User Manual

GCT-4382 V1.2

Controller for APS ELM205-LV

Thermal Printer for 3.0 to 7.2 VDC

MAN-E-401

Status 27.6.2001

Manual Summary:

Printer Mechanism ELM205 from APS	**Short Description , Technical Data**
Controller Board GCT-4382	**Short Description , Technical Data**
Software	**Character Sets, Command Set, Special Commands, Stored Text Files**
Hardware	**Interfaces, Data Formats, Power Supply, Configuration (Jumpers)**
Product List, Accessories	**Controllers, Assembly, Enclosures, Power Supplies, Cables**

(4,5 to 8,5 VDC Versions ELM205-ST and ELM-205-HS on request)

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GeBE Dok.Nr. 401-MAN-E-4382-V1.01

1. Contents

2. Printer Mechanisms Series ELM205

Features, Summary

	Unit	MP205LV	MP205HS	MP205ST	Comments
Weight	g	**35**			
Width	mm	**68,2**			
Length	mm	**22,4**			
Height	mm	**15**			head closed
Printing width	mm	**48**			
Paper width	mm	**57,5 +- 0,5**			
Resolution	dots/line	**384**			
	dots/mm	**8.0**			
Max. print speed	lines/sec	**400.0**	720.0	560.0	
	mm/s	**50.0**	90.0	60.0	
Voltage of logic Vcc	V	**2,7 - 5,25**		4,75-5,25	
Power voltage Vp	V	**2,7 - 7,2**	4,5 - 8,5	4,5 - 8,5	
Average power	A	**1,2 (3,6V)**	1,6 (7,2V)	1,9 (7,2V)	
Maximum power	A	**2,4 (3,6V)**	3,2 (7,2V)	3,9 (7,2V)	
Life span	km / miles	**50**			printed paper
Operating temperature	°C / °F	**0 - 50°C / 32 - 122°F**			environment; no moisture conden
Humidity	%	**10 - 90**			

Printing:

The mechanism prints on 58 mm wide thermal paper. It has a fixed dot line head with 8 dots/mm. The actual printing width is 48 mm (384 dots/line).
The printer mechanism prints matrices with 64 dots per mm2, which is sufficient for an outstanding print quality.
Its high resolution of 203x203 dpi also qualifies the mechanism to print images, graphics, and even bar code.

Paper path:

A stepper motor transports the paper forward and reverse. A two-position lever at the mechanism is used to insert paper. In the first position, the print head is relieved to support an automatic paper insert. However, this is usually not necessary.

In the second position, the head is completely lifted from the cylinder, so the paper can be directly pushed through.

Sensors:

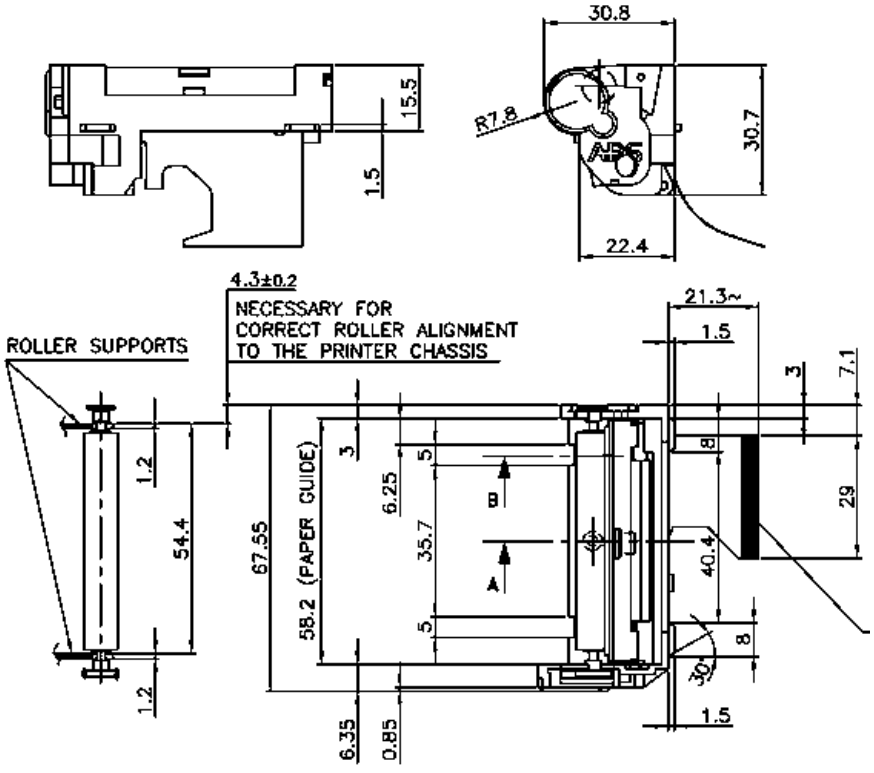
A reflex light barrier monitors, if paper has been inserted.

Mounting:

The mechanism is installed in a sturdy plastic frame and can be mounted with two hooks and one screw.

Other:

Its low weight, compact design, and external dimensions especially qualify this mechanism for applications in portable devices.



3. Controller Board GCT-4382 Features, Summary

Small dimensions:
GeBE designed the dimensions of the controller board (L x W x H = 68 x 58x 15 mm3), so it fits directly underneath the printer mechanism. This is achieved through SMD-technique. The board has mounting holes in the same positions as the mechanism.

Power supply:
Due to high voltage, electricity is conducted through screw clamps. The digital component is supplied through an integrated voltage regulator from the power component.

Parallel and serial interfaces:
The parallel interface (similar to Centronics) connects to a 16pin connector. The RS232 interface (standard component) is carried through a 10pin connector to the interface module on the board that carries out the level conversion between the TTL levels of the µ-processor and the levels of the serial RS232 data line.
If TTL levels are required (e.g. for external level converters), the internal converter can be replaced by 0-ohm bridges.
The inactive handshake lines are terminated through solder straps on the board.

Interface adapters:
The serial TTL interface can be connected with different interface adapters. These adapters e.g. allow an electrically insulated opto coupling or a 20mA current loop. We also offer RS-422, RS-485, and light wave conductors.

The peripherals:
A **paper rewinder** can be connected on solder pads.

Console:
A console with a Feed **button** and a **LED** is placed on the PCB.

Central µ-computer system
The heart of the controller board is a system of a micro processor with 2 KB RAM and a 60 KB flash EEPROM. Optionally, a serial EEPROM can be assembled. In up to 64KBs, logos , custom texts, settings, and character sets can be stored.
Operating modes (text/data mode), interface (Centronics or RS232), and baud rates can be preselected through 4 solder bridges.

Monitoring, watchdog
In order to permanently guarantee a correct function of the controller board, even in an environment with a strong electromagnetic disturbance, the GCT-4382 has an operating voltage control and a watchdog.

Self test:
A test printout can be initiated by pressing the feed button during reset.

Sleep mode:
The controller puts itself in a sleep mode with a power consumption of app. 3mA after 3 seconds of non-operation. This status can not be recognized by the host, and incoming data activate the controller with no data loss.

Power down:
Through an assembly option, the sleep mode can be upgrated to a complete power down. The controller has to be explicitly woken up, when in this mode, before it can receive data again.

Battery Charging Circuit:
Optionally, the controller can be assembled with a battery charging circuit for one lithium- ion battery (3.6 V) or for 3, 4, or 5 Ni-MH cells.

Ni-MH Charging Circuit:
This charging circuit is designed for 4 NiMhd cells (4.8 V). Circuits for 3, 4 or 5 cells or other capacities on request. The maximum charging current depends on the battery voltage (app. 0.7 - 0.3 A). The charging time for a 1,200 mA/h battery will be app. 4 - 5 hours.
The charging circuit is a "simple switch" regulator, meaning that the limitation of current is not done through the charging control but through the power supply unit. The power supply unit is available from GeBE.

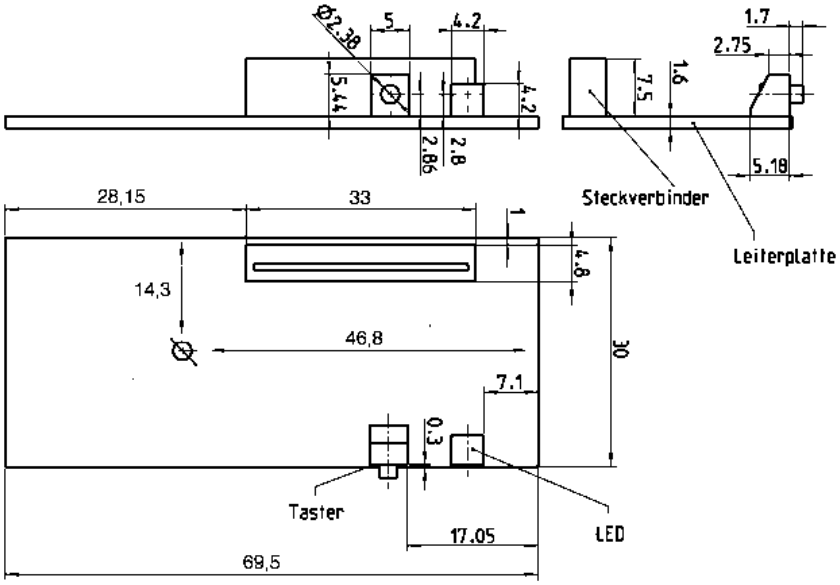
Lithium-Ion Chraging Circuit:
The chargin circuit is designed for one lithium-ion cell (3.6 V; 4.1 V breaking voltage. 4.2 V on request).
The maximum charging current dependson the battery voltage (app. 0.7 - 0.3 A). The charging time for a 1,200 mA/h battery will be app. 4 - 5 hours.
The charging circuit is a "simple switch" regulator, meaning that the limitation of current is not done through the charging control but through the power supply unit. The power supply unit is available from GeBE.
If the cells voltage drops below 2.5 V, the charging control will do a pre-charging with app. 6 mA.

ATTENTION !

Fixed voltage power supplies may never be used for the charging of NI-MH or Lithium-ION batteries. Make sure you use the suitable GeBE power supply, or contact us with your inquiry.

Charging Display:
During the charging process, the operation LED will display the charging status.
Fast charging and trickle charging will be displayed. Please see chapter 4.6 "Status Reports".

Technical Data



GCT-4382 with ELM205	Unit	Min.	Typ.	Max.	Comments
Weight	g		20		
Length	mm		69,6		
Width	mm		30		
Height	mm		7,5		
Voltage of logic	V	(3,0) 3,5		7,2	TTL and Centronics : 4,5 - 7,2VDC
Logic current	mA	0,3	3.0	6.0	Interfaces not connected
Logic current power down	µA	0.0	0.0	15.0	
Logic current with IR interface	µA	90	150.0	300.0	
Operating temperature	°C / °F	-10/14		65/149	Environment
Storage temperature	°C/ °F	-20/-4		85/185	Environment

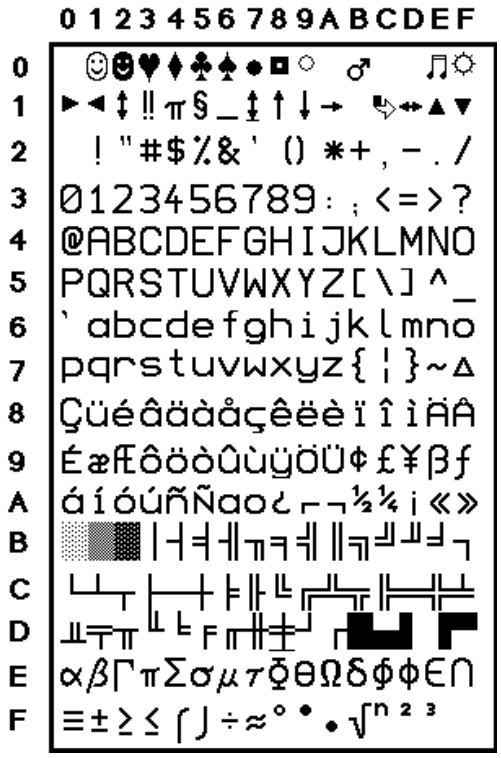
Attention for operation over 6.5VDC:
Due to its small stepper motor, this printer is not suitable for continous operation extending 1 minute. Please contact us for more detailed information.

4.SOFTWARE GCT-4382

4.1 Standard Character Sets, Characters per Line

The character sets in a controller can be selected by command. Other character sets on request.

GeBE Standard Character Set:
IBM II, similar to code table 850



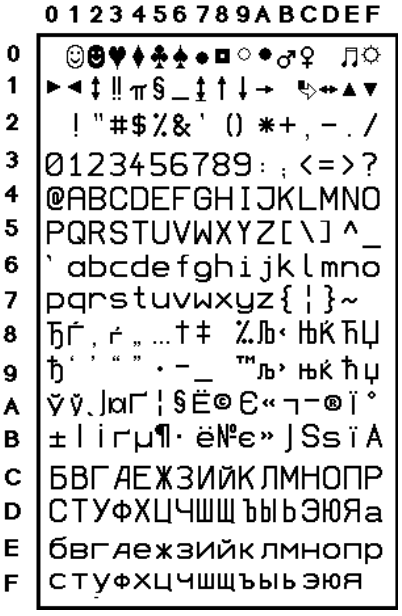
Font No.	Dots (horiz./vert.)	Characters/Line
1	16 / 24	24
2	12 / 24	32
3	9 / 22	42
4	7 / 16	54

4.2 Optional Character Sets, Characters per Line

The following character sets are available at the time and can be programmed optionally.
Other character sets can be created on request.

	Dots (horiz. x vert.) Characters / Line	
IBM II	16 x 24	24
IBM II	14 x 22	27
IBM II	11 x 22	34
IBM II	9 x 22	42
IBM II	7 x 16	54
IBM II 90°	16 x 11	"24"
Kyr	16 x 24	24
Kyr	14 x 22	27
Kyr	11 x 22	34

Optional character set: Cyrillic
Base: code table 850



4.3 Command Set

Summary

4.3.1 Nomenclature

The following terms are used in the tables below:
If possible, all codes and parameters of a command are named with their ASCII name. If that does not make sense, a hexadecimal value is given.
Hexadecimal values that appear in the comment text are marked with a preceding $-symbol. Control codes are written in pointed brackets (<LF> = Line feed: = $0A).
Characters of the character set are in quotes ("E" = $45).
Variable parameters are symbolized by small letters (l, m, n ...).
2-byte values consist of a leading ´Most Significant Byte´ (MSB), and an immediately following ´Least Significant Byte´ (LSB). They calculate the value t = MSB*256 + LSB.

4.3.2 Table of Commands

Short Form

Command (ASCII)	Function	Page
<CR>	Print command, one line paper feed	9
<CR> <LF>	Print command, one line paper feed	9
<LF>	Print command, one line paper feed	9
<LF> <CR>	Print command, one line paper feed	9
<FF>	Form feed to a set length or flag (TOF)	11
<ESC> "@"	Initialize the printer through a RESET pulse	15
<ESC> "A"	Erase data in print buffer	15
<ESC> "b" p1 .... p8	Print bar code (EAN8, EAN13, CODE 39, 2 of 5 interleaved)	14
<ESC> "D" n	Print text mode / data mode	11
<ESC> "E" n	Power Down	16
<ESC> "F" lh ll	Paper feed by lh x 256 + ll lines	9
<ESC> "G" g1....gn	Print pixel graphics, graphic line (old command)	12
<ESC> "g" n g1....gn	Pixel graphics PCL5 , print graphic line with a length of n byte	12
<ESC> "H" n	Change character height from 0: normal height to 7: 8 x height	11
<ESC> "h" n	Set vitual width of the printer mechanism	9
<ESC> "I" n	Print black on white / white in black	11
<ESC> "j" n	Control LED 2 (option LED)	16
<ESC> "k"	Send back current status	23
<ESC> "L" n	Print with / without underline	11
<ESC> "l" ph pl	Select page length	9
<ESC> "M" n	Print black / gray	11
<ESC> "m" n	Select graphic mode	12
<ESC> "N" ph pl	Absolute TAB to dot position p = 256 x ph + pl.	9
<ESC> "n" n [Data]	Send back data string through serial interface	20
<ESC> "o"	Set beginning of page	10
<ESC> "P" n	Select character set no. n	9
<ESC> "p" x y	Select light barrier and distance to print comb	10
<ESC> "R" ph pl	Relative TAB forward/reverse by p dots; p = 256 x ph + pl	9
<ESC> "r" p1.... p12	configure battery charging circuit	19
<ESC> "S" n	Increase horizontal spacing	11
<ESC> "s" n	Load stored text file	22
<ESC> "T" x	Print stored text file no. x. x:= { 0, ... 9}	20
<ESC> "u" n	Erase stored text file.	22
<ESC> "V" "X"	Send synchronous character "X" through the serial interface	9 / 17
<ESC> "v"....	Read out stored text file.	21
<ESC> "W" n	Print normal width / double width	11
<ESC> "y" n	Inverting LED display	16
<ESC> "Y" n	Select blackening of paper individually (n= 10 ...75)	11
<ESC> "[" n ,m	Select power consumptionand quality Mode	17
<ESC> "\" lh ll	Reverse paper feed by lh x 256 + ll lines.	9
<ESC> "]" n	Select baud rate and interface parameters	15

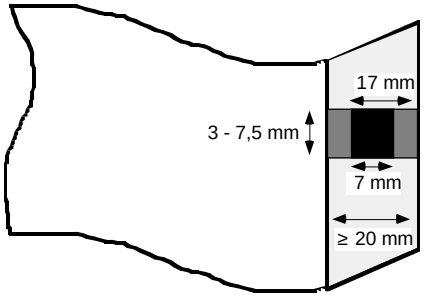
4.4.1 Print Commands

Command (ASCII)	Command (hex)	Function
<CR>	0D	Print command, one line paper feed. An immediately following <LF> will be ignored.
<LF>	0A	Print command, one line paper feed. An immediately following <CR> will be ignored.
<CR> <LF>	0D 0A	Print command, one line paper feed.
<LF> <CR>	0A 0D	Print command, one line paper feed.
Characters > Characters/Line		Characters that do not fit in a line will initiate the printing of that line.
String longer than 120 characters		Besides the printable characters, a large number of control characters can be written into the character buffer without initiating the printing of the following line. This could result in a blocking of the printer. Therefore, the printing of a line will be initiated, when the data string for the structure of a line reaches about 120 bytes or datas, even if the description of the line is not complete.
<ESC> "V" "X"	1B 56 x	Print and report synchronous character "X" through the serial interface. If the line buffer is not empty, this command will also initiate the printing of the current line. See also 4.4.7.3.

4.4.2 Positioning (Horizontally and Vertically)

Command (ASCII)	Command (hex)	Function
<ESC> "F" l_h l_l	1B 46 l_h l_l	Paper feed by l_h x 256 + l_l lines. This command can only be given at the beginning of a line and will be ignored otherwise. The transport is limited to 300mm (2400 dot lines.
<ESC> "\" l_h l_l	1B 5C l_h l_l	Reverse paper feed by l_h x 256 + l_l lines. Limited to 300mm (2400dot lines). This command can only be given at the beginning of a line and will be ignored otherwise. Do not use this command, when a paper rewinder is used. After a reverse feed, the printer will feed forward for 8 dot lines to compensate for the gear play. **ATTENTION:** The paper may not be transported too far backwards. Otherwise, the paper will become mis-aligned, so the rubber roll will not be able to transport the ejected paper forward again.
<ESC> "N" p_h p_l n = 384	1B 4E p_h p_l	Absolute TAB to dot position p = 256 x p_h + p_l.; 0≤p≤n . This command allows an exact positioning to the dot at a print start position for text and bars within a line. Here, dot n outside the print line represents a position, at which the printer expects the next command. This way, a command (e.g. Print gray") can be effective up to the last position n-1. After that, it can be canceled (e.g. "Print black"). If the requested positioning exceeds the available span of a line (0 ... n), the command will be ignored. A TAB will not change the attributes.
<ESC> "R" p_h p_l n = 48	1B 52 p_h p_l	Relative TAB forward/reverse by p dots;l p = 256 x p_h + p_l p is determined as an integer number with plus or minus sign as follows: p_{hl}:= .... FFFD FFFE FFFF 0000 0001 0002 0003 ... p := -3 -2 -1 0 +1 +2 +3 ... If the requested positioning exceeds the available span of a line (0 ... n), the command will be ignored. A reverse TAB will not change the attributes.
<ESC> "h" n	1B 68 n	Select the width of the printer mechanism in bytes. This command only works for text printing. It can be used to change the number of characters per line.

4.4.3 Form Feed, TOF

Command (ASCII)	Command (hex)	Function
<FF>	0C	Form feed: Printing and line feed up to the recognition of the TOF flag or the set page length. A form feed resets the page counter to zero. The feeding will continue until a mark appears (if it is activated), or the set page length is reached. If a mark has already appeared or the page length has been reached at the time the FF command is given, the internal FF counter will be reset to the page length. From the FF command on, the paper will therefore be fed either to the next mark, or (if no mark appears) for a full page length. A reverse feed will be considered, even if it exceeds the limit of the form.
<ESC> o	1B 6F	Set beginning of page to current cursor position. This command will set the internal position counter to zero.
<ESC> l <High-Feed> <Low Feed>	1B 6C xh xl	Set page length in 1/8 mm. Sets the form feed length for operation without light barrier, or the maximum feed length as a termination criterion, when light barriers are used. If a gap is not found or a flag is recognized during the set length, when the light barriers are in use, the feed will be stopped. This command automatically sets the beginning of the page.
		 Attention: The flag will be located on the sensitive side of the paper. The area of the flag may not be printed on. The beginning of the form is not the same as the flag, but depends on the positions of the light barrier.
<ESC> p <distance> <flags>	1B 70 xh xl	The parameter <light barrier distance> indicates the distance of the light barriers from the print comb minus label gap in 1/2 mm. (distance between internal light barrier and print comb = 10 mm = 14h). The gap has to be considered when labels are used. A gap is recognized, when PE, which represents a gap or a flag, is reported for at least 5 mm. When the printer recognizes a gap, it will feed by the selected light barrier distance. If the light barrier is installed behind the print head, the reverse feed has to be done manually. Never feed back a label that already left the print head. Authorized values for<light barrier flags>: xxxx xx00 b no light barrier, **default** xxxx xx01 b internal paper end light barrier The remaining bits should be set to zero. **Paper end recognition** Depending on, whether a form control is active with or without light barrier, there are two different paper end responses. **Without light barrier control:** In order to make the PE function insensitive to disturbances, the paper end will not be triggered before being recognized three times in intervals of 25 ms. With light barrier control: With light barrier, a PE can only be recognized while the motor is moving. A paper that is removed when the motor is standing still will not trigger a PE. A PE will be triggered, if the motor is running and no paper has been recognized for 68 dot lines (8,5 mm).The gap or the flag may therefore be 7,5 mm maximum.

4.4.4 Formatting

4.4.4.1 Selecting the Character Size — Character Set, Width, Height

Command (ASCII)	Command (hex)	Function
<ESC> "P" "n"	1B 50 n	Select character set no. n. n = 1 ...number of character sets The controller masks value n with $0F. Therefore, it can also be put in as an ASCII character "1", "2", "3", ... All character set can be mixed in one line.
<ESC> "H" "n"	1B 48 n	Print n + 1 times height. n := ASCII character "1", "2", "3", ..."7" 0: normal height,1: double height, 2 : triple height, ... 7 : 8x height This command can be mixed with other heights within the same line.
<ESC> "W" "1"	1B 57 31	Print double width. This command can be mixed with normal width in the same line and will be valid until cancelled.
<ESC> "W" "0"	1B 57 30	Print normal width. This command will be valid until cancelled. This setting will follow a RESET.

4.4.4.2 Character Layout

Command (ASCII)	Command (hex)	Function
<ESC> "I" "0"	1B 49 30	Print black on white. This command will be valid until cancelled.
<ESC> "I" "1"	1B 49 31	Print white in black. This command will be valid until cancelled.
<ESC> "L" "0"	1B 4C 30	Print without underline. This command will be valid until cancelled. This setting will follow a RESET.
<ESC> "L" "1"	1B 4C 31	Print with underline. This command will be valid until cancelled.
<ESC> "M" "0"	1B 4D30	Print black. This command will be valid until cancelled. This setting will follow a RESET.
<ESC> "M" "1"	1B 4D31	Print gray. This command will be valid until cancelled.Does not work for graphic commands.
<ESC> "S" n	1B 52 n	Increase horizontal spacing (0≤n≤15; default=0) All subsequent characters will be printed with an additional space of n pixels (spaced characters).

4.4.4.3 Print Mode — Quality Mode Text / Data Mode andAdjustment of Blackening

Command (ASCII)	Command (hex)	Function
<ESC> "D" "n"	1B 44 30	Printing Line rotated by 180°, first line at the bottom page margin Print n := 0 text mode / n:= 1 data mode This command will not work for graphics. This command can be given at any position within a line, as long as the line is not completed. It will be valid until cancelled by the corresponding command. After RESET, the status predefined by switch 4 will go into effect.
<ESC> "Y" n	1B 59 n	Adjust the blackening of the paper individually. n is a factor between 10 (lighter) and 75 (darker). Values outside of this range will not change the current setting. 25 is the default value after a RESET. If different values are required permanently, the command can be entered in the stored text file TINIT. A invalid factor will not affect the actual blackening.

4.4.5 Graphic Command, Compatible to Other GeBE Printers

Command (ASCII)	Command (hex)	Function
<ESC> "G" g1.....gn n = 48	1B 47 g1....gn	Pixel graphics (print a horizontal graphic line): g1 ...gn:= graphic bytes. In text mode, beginning from the left to the right, dot 0 is the MSB of the first byte, the dot on the very right is the LSB of the nth byte. A "1" in the respective bit position represents a black dot in the line. After the nth byte, the printer will automatically return to the character mode. It will ignore all commands while processing these n bytes. Mixing with text: If the graphic command is given and the current text line has not been completed by <CR> or <LF>, text and graphics will be mixed. The graphics will then begin in the top dot line of the text line. If the graphics were longer than the current text, the new text will begin with its top line in the line immediately following the graphics.

4.4.6 Extended Graphic Commands (see PCL Specification)

The structure of the graphic data in these modes correspond to the commands of the PCL specification from version 4 on.
They are compatible with the Windows Compression procedure.

The processing of the compressed data takes about as much time as bit map printing alone.

Command (ASCII)	Command (hex)	Function
<ESC> "m" n	1B 6D n	**Sets the current graphic mode.** 0 : Unencoded 1: Run length encoded 2: TIFF (4.0) encoded 3: Delta row encoded 4: X-byte offset (additional second parameter) 5: Reset delta row seed row This command will be valid until cancelled.The default value is 0. With the command <ESC>" m"$04 n the graphics can be moved to the right. In order to e.g. set a left margin of 10 mm = 80 pixels, you give the command <ESC>" m" $04 $A0. Graphics that exceed the right margin are going to be cut off. The command <ESC>"m" $05 will erase the seed row of the delta row graphics. The seed row is the current line that was printed last. The new line information is compared to the seed row. After the new line is printed, it will become the seed row. This command should always be given at the beginning of graphics that contain delta row commands. This is not necessary, if the first graphic line is not a delta row graphic.

Command (ASCII)	Command (hex)	Function
		Pixel graphics (print a horizontal graphic line): Mixing with text: If the graphic command is given and the current text line has not been completed by <CR> or <LF>, text and graphics will be mixed. The graphics will then begin in the top dot line of the text line. If the graphics are longer than the current text, the new text will begin with its top line in the line immediately following the graphics.
<ESC> "g" n g1.....g n	1B 67 n g1....gn	**0 : Unencoded** n := length of the graphics in bytes, g1 ...gn:= graphic bytes to be printed. In text mode, beginning from the left to the right, dot 0 is the MSB of the first byte, the dot on the very right is the LSB of the nth byte. A "1" in the respective bit position represents a black dot in the line. After the nth byte, the printer will automatically return to the character mode. It will ignore all commands while processing these n bytes. The command **<ESC> "g" n g1...gn** is synonymous with the old command **<ESC>" G" g1...gn**, if n = n max. The graphic mode "0" for unencoded is the default setting. We recommend to use the den ESC g command for new projects.
<ESC> "g" n <DATA>	1B 67 n <DATA>	**1 : Run length Encoded**. n := length of the following graphic bytes. Run length interprets graphic information in byte pairs. The first byte is the repetition count byte for the second byte. A "0" for the repetition count byte means that the graphic byte will be printed once without being repeated, i.e. that a "1" means that the graphic byte will be printed twice. The repetition count byte has a range of 0 - 255, which translates into a print factor of 1 to 256. The second byte contains the graphic information that is to be printed. In text mode, beginning from the left to the right, the dot on the very right is the LSB. A "1" in the respective bit position represents a black dot in the line. After the line is completed, the printer will automatically return to the character mode. It will ignore all commands while processing these n bytes. **2 : TIFF (4.0) Encoded..** n := length of the following graphic bytes. TIFF interprets graphic information as TIFF "pack bits" TIFF combines features of unencoded and run length encoding. The graphic information is preceded by a control byte. The control byte indicates (sign bit), whether the following byte is a graphic byte that is to be repeated (up to 127 times), or whether a number of bytes are following (up to 127) that are to be printed as bit map. A positive control byte is expecting bit map information, a negative control byte (two's complement) is expecting a repeat byte. **3 : Delta Row**. n := length of the following graphic bytes. Delta row will pick out the bytes from a line that are different from the bytes in the preceding line and copy only these. If only one bit is different, just that bit needs to be copied. The delta data consists of a command byte and 1 to 8 replacement bytes.The command byte contains two pieces of information, the number of replacement bytes (bit 7, 6, and 5), and the relative left offset of the last byte that was changed (bit 4, 3, 2, 1, and 0). The value 31 as offset expects a following <u>additional</u> offset byte. The value 255 of this additional offset byte expects another one ... In text mode, beginning from the left to the right, the dot on the very right is the LSB. A "1" in the respective bit position of a replacement byte represents a black dot in the line. After the line is completed, the printer will automatically return to the character mode. It will ignore all commands while processing these n bytes. Graphics and text can not be mixed with delta row.

4.4.7 Bar Code

If there is print data in the current line, the printer will print them and then start a new line. In the new line, the bar code will be printed. Bar code is printed without plain text.

Command (ASCII)	Command (hex)	Function
<ESC> "b" <Type> <Size> X_h X_l Y_h Y_l < Number> <String>	1B 62 <Type> <Size> X_h X_l Y_h Y_l n <String>	Print bar code. Type "A" - Code-39 with plain text; "a" - dito without plain text "B" - Code-2 of 5-interleaved with plain text; "b" - dito without plain text "C" - EAN 13 with plain text; "c" - dito without plain text "D" - EAN 8 with plain text; "d" - dito without plain text "E" - Code-39 with check digit after modulo 43, with plain text; "e" - dito without plain text Size = Width of bars and spaces (0 ...7) $X = X_h * 256 + X_l$ Start position of the code in pixels as distance from left margin $Y = Y_h * 256 + Y_l$ Height of the bar codes in pixels without the plain text. Y is internally rounded to whole millimeters, e.g.:Y = 406 is printed as 50.0mm (Y ≤ 100mm = 800pixels). n = Number of bar code characters (n ≤ 30). String = Characters that represent the bar code information (not all characters are allowed; see below).

Available Bar Sizes:

Size (hex)	Width [Pixels] Narrow Element	Width [mm] Narrow Element	Width [Pixels] Wide Element	Width [mm] Wide Element
0	2	0.250	5	0.625
1	2	0.250	6	0.750
2	3	0.375	7	0.875
3	4	0.500	9	1.125
4	5	0.625	12	1.500
5	6	0.750	14	1.750
6	7	0.875	16	2.000
7	8	1.000	18	2.250

Character Set:

Code-39: 1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ$/-.+%<Space>
Code 2 out of 5 interleaved: 1234567890 (The number of characters n has to be even.)
EAN13: 1234567890 (Other characters will only result in the printing of the text information, but not of the bar code itself. The check amount, which is the 13th character, is calculated and added by the printer itself.)

EAN 8: 1234567890 (Other characters will only result in the printing of the text information, but not of the bar code itself. The check amount, which is the 8th character, is calculated and added by the printer itself.)

Code Width:

Code-39: 6*wide + 14*narrow + n*(3*wide+7*narrow)
Special characters may slightly differ from this formula.
Code 2 out of 5 interleaved: 1*wide + 6*narrow + n*(2*wide+3*narrow)
EAN13: narrow element * 95
EAN 8: narrow element * 95

The printing of bar code will be ignored, when:
- a wrong type or an unknown size was given,
- the number n given was either too big, or did not correspond with the type.

A white area will be ´printed´ instead of bar code, when:
- the right line margin or the maximum height of 100mm would be exceeded,
- characters were put in that do not correspond with the character set of the code.

If the bar code is ignored, the characters of the string will be printed as plain text.

4.4.8 Special Commands, Initialization Commands

4.4.8.1 Baud Rate, Interface Parameters, Buffer Initialization Commands

<table>
<tr><th>Command (ASCII)</th><th>Command (hex)</th><th>Funktion</th></tr>
<tr><td><ESC> "]"
<baud rate>
<Mode-Flags></td><td></td><td>Configurate serial interface:
The controller switches to a new baud rate, as soon as the preceding characters have been decoded and transfered to the printer mechanism. This may lead to a delay for the execution of the baud rate command, so the old setting will be active for a short period of time.
Therefore, it is important to use this command only, when the controller is not busy. This is the case after a reset, or can be inquired with the feedback of a synchronous command (see "Synchronization with Other Devices").
Authorized values for <baud rate> (binary):
1 : 1,200 Bd , 2: 2,400 Bd , 4 : 4,800 Bd , 9: 9,600 Bd , 19 : 19,200 Bd
38 : 38,400 Bd , 57 : 57,600 Bd , 76 : 76,800 Bd
Authorized values for <mode-flags> (binary):
0xxx xxxx b error output on (default)
1xxx xxxx b error output off
xx00 xxxx b no parity xxxx 0xxx b 7 data bit
xx01 xxxx b zero parity xxxx 1xxx b 8 data bit
xx10 xxxx b odd parity xxxx x0xx b 1 stop bit
xx11 xxxx b Even parity xxxx x1xx b 2 stp bits
xxxx xx0x b mode flags disabled
xxxx xx1x b mode flags enabled

When a framing or a parity error occurs, a "?" will be printed in place of the defect character, and a "?" followed by an "X" will be sent through the RS232 interface.
This funktion is at1200 baud disabled.

After a RESET, the DIP switches are scanned first, and then the baud rates are set accordingly. The error output is disabled. If a different setting is required, it has to be entered in TINIT.
The command ESC] <00h> <02h> switches on the error output. The current parameter setting is not affected.This command is a default content of T-INIT. If the EEPROM T-INIT is used, this command has to be behind the baud rate command.
Through bit 7 of the MODE flags, the output through the serial interface can be turned off completely.</td></tr>
<tr><td><ESC> "@"</td><td>1B 40</td><td>Initializes the printer with a self-generated RESET pulse, just like after power-on. Between the receiving and the processing of this command some time will pass, which depends on the filling level of the buffer. Data that is received during this time will get lost due to the reset. Therefore, there has to be a waiting period of about 2s after this command has been given, before any print data can follow. Afterwards, the controller will report its state of readiness as usual through the serial interface.</td></tr>
<tr><td><ESC> "A"</td><td>1B 41</td><td>Erase the data in the line buffer.</td></tr>
</table>

4.4.8.2 Power Down

Befehl (ASCII)	Befehl (hex)	Funktion
<ESC> "E" n	1B 45 n	Sets the power down time in seconds: Parameters Time Mode 0 - Power down off 1 - 127 1 - 127 sec Always turn off after 1 - 127 sec 128 - 255 1 - 127 sec Turn off after 1 - 127 sec, if there are no data left in the line buffer. The parameter 128 - 255 is interpreted as an optionally signed byte value. The controller has a power down mode. In this status, the power consumption is reduced to app. 0A. Unlike the standard power saving mode (RS232 < 3 mA), the controller has to be "woken up" before it can receive data. By closing of the solder bridge BR6 also the RS232 driver goes into the Shut down , thereby the current reduces (without LED) from < 3mA to approx. 300 µA. However the controller announces so no ready status to the host over the status line DSR. During the wake-up phase, the controller will loop the usual power-up for about 1ms, i.e. all settings that were changed before the power-down will be reset to the standard settings. The power-down command and all required initializations should be written in the TINIT. This will allow the controller to correctly initialize after wake-up and go into power-down after the set time period. Attention: Power-down requires the prior removal of R31 and Jumper 3. **Wake-up:** - Through the feed button. (up version V1.3) - Through RS232 / TxD For wake-up, the TxD levelhas to be> 5V for at least 1 ms (logic 0). We recommend to send the dummy character 00Hex, until the printer reports to be ready with DSR or XON. - Through RS232 / DSR In order to switch the controller to the power-down mode, DSRhas to be < 0V (logic 1). For wake-up, DSR has to be > 5V for at least 1 ms, before it may be reset. - Through TTL / DSR In order to switch the controller to the power-down mode, DSR has to be 0V. For wake-up, DSR has to be > 5V for at least 1 ms, before it may be reset. - Through Centronics / Select In: In order to switch the controller to the power-down mode, a 00Hex has to be sent as the last character and "Select" In has to be low. For wake-up, Select In has to be on high for at least 1 ms, before it may be reset.

4.4.8.3 Option LED

Command (ASCII)	Command (hex)	Function
<ESC> "y" n	1B 79 n	LED power saving mode To save current, it is possible to reduce the lightning of the Status LED. For LED timing please take a look at capter 4.6
<ESC> "j" n	1B 6A n	Switches the "OPTION" LED: For n = 00h : LED off , n = FFh : LED on The lower 2 bits switch the flash frequency: 0 : app. 6.0 s , 1 : app. 3.0 s , 2 : app. 1.5 s , 3 : app. 0.75 s The upper 5 bits set the pulse / pause rate: (value of the upper 5 bits) 01h : 1/31 .... 1Fh : 31/31 Bit 2 is always 1 With this function, a programmable TTL output can be realized as well, e.g. for cashier drawers.

4.4.8.4 Power Consumption, Quality Mode

Command (ASCII)	Command (hex)	Function
<ESC> "[" n m	1B 5B n m	Select maximum power consumption and print quality: ESC [<max. black pixels> <max. segment size in byte> Parameter 1 <max. black pixels> Sets the number of black pixels that can be printed simultanously. Minimum: 8, maximum: 192 As soon as the black pixels in one line have reached this value,the print line will be filled up with zeros and the line heated up. Afterwards, a new cycle begins with the next pixels. Recommended values are : 8, 16, 32, 64, 128, and 192.. Default is 64 The maximum current peaks can be calculated as followed: **I = Vp* number of pixels/123 Ohm (+ IVcc + Imotor)** At 64 pixesl and VP = 3,6V app. 2,4A At Vp = 7,2V app. 4,7 A Parameter 2 <max. segment size in bytes> With this parameter, the print speed dynamics can be adjusted: High dynamics will allow the printer to print each line as fast as the maximum given current allows. Therefore, an empty line will be printed faster than a full line. With low dynamics, each line would be printed as fast as a completely black line. The parameter determines, how many bytes max. form a printhead segment that can be printed simultanously (even if they only contain zeros). If the minimum, 1, is chosen, the printer will always devide the line into 48 segments. With the maximum of 48, a whole print line can be heated up in one operation, if the maximum number of pixels for parameter 2 is not exceeded. Even Pinting: Example: ESC [<32> <4> heat segments of 4 bytes max., with 12 segments (already reached with 4 bytes, since 32 pixels can be heated). Printing with maximum dynamics: Example: ESC [<0> <32><48> segments of 1-12 bytes, depending on the number of black pixels. Recommended values are : 48 for maximum print dynamics, or same numbers for heating parameter and number of pixels (e.g. <64><8>) for even printing.

4.4.8.5 Synchronization

With this command, the printer can be synchronized with superior or peripheral devices. As an example, a certain action is to be done, after a certain text was finished being printed. Since the printer has a buffer, the user normally would not know, when this is the case. However, the printer can report this moment back through the serial interface, if the synchronization command was given subsequently to the text that is to be printed. All available characters can be used as synchronization commands. This also allows the monitoring of complex program sequences. It is recommended not to use characters that are also used as error messages.

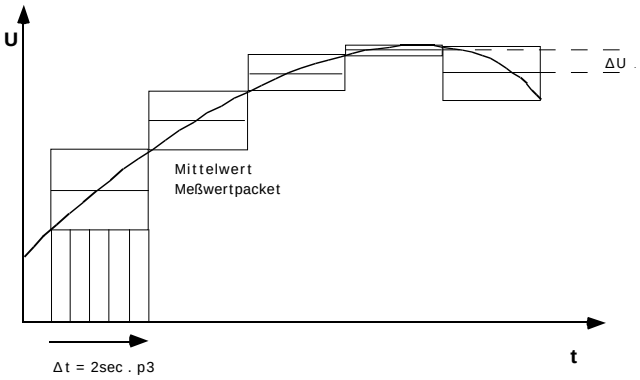
Command (ASCII)	Command (hex)	Function
<ESC> "V" "X"	1B 56 x	Print and report symchronous character X through the serial interface. X: = all available characters. If the line buffer is not empty, this command will also initiate the printing of the current line.

4.4.8.6 Ni-MH Charging Circuit (Only for EVAL Interface)

The GCT-4382 -EVAL is equipped with a Ni-MH charging circuit **WITHOUT ITS OWN CURRENT LIMITATION.** Therfore, this controller can only be operated with power supplies that have been authorized by GeBE.
The type of charging recognition can be configurated as desired. A controller in sleep mode will be re-activated by applying the charging voltage, and the rapid charge will start automatically. The rapid charge will end and change over to trickle charge, as soon as one of the following conditions is met:

1. Timer End
When the charging current is low, a negative Δ U can not easily be recognized. For some Ni-MH batteries, a timer controlled charge of up to 1/3 C is allowed. In this case, a charging time of about 3 - 4 hours is recommended.

2. - Δ U Recognition
Standard rapid charge process for Ni-MH batteries:
When a Mi-MH battery is fully charged, the battery voltage will fall. This falling of the voltage is interpreted a the end of charging. The charging current should never fall below 250 mA, so the fallingof the voltage at the end of the charging process can be clearly recognized.
In order to eliminate the noise between measured values, several values will be combinedand added up to a 16 bit average. The interval between measurements is 2 seconds.
As a result of the averaging of several measurement values the length of becomes Δt sufficient.
Parameter P3 controls the number of measurement values, and therefore the timeΔt.



3. Maximum U Recognition
This criterion is supposed to protect the battery from distruction, and should be set to the value specified for the battery.

4 . Δ T Recognition :
If the temperature of the battery rises with the given speed, the battery will be recognized as full
(From this point on, all charging power is converted into heat..).

5. Maximum T Recognition:
This criterion is supposed to protect the battery from distruction, and should be set to the value specified for the battery.

4.4.8.7 Standard Settings for GeBE Battery Types
The charge command is entered in the TINIT.

GeBE	Recommended Setting												Comment
Battery Types	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	
GNA-4,8-1,2-Ni-MH	"1"	50	255	1	128	170	3	255	1	128	35	3	

Rapid and trickle charge are displayd by a characteristic flashing of the status LED(see 4.6).

4.4.8.8 Discription of the Charge Command (Only for EVAL Controller)

The charge command is entered in the TINIT.

Command (ASCII)	Command (hex)	Function
<ESC> "r" p1..... p12	1B 72 p1 .... p12	With this command, the type of charging process can be selected. If the command is given during charging, the process will re-start. **p1:** Battery- Type: ´1´: Ni-MH Charge Baterry- Type: ´2´: Li-Ion Charge (not implemented yet) All other values are not allowed or turn off the charging process. **p2**: Timer controlled charging. The charging time starts with the applying of the charging current. **1 LSB corresponds to 1/10h, 250 (binary) corresponds to 25 hours.** **p3:** Number of values that are used to calculate the average voltage. The lower the charging current, the higher this value should be. **p4:** Number of delta V- recognitions required before delta V is recognized as valid (should normally be1 (binary)). **p5:** ΔU - difference: Gives the difference, from which the "ΔU" will be recognized (rated as big enough). **1 LSB corresponds to 0,565 mV ,128 (binary) corresponds to 72,32 mV.** **p6:** Voltage - maximum value. If the battery voltage (Vp) exceeds this value by p7-fold, the charging will end. **1 LSB corresponds to 36.165 mV ,170 (binary) corresponds to 6,148 V.** **p7:** Repetition counter for the maximum voltage. The maximum voltage has to exceed the value p6 p7-times in succession in order to stop the chrarging process. **p8:** Number of measured value averages for temperature corresponds to p3 for the temperature. **p9:** Number of delta T- recognitions required before delta T is recognized as valid. **p10:** ΔT difference corresponds to p5 for temperature. **1 LSB corresponds to 0,01°C,** **p11:** Maximum value for temperature. Attention! High temperatures result in low measuring values! Corresponds otherwise to p6 for temperature. **°C := (- 0,6 x value) +60 - 35 (binary) corresponds to 40°C.** **p12:** Repetition counter for maximum temperature otherwise corresponds to p7 for temperature:

4.5 Stored Text Files

The GeBE concept for stored text files represents a kind of file system in the printer memory.
The controller can store up to 13 text files (T0 - T9 ,TQ ..S) that can be selected by the user. In addition to that, there is a text file memory T-init, in which the controller initialization commands are filed. If e.g. a printer is supposed to print in data mode with double height and bold, the respective commands are entered in the stored text fileT-init. After the RESET, the controller will first process these commands. A stored text file can be called through another.

When no text files are stored in the EEPROM, the standard text files from the flash will be used. As soon as there are text files in the EEPROM, they will be substituted for the flash files. This workes by the command "<ESC> "t"<Nr.>" in the Flash file. Values between 1 kbyte and 64 kbyte can be used for the EEPROM. The software will check for an EEPROM and its size. EEPROM text files can also be addressed directly through "<ESC>" t"<Nr>".

There are two separated blocks of stored text files. Block 1 contains the text files T0 - T9, block 2 contains the text files T-INIT, TQ, TR, and TS . Each text file can be programmed independently, however, the files can only be erased as a block (block 1 or block 2).

Block 1:	T0 - T9 as custom macros, logos,etc.
Block 2:	T-INIT as Initialization macro
	TQ, TR, TS (for e.g. firmware status, serial number, ...)

Block 2 can be blocked in the EEPROM through the hardware.
Then, block2 will always have 1/4 of the total memory available.

Stored Text File T-INIT:
After a power-on RESET, watchdog RESET, or software RESET, the text memory t-init is called at the end of the software initialization. The commands that are filed in T-init can now be sent to the printer in order to change the parameters.
Stored Text Files TQ, TR, and TS: (only in Flash)
These stored text files work like the stored text files T0-9 , however, their erasing is linked to T-init.
Applications are e.g. serial numbers or firmware status.
Die text file TQ contains the software number: e.g. "GeBE GE-2790"
Stored Text File T0:
The printing of the stored text file T0 can be initiated with the command "Print stored text file no. 0", or after a RESET. If the feed button is pressed during a reset, the printing of this text file will begin. As a standard, information on the printer is stored in this memory.
Stored Text File T1:
The printing of the stored text file T1 can be initiated with the command "Print stored text file no. 1", or through the input "Test" (Connect button.). In the standard program, the stored text file no. 1 is called as a part of stored text file no. 0 with the command "Print stored text file no. 1".

4.5.1 Processing of Stored Text Files

Command (ASCII)	**Command (hex)**	Function
<ESC> "T" "X"	1B 54 x	Print stored text file no. x. x:= { 0, ... 9,Q,R,S}. The processing is "transparent" for the controller, meaning that for the controller the data of the stored text file appears to come through an interface.
ESC "n" [NUMBER] [DATA]	1B 6E n, y1 ..yn	Send string to serial interface: This command is entered with the data in a text file. It can be used to enter serial numbers and scan them by command. Example: serial number1234567890 in stored text file S ESC n <10><1234567890> is entered in TS. When ESC TS is called,1234567890 will be sent back to the host. This command is similar to the command "Send synchronous character". The only differences are that the controller will not wait for the synchronization, and that a whole string can be sent through the serial interface.

4.5.2 Management of Stored Text Files

4.5.2.1 Reading the EEPROM Memory Space

With these commands, the user can inquire before programming, whether there is still enough memory space available. The content of a text file will not be erased by another programming, but will remain unused in the memory. An erasing only occurs with the command ESC "V" "5".

Command (ASCII)	**Command (hex)**	Function
ESC "v" "5" "T"		Reading the available memory for T0 - T9. Readout format: The numbers are transferred to the host in the hex format as 2 bytes of 2 hex numbers each. Attention: Zeros in stored text files are stored as <zero> < number of zeros>. A file ends with two zeros.Therefore, the actual storage requirement of a file can differ from its length: The space requirement decreases, when several zeros follow each other, and increases for single zeros.
ESC "v" "5" "U"		Reading the available memory space for TINIT. Readout format: The numbers are transferred to the host in the hex format as 2 bytes of 2 hex numbers each.
ESC "v" "6"		Reading the EEPROM size. Readout format: The numbers are transferred to the host in the hex format as 2 bytes of 2 hex numbers each.

4.5.2.2 Reading Stored Text Files

With this command, the content of any text file can be read. Attention:
This command whould NOT, when the XON/XOFF-protocol function is turned on. XON / XOFF characters in the file (e.g. in graphics) are transferred uncoded. When XON/XOFF protocol is used, it is also important, that the printer buffer should not be in the XOFF status, before this command is sent, and that no further data should be sent to the printer during the reading of the text file in order to avoid the sending of an XOFF character. Otherwise, the printer might generate XON/XOFF characters that the host interprets as part of the file.

Command (ASCII)	**Command (hex)**	Function
ESC "v" "7" <Nr> DUMMY		Reading out the EEPROM file <No>: (0....9) Number of the T-INIT := @ Two bytes will follow (<High> <Low>) that are coded to 2 hex nibbles each, stating the length of the file. This is followed by the data of the file. The dummy byte can have any value, it is necessary for programming reasons. The command for the reading of the text files may not be part of a text file itself. If it is, in case of an invalid text file no., or when an EEPROM file is not programmed, the letter string 'XXXX' will be sent instead of the 4 hex numbers.
ESC "v" "8" <Nr> DUMMY		Reading out the FLASH file <No>: (0....9,TQ, TR, TS) Function like ESC "v" "7" See description above.

4.5.2.3 Programming and Erasing

Passwords are necessary for the programming and erasing of files.
These can be set separately for erasing and programming, or for block 1 and block 2, just as needed.
At this time, the passwords <PROG> and <ERAS> are used.

Command (ASCII)	**Command (hex)**	Function
ESC "s" <No> PROG <high number> <low number> <data>		Programming the stored text files 0 - 9 : <No> = Number of the text file that needs to be loaded, e.g. "9" for T9. PROG is the password/protection from accidental erasing. A text file can be programmed several times in a row without erasing. However, a reorganization of the memory does not occur. With the following programming, the memory space used for the first programming will get lost until the next erasing. 255 x <high number> + <low number> is the number of bytes to be loaded without command sequence. <data> = Data bytes in number stated above. Writing speed app. 200 bytes/sec.
ESC "s" " @" PROG <high number> <low number> <data>		Programming the stored text file T-INIT : For a description, see <ESC> s<No>.....
ESC "u" "T" ERAS		Erasing the stored text files 0 - 9 The stored text files T0 - T9 can only be erased together. ERAS is the password/protection from accidental erasing.
ESC "u" "U" ERAS		Erasing the TINIT file. ERAS is the password/protection from accidental erasing.

4.5.2.4 Error Codes for Programming and Erasing

Messages	**Message serial**	**Comments**
Errors:		
EE_NOERR	"E0"	EEPROM command completed error-free
EE_ERR_INVALID	"E1"	Invalid text file no.
EE_ERR_PW	"E2"	Wrong password for erasing or programming of text files
EE_ERR_FULL	"E3"	Text file memory overflow
EE_ERR_TIMEOUT	"E4"	The maximum programming time for an EEPROM byte was exceeded during programming.
	'E5' - 'E9'	Future Use

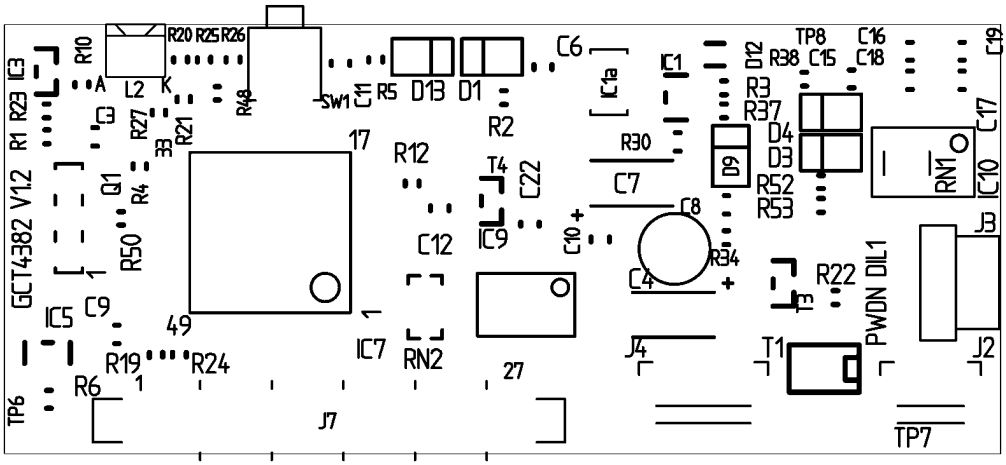
4.6 Status Messages
4.6.1 Automatic Status Output
Errors are reported through the parallel interface, the serial interface, and the error LED. Besides the data and handshake lines, the parallel interface also contains feedback lines that are switched accordingly, when errors occur. However, because of the limited number of lines, the feedback of errors is not always clear, when several errors would have to be reported simultanously. Most of the time, the most fatal error will be reported first. In this case, the serial interface has the advantage that errors are reported sequentially.
After an error was cleared, the corresponding small letter is sent, followed by an "X" if no futher error is activ .

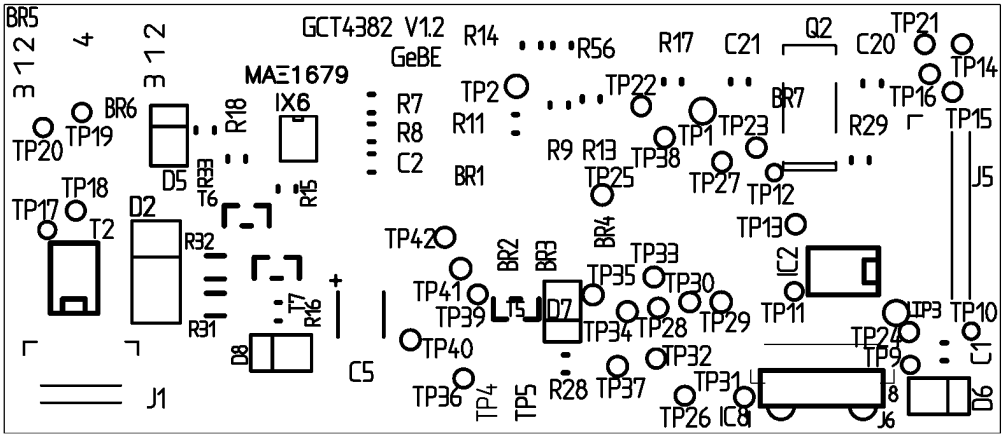
Messages	**Serial Interface**		**Busy**	**/Fault**	**Select**	**Paper end**	Status LED On/Off ; flash-frequency y := 1	y := 0	**Comments**
Faultless operation:				1	1	0	LED on	1:31;0,5 Hz	
Reset	"R"			0	0	0			Level on the status lines only short-term during phase of initialization Message: < XON R X(or error)>
Watchdog reset	"R"			0	0	0			After system failure
End of error	"X"			1	1	0	LED on	1:31;0,5 Hz	Also after reset, software, and watchdog resets
Buffer empty	X ON								Buffer emptied by 33 characters <DC1> = $11
Puffer full	X OFF		1						Space for 33 more characters in buffer <DC3> =$13
Synchronous feedback	all characters								Processing synchronization commands each sent character
Errors:		OK		1	1	0			
Paper end	"P"	"p"		1	0	1	1:1 ;0,5 Hz	1:1 ;0,5 Hz	
Temp. low	"K"	"k"		0	1	0	1:1 ;0,5 Hz	1:1 ;0,5 Hz	Print head temperature too low
Temp. high	"T"	"t"		0	1	0	1:1 ;0,5 Hz	1:1 ;0,5 Hz	Print head temperature too high
Vp too low	"U"	"u"		0	1	0	1:1 ;0,5 Hz	1:1 ;0,5 Hz	
Vp too high	"M"	"m"		0	1	0	1:1 ;0,5 Hz	1:1 ;0,5 Hz	
EE-OK	"E0"								EEPROM command completed error-free
EE-invalid	"E1"								Invalid text file no.
EE-password	"E2"								Wrong password for EEPROM access
EE-overflow	"E3"								Text file memory overflow
EE-time out	"E4"								EEPROM byte programming time exceeded
Akku Laden:									
Fast charge	"l"	"L"					1:1 ; 0,1 Hz	LED on	L := charge start l := charge end
Trickle charge	"f"	"F"					1:7 ; 0,1 Hz	1:7 ; 0,1 Hz	F := charge start f := charge end

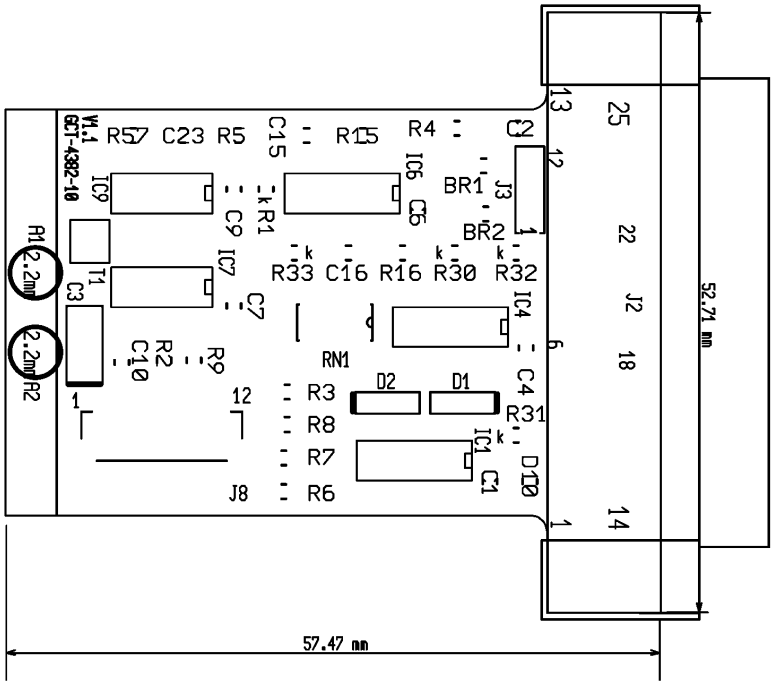
4.6.2 Inquiring the Current Status
With this command, the user can inquire the current status of the printer.

Command (ASCII)	**Command (hex)**	**Function**
<ESC> "k" n	1B 6B n	Send back all current status messages. The controller sends back all current status messages sequentially. If there is no error to report, an "X" will be sent back. This command will not be processed immediately. Since it is treated like a printable character, the processing will not begin, before all characters that were sent prior have been processed. For this special case, the error messages can be repeated automatically. n = 0 : The repeat function is turned off. n = 1 ... 254 The current printer status is sent in intervals of app. 1/10s x n to the host n = 255: Single inquiry without influence on the set repetition time.

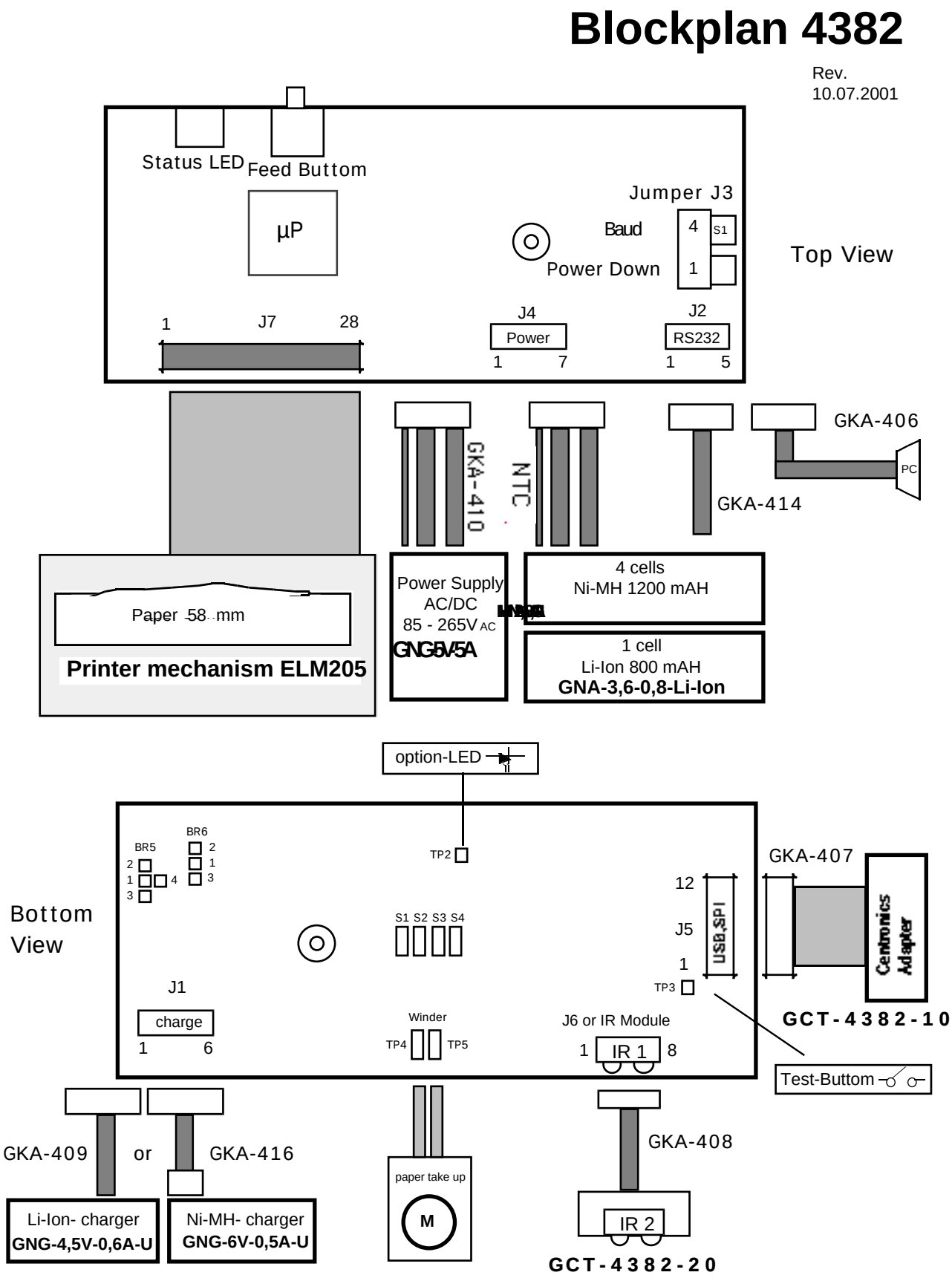
5.1 Mechanical Dimensions and mounting holes







5.2 Block Circuit Diagram



5.3 Connections

This chart is a summary of all connections of the controller board.The position of the connectors can be seen in the drawing in chapter 5.2 Layout. GeBE offers several different preconfigured cables and modules. These are either preconfigured on one end, or fit with an adapter for e.g. a PC connection. Further information can be found in the following detailed interface descriptions, and in the product list at the end of the manual.

Label	Pins	Name	Type of Connection	Connector	Manufacturer	GeBE Cable
J1	6	charge power supply	single wires		JST	GKA-409 (single ended)
J2	5	Serial RS232/TTL	single wires		JST	GKA-406 Sub-D 9 GKA-414 (single ended)
J3	2 x 2	Jumper	Jumper		JST	
J4	7	power supply	single wires		JST	GKA-410 (single ended)
J5	12	SPI-USB	single wires		JST	GKA-407 (single ended)
J6	8	Infrared	single wires		JST	GKA-408 (single ended)
J7	28	CON-A printer	flex cable		SUYIN	printer mechanism part
TP1	1					
TP2	1	Option LED	solder pad			
TP3	1	Test Bottom	solder pad			
TP4	1	winder+	solder pad			
TP5	1	winder -	solder pad			

5.3.1 Power Supply

The connection is done through a 7 pin crimp connector.
The power supply Vcc for the digital component is produced through a voltage transformer from the voltage Vp for the power component. Since the power component absorbs high currents, low-ohm current feeding is strictly required (short lines with a large cross section).

5.3.1.1 Power Supply Connector J1

PIN	Signal	Comment
1	Power GND	
2	3,0 - 7,2 V Power	
5		
6		
7	NTC	connect a 6.8KOhm NTC of a NI-MH Battery

5.3.2 Serial Interface

5.3.2.1 Infrared Interface (option)

Hardware:
GeBE offers a convenient infrared interface for wireless transmission. This IR transmitter/receiver unit is available with an external adapter, or as an option,can be installed on the controller board.
The physical transmission is compatible to the IrDA SIR hardware layer V1.0. This procedure is used for transmission rates between 2,400 bps and 115 kbps. These speeds are comparable to the serial standard interface. The hardware layers IrDA FIR and 4 ppm are not supported.Therefore, the bit intervals will be between 417 µs and 8.7 µs (~ 20 µs at 9600 bps). A pulse of 3/16 of the pulse width represents a logic 1. The light levels are between 40 mW/sr (Milliwatt/Steradian) and 500 mW/sr. The distance beween the host and the receiver is specified with 1cm to 30 cm. Standard settings: 9,600 baud (2,400 - 57,600 bps available on request) no parity, 1 stop bit.

1. SHARP IR Protocol:
Unlike the IrDA protocol, the Sharp IR protocol does not have any software layers that are used for communication in networks or for controlling the hardware. The Sharp IR is similar to the software layer IrCOMM of the IrDA Standard. For master-slave connections, Sharp IR provides a simple and cost-effective solution for including an IR protocol in existing systems.The protocol has been expanded for operation with a printer and also controls the functions of the printer

2. IrDA Protocol: An IRDA Protocol is under development.

3. HP Protocol: An HP Protocol is under development.

5.3.2.2 Serial Interface J5

The possible functions of the serial interface are the transmission of print data and the handshaking.

Hardware Handshake

The handshake line DSR (data set ready) is controlled together with the monitoring of the total input buffer. The signal is controlled simultanously with XON and XOFF. A handshake by the character does not occur. With the selected baud rates, the controller can immediately take all characters into the buffer memory without timing problems.

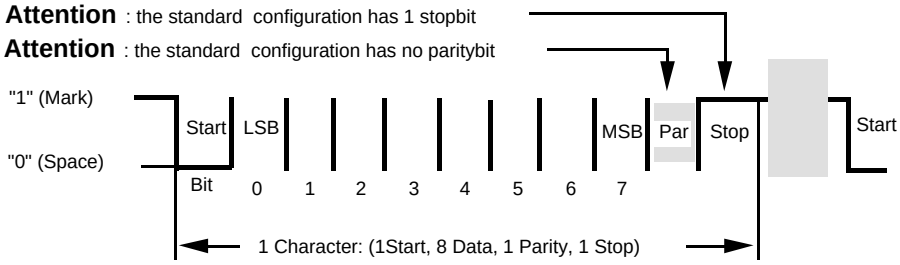
XON/XOFF - Protocol

The data transmission between host and controller board can either be controlled with the hardware handshake, or through XOFF and XON protocol.

The input buffer has 256 bytes memory. Since many hosts are not able to stop the data stream immediately, a handshake is carried out, before the input buffer is completely filled.

When the memory is full leaving space for 32 characters, the controller will send the control code Xoff to stop the data stream from the host to the controller. When the buffer is reduced to 234 characters again,the controller will send an Xon signal. Then, the host can start sending more data.

5.3.2.3 Timing of the Serial Interface



Signal	Level on TTL interface	Level on RS-232 interface
"1" (Mark)	+5V (TTL-level)	-3V ... -12V
"0" (Space)	0V (TTL-level)	+3V ... +12V

5.3.2.4 Serial TTL — Interface Adapters

The serial interface with TTL levels can be assembled **only as an alternative** to the RS232 interface. For that, the level adapter is replaced by 0-Ω bridges. This is an assembly variant which can not be carried out by the user. The level position in accordance with the table above will then be:

logic-0 or space corresponds to +0 ...+0,5V, and logic-1 or mark corresponds to +1,5 ...+3V.

5.3.2.5 Serial RS232 (EIA562)

The connector for the RS232 interface is a JST SH connector.

The arrangement that is shown below allows a 1:1 interface to connect an AT-compatible PC using a female 9 pin Sub-D multipoint connector.

5.3.2.6 Pin Arrangement RS232 / TTL

Pin	Signal	Input/ Output	Bemerkung	Cable GKA-406 D-SUB 9Pol
1	GND signal			5
2	TXD	I	Print data	3
3	RXD	O	Error messages and Xon/Xoff messages	2
4	CTS	O	When the controller can accept data, the level will be logic-0	7
5	RTS	I	Handshake input of the controller (Standard : no function)	
Auswahl über BR5	+3.0V digital		Power supply for external adaptors	
	+3.0 - 7.2V Power		Power supply for external adaptors	8

5.3.3 Operating Console

Paper Feed Button:
If the paper feed button is pressed, the paper will only be fed, after the printing of a line has been completely finished. Then, the paper will first be transported by only one character line (24 dot lines), followed by a small brake. If the button is still pressed afterwards, the paper will be fed continously line by line,as long as the button stays pressed. This allows a specific feeding of just one line by shortly pressing the button. Afterwards, normal printing will be continued at the beginning of the following line.

LED_Error
This connection is used to connect an LED. You can find information on its control in the table "Error Messages".

LED_Option
This connection is used to connect an LED. Available for custom solutions.

Test Button:
When the test button is pressed, stored text file T1 will be printed. Depending on its contents, it can activate other stored text files.

Pin	Signal	Input/Output	Bemerkung
TP2	LED-Option	O	Kathode, 180 ohms resistor on board
TP3	Test Buttom	I	

5.3.4 Options (solder pads) Peripheral Connections

Paper Rewinder
/rewinder is an open-collector power output for ohmic and inductive loads up to 150mA max (short-term 500mA). Here, a motor to rewind the printed paper can be connected against Vp. Ge BE offers rewinders and mounting accessories. See Product list and accessories..

Pin	Signal	Input/Output	Comments
TP4	Rewinder +		Paper rewinder
TP5	Rewinder -		

5.3.5 Connection of the Printer Mechanism J7

This connector is reserved for the connection of the thermal printer mechanism ELM205.

5.3.6 Expansion Bus SPI-USB J6

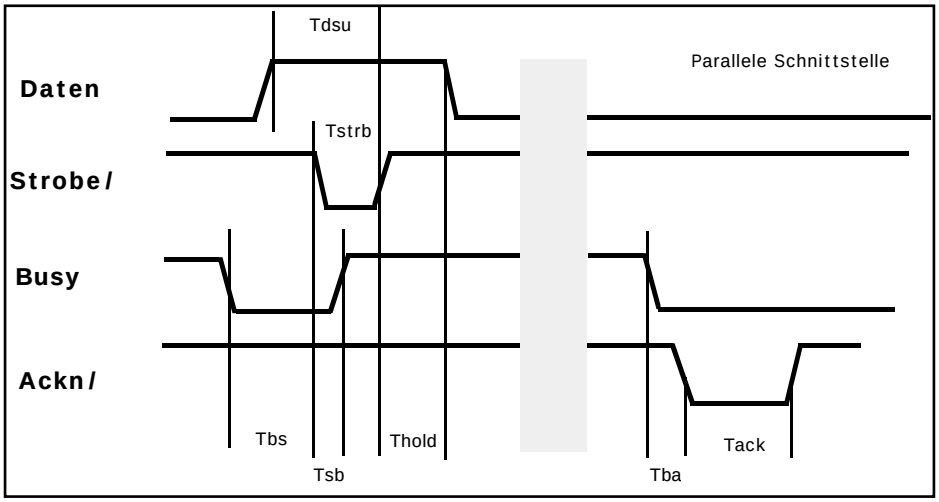
This is an expansion connector with a synchronous serial bus.
It is used for external devices like Centronics or a watch module.

Pin	Signal	Input/Output	Bemerkung
1	GND digital		
2	Vcc (+5V)		
3	CLK1		
4	MOSI1		
5	MSO1		
6	/EN3		
7	/Info-DSR		
8	En-Vcc		
9	/EN1 Error		
10	/EN2		
11	Vprog		
12	/Reset		

5.3.7 Parallel Interface (GCT-4382-TTL mit GCT-4382-10)

A Centronics adapter GCT-4382-10 can be connected to the controller GCT-4382-TTL through the SPI bus.
The possible functions of the parallel interface are the transmission of print data, the generation of a reset (hard- or software), as well as the status feedback. The status feedback will not be as detailed as the one from the serial interface. The parallel interface is very fast, which qualifies it for the transmission of graphic data.

5.3.7.1 Timing of the Parallel Interface



Time	Name	min (µs)	typ (µs)	max (µs)	Comment
Tack	Ackn.pulse width		17		
T_{ba}	Delay busy-ackn.			5.5	
T_{bs}	Busy setup	0.5			Time before the next strobe
T_{dsu}	Data setup	0.5			
T_{hold}	Data hold	0.5			With open collector-triggering, the minimum time is 3.5 µs. This value can be changed to other values by assembling the RC filters alternatively.
T_{sb}	delay strobe-busy	0.5			
T_{strb}	Strobe pulse width	0.5			

5.3.7.2 Pin Arrangement for the Parallel Interface

The connector for the parallel interface is a male 25 pin Sub-D-multipoint connector for a direct connection to a PC.

Pin	Signal	Input/Output	Comment
1	Strobe/	I	Accepting data DB0 ..7 WITH THE RISING EDGE
2	DB0	I	
3	DB1	I	
4	DB2	I	
5	DB3	I	
6	DB4	I	
7	DB5	I	
8	DB6	I	
9	DB7	I	
10	/Acknowledge	O	
11	BUSY	O	Becomes high with the falling edge of /strobe
12	Paper End	O	See error messages
13	Select	O	See error messages
14	Auto Line Feed	I	to be connectet with Select in Windows Mode
15	/Fault	O	See error messages
16	/Input-Prime	I	
17	Select In	I	wake up signal (see power down)
18-25	GND digital		

5.4 Presettings

5.4.1 Initialization Values After a Reset (Software, DIL Switches)

The memory has an initialization text file "Tinit ", in which the commands for the initialization of the controller are filed. If the printer is required to e.g. print with double height and inverse in data mode, the corresponding commands will be set in the stored text file T-init. After a RESET, the controller will first process these commands. All commands can be entered in a stored text file. The controller will interpret the calling of a stored text file, as if data is sent through an additional "virtual" interface. One stored text file can be called through other ones. Additional or different settings can be done by the manufacturer through entries in the stored text file T-init. If there is an optional EEPROM, T-init can be changed through an interface. Also see chapter "EEPROM".
A reset will first activate the standard settings, read the solder bridge settings, and then process TINIT. If the line feed button is still pressed after the TINIT has been processed, the stored text file T0 will be printed afterwards.The basic setting of the controller corresponds to the following commands that are not entered in the TINIT: <ESC> “A”; <ESC> “D” “0”; <ESC> “H” “0”; <ESC> “I” “0”; <ESC> “L” “0”; <ESC> “M” “0”; <ESC> “N” 0 0; <ESC> “P” 1; <ESC> “S” 0; <ESC> “W” “0”. If all these settings need to be changed, they should be added to the TINIT.

5.4.1.1 Standard Entries in the TINIT

Command (ASCII)	Command (hex)	Function
<ESC> "Y" $19	1B 59 19	Set the blackening og the paper to a medium value of 25.
<ESC> "[" $40$18	1B 5D 40 18	Set power consumption to 64 pixels, medium print dynamic and quality
<ESC> "]" $09$0A	1B 5B 09 0A	Interface : 9600,n,8,1
<ESC> "]" $00 $00	1B 5B 00 00	error messageing activ

5.4.2 Solder Bridges Baud Rate, Text/Data Mode

The controller board has four 0 Ohm bridges or optional two jumpers. These bridges are inquired once during each RESET.

S1/	Name	Meaning					Comments
R37 or J3	Enable Power Down	If the resistor is not assembled the controller is after Power up in sleep mode					Standard:assembled (disable) only with Power do
BR4	Text/data mode	Data mode: Printout turned by 180°, first line at bottom edge					Standard: not assembled (text mode)
BR3	RS232/Centr	Choice, whether RS232 or Centronics (GCT4382-10 on SPI) should be active.					Standard: not assembled (RS232)
BR1/ BR2 or J3	Baud rate	Baud	**9600**	19200	38400	57600	Standard: not assembled (OFF) Other baud rates on request. Each inquired once during RESET.
		BR1	OFF	OFF	ON	ON	
		BR2	OFF	ON	ON	OFF	
RN1	Signal- and Handshake lines	Assembled with TTL levels for serial interface					Standard: not assembled
BR5	V ADAPTER Select	Pin 4 of the serial interface can either be supplied with RTS (Host handshake of RS232 , in standard no function), Vcc or VP					**1-2 closed: Vcc to J2/Pin4** 1-3 closed: Vp to J2/Pin4 1-4 RTS to J2/Pin4 (wake up for TTL controller, up from version v1.3)
BR6	V RS232 Select	The power supply of the RS232 driver is permanent connected in power save mode.If closed, the driver will go in shut down after printing (ca. 300µA). In Shut down only the driver input is aktiv. This means that the Handshake signal will not give a "printer ready" signal.					**1-2 closed: permanet.** 2-3 closed: RS232 shutdown enabled

5.4.2.1 Solder bridges of the parallel Interface Module GCT-4382-10

	Name	Meaning	Comment
BR1 oder J3		Return of AUTO_LF exit of the host to SELECT: With this, a Windows System can report back SELECT.	J3: 1-2 closed. Select active
BR2 oder J3		SELECT interrupt	standard open

6. APPENDIX Product List and Accessories

GeBE Article No	GeBE Model Name	Description	Comment
	ELM205-LV	Thermal printer mechanism, (58 mm) 2.7 - 7.2V	ex stock
	ELM205-HS	Thermal printer mechanism, (58 mm) 4.2 - 8.5V	on request
	ELM205-HS	Thermal printer mechanism, (58 mm) 4.2 - 8.5V	on request

6.1 Controller Equipment and Options

	Artikelnumber	Controller for ELM-205-LV	Interface					EEPROM		Akku			Power Down	winder		chars / line: 24 and 42, 54	
			RS232	TTL	Infra Rot (connector for IR Adaptor)	Infra Rot on Board	SPI (for Centronics Adaptor)	2KByte EEPROM	16KByte EEPROM	LIION charge circuit	NiMhd charge circuit						
Stan-		GCT-4382-LV-24-V.24	X										X			X	
		GCT-4382-LV-24-Eval-V.24	X					X			X		X	X		X	
		GCT-4382-LV24-TTL-Centr		X			X	X			X		X	X		X	
		GCT-4382-LV-24-Eval-IR			X			X			X		X	X		X	
special versions		GCT-4382-LV-24-EVAL2-IR2				X		X		X			X	X		X	
						X											
Versions for ELM205-HS on request																	

6.2 Preconfigured Cables, PC-Connection Cables

GeBE Article No.	GeBE Model Name	Description	Comment
	GKA-406	**RS232 at PC:** 5 x single wires, 0.08 mm^2, 1000mm PC: 9pin Sub-D, female, socket connector	ex stock
	GKA-407	**SCI Bus:** 12 x single wires, 0.08 mm^2, 250mm Bouth sides JST connector	ex stock
	GKA-408	**Infra Red:** 8 x single wires, 250 mm, Bouth sides JST connector	ex stock
	GKA-409	**Battery charge:** 6 x single wires, 0.08 mm^2, 250mm One side open	ex stock
	GKA-410	**Power supply:** 7 x single wires, 0.08 mm^2, 500mm One side open	ex stock
	GKA-414	**RS232/TTl:** 5 x Einzelleitung, 0,08mm^2, 500mm, controller: JST connector, One side open	ex stock

6.3 Power Supplies

GeBE Article No.	GeBE Model Name	Description	Comment
	GNG-5V-5A-AC	Power supply 85-265VAC to 5V DC	ex stock
	GNG-5V-5A-DC24	DC/DC transformer 18 - 36 VDC to 5V DC	ex stock
	GNG-5V-5A-DC12	DC/DC transformer 9 - 18 VDC to 5V DC	on request
	GNG-4,5V-0,6A-U	Powersupply for Li-Ion Batteries	on request
	GNA-3,6-0,8-LIion	Lithium Ion Battery 3,6V, 0,8Ah	on request
	GNG-6V-0,5A-U	Powersupply for NiMhd Batteries	ex stock
	GNA-4,8V-1,2Ah-NiMH	MIMH Prisma- Battery 4,8V, 0,9Ah	ex stock 4cells
	GNA-4,8V-0,9Ah-NiMH	MIMH Mignon- Battery 4,8V, 0,9Ah	ex stock 4 cells

6.4 Interface Adapters

The assembly variant "TTL" we offer as an option has a serial interface with TTL level (0V-5V). Several different interface adapters can be connected to this TTL interface.

GeBE Artikel Nr	GeBE Model Name	Description	Comment
	GSW-RS422/485	Interface adapter TTL to RS422 level,10 pin connector	ex stock
	GSW-RS422/485 Opto	Interface adapter TTL to RS422 level, opto isolated, D-SUB 15 pin connector	on request
	GSW-RS232-2/2-Opto-DC/DC	Interface adapter TTL to V.24 level, opto isolated with DC/DC-transformer, D-SUB 9pin connector	on request
	GSW-20mA-1/1-Opto-passive	Interface adapter TTL to 20mA current loop, opto isolated, passive operation, D-SUB 9pin female multipoint connector	on request
	GSW-20mA-1/1-Opto-active	Interface adapter TTL to 20mA current loop, opto isolated, active operation through built-in DC/DC-converter, D-SUB 9pin female multipoint connector	on request

6.5 Paper Roll Holders, Rewinders

GeBE Article No.	GeBE Model Name	Description	Comment
		Paper roll holders:	
	GPW-K-060-062-24V	Paper rewinder 62mm disc 24volt	
	GPW-K-Fuß	Mounting foot	

6.6 Paper

GeBE Article No.	GeBE Model Name	Description	Comment
	GPR-T01-057-031	Thermal paper roll, one-ply, 57±0.5mm wide, app. 31 mm diameter, 7mm center	High quality, 5 years ex stock