Zebra® TTP2100

Kiosk Printer

Technical Manual

P1003640-001

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Introduction

About this Manual

This manual will be updated as, from time to time, printer functions and features may be added or amended. You will always find the latest edition on our web site (http://www.zebra.com). If you require functions not found in the manual edition at your disposal, you are welcome to consult one of our representatives for information.

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You can contact Zebra Technologies at the following:

Web Site

http://www.zebra.com

Technical Support via the Internet is available 24 hours per day, 365 days per year. Go to http://www.zebra.com/support.

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Product Presentation

The TTP 2100 series of ticket printers are available both for kiosk integration and desktop use.

They print on most ticket media from 50 mm to 82.5 mm wide using direct thermal printing, The ticket media can be up to 0.25 mm thick, fanfold, roll, or single cut handfed.

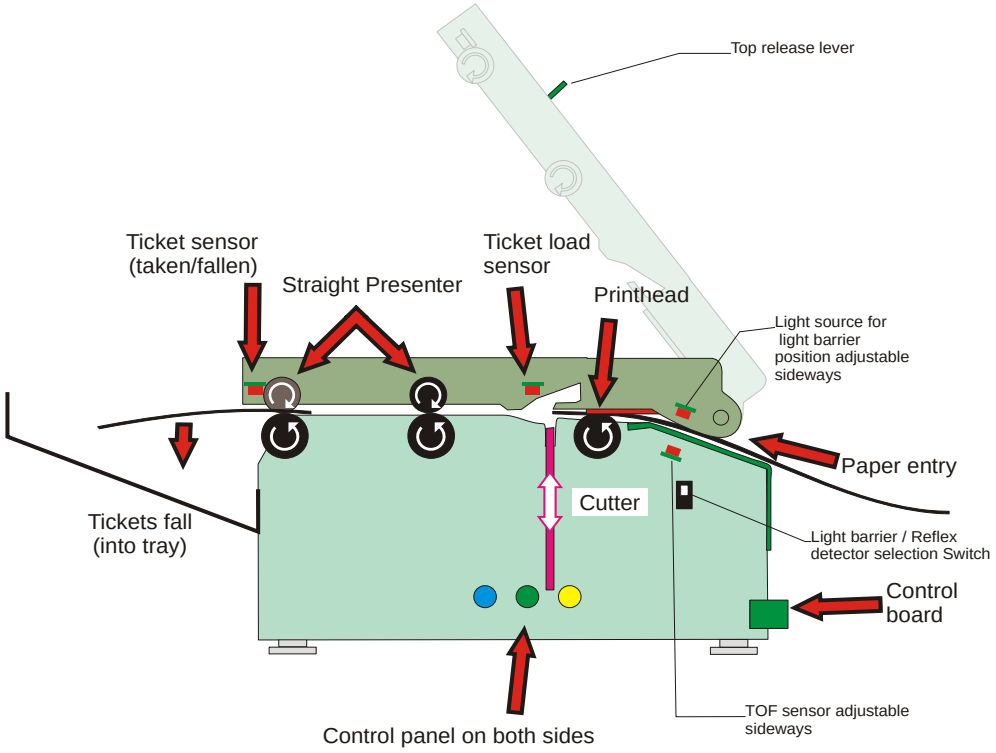
The printers have integrated guillotine cutter, straight presenter, and control board. The print speed is 150 mm per second, and the eject speed 300 mm/s to ensure high throughput.

The cut can be synchronized with :

- Gaps between tickets, or punched holes
- Black-marks on the non thermal side of the ticket stock
- Foil opacity (for labels on opaque foil backing)
- Ticket corner radius

You can also print fixed- or variable-length tickets without synchronization. The presenter can be set to eject the ticket into a tray or hold it by the back edge until the customer takes it. The top can easily be opened to give the operator access to the paper path, and print head, for maintenance purposes.

Figure 1 • Principle of Operation



The printer is available with two different control boards; the TTP 2110 with serial interface and the TTP 2130 with USB interface.

Printer drivers for Microsoft Windows™ and Linux are available, and the printer is compatible with the Plug and Play standard.

The extensive text capability makes it easy to print directly from the ticket software without using a driver. This is especially useful for the serial interface version with its limited data transfer rate.

Presenter

The straight presenter takes care of the ticket after it is printed and cut.

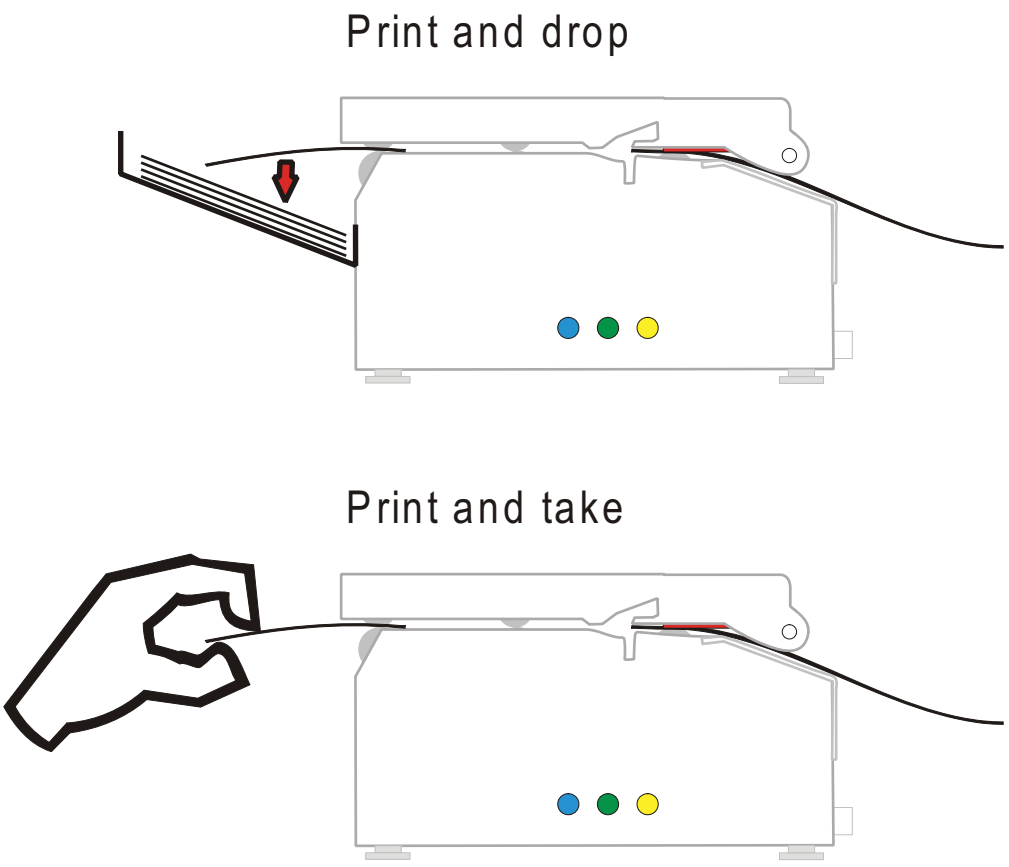
Eject Mode

The ticket is ejected after being cut. The printer is designed so that the ticket always drops down. A sensor is located outside the grip-point of the presenter roller to ensure that the sensor can verify that the ticket drops down. To get this functionality you set “Clear presenter after print” in the driver printing preferences.

Hold Mode

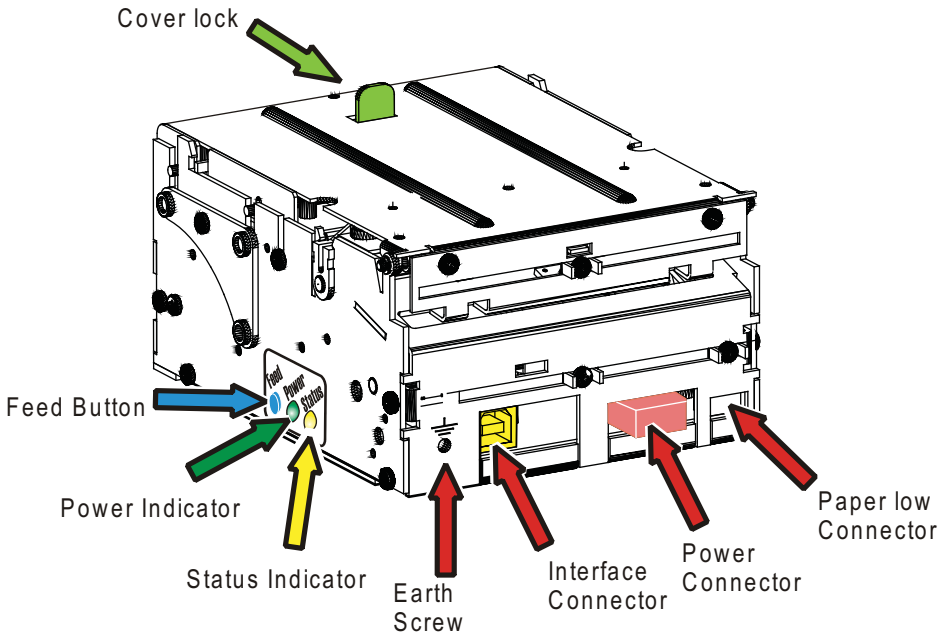
When presented, only the very end of the printout is held by the printer so the customer can easily take the printout no matter how long or short it is. If one customer should have several tickets, the printer can detect when he takes one ticket and directly print the next and hold that one until he takes it, and so on.

Figure 2 • The Presenter



Controls

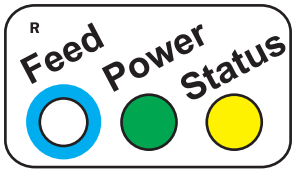
Figure 3 • Rear View



The buttons and indicators are duplicated on both sides of the printer so that they are easily accessible regardless of how the printer is installed.

Feed Button

The **Blue** feed-button has several functions:



- Press and release will feed, cut, and present a complete page.
  Any data in the print buffer will be printed.
  If the buffer is empty the page will be blank.
  In black-mark mode, the page will be synchronized with the black-mark.
- Press and hold FF while turning on the power, or press and hold FF just after closing the print head, will print a self-test printout (see *Making a Test Printout* *on page 31*).
- With no paper in the printer, holding FF pressed while closing print head to enter black-mark calibration mode (see *Print Setup* *on page 88*).

Status Indicator

The status indicator has several functions:

- **ON constantly** — the printer is operational
- **Flashes rapidly** — indicates error. Hold down the feed button and the number of blinks will reflect the *status-code*.

Table 1 • Status Indicator Flash Codes

Number of Flashes	Description
1	Presenter jam, paper cannot be ejected
2	Cutter cannot return to home position
3	Out of paper
4	Printhead lifted
5	Paper did not reach presenter sensor in time
6	Temp error, printhead is above 60°C
11	Black mark calibration error
Fast flashes	Checksum error at firmware loading
Steady light	Wrong firmware type or target at firmware loading
Constantly off	Waiting for paper in black mark calibration mode

Status-Codes are reset:

- When the conditions causing them are removed
- When the printer is turned off/on
- When the printhead is lifted and then lowered.
  Blink, blink, pause, blink, blink — is the warning-code for paper low[1]
  The warning-code is reset automatically when the condition causing it is removed.

Voltage Indicator

Green indicator constantly ON — 24 V present

Notes •

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Installation

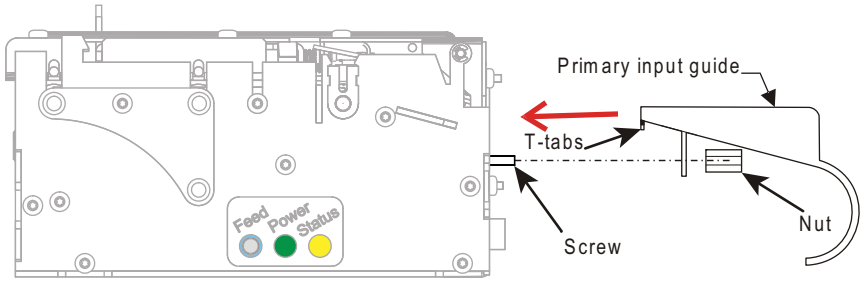
Note • Configuration cards describing how to set the printer up for a specific ticket formats are available on http://www.zebra.com.

Installing a Paper Guide

The TTP 2100 printers are delivered without paper guide fitted.

1. Open the printhead by pushing green printhead lock plate backwards and lifting up the printhead, see *Clearing Paper Jams* *on page 41*.
2. Enter the T-shaped tabs of the paper guide into the “T”-holes, and press the rear of the guide down/in.
3. Fasten the nut using the 5 mm wrench supplied.
4. Close the printhead.

Figure 4 • Fitting the Paper Guide



When a guide is fitted the print with should be set with parameter n48, and sensor selected with parameter n63.

5. If not already done, install a printer driver, see *Installing a Printer Driver* *on page 33*.
6. Start the utility program TTPLoader.exe. This application is available from www.zebra.com.
7. Select the parameters tab.
8. Enter 48 as parameter number and the value in millimeters of the print width you want. Recommended values are:

Paper Width	Setting
82.5 mm	n48 = 78
80 mm	n48=72
76 mm	n48=70
60 mm	n48=54
54 mm	n48=50
50 mm	n48=46

9. Press SET.

10. Enter 63 as parameter number. Recommended values are:

Value	When Used
2	(center sensor) for ISO tickets and most other tickets
4	(12.5 mm from center sensor) for baggage tags according to IATA 740
1	(edge sensor) for ATB tickets without hole in the perforation.

11. Press SET.

12. Press STORE.

13. Wait for the printer to buzz as a confirmation of that the new value is stored.

Top of Form (TOF) Sensor

The TTP 2100 has a flexible top of form detection system. When delivered the printer is configured with fork sensor to detect holes / gaps between tickets. The holes / gaps should be in the paper center, 12.5 mm to the right of the center (according to IATA resolution 740) or at the edge of 82.5 mm wide tickets (Boarding cards).

If the TOF mark is at a suitable position, an auto calibration routine will configure everything for you.

You can move the sensor to other positions, force the printer to use a specific sensor, switch to reflex sensor for black-mark detection by setting up the parameters in the printer.

Selecting Fork or Reflex TOF Sensor

The TTP 2100 can use a fork sensor that looks for holes between tickets, or a reflex sensor that looks for black-marks on the back of the ticket stock. Sensor mode is selected with parameter n61, see *Summary of Parameter Settings* *on page 85*.

Positioning the TOF Sensor

The sensor board sits on a bracket that can slide left/right in a grove. When delivered the bracket is positioned to the very right. In this position Sensor 1 is at the right side ready to detect the corner radius of Boarding cards, Sensor 2 is at the very center of the page and sensor 4 is 12.5 mm to the right of the center at the position determined for baggage tags in IATA resolution 740. To configure the printer for other papers that do not fall into any of the three categories do as follows:

1. Loosen the screw holding the sensor 1 ½ turn.
2. Press the screw in with the screwdriver and carefully slide it to the new position making sure the cables to the sensor does not obstruct the movement.
3. Tighten the screw.
4. Move the light source to the same position, right above the sensor.

Note • The standard ticket guides have holes for the following sensor positions: Center, Edge, and 12.5 mm from center, and the sensor position must correspond to these holes.

Calibrating the TOF Sensor

1. Open the printhead.
2. Remove ticket stock.
3. Hold the Feed button pressed and close the printhead (keeping the button pressed all the time).
4. Release the button, the Status LED should be off.
5. Load ticket stock (just slide into the slot and let the printer auto load the paper).

Note • To ensure good calibration conditions, lightly press the ticket stock towards the bottom of the input guide during calibration.

The printer will forward the paper until it finds two TOF marks and then stop and save all TOF-mark parameters

6. Now open the printhead and remove the ticket stock, close and feed the tickets in again and the printer is ready for use.

Repeat this procedure if the procedure fails or if the printer should be used with tickets that differ from the original specification.

Installation Considerations

The TTP 2100 Kiosk is for embedded applications and should be installed in an enclosure such as a self-service kiosk.

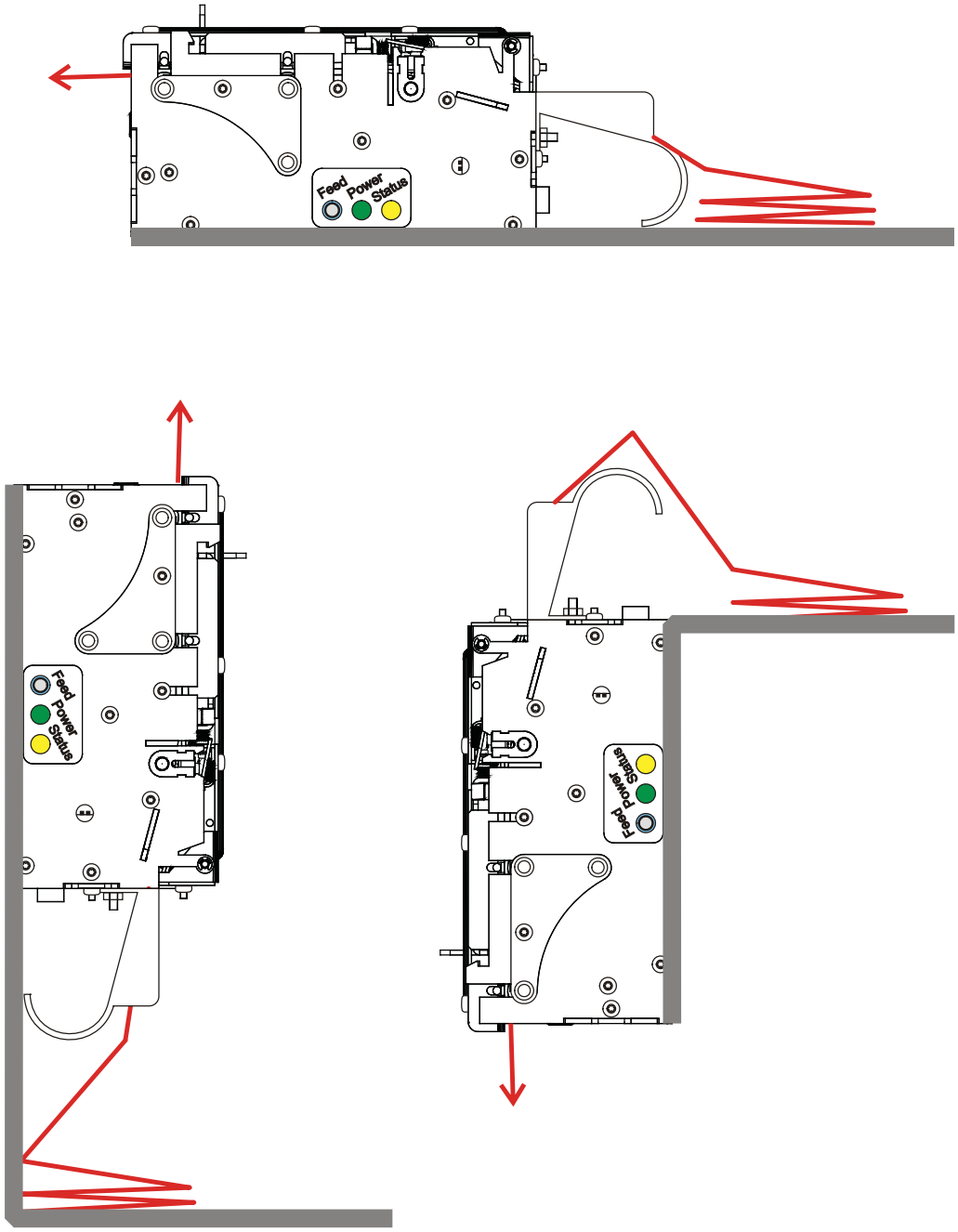
Caution • NEVER use screws that go into the printer more than 4 mm! Longer screws will destroy the electronics inside.

The "TTP 2100 Desktop" is a stand alone printer in a housing. The housings can be stacked so two or more printers can reside on top of each other to save space.

Orientation

The TTP 2100 can be installed at any angle. Horizontal is the most common use but vertical with the ticket presenting upwards can be used if you want the ticket to come up from the desk surface. Vertical with the ticket presented downwards can be used if you want to stack many tickets before picking them up.

Figure 5 • Printer Installation Orientation Options

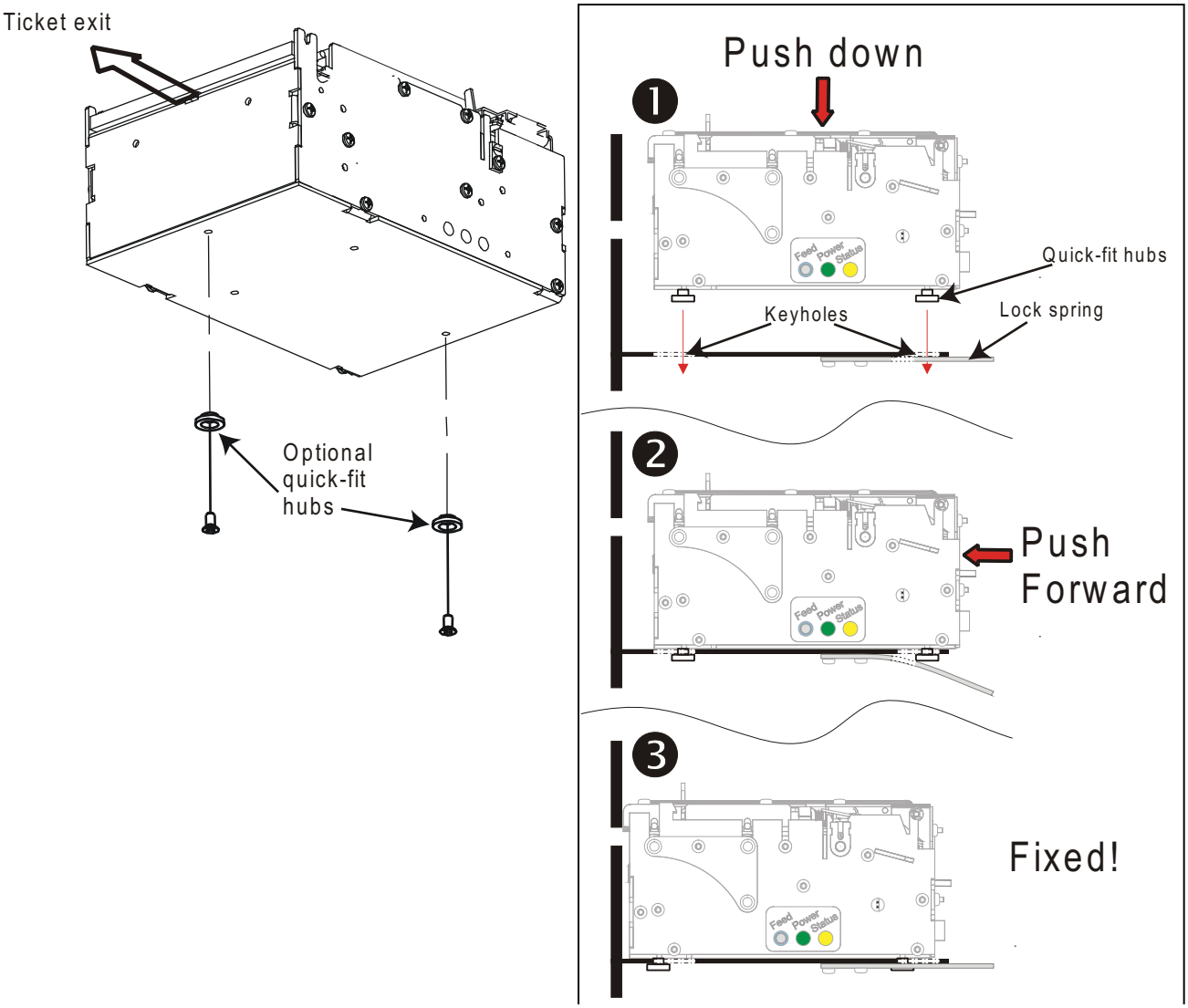


Quick-Fit Hubs

The printers attach to the kiosk in three ways:

- using two screws
- using four screws
- using slides in place using the quick-fit hubs.

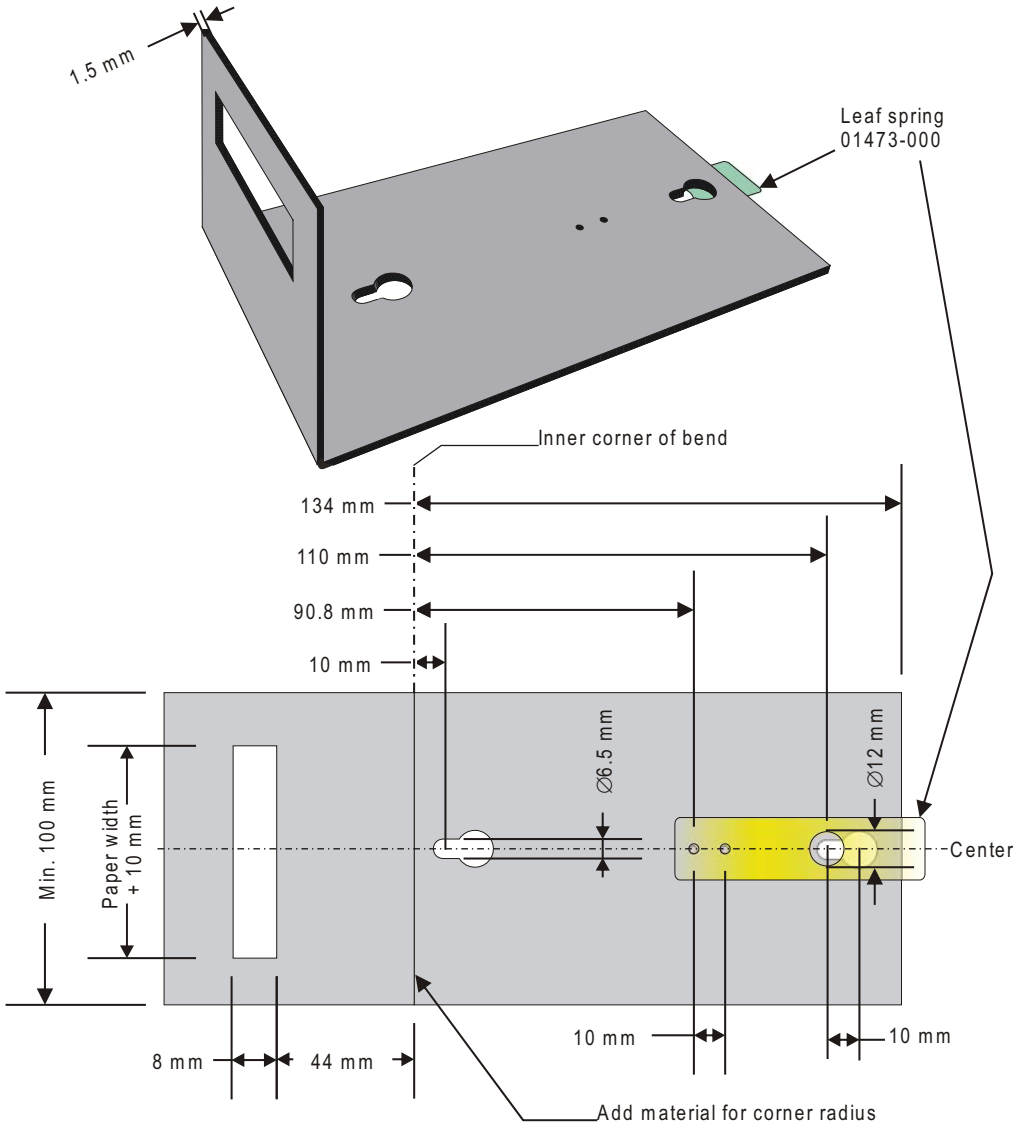
Figure 6 • Front, Bottom View



Design Your Own Mounting

The illustration below gives an example of a printer-mounting shelf. See *Dimensions* *on page 126*, and the 3D solid models and outline drawings for CAD that are available on http://www.zebra.com.

Figure 7 • Example of A Simple Shelf For Fastening a Standard Printer Using Quick-fit Hubs and a Leaf Spring Retainer (Order No. 01473-000)



Additional space is required for paper loading and paper jam removal. Consider mounting the printer on a movable platform so that the printer can be maintained outside the printer enclosure.

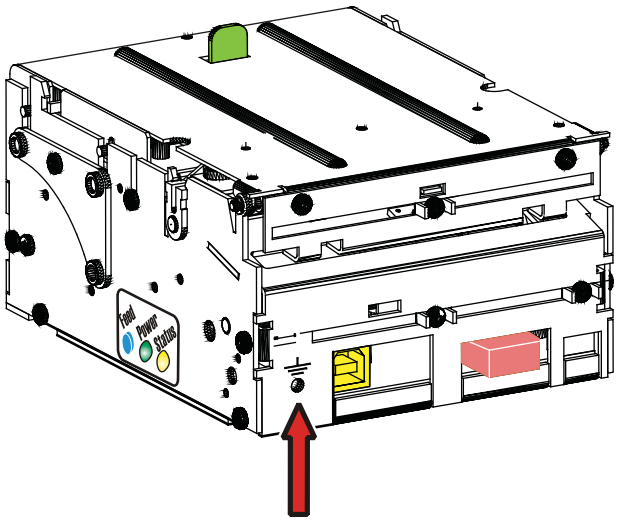
Note • We recommend you to make the output slot 97 mm wide. This way you will be able to use all paper widths that the TTP 2100 series of printers can handle.

Caution • NEVER use screws that go into the printer more than 4 mm! This will destroy the electronics inside.

Electrostatic Discharges and Earth Currents

Preventing ESD and earth currents from affecting the printer operation *requires* proper connection of the printer chassis to protective earth through a mounting platform or through a separate earth conductor. A threaded hole for an M4 earth screw is provided on the back of the printer. Use an M4 x 10 screw and two lock washers when fastening the ground cable.

Figure 8 • Locatoin of Earth Grounding Screw



Note • An optional antistatic brush can be fitted to the front of the printer if required.

Ambient Light

There is an optical sensor at the paper exit at the front of the printer.

To ensure proper printer operation, design the kiosk so that it prevents direct sunlight or light from indoor lamps from reaching the sensor through the paper exit.

Installing a Paper-low Sensor (Optional)

A paper-low sensor alerts the system when a certain length of paper remains on the roll. The purpose of this sensor is to get an early alert so that you can replace the ticket stock in time in remotely located kiosks.

Ticket cassettes and roll holders supplied by Zebra can be equipped with paper-low sensors. Just attach the sensor, and connect the cable to the paper low connector at the back of the printer.

Figure 9 • Paper-low Sensor Connection

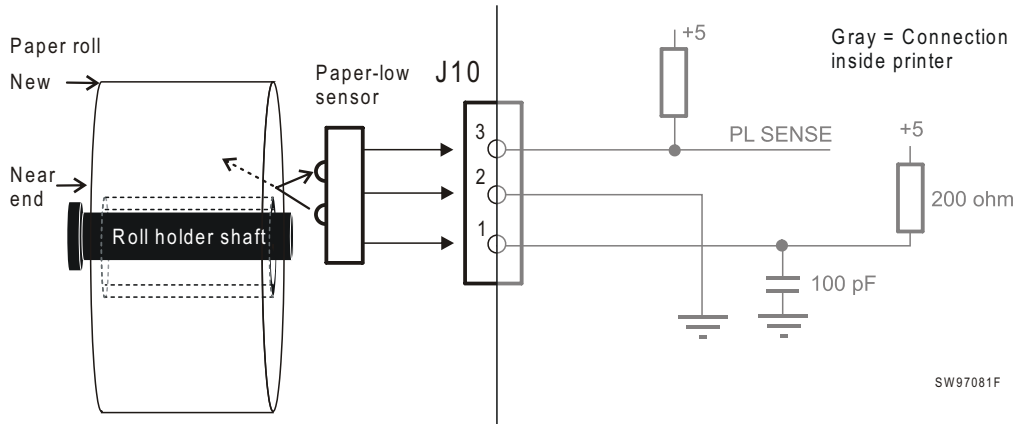
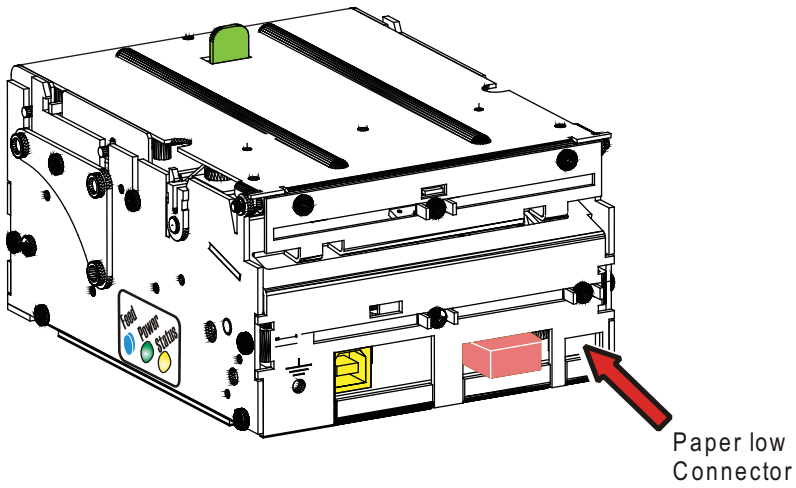
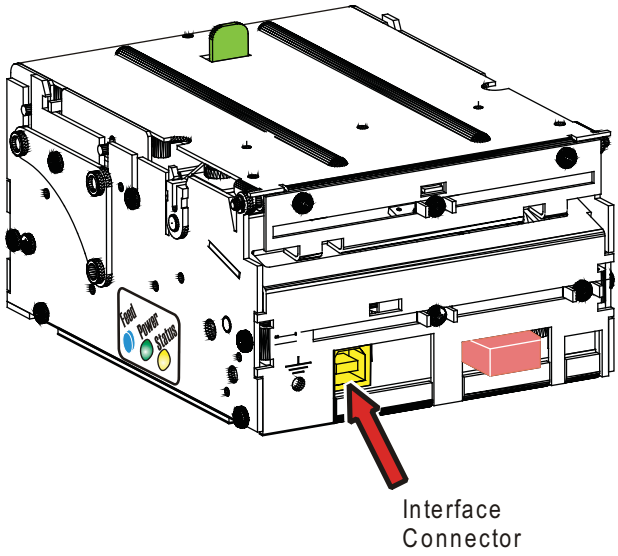


Figure 10 • Location Of Paper-low Connector



Connecting to the Computer

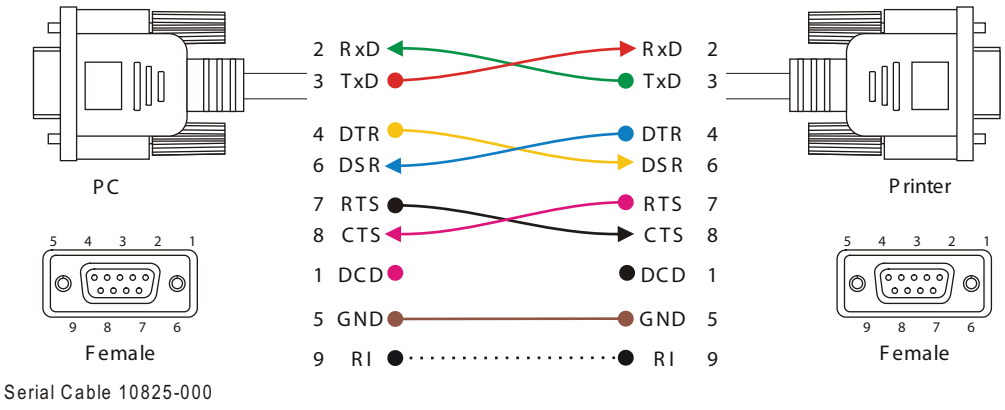
Figure 11 • Location of Interface Connector



TTP 2110

Connect a Zebra serial cable, ordering No. 10825-000, between the printer and the computer to be used. We strongly recommend using the Zebra cable because many incompatible cables are available.

Figure 12 • Serial Interface Cable 10825-000.



Dotted leads are not connected in the printer. To be able to connect the cable in any direction, make symmetrical cables.

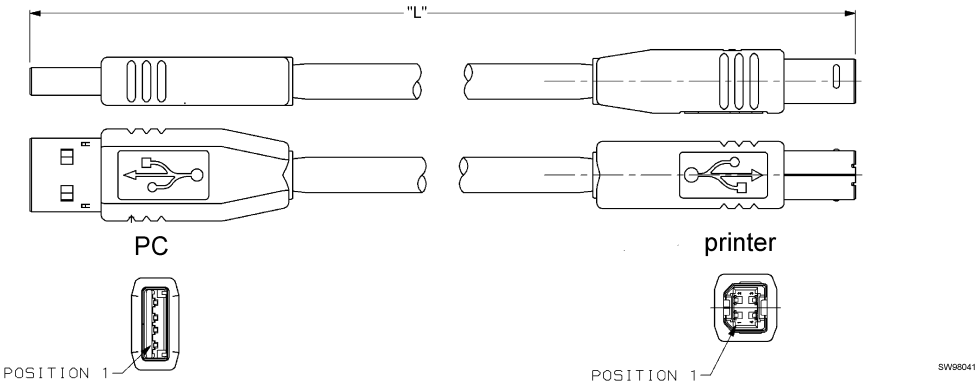
TTP 2130

Connect the printer to the USB port of the computer or the USB hub to be used. USB connectors can be recognized by the following symbol:

The connector on the printer is a 4-pin USB type B connector. See Table 4, *USB Connector (J13) Pin Assignment on page 111* for pin assignment.

A suitable cable is available from Zebra, ordering number 01542-000.

Figure 13 • USB Cable with Type A and Type B Connectors



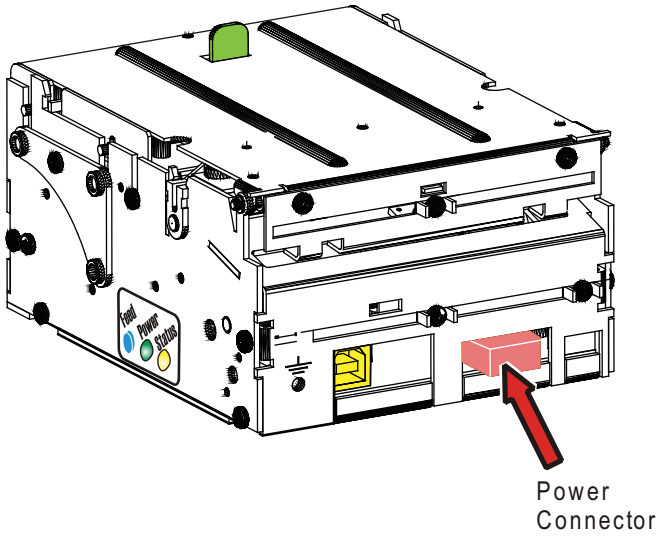
Connecting the Power

Caution • Using a non-Zebra power supply may cause excessive EMC interferences and void the EMC certifications of the printer.

Caution • To avoid electrical shock and printer damage, wiring of a non-Zebra power supply should only be done by qualified service personnel. Use ONLY a power supply which meets the following requirements:

- 24 VDC ±5%
- 70W average (2.92A) and 284W peak (11.8A) power supply

Figure 14 • Location of Power Connector



Caution • On power supplies with line voltage selector, make sure it is set to your local line voltage.

Using the Zebra 70 W power supply for TTP 2100 Desktop, or Embedded (*70W Power Supply on page 128*):

1. Connect the cable from the power supply the power connector on the back of the printer.
2. Connect the power cable to the line outlet.
3. Turn ON the power.

In kiosk applications you may draw power from common PSU in the kiosk if the characteristics are suitable. In such case, cables that fit the connector on the back of the TTP 2100 is available from Zebra, part No. 01370-000. If you make cables of your own, connect the voltages according to the following illustration.

Note • Protective ground and minus output should *not* be interconnected in the power supply.

At the printer end of the cable, use an AMP Mate-N-Lok connector housing and two contact-sockets.

Figure 15 • Power Connection

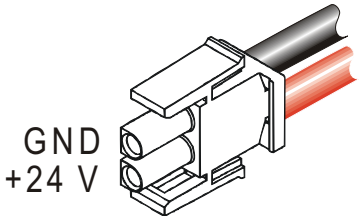
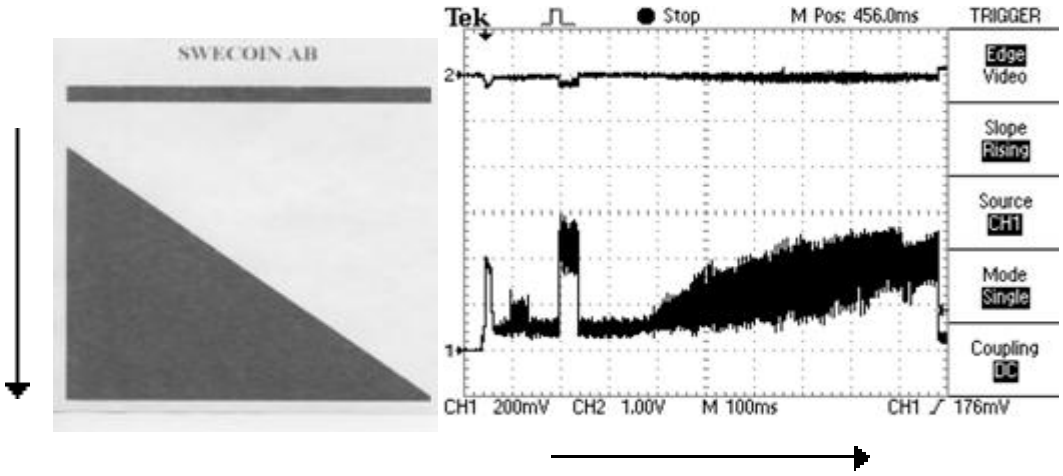
Housing: AMP No. 350777-1	Socket: AMP No. 350689-1
	

Table 2 • Current Consumption

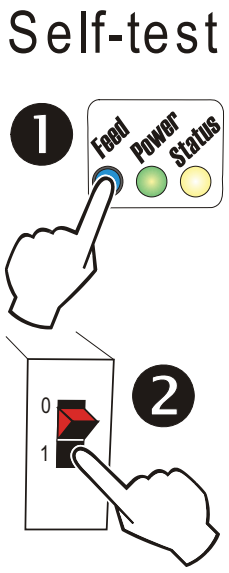
Mode	58-60 mm paper width	80 – 82.5 mmpaper width
Idle	150 mA	150 mA
Standard text printing	0.7 A average	1 A average
All black printing	4 A	6 A

Table 3 • Current Consumption for the Printout on the Left Oscilloscope Setting 2A/div.



The arrows above indicate printing direction

Making a Test Printout



1. Is a power button available for the printer?

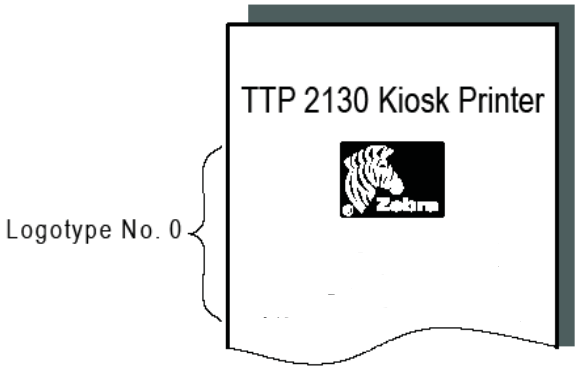
If…	Then…
No	**a.** With paper loaded, press FF just after closing the print head to print a self-test printout. **b.** The printer exits self-test mode and goes on-line.
Yes	**a.** Switch OFF the power. **b.** Hold the Feed button depressed while powering ON the printer. Keep the button depressed until printing starts. This produces a printout showing the firmware version and date, control board revision number and serial number, name of loaded fonts and logotypes, and the parameter settings. **a.** Each successive press of the button will produce a test printout. **b.** Switch the printer OFF and ON again or open/close the print head to exit self-test mode .

Customizing the Self-Test Printout

The self test printout starts with a text line, and then a Zebra logotype. This logotype is just a printout of logotype No. 0., so if you want to personalize the self test printouts in your installation, delete all logotypes and store your own logotype as No. 0.

See also *Logotypes* *on page 79*.

Figure 16 • Logotype No. 0 is Printed on the Self-Test Printout



Installing a Printer Driver

Printer drivers for Linux, and Microsoft Windows™ are available on the Zebra web site http://www.zebra.com, or on disk from Zebra. Please follow the installation instructions that accompany the drivers.

Status Monitoring Through Windows

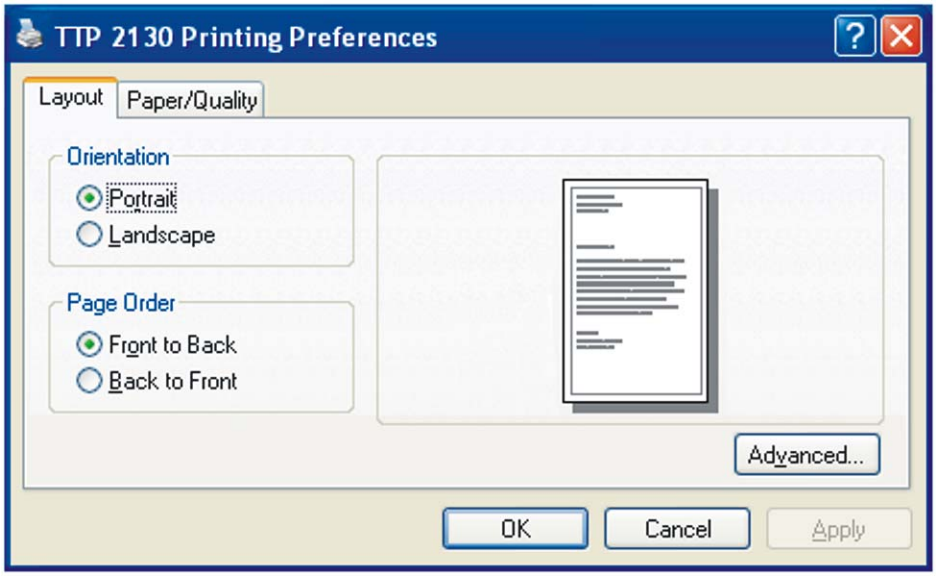
Status can be fetched from a language monitor (21x0mon.dll) that is installed into Windows with the driver. Documentation of the language monitor is available on the drivers' page on the Zebra web site.

If you want to monitor status through the language monitor, make sure that the printer is selected as default printer, and that bi-directional support is enabled in the port section of the driver settings.

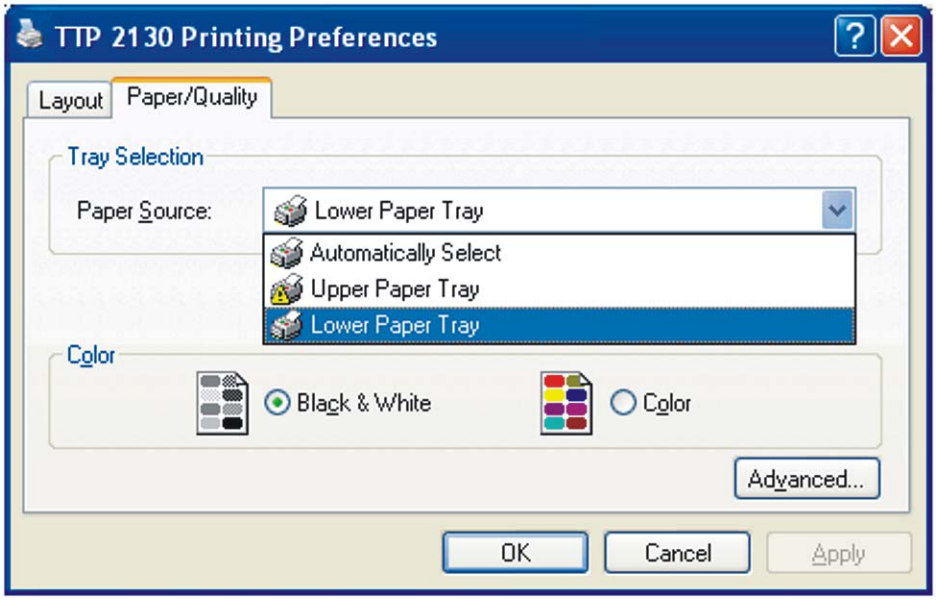
Settings Available in the Driver

The looks of the dialogue boxes vary between driver versions, but essentially the same settings can be made.

You start with the Printing Preferences window. Here you find the portrait/landscape setting, and an advanced button.



The Paper/Quality tab shows the tray selection.

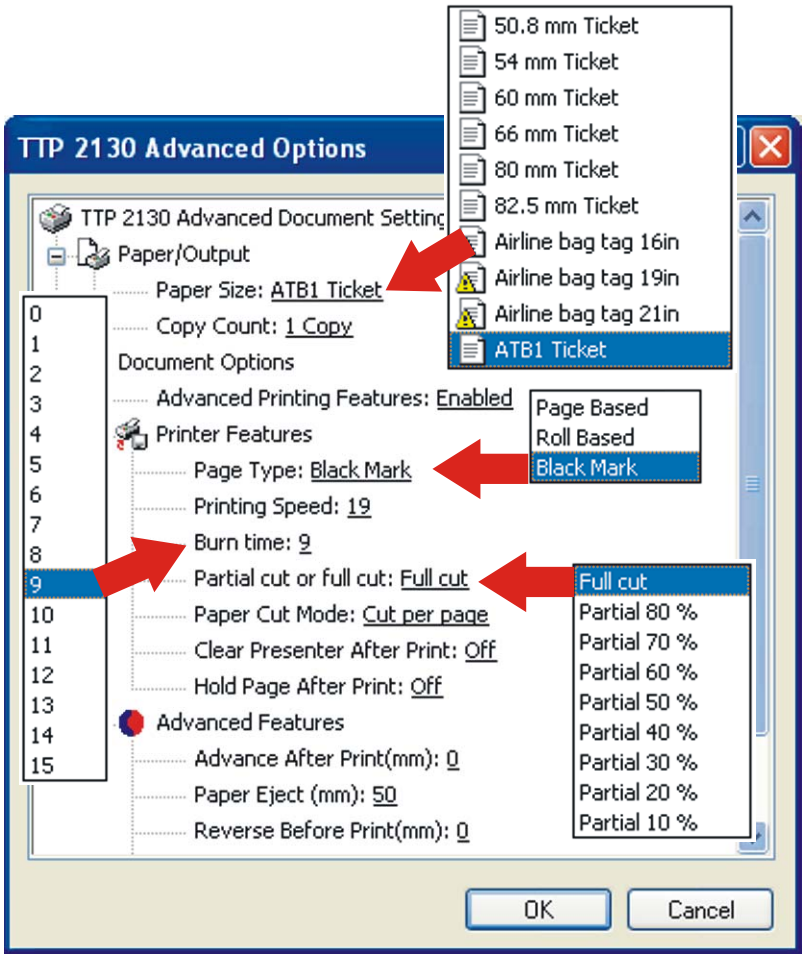


This is an information window - no settings can be change here.

- Lower Paper Tray is when paper is loaded in the primary input guide.
- Upper Paper Tray is when paper is loaded in the secondary input guide.
- If no tray contains ticket material, the printer indicate out of paper.

Note • You cannot load paper in both guides and select tray with this setting. The trays are only used by the status monitoring to report what paper is loaded.

The advanced button contains the Zebra specific settings:



Paper/Output

- Paper size : **ATB1 ticket**, 50.8, 54,60, 66, 80, and 82.5 mm tickets, 16in., 19 in., and 21 in. bag tags
- Copy Count: **1** to 9999

Document Options

- Advanced printing features: **Enabled** / disabled

Printer Features

- Page Type: Page based/Roll based/**Black-mark**
- Printing Speed: 1 to 19
- Burn Time: 1 to 15
- Partial cut or full cut: **Full cut**, and 10-80% cut

- Paper Cut Mode: No Cut / Cut per document / **Cut per page**
- Clear Presenter After Print: On / **Off**
- Hold Page After Print: On / **Off**
- Vertical mount: On / **Off**
- Slow present: On / **Off**

Advanced Features

- Advance After Print: 0-100 mm (**10 mm**)
- Paper Eject: 0-100 mm (**30 mm**)
- Reverse Before Print: 0-100 mm (**0 mm**)[1]

Black-mark Settings:

- Minimum black-mark: 0-100 mm (**3 mm**)
- Maximum black-mark: 0-100 mm (**16 mm**)
- Cut position: 0-100 mm (**0 mm**)
- Scaling: 10-400% (**100%**)
- Contrast/brightness

4

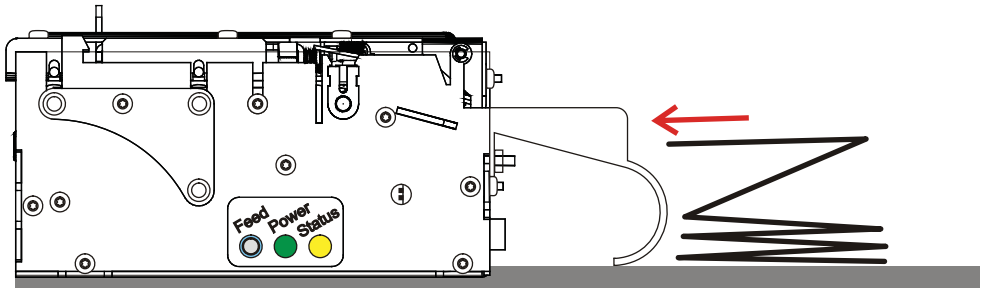
Operation

Loading Fanfold Ticket Stock

1. Turn the tickets so that the surface to be printed (temperature sensitive side) faces upwards. Put the first ticket on the input guide and slide it up the guide into the printer.
2. The printer will grab the paper, locate the edge and reverse to printing position.
3. When ready, the yellow status led will be ON indicating that the printer is ready to be used.

Note • Remember that the thermal coating should be upwards and black-marks (if used) should face down. The printer will automatically load the tickets when the sensors detect it's presence.

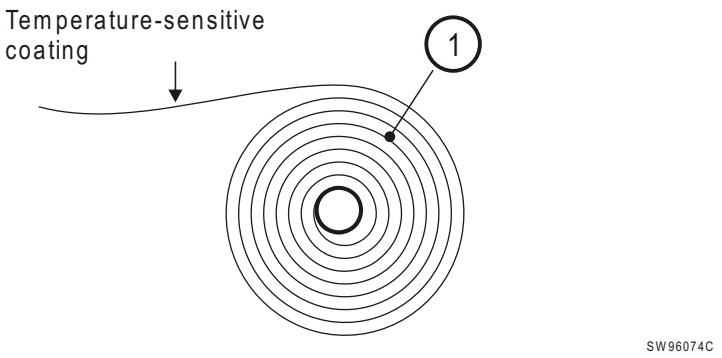
Figure 17 • Loading Ticket Stock



Installing a Paper Roll

1. Turn the new paper roll as shown. The paper should be inserted into the printer with the temperature-sensitive side up so that the paper leaves the roll from the top.

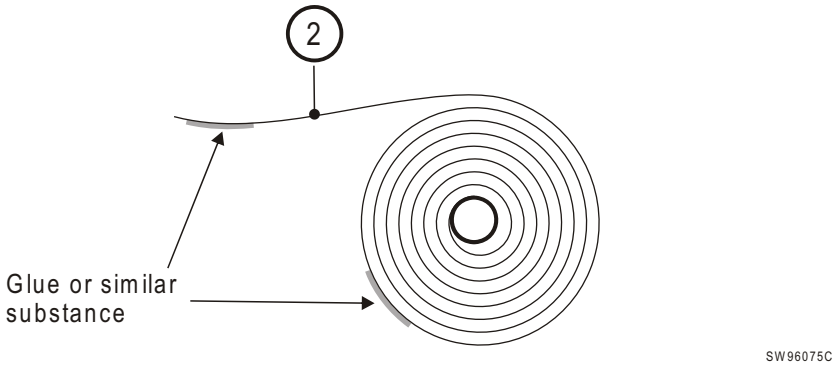
Figure 18 • Installing a Paper Roll



2. Tear off a full turn of the paper from the new paper roll.

Caution • This is important since the outer end of the paper is usually fixed to the roll with some type of glue or self-adhesive substance that might otherwise cause paper jam or even print head damage.

Figure 19 • Remove Outer Layer of Paper Roll



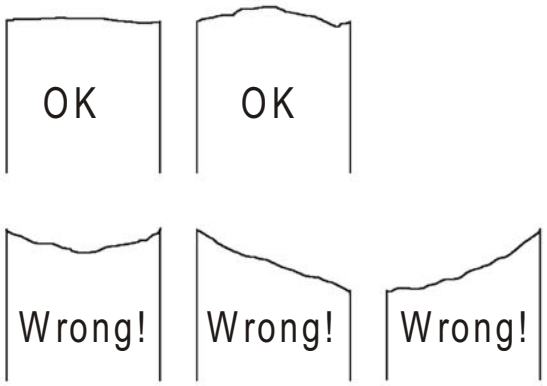
3. Make sure the printer is turned ON.

4. Insert the ticket stock through the paper entry opening at the back of the printer.

Note • The ticket sensor is at the center of the print width. If the ticket edge is torn off in such a way that the sensor does not see it, auto load will not be triggered. If so, reshape the edge so that the sensor sees the ticket stock.

5. Press the Feed button so that the printer feeds, cuts, and ejects a page. This ensures that the first ticket printed will have a straight edge.

Figure 20 • Example of Bad Page Edges

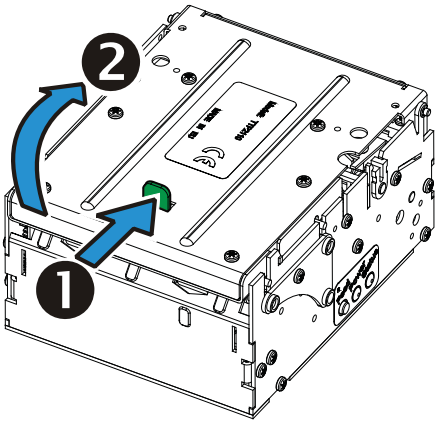


Clearing Paper Jams

Should a paper jam occur, follow the procedure below:

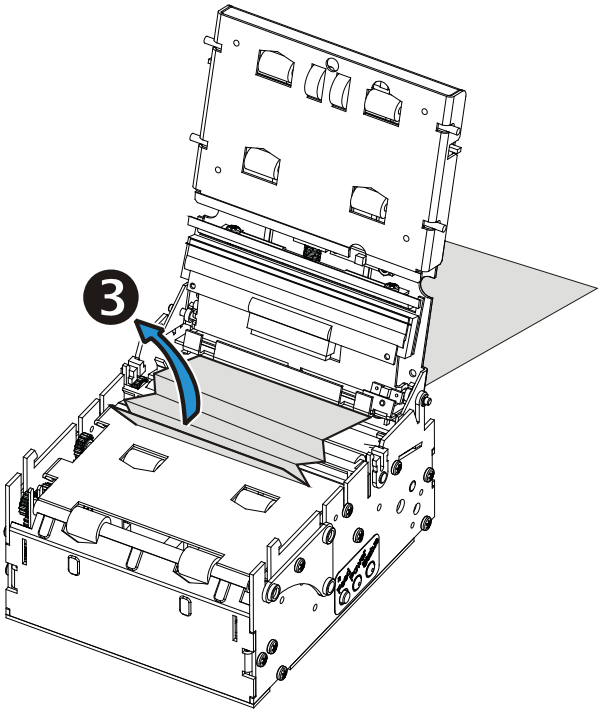
1. Open the printer lid.
   a. Press the green release lever toward the rear of the printer.
   b. Lift the lid.

Figure 21 • Opening the Lid



2. Remove any paper trash and close the lid.

Figure 22 • Remove Paper Trash



Notes •

5 Programming

There are two ways of setting up the printout: Text oriented and driver oriented style.

Text Oriented

The printout can be seen as the page of a simple word processor. You send text and graphics to the printer, which prints the information in the same sequence as the data is received. Design features are limited to the font stored in the flash PROM of the printer.

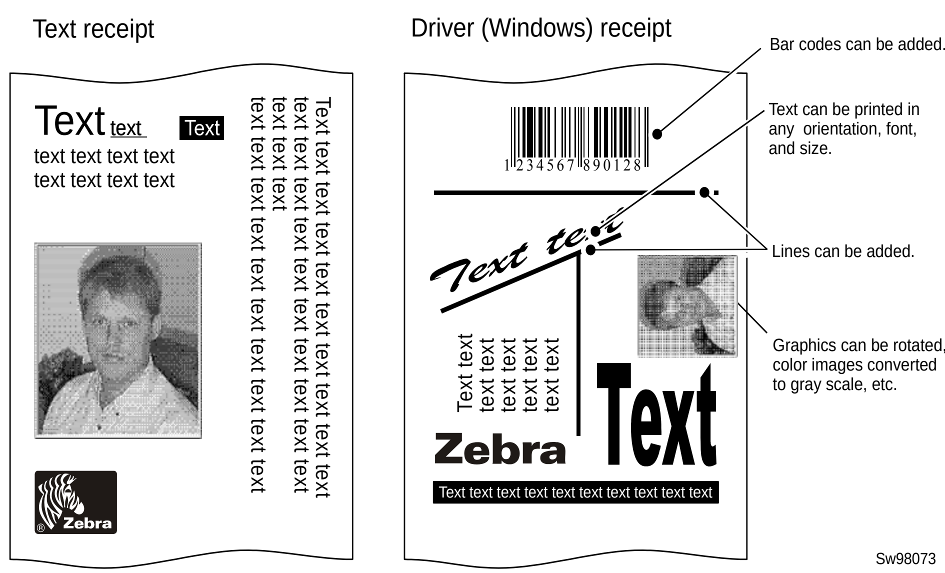
There are two text cursors, one for portrait, and one for landscape. The start positions of the cursors are the upper left corner for the portrait cursor, and the upper left corner for the landscape cursor, see Figure 23, *Printout Styles, on page 44*. You can switch between these cursors at any time; the cursor will retain its last position on the ticket.

Driver Oriented

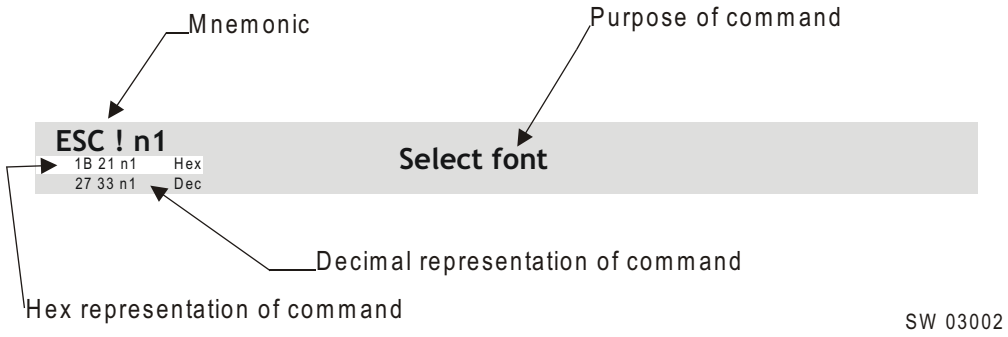
All TTP 2100 printers can print documents through a driver. When a Windows driver is used, you can use any Windows program to design the ticket with text, graphics, bar codes or whatever you want to print and in any orientation you want.

The Windows driver issues all the necessary commands. By setting up printing preferences in the driver you select how the printer should cut and present the printout.

Figure 23 • Printout Styles



How the Commands are Described



Mnemonic

Is the popular command name that should be easy to remember.

Hex

Give the command in hex representation

Decimal

Give the command in decimal representation

Values

n1, n2, etc. represents values that you set with the commands. What you should enter here depends on what you want the command to do.

Examples

Command examples are formatted in `Courier` and typed in the same way as used in the Zebra TTP editor:

```
<ESC>&P<001><019>
```

Where `<ESC>` means the escape character 27 decimal (hex 1B). Numbers between less-than and greater-than characters, for example `<001><019>`, means 1 and 19 decimal. When the numbers indicate a hex value, h is appended to the number (`<01h><13h>`).

Example • The examples below are four different ways of expressing the character A.

- `<065>`
- `<65d>`
- `<41h>`
- A

Summary of Control Codes and Escape Sequences

Command	Hex	Decimal	Function	Page
BS	08	8	Backspace	52
CAN	18	24	Cancel	52
CR	0D	13	Carriage return	52
EM n1	19 n1	25 n1	Enforced Clear Presenter	64
ENQ	05	5	Clear Presenter	64
ESC ACK n1	1B 06 n1	27 6 n1	Acknowledge Marker	76
ESC |	1B 7C n1…nx	27 124 n1…nx	Barcode print	57
ESC ! n1	1B 21 n1	27 33 n1	Select Font	49
ESC #	1B 23	27 35	Calibrate TOF Sensor	48
ESC & 000	1B 26 00	27 38 0	Load Font	65
ESC & 001	1B 26 01	27 38 1	Load Logotype	65
ESC & 004	1B 26 04	27 38 4	Store current Parameter Values	65
ESC & C	1B 26 43	27 38 67	Erase all Fonts	66
ESC & D	1B 26 44	27 38 68	Erase Fonts 4 to 7	66
ESC & F	1B 26 46	27 38 70	Recall Parameter Profile	66
ESC & L	1B 26 4C	27 38 76	Erase all Logotypes	65
ESC & P n1...n2	1B 26 50 n1...n2	27 38 80 n1...n2	Set Parameter Value	66
ESC & s n1	1B 26 73	27 38 115	Load SPI slave firmware	67
ESC ?	1B 3F	27 63	Reset (full)	64
ESC @	1B 40	27 64	Reset (initialize)	64
ESC b n1...n5	1B 62 n1...n5	27 98 n1...n5	Print Bitmap at XY-position	58
ESC B n1	1B 42 n1	27 66 n1	Bold	50
ESC B C	1B 42 43 n1	27 66 67 n1	Barcode Clear	56
ESC B S n1...n11	1B 42 53 n1...n11	27 66 83 n1...n11	Barcode field Specify	55
ESC BW	1B 42 57 n1	27 66 87 n1	Barcode Write	56
ESC d n1	1B 64 n1	27 100 n1	Make n Linefeeds	53
ESC ENQ 001	1B 05 01	27 5 1	Status Enquiry	68
ESC ENQ 002	1B 05 02	27 5 2	Paper-near-end Enquiry	69
ESC ENQ 004	1B 05 04	27 5 4	Fonts and Logotype Enquiry	70
ESC ENQ 005	1B 05 05	27 5 5	Sensor Enquiry	70
ESC ENQ 006	1B 05 06	27 5 6	Status Report	71
ESC ENQ 007	1B 05 07	27 5 7	Firmware-version Enquiry	72
ESC ENQ 009	1B 05 09	27 5 9	Serial-number Enquiry	73
ESC ENQ 010	1B 05 0A	27 5 10	Control board revision Enquiry	73
ESC ENQ 011	1B 05 0B	27 5 11	Head temperature Enquiry	73

Command	Hex	Decimal	Function	Page
ESC ENQ 012	1B 05 0C	27 5 12	Bootware version Enquiry	74
ESC ENQ c	1B 05 63	27 5 99	Device ID Enquiry	74
ESC ENQ E	1B 05 45	27 5 69	Read extended status	75
ESC ENQ P n1	1B 05 50 n1	27 5 80 n1	Parameter-setting data Enquiry	76
ESC FF n1	1B 0C n1	27 12 n1	Eject (run presenter)	63
ESC g n1...n5	1B 67 n1...n5	27 103 n1...n5	Print Logotype	60
ESC h n1	1B 68 n1	27 104 n1	Text Height	51
ESC i n1	1B 69 n1	27 105 n1	Italics	50
ESC j n1	1B 6A n1	27 106 n1	Paper Reverse	62
ESC J n1	1B 4A n1	27 74 n1	Paper Advance	61
ESC L n1	1B 4C n1	27 76 n1	Print Logotype at Current Position	60
ESC N n1	1B 4E n1	27 78 n1	Align Text	49
ESC NUL	1B 00	27 0	Load Firmware	67
ESC o n1	1B 6F n1	27 111 n1	Text and logotype orientation	49
ESC p	1B 70	27 112	Print	61
ESC P n1	1B 50 n1	27 80 n1	Print Self-test Printout	61
ESC Q n1 n2	1B 51 n1...n2	27 81 n1...n2	Quick Advance	62
ESC r n1...n9	1B 72 n1...n9	27 114 n1...n9	Print Ruler Line	59
ESC RS	1B 1E	27 30	Cut only, no Eject	63
ESC s n	1B 73 n1	27 115 n1	Send dot-line, 203 dpi	58
ESC t n1...n5	1B 74 n1...n5	27 116 n1...n5	Print Text at XY	51
ESC T n1	1B 54 n1	27 84 n1	Reversed/Inversed Text	50
ESC u n1	1B 75 n1	27 117 n1	Underline	50
ESC w n1	1B 77 n1	27 119 n1	Text Width	51
ESC Z	1B 5A	27 90	Go to next Top of Form	48
FF	0C	12	Form Feed	53
HT	09	9	Horizontal Tabulation	53
LF	0A	10	Linefeed	52
RS	1E	30	Cut and Eject	62
US	1F	031	Partial cut	63

Note • In all responses from the printer the most significant byte (MSB) is transmitted first.

Software command syntax

The commands in this section are grouped after what they do, and these groups are sorted in a theoretical usage sequence. It starts with commands for specifying the printed page — through text-and-graphics commands — to cut-and-present commands. System and status commands are presented at the end.

Black-mark (Top-of-Form) Commands

See also *Aligning Preprint and Thermal Print* *on page 101*.

ESC #	Calibrate TOF Sensor
1B 23 Hex 27 35 decimal	

In *Variable* and *fixed page modes* the calibration measures the out of paper level and the whiteness of the paper, and stores these values in parameter n51 and n58.

In *black mark mode* it also determines if it should trigger on black-marks or holes, then measures the contrast and distances, then sets parameters n37 -n40, n51, n57 bit 3, n58, n61, and n62 to suitable values for the analyzed ticket.

To make the calibration permanent, send `ESC & 4h`, store parameter values.

See also *Simple Calibration Process* *on page 102*

Note • If black-mark calibrations fails, the printer will indicate error code 11 by blinking 11 times when you hold the FF button pressed, and by answering NAK 0Bh to the status enquiry.

Note • The printer must not be in self-test mode when calibrating.

ESC Z	Go to next Top of Form
1B 5A Hex 27 90 Decimal	

In black mark mode, an `ESC Z` starts looking for a black mark at the current position and continues for one page length. If no black mark is found, bit 3 in status byte 1 is set to 1 and the printer will report NAK 0A on the next status query.

When black-mark mode is disabled, ESC Z will perform a form feed.

Text Commands

Text received by the printer is printed with the currently selected font and font attributes. Text exceeding the page width is wrapped with the line spacing selected.

ESC o n1 — Text and Logotype Orientation

1B 6F n1 hex
27 111 n1 decimal

Changes the orientation of text and logotypes.

n = 0	Gives portrait orientation
n = 1	Gives landscape orientation

Portrait and landscape can be mixed on the same printout. There are two cursors, one for portrait and one for landscape. The cursor always starts at the top left corner of the document. Looking at the paper when it exits the printer, the portrait cursor is at the top left corner of the printout, moving to the right as text is typed, while the landscape cursor is at the top right corner, moving downwards.

Note • Landscape orientation can only be used with Fixed Document Mode.

ESC N n1 — Align Text

1B 4E n1 hex
27 78 n1 decimal

Changes the alignment of text and logotypes on the current line; on subsequent lines, it defaults back to Left align.

`ESC N 0`	Left
`ESC N 1`	Center
`ESC N 2`	Right

ESC ! n1 — Select Font

1B 21 n1 hex
27 33 n1 decimal

This command selects one of eight fonts. The font design depends on which fonts have been loaded into the printer. Make a test printout to see which fonts are available in your printer.

`ESC ! 0`	selects normal font (font 0)
`ESC ! 4`	selects font 4
`ESC ! 1`	selects font 1
`ESC ! 5`	selects font 5
`ESC ! 2`	selects font 2
`ESC ! 6`	selects font 6
`ESC ! 3`	selects font 3
`ESC ! 7`	selects font 7

Lines, too long to be printed in the selected font, are automatically wrapped around.

Different fonts can be used on the same line.

Selecting an empty font location, will set bit 4 of byte 1 in the status enquiry response to ”1". See *Parameter-Setting Data Enquiry* *on page 76*

Note • If more than 379 characters are sent to the printer before an LF, the first part of the buffer contents is printed-out automatically. The text is formatted according to the already received formatting commands.

ESC B n1

1B 42 n1 Hex
27 66 n1 decimal

Bold Normal **Bold**

n = 0	Turns OFF bold (Normal)
n = 1	Turns ON **bold**

Bold is designed for normal character width and shows less and less as the width increases.

ESC i n1

1B 69 n1 Hex
27 105 n1 decimal

Italics Normal *Italics*

n = 0	Turns OFF Italics (Normal)
n = 1	Turns ON *Italics*

ESC T n1

1B 54 n1 Hex
27 84 n1 decimal

Reversed/Inversed Text

Selects normal or reversed print.

Single words, characters, or complete text lines can be reversed.

n = 0	Gives normal print, black on white
n = 1	Gives reversed print, white on black

Note • Reverse text and underline XOR's the background with the foreground. This means that the order in which the commands are issued affect the printout if one text overlaps another.

ESC u n1

1B 75 n1 hex
27 117 n1 decimal

Underline

Characters, single words, or complete text lines can be underlined.

n = 0	Turns OFF underline
n = 1	Turns ON a 1 pixel wide underline
n = 2	Turns ON a 2 pixel wide underline, etc. up to n=7.

ESC h n1 — Text Height

1B 68 n1 hex
27 104 n1 decimal

Applicable n values are 000 — 015.

n = 1	Increases the character height to 2 times the basic character height.
n = 2	Increases the character height to 3 times the basic character height etc.
n = 0	Resets the character height to the basic character height.

In combination with variable character width (ESC w n), give highly legible characters depending on the font to which the command has been applied.

Different fonts and heights can be mixed on the same print line.

Note • DO NOT use multiple height/width attributes when printing bar codes .

ESC w n1 — Text Width

1B 77 n1 hex
27 119 n1 decimal

Applicable n values are 000 — 007.

n = 1	Increases the character width to 2 times the basic character width.
n = 2	Increases the character width to 3 times the basic character width etc.
n = 0	Resets the character width to the basic character width.

In combination with variable character height (ESC h n), give highly legible characters depending on the font to which the command has been applied.

Different fonts and widths can be mixed on the same print line.

Important • DO NOT use multiple height/width attributes when printing bar codes .

ESC t n1...n5 data — Print Text at XY

1B 74 n1...n5 data hex
27 116 n1...n5 data decimal

Prints a text string at the specified X-Y position. The string will use the formatting set by font, reversed, width, height, bold, italics, and underline commands.

n1n2	Two byte definition of the X print position (in pixels).
n3n4	Two byte definition of the Y print position (in pixels).
n5	The number of characters in the string. To avoid having to count characters you can set n5 to 00h (null) and then terminate the text string with null.
data	The text string. If text string length is specified with n5, the length must be exactly the number of characters specified; otherwise the printer will stop, waiting for more characters.

After the string has been printed, the cursor will return to the position it had before the string command was issued.

Note • `ESC t` only works with fixed document mode (p36=0).

Note • `ESC t` clears any text preceding it on the same line. Commands will not be cleared.

BS — Backspace

08	Hex
8	Decimal

Moves the print-position one step to the left. Backspace can be used to combine characters. For instance to print a Ø, send text commands `O BS /` to the printer, and the slash will overprint the O.

Only one backspace can be used at a time. Excessive backspaces will be ignored.

CAN — Cancel

18	hex
24	decimal

Cancels text and attributes sent before the `CAN` command on the same line. Commands are not cancelled.

CR — Carriage Return

0D	hex
13	decimal

By default, carriage return is ignored. By changing the default settings, you can:

- Interpret it as `CR` which returns print position to beginning of line without line feed.
- Interpret `CR` as `CR/LF` which inserts line space as specified by the line spacing setting (see parameter p13), and returns the print position to beginning of the line.

See *CR* *on page 52*.

LF — Linefeed

0A	hex
10	decimal

Linefeed is interpreted as `CR/LF` by default. This inserts line spaces as specified by the line spacing setting (see parameter p13), and returns the print position to beginning of the line. LF also converts text from the input buffer to pixel lines and stores them in the line buffer, ready to be printed.

By changing the default settings, you can:

- Interpret `LF` as Linefeed. This inserts line space as specified by the line spacing setting (see parameter p13), without returning the print position to the beginning of the line.
- Ignore `LF`.

See *CR* *on page 52*.

ESC d n1

1B 64 n1	hex
27 100 n1	decimal

Make n Linefeeds

Executes the number of linefeeds as defined by variable n1. The length of each line feed is determined by the default value for selected font (see parameter *13* *on page 89*).

The print position is returned to the beginning of the line. Any text on the line is lost. To avoid losing text, send an LF before sending ESC d n.

FF

0C	hex
12	decimal

Form Feed

Prints data from the input buffer and feeds the paper to the top of the next page.

In fixed document length (FORM-mode) this command prints data in the input buffer and feeds the paper to the top of next page.

In variable document length mode FF advances to the minimum page length. If the printout already is longer than the minimum page length, FF does not feed the paper at all.

In black-mark mode, the FF command looks for a black-mark, see ESC Z.

If "Auto cut" is set to 1 (see *Auto Cut After FF* *on page 90*), FF effects form-feed, cut, and eject.

Note • Use parameter p37 and p38 to define page length.

HT

09	hex
9	decimal

Horizontal Tabulation

Shifts the current print position to the next Tab position.

Set tab positions with parameters p15 – p30.

Barcode Commands

TTP 2100 can print EAN 8, EAN 13, EAN128, UPC, 2-of-5 Interleaved, ISBN, Code39 and Code128 barcodes with it's standard firmware. A special firmware is available where the barcodes are replaced with the PDF 417 2D barcode. See *Firmware* *on page 116*, and *Barcode print (PDF 417)* *on page 57*.

Figure 24 • Samples of Barcodes

Example • This example will print an EAN barcode with height = 10 mm, 15 mm in from the right margin.

<ESC>BS<00h><00h><78h><00h>
<00h><0Ch><00h><50h><00h><02h>
<00h>

<ESC>BW<00h>733104000099<00h>
<LF>
<RS>

Code 128 / EAN128

The following codes select function codes in Code 128:

Name	Dec	Hex
FNC1	193	C1h
FNC2	194	C2h
FNC3	195	C3h
FNC4	196	C4h

Starting the data string starts with `FNC1` generates an EAN128 code.

Should you want to print barcodes without human readable characters you must load font 1x1.swf and select that font before you specify the barcode, then go back to your normal font after the barcode.

ESC B S n1...n11

1B 42 53 n1...n11 hex
27 66 83 n1...n11 decimal

Barcode field Specify

Bar codes can only be printed in portrait mode unless Fixed Document Mode is selected with parameter n36.

The command reserves an information field as a bar code field. The command also identifies the type, number of digits, and the configuration of bars to be placed in the bar code field.

n1	Specifies the bar code field No. (0—15). Bar code fields may be specified in any order.
n2n3	<x_msb> <x_lsb> Sets the X-coordinate of the bar code field origin.
n4n5	<y_msb> <y_lsb> Sets the Y-coordinate of the bar code field origin. The Y-coordinate values are only used in fixed document mode but must always be specified.
n6	Specifies the number of bar code digits, but is ignored by the printer.
n7n8	Specifies the height of the bars.
n9	Specifies the type of bar code. The following types are supported.
n9 = 0	EAN 8 or 13 (auto detect). The printer calculates the necessary check digit.
n9 = 1	UPC
b9 = 2	2/5 Interleaved (even number of characters must be sent)
n9 = 3	ISBN
n9 = 4	Code128 (Start data string with C2h to encode EAN128)
n9 = 6	Code39
n10	Specifies the thickness of the narrow bar 0=1 pixel, 1=2 pixel, and so on.
n11	Specifies the wide-bar-to-narrow-bar ratio. Only used in Code 39 and 2-of-5 interleaved where different ratios are allowed

ESC BW n1 nx — Barcode Write

1B	42 57	n1	nx	Hex
027	066 087	n1	nx	Decimal

Writes data to the bar code field reserved by the ESC BS command.

n1	Specifies the field No. Range 0 to 15. Fields can be specified in any order but other values than 0 to 15 are ignored.
n2 . . . nx	Specifies bar code data bytes.To create a bar code add-on, insert a space character and then the data for the add-on. Two of five characters are allowed of the add-on.
NUL	Must be placed at the end of the bar code data.

Any invalid bar code character terminates the command, and print <Invalid barcode> on the printout.

Example • This example will print one barcode with a height = 10 mm and moved 10 mm to the right.

ESC>BS<h00><h00><h32><h00><h00><h0C><h00><h50><h00><h02><h00>«»

<ESC>BW<h00>733104000099<h00>«»

<RS>«»

ESC B C — Barcode Clear

1B 42 43 n1	hex
27 66 67 n1	decimal

Clears the bar code field reserved by command ESC BS.

n	Specifies which bar code field to clear. The range is 0 to 15. The fields may be cleared in any order.

ESC	|	n1	nx	
1B	7C	n1	nx	Hex
027	124	n1	nx	Decimal

Barcode print (PDF 417)

This command positions and prints a PDF 417 2D barcode.

<ESC> "|" <type=5> <x_msb> <x_lsb> <y_msb> <y_lsb> <rows> <cols> <errLevel> <dotHeight> <scale> <len_msb> <len_lsb> <data>

n1	Specifies the type of bar code. The following types are supported: n1 = 5 PDF417
n2n3	<x_msb> <x_lsb> Sets the X-coordinate of the bar code field origin.
n4n5	<y_msb> <y_lsb> Sets the Y-coordinate of the bar code field origin. The Y-coordinate is discarded in variable document mode.
n6	Rows
n7	Columns
n8	Error level, 0=auto, 1=Level0, 2=Level1, etc.
n9	Dot Height, sets how many pixel lines each row consists of.
n10	Scale
n11n12	Len. If set to 00h, <nul> indicates the end of the data block <data>. If <len is set to other values the value indicates the no of bytes in <data>
<data>	data to be encoded

Note • If <rows> and <cols> are 0 the printer will automatically create a barcode where the width is about twice the height.

Example • This example will print Zebra as a PDF 417 barcode.

Send the following to the printer:

<ESC><124><005><000><000><000><000><000><000><000><003><003><000><000>Zebra<000>

The barcode will look like this:

Graphics commands

ESC b n1...n5 data — Print Bitmap at XY-position

1B 62	n1...n5	Data	hex
27 98	n1...n5	Data	decimal

Prints a black & white (1-bit color depth) Windows bitmap (BMP-file) at the specified X-Y position. The bit-map must be a complete uncompressed Windows bitmap where the data starts with BM. Max size is limited to the free RAM printed on the self-test printout.

n1	Always 0
n2n3	Two byte definition of the X print position (in pixels).
n4n5	Two byte definition of the Y print position (in pixels).
data	Bitmap data.

After the bitmap has been printed, the cursor will return to the X-position that it had before the bitmap command was issued.

Selecting horizontal mode (with `ESC o 0h`) prints the image in portrait orientation, while selecting the vertical mode (with `ESC o 1h`) prints the image in landscape orientation.

Note • The Y print-position and horizontal/vertical orientation only works if Fixed Document Mode is set with parameter n36.

ESC s n data — Send Dot-line, 203 dpi

1B 73	n	Data	Hex
27 115	n	Data	Decimal

Sends one line of dot data. This command is used to build images one dot line at a time by the printer driver and should not be combined with text commands.

n	Determines the number of bytes. Range: 1-255.	The printhead width is 80 mm and with 8 dots per mm this corresponds to 80 bytes. The print width can be limited by setting parameter n48. If n is set to less than the value of n48 the printer will fill the rest of the line with white pixels.
<data>	n bytes of data.	Bits with the value 1 will produce black pixels.

Caution • Always send the No. of bytes that you specify in n! If more than the specified No. of bytes are received, the rest of the bytes will be interpreted as text or commands. This can cause any kind of problems in the printer as graphics data can contain any hex value.

ESC r n1...n9

1B 72 n1...n9 hex
27 114 n1...n9 decimal

Print Ruler Line

Prints a ruler line across the paper.

A ruler line is normally used to divide the printout into logical parts to make it easier to read. A ruler line is actually an area defined by a start X-Y position and a stop X-Y position. This area is filled with black or a checkered pattern.

n1n2	Two byte definition of the X start position
n3n4	Two byte definition of the Y start position
n5n6	Two byte definition of the X stop position (must be larger than x1x2)
n7n9	Two byte definition of the Y stop position (must be larger than y1y2)
n9	Fill pattern:

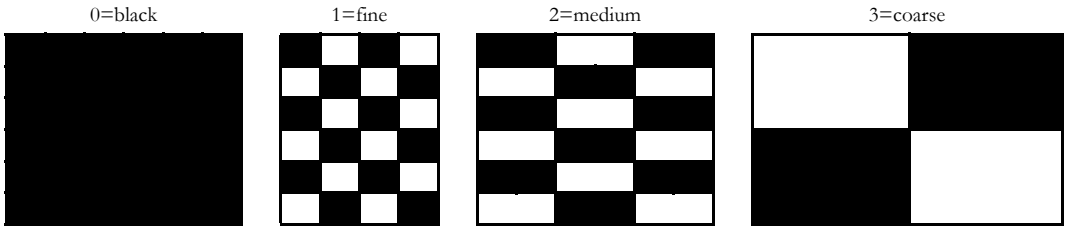
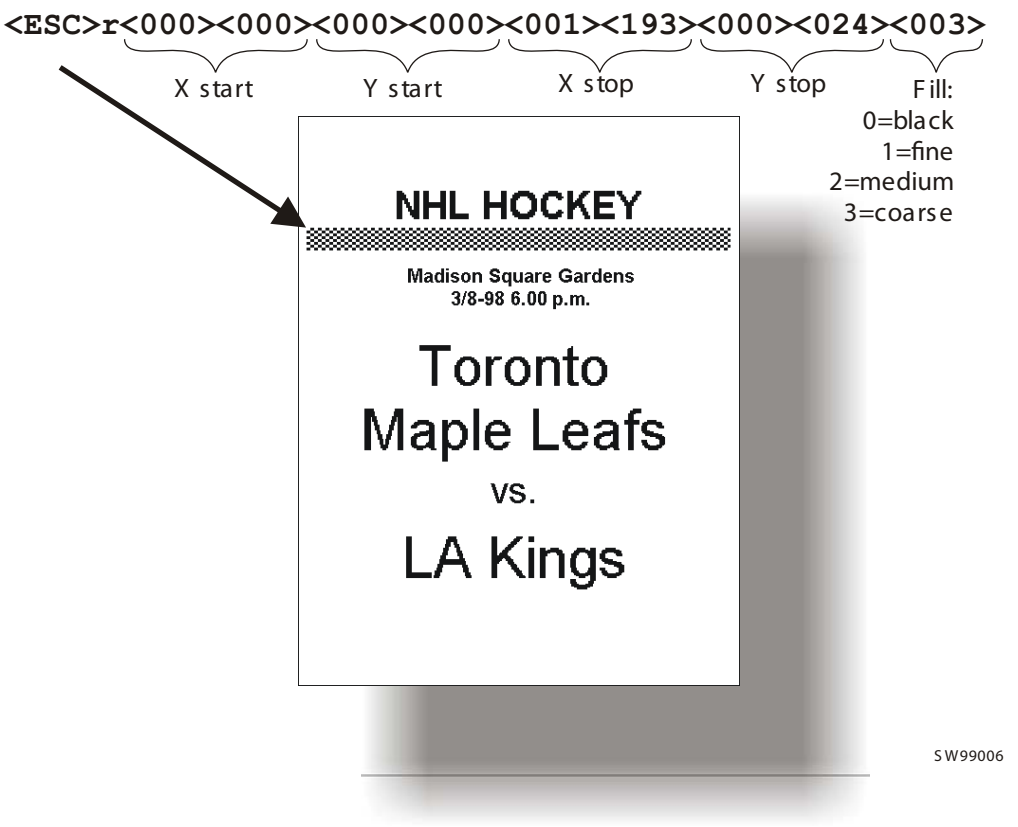


Figure 25 • Printout with checkered ruler line



ESC g n1...n5 — Print Logotype

1B 67 n1...n5	hex
27 103 n1...n5	decimal

Prints a customized logotype stored in the flash PROM. See also *Logotypes* *on page 79*.

n1	One-byte logotype identification No. (0—15)
n2n3	Two-byte definition of desired print position in X-direction measured from left-hand edge of the page (see Figure 28, *Definition of Page Size*, *on page 91* regarding definition of "page"). X-direction is perpendicular to the paper transport direction.

ESC L n1 — Print Logotype at Current Position

1B 4C n1	Hex
27 76 n1	Decimal

Prints a customized logotype stored in the flash PROM at the position of the cursor. The bottom line of the logotype is positioned at the baseline of the text on the line. If the logotype is higher than the text, the line spacing is increased.

See also *Logotypes* *on page 79*.

n	One-byte logotype identification No. (0—15)

Print Commands

ESC p — Print

1B 70 Hex
27 112 Decimal

This command makes the printer print the contents of the line buffer.

Text is converted from text to pixel lines and stored in the line buffer when an LF is received. If the line buffer is empty when ESC p is received, nothing is printed.

`Text to be printed <LF><ESC>p` prints "Text to be printed" on the paper.

Printout is effected automatically at:

Cut	(`RS and ESC RS`)
Form feed	(`FF`)
Clear presenter	(`ENQ`)
Run presenter	(`ESC FF n`)
Print buffer full	
Press on FF-button	

ESC P n1 — Print Self-test Printout

1B 50 n1 Hex
27 80 n1 decimal

This command makes the printer generate a self-test page based on the current parameter settings and print that page. The parameter values printed are the ones currently being used. They can differ from Power-ON default values if for example a printout from Windows has been done before `ESC P` is sent to the printer. To make a self test printout with the Power-ON default settings, power up the printer with the FF button pressed.

n = 0	Gives standard self-test printout.
n = 1	Gives a character set printout using the font selected by parameter p14.

ESC J n1 — Paper Advance

1B 4A n1 hex
27 74 n1 decimal

The value n represents the number of dot lines the paper is to be transported forwards. Range: 1–255.

A dot line is 0.125 mm, and 255 dot lines equal approximately 32 mm.

ESC j n1 — Paper Reverse

1B 6A n1	hex
27 106 n1	decimal

The value n represents the number of dot lines the paper is to be transported backwards. Range: 1–255.

Caution • NEVER reverse more than 6 mm at top of page! You may lose grip of the paper.

A dot line is 0.125 mm, and 255 dot lines equal approximately 32 mm.

ESC Q n1 n2 — Quick Advance

1B 51 n1	hex
1B 81 n1	Decimal

The value n1 n2 represents high byte and low byte of the number of dot lines the paper is to be transported forwards. Minimum value is 0, and maximum value is 32767.

A dot line is 0.125 mm, and 32767 equals approximately 4.1 m.

Cut and Present Commands

Note • The printer does not receive data while cut and present commands are executed.

RS — Cut and Eject

1E	Hex
30	Decimal

Effects a paper cut-off and an eject through the presenter module. The RS command automatically give the eject length of 50 mm in addition to the factor stored in parameter p47.

If the printout length is too short, paper-feed is added until the minimum printout length (set by parameters 37 and 38) is reached, before execution of the Cut command.

Note • The cut position is 9 mm before the print line. This makes the last 2 lines on a page end up in the beginning of the next page. To get the cut after the text, Please have parameter 49 set to auto (default setting).

If you do not use the auto setting you can use <RS> together with the paper advance command:

```
<ESC>J<110><RS>
```

Gives a cut & eject after the last text line.

ESC RS — Cut Only, No Eject

1B 1E	Hex
27 30	Decimal

Effects paper cut-off only.

Eject can be effected with the ESC FF n command (see 49) which also activates the pull detector.

To avoid thin strips of paper in the printer, multiple cut commands without paper feed in-between will not be performed. If the printout length is too short, paper-feed is added until the minimum printout length is reached, before execution of the cut command.

See Also Note on cut position for the <RS> command above.

Note • Use the cut command if you want full control over the printer from your system. But remember that you also must add commands to feed to the correct cut position and eject the paper so that the customer can get hold of it.

Note • Top margin settings that move the paper count as paper feed.

US — Partial Cut (Unit Separate)

1F	hex
031	decimal

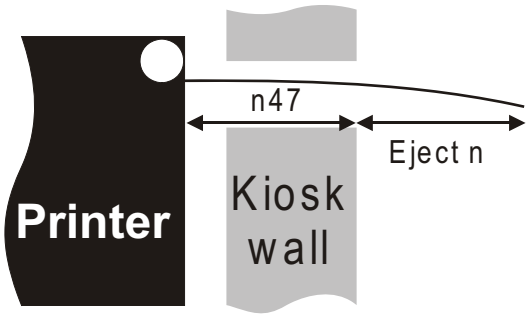
The US command triggers printout of data, then prints a dotted line and a pair of scissors, and partially cuts the paper from both edges towards the center to make it easier to tear off the paper.

The length of the partial cut can be set with parameter n60.

ESC FF n1 — Eject (Run Presenter)

1B 0C n1	hex
27 12 n1	decimal

ESC FF ejects the document through the presenter module. Variable **n** represents the eject-length in steps. The setting of parameter n47 is always added to the eject n in all forms of eject.



The range for n is 1 to 127. The range 128-255 is reserved for future use.

One step is 1 mm.

Place this command after a cut command (ESC RS) to partially eject the printout to the customer. Set the eject length so that the customer sees that the printout comes out of the kiosk wall. The pull-detector gives motorized eject of the rest of the printout when the customer pulls the paper.

Note • The cut and eject command RS, automatically give the eject length of 50 mm in addition to the factor stored in parameter n47.

Note • Never use ESC FF n without first cutting the paper!

EM n1 — Enforced Clear Presenter

19 n1	Hex
25 n1	Decimal

Same function as ENQ but overrides parameter (p45) setting with another presenter behavior. The function of n can be 0 to 255 0-99 ejects while 100-255 should not be used in this printer (see the description of parameter 45). The command will clear the presenter immediately (with printing synchronization).

<EM><000>	Ejects the presented page

ENQ — Clear Presenter

05	Hex
5	Decimal

Clear the paper-path in the presenter of printouts. For example, to eject a document not removed during the previous print/cut/eject operation. Parameter No. 45 controls how the presenter is cleared.

System Related Commands

ESC ? — Reset (Full)

1B 3F	Hex
27 63	Decimal

Restarts the printer with a complete reset.

This is the same as power off/on and takes about a second to execute.

ESC @ — Reset (Initialize)

1B 40	Hex
27 64	Decimal

Terminates the processing and initializes the control board. The control board is reset to default-values (same as after power ON). Do not use this command as part of a print data command string.

ESC & 001 — Load Logotype

1B 26 01	Hex
27 38 1	decimal

Stores a logotype bitmap in the flash PROM. The logotype is printed with the ESC g and ESC L commands, see *ESC g n1...n5* *on page 60* and *ESC L n1* *on page 60*. Also see *Logotypes* *on page 79*.

Note • If the logo width exceeds the print width, the operation is aborted.

ESC & L — Erase all Logotypes

1B 26 4C	Hex
27 38 76	decimal

Erases all logotypes stored in the flash PROM.

Note • This command is only executed if at least one logotype has been loaded.

ESC & 004 — Store current Parameter Values

1B 26 04	Hex
27 38 4	decimal

Stores the current setting of all parameter values in the setting memory. These parameters are then used as default parameters. Storing takes approximately 4 seconds. The printer activates the presenter motor temporarily to indicate that storing is complete.

ESC & 000 — Load Font

1B 26 00	hex
27 38 0	decimal

This command is used to load a font to the printer flash PROM. The font is placed in the first free address position in the order of load sequence.

A Zebra font-file consists of a header containing data describing the font as well as data for each individual character in the font.

Fonts can be designed with the font editor and loaded or deleted with the software available for free on the Zebra web site. The font loading and deleting commands described here should only be used if you do not work in the Windows environment.

For complete specification of the font format, see the Fonts section of http://www.zebra.com.

Note • The available font memory is printed on the self-test printout. A maximum of 8 fonts can be addressed. Exceeding any of these limits will cause this command to fail.

ESC & C — Erase all Fonts

1B 26 43 Hex
27 38 67 decimal

Erases all fonts stored in the flash PROM.

Note • This command is only executed if at least one font has been loaded.

ESC & D — Erase Fonts 4 to 7

1B 26 44 Hex
27 38 68 decimal

Erases fonts number 4–7. Fonts 0–3 are not affected by this command.

The operation is complete when the printer resets automatically and activates the presenter motor temporarily. Takes approximately 4 seconds.

ESC & F — Recall Parameter Profile

1B 26 46 hex
27 38 70 decimal

This command resets the parameters of the printer to default.

Temporarily sets all parameters to predefined values that are stored in the printer. To keep the values as default, store them in the EEPROM with command ESC & 4.

Unless you save the parameters, a reset command or power OFF/ON will return the parameters to the settings stored in the EEPROM.

ESC & P n1...n2 — Set Parameter Value

1B 26 50 n1...n2 hex
27 38 80 n1...n2 decimal

An EEPROM hold various parameter values called *default parameters*. One or several of them can be overridden temporarily with this command.

n1	Parameter number, range 1 -255.
n2	Parameter value.

See *Default Parameter Settings* *on page 83*.

The permanently stored parameters will be used again after a printer-reset command or at power ON.

The temporary values can, however, be stored in the EEPROM as permanent values with command ESC & 4.

Set Several Parameters at Once

ESC & P <000> <FromPar><ParCount><Data>

FromPar is the parameter number to start writing and ParCount is the number of bytes being sent. For every byte sent the parameter number is incremented.

Example • This example sets the first 5 tabs to 5, 10, 15, 20, and 25. (FromPar 15, ParCount 5).

<ESC>&P<000><015><005><005><010><015><020><025>«»

ESC & s n1 — Load SPI Slave Firmware

1B 26 73 0A	hex
27 38 115 10	decimal

The TOF sensor board has it's own firmware that can be upgraded using this command.

n1	SPI Slave address, for the sensor board the address is 10 dec.
<file>	the bin file with the new firmware.

ESC NUL — Load Firmware

1B 00	Hex
27 0	Decimal

This command should be used when you integrate firmware loading into your kiosk program.

Note • Utility programs to load firmware into the printer are available from http://www.zebra.com.

Status Reporting Commands

See also *Status Reporting* *on page 81*.

Note • All status commands except for the acknowledge marker are immediate. That is they pass the print queue and are answered directly.

Status-codes are reset:

1. When the conditions causing them are removed.
2. When the printer is turned off/on or a reset command is received.
3. When the printhead is lifted and then lowered.

ESC ENQ 001

1B 05 01 Hex
27 5 1 decimal

Status Enquiry

A status enquiry results in response ACK (06h) if all sensors are clear, but NAK (15h) + code if one or more sensors report some condition.

Status Code	Meaning
ACK	OK (printer is operable)
NAK 01h	Paper left in presenter module. Attempt to clear the paper path failed.
NAK 02h	Cutter jammed
NAK 03h	Out of paper
NAK 04h	Printhead lifted
NAK 05h	Paper-feed error. No paper detected in presenter although 10 cm has been printed. Paper might be wound around the platen or, in some way, has been forced above the presenter module.
NAK 06h	Temperature error. The printhead temperature has exceeded the 60 °C maximum limit.
NAK 07h	Presenter not running
NAK 08h	Not used
NAK 0Ah	Black-mark not found
NAK 0Bh	Black-mark calibration error
NAK 0Ch	Index error
NAK 0Dh	Checksum error
NAK 0Eh	Wrong firmware type or target for firmware loading
NAK 0Fh	Firmware cannot start because no firmware is loaded or firmware checksum is wrong.
NAK 10h	Presenter timed out. If the customer doesn't take the paper and the printer clears the presenter due to a timeout, the pending error bit is set and error code NAK 10h is reported.

Status Code	Meaning
NAK 11h	Paused (ex. To avoid overheating of stepper motors)
NAK FFh	Undefined error

Note • Errors 02h, 05h, and FFh are terminal faults that require you to reset the printer before it will be operable again. A reset means that any data in the buffer is lost.
The printer automatically recovers from the other conditions as soon as the condition is corrected, without data loss.

A status enquiry command can only return one status code at a time. If there are two or more simultaneous conditions, each condition should be cleared and the status enquiry repeated in order to get a complete report of all status codes.

The host computer cannot be certain that all conditions have been cleared until an **ACK** is received.

The possible conditions are reported in the above order.

Note • If you want to read out all status information directly, use ESC ENQ E.

ESC ENQ 002

1B 05 02 hex
27 5 2 decimal

Paper-near-End Enquiry

This command requests a paper-near-end sensor (paper low) status from the printer in a 1-byte format.

Value = (01h)	indicates “No paper”
Value = (00h)	indicates “Paper present” at the sensor position

Note • The status of the sensor is sampled every time the printout is cut. If three succeeding samples show "no paper", the status reply changes to 00. This is to prevent false alarm if the side of the paper roll is not clean. If you want the momentary status of the sensor, use ESC ENQ 6 and extract the paper-near-end bit.

ESC ENQ 004

1B 05 04 hex
27 5 4 decimal

Fonts and Logotype Enquiry

Requests multiple bytes of information regarding loaded fonts and logotypes.

Example • (↲ = CR LF)

Send→ESC ENQ 04d

Read←0:7862 ATM9↲
1: ↲
2: ↲
3: ↲
4: ↲
5: ↲
6: ↲
7: ↲
Free font memory:123082↲
00:38 117 Zebra Logo ↲
01: ↲
02: ↲
03: ↲
04: ↲
05: ↲
06: ↲
07: ↲
08: ↲

09: ↲
10: ↲
11: ↲
12: ↲
13: ↲
14: ↲
15: ↲
16: ↲
Free logo memory:126352↲

ESC ENQ 005

1B 05 05 hex
27 5 5 decimal

Sensor Enquiry

Results in a 2-byte response, reflecting the status of all virtual sensors. Virtual sensors maintain their functionality in all configurations of this printer, while physical sensors reported by ESC ENQ 6 signals differently in printers where you can select for example horizontal or vertical mode.

The same physical sensor give several virtual statuses depending on when, in the print cycle, the sensor is activated.

First Byte:

Reserved for future use.

Second Byte:

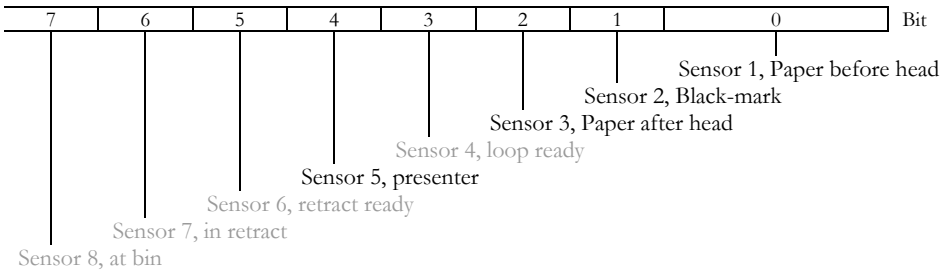
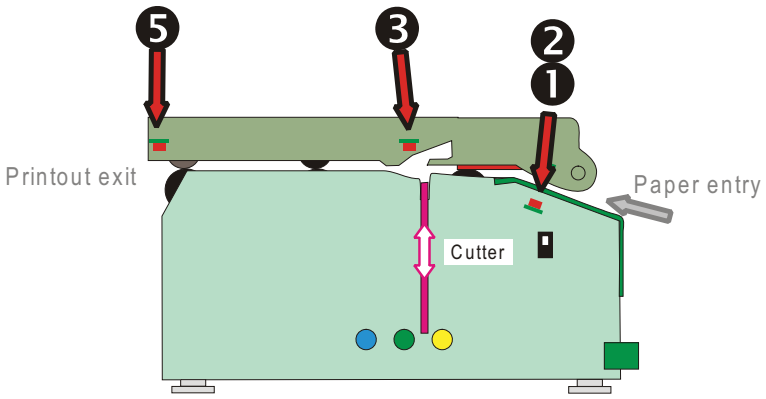


Figure 26 • Physical-to-virtual sensor mapping



ESC ENQ 006

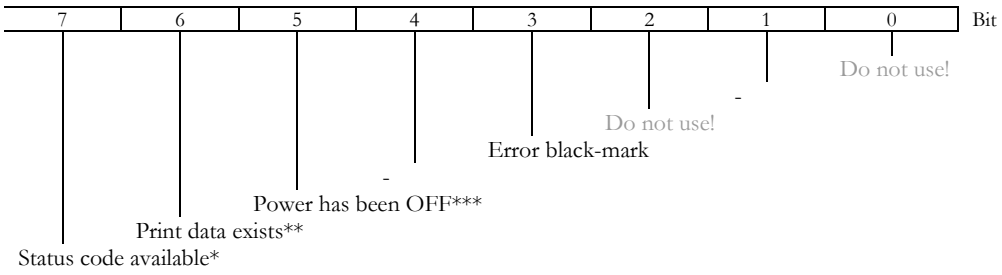
1B 05 06 hex
27 5 6 decimal

Status Report

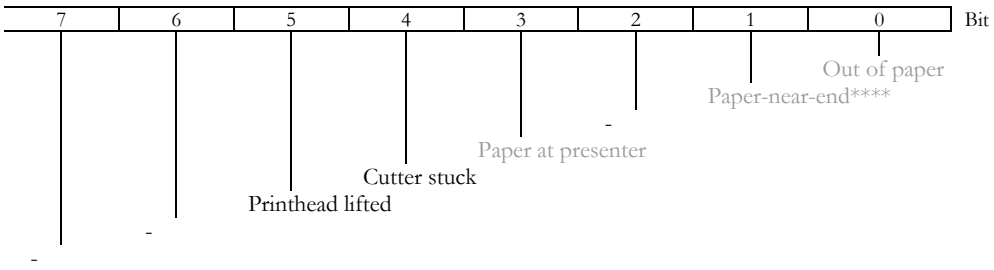
Note • The sensor status reported it the status report are for compatibility with older printers. Please use ESC ENQ 5 in new applications.

Results in a 2-byte response, reflecting the status of each sensor. This command is intended as a go/no go indication.

First Byte:



Second Byte:



Note • Mask away the undefined bits in your application program to avoid having to change the application, if future firmware releases starts using them.

Mask first reply byte with E8h.

Mask second reply byte with BBh.

*	This bit indicates that a status code is available. Use `ESC ENQ 1` or `ESC ENQ E` to fetch it.
**	This bit tells you that there are data in the printer that have not yet been printed. There are two possible reasons for that: **1.** The last command received by the printer was not a command that triggers a printout. **2.** The printer is printing.
***	When parallel cable is connected, both printer and host computer must have been off to set this bit. This is because the interface powers the RAM in the printer.
****	This paper-near-end bit differs from the `ESC ENQ 2` response, see *ESC ENQ 002* *on page 69*.

Bit 4 and 5 in the first byte are reset when read.

ESC ENQ 007 — Firmware-Version Enquiry

1B 05 07	Hex
27 5 7	decimal

Results in a 2-byte response representing the version of the installed firmware.

The first byte represents major versions, and the second byte minor versions.

If no firmware is loaded, the printer will answer with `00h`.

Example •

Send→ `ESC ENQ 07d`

Read← `<02h><29h>`

That is, a response with the value `<02h><29h>` indicates version 2.41.

ESC ENQ 009 — Serial-Number Enquiry

1B 05 09 hex
27 5 9 decimal

Results in an 6-byte response representing the serial number.

Example •

Send→`ESC ENQ 09d`

Read←`00h 00h 02h 2Bh C6h 28h` (hex), or `000 000 002 043 198 040` (dec)

ESC ENQ 010 — Control Board Revision Enquiry

1B 05 0A hex
27 5 10 decimal

Results in a 1-byte response representing the control board revision. A minus sign indicates that no revision has been made, while A indicates the first revision, and so on.

Example •

Send→`ESC ENQ 10d`

Read← n Where n can be ‘A’ (ASCII) or41h (hex) or 065 (dec)

ESC ENQ 011 — Head Temperature Enquiry

1B 05 0B hex
27 5 11 decimal

Results in a 1-byte response representing the temperature of the Printhead.

Example •

Send→ `ESC ENQ 11d`

Read← n Where n is a value representing the approximate temperature in Celsius.

The answer is an signed byte (two's complement). If bit7 is 1 than it’s a negative value, invert all bits and add 1 the get the value.

ESC ENQ 012

1B 05 0C hex
27 5 12 decimal

Bootware Version Enquiry

Results in a 2-byte response representing the version of the installed bootware.

The first byte represents major versions, and the second byte minor versions.

Example •

Send→ `ESC ENQ 12d`

Read← `<001><030>`

That is, a response with the value `<01h><30h>` indicates version 1.48.

Note • TTP 2100 does not store the bootware in the printer so this query will always return <000><000>.

ESC ENQ c

1B 05 63 hex
27 5 99 decimal

Device ID Enquiry

Results in a string containing the device ID in the Windows Plug and Play string format. The two first bytes represent the string length.

Example •

Send→`ESC ENQ 99d`

Read←`00d 106d` This indicates that the string is 104 characters (plus two characters indicating the string length).

ESC ENQ E

1B 05 45 hex
27 5 69 decimal

Read Extended Status

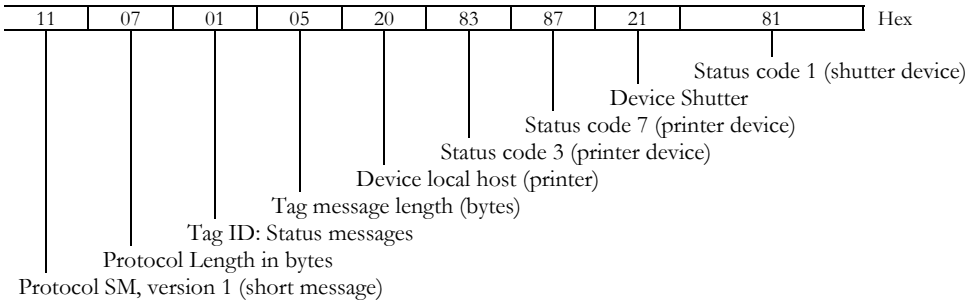
Extended status is status from the printer together with devices connected to the I^2C options-bus available in some Zebra printers (the TTP 2100 series does not have any I^2C bus so these parts of the command are superfluous). The short message protocol gives replies up to 255 bytes. Other protocols may be defined in the future. Protocols are described in separate documents.

ESC ENQ E results in a variable length reply:

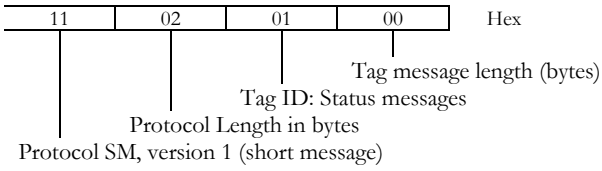
n1	Protocol version, 11h = Short Message Protocol
n2	Protocol length in bytes
n3-n255	Data specified by the protocol

Short message status examples

Example 1 • Out of paper presenter Jam, and shutter open error.



Example 2 • No errors in any device.



ESC ENQ P n1

1B 05 50 n1 Hex
27 5 80 n1 Decimal

Parameter-Setting Data Enquiry

This command requests information about the setting of parameter n1, that is, the parameter value stored in EEPROM or any parameter value temporarily set by other ESC commands.

n1= 1	gives the setting of parameter 1, etc. The parameter names are listed under *Summary of Parameter Settings* *on page 85*.
n1 = 0	gives a response where the first two bytes specifies the length of data to come, and then follows a block of data for all parameters in the temporary setup.

ESC ACK n1

1B 06 n1 hex
27 6 n1 decimal

Acknowledge Marker

n1 =	One-byte marker. Range 1h to 255h

The "acknowledge marker" n is placed in the command queue and when the execution of commands reaches the marker it is sent back to the host computer. This is an addition to the status commands that pass the queue and are answered immediately when received.

Example •

"Print data" `<LF><esc>p<ESC><ACK><01h>`

Wait for <01h>

`<RS><ESC><ACK><02h>`

Wait for <02h>

The printer will send `<01h>` when <print data> has executed and **`<02h>`** when the ejecting has been performed.

Note • You must wait for the acknowledge marker to return before sending any more data to the printer.

Note • Acknowledge marker cannot be used for events that write to the flash PROM, for instance font loading. This is because the writing procedure erases the buffer, including the markers, and uses all RAM in the printer.

Font Loading

The printer can store 8 fonts in its flash PROM. The memory available for fonts is printed on the self-test printout. The character size is fixed, so you must load one font file for each character size you require. The fonts are given font numbers when they are loaded into the printer. The first font is assigned number 0 and the next font 1 etc. up to font 7. Parameter p14 “Font Selection” will determine what font to use when no font selection command has been received (see *Font Selection* *on page 89*).

You cannot erase a single font, but must erase font 4-7 with command `ESC & D,` or all eight fonts with `ESC & C`, then reload the fonts you wanted to keep.

Windows software for font generation and management is available on the Zebra web site. If you need to load fonts in a non-Windows environment, use the `ESC & NUL` command.

The time required for processing the font data that is loaded is typically 15–20 seconds per font, excluding transfer time. During this time, any data sent to the printer will be lost.

Note • The font processing ends with a reset. The presenter motor runs momentarily to indicate that the printer is ready to be used.

Caution • Loading to the flash PROM will erase the RAM completely since the RAM is used during the loading process. Any print data residing in RAM will thus be lost.

File Format

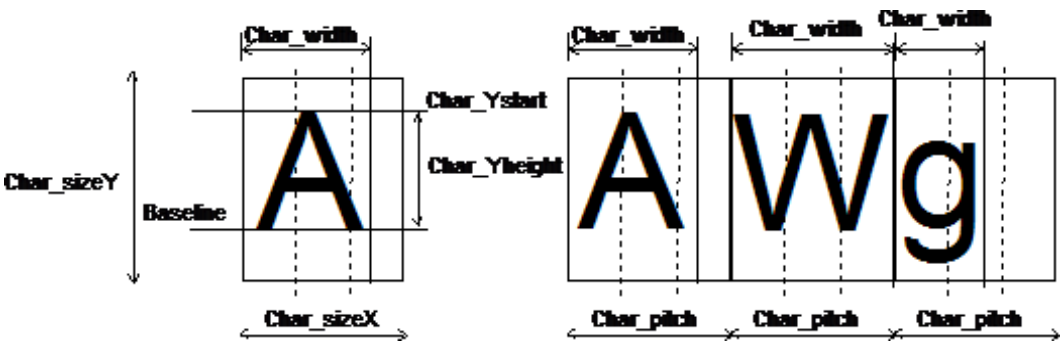
A font consists of a header describing the font, then data for every character in the font. The header has to be downloaded even if the font consists of a single character only. Below is a description of the font header.

1 byte	Reserved	Should always be 0 (zero)
1 byte	Reserved	Should always be 0 (zero)
1 byte	Char. width (X)	The number of bytes required for the width of one character, usually 2 or 3. Range 1 to 8.
1 byte	Character pitch	The maximum width of one character in the set. This value is used for tab position calculation. Range 1 to 255.
1 byte	Char. height (Y)	The maximum height of one character matrix measured in pixels. This is also the minimum line spacing for this character set.
27 byte	Font name	String of characters used to identify the character set. This will be printed on status printouts. (E.g. Swiss 10 cpi.)

Char_matrix table: 256 records, each containing 3 bytes.

3 byte Char_width (pixels) + Char_Ystart(pixels) + Char_Yheight(pixels)

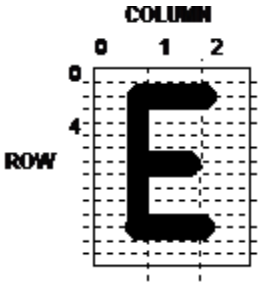
Char_bitmap data: Bitmap data for all characters that are to be defined.

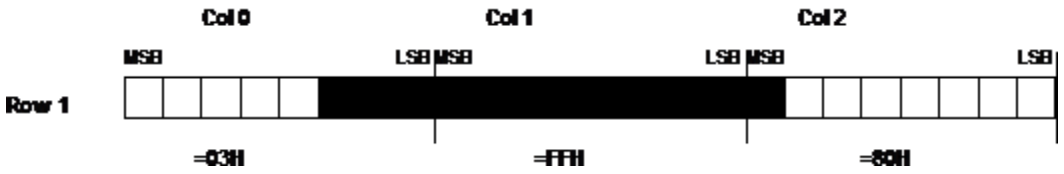


Character Bitmap Data

A character is made up of a bitmap the size of which is:

Char. width (X) * Char. Height (Y) bytes.





The bitmap data consists of bitmap patterns for each character in a character set for which the parameter Char_width in the Char_matrix table is set to a value between 1 and 24. A character that has its Char_width set to zero, is not included in the bitmap data.

The bitmap for one character is then defined according to the following table:

Example • In this example, each row consists of 3 columns equal to 3 bytes.

(COL 0, ROW Ystart) , (COL 1, ROW Ystart) , (COL 2, ROW Ystart)

(COL 0, ROW Ystart+1) , (COL 1, ROW Ystart+1) , (COL 2, Ystart+1)

(COL 0, ROW Ystart+Yheight), (COL 1, ROW Ystart+Yheight), (COL 2, ROW Ystart+Yheight)

In order to minimize the required storage space, only rows between Ystart and Ystart+Yheight are included in the character bitmap.

Logotypes

Up to 16 logotypes can be stored in the flash PROM of the printer. The logotypes can be positioned and printed out with commands ESC g or ESC L.

The exact number of logotypes and their sizes is determined by the total amount of memory used for fonts, logotypes and loaded firmware. Make a test printout to see how much memory is available.

Note • Logotype No. 0 is printed in the top of the self test printout, so this can be used to customize the self test printout.

Loading

Windows software that converts black and white BMP bitmap files to logotypes and load them into the printer is available on the Zebra web site. If you need to load logotypes in a non-Windows environment, use the ESC & 1 command.

The time required by the printer to process logotype data, excluding transfer time from the PC, is typically 15 to 20 seconds, per logotype. During this time, any data sent to the printer will be lost.

File Format

A header containing information about the logotype number, size and logotype name shall define each loaded logotype. Immediately after the header follows the actual bitmap of the logotype.

ESC & 01H <Header><Bitmap>

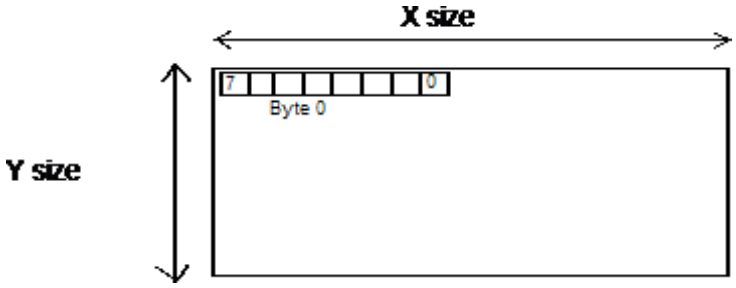
Header

Byte 0	Logotype number used to identify the logotype when printing.
Byte 1	X size measured in bytes.
Byte 2	Y size measured in pixels.
Byte 3—15	A logotype name that will be printed on test printouts.

Bitmap

The bitmap **must** have exactly (X size * Y size) number of bytes. 1=black, 0=white dot.

Bit No. 7 in byte 0 represents the top left corner of the logotype.



Printing

To print a logotype you can use two commands, `ESC L n1`, prints the logotype at the current cursor position, just like any character. `ESC g n1 n2n3 n4n5` prints the logotype at a specified X-Y position.

n1	One byte logotype number, (0—15)
n2n3	Two byte X position measured in pixels from the left hand edge of the print window.
n4n5	Two byte Y position in pixels from top of the page. These bytes must always be inserted but they are ignored in variable-page-length mode where logotypes are always printed at the current Y-position.

Erasing

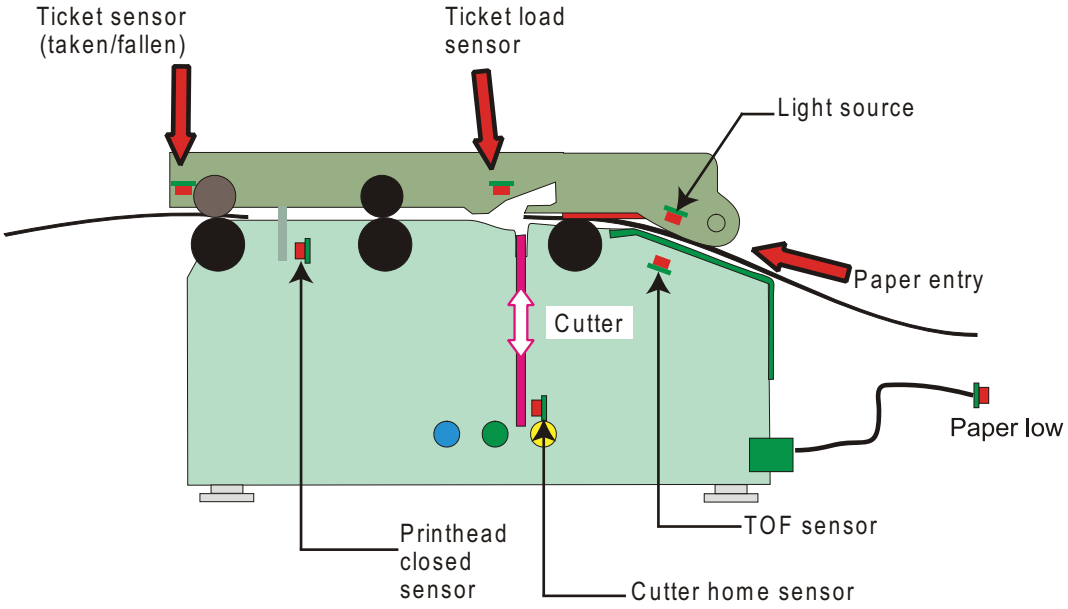
All logotypes are erased with the `ESC & L` command.

Caution • Loading to the flash PROM will erase the RAM completely since the RAM is used during the loading process. Any print data residing in RAM will thus be lost.

Status Reporting

The printer is equipped with a number of sensors that report the printer status and various conditions such as out-of-paper, previous printout not removed, etc.

Figure 27 • Sensor placement in the printer



A good practice in unattended printer applications is to check for errors and paper availability before printing.

1. Send a Status Report Query (`ESC ENQ 6`) and check that the answer is "No errors"
2. If “Status codes available” is indicated, read out the status message with Status Request (`ESC ENQ 1`), and take appropriate actions.
3. Send a paper-near-end query (`ESC ENQ 2`) to see if the sensor reports low paper level.
4. If paper-near-end is indicated, report the condition to the systems supervisor so that he can schedule a service visit to the printer.
5. Print the printout.

Note • A status reply must be read! Sending a second status query without reading the reply of the first query may lock the printer.

Note • When using a multitask OS, status queries and responses may not be transferred immediately from your application to the printer and vice versa. So write your program in such a way that it repeats the query if it gets a timeout or an invalid reply. Good practice is to ask once every ten seconds, five times before giving up.

Note • You should construct your application in such a way so as not to request status while printing, as this can result in loss of data.

Notes •

6

Default Parameter Settings

Some of the printer settings can be stored in an EEPROM so that they will be used also after power OFF.

The stored parameter settings are printed out on the self-test printout.

The number in front of the function is the parameter number (n) used when setting the parameter with the command ESC & Pnv.

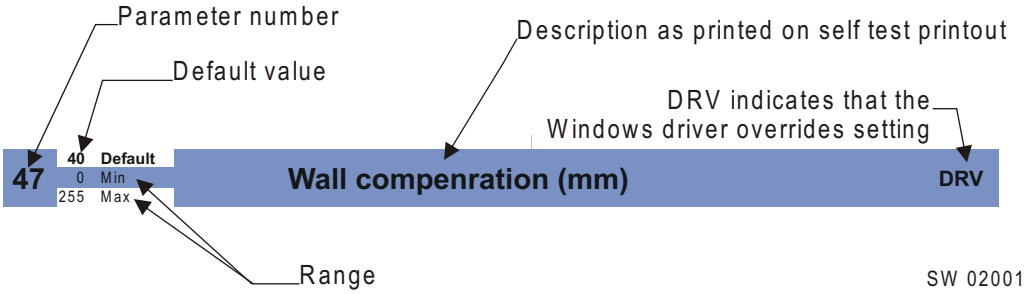
You can use the parameter settings pretty much like normal commands. Either send the parameter values with each printout, or set them up once and then send ESC & 4h to store all settings in the EEPROM.

You can always return to factory default settings by sending ESC & F, and then storing those settings with ESC & 4h.

Note • The parameters can be locked so that no changes are possible. Check parameter 53 on the self-test printout to find out.

Note • If you try to set a parameter to an invalid value, the parameter will be set to the nearest valid value below.

How the Parameters are Described



Default Value

The default values indicated are "factory default settings" you get by sending ESC & F. These are not necessarily the settings that your printer was originally delivered with because many printers have customized settings when delivered.

Examples

Command examples are formatted in Courier and typed in the same way as used in the Zebra TTP editor:

```
<ESC>&P<001><019>
```

Where <ESC> means the escape character 27 decimal (hex 1B). Numbers between less-than and greater-than characters, for example <001><015>, means 1 and 15 decimal (hex 1 and 13).

Summary of Parameter Settings

Parameter	Description	ESC&F Default	Page	TTP model	
				2110	2130
1	Baud rate	96 (9600 Baud)	87	X	
2	Data bits	8	87	X	
3	Parity	0 (No parity)	87	X	
4	Flow control	2 (Hardware)	87	X	
7	Burn time	9	88	X	X
8	Print speed	17 (123 mm/s)	88	X	X
10	Pulse control	3 (2 burn pulses)	88	X	X
12	Font attributes	0 (off)	88	X	X
13	Line spacing	0 (Auto)	89	X	X
14	Font selection	0 (ATM9)	89	X	X
15 to 30	Tab stop	4, 8, 12 etc.	89	X	X
33	CR/LF	0 (LF = CR/LF, CR=Ignored)	89	X	X
34	Auto cut after FF	1 (Off)	90	X	X
35	Black mark sync	1 (On)	90	X	X
36	Document mode	1 (Variable)	90	X	X
37 & 38	Page length, Minimum / fixed / BM	2, 88 (75 mm)	90	X	X
39	Max black-mark length	80 (10 mm)	92	X	X
40	Min black-mark length	24 (3 mm)	92	X	X
41 & 42	Black-mark cut offset	0, 0 (0 mm)	92	X	X
43 & 44	Black-mark top margin	0, 0 (Disabled)	92	X	X
46	Cut position calibration	128 (no adjustment)	93	X	X
47	Wall compensation	0	93	X	X
48	Paper width	0 (Auto)	94	X	X
49	Advance before cut	0 (Off)	94	X	X
51	Black-mark level	75	94	X	X
52	Warning level	0 (Off)	94	X	X
56	Max status code	255	95	X	X
53	Lock parameters	0 (Unlocked)	95	X	X
57	System	247 (Gap sensor)	95	X	X
58	Out of paper level	0	96	X	X

Parameter	Description	ESC&F Default	Page	TTP model	
				2110	2130
59	Vendor class mode	0 (Disabled)	96	X	X
60	Partial cut length	10	96	X	X
61	TOF Sensor Mode	2 (Gap sensor)	96	X	X
62	TOF Sensor Mask	0 (Masks away sensor 2 and 3)	97	X	X
63	BM Sensor	0 (auto selection between 1 and 4)	97	X	X

Note • When the printer is set up the way you like it to be, you send `ESC & 4h`, and all settings will be stored.

Serial Interface Set-up

1 Baud Rate

96 Default
11 Min
96 Max

Stores the communication speed on the serial interface.

<ESC>&P<001><024>	2400 bps
<ESC>&P<001><048>	4800 bps
<ESC>&P<001><096>	9600 bps
<ESC>&P<001><019>	19200 bps
<ESC>&P<001><038>	38400 bps
<ESC>&P<001><057>	57600 bps
<ESC>&P<001><011>	115200 bps

Note • If you set an invalid value, the baud rate will return to the previous value.

2 Data Bits

8 Default
7 Min
8 Max

Selects if 7-bit ASCII, or 8-bit, is used on the serial interface.

<ESC>&P<002><008>	8-bits (characters 0-255)
<ESC>&P<002><007>	7-bits (characters 0-127)

Note • In 7-bit mode you can not print graphic, read status or set parameters because no value can ever be greater than 127.

3 Parity

0 Default
0 Min
2 Max

Select what parity to use on the serial interface.

<ESC>&P<003><000>	No parity
<ESC>&P<003><001>	Odd parity
<ESC>&P<003><002>	Even parity

4 Flow-control

2 Default
0 Min
2 Max

Select what handshaking to use on the serial interface.

<ESC>&P<004><000>	No flow control
<ESC>&P<004><001>	Xon / Xoff
<ESC>&P<004><002>	Hardware

Print Setup

7 Burn Time DRV

9 Default
1 Min
15 Max

A long burn time gives darker print. On insensitive paper types you may have to increase the burn time to get an acceptable print quality.

8 Max Print Speed DRV

19 Default
1 Min
19 Max

The main reason to decrease the print speed is to enhance print quality, and to reduce average current consumption. nics

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
mm/s	47	48	49	50	51	52	53	55	57	61	65	70	77	86	96	107	123	136	150

Note • With firmware version 3.50, do not use settings 18 and 19.

Note • Settings below 15 result in printer chassis resonance causing increased noise and deteriorated print quality.

10 Printhead Pulse Control

3 Default
3 Min
7 Max

Controls how the printhead burns the pixels. Four burn pulses give a more even blackness over the width of the paper and a lower peak current consumption. Two burn pulses give faster printouts at high burn times. At normal burn times the speed is the same for both settings.

<ESC>&P<010><003>	2 burn pulses
<ESC>&P<010><007>	4 burn pulses

Caution • 3 and 7 are the only allowed setting, do not set anything else!

12 Font Attributes

0 Default
0 Min
255 Max

Selects which font attributes are selected at power ON or after reset. Font attributes bold, height and width are stored in this parameter.

bits 0-3	Height Multiplier
bits 4-6	Width Multiplier
bit 7	Bold enable

13 Line Spacing

0 Default
0 Min
30 Max

The line spacing is normally set by the font height. With this parameter you can set a line spacing that is higher that the font height. Line spacing settings lower than the font height will be ignored.

<ESC>&P<013><030>	30 pixels or font height, whichever is the largest

14 Font Selection

0 Default
0 Min
7 Max

Store which font number is used if no font is specified. Font is selected using the "Select Font " command ESC ! n. Selecting an invalid font gives a software error status message (invalid index).

15 to 30 Tab Stop

- Default
1 Min
255 Max

Stores 16 different TAB stop positions. The position is set in increments of 2.5-mm.

Tab position 255 sets a tab stop on the last position of the line. Use this if you want underline or reversed text to extend across the full paper width.

To set all tab stops at once, follow the procedure *Set Several Parameters at Once* *on page 67*.

To move a single tab stop, use the set parameter command <ESC>&P. for example:

Example • This example sets the first tab stop 25 mm from the left margin.

```
<ESC>&P<015><010>
```

Default positions are one TAB on each cm; that is parameter values 4, 8, 12 etc.

33 CR/LF Behavior

0 Default
0 Min
4 Max

Carriage Return and Line Feed can be interpreted in five different ways to suit different operating systems.

<ESC>&P<033><000>	LF = CR/LF	CR = Ignored
<ESC>&P<033><001>	LF = CR/LF	CR = CR
<ESC>&P<033><002>	LF = LF	CR = CR
<ESC>&P<033><003>	LF = LF	CR = CR/LF
<ESC>&P<033><004>	LF = Ignored	CR = CR/LF

Note • The character currently interpreted as LF converts text from the input buffer to pixels on the paper. If no such character has been received after 379 characters, a linefeed is inserted automatically.

34 Auto Cut After FF

1 Default
0 Min
1 Max

Decides if the printer should cut after executing an FF command, or if it should just feed the form length.

<ESC>&P<034><000>	No cut
<ESC>&P<034><001>	Cut

35 Black Mark Sync DRV

1 Default
0 Min
1 Max

Determines what should control the page length:

<ESC>&P<035><000>	No synchronization
<ESC>&P<035><001>	Cuts will be synchronized with black marks / gaps.

This parameter also determines the function of auto sensor calibration:

- If black mark / gap sync is enabled, the auto calibration will set n37 - n40, n51, n57 bit 3, n58, n61, and n62.
- If set to zero, only the BM level n51, and out of paper level n58 will be set.

36 Document Mode DRV

1 Default
0 Min
1 Max

Determines what should control the page length:

<ESC>&P<036><000>	Fixed Document Mode. Shorter documents will automatically be extended, while longer documents will be divided into several pages of the desired length. Page length will be the length set by parameters 37 and 38
<ESC>&P<036><001>	Variable Document Mode. The length of the page varies with the contents (printouts shorter than the value specified by parameters 37 and 38 will be extended to that length)

Note • Max page length in Fixed Document Mode is A5-size, which is 148.5 mm.

37 & 38 Page Length DRV

2 , 88 Default
0 , 0 Min
255 , 255 Max

Defines three different things:

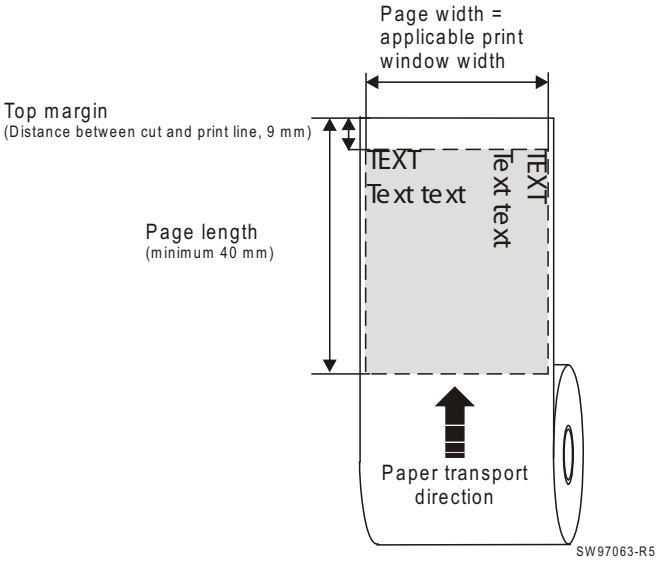
1. The minimum length of a page in variable document mode
2. The actual page length in fixed document mode
3. The distance between black-marks in black-mark mode

One step is 0.125 mm. Settings shorter than 37 mm, will be extended to 37 mm when printing.

<ESC>&P<037><006><ESC>&P<038><090>	Set page length to 203 mm.

Figure 28 • Definition of Page Size

Length	p37	p38
40 mm	<001>	<064>
75 mm	<002>	<088>
85.6 mm	<002>	<173>
156 mm	<004>	<224>
203 mm	<006>	<090>
16”	<012>	<180>
19”	<015>	<021>
21”	<016>	<171>



Fixed Document Mode

Max *fixed document mode* page length is depends of the amount of free ram. Make a self-test printout to check how much is available in your printer. (Depends on firmware version).

$$Page\ length = \frac{Free\ RAM\ in\ bytes \times 1024}{Paper\ width} - top\ margin \times bottom\ margin$$

Paper length, top, and bottom margins are in pixel lines. Paper width is in bytes or mm. (1 byte = 1 mm.).

Example • If Free RAM on a TTP 2100 is 114627 bytes, print width is 80 mm = 80 bytes, top margin is 20 mm, and bottom margin 10 mm (20 x 8 =160 and 10 x 8 = 80 pixel lines).

$$Page\ length = \frac{114627 \times 1024}{80} \quad 160 \times 80 = 1180\ pixel\ lines = 147\ mm$$

If a too large fixed page is specified the printout will be blank from memory full to the cut.

39 BM (Black-Mark) Length DRV

50 Default
1 Min
160 Max

Specifies the length of the black-mark in 0.125-mm steps. Measure the length of the black-mark on your paper and enter that value here.

Marks 5 mm longer than this value are interpreted as paper out. The default value of 80 equals 10 mm.

<ESC>&P<039><040>	Sets max black-mark length to 5 mm.

40 Min BM (Black-Mark) Length "Garbage Filter" DRV

30 Default
1 Min
159 Max

Specifies the minimum length of the black-mark in 0.125-mm steps. Shorter marks are ignored. The default value of 24 equals 3 mm.

<ESC>&P<040><036>	Sets min black-mark length to 4 mm.

41 & 42 BM (Black-Mark) Cut Offset DRV

0 , 0 Default
0 , 0 Min
255 , 255 Max

Defines the paper feed between the black-mark detection and cut. One step is 0.125 mm.

<ESC>&P<041><001><ESC>&P<042><144>	Feeds 50 mm between black-mark and cut.
<ESC>&P<041><000><ESC>&P<042><000>	Automatically sets cut offset so the printer cut is in the middle of the black mark.

43 & 44 Top Margin (mm)

0 , 0 Default
0 , 0 Min
255 , 255 Max

Defines the distance between the cut in Black-mark mode and the top of the first text line in 0.125 mm steps. The top margin feed is effectuated when the presenter is cleared from the previous page.

0	Disabled top margin. This gives the physical top margin of the printer, which is 9 mm.

Settings that give a shorter margin than 9 mm will be extended to 9 mm so this parameter can only be used to extend the margin, not reduce it.

<ESC>&P<043><000><ESC>&P<044><240>	Add 30-mm top margin.

46 Cut Position Calibration

0 Default
0 Min
255 Max

Calibrates the cut position. The value is a signed byte.

A change of 1 moves the cut 1/8 of a mm *more* than normal.

A change of –1 moves the cut 1/8 of a mm *less* than normal. -1 is entered as 256-1=255

The positive range is 1-127. The negative range is 128-256

This parameter can be individually set for each printer and is not affected by the driver or reset commands. It is used to compensate for differences in sensor position in production. After moving or replacing the TOF-sensor, the calibration may have to be done again.

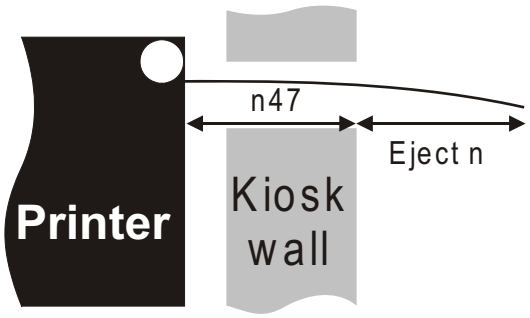
Note • The cut is not 100% repetitive because the paper may be closer to the sensor for one ticket than it is for the next. So do not expect a perfect synchronization between perforation and cut.

It is better to cut slightly after a perforation than before because cutting before perforation leaves a flap that is pushed through the printer and that may cause paper jam.

47 Wall Compensation (mm) DRV

40 Default
0 Min
255 Max

When the printout is printed and cut, the presenter ejects 50 mm of the page so that the customer can grab it. If the kiosk wall is thick, or if you just want a longer part of the printout to be visible, this parameter adds extra eject length.



<ESC>&P<047><050>	Adds 50 mm extra eject = 100 mm in total.

48 Paper Width (mm) DRV

0 Default
0 & 20 Min
80 Max

Sets the width of the paper loaded into the printer. The range is 20 to 80 mm. This can also be used to get left and right margins, for instance if you load 80 paper but set the paper width to 60 mm you get a 10 mm margin on both sides of the page.

Note • You should not change paper width within a page.

<ESC>&P<048><000><ESC>&<004>	Position of sensor selector switch on TOF sensor board selects width (54 or 72 mm)
<ESC>&P<048><060><ESC>&<004>	Sets 60 mm print width

Note • We recommend you to set a somewhat narrower print width than the loaded paper width to allow the paper to wander a bit sideways without losing print.

49 Advance Before Cut DRV

1 Default
0 Min
1 Max

Selects if the cut command cuts at the position where the paper is at, or if the printer should advance the paper before cutting.

<ESC>&P<049><000>	Off
<ESC>&P<049><001>	Automatic Distance Calculation

Set to 1 if the printer is used in text mode and 0 if it is used from a driver that takes care of this in the driver.

Note • The paper is advanced before the FF command calculates the page length to see if the page length is longer than the set minimum length.

51 Black-Mark Sensitivity

50 Default
0 Min
255 Max

Sets the lever at which the sensor output is interpreted as paper or as black-mark.

0 is white and 255 is pitch black.

52 Warning Level

0 Default
0 Min
255 Max

Turns on/off indication of Paper near end level on the status indicator. This affects only the status indicator, not the status enquiries

<ESC>&P<052><000>	No indication
<ESC>&P<052><001>	Paper Near End indication

53 Lock Parameters

0 Default
0 Min
1 Max

You can lock the parameters so that they cannot be changed by the ESC & P command.

<ESC>&P<053><000>	Unlocked
<ESC>&P<053><001>	Locked

56 Max Status Code

255 Default
0 Min
255 Max

This will control the highest status code that is reported by ESC ENQ x06 and ESC ENQ x01 (Pending-status-code bit). You use this if your kiosk software is not written so it masks away unknown status messages.

Example • If you want the TTP 2100 to be compatible with software written for TTP 1020, set parameter 56 to 6h and error codes 7 and up will not be reported.

57 System

247 Default
0 Min
255 Max

The system parameter will control up to eight system components in the printer.

The bits specified so far are these:

Bit 0	Clear presenter at reset
Bit 1	Pull detector
Bit 2	-
Bit 3	Standard BM
Bit 4	Disable USB reconnect

Setting a bit to 1 enables the function and setting it to 0 disables it.

Note • Bits whose function are not yet specified must always be set to 1.

Examples •

<ESC>&P<057><254> Presenter will not be cleared at power ON and reset.

<ESC>&P<057><253> The pull detector is disabled.

<ESC>&P<057><252> The presenter will not be cleared at power ON and reset and the pull detector is disabled.

<ESC>&P<057><239> The printer will monitor USB heartbeat, and thus try to reconnect if it disappears.

<ESC>&P<057><247> The printer is reset to normal behavior (gap sensor)

58 Out-of-Paper Level

0 Default
0 Min
255 Max

Sets the level at which the TOF sensor detects out of paper. The out-of-paper level may differ from the black-mark level on label stock where the foil opacity indicates top of form.

This parameter is set automatically when you run the “Calibrating the TOF sensor procedure” (manually or using ESC #).

59 Vendor Class

0 Default
0 Min
1 Max

Switches identity of the device from Printer Class (0x07) to Vendor Class (0xFF).

Caution • When not set to “Printer Class”, no programs that rely on the Windows printer driver will be able to communicate with the printer, and thus not be able to reset the parameter to Printer Class again.

60 Partial Cut Length

10 Default
1 Min
40 Max

Sets the length of the partial cuts in mm from the edges of the paper (the blade cuts from the paper edges towards the middle).

The paper width parameter n48 is used to specify the edges of the paper so the printer knows where to start to cut. If parameter n48 is set to auto width, the setting of the TOF sensor selector switch determines the print width and thus also the start position for the partial cut.

Caution • A too large partial cut may cause problems with the presenter, so stay with the default setting if possible.

61 TOF Sensor Mode

2 Default
0 Min
2 Max

0	All transmitters OFF
1	Reflex sensor mode
2	Gap sensor mode

62 TOF Sensor Mask

9 Default
0 Min
255 Max

The sensor mask is set automatically at calibration. It will mask away all sensors seeing the guide and is used for the virtual sensor “Paper before head” and will affect paper loading and calibration start. Any raw value will not be affected by the mask.

bit 0	Sensor BM1 in use (edge sensor for 82.5 mm paper)
bit 1	Sensor BM2 in use (center sensor)
bit 2	Sensor BM3 in use (sensor 17.5 mm from center)
bit 3	Sensor BM4 in use (sensor 12.5 mm from center)
bit 4	7 Reserved, shall be 0.

63 BM Sensor

1 Default
0 Min
4 Max

Selects which sensor should be used for black mark / Gap detection.

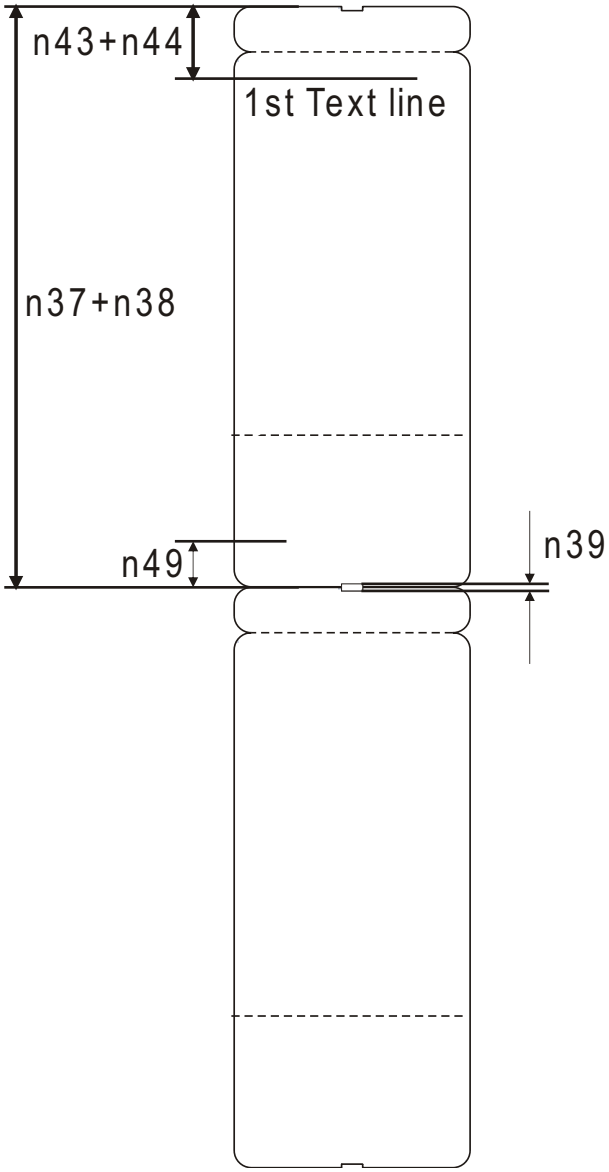
<ESC>&P<063><000>	Auto, selects sensor BM1 or BM4 depending on paper width.
<ESC>&P<063><001>	Force the use of sensor BM1 (edge sensor for 82.5 mm paper)
<ESC>&P<063><002>	Force the use of sensor BM2 (center sensor)
<ESC>&P<063><003>	Force the use of sensor BM3 (sensor 17.5 mm from center)
<ESC>&P<063><004>	Force the use of sensor BM4 (sensor 12.5 mm from center)

Notes •

7

Page Setup

Printable Area



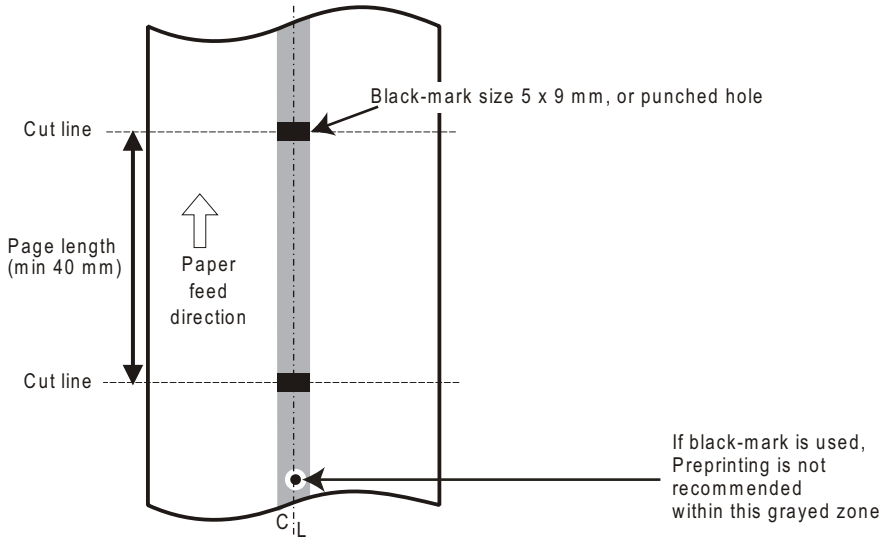
Top margin, bottom margin, page length, and synchronization with preprint are set up with parameters in the printer. In addition to the above, n41+n42 are used if the hole or black-mark is not on the desired cut position.

Aligning Preprint and Thermal Print

The printer can synchronize the cutting with black-marks printed on the back of the paper, punched holes or gaps in-between tickets. You use this function when you have preprint on the printout and you don't want a cut in the middle of that preprint, or text printed on top of the preprint.

The sensor used to detect the marks is the same sensor as used for paper end detection. The sensor is at the paper center but can be moved sideways to fit a specific ticket material.

Figure 29 • Recommended Black-mark Size and Position



The sensor measures the length of the black-mark and the cut is placed in the middle of the mark.

Since the same sensor is used for both paper end and black-mark detection, the printer must know the length of the black-mark to avoid signaling end-of-paper when it detects a black-mark. The default setting accepts black-marks in the range 3 –16 mm, and works perfectly with the recommended black-mark length of 5 mm. Marks shorter than 3 mm are interpreted as dirt, and marks longer than 16 mm as out-of-paper. You can change both these values by changing the printer default settings.

Black-mark mode is selected by setting parameter 36 to 2, and storing the parameters.

Note • It is essential that you store the parameters in the printer for black-mark synchronization even if you enable black-marks in the Windows driver. This is because Windows is not used at paper loading, and feeding with the FF button on the printer.

Simple Calibration Process

1. Open the printhead
2. Remove ticket stock
3. Hold the Feed button pressed
4. Close the printhead (keeping the button pressed all the time)
5. Release the button, the status LED should be off and the power LED on.
6. Load ticket stock
7. The printer will now forward two tickets and look for TOF marks, then stop and save all TOF-mark parameters.
8. Now open the printhead and remove the ticket stock, close and feed the tickets in again and the printer is ready for use.

Repeat this procedure if the printer should be used with tickets that differ from the original specification.

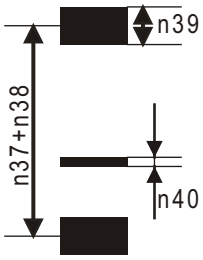
The following parameters are affected: n37 - n40, n51, n57 bit 3, n58, n61 and n62

Parameters Used

Parameter n35 – Document Mode

Set parameter n36 to 1 to enable black-mark check.

Parameters n37 and n38 – Page Length Minimum



Measure the distance from the center of one black-mark to the center of the next. The resolution is 0.125 mm so multiply the distance by 8, then calculate the value to enter as n37 and n38.

Example • If the page length is 100mm,

(100 x 8) / 256 = 3.125.

n37 is the integer value, that is 3, while n38 is the fraction, 0.125 x 256 = 32

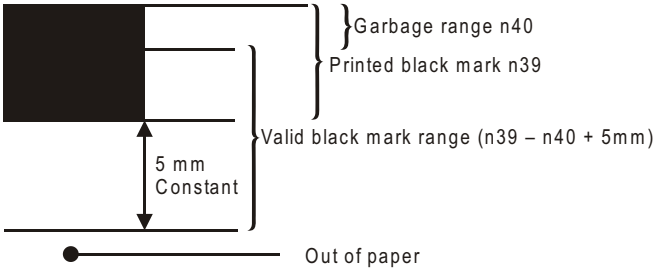
Parameter n39 – Max Black-markLength

Measure the height of the black-mark or gap. The resolution is 0.125 mm so multiply the black-mark length (in millimeters) by 8 and enter the value as n39.

Parameter n40 – Min Black-mark Length (Garbage Filter)

This parameter is actually a filter to filter-out garbage on the paper. If a spot or perforation is smaller than this value, it will not be regarded as a black-mark. 1. About ⅓ of the black-mark length is usually a suitable setting.

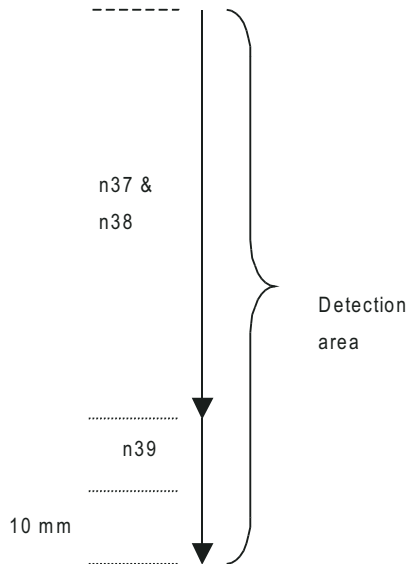
Garbage, Black-mark, and Out of Paper Detection



For every step the paper is feed, the black-mark sensor is sampled to detect garbage, black-marks or out of paper.

When the printer detects blackness is has to check if it is only garbage; if the paper gets white again within n40 x 0.125 mm, then it is garbage and the spot is ignored. If it is still black after n40 x 0.125 mm, it is probably a black-mark.

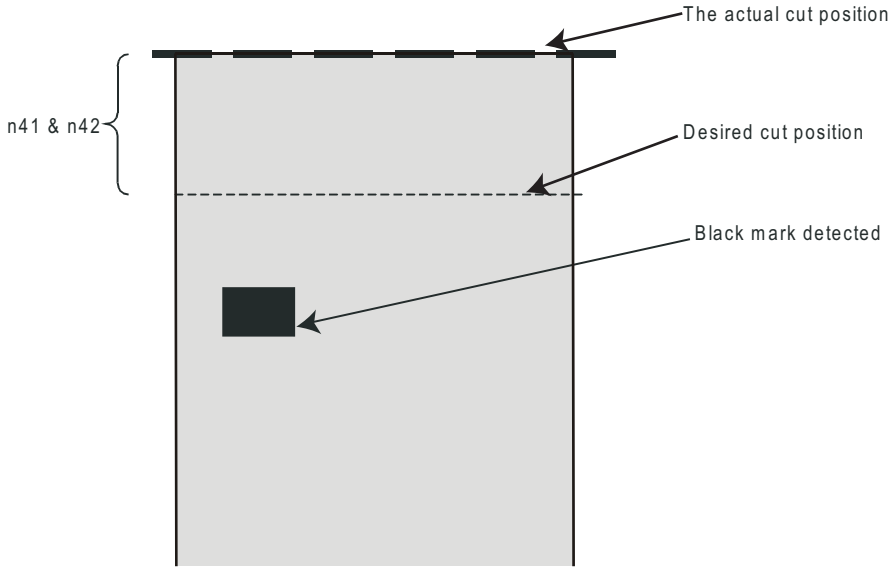
If the paper gets white within an additional n39-n40 plus 5 mm then it is a black-mark. The 5-mm is a constant added to make sure that noise on the edge not will interfere with the samples. If it at this point still is still black we have detected out of paper.



Important • Be careful about n40 and n39. If n39 – n40 is to small, then the minimum detection area will be too little. This area should not be less than a millimeter.

Parameters n41 and n42 – Black-mark Cut Offset

After the black-mark is detected and the center of the black-mark calculated, the printer feeds another distance to place the paper in cut position. This distance cannot be negative so placing the black-mark too close to the paper edge is better than too far away.



FF (Form Feed)

Use FF to print the buffer content, go to the next top of form (black-mark), and cut the paper.

ESC Z (Go To Next Top of Form)

Use ESC Z to move the paper to the next top of form. This is practically a Form-Feed without printing and cut. It searches for the next black-mark for maximum one page length + black-mark length (256 x n37+n38 + n39)/8. An additional length of 20mm is added to be sure to pass the edge of the next black-mark. If there is no black-mark within the set distance plus 20 mm, an error is raised.

The commands are used together in the following way:

Example • The following examples are not made for a specific programming language or editor, but can be implemented with the tools of your choice. The data sent **to the printer** are marked with "Send→".

When setting up the printer:

Send→ESC & P 35d 1d Enables black-mark sync

Send→ESC & P 37d 4d Sets distance between two black-marks
Send→ESC & P 38d 0d n37=4d and n38=0d gives 128 mm

Send→ESC & P 39d 80d Sets max Black-mark to 80 x 0.125 = 10mm

Send→ESC & P 40d 24d Sets max Black-mark to 24 x 0.125 = 3 mm

Send→ESC & P 41d 0d
Send→ESC & P 42d 200d Sets Black-mark offset to 200 x 0.125 = 25mm

Send→ESC & P 43d 0d
Send→ESC & P 44d 0d Sets Black-mark top margin to 0mm

Send→ESC & 4d Stores the above parameters as default parameters.

The above set up and stores the parameters in the EEPROM of the printer, so this needs only be sent once to the printer when setting it up for Black-mark sync.

Document:

Send→the text and graphics

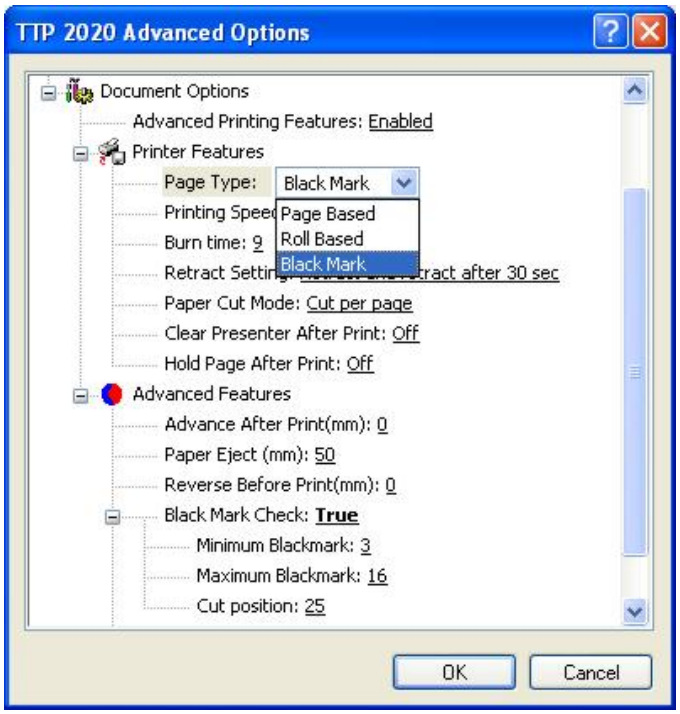
At the end of the document:

Send→ESC Z Feeds the printout to the next black-mark + the additional feed specified by the ESC x command.

Send→ RS Cuts and ejects the printout.

Black-Mark Sensing from Within Windows

In Windows, the printer driver controls when the paper is cut and ejected. Settings in the driver override the default parameter settings in the printer.



The settings are available in the Windows *Printing Preferences Menu*, in the Advanced Options window. The names of the options box differ between driver versions, but the same settings are available:

To Set This Value…	Perform This Action
n35 to 1	Set Page Type to Black-mark, and Black-mark Check: True.
n37, n38	Set the Paper Size. If no standard paper size is corresponds to the page length you have, create a new form with that length in the Windows Printer Server Properties.
n39	Set Maximum Black-mark to the length of the black-mark on your paper.
n40	Set Minimum Black-mark to the value you want for garbage filter.
n41, n42	Set Cut Position to the length of transport that you want between black-mark and cut.

Note • When everything is set up correctly and the printer prints as it should; print a page, then without switching the power off, send the store parameters command ESC & 04h to the printer (for example using the PRTMON.EXE program from www.zebra.com. If you do this, parameters that the driver uses are stored in the printer as default parameters. This way the printer synchronizes on black-mark also when you load paper, if you press the FF button, etc.

Notes •

8 Interface

The printer has one standard interface, and an optional serial interface. There are no selections to be made, but only one interface can be used at a time. The printer will not function properly if data is received on more than one interface at a time.

Note • If you use the printer through a Windows driver, you need not read the rest of this chapter.

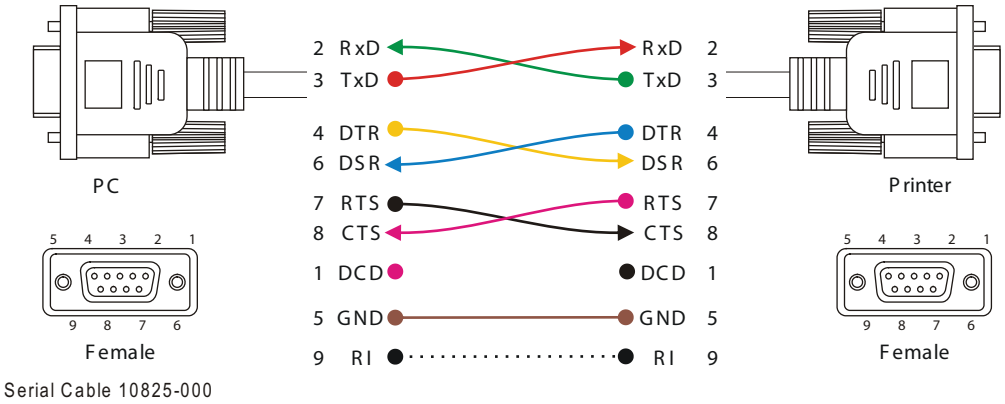
Serial, TTP 2110

Caution • Using a non-approved cable with the printer may void the FCC and other EMC approvals of the printer.

The RS-232 interface of the TTP 2110 printer has a transfer speed that can be set to between 2 400 and 115200 bits/s.

Applications where text-only printouts are to be printed are suitable for serial interface because of its easy to use bi-directional capability. The relatively low transfer speed limits the printing speed when printing graphics. Full-width graphics with 115 200 bits/s result in printing speeds of about 24 mm/s for the 80-mm version of the printer.

Figure 30 • Serial connector pin assignment



Setup Options

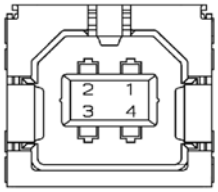
Parameter	Options
Baud	2 400, 4 800, 9 600, 19 200, 38 400, 57 600, and 115 200 bits/s
Flow control	None, Xon / Xoff, or Hardware
Data bits	7/8
Stop bits	1 (fixed)
Parity	None, Odd, or Even
Default settings	9600 bits/s, 8-bits, No parity, 1 stop bit, and hardware flow control.

See also *Default Parameter Settings* on page 83.

USB, TTP 2130

The USB (Universal Serial Bus) is an interface designed to handle peripherals daisy chained to a single connector. The transfer speed is up to 12 Mbits/s, which is quite adequate for the printer. Use this interface in operating systems with USB support, for instance Windows XP. USB devices are Plug and Play compatible and hot swappable, which means that they can be connected and disconnected without turning off the power, or rebooting the computer.

Table 4 • USB Connector (J13) Pin Assignment

	Contact Number	Signal Name	Comment
	1	VCC	Cable power
	2	– Data	
	3	+ Data	
	4	Ground	Cable ground

Notes •

9

Maintenance

Fault Finding / Troubleshooting

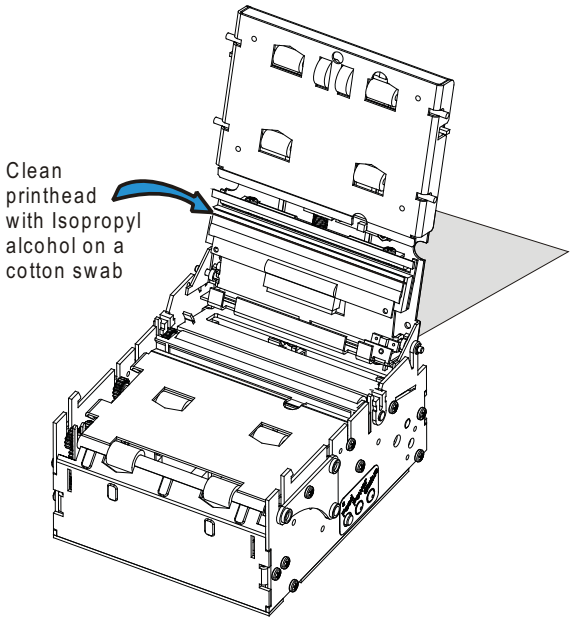
In connection with service of the printer it is good practice to remove paper dust and lint from the paper path, cutter and sensor areas. Paper dust, when accumulated, may interfere with printer functions such as optical sensors.

To avoid smudging the paper, do not apply oil on the cutting knife.

Table 5 • Fault Finding / Troubleshooting)

Symptom	Suggested actions
Nothing is printed when you press the feed button in self-test mode, but the document is transported, cut and ejected.	• Check that the paper roll is turned the correct way with thermal sensitive layer facing up. • Check that the paper used meets the paper • Check that the printhead cable is fully inserted into the connectors at each end.
Paper jam	• Check cutter-home sensor.
Printer does not work at all	• Check that the printhead is closed. • Check that power is supplied to the printer. • Check the function of the paper-out sensor.
Self-test prints OK, but the printer works strangely in normal operation.	• Check that both ends of the interface cable are properly connected. • Application program might be incorrect. Contact system manager.
No cutting	• Check that the connector for the cutting motor is fully seated on the control board.
Bad cutting (uneven top and bottom document edges).	• Switch OFF printer and remove any obstructing paper particles in cutter and presenter modules.
Inconsistent cutter operation	• Check/clean cutter-home sensor.
Missing print or irregular spots.	• Paper may be too humid. Let it adapt to ambient temperature and humidity for approximately 24 hours before use. • The paper used might not meet the paper specification.
White longitudinal lines in the printout.	• Faulty print head, replace.
Faint print.	• The paper used might not meet the paper specification. • Clean print head with ethyl or isopropyl alcohol. • Adjust print contrast, see *Print Setup* *on page 88*.
Strange characters or graphics printed, or any kind of strange printer behavior.	• Might be caused by erroneous data sent from the host. Check validity of transferred data.

Cleaning the Printhead



The printhead can be cleaned without removal.

1. Open the printhead.
2. Clean the heat elements with a cotton swab immersed in ethyl or isopropyl alcohol.

Firmware

The firmware is stored in flash-PROM on the control board. A replacement control board may not contain the same firmware version that you are currently using, so if you replace control board for some reason, upgrade it to the firmware version you want to use.

Loading

Note • Always design your kiosk system so that remote upgrade of firmware is possible. If you need to upgrade firmware in the future, the kiosks can be spread over a vast area and upgrade can become very expensive.

1. Download the firmware from the zebra web site http://www.zebra.com. There you will also find a loader program (Windows™ software) facilitating the loading of the firmware into the printer.
2. Are you using a windows environment to load the firmware?

If…	Then…
No	**a.** Send ESC NUL (1BH 00H) to the printer. **b.** Wait 0.5 seconds. **c.** Send the firmware file to the printer. **d.** Wait until the printer buzzes to confirm that the loading is complete (the presenter motor runs for a second).
Yes	The loader program contains a help file with detailed instructions on how to load the firmware into the printer.

Caution • The loading and burning can take up to one minute. Do not abort before one minute by turning OFF the power to the printer. Doing so may leave the printer in a state where new firmware cannot be loaded.

Firmware History

Functions and features are being added from time to time affecting the firmware in the printer. The following table lists the changes of general interest.

Notice that the list may not contain the latest firmware versions. Please visit our web site http://www.zebra.com for current information.

The firmware number is divided into two sections, the header and the version, separated by a dash.

Printer	Barcode Support	Firmware Header
TTP 2110	1D barcodes	1824-xxx
TTP 2110	2D PDF-417	1826-xxx
TTP 2130	1D barcodes	1823-xxx
TTP 2130	2D PDF-417	1825-xxx

Other headers are for customized versions of the printer and only available for the customer for whom this version was developed.

A printer can only be updated with firmware that has the same header as the original number.

The -xxx indicates the firmware version and for example 350 means firmware version 3.50.

FW version	Change
3.50	First released firmware version

Notes •

10

Specifications

Important • Specifications subject to changes without notice.

Ticket Specifications

Ticket materials	Paper, laminate, plastic , and label stock.
Ticket widths	50.8 mm 53.98 mm 60 mm 66.3 mm 80 mm 82.5 mm 2” 2 ⅛” 2 ⅓” 2,61” 3 1/6” 3 ¼” credit card dollar bill ISO airline ticket
Paper thickness	0,28 mm 0,18 mm 11 mils 7 mils
Ticket length	85.6 mm for ISO 7811, & up to 19” for baggage tags 156 mm 203.2 mm
Text mode	25 cm 17 cm Min. 40 mm, Max depends on free RAM and print width
Driver Mode	Min. 40 mm, Max 534 mm (1.37” to 21”)
Paper weight	80 – 240 g/m^2 depending on width, see above
Paper supply	Roll, fan-fold paper, or hand fed single cut
Roll diameter	Max 250 mm, Recommended 184.2 mm (7.25”)
Spindle diameter	50 mm minimum, recommended 76.2 mm (3”)
Fanfold tickets	Straight or with corner radius
Label stock	With punched hole, or opaque space, variable length. Carrier must be at least 0.5 mm wider than the label on both sides.

TOF Detection

Handles the following Top of Form-indicators:

1. Gap in-between tickets, Gap length from 6 mm down to 1.59 mm
2. Black-marks on the non thermal side of the ticket stock
3. Foil opacity (for labels on opaque foil backing) Length from 6 mm down to 3.175 mm. Optical translucency of backing shall be a minimum of 57%, while maximum optical translucency of tag is 18% including backing paper, adhesive and face material.
4. Corner radius down to 3.15 mm
5. Fixed length without TOF indicator
6. Variable length without TOF indicator

Features

- Cut is placed in the middle of the TOF-mark regardless of mark length
- It is possible to detect the black-mark before reaching the end of the document
- Auto loads ticket material without wasting a ticket
- Fully prints and eject last ticket in ticket stock
- Conforms to IATA Resolution 740 for baggage tag TOF detection.

Print Module

Resolution	8 dots/mm (203 dpi)
Print speed	Up to 150 mm/s
Print duty cycle	Up to 33%, (5s on, 10s off)
Max print width	Max 640 pixels = 80 mm. Selectable through parameter n48.
Life Expectancy	100 km paper (= about 1 000 000 85.6 mm tickets)1x10^8 pulse lines (typically)

Ticket Separation

The separator is able to cut roll paper and separate fanfold paper in perforations already in the ticket stock.

Guillotine cutter	Yes
Partial cut	Yes, Parameter selects the size of the cut.
Life Expectancy	1 000 000 cuts for 54 mm wide 0.18 mm thick paper (typically)

Presenter

Straight presenter with two modes:

Mode 1	Holds the ticket by its back end
Mode 2	Ejects ticket fully so it falls down and leaves the printer
Retract	No
Life Expectancy	1 000 000 tickets of 85.6 mm length (typically)

Electronics

Interfaces	Serial RS 232	115200 bps (TTP 2110)
	USB	Version 1.1 (TTP 2130)
TOF sensors	Selectable between light-barrier and reflex type detectors.	

Firmware

Driver mode	Yes, Windows XP and Linux (CUPS)
Text Mode	Yes
Emulations	No

Text Mode

Orientation	Portrait and Landscape
Standard fonts	ATM9 (40 characters/line at 72 mm width), OCR-B 10 and 12
Text attributes	Underline, Bold, Italics, reverse print, multiple width and height
Character set	224 printable characters out of a 255-character space. Default character sets should use Windows Code Page 1252 (Western). Possible to use other code pages if new fonts are loaded.
Bar codes	Standard: EAN-13, UPC, Interleaved 2-of-5, ISBN, Code 39, and Code 128. Optional PDF417.
Graphics	Logotypes and b&w BMP-files

Basic Character Set

The default fonts use Windows code page 1252 Western which contains ISO 8859-1 (ANSI) characters. You can use other character sets by creating and loading appropriate font files.

Characters 0 to 31 are control codes that cannot be changed, but 32 to 255 can be custom designed.

The table below shows the characters stored in flash PROM on the printer control board.

Table 6 • Code Page 1252 Character Table

Dec	Hex	Key		Dec	Hex	Key		Dec	Hex	Key		Dec	Hex	Key		Dec	Hex	Key		Dec	Hex	Key	
32	20			33	21	!	!	34	22	"	"	35	23	#	#	36	24	$	$	37	25	%	%
38	26	&	&	39	27	'	'	40	28	(	(	41	29	)	)	42	2a	*	*	43	2b	+	+
44	2c	,	,	45	2d	-	-	46	2e	.	.	47	2f	/	/								
48	30	0	0	49	31	1	1	50	32	2	2	51	33	3	3	52	34	4	4	53	35	5	5
54	36	6	6	55	37	7	7	56	38	8	8	57	39	9	9	58	3a	:	:	59	3b	;	;
60	3c	<	<	61	3d	=	=	62	3e	>	>	63	3f	?	?								
64	40	@	@	65	41	A	A	66	42	B	B	67	43	C	C	68	44	D	D	69	45	E	E
70	46	F	F	71	47	G	G	72	48	H	H	73	49	I	I	74	4a	J	J	75	4b	K	K
76	4c	L	L	77	4d	M	M	78	4e	N	N	79	4f	O	O								
80	50	P	P	81	51	Q	Q	82	52	R	R	83	53	S	S	84	54	T	T	85	55	U	U
86	56	V	V	87	57	W	W	88	58	X	X	89	59	Y	Y	90	5a	Z	Z	91	5b	[	[
92	5c	\	\	93	5d	]	]	94	5e	^	^	95	5f	_	_								
96	60	`	`	97	61	a	a	98	62	b	b	99	63	c	c	100	64	d	d	101	65	e	e
102	66	f	f	103	67	g	g	104	68	h	h	105	69	i	i	106	6a	j	j	107	6b	k	k
108	6c	l	l	109	6d	m	m	110	6e	n	n	111	6f	o	o								
112	70	p	p	113	71	q	q	114	72	r	r	115	73	s	s	116	74	t	t	117	75	u	u
118	76	v	v	119	77	w	w	120	78	x	x	121	79	y	y	122	7a	z	z	123	7b	{	{
124	7c	|	|	125	7d	}	}	126	7e	~	~	127	7f	A0127	□								
128	80	A0128	€	129	81	A0129	□	130	82	A0130	‚	131	83	A0131	ƒ	132	84	A0132	„	133	85	A0133	…
134	86	A0134	†	135	87	A0135	‡	136	88	A0136	ˆ	137	89	A0137	‰	138	8a	A0138	Š	139	8b	A0139	‹
140	8c	A0140	Œ	141	8d	A0141	□	142	8e	A0142	□	143	8f	A0143	□								
144	90	A0144	□	145	91	A0145	‘	146	92	A0146	’	147	93	A0147	“	148	94	A0148	”	149	95	A0149	•
150	96	A0150	–	151	97	A0151	—	152	98	A0152	˜	153	99	A0153	™	154	9a	A0154	š	155	9b	A0155	›
156	9c	A0156	œ	157	9d	A0157	□	158	9e	A0158	□	159	9f	A0159	Ÿ								
160	a0	A0160		161	a1	A0161	¡	162	a2	A0162	¢	163	a3	A0163	£	164	a4	A0164	¤	165	a5	A0165	¥
166	a6	A0166	¦	167	a7	A0167	§	168	a8	A0168	¨	169	a9	A0169	©	170	aa	A0170	ª	171	ab	A0171	«
172	ac	A0172	¬	173	ad	A0173	-	174	ae	A0174	®	175	af	A0175	¯								
176	b0	A0176	°	177	b1	A0177	±	178	b2	A0178	²	179	b3	A0179	³	180	b4	A0180	´	181	b5	A0181	µ
182	b6	A0182	¶	183	b7	A0183	·	184	b8	A0184	¸	185	b9	A0185	¹	186	ba	A0186	º	187	bb	A0187	»
188	bc	A0188	¼	189	bd	A0189	½	190	be	A0190	¾	191	bf	A0191	¿								
192	c0	A0192	À	193	c1	A0193	Á	194	c2	A0194	Â	195	c3	A0195	Ã	196	c4	A0196	Ä	197	c5	A0197	Å
198	c6	A0198	Æ	199	c7	A0199	Ç	200	c8	A0200	È	201	c9	A0201	É	202	ca	A0202	Ê	203	cb	A0203	Ë
204	cc	A0204	Ì	205	cd	A0205	Í	206	ce	A0206	Î	207	cf	A0207	Ï								
208	d0	A0208	Ð	209	d1	A0209	Ñ	210	d2	A0210	Ò	211	d3	A0211	Ó	212	d4	A0212	Ô	213	d5	A0213	Õ
214	d6	A0214	Ö	215	d7	A0215	×	216	d8	A0216	Ø	217	d9	A0217	Ù	218	da	A0218	Ú	219	db	A0219	Û
220	dc	A0220	Ü	221	dd	A0221	Ý	222	de	A0222	Þ	223	df	A0223	ß								
224	e0	A0224	à	225	e1	A0225	á	226	e2	A0226	â	227	e3	A0227	ã	228	e4	A0228	ä	229	e5	A0229	å
230	e6	A0230	æ	231	e7	A0231	ç	232	e8	A0232	è	233	e9	A0233	é	234	ea	A0234	ê	235	eb	A0235	ë
236	ec	A0236		237	ed	A0237		238	ee	A0238		239	ef	A0239									
240	f0	A0240		241	f1	A0241	ñ	242	f2	A0242	ò	243	f3	A0243	ó	244	f4	A0244	ô	245	f5	A0245	õ
246	f6	A0246	ö	247	f7	A0247	÷	248	f8	A0248	ø	249	f9	A0249	ù	250	fa	A0250	ú	251	fb	A0251	û
252	fc	A0252	ü	253	fd	A0253	ý	254	fe	A0254	þ	255	ff	A0255	ÿ								

Miscellaneous

Versions	Kiosk print mechanism and desktop version
Environment	0°C to +50°C, 35% to 75% RH, non-condensing
Size	Mechanism: approx 107x71x127mm (w x h x d) + 41 mm for input guide
Desktop	approx 117x85x137mm (w x h x d) + 41 mm for input guide
Weight	approx. 1.2 kg for mechanism and 1.4 kg for Desktop
Power requirements	24 Vdc ± 5% 70W average (2.92A) and 284W peak (11.8A) power supply

Ordering Number List

Printer Assembly

Printer Model/Type	Printer	Evaluation kit
TTP 2110 Embedded (Serial)	01991-000	01991-800
TTP 2110 Desktop (Serial)	01991-100	01991-801
TTP 2130 Embedded (USB)	01993-000	01993-800
TTP 2130 Desktop (USB)	01993-100	01993-801

Accessories

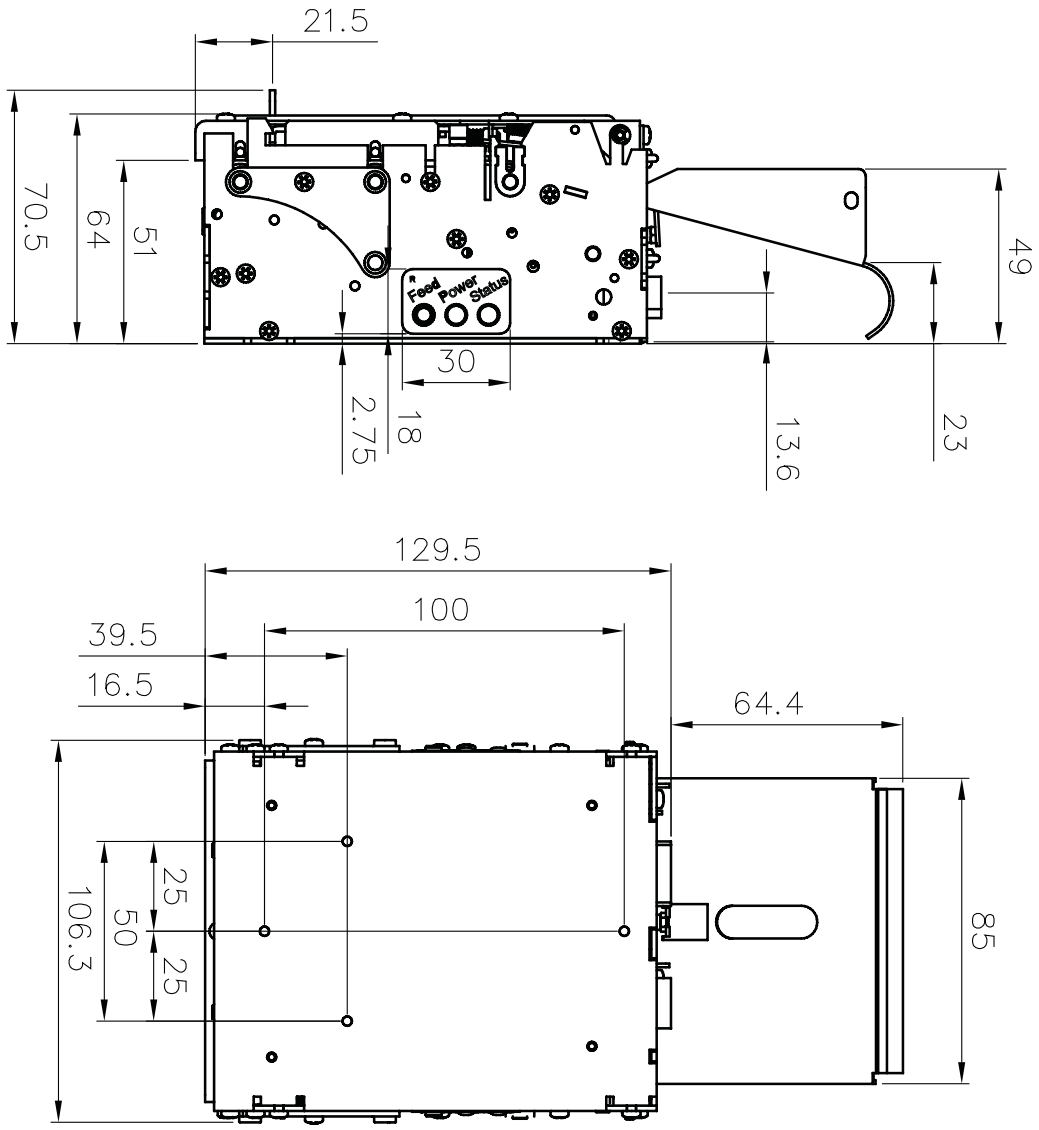
	Printer	Shown on
Paper Guide Kit 50.8 mm	01990-051	page 16
Paper Guide Kit 54 mm	01990-054	page 16
Paper Guide Kit 60 mm	01990-060	page 16
Paper Guide Kit 66 mm	01990-066	page 16
Paper Guide Kit 80 mm	01990-080	page 16
Paper Guide Kit 82.5 mm	01990-082	page 16
Media holder, roll & fanfold	104877	page 127
Paper-low sensor w. 300 mm cable (5-15 mm focal dist)	01890-300	page 25
Quick-fit hub kit (2 pcs w. screws)	103939	page 22
Leaf-spring retainer for quick-fit hubs	01473-000	page 23
Output tray	104385	page 10
Serial cable RS232, 9-pin, 1.5m	10825-000	page 26
USB cable 1.8 m	01542-000	page 27
Credit card sized tickets	01770-000	page 120
ATB tickets with staple stub and tear off tab, box of 1000 pcs	01807-000	page 120
Printer driver CD, Windows and Linux	101368	page 16
70 W Power supply unit with 1.8m secondary cable	01776-000	page 128
150W Power supply unit with on/off switch, and 500 mm secondary cable	01035-014	page 129

Dimensions

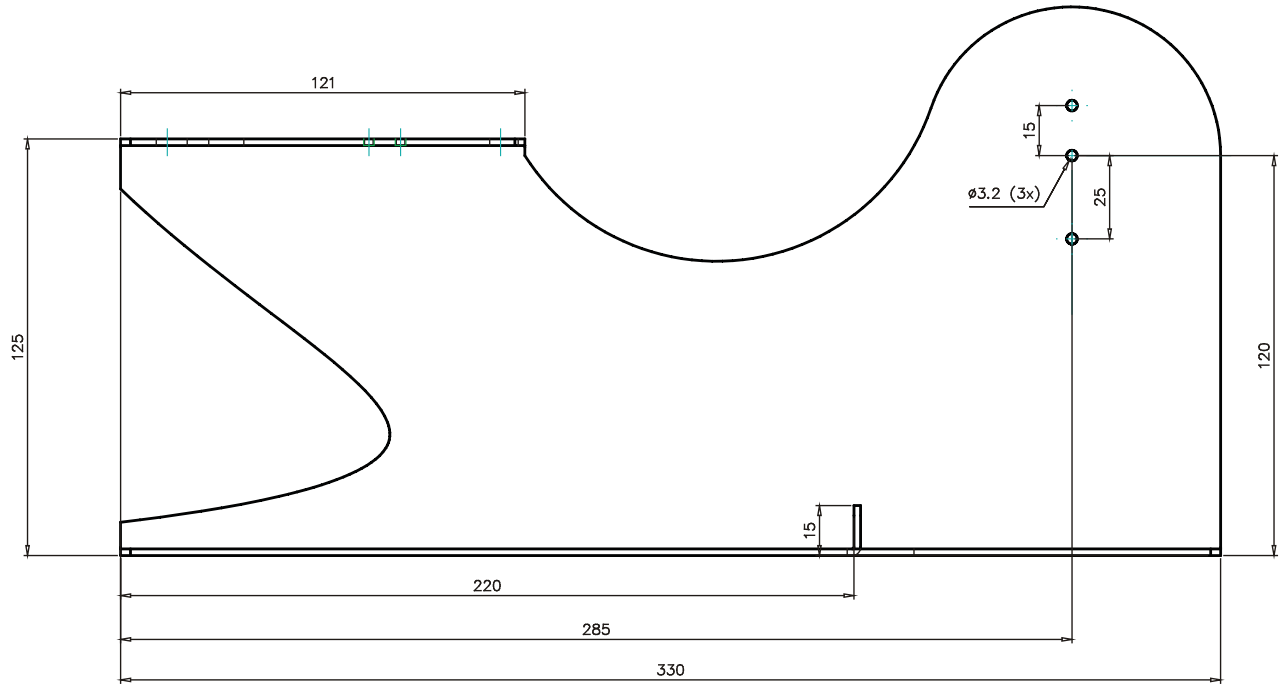
Printer

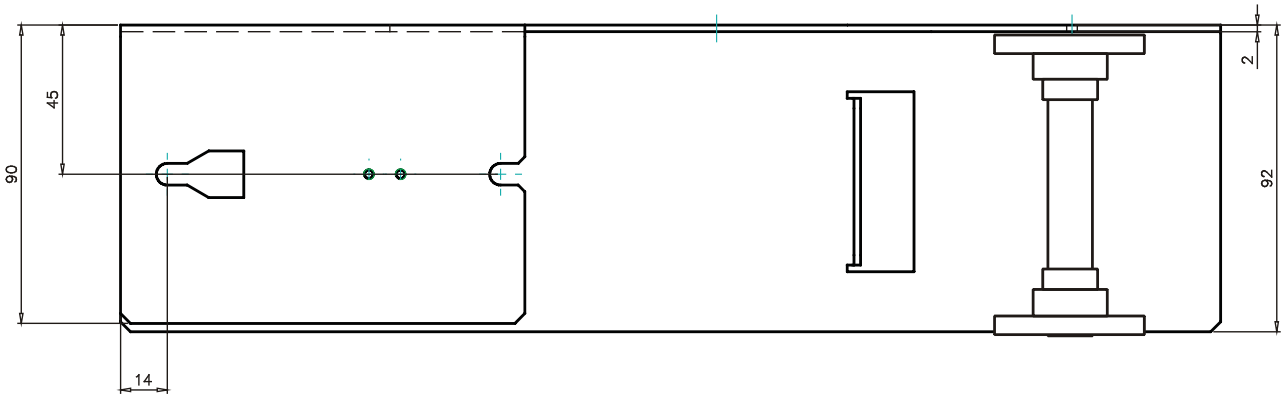
Note • Additional space is required for paper roll and handling.

Figure 31 • Measurements Drawing

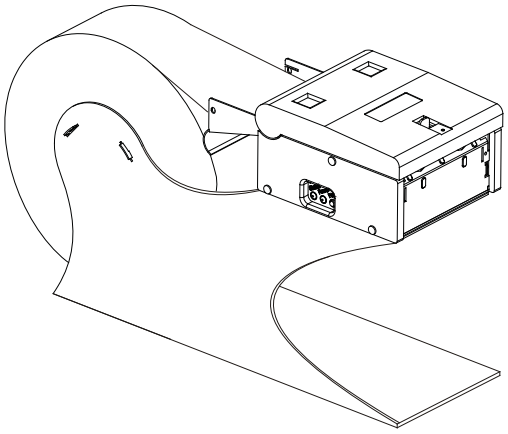


Media Holder



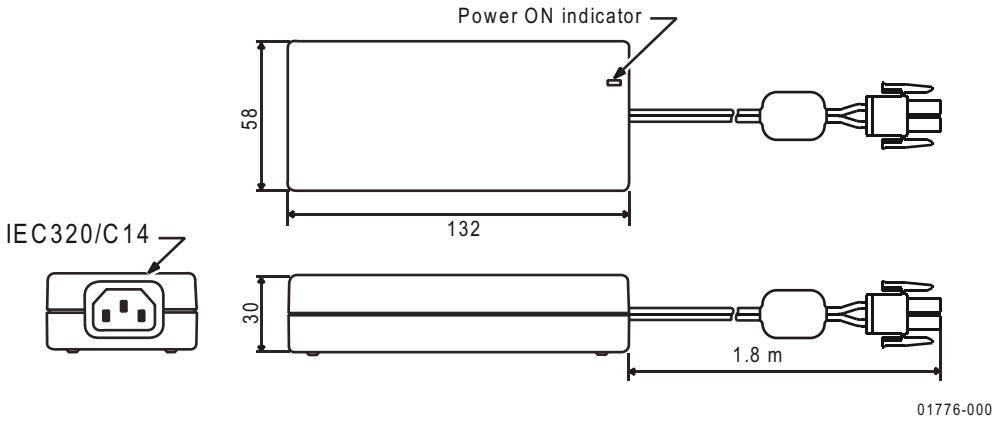


The media holder can take both fanfold and roll ticket stock. The roll shaft has three levels so it supports 54 mm, 60-66 mm, and 80-82.5 mm media, and rolls up to 180 mm in diameter.



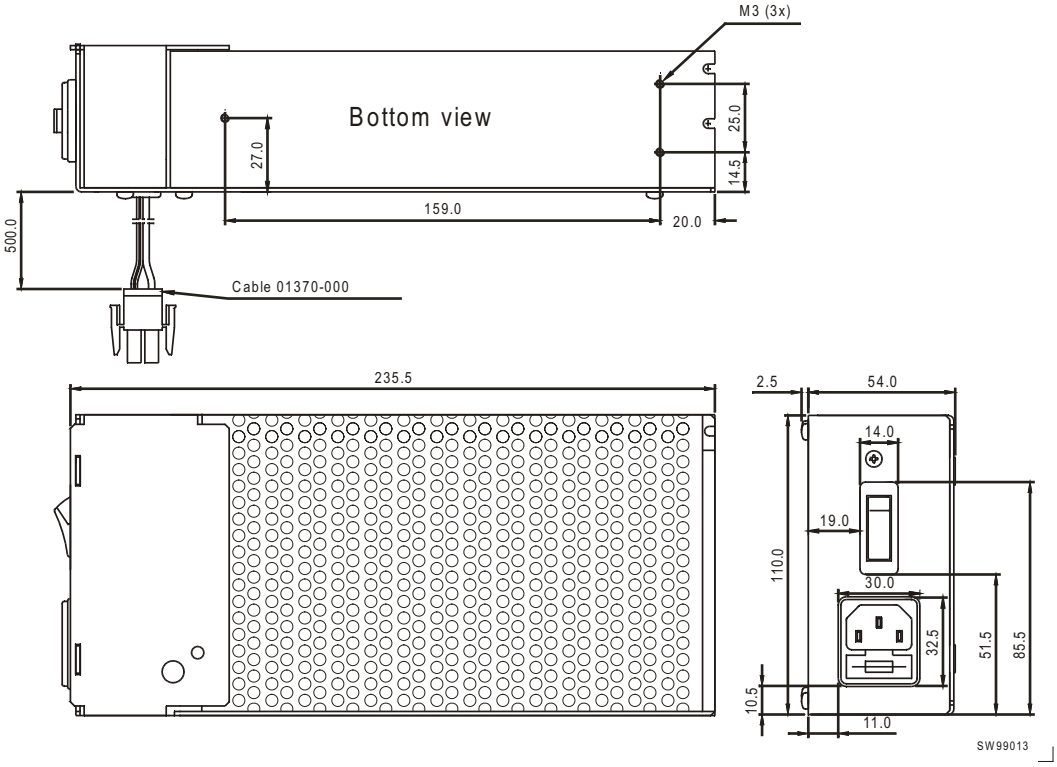
70W Power Supply

Figure 32 • Measurements of 70W PSU



150W Power Supply

Figure 33 • Measurements of 150W PSU



Notes •

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