: ESC M Hex $1B $6D

Transmits the printing mode in serial

The command "ESC" m transmits the byte containing the printing mode by default to the serial port of the printer. Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

0 2 (or $30 $32)

this means that the printer is in double height printing mode.

ASCII: ESC s Hex: $1B $73
Transmits next character in serial
The command "ESC" s ($1B $73) sets the printer to transmit the next character it receives. If, for example, we transmit "ESC" s A, the last character, A, will not be printed but will immediately be transmitted in serial. If we use this function in memorizing blocks of text, we can simulate a password which would be transmitted, for example, when the printer is switched on, or command codes on pressing the PRINT key, or connected printer tests.

ASCII: ESC W (n) Hex: $1B $57 (n)
Starts saving block (n)
The command "ESC" W ($1B $57) followed by a number (from 1 to 3) activates the function for saving a file in one of the three blocks defined by the number n. These blocks are contained in a non volatile memory which stores the data even when the power is switched off. The length of the files which can be memorized is of 300 bytes for the first block and 700 bytes for the second and third blocks. The files can contain all kinds of codes; it is therefore possible to store tests, data, executive commands to the printer, auto-headings, graphic files etc. If files exceeding the memory bank capacity are transmitted, the extra characters will be printed directly without being saved. Loading can be done in either serial or parallel. When you have finished loading a block, it is advisable to enter the terminating command "ESC" Z. The three blocks stored in this way can either be printed or transmitted in serial. If printer commands have been saved, these will be carried out as they would normally.

ASCII: ESC V (n) Hex: $1B $56 (n)
Prints block (n)
The command "ESC" V ($1B $56) followed by a number (from 1 to 3) prints block n. The file continues printing until it reaches the terminating command "ESC" Z. Obviously, if the block is clear, or if all the characters are $20, the printer will not print anything. The first block, also called heading, will automatically be printed when the printer is switched on, if the auto-heading flag is set. The user's logo or the name of his company can, therefore, be printed each time the printer is switched on. The three blocks can also be printed one after the other, there being a total memory bank of 1700 bytes. To recall a block, you must enter the command "ESC" V and the number of the block you wish to recall.

ASCII: ESC E (n) Hex: $1B $45 (n)
Transmits block (n) in serial
The command "ESC" E ($1B $45) followed by a number (from 1 to 3), transmits in serial the memory block defined by n. If the printer is using the parallel port this command will, of course, produce no effect. The file will be transmitted in its entirety, the first block will contain 300 bytes and the second and third blocks 700 bytes each.

ASCII: ESC F Hex: $1B $46
Look for the notch on the paper
After the reception of this command, the printer put forward the paper up to read a black notch on the same paper. If in the paper there isn't the black notch, a timer stops the form feed. In order to use this fuction the model with placed photocell must be required inequivocally.

ASCII: ESC Z Hex: $1B $5A
Block saving completed
The command "ESC" Z ($1B $5A) acts as a terminator for the three memory blocks. When the line buffer reads this terminating command during printing, it stops printing the block and reverts to normal functioning. In the absence of the terminating command, the entire block will be printed.

ASCII: ESC J (n) Hex: $1B $4A (n)
Loads programmable character (n)
The command "ESC" J ($1B $4A) followed by a number (1 or 2 for 4.3 software and 1 - 8 for 5.3 software) is used to generate the programmable characters. The programmable characters go from code $1E to code $1F (4.3) or from code $17 to code $1F (5.3). A programmable character consists of 10 lines of 6 dots each; to form a character which corresponds to code $1E, therefore, you must transmit 10 bytes preceded by "ESC" J1. The bytes must have the same characteristics as the graphic mode, i.e.:

X	**P7**	**P6**	**P5**	**P4**	**P3**	**P2**	**P1**
d7	d6	d5	d4	d3	d2	d1	d0

where:
x is not used;
P7 must be fixed at 1;
P1 to P6: the graphic dot data ; if it is at 1 it prints and if it is at 0 it does not print.
The P6 bit of the string of points transmitted is printed on the left with the other points running from left to right (P6, P5, P4, P3, P2, P1) as illustrated:

P6	P5	P4	P3	P2	P1	**1st byte**
P6	P5	P4	P3	P2	P1	**2nd byte**
P6	P5	P4	P3	P2	P1	**3rd byte**
P6	P5	P4	P3	P2	P1	**4thbyte**
P6	P5	P4	P3	P2	P1	**5th byte**
P6	P5	P4	P3	P2	P1	**6th byte**
P6	P5	P4	P3	P2	P1	**7th byte**
P6	P5	P4	P3	P2	P1	**8th byte**
P6	P5	P4	P3	P2	P1	**9th byte**
P6	P5	P4	P3	P2	P1	**10th byte**

After the tenth byte the function "ESC" J finishes. If, for example, we wish the symbol of code $1F to be #, we must transmit "ESC" J 2 pieces of data, i.e.:

$1B $4A $32 $52 $52 $52 $7F $52 $52 $7F $52 $52 $52

All the data must be transmitted consecutively. This type of loading is allocated to the volatile memory; thus, when the power is switched off the character is zero-set and reverts, when the printer is switched on again, to the default character configured.