Thermal Printer Module

Elektronik und
Feinwerktechnik GmbH

Module und Geräte zum Eingeben, Auswerten, Anzeigen und Ausdrucken analoger und digitaler Daten.

GPT-621X-83/84

5V Printer Mechanism GPT-6202-Cut
58/60 mm Paper Width • 203 dpi • Paper Cutter
5V Printer Mechanism GPT-6203
80/85 mm Paper Width • 203 dpi
5V Printer Mechanism GPT-6204
112/114 mm Paper Wdith • 203 dpi
Printer Controller GCT-6283/84-V1.1b
RS232 • TTL • IR • Text, Graphics and BarCode • Power Down Modes

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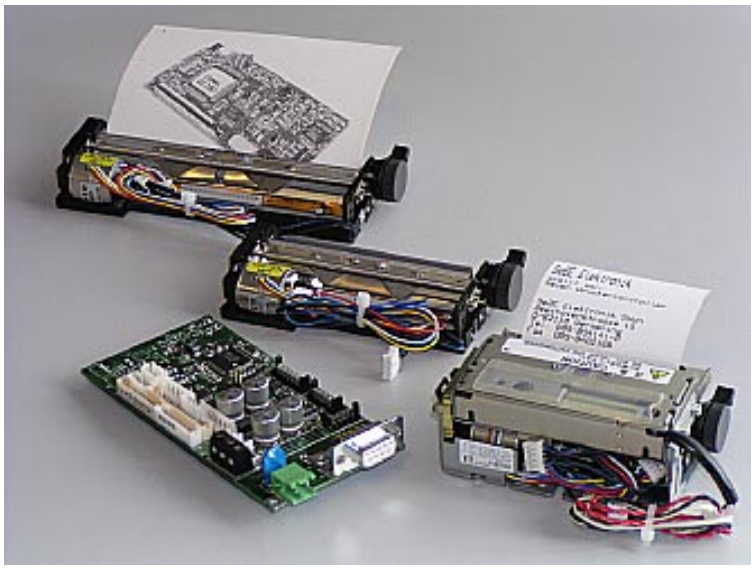
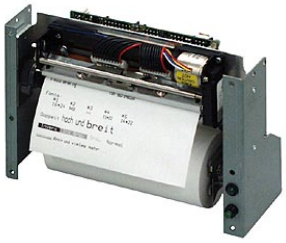
Software ab GE-3136
German: MAN-D-464



GeBE Produkts on the INTERNET

You can find the products described in this manual under:

www.oem-printer.com/gct-621x



Applications for the printer modules of the GeBE printer series INFO, HOUSING, and VARIO

User Manual

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About this Manual

This manual provides information regarding the 5V thermal print system GPT621X that essentially consists of:

- 5V thermal printer mechanisms: with front/ reverse paper feeder

GPT-6202	58/60 mm paper width
GPT-6202-Cut	58/60 mm paper width incl. paper cutter
GPT-6203	80/85 mm paper width
GPT-6204	112/114 mm paper width

- thermal printer controller GCT-6283/84, developed and manufactured by GeBE.

GeBE is offereing these print systems installed in mutiple housings for integration:

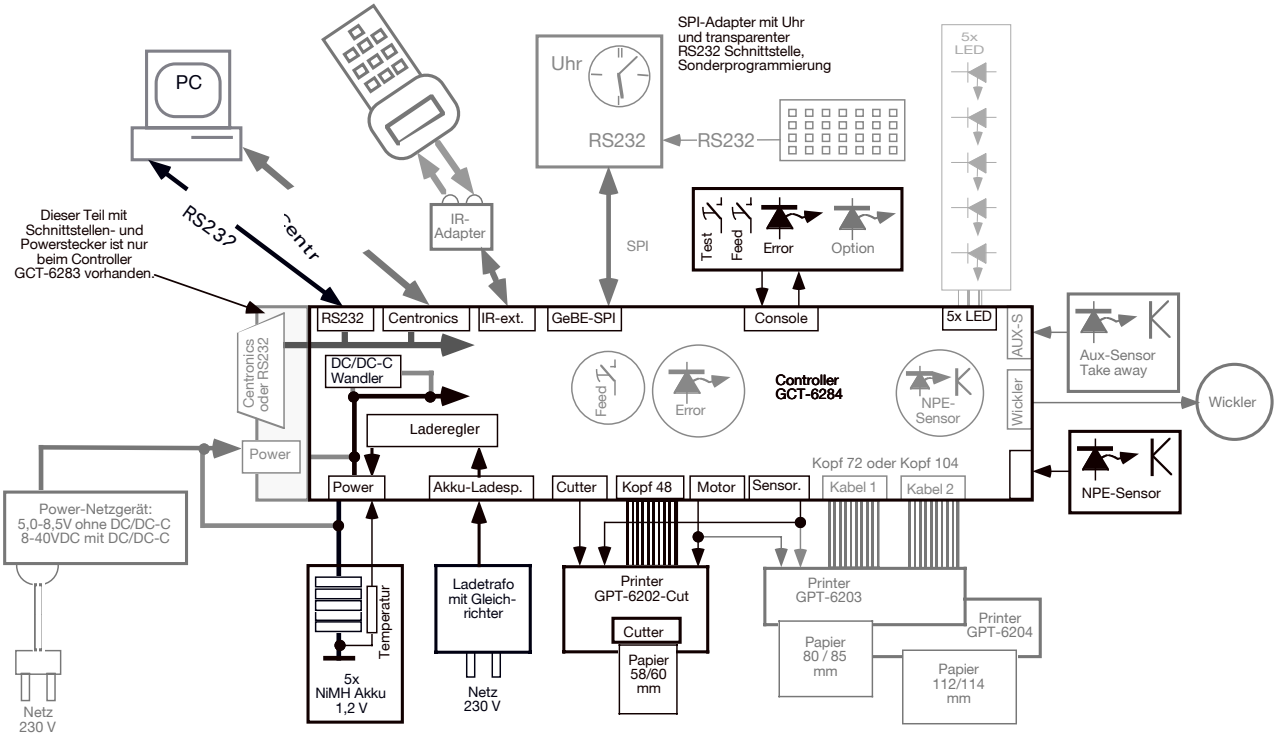
- **System INFO:** For integration in vending machines, terminals, vehicles for ticket issuing.

- **System HOUSING:** An injection molded housing only for the 80 mm wide version, the GMT-3392. Due to its outstanding power management, this system is ideal for applications in battery-operated, portable devices like handheld computers, measuring instruments, and terminals.

- **System VARIO:** Installation behind front panels of any design.

After the table of contents and the history of changes, you can find marketing information describing the main features of the printer mechanism and its specifications, followed by a summary of the basic features of the controller board in combination with the printer mechanisms, as well as possible applications for these printer systems.

For the technical user, a detailed description of the hard- and software with a list of product versions, system components, and accessories follows.



Hervorgehobene Konfiguration:
Controller: GCT-6284-24-V.24
Druckwerk: GPT-6202-Cut (58 Papierbreite mit Cutter)
Schnittstelle: Seriell RS232
Stromversorgung: Akku 5x NiMH, Ladetrafo mit Gleichrichter
Bedienelemente: Externe Konsole mit Test- und Feedtaster
Anzeigeelemente: Error LED auf externer Konsole

Blockplan System GCT-621X

GeBE Elektronik und Feinwerktechnik GmbH www.oem-printer.com
File: GCT-6283/84-Prod. Stand 10.1.2003 v2.0

Inhalt

1 History of Changes in this Document

Version	Date	Cange
V0.1-V0.8	12/02 - 06/03	First edition
V0.9	07.2003	Preliminary version
V0.91	11/2003	Preliminary version; layout changes
V0.92	04/2004	Chapt. 4.7.1 new: LED - Flashing = error free; new: Cutting Command Chapt.4.2.2 and 4.3.6
V0.93	08/2004	New Version Number 1v1b; Chapt. 4.1 new Character Set3 and Character Set3 cyrillic
V1.0	08/1002	Report "E5" in Chapt.4.7; last Check

Short Information

• Compact, high quality thermal printer mechanisms by Fujitsu

• Efficient printer controllers from GeBE

• For applications in handheld computers, terminals, and portable measuring instruments

• For protocol, receipt, and ticket printing

• Battery operated with 5x 1.2V NiMH cells

• Integrated charging circuit

• Sophisticated power management with energy saving power down modes

• DC/DC converter supports the use of car batteries through wide input buffer range of 8-40 VDC

• The printer with 58/60 mm paper width can be equipped with an integrated cutter.

(Due to the relatively low operating voltage and the high forces required for cutting, there is no cutter available for the other printers at this time.)

• Serial and parallel interfaces
• High print speed, up to 50 mm/s
• High print quality with 203 dpi
• Text, graphics, and bar code printing
• Batch file and logo printing from the EEPROM
• 4 different character sets (IBM-II/850) in multiple sizes
• Special character sets and custom programming possible. Please contact us.
• Generates 4 different bar codes:
EAN8 / EAN13 / 2 of 5 interleaved / code39
(others on request)

Flexible Hardware Adaptability

These 5V thermal printer modules stand out through their ease of integration, adaptability, and extensive flexibility for special applications - especially for small and medium-sized quantities.

The essential variable parameters are:

• **Paper widths**: with front feeder 58/80/112 mm; with reverse feeder (label printing) 60/85/114 mm

• **Serial interfaces:** Different data formats up to 115 Kbaud, Xon-Xoff, or hardware handshake, RS232 or TTL levels, external, opto-isolated level converters from TTL to RS422/485 and current loop, infrared through freely positionable IR adapter

• **Parallel interface:** instead of serial interface

• **Operatig voltages:** 5.0 - 8.5 VDC through power supply, or 5 cells 1.2V NiMH batteries with charging circuit controlled by the µ-processor,or 8 - 40 V with integrated DC/DC converter

•**Power saving modes:** Idle mode (automatic), sleep mode optional, hard and software controlled, with or without new initialization for reactivation with a dummy character

• **Operaing elements:** On the controller board for application in INFO printers, or through connector for external connection: FEED button, status LED, near paper end sensor, 5 additional LEDs

• **Integrated paper cutter:** Currently only available for the 58/60 mm printer mechanism

• **Paper rewinder control:** Can be used for other tasks as open collector output

Convenient Choices for Creating the Print Layout

4 **character sets** with 256 characters each (similar to IBM-II code table 850) and different sizes to choose from;
Extensive **layout commands** to create a more attractive receipt: print black on white, print white on black, print gray, underline, select character size from single to 8-fold, single or double character width, change **horizontal spacing**, adjust effective print width. The paper can be transported forward and reverse by the line. The printer independently generates 4 different **bar codes** (EAN8 / EAN13 / Code39 / 2 of 5 interleaved). Other character sets (e.g. cyrillic) or bar codes on request.

• **Controlled Reliablity**
A **synchronizing command** causes the printer to send feedback to the host, when the print job has been processed up to this position. This can be used to monitor the progress of the printing, but also to start other processes within a system. The program flow is safeguarded by a **watchdog**. **Sensors** and **A/D converters** monitor the paper supply, measure the print head and battery temperature, and control the operating voltage. When an EEPROM is installed, a sophisticated **reporting system** delivers the amount of printed paper and the number of cuts the cutter has performed for service purposes.

• **User Friendly Software Integration**
All commands that overwrite the power-on initialization before the printer starts printing, including the commands for parameterizing, can be filed in a serial EEPROM (8 - 64 KB). This EEPROM can be programmed by the user himself. Batch files for recognition, advertising purposes or logos can be filed. The printout can be started by command.

• **Custom Software by GeBE**
Command and character set customization can be performed at the factory.

• **VARIO:** Printer modules for all three paper widths (58/80/112 mm): For integration behind front panels; exchange of paper through front lid; paper output under a window; with paper tear bar; optional long view port on large front lid with integrated rewinder; models in DIN-switchboard housings with or without transparent front lid.

• **HOUSING:** Injection molded housing with elegant design for 80 mm paper width for installation in front panels or desktop housings. Also suited for portable devices. Easy paper exchange due to separated front panel at the paper output with sliding lock that is easy to operate.

• **INFO:** Robust printer for integration, available for all three paper widths (60/85/114 mm): With slim form factor for vending machines with receipt issuing through paper catch or through issuing slot in the front; front or side installation, large paper rolls up to 150 mm diameter, very service friendly.

GeBE products on the INTERNET

You can find the products described in this manual under:

Modules:
www.oem-printer.com/gct-621x
VARIO:
www.oem-printer.com/vario
MULDE:
www.oem-printer.com/mulde
INFO:
www.oem-printer.com/info

2 Easyload Printer Mechanism Systems GPT-621X

2.1 Components of the Printer Modules

The printer systems essentially consist of

- 5V printer mechanism GPT-6202 (FTP-624MCL304)
- 5V printer mechanism GPT-6202-Cut (FTP-624MCL001)
- 5V printer mechanism GPT-6203 (FTP-634MCL503)
- 5V printer mechanism GPT-6204 (FTP-644MCL001)
- Thermal printer controller GCT-6283
- Thermal printer controller GCT-6284

2.2 Printer Mechanisms

The printer mechanisms are manufactured by Fujitsu with a high level of technical competence. Their small size and low power consumption make them stand out. They can be operated with 4.5 V, which makes them ideal for portable applications.
While the printer mechanism GPT-6202-Cut has an integrated paper cutter, the printer mechanisms GPT-6202, GPT-6203, and GPT-6204 do not.

FTP-624MCL001 (GPT-6202) 58 mm

FTP-624MCL001 (GPT-6202-Cut)

FTP-634MCL503 (GPT-6203)

FTP-644MCL001 (GPT-6204)

Thermal Printing

A fixed print comb prints 8 dots/mm on thermal paper. The effective print width is 48 / 72 / 104 mm.
The print comb is controlled electronically. The print dots are specifically heated within milliseconds. They heat up a dot on the paper surface which has a thermo-sensitive layer. When the temperature of the print dot rises above the reaction temperature of the thermal paper (app. 100 degrees Celsius), the heated layer blackens, and a small dot appears. All dots together finally show the desired graphics on the paper. In order to achieve this, the controller activates the dots of the print comb electronically line by line. The paper transport is controlled by a stepper motor.

Paper Paths Inside the Printer Mechanism

The thermal paper can be fed into the printer mechanism either from the back (widths 60 / 85 / 114 mm), or from the front (widths 58 / 80 / 112 mm). An IR reflex light barrier monitors, when the paper is inserted, and then starts the auto-load function through the controller. The transport roll starts spinning. When it grasps the paper, it is automatically pulled inside the printer mechanism, so the print roll will not need to be turned manually. Next to the small manual wheel is a lever that lifts the print head from the transport roll. This is helpful, when the print head needs to be cleaned or exchanged, or to clear a paper jam. A sensor at this lever (small micro-switch) monitors, if the printer mechanism is closed correctly, and triggers an error report, if the print head is not closed at the beginning of printing.

Paper Transport

The gearing, which is protected against dust, reduces the torque of the small stepper motor enough to allow for steps of 0.125 mm length in forward and reverse direction. With this step size, the printer can print with a density of 8 dots/mm (matrix printing with 64 dots per sq mm), even in the direction the paper is transported in. This results in a high resolution printout, high enough for bar code printing.

Installing the Printer Mechanism

The printer mechanisms are set in a sturdy plastic frame. During installation, be particularly careful that there is an even amount of pressure on all mounting points. This is to ensure the printer mechanism does not become misaligned, causing the paper path to become skewed.
The printer mechanism can be mounted with 2 screws and 2 fasteners, or alternatively with 4 fasteners.

2.3 Controller GCT-6283/84 - Features, Summary

Two Versions: GCT-6283 and GCT-6284

The controller system that GeBE developed for the 5V Fujitsu printer mechanisms of the GPT-620X series is available in two different board dimensions:

- GCT-6283 (long version with standard interface connections)
- GCT-6284 (short version)

The circuit board has two holes for installation.

Central µ-Computer System

The heart of the controller system is a single chip microprocessor with 2 KB RAM and 60 KB flash ROM. A serial EEPROM (standard 8 KB) that is expandable up to 64 KB can be assembled as an option for filing logos, custom texts, and parameter setting commands with the operating programm. Virtually all commands that have to be directed at the controller can be filed in text files (like a batch file) in the serial EEPROM, and activated with a short command.

Presetting Important Operating Modes through Hardware

Text/data mode, power-down, and baud rates can be preset through solder bridges and jumpers.

Monitoring, Watchdog

In order to permanently guarantee the correct function of the controller board, even in an environment with a strong electromagnetic disturbance, the GCT-6283 and the GCT-6284 have an operating voltage control and a watchdog. When addressed, they cause the system to reinitiate.

Self Test Printout

While the controller is being turned on, a test printout can be initiated by holding the feed button down.

Serial Interfaces RS232 and TTL

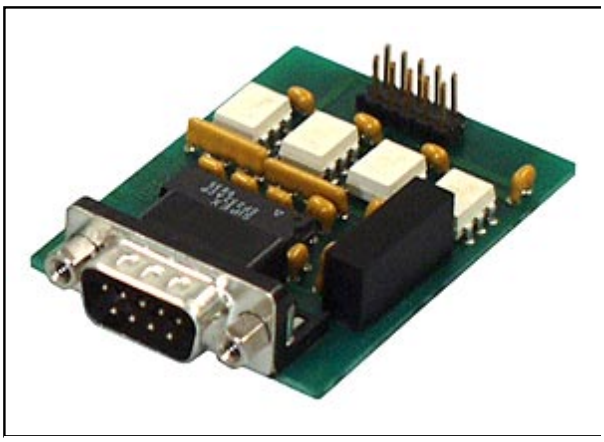
The serial RS232 interface is connected to the controller either through a 9 pin SUB-D connector (GCT-6283), or through a 10 pin MICA connector (GCT-6284).
If TTL levels are required (e.g. for external level converters), the internal RS232/TTL converter can be replaced by 0-ohm bridges.

Interface Adapters

A number of interface adapters can be connected to the serial TTL interface. These adapters e.g. include an electrically insulated opto coupling, and lead to a 20mA current loop, RS422, RS485, or light wave conductors on the secondary side.

Infrared Interface

An infrared interface is available as an optional component. The associated IR transmitter/receiver module (GCT-4382-20-IR) can be connected through a connector pair. This IR interface is operated with the bidirectional GeBE IR protocol, which is completely disclosed by GeBE, so users are able to adapt their drivers.



Converter TTL >>> RS-422/485 GSW-RS422/485

Parallel Interface

The controller concept also supports an optional parallel interface. The controller version GCT-6283 can have a 15 pin SUB-D-HD socket installed at the factory in place of the 9 pin SUB-D of the serial interface.

GeBE SPI Interface

To expand the functionality of the controller, it is equipped with the GeBE-SPI-BUS. Additional external functions like small keyboards or displays can be operated through this interface, subject to the required special programming. One example is the clock module that is described below.

Clock and Second Serial Interface on a Peripheral Module

If special protocol tasks require the time to be

on the printout, but a clock is not available in the superior system, a clock module buffered by a lithium battery can be installed through the accessable GeBE-SPI-BUS on the controller board. The clock is set with two buttons (FEED and test) through the console connection, while the printer prints out the current setting. Date and/or time can be added to the printed text by command. The clock module can be equipped with another serial interface for the transparent transmission of data to the host (e.g. to connect a keyboard or a small display). However, this requires special programming. Please contact us with your inquiry.

Near Paper End Sensor Inside the Paper Roll Holder

A paper sensor can be installed (reflex light barrier) that reports when the paper supply is almost out.

Paper Cutter

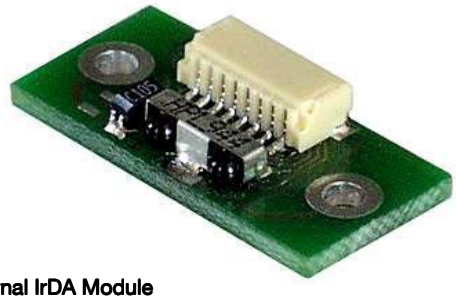
The 58/60 mm printer mechanism is equipped with a paper cutter controlled by the controller board.

Paper Rewinder

The standard version comes with an installed motor driver for the connection of a paper rewinder that can be operated with the Vp. This output (open collector, 150 mA at Vp) can also be used for other tasks subject to special programming.

Paper Path Monitor

A light barrier can be connected to monitor the correct functioning of the paper path.



External IrDA Module

Console

A **control key FEED** and a green status LED can be installed on the board as an option. The controllers GCT-6283 that are integrated with the GeBE INFO printers have this option included. Usually, the operating elements are connected through the console connector. Besides the FEED button for reactivating the printer and feeding the paper, there is a "test" key for initiating printouts of special batch files (e.g. advertising with logo, operational comments). The status LED, or an additional LED that is controlled by a program, can also be connected through the console connector.
See chapter 4.6 Text Files (Batch Files) on page 47, and LED Control on page 34.

5 LEDs Optionally Controllable

As an option, a shifting register for the control of up to 5 LEDs can be installed on the board at the internal SPI-BUS (En-Aux2). If the serial interface is used, this shifting register also serves for the output of status messages (fault, PE, select), which requires special programming.

2.4 Power Supply, Power Management

2.4.1 Multiple Operating Voltage Sources

The printer system can be operated with voltages between 5 and 40 V.
The following operating voltage sources are feasible:

- 5-8,5 VDC external stabilized power supply
- 10 - 36 V DC uncontrolled, (DC/DC converter 10-36VDC installed in the controller)
- 5x NiMH batteries (Mignon), voltage source for charging uncontrolled 10 - 28 VDC, 800 mA

The digital component is supplied through an integrated voltage control, therefore, the system can be operated with just one connected voltage source.
The maximum current that is withdrawn from the power source during printing can be limited to values between 0.7 and 4.5 A, which allows the printer to adapt to the capacity of the feeding power source. If this results in less power, the printing will be slower.

External Power Supply

As an external power supply, a controlled power supply with 5-8,5 VDC (should be capable of handling high peak currents up to 5 A (high peak currents within milliseconds), in order to achieve a high print speed) can be used.

Integrated DC/DC Converter

As an alternative to the charging current regulator for battery operation, an efficient DC/DC converter can be installed on the board. Through this converter, the print system can be operated with a voltage between 10 and 36V DC (output voltage Vp in the system is about 7,7 V, permanent current 2.5 A). If car batteries in vehicles are used for operation, optional filter elements may be installed.

Operation with 5 NiMH Batteries

For battery operation, the charging process is monitored by the µ-controller chip of the controller. The battery charging current is controlled by a charging current regulator that is installed as an alternative to the DC/DC converter. In this case, a simple, cost-efficient, uncontrolled power supply (plug-in) can be used for charging.

Battery Charging Circuit

See 4.5 Battery Charging Circuit (Software Control) General Information on page 41. The standard charge regulator circuitry is designed for 5 NiMH cells (6 V; NiCd on request).
The charging circuit that can be installed as an option is a current regulator, which takes the charging current for the batteries from a direct current voltage source that may be between 10 and 28 volts.
The charging current and the charging performance are adaptable to the batteries used. By default, the charging circuit is designed for 5 NiMH cells with 1,500 mAh.

The charging cycle is controlled by the A/D converters of the µ-processor chip, which also monitors the cell temperature with a sensor that is installed at the cells (NTC resistance). Below 2.5 V cell voltage, the charge control automatically initiates a precharging with app. 5mA in order to avoid damage due to overdischarging. Three criteria determine the charging end: the battery temperature, a voltage reversal at full charge, and the time limit of 4.5 hours.

The charging time for a 1500 mAh battery will be app. 4 hours. GeBE offers preconfigured 1,200 mAh battery packs with the matching connectors and an installed thermistor for temperature control. Page 8 Appendix - Product List and Accessories on Page 72.

Charging Process Indicator

During the charging process, the green operation LED indicates the current type of charging process through different flashing frequences. Rapid and trickle charging are indicated.
See chapter 4.7.1 Automatic Status Report on page 51.

Energy Saving Modes (Power-Down)

The controller has three levels of energy saving modes:
- idle mode
- sleep mode (standard)
- power-off mode (option)

Idle Mode (Automatic)
While the controller is waiting for print data, its power consumption is automatically reduced to about 8 mA (with RS232 interface connected, LEDs turned off).
This value will vary with different component variants and external loads of the interfaces.
When the controller is in idle mode, print data or commands will be received directly without corruption at any time. Hardware handshake signals will be valid.

Sleep Mode (Standard Power Saving Mode)
The sleep mode is either initiated by command, or automatically started after a time-out period due to a preset reaction.
The default status upon delivery is: sleep mode off (with closed bridge Br10).
In sleep mode, the power consumption is lowered to 20 µA typical (RS232 version). For this, the serial interface outputs of the controller are switched to a high-ohm status. Therefore, the controller has to be reactivated from this mode, before it will be able to receive data again. The reactivation from the sleep mode can be done with:

- a dummy character that is received through the serial interfaces (RXD, RS232/TTL)
- dummy characters that are received through the IR interface
- level change at the handshake line RTS (serial)
- LOW to HIGH level change at the /strobe line (parallel)
- pressing the feed button

The controller takes about 50 ms to reactivate. During this time, no printable data may be sent to the controller. Only after the handshake signals (Xon, DSR, BUSY) have cleared by the interface, data may be sent again. See chapter 4.4 Power-Down Modes on page 37.

Power-Off Mode (Optional Component of a Special Version)
The power-off mode is available as an option. It can be initiated by command, if the additional hardware is installed on the controller board, and the respective signals are applied from outside.
In power-off mode, the controller turns itself off completely, reducing its power consumption to < 1µA typical.
When the controller is in power-off mode, it has to be turned on again, before it can receive data. It can be turned on with:

- dummy characters sent through the serial RS232 interface
- setting the handshake line RTS (serial)
- setting the line Select_In (parallel interface)
- pressing the feed button

GeBE recommends the use of the sleep mode, since it is a lot easier to manage than the power-off mode. The power consumption during the power-down status of the sleep mode is higher than during the power-off mode, however, it is significantly lower than the self-discharge rate of a NiMH battery, and therefore virtually irrelevant. Furthermore:

Attention! The controller cannot be rectivated from the power-off mode through the IR interface, because the IR transmitter/receiver is turned off in the power-off mode.

2.5 Applications for the Print Systems

① Print system GPT-6213 (80 mm paper width) in plastic housing for integration

② Print systems 5 - 40 V in GeBE VARIO printers for integration

③ Print system 5 - 40 V (60 mm paper width) in GeBE INFO print system in vending machines

④ Print system GPT-6213 (80 mm paper width) in 144 x 144 DIN switchboard housing

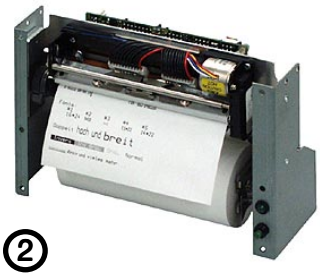
⑤ Print system GPT-6214 (112 mm paper width) in 192 x 144 DIN switchboard housing

⑥ Print system GPT-6213 (80 mm paper width) in DIN switchboard housing with rewinder

⑦ Integration in different standard enclosures for 19" rack installation

⑧ GPT-6214 in portable set with IR interface to handheld computer

①



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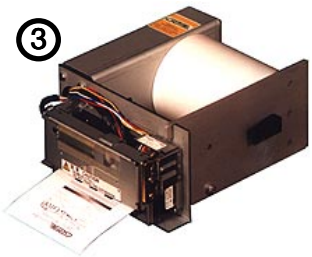

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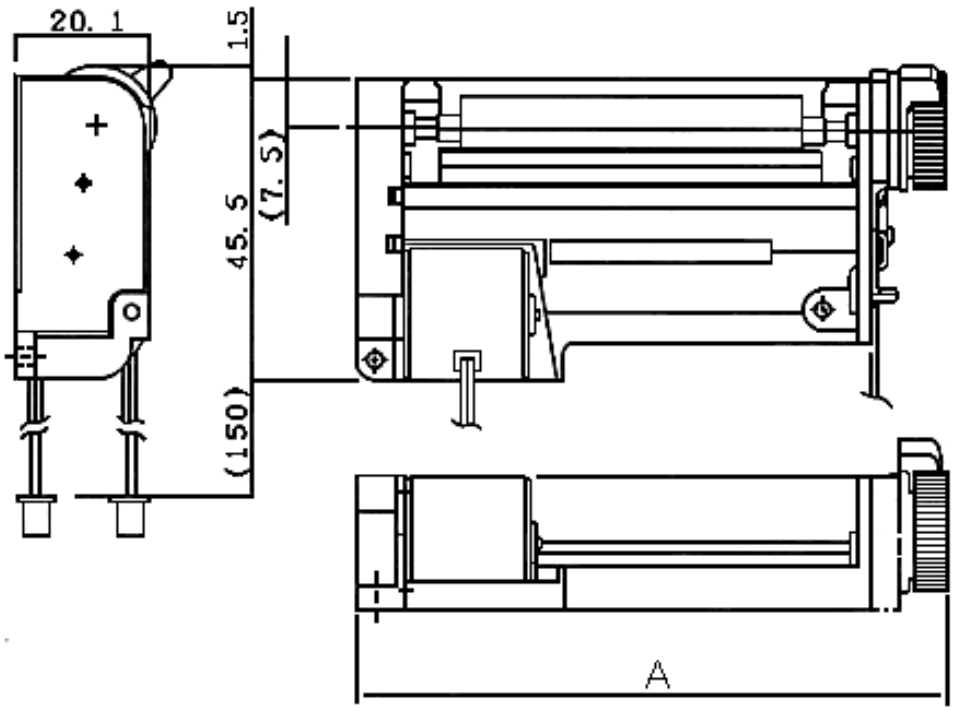
3 Technical Data of the Printer Modules GPT-621X

3.1 Printer Mechanisms

3.1.1 Table of Important Specifications GPT-6212/13/14

	GPT-6212- (Cut) (FTP624)	GPT-6213 (FTP634)	GPT-6214 (FTP644)	Comments
Paper / eff. print width front feed	57.5±0.5 / 48 mm	79.5±0.5/72 mm	111.5±0.5/104 mm	paper path around roll
Paper / eff. print width reverse feed	59.5±0.5 / 48 mm	84.5±0.5/72 mm	113.5±0.5/104 mm	straight paper path
Paper thickness	50 - 80 µm			
Paper roll diameter	max. 150 mm			
Print resolution	8 dpmm / 203 dpi			
Resolution dots/line	384	576	832	
Max. print speed lines/s;	440,0	400,0	360,0	
mm/s	55	50	45	
Print speed (system)	up to 50 mm/s			
Paper end sensor	two versions: front / reverse feed			
Closed head sensor	micro switch			
Aux sensor	micro switch or light barrier			
Serial interfaces	RS232 (V.24), TTL, infrared, GeBE SPI			
Data formats	1,200 baud up to 115 Kbaud, GeBE IR-Protocol			
Parallel interface	Centronics			
Serial BUS interface	GeBE SPI-BUS for external extensions			
Characters/line	24(34,42,54)	36(52,64,82)	52(75,92,118)	
Print modes	Text / data / graphic mode / bar code			
Graphic printing dots/line	384	576	832	
Text files in EEPROM	8 KB, optional up to 64 KB			
Logic voltage Vcc in V	5VDC ± 5%			
Current in standby mode	app. 8 mA			
Power voltages	5.0 -8.5 VDC; 5x1.2V NiMH batteries; 8-40VDC-DC converter			
Power current (peak)	3A to 6A, depending on print speed and blackening			
Adjustable current limitation	0.7 A to 6.4 A, has effect on print speed			
Current in sleep mode	20 µA typ.			
Printer weight not incl. cutter	81g	94g	125g	
Wdith of mechanism **(A)** mm	82	108	138	See drawing below **(A)**
Length mm	48			
Height mm	20			Head closed
Operating Temperature	0 - 50 °C			Others on request
rel. humidity %	10 - 90			No moisture condensation
Printed paper	app. 50 km			
Connectable Peripherals				
Paper cutter	Cut	--	--	
Paper roll holder with NPE sensor	GPH-058-050-F-S-B	GPH-080-050-F-S-B	GPH-112-050-F-S-B	
Paper rewinder	60 mm	85 mm	114 mm	
5 LEDs	Option			
Connectable operating console	FEED button, test button, status LED, Aux LED, RESET_In			

3.1.2 Drawings - Mechanical Dimensions of the Printer Mechanisms



The printer mechanisms have a very similar design, with practically the only distinguishing feature being the width.

List of Widths A

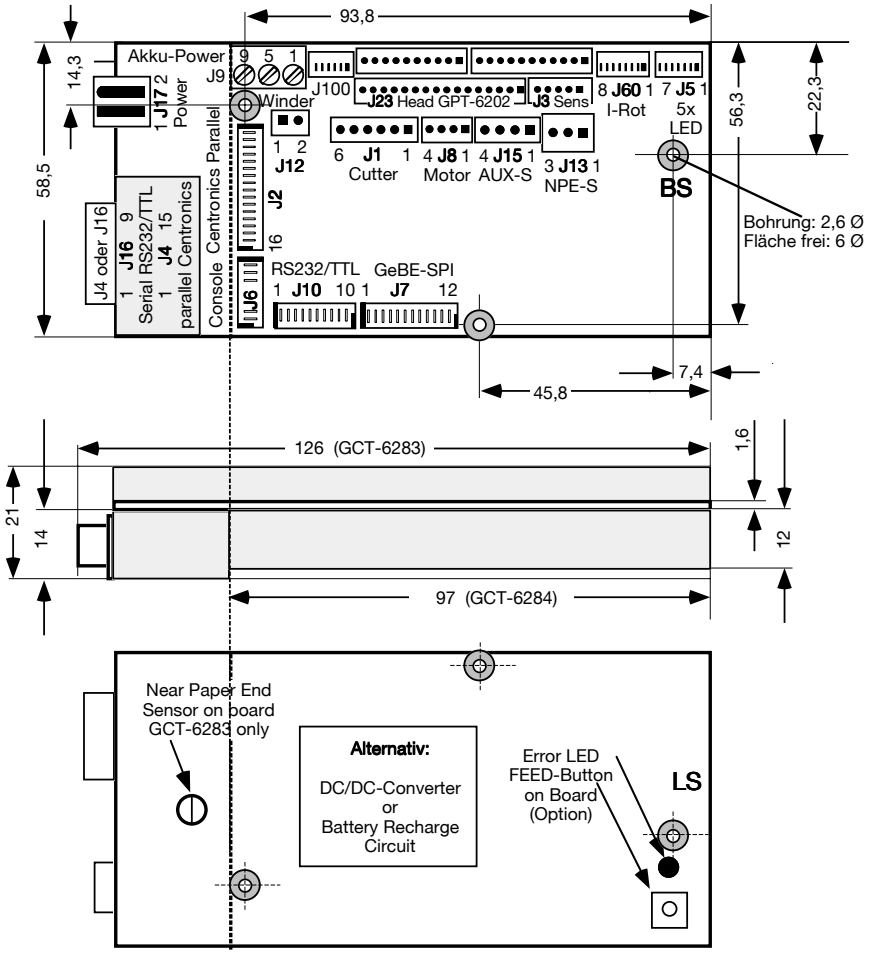
- GPT-6202: A = 82 mm
- GPT-6202-Cut: A = 82 mm
- GPT-6203: A = 108 mm
- GPT-6204: A = 138 mm

3.2 Technical Data of the Controller GCT-6283/84

3.2.1 Important Specifications of the Controller GPT-6283/84 V1.0

GCT-6283/84	Unit	min	typ	max	Comment
Flash program memory	KB		60		
RAM program memory	KB		2		
Serial EEPROM memory	KB	2	8	64	Standard: 8 KB; others: optional
Power voltage (without DC/ DC converter)	V	4,75	6,50	8,50	
Power voltage (with DC/DC converter)	V	10	12/24	36	shortly 8-40VDC
Power voltage from 5 NiMH battery cells	V	4,75	5,50	8,5	
Logic current in idle mode	mA	0,3	3,0	6,0	Interfaces not connected, LEDs off
	mA		8,0		RS232 interface connected and active; LEDs off
Logic current in sleep mode	µA	10	20	40	EVAL controller with RS232 interface
	µA	90,0	150,0	400,0	Parallel interface , /strobe = high
Logic voltage in power-off	µA	0,0	0,0	15,0	Component option
Weight	g	30	55	70	
Length GCT-6283	mm		126		
Length GCT-6284	mm		97		
Width	mm		58,5		
Height GCT-6283	mm		21		
Height GCT-6284	mm		19		
Operating temperature	°C	-10		65	Environment
Storage temperature	°C	-20		85	

3.2.2 Mechanical Dimensions of the Controller GCT-6283/84



4 SOFTWARE GCT-6283/84 V1.0

4.1 Character Sets, Characters/Line

The four character sets in the flash memory of the standard controller can be selected by command. Other character sets on request. The euro character is located at 16 hex.

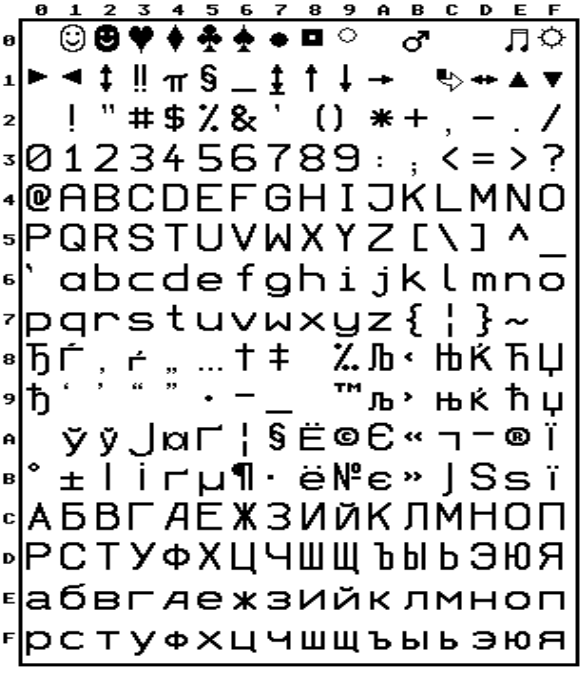
4.1.1 GeBE Standard Character Set: Resembles IBM II Code Table 850

4.1.2 Optional Character Sets

The following character sets are available at this time, and can be programmed into the FLASH memory of the µ-processor in exchange for other character sets. Please contact us with your inquiry. GeBE will gladly create other character sets on request.

Type	Dots (horiz x vert.) Characters/Line	Font No.	GPT-6202 58/60 mm 384 Dots/Line	Font No.	GPT-6203 80/85 mm 576 Dots/Line	Font No.	GPT-6204 112/114 mm 832 Dots/Line
IBM II	16 x 24	1	24	1	36	1	52
IBM II	12 x 24	4	32	4	48	4	69
IBM II	14 x 22		27		40		59
IBM II	11 x 22		34		52		75
IBM II	9 x 22	2	42	2	64	2	92
IBM II	7 x 16	3	54	3	82	3	118
IBM II 90°	16 x 11		"24"		"36"		"52"
Cyr	16 x 24		24		36		52
Cyr	14 x 22		27		40		59
Cyr	11 x 22		34		52		75

Optional character set: cyrillic
Basis: IBM code table 850



4.2 Command Set

4.2.1 Nomenclature

The following terms are used in the tables below:
If possible, all codes and parameters of a command - consisting of one byte:= 8 bits in most cases - are named with their corresponding ASCII character. If this does not make sense, either a hexadecimal value or a place holder is given for the byte. Place holders can be n, m, or even lh and ll, like in the paper feed command <ESC> "F" lh ll. For the transmission of a command, the relevant values - encoded in a byte - are to be used instead of the place holders. The status of single flags, for example, or even graphic dots can be encoded in a byte.

Hexadecimal values are marked with a $ symbol.
These values are marked with a preceeding $ symbol: example: decimal 10:= $0A

Control codes of the ASCII character set are put in <>.
Control codes with a character sequence defined in ASCII code are written in pointed brackets: example: "line feed": <LF> := $0A

Binary form of the flags represents one byte in [ ].
Flags encoded in a byte are put in [ ]. As a flag, each bit in the byte can assume the values 0:= - not set, 1:= set, or x:= not relevant. Eight bits are arranged in a flag byte, and they are identified by the **b** that follows them.
Example: [FLAG] with the bit order 001x 1111 **b** can either be put out as 0010 1111 **b** := $2F, or as 0011 1111 **b** := $3F, since the flag in the fourth position (flags from position 7 to 0) is meaningless.

Printable characters or character strings of the ASCII character set are in quotes.
Example: "E": = $45.

Symbols for names or character strings are written in ( ).
Whenever names, symbols, or values do not immediately indicate the data form through a generally accepted arrangement, they are written in round brackets ( ).
Example: (Name):="ABC":= "A" "B" "C" := $41 $42 $43

Many value ranges of any kind are put in { }.

Variable parameters are small letters.
Parameters are symbolized by small letters (l, m, n ...). Their value can be {0, ... , 255}, stated in a byte as a binary or hex value.
2-bytes parameters consist of a leading ´high byte´, indicated by h (high), and an immediately following ´low byte´, indicated by l (low). Their 2-bytes value is calculated: nh*256 + nl, meaning that values between 0 and 64.535 can be used for this 2-bytes parameter.

Example:
The command **"paper feed by X lines"** has the general form
<ESC>"F"lh, ll. , lh := {0, ... ,9} ; ll := {0, ... ,F}
The command <ESC> "F" $03 $E8 causes the paper to be fed by 1,000 lines: = 125 mm exactly.
$03E8:= decimal 1,000; ($03E8:= decimal (3x256 + 14x16 + 8) = decimal 1,000).
The range of values for the parameters is limited.

4.2.2 Table of Commands

Command (ASCII)	Function	Values	Page
<CR>	Print command, one line paper feed		22
<CR> <LF>	Print command, one line paper feed		22
<LF>	Print command, one line paper feed		22
<LF> <CR>	Print command, one line paper feed		22
<FF>	Form feed up to a preset length or marker (TOF)		26
<ESC> "@"	Initialize the printer with a RESET pulse		35
<ESC> "A"	Erase the data in the print buffer		35
<ESC> "b" p1 ....p8	Bar code		31
<ESC> "C" n	0: Full-Cut / 1: Half-Cut / 2: Cutter Init		31
<ESC> "D" n	Print text mode / data mode	n:= {0,1}	28
<ESC> "e" n [Flags]	Sleep mode		31
<ESC> "E" n	Power-off	n:= {0,1}	38
<ESC> "F" lh ll	Paper feed by lh x 256 + ll lines		22
<ESC> "G" g1....gn	Print pixel graphics, graphic line (old command)		29
<ESC> "g" n g1....gn	Print pixel graphics PCL5 , graphic line with length of n bytes		30
<ESC> "H" n	Change character height from 0: normal height to 7: eightfold height	n:={0,1, ...,7}	27
<ESC> "h" n	Set virtual width of the printer mechanism		22
<ESC> "i" n	Print black on white / white in black	n:= {0,1}	27
<ESC> "j" n	Control LED 2 (option LED)	n:= {0,1}	34
<ESC> "k"	Send back current status		53
<ESC> "L" n	Print with/without underline	n:= {0,1}	27
<ESC> "l" ph pl	Set page length		26
<ESC> "M" n	Print black / gray	n:= {0,1}	27
<ESC> "m" n	Set graphics mode		29
<ESC> "N" ph pl	Absolute TAB to dot position p = 256 x ph + pl.		23
<ESC> "n" n (Data)	Send back data string through serial interface		48
<ESC> "o"	Set beginning of page		26
<ESC> "P" n	Select character set no. n	n:={1, .. ,4 }	27
<ESC> "p" m n	Select light barrier, and set distance to print comb		26
<ESC> "R" ph pl	Relative forward/reverse by p dots; p = 256 x ph + pl		23
<ESC> "r" p1 ... p15			23
<ESC> "S" n	Increase horizontal spacing		27
<ESC> "s" n	Load batch file or TINIT	x:= { 0 ...9, A, Q, R, S)	50
<ESC> "T" "x"	Print batch file no."x".	x:= { 0 ...9, A, Q, R, S)	48
<ESC> "T" "A"	Switch to hex-dump mode		54
<ESC> "u" n	Erase batch file or TINIT	x:= { 0 ...9, A, Q, R, S)	50
<ESC> "V" "X"	Send synchronizing character "X" through the serial interface		22
<ESC> "v"....	Read out batch file from flash or serial EEPROM		49
<ESC> "v" "5" "T"	Read out the available memory space for text files T0-T9 in the EE-PROM		49
<ESC> "v" "5" "U"	Read the available memory space for TINIT in the EEPROM		49
<ESC> "v" "6"	Read the size of the serial EEPROM memory		49
<ESC> "v" "7"	Read out batch file x from the serial EEPROM		49
<ESC> "v" "8"	Read out batch file x from the flash		49
<ESC> "W" n	Print normal width / double width	n:= {0,1}	27
<ESC> "y" "n"	LED energy saving mode - select table		34
<ESC> "Y" n	Set blackening of paper individually (n= 10 ...75)		28
<ESC> "z"	Charge command (parameter list for charging characteristics)		54
<ESC> "[" n m	Set power consumption and print quality		36
<ESC> "]" n	Set baud rate and interface parameters		33
<ESC> "{" ...	Battery test		46
<ESC> "}" n	Establish minimum length n for mark recognition		26
<ESC> "\" lh ll	Reverse paper feed by lh x 256 + ll lines		22
<ESC> "_" n	Wait until label is removed, plus n x 25 ms		26

4.3 Command Set - Detailed Descriptions of the Technical Functions

4.3.1 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.
Number of characters that are sent without a print initiation character > maximum number of characters/line		When a line is full, the exceeding characters will trigger the printing of that line. The number of characters per line is determined by the selected font and the width of the printer mechanism. Usually, the width of the mechanism is 48 (72 / 104) bytes at 8 pixels per byte = 384 (576 / 832) pixels, however, it can be reduced to a smaller value with the command <ESC> "h" n. For the standard font #1 with 16 horizontal times 24vertical characters, this results in 384 (576 / 832) pixels/line / 16 pixels/character = 24 (36 / 52) characters/line.
String length exceeds 120 characters		Besides the printable characters, a large number of control codes can be written into the character buffer without triggering the printing of the next line. This could result in a blocking of the printer. Therefore, the printing of a line will be initiated, when the data string for its construction reaches about 120 bytes, even if the description of the line is incomplete.
<ESC> "h" n	1B 68 n	Set the width of the printer mechanism in bytes. 58/60: n:= {16 ...48}; (16 mm - 48 mm), 80/85: n:= (16 mm - 72 mm) 112/114: n:= (10 mm - 104 mm) This command only works for text printing. It can be used to change the maximum number of characters/line. The text is printed with left-side justification.
<ESC> "V" "X"	1B 56 x	Print and report synchronizing character "X" through the serial interface. If the line buffer is not empty, this command will also initiate the printing of the current line.

4.3.2 Positioning (Horizontally and Vertically)

Command (ASCII)	Command (hex)	Function
<ESC> "F" l_h l_l	1B 46 l_h l_l	Paper feed by $l = l_h \times 256 + l_l$ 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 $l = l_h \times 256 + l_l$ lines. Limited to 300mm (2400 dot lines) This command can only be given at the beginning of a line and will be ignored otherwise. Eight dot lines will be added to each reverse paper feed. Afterwards, the printer will feed the paper forward for eight dot lines in order to compensate for the gear play. **ATTENTION!** The paper may not be transported too far backwards. Otherwise, the paper becomes mis-aligned, and the rubber roll will not be able to transport the ejected paper forward again. This command should not be used with a paper rewinder, since the rewinder pulls forward, while the paper is transported backwards.

Command (ASCII)	Command (hex)	Function
<ESC>"N" ph pl	1B 4E p_h p_l	Absolute TAB to horizontal dot position p = 256 x p_h + p_l p = 0 ...383 (575/831) (mechanism width -1, in dots). This command allows the exact positioning to the dot to a print start position within one line. If the requested positioning goes beyond the available span of one line (0 ... n), the command will be ignored. The print attributes are not affected.
<ESC> "R" p_h p_l	1B 52 p_h p_l	Relative TAB forward/reverse by p dots; 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 goes beyond the available span of one line (0 ...n) with n:= 384 (576 / (32), the command will be ignored. The attributes are not affected by the reverse TAB.

4.3.3 Form Control: Form Feed, TOF (Top of Form)

The printer controller has multiple commands for form control. There are different types of form control:

• Control by Paper Length

The length of the receipt is entered through the command <ESC> "l" xh xl. The paper length is then measured through the feed of the printer mechanism starting from the position determined by this command. A sensor for paper positioning is not in use in this case. Strictly speaking, this is not a type of form control. Therefore, a start position can be predetermined at any place on the paper, and there cannot be any positioned form printing on the paper.
If less paper is printed on than the length predetermined by the command, the final form feed command will trigger the final printing, and a paper feed will be processed, until the page length counter reports the reaching of the receipt length. At this point, the printer stops feeding paper, and the receipt may be cut off with a cut command, if a 60 mm wide printer is used.
If the length of printed paper exceeds the predetermined receipt length, the paper length counter will automatically remain at the receipt length limit "max.", until an FF is processed. It will then start to measure the predetermined paper length of the following receipt.

• Control by Markers (Forms and Labels)

Markers on the paper are recognized by a sensor (light barrier). This type of control is done with preprinted markers on the print side of the paper, or with holes that are pre-punched into the paper. This allows the use of preprinted paper, which makes it easier to put the printer in the correct print position on the forms.
These markers are recognized whenever a PE of at least 3 mm length is reported.
The control for label printing works the same way, in order to be able to position the print head at the start of printing as close to the edge of the label as possible. The gap between two labels is used as the marker in this case.
To measure the paper position, two different sensors may be used. Which sensor is used for form control is determined by the two lower bits in the flag byte of the command <ESC> "p" [distance][flags].

• Label Printing

If the printer mechanism is equipped with a peeler, it can print labels, but also present them with the support of a paper rewinder. The paper rewinder pulls the carrier paper around the peeler, causing the label to separate from the carrier paper and to proceed straight. The paper transport is preset by the form feed command to stop at a position, where a small area of the label remains attached to the carrier paper at the edge of the peeler, presenting the label to the user without having it fall off. The user can remove the label at this point.
A sensor that is installed at the peeler's edge (AUX sensor) registers the label and reports to the controller, when it is removed. After a label has been removed, the printer transports the carrier paper back for a small distance to position the head as close to the upper edge of the following label as possible to ready it for the next label printing.

Several different commands are required to process the procedures explained above. They are described in the table on page 26.

Three sensors are available:
- paper end sensor (PE sensor) at the entry of the printer mechanism
- near paper end sensor (NPE sensor) sensor connection J13 on the controller board, is usually used for the recognition of the paper supply almost running out
- auxilliary sensor (AUX sensor) sensor connection J15 on the controller board, is usually used for the recognition of the removal of a peeled-off label.

All three sensors can be used for the form control. If the two lowest bits of the byte n:= [flags] are both 0, none of the light barriers are selected for the form feed, and a form control will not be activated.

Paper End Sensor as Form Control Sensor

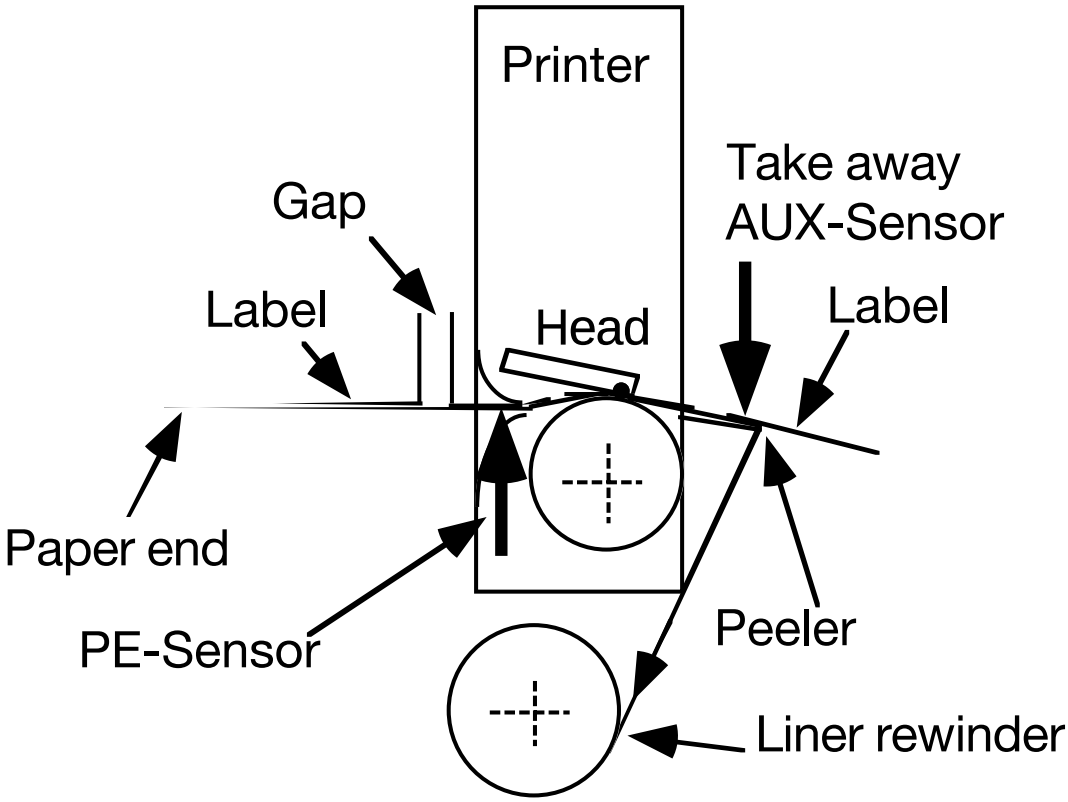
Most of the time, the internal reflexion light barrier (PE sensor) at the paper entry of the printer mechanism is selected to control the form feed. The distance from this light barrier to the print comb is about 10 mm. For label printing with gap control, the paper must be transported forward for about 10 mm after the gap has been recognized by the light sensor, in order for the upper edge of the label to be positioned directly under the print comb. This is automatically processed by the command <ESC>"p"$14[XXXX XX01], if the control has located the gap (see page 26 with the commands).
Since this sensor is also required to recognize the paper end during the form control, the marker (or the gap between labels on carrier paper) may not exceed a length of 7 mm. If no paper is detected within 60 dot lines (7.5 mm), while the motor is running, paper end will be signaled, the printer will stop, and the message PE will be reported. Please note that in this form mode, PE can only be recognized when the motor is moving. Therefore, paper that is removed, when the motor is standing still, will not trigger a PE message, even when the form control is turned on.

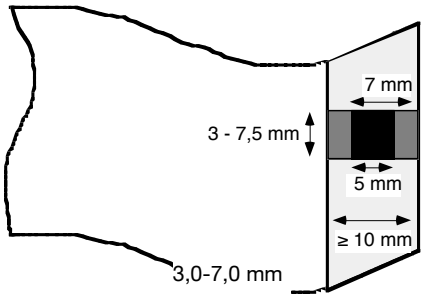
Inserting Paper in Form Mode

Since the printer can only recognize a PE in the form mode, when the paper is moving, an auto paper load as in the standard mode is not possible. The paper has to be inserted manually. If bit 2 of m:= [light barrier flags] is set, the printer will switch back from form mode to standard mode **with the print head open** (recognition through sensor switch "head open"). This allows an auto load even in form mode, when the head is open. When the head is closed, the printer returns to the form mode. Any markers during the auto load feeding will be ignored. After the auto paper load and the closing of the head, batch file T10, which is only available in the flash, will be processed, regardless, whether the printer is positioned on a marker or not. In this file, a short feed followed by an FF is stored. With the short feed, the printer can recognize a PE and stop further printing or form feeding in this case. The opening and closing of the print head during operation does not trigger a form feed.

Inserting Paper in Standard Mode

In standard mode (no form control), paper end (PE) is recognized through the internal light sensor as follows: In order to make the PE function insensitive to disturbaces, the PE message and the stopping of the printer are not triggered, until it has been positively recognized three times in a 25 ms interval.


Printer
Gap
Label
Head
Take away
AUX-Sensor
Label
Paper end
PE-Sensor
Peeler
Liner rewinder

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "l" [high feed] [low feed]	1B 6C xh xl	Length:= (xh(256) + xl) x 0,125 mm sets the page length in mm. This is the form feed length, if no light barriers are used. It is also used as the maximum feed length (as a criterion for termination), when the light barrier is used as a marker sensor. If no marker is reached and no gap is recognized within the set length, the feeding will be stopped. When this command is processed by the printer controller, the beginning of the page will be set automatically, as if it contained the command <ESC> "o".
<FF>	0C	Form feed: Print command and line feed, until the TOF marker is recognized or the preset page length is reached. With an FF, the printer will feed, until either a marker (if the corresponding sensor is activated), or the preset page length is reached. If a marker has already appeared or the page length has been reached at the time of the FF, the internal FF counter is set to the new page length. Therefore, an FF causes either a feeding to the nex marker, or (if there is no marker) by a whole page length. Reverse feeding is taken into account, when the page length is calculated, even if it goes beyond the form limits.
<ESC> "o"	1B 6F	Set beginning of page to current cursor position. This command sets the internal position counter to zero.
<ESC> "_" n	1B 5F	Wait until label is removed, plus n x 25 ms This command is usually given after a form feed command. This command refers to the AUX light barrier, which has to be installed at the front of the printer in order to recognize the removal of an adhesive label from the peeler edge. This command will only clear the printer, after the label has been removed, and the light barrier reports "AUX-PE". Please note that AUX is a light barrier that uses transmitted light.
form marker		 Please note: The marker is located on the printable side of the paper. The marker may not be printed on. The beginning of the form does not correspond with the marker, but depends on the position of the light barrier.
<ESC> "p" [distance] [flags]	1B 70 m n	Parameter m - [distance] - represents the distance between the light barrier and the print comb in 1/2 mm increments. (distance between internal light barrier and print comb = 10 mm; m: = $14:= 20) Meanings of the values n for light barrier selection - [flags]:= n **xxxx xx00 b** no light barrier, **default** (form control) **xxxx xx01 b** internal paper end light barrier (marker control) **xxxx xx10 b** NPE light barrier (reflex type) **xxxx xx11 b** AUX light barrier (forked type) The remaining bits should be set to zero. A form feed will initiate a search for the marker. When it is detected, the paper will automatically be fed by the distance m in order to place it at an exactly defined position on the form.
<ESC> "}" [marker length in lines]	1B 7D n	Set marker length n in print lines: (1 line := 1/8 mm) The default setting after a reset is 3mm (24 lines). The maximum length is 7 mm (56 lines). Please note: This command actually sets the length that the light barrier detects "black"(or a value sufficiently below this length). Depending on the marker and the paper used, the light barrier may report "paper still present" at the edges of the marker.

Batch file T10 is processed after an auto paper load. T10 can not be programmed by the user, but is filed only in the FLASH of the controller chip.
Normally (starting with software version GE-3115), it is filled with 104 zeros. With PCL coding, they are compressed to just 2 bytes which are followed by an <FF> character.
The purpose of the zeros is the completion of a graphic line that may be processed at the time. It will be ignored otherwise.

Using the AUX light barrier as a sensor to clear the cutter:
If the receipt is automatically cut, as with a paper catch configuration, the controller will make sure that the receipt fell into the issuing tray below the paper catch. A forked light sensor (transmitted light) is installed behind the cutter. When the light beam is uninterrupted, it reports that the receipt fell into the catch. The printer can continue printing, when the light beam is no longer interrupted by the receipt. This function is opposite to the one of the reflexion light barrier at the AUX connection that recognizes the presence of labels.

4.3.4 Formatting

Select Character Size - Character Set, Width, Height

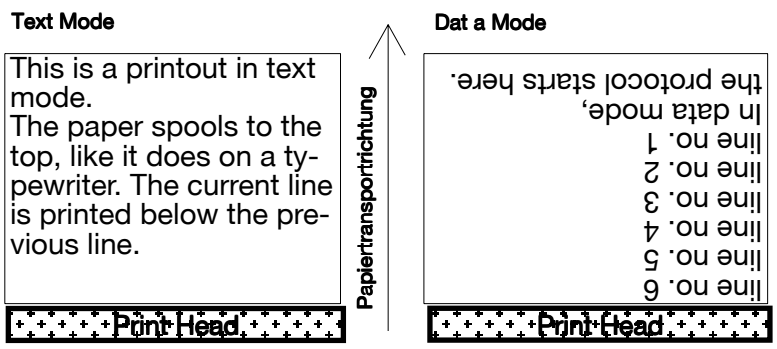
Comm. (ASCII)	Comm. (hex)	Function
<ESC> "P" "n"	1B 50 n	Select character set no. n. n: = {, 2, ..., number of character sets} The controller masks value n with $0F. Therefore, it can also be entered as an ASCII character "1", "2", "3", ... **All fonts can be mixed within the same line.**
<ESC> "H" "n"	1B 48 n	Print n + 1 -fold height. n := {ASCII character "1", "2", "3", ...,"7"} "0":= normal height; "1":= double height; "2":= triple height; ..... "7":= eightfold height, **This command can be mixed with other heights within the same line.**
<ESC> "W" "1"	1B 57 31	Print double width. This command will be valid until cancelled. **This command can be mixed with normal width within the same line and will be valid until cancelled.**
<ESC> "W" "0"	1B 57 30	Print normal width. **This command can be mixed with double width within the same line.** It will be valid until cancelled. Default setting after a RESET.

Character Layout

Command (ASCII)	Command (hex)	Function
<ESC> "I" "0"	1B 49 30	Print black/gray on white. This command will be valid until cancelled. Default setting after a RESET.
<ESC> "I" "1"	1B 49 31	Print white in black/gray. This command will be valid until cancelled.
<ESC> "L" "0"	1B 4C 30	Print without underline. This command will be valid until cancelled. Default setting after a RESET.
<ESC> "L" "1"	1B 4C 31	Print with underline. This command will be valid until cancelled.
<ESC> "M" "0"	1B 4D 30	Print black. This command will be valid until cancelled. Default setting after a RESET.
<ESC> "M" "1"	1B 4D 31	Print gray. This command will be valid until cancelled. Does not work with 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). This command can be given and cancelled multiple times within one line. The default spacing after a RESET is n:=0.

Print Mode Text / Data Mode and Blackening Adjustment

Also see 7.2 Solder Bridges - Baud Rate, Text / Data Mode on page .

Command (ASCII)	Command (hex)	Function
<ESC> "D" "n"	1B 44 "n"	Print in text mode ("n"="0") or data mode ("n"="1"). In data mode, the characters are turned by 180° in order to make the printout readable, when the paper slip is hanging from the printer. The chronological sequence of the printed lines therefore appears from the bottom to the top.  This command does not work for graphics. This command can be given at any point within a line, as long as the line has not been completed. It affects the complete line. This command will be valid until revoced with the corresponding command. After RESET, the status predefined by switch 4 will go into effect.
<ESC> "Y" n		Adjust the blackening of the paper individually. n is a factor between 10 (lighter) and 100 (darker). Values outside of this range will not change the current setting. 30 is the default value after RESET. If different values are required permanently, the command can be entered in the batch file TINIT.

4.3.5 Graphic Commands

Graphic Command Compatible with GeBE Printers

Command (ASCII)	Command (hex)	Function
<ESC> "G" g_1 ...g_n	1B 47 g_1 ...g_n	Pixel graphics (print one horizontal graphic line): g_1 ...g_n are the graphic bytes. Their total number is specified with n=48 (72, 104). In text mode, as seen from the left to the right, dot 0 is the MS bit (most significant bit with the highest value) of the first byte (g_1); the dot on the very right is the LS bit (low significant bit with the lowest value) of the nth byte (g_n). A 1 in the respective bit position represents a black dot in the line. After the 48th byte, the printer automatically returns to the character mode. It will ignore all commands while processing these 48 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. In this case, the graphics will begin in the top dot line of the text line. If the graphics are longer than the current text, the following new text will begin with its top line in the line that immediately follows the graphics. For new projects, GeBE recommends to use the command <ESC> "g" (see below).

Extended Graphic Commands (See PCL3 Specification)

The graphic data structure of these modes corresponds to the commands of the PCL specification from version 3 on . They are compatible with the Windows compression procedure.

The processing of compressed data takes about as much time as pure bit map printing. As a result of the smaller amount of data that has to be transmitted, there is a clear advantage in speed compared to the process without compression (about a 1:3 ratio).

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "m" n	1B 6D n	**Set the current graphic mode.** n=$00: unencoded n=$01: run length encoded n=$02: TIFF (4.0) encoded n=$03: delta row encoded n=$04: X-byte offset with additional second parameter o n=$05: reset seed row of delta row (see below) This command will be valid until cancelled. 0 is the default value after a RESET.
<ESC> "m" n o	1B 6D 04 o	**X-byte offset with additional second parameter o** With the command <ESC> "m" $04 o, the graphics can be shifted to the right. In order to achieve a left margin of 10 mm = 80 pixels, you would use the command <ESC>" m" $04 $0A. Graphics that go beyond the right margin will be cut off.
<ESC> "m" n	1B 6D 05	**Reset seed row of delta row** The command <ESC> "m" $05 erases 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 with the seed row. After the next line is printed, it will become the seed row. The command to erase the seed row 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.

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 (except with delta row encoding). In this case, the graphics will begin in the top dot line of the text line. If the graphics are longer than the current text, the following new text will begin with the top line in the line that immediately follows the graphics.
<ESC> "g" n g_1 ...g_n	1B 67 n g_1 ...g_n	**0 : unencoded** n := length of graphics in bytes (max. 48) g_1 ...g_n := graphic bytes to be printed In text mode, beginning from left to right, dot 0 is the MSB of the first byte, while 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 automatically returns to the character mode. It will ignore all commands while processing these n bytes. The command **<ESC> "g" n g_1 ...g_n** is synonymous with the old command **<ESC>" G" g_1 ...g_n**, if n = n max. = 48 (576/832). The graphic mode "0" for unencoded is the default setting.
<ESC> "g" n [DATA]	1B 67 n g1....gn	**1 : run length encoded** n := number of bytes following Run length interprets graphic information in byte pairs. Each first byte is the repetition count byte for the second byte. A "0" in the repetition count byte means that the following graphic byte will be printed once without being repeated. A "1" means that the graphic byte will be printed twice. The repetition count byte has a value 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 LS bit. A "1" in the respective bit position represents a black dot in the line. After completing the line, the printer will automatically return to the character mode. **2 : TIFF (4.0) encoded** n := length of the following byte 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 follows (up to 127) that are to be printed as bit map. A positive control byte expects bit map information, a negative control byte (complement on two) expects a repeat byte. **3 : delta row** n := length of the following graphic byte Delta row will pick out the bytes from a line that are different from the bytes in the preceding line, and transfer only these differences. If only one bit differs, just the respective byte has to be transferred. 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). Value 31 as offset expects a following <u>additional</u> offset byte. Value 255 of this additional offset byte expects another one, and so on. The offset values are added up. In text mode, from left to right, the dot on the very right is the LS bit.. A "1" in the respective bit position of a replacement byte represents a black dot in the line. After completing the line, the printer will automatically return to the character mode. During the printing of this line, the printer will ignore all other commands. Mixing of text and graphics is not possible with delta row.

4.3.6 Special Commands

Cutting

Befehl (ASCII)	Befehl (hex)	Funktion
<ESC> "C" "n"	1B 43 n	**n = 0 : Full Cut** The paper is cut off completely. **n = 1 : Half Cut** The cutting procedure leaves a small connection between the labels or receipts. **n = 2 : Initialize Cutter** This command is entered in the TINIT, when a cutter is being used. The controller will then check after a RESET, if a cutter is in the home position. If not, the cutter will be moved into the home position. **If there is no cutter, no error report is issued. If there is a cutter, but it is not in the home position, nor does it move to the home position within the next 2 seconds, the error report "C" for blocked cutter is issued, and the print process is stopped.**

Barcode - Character Set, Code Width

If there is data in the current line that has not been printed, when the bar code command is to be processed, the printer will print it and then start the bar code printing in a new line. Bar code is printed with or without plain text, however, the text is not placed according to the norm.

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 w/o plain text "B" - code-2 of 5-interleaved with plain text; "b" - dito w/o plain text "C" - EAN 13 with plain text; "c" - dito w/o plain text "D" - EAN 8 with plain text; "d" - dito w/o plain text "E" - code-39 with check digit after module 43, with plain text; "e" - dito w/o 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 code in pixels not including plain text. Y is internally rounded to whole millimeters, e.g.: Y = 406 is printed as 50.0 mm. (Y =< 100 mm = 800 pixels). 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

By choosing the bar widths according to the table, the bar code can be printed in different 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 Sets for Different Bar Codes

Code-39: 1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ$/-.+%<Space>

Code 2 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.)

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.)

Code Width of Different Bar Codes

Code-39: 6*wide + 14*narrow + n*(3*wide+7*narrow)
Special characters may slightly differ from this formula.

Code 2 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, if:
- 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 a bar code, if:
- the right line margin or the maximum height of 100mm is 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, as long as a type with plain text has been selected. Ignored bar code without plain text will not initiate printing.

Setting Interface Parameters for the Serial Interface

Also see 7.2 Solder Bridges - Baud Rate, Text / Data Mode on page 72.

Command (ASCII)	Command (hex)	Function
<ESC> "]" [baud rate] [mode flags]	1B 5D n m	Configuration of the serial interface: The controller switches to a new baud rate as soon as the preceding characters have been decoded and transferred to the printer mechanism. This may lead to a delay for the execution of the baud rate command, so the old setting will remain active for some time. Therefore, it is important to use this command only, when the controller is not busy. This is the case after a reset, or it can be inquired with the feedback of a synchronizing command (See "Chronological 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** transmitter of serial interface turned on (default) **1xxx xxxx b** transmitter of serial interface turned off **x1xx xxxx b** framing/overrun error output turned on **x0xx xxxx b** framing/overrun error output turned off (default) **xx00 xxxx b** no parity (default) **xx01 xxxx b** zero parity **xx10 xxxx b** odd parity **xx11 xxxx b** even parity **xxxx 0xxx b** 7 data bit **xxxx 1xxx b** 8 data bit (default) **xxxx x0xx b** 1 stop bit (default) **xxxx x1xx b** 2 stop bits **xxxx xx0x b** mode flags disabled **xxxx xx1x b** mode flags enabled (default) **xxxx xxx0 b** handshake output CTS is blocked only when buffer is full (default) **xxxx xxx1 b** handshake output CTS is blocked at end of paper If the second highest bit in the mode flag is set, the following will occur: When a parity or a framing error occurs, a "?" will be printed, and in case of an overrun error, a "!" will be printed in place of the defect character. A "?" followed by an "X" will be sent through the serial interface. The printing of a "?" after framing errors is disabled in the standard version. After a RESET, the DIP switches are scanned first, and then the baud rate is set accordingly. If a different setting is required after each RESET, it has to be entered in the TINIT. At first, the transmission of the serial interface will be disabled in order to prevent messages from being sent in a baud rate other than the one selected. The command **<ESC> "]" $00 $00** will turn on the transmission of the serial interface without changing the current parameter settings. This command appears at the end of the TINIT in the flash. If the EEPROM TINIT is used, this command has to be behind the baud rate command. Through bit 7 of the MODE flags, the output of messages through the serial interface can be disabled completely.

LED Control

The status LED is set to the power saving mode by default, meaning that the LED will flash shortly in long intervals during faultless operation. By command, it can also be set to a permanent ON or OFF during faultless operation.

The status LED is located either on the console that is connected through J6, or (optionally) next to the feed button on the curcuit board of the controller (application in system INFO).

The function of an optionally controllable LED is custom programmable. The connection of this external LED is done through J6/5. This connection (see page 65) can also be used for other external tasks, like the operation of a relay subject to the necessary amplification.

Command (ASCII)	Command (hex)	Function
<ESC> "y" "n"	1B 79 n	LED indicates energy saving mode. (standard: n=1, second table) Indication of current status by the status LED according to the selected table.
<ESC> "j" [flash mode]	1B 6A n	Controls the "optional" LED: The lower 2 bits of [flash mode] control the flash speed: xxxxx00 : app. 6.0 s xxxxx01 : app. 3.0 s xxxxx10 : app. 1.5 s xxxxx11 : app. 0.75 s The upper 5 bits of n set the pulse/pause ratio. Bit 2 (the third bit) must always be set. Value of the upper 5 bits (binary): 000011xx : 1/31 .... 111111xx : 31/31 For n = $00 : LED permanently off, for n = $FF : LED permanently on. A programmable TTL output can also be realized with this function, e.g. to control a cashier drawer.

Initialization Commands

All data and commands of the 'print data stream' are processed sequentially.
The printer does not perform an interpretation of commands, when data enters the input buffer. The data is only processed at the output of the fast FIFO input buffer, where the so-called parser interprets the data for printing. This means e.g. for the RESET command <ESC>"@" that it is not immediately processed upon arrival at the input of the interface, but only after all data has been processed by the parser that is ahead of it in the input buffer. The reason for this is that GeBE gave preference to the significantly higher print speed, since the direct interpretation of data at the interface input would greatly slow down the speed of the processor. For the same reason, the input buffer is fairly small. In case of an error that could be cleared with a RESET command, unprocessed data in the buffer would be the reason that this command could only be processed after the error has been cleared. This circumstance has to be considered when choosing a strategy for error recovery.
The program transports the data that have to be interpreted from the input buffer to the line buffer. From there, they are finally printed, when the print command reaches the output of the input FIFO, and is interpreted as print start. However, if the command <ESC> "A" is entered into the print data stream, the data that is already written into the line buffer will be erased.
The commands <ESC> "@"and <ESC> "A" that are described below can mainly be used to ensure the reliability of the data transfer to the printer and to eliminate interruption in a rough environment with strong disturbances.

Command (ASCII)	Command (hex)	Function
<ESC> "@"	1B 40	Initializes the printer just like after power-on. Between the receiving and the processing of this command, the data in the input buffer has to be processed first. Further print data may not follow this command <ESC> "A", until the readiness of the printer can be confirmed through the serial interface by the report that the RESET is completed. Otherwise, data that was sent during the processing of a reset would be lost, since the input buffer is erased during RESET.
<ESC> "A"	1B 41	Erase the data (that has not been printed) in the line buffer.

Synchronization with External Events

With the command <ESC> "V" "X" the printer can be synchronized with superior or peripheral devices.

As an example, a certain action has to be done, after a text has been printed. Since the printer has a buffer, the user would not know, when this is the case. However, the printer can report this 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 recommanded not to use characters that are used for error messages.

Command (ASCII)	Command (hex)	Function
<ESC> "V" "X"	1B 56 x	Print and report the default synchronizing 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.

4.3.7 Power Management

The power management of the GCT-6283/84 system was mainly developed for use with mobile devices. It covers all aspects required for power saving operations - mainly in battery-operated systems.

• Low Minimum Voltage

The minimum operating voltage for the printer mechanism and the controller is 4.75 V. In combination with the maximum operating voltage of 8.5 V for the printer mechanism, this allows great utilization of the battery capacities of the 5 NiMH battery cells.

• Limitation of Peak Print Current

The peak currents during printing can be reduced by command from the usual app. 4.5 A down to about 700 mA. This controls the maximum number of simultaneously printed dots, so the preset peak current is not exceeded during printing. This is an elegant way to adapt the power consumption to the current output options of a mobile power supply. As a result, the print speed may be affected, especially, if a lot of black dots have to be printed in one line.

Please see the command <ESC> "[" n m below.
In addition, this command sets the print dynamics, and therefore the print quality.

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "[" n m	1B 5B n m	Set maximum power consumption and print quality: <ESC>"[" [max. number of black pixels] [max. segment size in bytes] Parameter 1 [max. number of black pixels] selects, how many black pixels can be printed simultaneously. The minimum is 8, the maximum is 128, **default is 64 or $40**. As soon as the number of black pixels has reached this value in one line, the print line is filled with zeros, and current is applied to it. Afterwards, another cycle is started with the next pixels, and so on. Recommended values are : 8, 16, 32, 64, and 128. The maximum current depends on the operating voltage Vp and the dot resistance (123 ohm), and is calculated: $I = (V_p \times \text{number of pixels} / 123) + I_{Vcc} + I_{motor.}$ For 64 pixels, V_p = 5 V min app. 3 A For V_p = 7.2 V max app. 4.7 A Parameter 2 [max. segment size in bytes] Minimum is1, maximum is 48, **default is 24 or $18**. Through this parameter, the print speed dynamics are set.

High dynamics means that the printer prints each line as fast as the maximum current allows, i.e. an empty line is printed faster than a full line. Without dynamics, each line would be printed as fast as a completely black line.

The parameter determines, how many bytes are in one print head segment, representing the max. number of bytes that are printed simultaneously (even if they only contain zeros and no dots are printed).

If the minimum "1" is selected, the printer will divide the line into 48 segments representing 48 operations. With a maximum of 48, current can be applied to a whole print line in one operation, as long as the maximum number of pixels of parameter 1 is not exceeded.

Even printing:

Example: <ESC> "[" [32] [4]. After this command, the maximum size of heated segments will be 32 bits:= 4 bytes. This divides the print head (48 bytes) into 12 segments of 4 bytes. The result is even printing.

Printing with maximum dynamics:

Example: <ESC> "[" [32] [48]: If no more than 32 dots with 48 bytes max. are printed in one line, this can be done in one print cycle. However, the printing of a black line requires 12 cycles of 4 bytes, which increases the print time significantly.

Recommended values are :

• for maximum print dynamics: [max. segment size in bytes]:= 48

• for even printing: same number of pixels as the parameter for current (e.g. [64] [8]), always considering the maximum peak current for V_p.

4.4 Power Down Modes

• Idle Mode: Low Power Consumption - but Always Ready for Operation

The power consumption in "idle mode" of the GCT-6283/84 is reduced from the usual 40 mA of similar devices to about 3mA (8mA with serial RS232 interface connected). This significantly increases the usage time of batteries. The controller automatically switches to this mode. Print data and commands are received without any delay, while the controller is in idle mode. Handshake signals are still valid.

• Status Display

The low current status LED displays the various modes of operation; this can be installed directly on the board. By command, it can be turned off or set to a power saving mode. Please see the command <ESC> "y" "n" in the chapter LED Control on page 34.

• Sleep Mode

In addition to the idle mode, the controller can be switched to the sleep mode in order to save energy. If jumper J3 is open, or the command <ESC> "e" n [flags] has been given, the printer will go into sleep mode after 10 seconds (default) in idle mode. In sleep mode, the power consumption is lowered to a value that is significantly below the self-discharge rate of a Ni-MHbattery (20 µA typical for RS232 interface), allowing operation without switching to power-off under normal circumstances. The RS232 interface outputs of the controller are switched to a high-ohm status during sleep mode. If the mode was selected with jumper J3 open, the controller goes through an initialization upon reactivation, and the same settings that go into effect after a RESET apply. This can only be changed by using the extended power down command <ESC> "e" n [flags]. See page 38.

• Power-Off

Attention: Power-off only with special components

On request, a version with an even further reduced power consumption through a power-off mode if available as an option. The GCT-6283/84 turns itself off automatically (< 1 µA). This is an elaborate configuration exclusively for custom manufacture and therefore, it can only be cost-effective in large quantities.
If "power-off" has been selected as the power down mode, the controller will go through a re-initialization after being reactivated, and a hardware reset will be processed.
Part of the standard initialization of the controller is the command <ESC> "e" $05 $02 , which switches the printer to the power down mode about 10 seconds after the last activity. The type of mode is predetermined by jumper J3. See 7.3 on page .

Attention: Use SLEEP mode if possible.

GeBE recommends sleep mode over power-off, as it is easier to manage. The power consumption of the sleep mode is higher than that of the power-off mode, however, it is still significantly below the self-discharge rate of a Ni-MH battery.

4.4.1 Setting the Waiting Period before Power Down - Traditional Command

After a preset waiting period (power down time), the controller can switch from the idle mode to a power down mode. The traditional command <ESC> "E" n either allows a complete blocking of the power down, or the setting of this waiting period.
This command will not affect the other power down parameters.
Only jumper J3 determines, whether power down (J3 open) or idle mode (J3 plugged in) will be activated.

Command (ASCII)	Command (hex)	Function
<ESC> "E" n	1B 45 n	Set the power down time in seconds.

Parameter	Time T_{PWD}	Mode
0	infinite	power down off
1 - 127	1 - 127 sec	power down after 1 - 127 sec
255-1	1 - 127 sec	power down after 1 - 127 sec, if there is no more data in the line buffer.
		Attention: Some errors like paper end prevent printing, because the line buffer cannot be emptied.

Parameter n is interpreted as an optionally signed byte value. The power down time calculates as follows:

If n= 1 ...127, then T_{PWD}=n in seconds,
if n= 127 ...255, then T_{PWD}=256-n in seconds.

Attention: Either jumper J3 or a previously given command <ESC> "e" n <flags> determine, whether the power down mode is processed as sleep mode or as power-off. For power-off, R37 has to be removed, and Br9 has to be open.

4.4.2 Setting the Waiting Period and the Power Down Modes - Extended Command

If there is no more data in the line buffer of the controller that needs to be processed, the controller will switch from the idle mode to the sleep mode or power-off mode, after the preset "waiting period before power down" has passed.

The extended command <ESC> "e" n [flags] grants the following choices:
• hardware selection (jumper 3) is valid / is ignored
• blocking of power down
• setting the waiting period
• selecting the type of power down mode
• behavior after reactivation from sleep mode: initialization, or continue working with the settings that were valid before entering sleep mode

Jumper J3 normally determines, whether the controller processes a power down (sleep mode or power-off), or remains in idle mode. With the extended command <ESC> "e" n [flags], this jumper setting can be ignored, and other settings can be enforced.
The enforcing of sleep mode in spite of jumper J3 being affixed, however, results in an increased power consumption of up to 100µA. Therefore, it is recommended to remove jumper J3, if the sleep mode is permanently required.

Comment:

Part of the standard initialization of the controller is the command <ESC> "e" $05$02. It causes the printer to switch to power down mode about 10 seconds after the last activity.

If sleep mode was selected with **'BR10'**, the controller will go through an initialization process after its reactivation, and the same settings will be in effect as after a hardware RESET. This can only be changed through the extended power down command <ESC> "e" n [flags].

Command (ASCII)	Command (hex)	Function
<ESC> "e" n [flags]	1B 65 n [flags]	Power down modes Set "waiting period before power down" in seconds with value n. Parameter n is interpreted as an optionally signed byte value: Parameter / Time T_{PWD} / Mode 0 / infinite / power down off 1 - 127 / 1 - 127 sec / power down after 1 - 127 sec 255-1 / 1 - 127 sec / power down 1 - 127 sec, if there is no more data in the line buffer. Attention: Some errors like paper end prevent printing, because the line buffer cannot be emptied. This has to be considered for some application strategies. The waiting period will always start when there is no more data in the line buffer. The individual bits in the byte [flags] have the following effect: Authorized values for the b in the byte [flags] : **xxxx x0xx b** bit2:=0: Jumper J3 determines the type of power down mode for the power-off controller configuration: J3 affixed: = Power-off mode is selected. J3 open: = Sleep mode is selected. **xxxx x1xx b** bit2:=1: bit0 (>>> see there) determines the type of power down mode. **xxxx xx0x b** bit1:=0 (only effective in sleep mode): After being reactivated, the printer retains all settings that were in force before sleep mode, i.e. no initialization after reactivation from the sleep mode. **xxxx xx1x b** bit1:=1 (only effective in sleep mode): The printer is initialized after each reactivation. Attention: After reactivation from power-off mode, the printer will **always** reinitialize. **xxxx xxx0 b** bit0:=0 (only effective, if bit2:=1): Independent of jumper J3, the controller will always switch to the power-off mode after the waiting period (subject to the required configuration). **xxxx xxx1 b** bit0:=1 (only effective, if bit2:=1): Independent of jumper J3, the controller will always switch to the sleep mode.

In comparison: The command <ESC> "e" $05 $00 causes a reset of the power down mode to the default status including the command <ESC> "E" $05 stated in the TINIT.

Attention: If bit2 is set, bit0 determines the power down mode instead of J3, however, an affixed jumper J3 can cause a max. current increase during sleep mode of 100 µA.

Attention: To enable power-off, BR10 has to be open, and the additional hardware for reactivation has to be part of the configuration.

Also see chapter 4.4 Power Down Modes on page 37 and the following.

4.4.3 Reactivation from Power Down Mode

Attention: ***Explicitly reactivate from power down mode***

In contrast to the *idle mode,* the controller has to be reactivated from the SLEEP mode or the POWER-OFF mode, before it can receive data again.

Methods for Reactivation

- Pressing the feed button
- Sending a dummy character through the serial (RS232/TTL) interface or the infrared interface
- Level change at the handshake line RTS (serial) (RS232/TTL)
- Giving a /Strobe pulse (parallel interface adapter), or sending a dummy character through the parallel interface
- Applying a charging voltage

After the reactivation, the controller will go through an initialization phase for a period of about 30 ms. If not predetermined throught the command <ESC> "e" n [flags], the controller will go through a standard initialization, and be forced to set parameters back to default values in the batch file TINIT.

Reactivation with the Feed Button

For reactivation, the button only needs to be pressed briefly - even for the power-off mode, 3 ms are sufficient. If the button is held down for more than about 2s, the printer will start with a test printout after being reacivated from any type of power down mode. The content of the test printout is predefined in the batch file T0. See 5.1 Self Test, Batch File T0page 53.

Reactivation through the Data Line TxD of the Serial RS232/TTL Interface

The most secure way to reactivate the printer controller form the sleep mode is with unprintable dummy characters that are sent individually in intervals of > 50 ms, until the printer controller reports back by changing the control line RTS, or with the software handshake signal <XON>. The dummy characters are received through the seial RS232/TTL or the infrared interface. At least one dummy character ($00) has to be sent for reactivation. In the infrared protocol, a request packet of characters may replace the dummy character. During reactivation through infrared, brakes are required between these data packets (blocks).

Attention: **Ignore BUSY during reactivation**

When the printer is in power down mode, the host will receive the status message "not ready to receive" through the handshake line RTS, since the interface drivers are turned off. For a reactivation with dummy characters, this message has to be ignored by the host. It may be helpful to use the <XON>/<XOff> protocol, since the controller will not send an <XOff> while in power down, and therefore, will not interrupt the data stream.
However, if a continous string of characters is used for reactivation, and the useful characters are attached without any delay, incorrect characters and/or framing errors have to be expected. After the transmission of the dummy character and the feedback of the initialization being completed (< Xon> / "R"), there has to be a pause of at least one character period, so the receiver of the printer can symchronize with the beginning of the first useful character (1 character period = app. 1.05 ms at 9,600 bd, 8 bits, no parity, 1 stop bit).

Reactivation through Centronics / Select-In:

The first character (positive edge at /Strobe) will reactivate the controller. If a reinitialization after the reactivation was preselected (default), this character will be rejected. This problem can be circumvented by adding a dummy character ($00) before the print data for reactivation.

Reactivation by Connecting a Charger

Applying or disconnecting the charging voltage, e.g. by connecting or disconnecting the voltage-carrying power supply, will reactivate the controller. If the printer detects a charging voltage after reactivation, it will stay turned on in order to be able to monitor the remaining charging process.

• Battery Charging

The GCT-6283/84 can have a charging circuit for 5x Ni-MH battery cells as an alternative of the DC/DC converter. Due to the monitoring via µP, it is possible to continue printing during the charging process without confusing the charge control. The current charging method (formatting for over-discharging, charging, or trickle-charging) is indicated through the status LED.

See chapter 4.5 Battery Charging Circuit (Software Control) General Information on page 41.

• Assessing the Battery Status

The GCT-6283/84 has a battery test command that causes the controller to report some parameters concerning the battery status to the host. This allows the host to assess the battery status if necessary.
See chapter 4.5.4 Battery Test on page 45.

4.5 Battery Charging Circuit (Software Control) General Information

For applications with battery operation, the rear of the controller has a layout for the installation of a charging circuit supported by the processor. This component is the alternative of a DC/DC converter. The five battery cells of the NiMH battery can be directly connected through the screw clamp J9. The charging voltage is supplied through the connection J17 (GCT-6283) or J100 (GCT-6284).

Start of the Charging Process with Start-Up Charge

The charging device consists of a hardware component and the corresponding charge regulating software embedded in the µ-processor.

When the charging voltage is applied, the hardware will first check the charging status of the battery. If the battery is found to be overdischarged, the charging cycle will start out with a battery-saving start-up charge (the charging status indicator will remain off). If the battery is not defective, the battery voltage is going to increase, and will soon exceed the RESET threshold of the µ-processor circuit of the controller. In order to bridge the RESET threshold, the controller will first generally turn on the charging, if the battery voltage is low (Vp< 1.1 Vcc), in order to compensate for the decreasing battery voltage due to the higher energy use after the initialization.

When the initialization is completed, the applied charging voltage will be registered, and the fast charge will start with setting the control criteria for the end-of-charge recognition.

Charging Status Indicator

The current status of the charging circuit is indicated through different flash rhythms of the status LED. Status inquiries through the serial interface are responded to by appropriate feedbacks. See chapter 4.7.1 Automatic Status Report on page 51.

End-of-Charge Recognition

The type of end-of-charge recognition requires exact knowledge of the battery parameters.
• for Ni-MH battery charging circuit (standard component) see 4.5.1 Charging Circuit (Standard Component on page 42
The end-of-charge recognition parameters are considered in the software matching the configuration. After the initialization, they are first determined through the standard values filed in the batch file TINIT in the flash, however, they can also be overwritten by the commands described below. The user has the option to write these commands in the programmable batch file in the serial EEPROM.

4.5.1 Ni-MH Charging Circuit (Standard Component)

First see 4.5 Battery Charging Circuit (Software Control) General Information on page 41.

The GCT-6283/84 can be equipped with a NiMH charging circuit that has its own current limit, so the five battery cells can also be charged with stabilized power supplies. The input voltage can range from 9 V to 28 V. Therefore, the charging circuit can be operated with car batteries. The charging current is about 500 mA.

The standard charging parameters filed in the flash memory of the batch file TINIT are tuned to 5 NiMH battery types with a charge capacity of 1,200 mAh.

End of Fast Charge for NiMH Batteries

As soon as one of the following conditions is met, the controller will finish the fast charge and switch to trickle charge:

- end-of-charge through timer (4h)
- minus delta-U recognition
- maximum U recognition
- delta-T recognition
- maximum T recognition

End-of-Charge Through Timer

If the charging currents are very low, the necessary end-of-charge cannot always be achieved by recognizing the drop of the cell voltage (minus delta-U). Some modern Ni-MH batteries allow a timer-controlled charge with charging currents up to 1/3 C. For a battery with e.g. 1,200 mAh, a charging time of about 3-4 hours would be reasonable.

Attention: The timer-controlled charge limiting is only considered a makeshift solution, and serves as a secondary battery protection, since the charging status of the battery is unknown at the beginning of the charging process.

Minus Delta-U Recognition (Voltage Reversal at End-of-Charge)

When a Ni-MH battery is fully charged, the battery voltage will drop again, even though the charging current is still being supplied. This voltage drop is interpreted as the end-of-charge.

The course of the charging voltage is acquired and interpreted by the 10 bit A/D converter that is integrated in the µ-processor.

In order to eliminate the fluctuation of the individual measured values, multiple measured values are averaged and added up to a 16 bit value. The interval between individual measurements is 2 seconds. The number of values that are formed this way can be predetermined in parameter P3. It controls the time delta-t, through which the drop is to be detected.

Maximum U Recognition (Maximale Voltage at Battery)

This value is determined by measuring the cell voltage. It protects the battery from destruction. A value specific for the battery being used should be set.

Delta T / Delta t Recognition (Rate of Temperature Increase)

If the battery temperature T rises faster during the time t than stated in the parameter (the charging energy is completely converted into heat), the battery is recognized as full, and the charging is completed.

Maximum T Recognition (Maximum Temperature at the Battery)

This value serves the protection of the battery from destruction, and should be set to a value specific for the battery being used.

Sending the charge command <ESC> "r" p1 ...p15 will restart the charge. Since this command is part of the standard TINIT, the charge is restarted with each reset, if the charging voltage is applied. The charge will also restart, whenever the battery voltage drops below a defined minimum value (1.2 V typical / cell of the standard battery pack).

4.5.2 Description of the Ni-MH Charge Command

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "r" p1 ...p15	1B 72 p1 ... p15	This command manages the type of charging process. If the command is given, while the charging voltage is applied, the charge will be restarted. **p1:= "1"** battery type: P1:="1": Ni-MH charge (standard) (battery type: P1:="2": Li-Ion charge). All other values are not permitted or turn off the charging. **p2**: Timer controlled charge: 1 equals : 1/10h, i.e. 1 := 6 min, but 250 := 25 hours; default is 40:= 4h. The charging time starts with applying the charging voltage with the command being received, e.g. from the TINIT during reset, or when the voltage drops below the voltage limit of the battery predetermined through p13. **p3:** Number of values that are used for the subtraction of the voltage delta-U. Default is p3=60. This results in a measuring time of 60 x 2 s: = 2 min. The lower the charging current, the higher this value should be. **p4:** Number of recognitions with delta-U as a negative result, before the end-of-charge is determined from that. Default is p4=1. **p5:** Indicates the voltage difference, from which the delta-U is recognized as a valid negative delta-U. 1 LSbit equals 0.565 mV. Default is p5=18 x 0.565V = 10mV. **p6:** maximum voltage value. 1 LSbit equals : 36.165 mV Default is p6=169. This results in a maximum voltage value of 169 x 36.165 mV = 6.11 V . For 4 cells, this is equivalent to a voltage of 1.53 V/ cell. If the battery voltage (Vp) exceeds this maximum voltage value as many times as stated in p7, the charging will be stopped. **p7:** repetition counter for the exceeding of the maximum voltage value set with p6. The maximum voltage value has to exceed the value determined with p6 P7 times in a row, in order for the end-of-charge to be recognized and the charging to be stopped. Default is p7=1. **p8:** p8 is like p3 for the measurement of the temperature change. p8 is the number of values determined in multiple measurements within 2 s in order to calculate the temperature change. Default is p8=60. This results in a delta-T recognition measurement time of 60 x 2 s = 2 min. **p9:** p9 is like p4 for the measurement of the temperature change. p9 is the number of delta-T recognitions. (with p8:=60 within 2 min.), before delta-T is recognized as valid. Default is p9=1. **p10:** p10 is like p5 for delta-temperature difference. 1 LSbit equals about 0.01°C. Default is p10=64. p10:=64 means that the acquisition interval is recognized as a temperature change at the end-of-charge, if the difference in temperature of 0.64°C (p10:=64) predefined by p10 is exceeded within the time determined by p8 (8:=60 e.g. results in 2 min).

		p11:	Maximum temperature value, like p6 for temperature. The temperature is measured with an NTC resistor that is sol dered into the battery pack. p11 determines the maximum temperature value. If this is exceeded p12 times at the battery cells during charging, the fast charge will be considered completed. The estimation formula for a 6.8K NTC is: p11:=(60°C - T_{max}°C) / 0.6°C The default setting is p11:=25, corresponding to T_{max} app. 45°C. **Caution:** High temperatures will result in small measured values, which makes them inaccurate.
		p12:	Like p7 for temperature, p12 is the value for the repetition counter for recognizing the criterion for the exceeding of the temperature. Default is p12=1.
		p13:	p13 determines the charge start voltage for dropping voltage. 1 LSbit theoretically corresponds to: 36.165 mV. Default is p13:=133, corresponding to 133 x 36,165mV = 4.81 V. For 4 cells, this equals 1.2 V / cell.
		p14:	Trickle charge ratio. After the end of the fast charge, this value determines the medium value of the trickle charge, if the charger remains turned on. 1 LSbit corresponds to 2s on-time during 512 s. Default is p14:=10. This means that the charging current of assumed 300 mA is turned on 10 x 2 s during a period of 512s. 20s represent 3.9% of 512s. Therefore, the trickle charge current will be about 12 mA, corresponding to 3.9% of a permanent current.
		p15:	p15 determines the minimum battery voltage. A minus delta-U recognition will not be processed below this value. Default is p15=140. Therefore, the value for 4 cells will be 140 x 36.165mV = 5.06V.

4.5.3 Standard Settings for GeBE Batteries

In the flash batch file TINIT, charging is preset for 5x Ni-MH cells. For changed batteries, the appropriate amount has to be entered in the flash or the EEPROM. Please contact us regarding this option.

Fast and trickle charge are indicated through characteristic flashing of the status LED.

GeBE Battery Type	Recommended Setting															Comment
NI-MH	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14	p15	
GNA-6V-1,2Ah-NiMH	"1"	40	60	1	18	169	1	60	1	64	25	1	133	10	140	standard programming in the TINIT

4.5.4 Battery Test

Generally, the exact determination of the remaining battery capacity in mobile systems can only be achieved through extensive measuring. It also represents information that is not really important to the user.
For the printer system, it is more important to know, how high the output currents may become to still allow printing. The internal resistance determines, which currents can still be withdrawn. This information and the knowledge about the type of battery that is used helps to judge the remaining print capacity. This evaluation should be done by the host, which can also estimate from experience, how many printouts (e.g. info receipts) can still be printed. A self-learning software for the host could calculate and indicate from experience, how many printouts are still possible with the current battery capacity.
The printer module has an inquiry command <ESC>"{" that can specifically put a load on the battey for test measurements. The measuring values determined by the controller are reported back through the serial interface.

Akku Test Command

Command (ASCII)	Command (hex)	Function
<ESC> "{"l m n [number of black pixel bytes] [segment-on time] [segment-on repetition]	1B 7B l m n	l:= number of black pixel bytes determines,how many pixels are to be set for the load. Only full bytes can be turned on: 1 corresponds to 8 pixels, 2 corresponds to 16 pixels, etc. The maximum value of 24 therefore corresponds to 192 pixels that are turned on simultaneously. m:= sets the segment-on time. This value multiplied with 1/4 µs is the period of time the individual pixel remains turned on. The minimum value is 52, which corresponds to a time of 52 x 0.25 µs = 13 µs. n:= determines the segment-on repetition rate The segment-on time is repeated n times with a shifted bit pattern. This increases the testing times for the battery without creating the load with the same pixels. With this method, a blackening of the paper from the measuring can be avoided. **Example:** <ESC> "{" [7] [80] [24] **Feedback values through the serial interface:** ---------- "S" [hex value loaded voltage Vp] [hex value unloaded voltage Vp] The real voltages that are reported back can be calculated, since the AD-reference voltage (Vcc) and the resistive proportion at the Vp voltage devider in front of the A/D converter are known: If e.g. the controller is equipped with a 3 V control for Vcc, the result will be 35 mV per digit. ; for 4.5 V systems, the result will be 54 mV per digit. **Example for 3 V system:** The feedback is a character string with 5 ASCII characters: e.g. "S""9""D""A""3" with the following meaning: "S": header, marks the feedback string The following characters are interpreted as hex numbers in groups of two: $9D : represents the battery voltage measured with load Vp (loaded) := 157 x 0.035 V := 5.5 V $A3: represents the battery voltage measured without load Vp:= 163 x 0.035 V := 5.7 V From the predetermined load and the voltage drop that is reported back, it can be determined, how high the remaining capacity of the power source is, without this load causing a drop below the authorized operating voltage. Please contact the GeBE service for advice.

4.6 Batch Files

The Concept of Batch Files

In the program memory of the µ-processor (flash memory), the user can manage batch files (Tx) that can be called back by command. Practically all commands that the printer understands can be filed there in data strings of a macro, and retrieved through the command (<ESC>"t" [No.]:= print batch file [No.]). In place of this command, the command sequence from the batch file will be managed during the processing of the print buffer, as if it had been written into the print buffer through the interface.
Batch file memories with special functions (e.g. TINIT, the file for the initialization commands of the controller) are available.

Filing Batch Files in an External EEPROM

As an option, the controller can be equipped with a serial EEPROM, into which the user himself can write the batch files.

EEPROMs with a memory size of 1 / 2 / 4/ 8 / 16 / 32, or 64 KB can be used. The standard is 8 KB.
The software will check whether there is an EEPROM, then its size and content, and automatically

adapt to it.
If there are no batch files stored in the EEPROM, the standard batch files from the flash will be used. However, if there are batch files in the EEPROM that are filed under the same names, they will take precedence over the batch files in the flash.

Two separate blocks of batch files exist:
Block 1 contains the batch files T0 - T9.
Block 2 contains the batch files TINIT, TA, TQ, TR, and TS.

Batch File Block 1: T0 ...T9

T0 ...T9 can contain user-specific makros, logos, etc., but also special functions:

T0: Is retrieved, if the feed button is held down for at least 2 min. during reset. This batch file can be used to print out a service text, or e.g. the company logo and address. The printing of batch file T0 can also be initiated through the command "Print batch file no. 0". As a standard, T0 contains information about the printer.

T1: Can be retrieved during operation through the command <ESC>"t""1":= [Print batch file no. 1], or with a test button that can be connected as an option.
A self test with character set, printer specifications, etc. can be filed in this batch file.

T2-T9: These batch files have no special functions assigned to them.
The user can change the batch files TINIT and T0 through T9 by command in the EEPROM at any time.

At the end of the command sequence of a batch file, the call for another batch file can be added.

Batch File Block 2: TINIT, TA, TQ, TR, TS

TINIT: Works as initialization makro. After a power-on RESET, watchdog RESET, or software RESET, TINIT is called at the end of the software initialization, so the commands for the changing of the parameters that are stored in it are sent to the printer. If the TINIT is filed in the EEPROM, the commands stored in it take precedence over all previously set parameters. Since the TINIT in the EEPROM can be written by the user himself, it enables him to determine the printer initialization. If e.g. a printer is supposed to print in data mode with double height and bold, the corresponding commands are entered in the batch file TINIT. After the RESET, the controller will first process these commands, thereby changing its initialization.

TA, TQ, TR, TS

These batch files work like the batch files T0-9, but they can neither be erased nor rewritten. Contents are firmware status, serial numbers, etc.

TA: Contains commands that initiate the HEX-dump mode, and can only be programmed by GeBE.

TQ, TR, TS: These batch files are filed in the flash, can only be programmed at the factory (for firmware status, serial numbers, etc.), and are not meant for general use.
TQ contains the firmware nomenclature, e.g. "GeBE GE-3055".

Storage Space for Batch Files

The GeBE batch file concept represents a file system within the printer memory.
The EEPROM is managed by adding newly entered or overwriting batch files to the storage spaces. Erasing single batch files is not possible. Batch files can be programmed independently, but they can only be erased by block (block 1 or block 2).
Block 2 in the EEPROM can be protected against erasing via software (please inquire).
In this case, a quarter of the total memory will be available for block 2 at any time. Otherwise, 200 bytes are assigned to block 2 from a 1K EEPROM, and 456 bytes from all larger types. For the programmable batch files, the following capacities remain:
From a 32 KB EEPROM, 24,424 = $5f68 bytes are available,
from an 8 KB EEPROM, 5992 = $1768 bytes are available.
For the filing of graphic data in a batch file, we recommend to use PCL compression, which al-

lows much larger graphics files to be stored (app. 1:3), if they contain a lot of zeros in the pure pixel image ($00).

Help with Unknown Interface Parameters

If a controller gets "out of control" during communications due to a fault or other initialization problems, it can be addressed as follows:
The special setting of the solder bridge combination Br1, Br2, Br3 closed and Br4 open allows to by-pass TINIT. In this setting, it is always started serially with 9,600 bauds, 8 data bits, 1 stop bit, and no parity bit. The user can still communicate, when the interface programming is unknown, and the EEPROM can be reprogrammed.

4.6.1 Commands for Managing Batch Files

Print Batch File, Send a File to the Host

Command (ASCII)	Command (hex)	Function
<ESC> "T" "x"	1B 54 <x>	Print batch file no. "x". "x":= { 0 ... 9, A, Q, R, S}. For the controller, processing is transparent, as if the data of the batch file were coming in through an interface.
<ESC> "n" [NUMBER] [DATA]	1B 6E n, y1 ..yn	Send string through the serial interface to the host: This command is entered in a batch file with the data. It can be used to retrieve serial numbers from TS. **Example:** The serial number 1234567890 is entered in the text file TS as < ESC> n [10] [1234567890]. With the command <ESC>"T" "S", the batch file TS is retrieved, and the command < ESC> n [10] [1234567890] that it contains is processed. The text string "1234567890" (the serial number) is sent back to the host. This command is similar to the command "Send synchronizing character", except that it does not wait for the synchronization, and a complete string can be sent out through the serial interface.

Reading out Free Memory Space in the EEPROM

With a command, the user can check if there is enough memory space available in the EEPROM before programming. If a batch file is reprogrammed under the same name, the original content will not be erased, but remains in the memory unused. Erasing in the EEPROM can only be done through the command <ESC> "u"... . See page 50.

Command (ASCII)	Command (hex)	Function
<ESC> "v" "5" "T"	1B 76 35 54	Readout of available memory space for T0 - T9. Readout format: The numbers are transferred in hex format to the host as 2 bytes of 2 hex digits each. **Please note:** Zeros in batch files are stored as <zero> <number of zeros>. A file is completed with two consecutive zeros. Therefore, the actual storage requirement of a file may differ from its length: Several consecutive zeros decrease the required space, while single zeros increase it.
<ESC> "v" "5" "U"	1B 76 35 55	Readout of available memory space for TINIT. Readout format:The numbers are transferred in hex format to the host as 2 bytes of 2 hex digits each.
<ESC> "v" "6"	1B 76 36	Readout of EEPROM size. Readout format:The numbers are transferred in hex format to the host as 2 bytes of 2 hex digits each.

Readout of Batch Files

With this command, the content of any batch file can be read out through the serial interface.

Attention:

This command should NOT be given, if the <X_{ON}>/<X_{Off}> protocol is used.
<X_{ON}>/<X_{Off}> characters that are in the file (e.g. in graphics) are transferred uncoded.
When the <X_{ON}>/<X_{Off}> protocol is activated, the printer buffer should not be in the <X_{Off}> state, before this command is sent, and no other data should be sent to the printer, while batch files are being read out, in order to prevent an <X_{Off}> character from entering the data stream. Otherwise, the <X_{ON}>/<X_{Off}> characters that were generated by the printer may be interpreted as part of the file.

Attention:

If batch files were filed several times in a row under the same file name, only the file that was stored last can be read. The access to previously stored contents is lost.
The FLASH files, however, can always be read with the command ESC "v" "7" [Nr] [DUMMY] that is described below, even if a batch file was programmed in the EEPROM under the same name.

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "v" "7" "m" [DUMMY]	1B 76 37 "m" n	Readout of EEPROM file m:= {"0","1", ...,"9","@"} "@" :=name for TINIT The dummy byte n can have any value. It is required for technical reasons. After this command has been given, the file data are sent through the serial interface: The controller sends the length values l_h and l_l as 4 ASCII characters that are encoded as 2 hex nibble, and that define the file length. The command for reading out batch files must not be part of a batch file itself. In this case, with an unvalid batch file no., or if an EEPROM file is not programmed, the letter sequence "XXXX" will be sent instead of the 4 hex digits.
<ESC> "v" "8" "m" [DUMMY]	1B 76 37 "m" n	Readout of the FLASH file m:= {"0","1", ...,"9","Q", "R", "S","@"} (same function as ESC "v" "7") For description see above.

Programming and Erasing of Batch Files

The programming and erasing of batch files requires passwords. On request, these can be set separately for erasing and programming, as well as for block 1 and block 2.
The default passwords are "PROG" and "ERAS".

Comm.(ASCII)	Comm. (hex)	Function
<ESC> "s" (no.) "PROG" [high no.] [low no.] (data)	1B 73 n 50 52 4F 47 xh xl n1 ....nx	Programming the batch files with (no.):={"0", ...,"9"} [no.]: = name of the batch file to be loaded, e.g. "9" for T9. "PROG" is the password/protection from accidental erasing. A batch file can be programmed several times in a row without erasing the previous version. Always the last version is active. A reorganization of the memory, however, does not occur. With the next programming, the memory space that was used for the first programming is lost until the next erasing. 255 x [xh] + [xl] is the number of data bytes (without the command sequence). (Data) is a data string that contains the number of data bytes calculated from xh and xl. The writing speed is about 200 bytes/s.
<ESC> "s" " @" "PROG" [high no.] [low no.] (data)	1B 73 40 50 52 4F 47 xh xl <n1 ....nx>	Programming the batch file TINIT : For description see <ESC> "s"(no) ... **Attention:** As a standard, the TINIT contains important parameters for setting the serial interface, the battery charge, the power-down, etc., that are not automatically adopted, when the EEPROM is programmed. For this reason, the user should copy the old parameters (from the FLASH or from a TINIT in the EEPROM that were previously programmed by GeBE), when a new batch file TINIT is created, and write them into the EEPROM with the additional commands. Commands regarding the interface parameters should be inserted before the command <ESC> "]" $00 $00 to release the transmitter. This way, messages after the reset will already be sent with the new settings.
<ESC> "u" "T" "ERAS"	1B 75 54 45 52 41 53	Erase batch files 0 - 9. Batch files T0 - T9 can only be erased together. All batch files are erased, even the ones that were programmed earlier. "ERAS" is the password/protection from accidental erasing.
<ESC> "u" "U" "ERAS"	1B 75 55 45 52 41 53	Erase the TINIT file. All batch files are erased, even the ones that were programmed earlier. "ERAS" is the password/protection from accidental erasing.

4.6.2 Error Codes for Processing Batch Files

Whenever errors occur during the processing of text files, e.g. during erasing or reprogramming, error messages are transmitted through the serial interface.

Report Serial	Comments
"E0"	EEPROM commands completed without error
"E1"	Invalid batch file no.
"E2"	Wrong password for erasing or promgramming of batch files.
"E3"	Batch file memory overflow
"E4"	Maximum programming time for one EEPROM byte was exceeded (time out).
"E5"	EEPROM not found
"E6", ... "E9"	Future Use

4.7 Error and Status Messages during Printing

4.7.1 Automatic Status Report

How are Errors Reported Back?

Errors are reported through both the parallel interface and the serial interface, and are indicated through the status LED. Besides the data and handshake lines, the parallel interface also has feedback lines that are switched accordingly, when errors occur. However, because of the limited number of lines, the feedback of an error is not always unambiguous, if multiple errors have to be reported simultaneously. In most cases, 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 has been cleared, the corresponding small letter is sent, followed by an "X", if there are no additional errors.

Table of Error Messages

Messages	Serial			Parallel				Status LED			Comments
			CTS Output	Busy	/Fault	Select	Paper End	on:off / flash frequency fast: "S" app. 0.66Hz medium: "M" app. 0.33Hz slow: "L" app. 0.16Hz Parameter "n" refers to the command <ESC> "y" "n" (see 4.3.5.3. LED Control) "n" = "0" "n" = "1" "n"= "2"			
Faultless operation					1	1	0	LED on	1:31/ M	LED off	
After reset	"R"		1		0	0	0				Level on the status lines only short-term during phase of initialization; message: <X_{ON}> "R" "X" (or error)>
After watchdog reset	"R"		1		0	0	0				Crashing program
End of error	"X"		)*		1	1	0	LED on	1:31/ M	LED off	Also after hardware, software, and watchdog resets
Buffer empty	X ON		1								Buffer emptied by 22 characters <DC1> = $11
Buffer full	X OFF		0	1							Buffer has space for 22 more characters <DC3> = $13
Synchronizing feedback	all characters		-								Processing the synchronizing commands; each transmitted character
Errors:		OK			1	1	0				
Head lifted	"H"	"h"			1	0	0	1:1			
Paper end	"P"	"p"	)*		1	0	1	1:1 / S	1:1 / S	1:1 / S	After paper has been inserted, the printer will wait for about 2sec. before printing, to give enough time for the mechanism to be closed.
Paper end sensor	"Z"	"z"			1	1	0	3:1			Warning without interrupting the printing.
Aux sensor	"G"	"g"			1	1	0				
Cutter blocked	"C"	"c"			0	1	0	1:1			Error cleared through feed or reset
Temp. low	"K"	"k"	)*		0	1	0	1:1 / S	1:1 / S	1:1 / S	Print head temperature too low
Temp. high	"T"	"t"	)*		0	1	0	1:1 / S	1:1 / S	1:1 / S	Print head temperature too high
Vp too low	"U"	"u"	)*		0	1	0	1:1 / S	1:1 / S	1:1 / S	Theoretical report, since the voltage limit is below the reset threshold
Vp too high	"M"	"m"	)*		0	1	0	1:1 / S	1:1 / S	1:1 / S	Error message "M", usually when Vp>7.8V. Error is usually cleared, when Vp<7.6V.
Parity error	"?"		-								Parity or framing error/ printing not interrupted
EE-OK	"E0"		-								EEPROM command completed without error
EE-invalid	"E1"		-								Invalid batch file no.
EE-password	"E2"		-								Wrong password for EEPRROM access
EE-overflow	"E3"		-								Batch file memory overflow
EE-time out	"E4"		-								EEPROM byte programming time exceeded
EE-KO	"E5"		-								EEPROM not found
Battery charging:											
Fast charge	"l"	"L"	-					3:1 / L	3:1 / L	3:1 / L	L := charge start l := charge end
Trickle charge	"f"	"F"	-					15:1 / L	LED on	LED on	F := charge start f := charge end

)* Handshake output CTS reacts only to the filling level of the input buffer, but it can also be programmed to go to "block interface" (log. 0), when an error occurs. See the chapter on the configuration of the serial interface on page 33.

Attention! The LED is FLASHING (1:31 on/off) when the printer is working error free!

Statistics

With these functions, a load profile can be created for generating service intervals. Servicing can be done according to the effective load of the printer, and does not have to be executed preventively.
The system should be monitored, e.g. through the internet.
Also see: Synchronizing Commands, NPE Sensor, and AUX Sensor.
If the length of the paper roll is known, a software paper length counter can be monitored with the function ESC"v" "3".

Readout of Statistical Values in the EEPROM

Each statistical variable is stored in 16 strings within the EEPROM. The values of all 16 strings are added up. This results is a total value range of 65535 * 16 = 1,048,560, which is equal to 100 km or 12 years of permanent operation. Due to the splitting into 16 strings, the EEPROM bits are written 65,535 times maximum (1,000,000 are guaranteed by the manufacturer). When the maximum value of 0FFFFFHEX is reached, this value is retained, and the overflow to ZERO is disabled.

Comm. (ASCII)	Comm. (hex)	Function
ESC "v" "0"	1B 76 30	Cutter readout. Readout format: The numbers are transferred as 4 bytes of 2 hex digits in hex format to the host. Example: 0000B3A9; therefore 45,814 cuts.
ESC "v" "1"	1B 76 31	Readout of the total printer mechanism output in 1/10 meters. Readout format: The numbers are transferred as 4 bytes of 2 hex digits in hex format to the host. Example: 000001A9 equals 425 or 42.5 m paper length. The counter reading in the EEPROM is incremented every 800 dot lines during forward and reverse feeding.
ESC "v" "2"	1B 76 32	Readout of the operating time in 1/10 hours. Readout format: The numbers are transferred as 4 bytes of 2 hex digits in hex format to the host. Example: 000001A9 equals 425 or 42.5 hours of operation.
ESC "v" "3"	1B 76 33	Readout of the paper length since the last paper roll change in 1/10 meters. The numbers are transferred as 4 bytes of 2 hex digits in hex format to the host. Example: 009C equals 156 or 15.6 m paper length. The counter reading in the EEPROM is incremented every 800 dot lines during forward feeding. A reverse transport decrements only the current reading in the memory. The EEPROM value is updated, when this counter exceeds the EEPROM status by more than 800 dot lines. A paper end resets the counter to zero.
ESC "v" "4"	1B 76 34	Readout of the last 10 error messages. Readout format: The controller sends back the last 10 error messages sequentially, followed by 10 bytes corresponding to the last 10 errors. If less than 10 errors have been stored, the remaining values are filled with binary zeros.
ESC "x" "n"	1B 78 n	Activate/Deactivate storing of warnings in the EEPROM error memory. n = "0 " on (default) n = "1 " off Warnings are all error messages that do not interrupt the printing: "Z" ten percent paper "G" AUX paper "?" parity error

Periodical Output of the Current Status

With this command, the current status of the printer can be inquired through the serial interface.

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "k" n	1B 6B n	Send back all current (error) status messages. The controller sends back all current status messages sequentially. If there is no current message, an "X" will be sent back. This command will not be processed immediately. Since it is treated like a printable character, it will not be processed, before all characters that were sent prior to it have been processed. For this case, an automatic repeat of error messages can be activated. n = "0" : The repeat function is turned on. n = (1, ... ,254):=($01, ... ,$FE) The current printer status is transmitted to the host in intervals of about 1/10s x n. n = (255):= ($FF). Single inquiry that does not affect the set interval time.

5 Error Diagnosis

An error diagnosis does not replace the complete functions test that is done by the GeBE test department before each delivery. However, the diagnostic suggestions described below often prove to be helpful, especially for the initial operation of the printer. For example, the interface cannot be checked by initiating a self test printout, when the power supply is turned on, however, the printer should be able to print data, if it were able to receive it through an interface. The user will also be able to see, if the internal system is running.
The hex-dump mode allows the diagnosis of transmitted data, without it being interpreted by the software of the printer controller. It helps to determine, if the command sequence that was received corresponds to the required command.
The following diagnostic help is available:
• Self test printout, when controller is being turned on
• Test printout caused by the closing of a connected external test button
• Hex-dump mode
• Error diagnosis of occuring standard errors

5.1 Self Test, Batch File T0

The functions of the printer can be tested with a test printout. Batch file T0 is processed and printed, if the feed button is held down for more than 2 s during power-on. T0 can also be filed in the EEPROM, e.g. containing a command for printing an additional batch file at the end. Batch file T1 (test printout) may be attached.

5.2 Test Printout, Batch File T1

If the test button is pressed during operation, batch file T1 will be processed.
The character set and other information, like the call for the batch file containing the software version number, may be filed in T1.

Hex-Dump Mode

In the hex-dump mode, the bytes that are transmitted from the host system to the printer are printed as hexadecimal values and ASCII characters, in order to recognize independently from interpretations happening in the parser, which data sequences are received by the printer. This allows the user to detect communication errors, and can be very helpful for servicing the printer. The printer will switch to hex-dump mode, if the feed button is held down for at least 3 seconds during power-on, and if it does not detect any paper at the paper inlet at that time (remove paper, if necessary).
While the printer is in hex-dump mode, a power-down (sleep mode or power-off mode) will be prevented. In order to leave this mode, the printer either has to be turned off, or a hardware RESET has to be initiated (separate power supply!). The hex-dump mode is also left, if the paper

is removed again, after it was detected, and the feed button is held down for at least 3 s afterwards. After the hex-dump mode, the controller goes through an initialization by processing the TINIT.

Comm. (ASCII)	Comm. (hex)	Function
<ESC> "T" "A"	1B 54 41	Retrieval of the unalterable batch file TA. It contains the command <ESC> "z" [number] "HEXDUMP" for formatting the printout in hex-dump mode.
<ESC> "z" [number] "HEXDUMP"	1B 7A n 48 45 58 44 55 4D 50	With this command, the printout in hex-dump mode can be formatted. It is only available through the corresponding entry in the flash. In order to call the hex-dump mode, batch file "A" is retrieved. [number] states the number of represented bytes per line (default: n=12). The selected text format is retained. The password "HEXDUMP" represents a protection against unintentional inputs. A printout may look like the following: 0000 30 31 32 33 34 35 36 37 38 39 3A 3B 0123456789; serial no. character code (hex.) ASCII characters For this representation, the following commands were filed in TA: (Print in font 3) <ESC> "z" $0C "HEXDUMP"

5.3 Error Detection

Not every problem is caused by a printer error.
You will save time and money by clearing simple errors yourself.
The following tips are provided to help you with this:

See "Help with Unknown Interface Parameters" on page 70.

Symptom	Cause	Remedy
The printer seems to be printing, but there is no blackening.	Paper: wrong side toward the print head	Reinsert paper correctly.
At the beginning of printing, just the LED goes out briefly.	The power supply is not designed and/ or connected optimally.	Use power supply with sufficient dimension as well as short supply lines. Check all connections for transfer resistances. Since high peak currents occur with thermal printers, even the smallest transfer resistances can result in excessive voltage drops. In this case, no power supply is strong enough. Buffering with large capacitors may be possible, if the power supply is too weak by only a small margin, and large capacitors (e.g. 4,700 µF) are used.
The printer only prints a few dots in one line.		
The paper feed works, but the self test does not.		
The printer only prints a few characters in one line. If more are entered, it stops printing.		
After a few characters, the printout starts to be incomplete.	The printer buffer is "over-run" (256 bytes), causing a loss of data.	Check or use handshake. (Software: Xon/ Xoff or hardware: CTS). If necessary: decrease output speed, e.g. to 1,200 baud.
The printer prints the wrong characters.	RS232 instead of TTL interface or reversed. (Characters of the upper area are printed).	Use the correct interface.
	Wrong baud rate is set. ("?" is printed repeatedly)	Set baud rate through solder bridges or TINIT
	Bad ground connection of the printer that causes part of the print current to flow through the interface. This results in a voltage rise which causes data corruption.	Check and improve ground connection. Supply current through short, thick lines.
	Host sends a break signal after print jobl (only "?" are printed).	Turn off "framing error ".
Centronics printer works with the PC, but not with my machine.	Printer electrically not compatible with the host.	Measure line levels. Contact GeBE for adjustments.

6 Hardware Description (Controller GCT-6283/84)

6.1 Component Placement GCT-6283/84

Image of the Component Side of the Controller GCT-6283

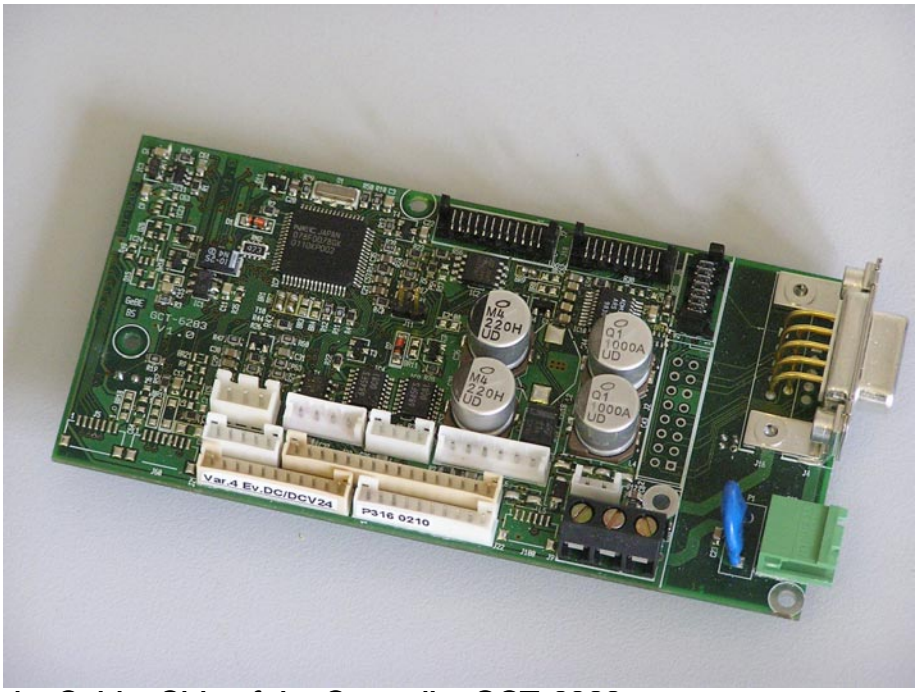


Image of the Solder Side of the Controller GCT-6283

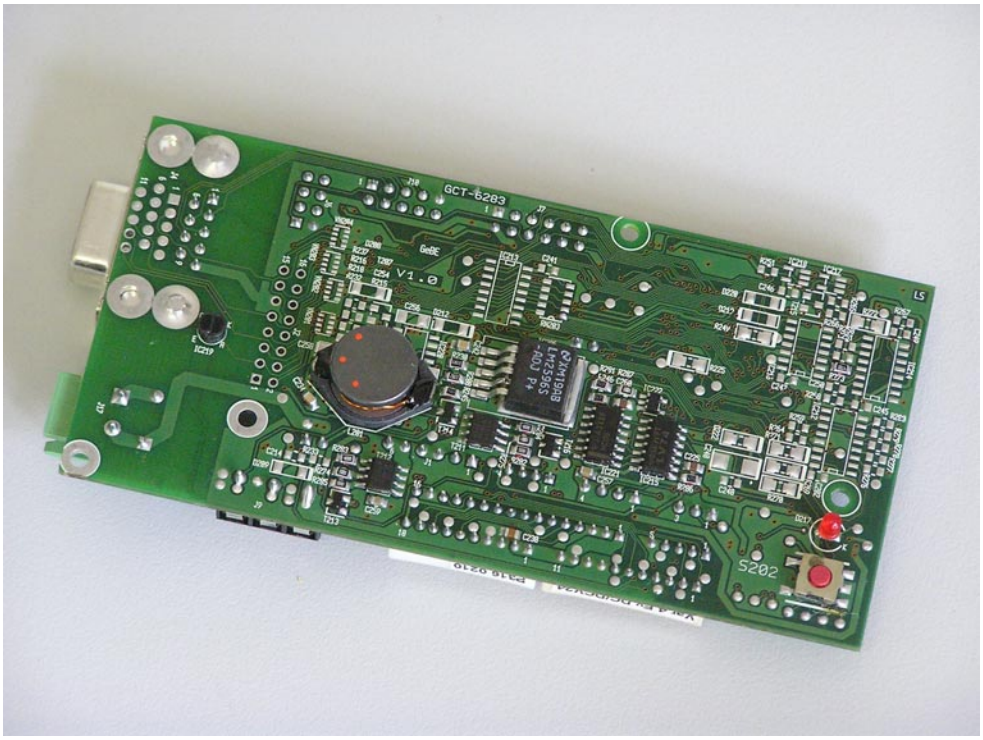


Image of the Component Side of the Controller GCT-6284

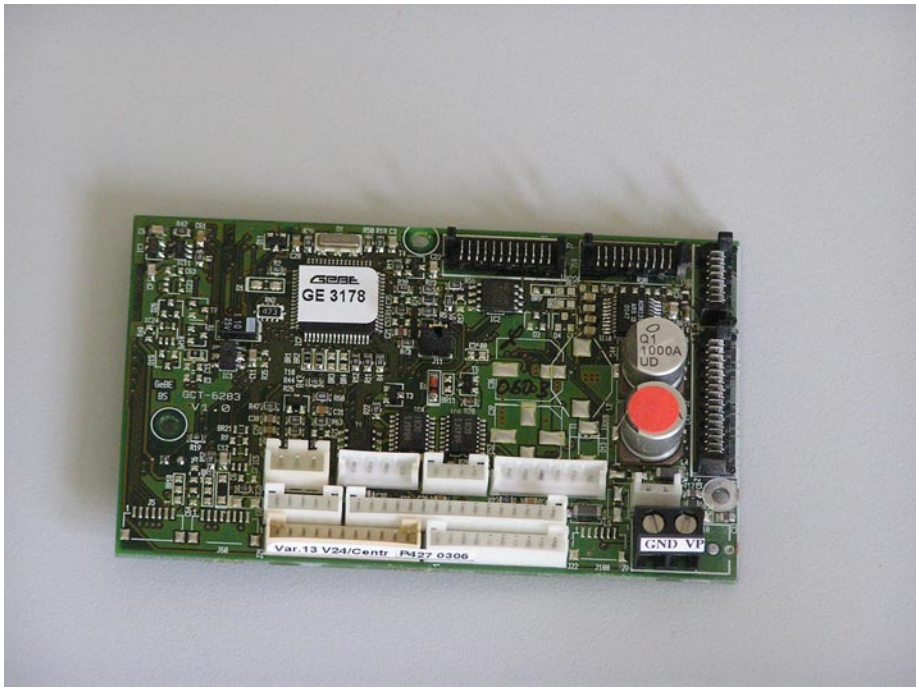
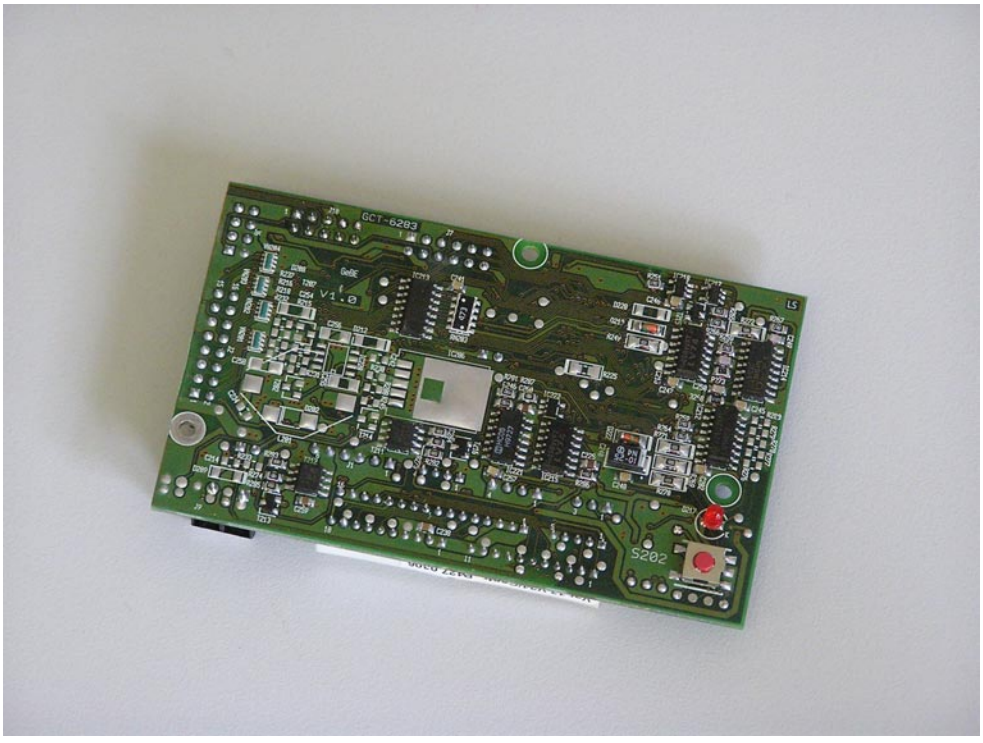
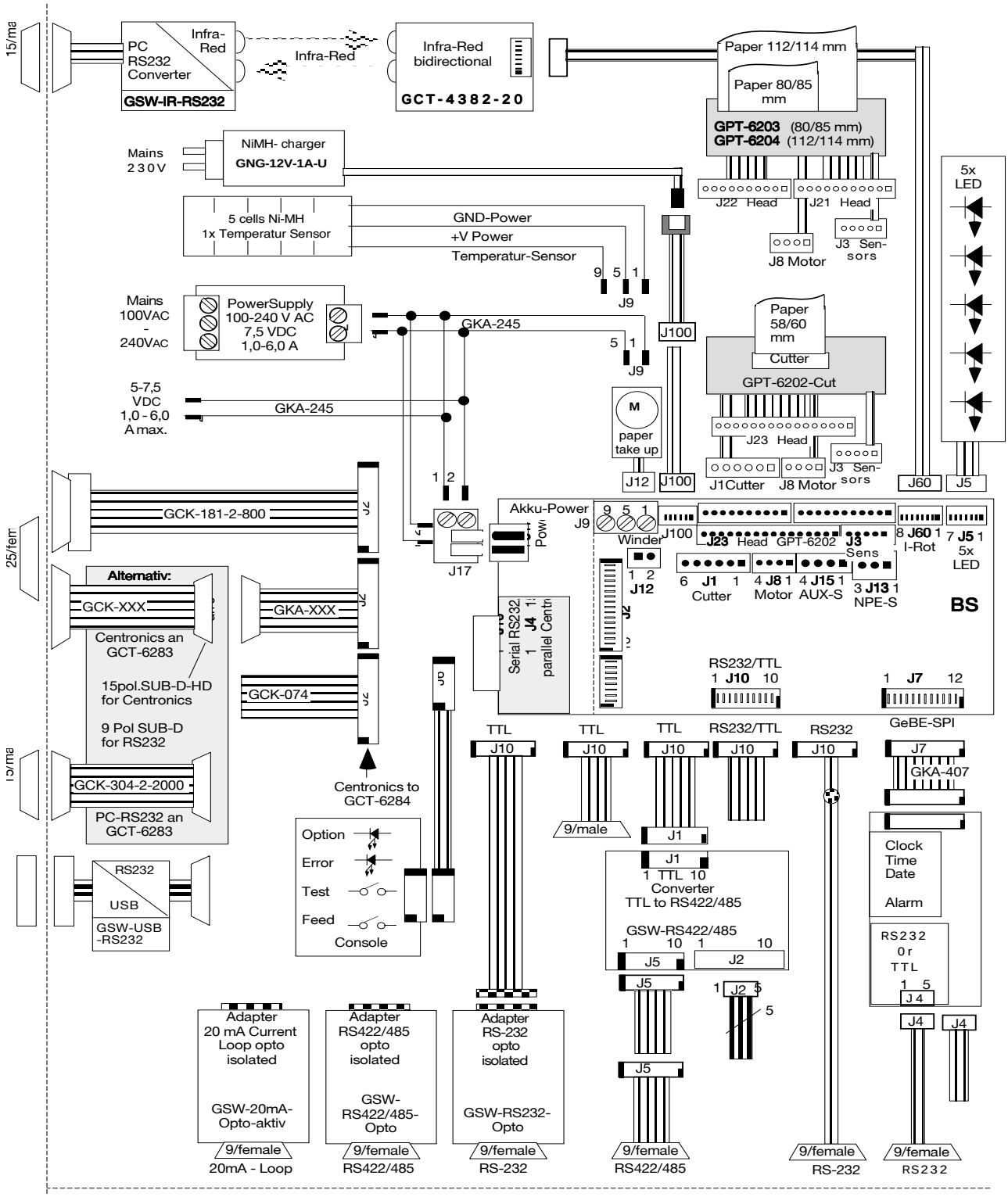


Image of the Solder Side of the Controller GCT-6284

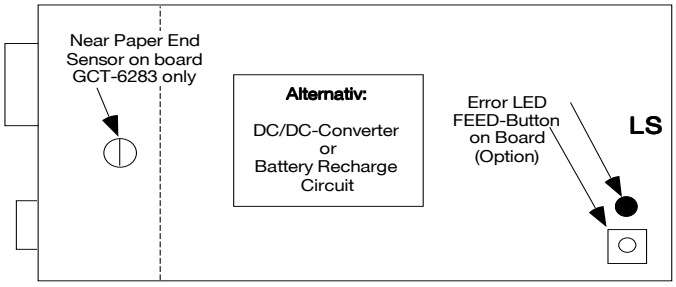


6.2 Block Circuit Diagram of the Printer Module System GPT-621X-83/84



Overview Scheme Thermal Printer Controller GCT-6283/84 all Functions, peripherals and accessories

Stand: GCT-6283/84 ...-... V2.1
3.4.2003 (gb)



6.3 Electrical Connections at the Controller GCT-6283/84

The position of the connectors can be seen in the images and the diagram in chapter 6.1 Component Placement GCT-6283/84 on page 55. GeBE offers different preconfigured cables and modules, either configured on one side, or equipped with adapters, e.g. for PC connection. You can find further information in the detailed interface descriptions below, and in the chapter on product versions.

Connecting Plugs (Table)

Name	Pins	Type	Type of Connection	Connector on Circuit Board	Manufacturer	GeBE Cable	Connector at Cable	Page
J1	6	cutter (6202-Cut)	sep.wires	B06B-EH-A		at the mechansim		66
J2	16	Centronics parallel	sep.wires					70
J3	5	printer mechanism sensors	sep.wires	B05B-PH-K		at the mechansim		65
J4	15	Centronics parallel	sep.wires	SUB-D HD socket				70
J5	7	5 extra LEDs	sep.wires					67
J6	8	console	ribbon cable	MICS-08	Lumberg			64
J7	12	GeBE-SPI-BUS	ribbon cable	MICS-12	Lumberg		MICA-12	68
J8	4	motor	sep.wires	B04B-PH-K		at the mechansim		65
J9	6	power supply	sep.wires	3pin screw clamp				60
J10	5	serial RS232/TTL	sep.wires	SM05B-SRSS-TB	JST	GKA-414 (single-sided) GKA-406 (PC adapter)	SHR-05V-S	62
J12	2	rewinder	sep.wires	B02B-EH-A				66
J13	3	near paper end	sep.wires	B03B-XH-A				67
J15	4	AUX sensor	sep.wires	B04B-EH-A				67
J16	9	RS232 (6283)	ribbon cable	SUB-D socket				62
J17	2	power supply	sep.wires	KBWO02	Phönix			60
J21	11	head CN1 (6203/4)	sep.wires	B11B-PH-K		at the mechansim		66
J22	11	head CN2 (6203/4)	sep.wires	B10B-PH-K		at the mechansim		66
J23	16	head CN1 (6202)	sep.wires	B16B-PH-K		at the mechansim		65
J60	8	infrared	sep.wires	SM08B-SRSS-TB	JST	GKA-408 (single sided)	SHR-08V-S	63
J100	6	charger	sep.wires	SM06B-SRSS-TB	JST	GKA-409 (single sided)	SHR-06V-S	60
BR10	2	power down	jumper	grid 2 mm	Fischer	FN0834 (jumper)		72

6.3.1 Main Power Supply

Different Operating Voltage Sources

The printer system can be operated with voltages between 5 and 40 V from the following sources:

- 5-7 VDC from external power supply
- 8.5 - 40 V DC with integrated DC/DC converter
- 5x NiMH batteries (Minion), uncontrolled charging voltage source 10 - 28 VDC, 800 mA

The power supply Vcc (5V) for the digital component is generated through a voltage transformer on the board from the voltage Vp. Therefore, only one main power supply is required. Since the power component uses high currents, low-ohm current lines (short with a large cross-section) are a must.

Main Power Supply for GCT-6283, J17

The main power supply is connected from the outside through a 2pin screw clamp with counterpart that is plugged into the 2pin connector. Depending on the component variant supplied by the manufacturer, either the externally controlled power supply unit (Vp = 5-7 V), the unstabilized power supply (8-40 V) for the internal DC/DC converter, or the charging voltage (V charge), if the print system is powered by a battery at J9, is connected here.

Pin Assignment at the Main Supply Connector J17

PIN	Signal	Comment
1	Power GND	
2	Power	Externally controlled power supply unit (5-7 V; 5 A peak current), external, uncontrolled operating voltage 8-40 VDC, or charging voltage for 5 cells NiMH battery

Main Power Supply for GCT-6284, J9

The connection is done through a 3 pin screw clamp. Depending on the component variant supplied by the manufacturer, either the externally controlled power supply unit (Vp = 5-7 V), the unstabilized power supply (8-40 V) for the internal DC/DC converter, or the battery (Vp) are connected here. The charging voltage is supplied through J100.

Pin Assignment at the Main Supply Connector J9

PIN	Signal	Comment
1	Power GND	
5	5 - 7 V Power	Battery or externally controlled power supply unit (5A peak current)
9	NTC	Connection for a 6.8 Kohm NTC of a NiMH battery, temperature sensor

6.3.2 Battery Charging Supply J100

The fully configured controllers (-EVAL-) are equipped with a charging control for 5 NiMH cells (6 V).
The charging time for a 1,200 mAh battery will be about 4 - 5 hours with this circuit. It is regulated to this time frame by the controller. During the charging process, the operation LED indicates through different flash sequences, whether fast charge is active (1:1 flashing), or if the charging cycle already changed to trickle charge (1:1 flashing). When the battery is over-discharged, it will first be gently formatted with a small current (app. 5 mA), until the system reaches the power-on RESET threshold and starts the fast charge cycle. The LED will be off during the formatting phase.

Pin Assignment Battery Charging Supply Connector J100

PIN	Signal	Comment
1	GND	
2		
3		
4	V Power	10-28VDC regulated, min. 800 mA
5		
6		

6.3.3 Serial Interface J16 (GCT-6283) / J10 (GCT-6284)

Also see 7.2 Solder Bridges - Baud Rate, Text / Data Mod on page .

The serial interfaces transfer print data to the printer and report back status information from the printer. These data streams are controlled through the so-called handshake method:

- hardware handshake
- software handshake

A handshake does not occur every time a character is sent. With the baud rates it has available, the controller can immediately take all characters into the buffer memory without timing problems. The input buffer has a memory depth of 256 bytes. Since many hosts are not able to abruptly stop the data stream, a handshake is processed, before the buffer is completely filled.
The handshake method is not used for data transfer from the printer controller to the host, since the controller only sends short sequences with relatively low data instalments. It is assumed that this data can be directly received by the host without any loss.

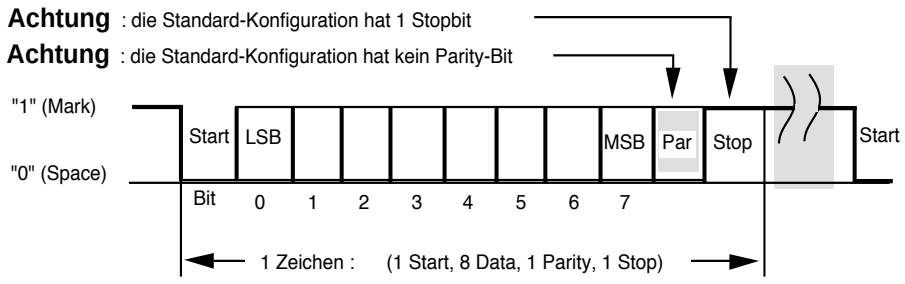
Hardware Handshake

With the hardware handshake, the transmitting data source (host or printer controller) usually recognizes from the voltage level on the hardware lines, whether the other side can receive data or not. The feedback line, however, is not being observed, when the printer controller sends data to the host. Whenever data arises, it is sent serially to the host without delay.
When receiving data, the printer controller manages the handshake line CTS (clear to sent) by monitoring the total input buffer. The signal is controlled almost simultaneously with the software handshake that is processed through the data line ($<X_{ON}>/<X_{Off}>$ protocol).

Xon/Xoff - Protocol

The data transfer from the host to the controller can be controlled by hardware handshake or through XOFF and XON protocol.
The input buffer has a capacity of 190 bytes. Since many hosts are not able to abruptly stop the data stream, a handshake is processed, before the receiving buffer is completely filled.
When there is only space for 32 more characters, the controller will send the control code Xoff to stop the data stream from the host to the controller. Later, when the buffer is emptied to 158 characters, the controller will send an Xon to indicate that the host can send more data.

Timing of the Serial Interface



Signallage	Pegel TTL-Schnittstelle	Pegel V.24 (RS-232) Schnittstelle
"1" (Mark)	+5V (TTL-Pegel)	-3V ... -12V
"0" (Space)	0V (TTL-Pegel)	+3V ... +12V

Pin Assignment Serial RS-232/TTL (GCT-6283) , J16

The connector for the RS232 interface is a 9pin SUB-D socket that can be connected to the PC with a 1:1 cable.

Pin	Signal	In-put/ Out-put	Comment	Assignment Cable D-SUB 9Pin to PC
1	DCD	(O/I)	through Br 9 at VPROG > supply of programming voltage possible	1
2	RXD	O	serial data for error messages and Xon/Xoff messages	2
3	TXD	I	serial data, print data	3
4	DTR	I	connected to CTS, optional reactivation with voltage level <= 0V	4
5	GND signal			5
6	DSR	O	If the controller can receive data, the level is logic-0.	6
7	RTS	I	handshake input of the controller (default : without function)	7
8	CTS	O	connected to DTR, optional reactivation with voltage level <= 0V	8
9	RI		not connected	9

Pin Assignment Serial RS-232/TTL (GCT-6284) , J10

The connector for the RS232 interface is a 10pin MICA male multi-point connector. Cable GKA-072, which is open at the opposite end, can be connected here, or the GKA-080 can lead to a 9pin SUB-D socket that connects to the PC with a 1:1 cable (serial COM interface).

J10 is a micro module Lumberg connector.
On request, GeBE supplies a cable with SUD-D 9 pin socket like the one at J16. See accessories.

Pin	Signal	Input/ Out-put	Comment	Assignment Cable D-SUB 9Pin to PC
1	DCD	(O/I)	through Br 9 at VPROG > supply of programming voltage possible	1
3	RXD	O	serial data for error messages and Xon/Xoff messages	2
5	TXD	I	serial data, print data	3
7	DTR	I	connected to CTS, optional reactivation with voltage level <= 0V	4
9	GND signal			5
2	DSR	O	If the controller can receive data, the level is logic-0.	6
4	RTS	I	handshake input of the controller (default : without function)	7
6	CTS	O	connected to DTR, optional reactivation with voltage level <= 0V	8
8	RI		not connected (test point 46)	9

Serial TTL Connection of Interface Adapters, J10

The serial interface with TTL levels can only be used **as an alternative** to the RS232 interface. This configuartion requires 0-ohm bridges in place of the RS232 level converter. This version cannot be implemented by the user. Please note:
The level position will then be inverted to the table in the above timing diagram of the interface: Logic-0 or space corresponds to +0 ...+0.5 V; logic-1 or mark corresponds to +1.5 ...+3 V.
Please send inquiries to the GeBE service department.
Different level adapters are available, including opto-isolated.
See 8.5 Page 76.

Firmware Download through the Serial Interface (Licence)

On request, a firmware update through the serial interface can be done (licence agreement with the OEM user).
The flash of the controller chip can be programmed through J10 with a special procedure. The firmware update can also be done through the integrated SPI connector J7. See page 69
Please contact us with your inquiry.

6.3.4 Infrared Interface, J60

For wireless transfer, the controller can be equipped with a convenient infrared interface option. The IR transmitter/receiver unit is located on a separate module, GCT-4382-20, that can be put at any position through a cable connection.
The physical transfer is compatible to the IrDA SIR hardware layer V1.0.
This procedure is used for transfer rates between 2,400 bps (bits/s or baud) and 115 kbps. These rates are in accordance with a standard serial interface. Hardware layers IrDA FIR and 4 ppm are not supported. This puts the bit intervals between 417 µs and 8.7 µs (~ 20µs at 9,600 bps).
A pulse of 3/16 of the pulse width represents logic 1. Light levels range from 40 mW/sr (milliwatt/steradian) to 500 mW/sr.
The default setting is 9,600 baud (2,400 - 115,200 bps possible on request), no parity, 1 stop-bit.
The transmitting range between host and receiver reaches from 1cm to about 20 cm for low-power IR devices, and from 1cm to about 30 cm for standard IR devices. Please contact us, if your application requires larger ranges.

PIN Assignment of the IR Connector J60

Pin	Signal	Input/Output	Comment
1	Vcc	O	5V digital system
2	TXD	O	Transmit serial data through IR
3	RXD	I	Receive serial data through IR
4	DSR	O	system select???
5	GND	O	
6	Vcc	O	Supply of the transmitting LED
7	test point	I	GND, when IR module is connected (not used)
8	GND	O	

GeBE IR Protocol (Bidirectional)

The GeBE IR protocol was developed for small printers.
In contrast to the IrDA protocol, the GeBE IR protocol does not have software layers that are used for communication in networks or for controlling the hardware in complicated connections. The GeBE IR protocol comes close to the software layer IrCOMM of the IrDA standard. It allows the user through its open description to create a simple, cost-effective master-slave connection, and to include it in existing systems. It can also be used to monitor the printer functions.
See protocol description: GeBE document no.: 395-MAN-E-IR-Protocol.

HP IR Protocol (Unidirectional)

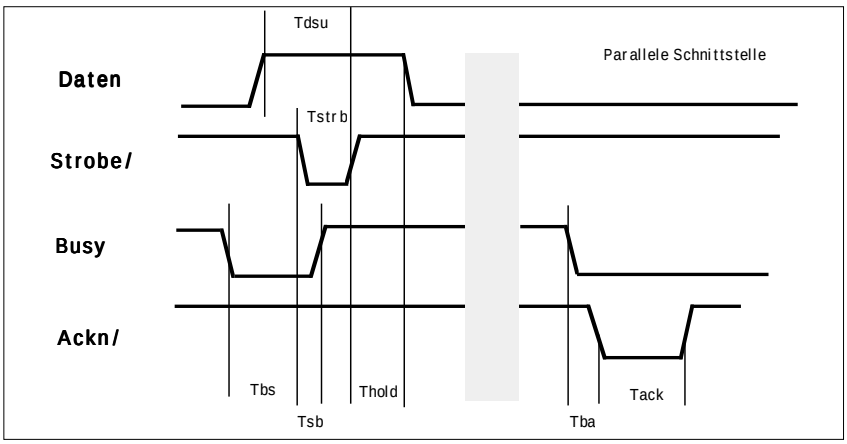
A program part for processing the unidirectional IR protocol from HP is available as an option. Please send us your inquiry.
If the HP protocol is installed in the software, bridge BR3 has to be closed in order to change to it.
See protocol description: GeBE document no.: 417-MAN-E-HP-IR.

As an option, a parallel Centronics interface can be installed on the controller board. On the GCT-6283 (long version), the parallel interface connects to the 15pin SUB-D socket J4 which can be installed as an alternative to the serial 9pin socket J16. The connector on the short version GCT-6284 is J2. The parallel interface is very fast, and therefore, ideal for the transmission of graphic data.
For connecting a PC (25pin SUB-D), GeBE offers the cable GKA-181.

Through the parallel interface, print data are transferred with the handshake procedure. The printer can be reactivated from the power-down, while a reset (hard- or software) is generated at the same time. Through the output lines fault, busy, paper end and select, the status messages can be sent back to the host. You can find a summary of this information in the table under 4.7.1 Automatic Status Report on page 51.

Since parallel intefaces are more interference-prone, long feed lines should be avoided. It is essential that the timing is done according to the specifications.
Please note:
To improve the power down behavior - feedback through the connected data lines may occur, if the interface is to be connected to several laptops - GeBE offers special configurations with filter effect on the controller that are not integrated in the standard version for functional and cost reasons. Please contact us, if you are interested.
ACK/ is only available at J2.

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 set-up	0,50			time before the next strobe
T_{dsu}	data set-up	0,5			
T_{hold}	data hold	0,5			For open-collector control, the minimum time is 3.5 µs. This value can be changed by replacing the RC filters with other components.
T_{sb}	delay strobe-busy	0,5			
T_{strb}	strobe pulse width	0,5			

Pin Assignment at 15pin SUB-D Socket J4, Parallel Interface on GCT-6283

Pin	Signal	Input/Output	Comment
1	Fault/	O	see error messages
2	BUSY	O	becomes high with the falling edge of /strobe
3	DB5	I	data
4	DB2	I	
5	Strobe/	I	accepting data DB0 ..7 with the rising edge
6	Paper End	O	see error messages
7	GND digital	GND	
8	DB6	I	data
9	DB3	I	
10	DB0	I	
11	Select (out)	O	see error messages
12	RESET/Sel_in	I	reactivation and RESET
13	DB7	I	data
14	DB4	I	
15	DB1	I	

Pin Assignment at 16pin Connector J2, Parallel Interface on GCT-6284

Pin	Signal	Input/Output	Comment
1	Strobe/	I	accepting data DB0 ..7 with the rising edge
2	DB0	I	data
3	DB1	I	
4	DB2	I	
5	DB3	I	
6	DB4	I	
7	DB5	I	
8	DB6	I	
9	DB7	I	
10	BUSY	O	becomes high with the falling edge of /strobe
11	GND digital	GND	
12	RESET/Sel_in	I	reactivation and RESET
13	Fault/	O	see error messages
14	Paper End	O	see error messages
15	/Acknowledge	O	feedback impulse after receiving data (BUSY free)
16	Select (out)	O	see error messages

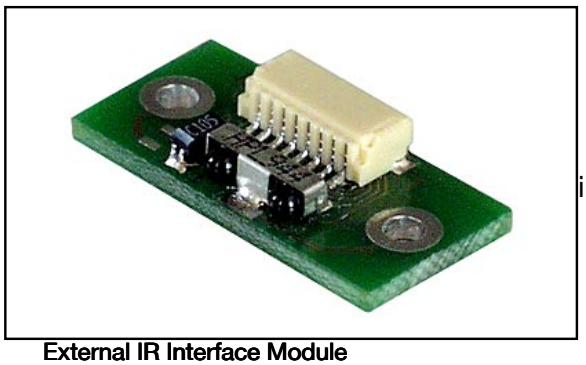
Clock and Serial Interface at GeBE-SPI-BUS (Option)

With expanded software, a buffered clock module (GCT-4382-30-Uhr / V.24) can be operated at the GeBE-SPI-BUS. It is equipped with an alarm register that can be used to reactivate the controller.
For its operation, a second button (test) is connected to the controller. It is used for setting the clock and the alarm register in combination with the FEED button and the print options of the printer as a display. The clock setting can be inquired through special commands and reported through the serial interface.
There are different formats for including the data and time in the current printing, so measuring protocols can be generated showing the current date and time.
The clock has its own battery that keeps it running, when the operating voltage at the controller is no longer sufficient.

Please contact us for a detailed description.

6.3.6 Control Console J 6

Usually, two buttons (FEED; test) and two LEDs (status/error and optional LED) are connected through the 8pin console connector J6, as well as the power supply (Vcc with GND) and a RESET-In/. Mounting positions for a paper feed button and a status LED are available on the controller board as an option. They are used for special versions (e.g. GeBE INFO printers).



External IR Interface Module
Infrared Transceiver GCT-4382-20-IR

in

Pin Assignment of the Connector J6

Pin	Signal	Input/Output	Comment
1	FEED/	I	Paper feed and reactivation from power-down
2	GND	I/O	
3	Vcc	5V	Supply LED (resistance in the controller)
4	LED-Error/	O	max 5mA
5	LED-Optinal/	O	max 5mA
6	Vcc	5V	Supply LED (resistance in the controller)
7	TEST/	I	Retrieval of batch file test and reactivation from the sleep mode
8	RESET-In/	I	External hardware RESET for the processor

Paper Feed Button (FEED/)

Through the paper feed button, a low signal (-1 mA) is caused at this pin.
When the paper feed button is pressed, the printer will not transport the paper, before the printing of the line is completed. Then it will only feed by one line (depending on font), and take a small break. If the button is still held down afterwards, the paper will be fed line by line without interruption until the button is released. This function allows the paper to be fed one line only through a short pressing of the button. Afterwards, normal printing is continued at the beginning of the next line.

Reactivation through the FEED Button

When the printer is in power down mode (power-off or SLEEP mode), it can be reactivated by pressing the feed button. See "Energy Saving Modes" on page 14.

Test Button (TEST/)

Through the test button, a low signal (-1 mA) is caused at this pin.
When the test button is pressed, the printer prints batch file T1. Depending on its content, it may retrieve other batch files. The printing of information or advertising text can be initiated this way.

Reactivation through the Test Button

When the printer is in SLEEP mode, it can be reactivated by pressing the test button. See "Energy Saving Modes" on page 14.

LED_Status (Green LED)

This is a connection for an LED (The current-limiting resistor on the controller board limits the LED current to < 5mA.). For its control, see the table "Error Messages". Optional to this LED, an LED with the same function can be installed on the board. Only one LED should be operated at a time. For error messages, see page 51. For signal function, see page 34.

LED_Optional

This is a connection for an LED used for custom solutions (The current-limiting resistor on the controller board limits the LED current to < 5mA.).
For control options see page 34.

6.3.7 Connecting the Printer Mechanisms

The controller can control the printer mechansims GPT-6202, GPT-6203, and GPT-6204.
The following connections are available:
• stepper motor for paper transport
• sensors for paper and head position
• print head control (printer mechanism GPT-6202 only has one connector (J23) at the head, while GPT-6203 and GPT-6204 each have two (J21 and J22).
• paper cutter (only GPT-6202-Cut)

Stepper Motor; Pin Assignment J8

The connection for the stepper motor of the paper transport is the same for all printer mechanisms (J8). The stepper motor is a bipolar motor, therefore, 4 connections are required for two windings. Both windings are triggered through a bridge, and also operated with a pulse to reduce the energy consumption.

Pin	Signal	Input/Output	Comment
1	MOT_B/	O	Stepper motor winding B
2	MOT_B	O	
3	MOT_A/	O	Stepper motor winding A
4	MOT_A	O	

Sensors ; Pin Assigment J3

The connector for the sensor that monitors the presence of paper (PE, reflexion light barrier at the paper entry, triggers auto-load of the printer) and the "head closed" sensor (switch at the head mechanics) is the same for all three mechanisms (J3).

Pin	Signal	Input/Output	Comment
1	MOT_B/	O	Stepper motor winding B
2	MOT_B	O	
3	MOT_A/	O	Stepper motor winding A
4	MOT_A	O	

Printer Mechanism Connections J21, J22, J23

The connections and cables at the heads and sensors of the printer mechanisms are not uniform. Each mechanism uses different components.
• J23 is only used for GPT-6202 and GPT-6202-Cut. There is a separate connection for the cutter through J1.
• J21 and J22 are used to connect the printer mechanisms GPT-6203 and GPT-6204.
• J1 cutter connection at the printer mechanism GPT-6202-Cut

Pin Assignment J23; Print Head Control for GPT-6202 and GPT-6202-Cut

The printer mechanism is connected through connector J23. The cutter has a separate connector J1.

Pin Assignment J23 (Printer Mechanisms GPT-6202 and GPT-6202-Cut)

Pin	Signal	Input/Output	Comment
1	Vp,H	O	power voltage (after safety circuit)
2	GND P	O	power ground
3	GND P	O	power ground
4	STB1/	O	negative strobe1
5	STB2/	O	negative strobe2
6	STB3/	O	negative strobe3
7	STB4/	O	negative strobe4
8	HEADTEMP	I	temperature sensor of the head (thermistor)
9	STB5/	O	negative strobe5
10	SI0/LAT/	O	negative latch impulse
11	STB6/	O	negative strobe6
12	Vcc	O	5V for digital circuit
13	SCK0	O	shift clock for serial graphic data
14	MOSI0	O	serial graphic data for shift register
15	GND P	O	power ground
16	Vp,H	O	power voltage (after safety circuit)

Cutter Connection J1 (Printer Mechanism GPT-6202-Cut)

As of now, only the 60 mm wide printer mechanism (GPT-6202-Cut) is available with an integrated cutter.

Pin Assignment J1

Pin	Signal	Input/Output	Comment
1	C-BUSY	I	position reporter of the cutter
2	GND	O	ground digital
3	C+	O	cutter motor + connection in bridge
4	C+	O	
5	C-	O	cutter motor - connection in bridge
6	C-	O	

Pin Assignment for GPT-6203 and GPT-6204

The heads of the printer mechanisms are connected through two separate connectors, J21 and J22.

Also see "Stepper Motor; Pin Assignment J8" on page 66, and "Sensors ; Pin Assigment J3" on page 66.

Pin Assignment J21

Pin	Signal	Input/Output	Comment
1	STB5/	O	negative strobe 5
2	STB6/	O	negative strobe 6
3	STB7/	O	negative strobe 7
4	STB8/	O	negative strobe 8
5	SCK0	O	shift clock for serial graphic data
6	SI0/LAT/	O	negativer latch impulse
7	MOSI0	O	serial graphic data for shift register
8	GND P	O	power ground
9	GND P	O	
10	Vp,H	O	power voltage (after safety circuit)
11	Vp,H	O	

Pin Assignment J22

Pin	Signal	Input/Output	Comment
1	Vp,H	O	power voltage (after safety circuit)
2	Vp,H	O	
3	GND P	O	power ground
4	GND P	O	
5	HEADTEMP	I	temperature sensor of the head (thermistor)
6	STB1/	O	negative strobe 1
7	STB2/	O	negative strobe 2
8	STB3/	O	negative strobe 3
9	STB4/	O	negative strobe 4
10	Vcc	O	5V for digital circuit

6.3.8 Periphery Connections

Paper Rewinder J12

J12/2 is an open-collector power output for ohmic and inductive loads up to 150 mA max. (short-term 300 mA). Here, a motor to rewind the printed paper can be connected to Vp. By default, the rewinder will automatically rewind, whenever the printer is printing, and continue to run for a short period of time, after the printing has stopped, in order to tighten the paper.

GeBE offers rewinders, rewinders in an enclosure, and mounting accessories. See "Product List and Accessories" on page 72.

Pin Assignment at J12 Paper Rewinder:

Pin	Signal	Input/Output	Comment
1	Vp	O	output for power operating voltage (battery, output DC/DC converter, or external power supply,(max 150 mA).
2	rewinder/	O	open collector dropping current up to -150 mA, rewinder connection

Paper Path Sensors

There are three sensors that monitor the paper path:
• PE sensor (paper-end sensor)
• NPE sensor (The "near paper-end sensor" at the paper roll holder reports, when only about 10% of paper is left on the roll.
• aux sensor

Paper-End Sensor (PE)

This reflexion light barrier is located at the paper entry of the printer mechanism. The sensor can be installed in two different positions, depending on whether the paper is entering the printer mechanism from the side, going around the print roll, or from the back (straight paper path for thick paper and labels).This sensor reports a paper end. The printer will stop and not continue printing. The paper end is reported through the serial interface. The status LED will indicate an error.
This sensor also controls the automatic paper load function. The paper feed motor automatically starts running for a certain period of time, whenever paper is inserted into the printer mechanism, pulling the paper inside, when it gets into the grasp of the transport roll.
For applications with preprinted markers or labels, this sensor is also used for form control (see page 23). It is connected through J3.

Near Paper-End Sensor (NPE) J13

The NPE sensor is installed at the paper roll holder and reacts, when only a small amount of paper is left on the roll, so roll exchange will be necessary soon. Its status can be inquired through the serial interface.
For applications in GeBE INFO printers, the NPE sensor is installed immediately on the controller board. The external connection is done through connector J13.

Pin Assignment at J13 (NPE)

Pin	Signal	Input/Output	Comment
1	GND	O	emitter photo transistor, cathode LED
2	NPE signal	I	collector photo transistor, operating resistance 47k on controller
3	LED anode	O	current supply of LED in the reflexion light barrier against GND

Auxiliary Sensor J15

This is an optional sensor connection. For applications, where a receipt has to be cut off, or a label has to be removed at the peeler, this sensor can monitor the removal of the printed object. The sensor can also be used for other tasks with special programming.

Pin Assignment at J 15 (Aux Sensor)

Pin	Signal	Input/Output	Comment
1	GND	O	emitter photo transistor, cathode LED
2	NPE signal	I	collector photo transistor, operating resistance **1k** on controller
3	LED anode	O	current supply of LED in the reflexion light barrier against GND
4	GND	O	emitter photo transistor, cathode LED

5 Extra LEDs at J5

An optional controller configuration has 5 LEDs for external signal outputs (e.g. battery status) connected to J5 through 270 ohm current limiting resistors on the controller. This feature is not supported by the standard software.

Pin Assignment at J 5 (5 LEDs)

Pin	Signal	Input/Output	Comment
1	LED1	O	LED1 cathode
2	LED2	O	LED2 cathode
3	LED3	O	LED3 cathode
4	LED4	O	LED4 cathode
5	LED5	O	LED5 cathode
6	GND	O	
7	Vcc	O	5V= (digital system), same for all LED anodes

6.3.9 Expansion GeBE-SPI-BUS, J7

6.3.9 Expansion GeBE-SPI-BUS, J7

The expansions connector J7 is connected to a synchronous, serial SPI-BUS that has been expanded by a few control and supply lines to the so-called 12pin-GeBE-SPI-BUS.
Through this bus, expanded hardware controller functions can be carried out, subject to the necessary control software being installed. Small displays or keyboards may be connected here. Please contact us with your inquiry.

The following functions are already connected to this BUS on the controller board:
- internal serial EEPROM; see under 4.6 Batch Files on page 47
- 5 optional LEDs; see under 5 Extra LEDs at J5 on page 68
- optional parallel Centronics interface

Also available is a
- battery-operated clock module with integrated wake-up function and additional bidirectional serial interface

Pin Assignment at J7 GeBE-SPI-BUS

Pin	Signal	Input/Output	Comment
1	GND digital	GND	
2	Vcc (+5V)	O	
3	CLK1	O	clock for synchronous data transfer
4	MOSI1	I	read data
5	MISO1	O	sent data
6	/EN3	O	used for internal Centronics interface
7	/INT	I	interrupt
8	En-Vcc	I	high level reactivates controller from power-off mode
9	/EN-Aux1	O	to connect other peripherals
10	/EN-Aux2	O	5 LEDs, optionally to connect other peripherals
11	Vprog	I	programming voltage for flash
12	/Reset	I/O	hardware reset/

7 Hardware/Software Presettings

7.1 Initialization Values after a Reset (Software; DIP Switches)

The flash memory contains an initialization batch file "TINIT", in which all the commands for initializing the controller are filed. Practically all commands can be entered in a batch file. For the controller, calling a batch file has the same effect as if data were sent through an additional "virtual" interface. If e.g. the printer is required to print with double height and inverse in data mode, the corresponding commands have to be set into the batch file TINIT. After a RESET, the controller will first process these commands. One batch file can call another once it has been completed . Settings in the batch file TINIT can be changed or added to by the manufacturer.
If an optional EEPROM is available, TINIT can be changed through an interface. Also see the paragraph regarding the EEPROM (page 47). A reset will first activate the standard settings, read the solder bridge settings, and then process the TINIT. If the line feed button is still held down after the processing of TINIT, text file T0 will be retrieved afterwards. T0 is mainly intended for the printout of a batch file that contains text (possibly a logo) as a kind of self test with advertising. The default setting of the controller corresponds to the following instructions, which are not entered in the TINIT, however: <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". In order to change these settings, the appropriate commands that cause the change have to be added to the TINIT. For more information on batch files see 4.6 Batch Files on page 47.

Standard Entries in the TINIT

Comm. (ASCII)	Comm. (hex)	Function
<ESC>"Y"n	1B 59 1E	Set blackening of the paper to a medium value of 30.
<ESC> "[" $40$18	1B 5B 40 18	Current carried to 64 pixels, medium print dynamics and print quality
<ESC> "E" $05	1B 45 05	Power-down after 5 seconds,regardless of the buffer status, if enabeled
<ESC> "r" "1"	Charging circuit configured for 4 NIMH	
<ESC> "]" $0 $0	1B 5D 00 00	Turn on the transmitter of the serial interface

Attention:

Help with Unknown Interface Parameters:
The solder bridge combination: Br1, Br2, Br3 closed, and Br4 open represents an exception. This combination does not call the TINIT of the EEPROM, but always starts serially with 9,600 baud, 8 data bits, 1 stop bit without a parity bit. This allows the user in the case of faulty EEPROM programming with unknown values, to communicate with the controller in spite of the hereby created error control, and to erase or reprogram the EEPROM, if necessary.

<table>
<tr><th></th><th>Name</th><th>Meaning</th><th>Comment</th></tr>
<tr><td>R37 or Br9</td><td>enable power down</td><td>Without R37, the controller will be in sleep mode after a power-up</td><td>default: connected (disable)</td></tr>
<tr><td>BR4</td><td>text/data mode</td><td>data mode: print rotated by 180°,first line at the bottom page margin</td><td>default: open (text mode)</td></tr>
<tr><td>BR3</td><td>RS232/Centr</td><td>choice, whether the RS232 or the Centronics is active through SPI (GCT-4382-10).</td><td>only connected on version SPI/Centronics</td></tr>
<tr><td>BR1/ BR2</td><td>baud rate</td><td>baud | 9600 | 19200 | 38400 | 115200
BR1 | OFF | ON | OFF | ON
BR2 | OFF | OFF | ON | ON
Br1, Br2, Br3 closed, and Br4 open:
See chapter 5.4.2.1 "Help with Unknown Interface Parameters"</td><td>default: open (OFF)
Other baud rates on request.
Inquired during RESET.</td></tr>
<tr><td>RN1</td><td>signal and handshake lines</td><td>equipped with TTL levels for the serial interface</td><td>only connected to versions TTL/serial and SPI/Centronics</td></tr>
<tr><td>R9, R13, R38</td><td>V ADAPTER select</td><td>Pin 4 of the serial interface can either be connected with RTS (handshake input of the controller), or with Vcc or Vp (power supply for external interface adapter).</td><td>default: only R9 connected - handshake input is used for reactivation.
option: only R13 connected - Vp at J2 / pin 4
option: only R38 connected - Vcc at J2 / pin 4</td></tr>
</table>

7.3 Jumper J3 for Selecting the Power Down Mode

Also see 4.4 Power Down Modes on page 37

	Name	Meaning	Comment
BR10	power down mode	Determines, if idle mode or power down mode is used	default: closed = idle mode open = power down mode

8 Appendix - Product List and Accessories

8.1 Controller GCT-6283/84- Configuration Versions

There are two different standard hardware versions:
• matching the printer mechanisms GPT-6202 and GPT-6202-CUT (58/60 mm)
• matching the printer mechanisms GPT-6203 (80/85 mm) and GPT-6204 (112/114 mm)

All three printer widths are operated with different software versions. These versions are derived from just one source code, and only differ in the area of print head control.

There can be variants that take different configurations into account.
Basically, the following single features are variable on the controllers:

Mechanical versions:
The form factor regards the length of the circuit board of the controller:
• -83:= long version; the standard connectors like D-SUB-9 or D-SUB15 are located on the circuit board extension, so this board can also be used in GeBE INFOprinters.
• -84:= short version, connector pairs are fed through intermediate cables to the connections that lead outside. Used mainly in portable devices.

Power Supply:
• external stabilized voltage supply (5-7.5 V) operated with power supply unit, or charged batteries
• external unstabilized power supply (8V - 40 V), DC/DC converter installed. Operated with 12V or 24V car batteries, unstabilized power supply unit, or DC/DC converter installed as an alternative of the charge control
• battery-operated, installed charge control circuit. Operated with 5 NiMH batteries. Charge control installed as an alternative of the DC/DC converter; Charge voltage 8 - 28V DC.

Data Interfaces:
• serial V24 interface: = 9pol. D-SUB connector (on GCT-6283: alternative of 15pin D-SUB-HD connector of parallel Centronics interface)
• serial TTL interface: p.e. external interface adapter, opto-isolated,
• serial infrared interface: = transmitter/receiver module connected externally
• parallel Centronics interface:= 15pin D-SUB-HD (on GCT-6283: alternative of 9pin D-SUB connector of serial RS232 interface)
• GeBE SPI-BUS: update of the flash programming through 12pin J7 possible, Clock module connectable

System Memory:
• EEPROM for batch files:= 8Kb up to 64 Kb

Periphery:
• cutter:= (currently) only for printer mechanism GCT-6202-Cut
• paper rewinder with near-paper-end sensor:= sensor connection J
• paper rewinder
• paper handling sensor:= aux sensor
• console connector:= buttons for FEED and test, LEDs for status and optional RESET input
• For GeBE INFO printer: FEED button, status LED and near paper-end sensor on board
• 5 extra LEDs

In order to facilitate the transition to this technology, GeBE offers the (-EVAL-) controllers with the complete configuration. However, for demands of more than 50 units per shipment it may be more effective for cost and service reasons to go with a partial configuration.
If large batch files are required (logo, advertising), the controller memory in the serial EEPROM can be expanded to up to 64 Kb.
GeBE develops and manufacturers these controllers. Therefore, special versions and software can be created that can support unique character sets or the generating of special bar codes.

Licence Agreements:
For use in special projects, OEM customers can acquire the hardware- or software design under a licence agreement.
Please contact us with your inquiry.

Possible product versions are listed in the following table. Others on request.
Availability is as follows:

L:= ex stock
small quantities ex stock; delivery within 2 weeks; larger quantities within about 6 weeks

P:=production
single samples short-term; larger quantities within about 6 weeks

S:= special product
delivery on request

8.2 Controller Versions

CONTROLLER VERSIONS Features	GCT-6283-28-V.24-EVAL-5V	GCT-6283-36-V.24-EVAL-5V	GCT-6283-52-V.24-EVAL-5V	GCT-6283-28-CENTR.-EVAL-5V	GCT-6283-36-CENTR.-EVAL-5V	GCT-6283-52-CENTR.-EVAL-5V	GCT-6283-28-V.24-EVAL-DC/DC	GCT-6283-36-V.24-EVAL-DC/DC	GCT-6283-52-V.24-EVAL-DC/DC	GCT-6284-28-V.24-EVAL-Akku	GCT-6284-36-V.24-EVAL-Akku	GCT-6284-52-V.24-EVAL-Akku	GCT-6284-28-IR-EVAL-Akku	GCT-6284-36-IR-EVAL-Akku	GCT-6284-52-IR-EVAL-Akku	GCT-6284-xx-V.24-EVAL-5V	GCT-6284-xx-V.24-DC/DC
Availability	L	L	L	S	S	S	L	L	L	P	P	P	S	S	S	P	P
FORMFAKTOR	83	83	83	83	83	83	83	83	83	84	84	84	84	84	84	84	84
Printer mechanismGPT-6202 (58 / 60 mm, withoutCutter)	X			X	-	-	X	-	-	X	-	-	X	-	-	X	X
Printer mechanism GPT-6202-Cut (58 / 60 mm, with Cutter)	X			X	-	-	X	-	-	X	-	-	X	-	-	X	-
Printer mechanism GPT-6203 (80 / 85 mm, without Cutter)	-	X	-	-	X	-	-	X	-	-	X	-	-	X	-	X	X
Printer mechanism GPT-6202 (112 / 114 mm, without Cutter)	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X	X	X
External Voltage 5-8,5V	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	X	-
DC/DC-Converter integrated	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	X
Uein: 10-36 V at J17	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-
Uein:10-36 V at J9 (PIN 1 / 5)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Battery Operation 5x NiMH an J9 (PIN 1/ 5 / 9)	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-
Installed Charge Regulator	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-
Charging Voltage atJ17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Charging Voltage at J100	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-
Serial RS232-interface on J16 (9pol.D-SUB)	X	X	X	-	-	-	X	X	X	-	-	-	-	-	-	X	X
Serial RS232-interface on J10 (10pol.MICA)	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	X	X
Serial TTL-interface on J16 (9pol.D-SUB)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SerialTTL-interface on J10 (10pol.MICA)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infrarotschnittstellenmodul an J60	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-
Parallel Centronics interface on 15p0l. D-SUB-HD J4 alternativ to J16	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-
Parallele Centronics Schnittstelle an 16p0l. MICA J2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
EEPROM (Byte)	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k	8k
Cutter over J1	X	-	-	X	-	-	X	-	-	X	-	-	X	-	-	X	-
Near-Paper-End-Sensor on Board	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Near-Paper-End-Sensor over J13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Paper-Handling-Sensor: AUX-Sensor over J15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paper rewinder over J12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FEED-button on Board	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FEED-button external over console J6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TEST button on console J6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Status LED on Board	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Status LED on console overr J6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Optional LED on Console over J6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-
5x extra LEDs over J5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

8.3 Preconfigured Cables, PC Connection Cables

8.3.1 Specific Connection Cables for the GCT-6283 (long)

Power supply for 6283 (long)			
Art.No	**Model Name**	**Description**	**Comment**
10258	**GKA-245-1-500**	**single wires with multicore cable end, mating connector J17**	ex stock
Interfaces RS232 / SPI / IR / Centronics parallel			
10589	**GKA-304-2-2000**	**D-SUB interface cable RS232 9pin, pins on both ends, 1:1**	
11406	**GKA-407-2-200**	**SPI bus (e.g. Centronics)** 12 single wires, 0.08mm^2, 250 mm, JST connectors on both ends	ex stock
11488	**GKA-408-2-110**	**Connecting IR port J60 to IR adapter** 8 pin single wire,110 mm, JST connectors on both ends	ex stock
11863	**GKA-468-2-2000**	**15pin D-SUB-HD at 25 connector D-SUB, Centronics**	
Console and Periphery			
	GKA-312	**Console Connection**	

8.3.2 Specific Connection Cables for the GCT-6284 / Battery / Charge Control on Board

Power Supply			
Art.No	**Model Name**	**Description**	**Comment**
11362	**GKA-409-1-190**	**charging supply** 6 single wires, 0.08 mm^2, 190 mm, JST connector, **open end not insulated, at J100**	ex stock
11362	**GKA-416**	**charging supply hollow socket through** 6 single wires, 0.08 mm^2, 190 mm, JST connector at J100	ex stock
Interfaces RS232 / TTL/ SPI / IR / Centronics parallel			
11352	**GKA-406**	**10pin MICA to 9pin D-SUB socket, round cable (through male connector 1:1 to PC)**	
10044	**GKA-072-1-1000**	**10pin MICA; one end open (RS232, TTL)**	
11282	**GKA-402**	**10pin MICA to 10 pin MICA, for TTL to converter RS422/ 485**	
10048	**GKA-080-2-800**	**10pin MICA to 9 pin D-SUB, directly to PC**	
10049	**GKA-081**	**10pin MICA to 10pin socket, adapter connection**	
11488	**GKA-408-2-110**	**Connecting IR port J60 to IR adapter** 8 pin single wire,110 mm, JST connectors on both ends	ex stock
11863	**GKA-468-2-2000**	**15pin D-SUB-HD at 25connector D-SUB, Centronics**	

Art.No	Model Name	Description	Comment
10055	**GKA-181-2-800**	**16pin MICA (J2) to 25pin D-SUB connector, Centronics**	
	GKA-XXX	**16pin MICA (J2) to 15pin D-SUB-HD socket**	
10046	**GKA-074-1-800**	**16pin MICA (J2) to 16 pin ribbon cable, one end open**	
	GKA-XXX	**16pin MICA (J2) to 15pin D-SUB-HD socket**	

8.3.3 Console and Periphery

	GKA-312		

8.4 Power Supplies and Batteries

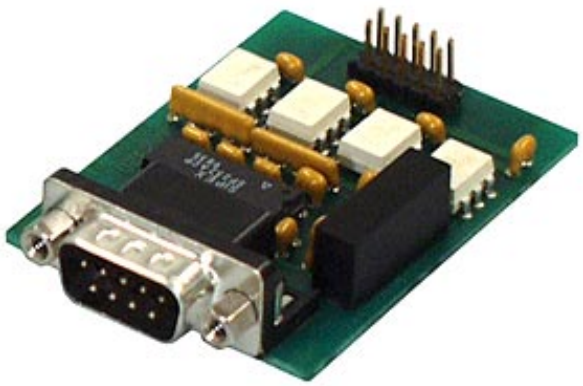
11451	GNG-6,5V-3A-(10-36)VDC	DC/DC converter from 10-36VDC to 6.5V, 3A, open design, compact board	circuit board / ex stock
11445	GNG-5V-2.5A-AC-T	desktop power supply 110-240VAC to 5V DC, 2.5A	power supply / ex stock
10473	GNG-5V-5A-AC	power supply 100-240 VAC to 5V DC, 5A	open frame / ex stock
11909	GNG-12V-1,2A	Steckernetzgerät, spezieller Stecker	ex stock
	GNA-6V-1.2Ah-NiMH	5x NiMH Mignon battery 6 V, 1.2 Ah, NTC	ex stock

8.5 Interface Adapters

The configuration version"TTL-EVAL" realizes the serial interface with TTL levels (0V-5V). Several different interface adapters can be connected to the TTL interface:

10539	GSW-RS422/485	interface adapter TTL to RS422 level,10 pin plug	ex stock
10538	GSW-RS422/485 Opto	interface adapter TTL to RS422 level, opto-isolated, D-SUB 15 pin plug	on request
10208	GSW-RS232-2/ 2-Opto-DC/DC	interface adapter TTL to RS232 level, opto-isolated with DC/DC-converter, D-SUB 9pin plug	on request
10205	GSW-20mA-1/1-Opto-passiv	interface adapter TTL to 20mA current loop, opto-isolated, passive operation, D-SUB 9pin socket	on request
10206	GSW-20mA-1/1-Opto-aktiv	interface adapter TTL to 20mA current loop, opto-isolated, active operation through integrated DC/DC converter, D-SUB 9pin female multipoint connector	on request

GNG-5V-5A-AC
Open Frame Power Supply



GSW-RS422/485-Opto
Interface Adapter , Serial TTL to RS422/485

8.6 Paper Roll Holder, Paper Rewinder

Standard Paper Roll Holder

In the plain standard design, there are three roll holders of different width available, all with the same basic design. The only difference between them is the width of the paper that can be used. The maximum roll diameter is 50 mm for all. The diameter of the paper axle is 11 mm, therefore, standard paper rolls with a 12 mm center can be easily pushed onto the axles.
The roll holders are offered for 58 / 60 / 80 / 85 / 112 / and 114 mm paper width.

Please contact us for availability.

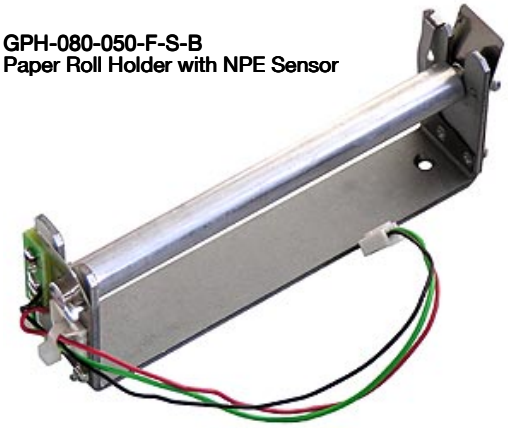
GPH-058-050-K
Paper Roll Holder

Paper Roll Holder with NPE Sensor

These roll holders have an integrated IR reflexion light barrier that is directed to the paper sideways. When the paper supply goes below a certain diameter, the IR light is no longer reflected to the sensor. It will report that the paper supply is running low.

Please contact us for availability.

GPH-080-050-F-S-B
Paper Roll Holder with NPE Sensor



GPW-K-114-062-5V
Paper Rewinder

Paper Rewinder in Plastic Enclosure

GeBE also offers matching paper rewinders for the printer modules described in this manual. They can be operated with 5V or 24V. These paper rewinders are controlled by the printer controller, and only rewind during printing. They are equipped with a slip friction clutch.

Please contact us for availability.

8.7 Thermal Paper, Different Qualities

The thermal printers can work with paper of multiple specifications. Thermal paper is virtually available for all kinds of applications today.
There are papers with the following features: readable for 5 years, 15 years, or 99 years;
thermal layer on the inside or outside of the roll, different center diameters, adhesive labels, surface protected against grease and dirt, colored carrier paper, single-color printing, printing with multiple colors, printing black and red, 60µm thick, 80 µm thick, postcard thickness, selective sensitivity, preprinted papers, control markings for receipt length, with protection against forging, etc.

Different Quality Thermal Papers