Users Manual

Table Printer PS-180

GFM Gesellschaft für Microdatentechnik GmbH

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Declaration of Conformity
Document: EUPS180-ENGL Product Name: Table Printer PS-180 We declare the products conformity to the following standard 89/336/EWG (EEC) from 3.5.1989 The declaration of Conformity is based on the test report Nr. 96917from 26.9.1996. Laboe, den 31.03.2006 ..... CEO

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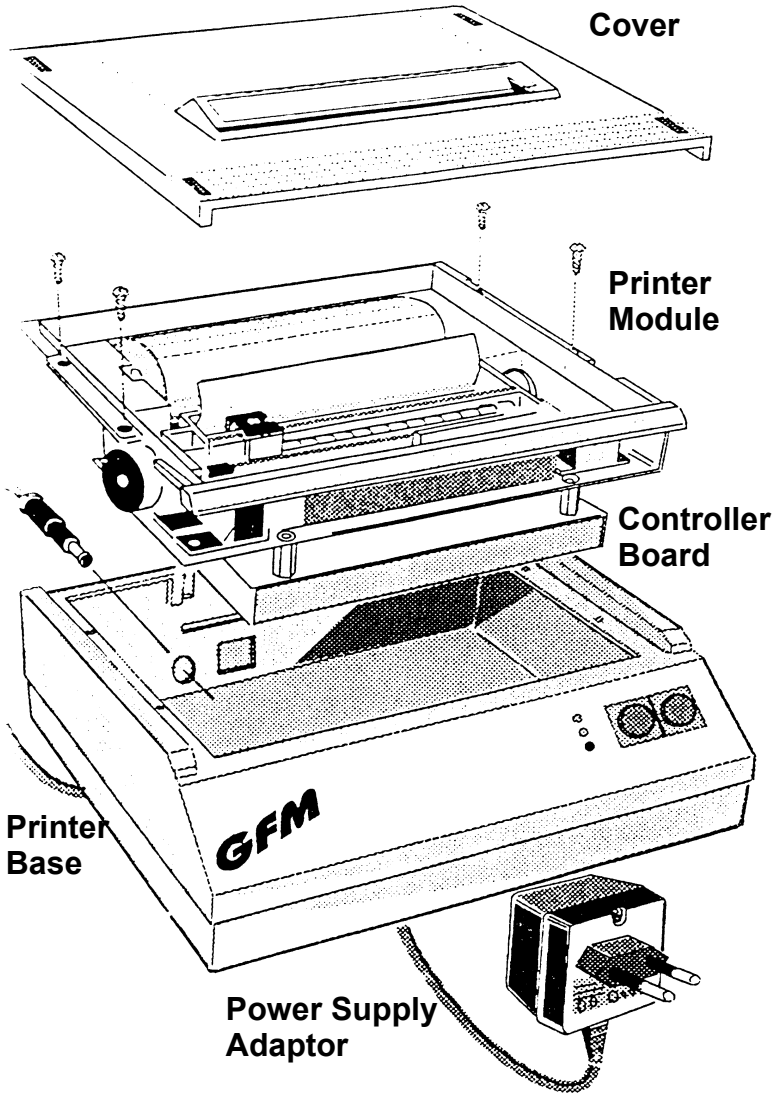
Introduction



Operating Precautions

The printer is for use only in a room that fits for sensible electronic parts.
Please use the cable that is delivered together with the printer.
Disconnect the power cable before you open the printer.

Changing Parameters for Serial Interface

Serial Interface RS232

You can change all parameters, if necessary, by using the DIP-switch setting on the controller board.
The controller board is part of the printer module. To get to the controller board, please remove screws from printer module and lift the printer module carefully.
A listing of possible settings you will find on page 13.

Operating the printer

Interface cable

Please use the interface cable that is delivered together with this printer.
Turn off printer and analysis system before you connect these two devices.
Please connect data line first before you connect the power cable.

Power Connection

Please only use the power supply adaptor that is delivered together with the printer. Other adaptors may damage the printer.

Please insert Ithe plug into a socket of the specified voltage and put the small round plug into the printers power input.

Please connect data line first before you connect the power cable.

Switches / Button /LED-Lamps

Power Switch-Off

The printer has a power switch-off at the backside to turn printer on and off.

On the front side of the printer there are two buttons:

Online/Offline Button

Is used to connect and disconnect the printers data line to the data sender.

Paper-Feed-Button (PF)

If you press the button the paper is pushed immediately.
This function is very helpful when you change the paper roll.

LED-Lamps

The printer has three LED-Lamps:

The green ON-LED-Lamp is on as long as the controller board is supplied with electrical power.

The yellow Online-Lamp is on as long as the data line is connected logically to the sender.

The red LED-Lamp is without function for this type of printer.

Control Codes and Escape-Sequences

Control Codes

Hex	Dec	Name	Function
09	09	TAB	TAB
0A	10	LF	Line-Feed, advance paper one line
0D	13	CR	PRINT contents of buffer, move the column pointer to LEFT MARGIN
18	24	CAN	Clear buffer.
1B	27	ESC	ESCAPE (--> see ESCAPE sequences section
1C +n	28	FS	Direction of Characters: n=1: Rotate, n=0 : Normal.

Escape-Sequences

An ESCAPE SEQUENCE is the ESC character immediately followed by the byte or bytes as defined below to complete the sequence.
In the first column of the table below +n refers to another byte, +s refers to more than 1 byte to be sent to complete the command sequence.
The following abbreviations are used:

NC = Number of characters per line
ND = Number of dots per inch
DL = Dot line
CL = Character line
LM = Left margin (default = 1)
RM = Right margin (default = NC)
BI = Bit-image graphics

	Hex	Dec	Name	Function
+n	05	05	ENQ	Line Feed, Auto-Line-Feed mode change.

Code	LF-enable	Auto-LF	Auto-CR
0	off	off	off
1	on	off	off
2	off	on	off
3	on	on	off
4	off	off	on
5	on	off	on
6	off	on	on
7	on	on	on

Escape-Sequences continued

Hex		Dec	Name	Function
	09	09	HT	TAB to character column
+n	0C	12	FF	n dots line feed
	14	20	DC4	Self Test
+n	20	32	(sp)	Add n dot space between characters.
+n	24	36	$	TAB to dot position. Range n = 1 RM * 6. Command ignored if n is out of range
	2A	42	B	same as ESC-'K'.
+n	2D	45	-	Underline Mode. n = 0 is off, n = 1 is on.
	30	48	0	Set line spacing to 9 DL/CL (default)
	31	49	1	Set line spacing to 8 DL/CL
	32	50	2	Set line spacing to 12 DL/CL
	33	51	3	same as ESC-'A'.
	40	64	@	Reset. Initialise Printer
+n	41	65	A	Set line spacing to n DL/CL. n0 through 8 is treated as n=8. n09 through 127 is treated as n. n>127 is treated as (n-128)
	48	72	H	80 Characters / line mode
+n	4A	74	J	fast Paper Feed n DL. The column counter is not changed
	4B	75	K	Bit Image Mode. See separate section Bit-Image Graphics
	53	83	S	Double Strike
+s	58	88	X	Set Margins. +n1 & n2 = smaller => left margin, bigger => right
+s	5B	91	[	+n1, n2 set Character Size
	62	98	b	Uni-directional printing
	66	102	f	Draft mode
	68	104	h	40 Characters / line mode
	70	112	p	Fine Resolution mode
+n	72	114	r	Revers/Normal video (n=1/n=0).
	73	115	s	Normal strike
+n	7A	122	z	Printing Direction: Invers/Normal Printing (n=1/n=0)

Bit-Image-Graphics Protocol

The ESC K protocol is similar to EPSON line printers with limitations due to the fact that the printers used to have a fixed number of dot positions (ND). If more data is specified than the printer being used is capable of printing, the first ND (left part) will be printed and the remaining columns of data will be ignored (truncated to ND). If the margins are changed with the ESC X +s command then the effective ND is also changed.

Protocol: ESC K n1 n2 (n2*256 + n1 bytes of data) PRINT

Example: $1B_{hex}$ K 16_{dec} 1_{dec} (272 bytes of data) $0D_{hex}$ will print 272 columns of BIT-IMAGE graphics (truncated at ND columns).

If the number of bytes = N, the values of n1 and n2 are:

n1 (lsb) = the remainder of dividing N by 256 (N MOD 256). The range is 0_{dec} through 255_{dec} but any number larger than the number of dots per line will be truncated.

n2 (msb) = the integers quotient of dividing N by 256 (INT(N/256)). Any data for n2 > 0_{dec} will be truncated.

The character line spacing remains in effect so if the graphics is desired to be printed on adjacent character lines with no blank dot lines between the graphic lines, the line spacing must be set by sending ESC 1 (8 DL/CL).

The first byte of data will be printed in the current dot position as a vertical group of 8 dots defined by the data byte. The most significant bit of the byte will be printed at the top of the group of dots and the least significant bit will be printed at the bottom of the group of dots. (If the appropriate bit is a logical 1, a dot will be printed. If the bit is a 0, nothing will print at that position.) The second byte will be printed in the next dot position etc., etc., until the byte n1 + (n2 x 256) is printed. Printing does not occur until a PRINT command is received or until more than ND bytes of data are received.

Graphics data and ASCII text data can be printed on the same line by not printing until all required data is in the printer's input buffer. Printing does not occur until a PRINT command is received or if the ND counter gets greater than the ND for the printer.

This family of printers has solenoids mounted horizontally with each printing part of the dot positions for each dot line. Paper is automatically advanced one dot line as each dot line is printed. The motor is turned off any time the next line of data is not ready to be printed when the printer completes the previous character line. The motor must be turned on for one shuttle to get back in sync before any printing can be done, which causes the paper to feed one dot line. For graphics mode this means that DATA MUST BE SENT AT A FAST ENOUGH RATE THAT IT STAYS AHEAD OF THE PRINTER TO AVOID BLANK DOT LINES FROM OCCURRING between each 8 dot lines of BI data.

Character Set

An IBM Character Set is installed with some additional characters.

Controller Board (ST-100-X)

20_{hex} thru FF_{hex} IBM/PC character set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2x		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3x	0	1	2	3	4	5	6	7	8	9	:	;	>	=	>	?
4x	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5x	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6x	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7x	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	▒
8x	Ç	ü	é	â	ä	à	á	ç	ê	è	é	í	î	ì	Â	À
9x	É	æ	Æ	ô	ö	ò	û	ù	Ÿ	Ö	Ü	ď	£	¥	Pts	Ŧ
Ax	á	í	ó	ú	ň	Ň	˜	°	¿	⌐	¬	½	¼	;	«	»
Bx	⁞	▒	▓	|	┤	╡	╢	╖	╕	╣	╗	╝	╜	╛	┐	
Cx	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
Dx	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	▉	▄	▌	▐	▀
Ex	α	β	Γ	π	Σ	σ	µ	ν	Φ	θ	Ω	δ	ω	ώ	Є	п
Fx	≡	±	≥	≤	⌠	⌡	÷	≈	°	•	·	√	n	²	■	ÿ

For controller with German character set the following table is valid:

Address: 5B 5C 5D 7B 7C 7D 7E

Character : Ä Ö Ü ä ö ü ß

The self test is printing this version: T189-2.00

Data Connectors

Connector serial RS232 Version

DB-9, female - RS232 pinout compatible

Pin	Name	E/A	Funktion
1	DTR	A	connected to PIN 8
2	TXD	A	RS232 Transmitted Data (no function)
3	RXD	E	RS232 Received Data
4	N.C.	-	
5	Masse	-	Logic Ground
6	DTR	A	connected to PIN 8
7	RTS	A	Pulled-up
8	DTR	A	Hardware Handshake Line
9	N.C.	-	

Connector parallel Centronics Version

DB-25, female - Centronics pin-compatible.

Pin	Name	E/A	Funktion
1	/STB	E	Active LOW-Pulse to send data to printer
2	D0	E	ASCII Datenbit 0 (lsb).
3	D1	E	ASCII Datenbit 1.
4	D2	E	ASCII Datenbit 2.
5	D3	E	ASCII Datenbit 3.
6	D4	E	ASCII Datenbit 4.
7	D5	E	ASCII Datenbit 5.
8	D6	E	ASCII Datenbit 6.
9	D7	E	ASCII Datenbit 7 (msb).
10	/ACK	A	Activer LOW-Pulse, when data is accepted.
11	BUSY	A	HIGH-level when printer cannot accept data.
12	PE	A	HIGH-level when printer is out of paper (not in use).
15	/ERROR	A	Normally HIGH, LOW = Error condition
16	/INIT	E	LOW-Pulse resets the printer.

Hint: Pin 13 is set to +5 Volt. Pins 14, 17 to 25 are grounds.

Interface Board

Dip-Switch Settings (serial Version) ST-100-S2

Pos.	On =	Off =	Function
8	Reverse Printing	Normal Printing	Printing direction
7	M-19X	M-16X,18X	Type of printer
6	7 Bits	8 Bit	Data Bits
5	Odd	Even	PARITY
4	Enable	Disable	PARITY.
4	2 Stop bits	1 Stop bit	Stop bits
3 BR3	⎫		
2 BR2	⎬ - see Baud Rate Table		
1 BR1	⎭		

NOTE: 7 DATA BITS, NO PARITY an 1 STOP BIT is NOT a valid combination to send to the printer

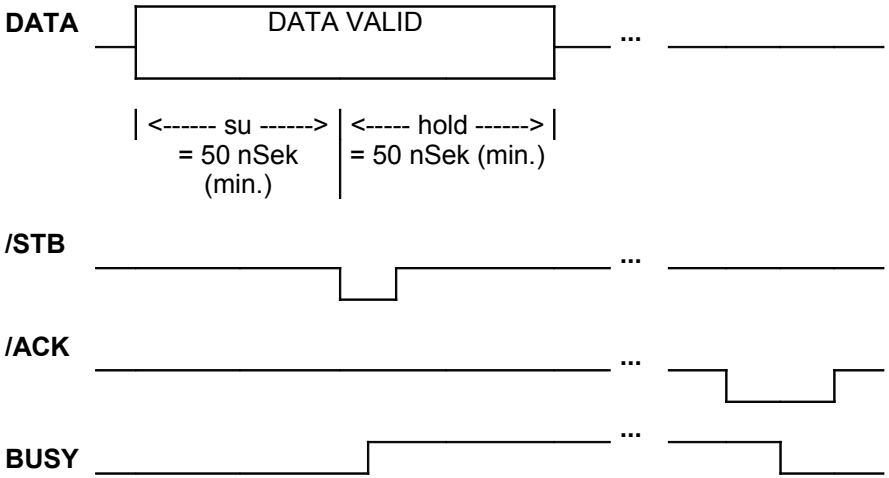
Baud Rate Table

BR1	BR2	BR3	BAUD
On	On	On	150
Off	On	On	300
On	Off	On	600
Off	Off	On	1200
On	On	Off	2400
Off	On	Off	4800
On	Off	Off	9600
Off	Off	Off	19200

Jumper Options E3 and E4 (parallel version ST-100-C)

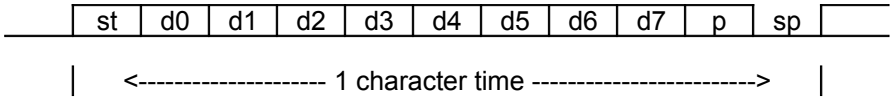
E3: must be set short for M-19X printers
E4: must set short form normal printing direction

Parallel Timing Diagram (Parallel Interface Centronics)



su = Set-Up-Time Data valid until /STB LOW = 50 nanoseconds (min.).
hold = Hold-Time /STB LOW until DATA changes = 50 nanosesconds (min.). /STB-width = 20 nanoseconds (min.). /ACK-width = 0.5 microseconds (nominal). /STB LOW until BUSY HIGH = 40 nanoseconds (nominal).

Serial Timing Diagram (serial Interface RS-232)

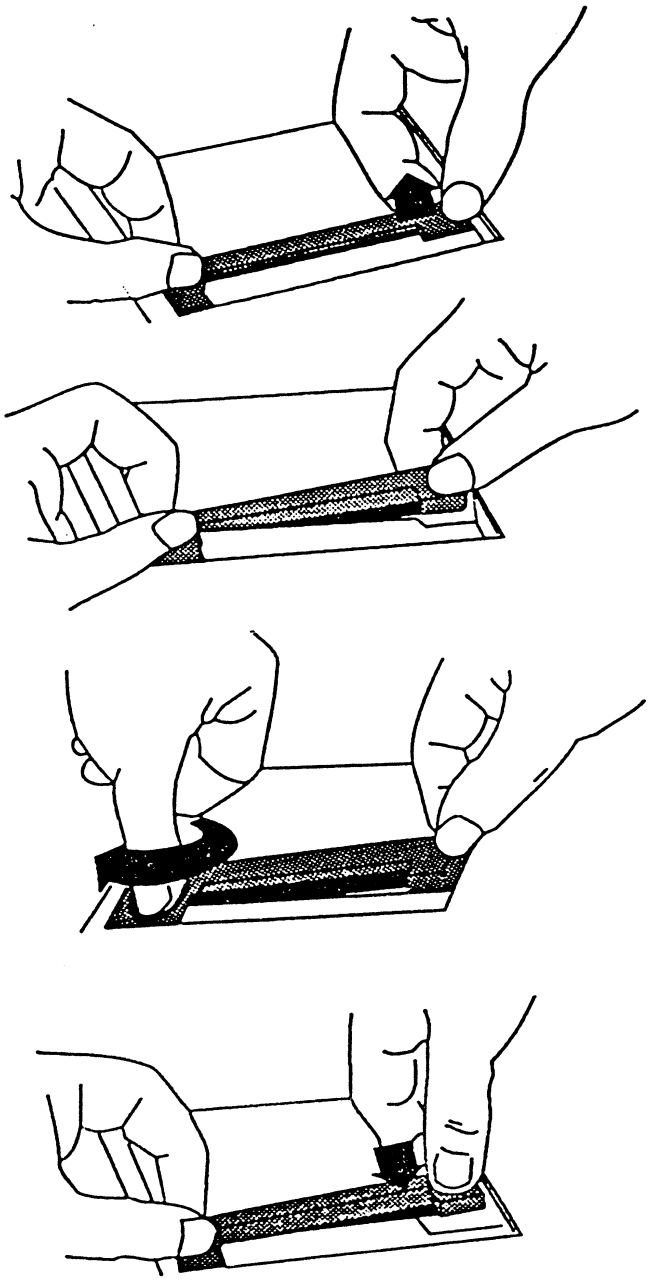


st = Start bit. sp = Stop bit. p = Parity bit (optional). d0 through d7 = Data bits. d7 is optional unless needed for graphics. The width of each bit depends on the baud rate.

NOTE: The data byte must be 10 bits minimum length. 7 DATA BITS, NO PARITY and 1 STOP BIT is NOT a valid combination to send to the printer.

NOTE: Polarity shown (START BIT high and STOP BIT low) is for RS232 voltage levels of serial data stream(± 12 Volt).

Changing of Ink Ribbon



Changing of Paperroll