



**MINICONT 5 V (3.3V version)  
CONTROLLER BOARD**

**SERIAL INTERFACE  
&  
PARALLEL INTERFACE**

**USER'S MANUAL**

Reference FDE 3105814 - A

September 2004

|                   |
|-------------------|
| <b>EVOLUTIONS</b> |
|-------------------|

| <b>Date</b> | <b>Issue</b> | <b>Modifications</b> |
|-------------|--------------|----------------------|
| 01/2000     | Z            | Creation             |
| 10/2004     | A            | 3.3V version         |
|             |              |                      |
|             |              |                      |

## CONTENTS

|   |           |
|---|-----------|
| <b>1. PREFACE .....</b>                             | <b>4</b>  |
| <b>2. BOARD DESCRIPTION .....</b>                   | <b>5</b>  |
| <b>3. POWER SUPPLY.....</b>                         | <b>6</b>  |
| <b>4. CONSUMPTION.....</b>                          | <b>6</b>  |
| <b>5. RS232 PARAMETERS .....</b>                    | <b>7</b>  |
| 5.1. XON/XOFF PROTOCOL .....                        | 7         |
| 5.2. DTR/DSR PROTOCOL .....                         | 8         |
| <b>6. COMMUNICATION CONNECTOR .....</b>             | <b>8</b>  |
| <b>7. PC → BOARD CONNECTION .....</b>               | <b>9</b>  |
| 7.1. CENTRONICS.....                                | 9         |
| 7.2. SERIAL.....                                    | 9         |
| <b>8. THTP CONNECTION.....</b>                      | <b>9</b>  |
| <b>9. CONNECTORS DESCRIPTION .....</b>              | <b>10</b> |
| <b>10. CONFIGURATION MENU .....</b>                 | <b>11</b> |
| 10.1. HOW TO ENTER THE CONFIGURATION MENU .....     | 11        |
| 10.2. HOW TO MOVE THE POINTER.....                  | 11        |
| 10.3. HOW TO ENTER SUB-MENUS .....                  | 11        |
| 10.4. HOW TO SAVE AND QUIT CONFIGURATION MENU ..... | 11        |
| <b>11. CONTROL CODE LIST .....</b>                  | <b>12</b> |
| <b>12. CONTROL CODE DESCRIPTION.....</b>            | <b>14</b> |
| <b>13. CONNECTORS REFERENCE .....</b>               | <b>40</b> |
| <b>14. INDEX .....</b>                              | <b>41</b> |

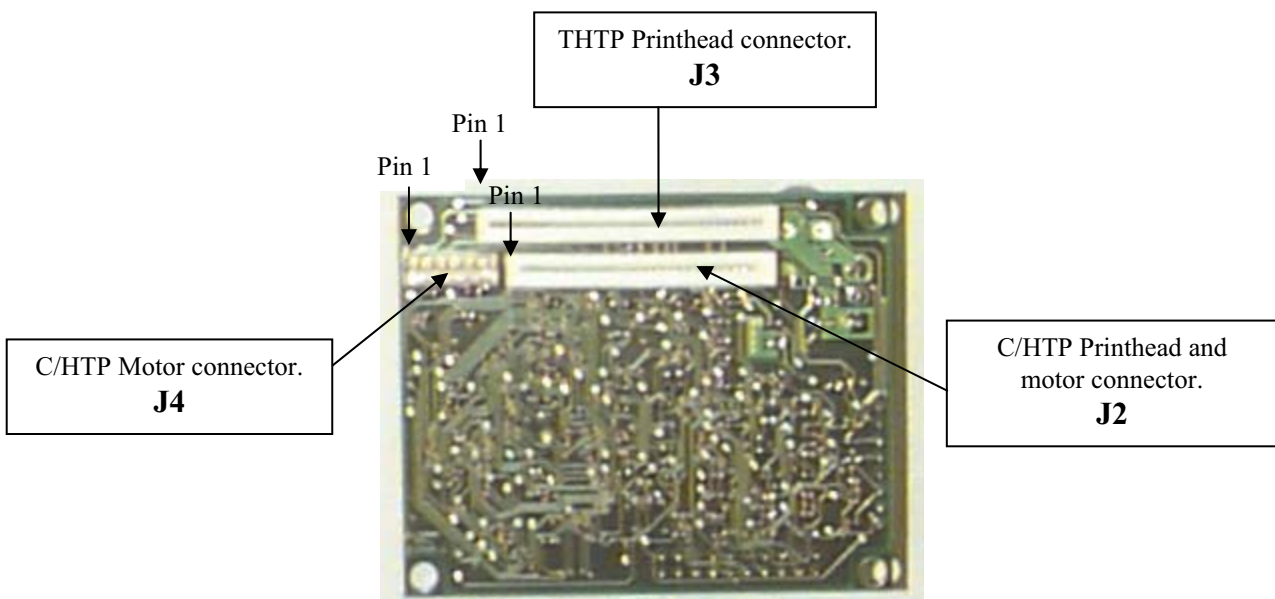
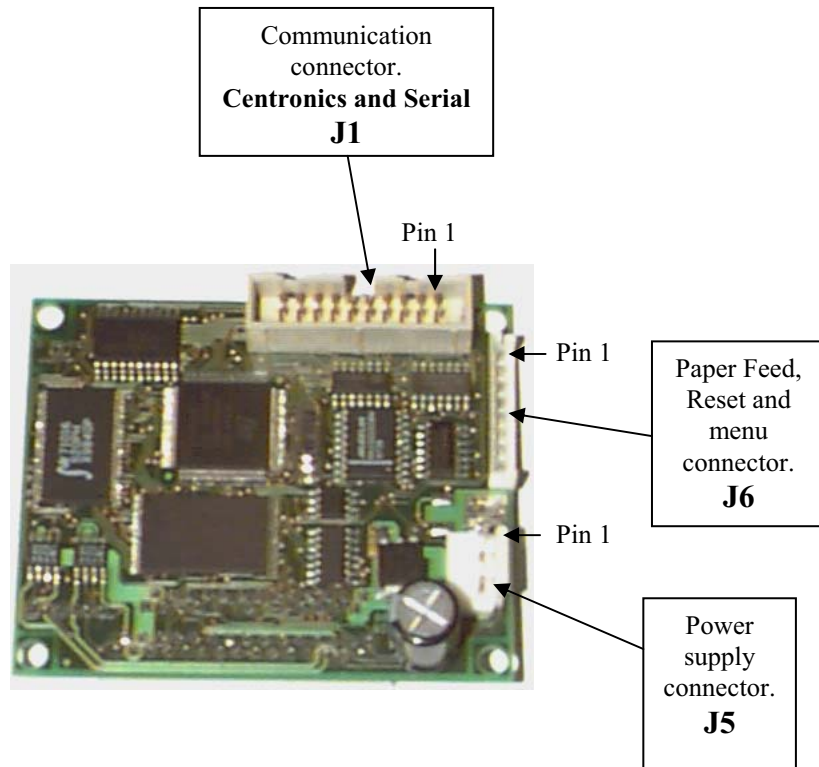
## 1. PREFACE

This Controller Board has been designed to drive THTP mechanism and C/HTPN Series mechanisms. This board has both parallel and serial interface on the same connector.

### Features

|                        |  |   |
|------------------------|--|---|
| Interfaces             | RS232 and Parallel (Centronics)  |   |
| Memory/Firmware        | 1 Mb flash memory, 4k buffer   |   |
| Resident character set | Code Page 437 (US)   |   |
| Integrated bar codes   | Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 5, Codabar, Code 128 and EAN 128. |   |
| Print                  | Host-selectable 24 or 42 columns of print on 60 mm wide thermal paper                              |   |
| Print resolution       | 8 dots/mm   384 dots width   |   |
| Human Interface        | Configuration menu for easy configuration  |   |
| Power Supply           | Logical supply and printhead supply are separated.   |   |
|                        | <b>Logical supply ( VCC ) :</b><br>From 4.75 to 5.25V  | <b>Printhead supply ( VCH ) :</b><br>From 4.1 to 7V for C/HTPN<br>From 4.1 to 8.5V for THTP |

## 2. BOARD DESCRIPTION

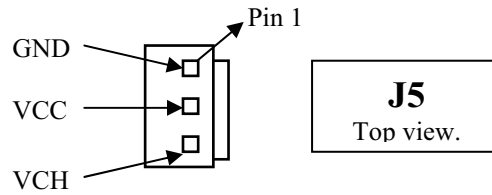


Length : 72 mm  
Width : 59 mm  
Height : 28 mm

Fixing holes diameter : 4mm (four symmetrical holes)  
Fixing holes position : the centre of holes is at 3mm from each edge of the board.

### 3. POWER SUPPLY

The Minicont5 controller board has separated power supply for VCC ( logical ) and VCH ( printhead supply ). Both are on the same connector ( J5 ).



### 4. CONSUMPTION

| Condition  | STANDBY MODE  |
|--|---|
| The board is powered with the logical power supply only. | Consumption of the board<br>4.75v -> 141mA<br><b>5V -&gt; 150mA</b><br>5.25V -> 160mA |

| Condition   | STANDBY MODE   | IDLE MODE                              | POWER DOWN MODE                         |
|---|--|--|---|
| The board is powered with the logical power supply and the printhead power supply : (THTP Mechanism).<br>VCC 5V and VCH 5V<br>No communication cable.   | Consumption of the board<br><b>Vcc -&gt; 172mA</b><br><b>Vch -&gt; 7mA</b> | With Centronics cable :<br><b>55mA</b> | With either Centronics or RS232 cable : |
| The board is powered with the logical power supply and the printhead power supply : (C/HTPN Mechanism).<br>VCC 5V and VCH 5V<br>No communication cable. | Consumption of the board<br><b>Vcc -&gt; 173mA</b><br><b>Vch -&gt; 7mA</b> | With RS232 cable :<br><b>63mA</b>      | <b>23mA</b>                             |

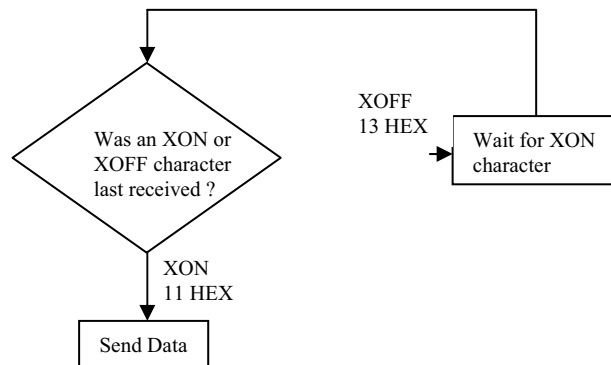
## 5. RS232 PARAMETERS

The RS-232C interface uses either XON/XOFF (software) or DTR/DSR (hardware) protocol to control the flow of information between the computer and the printer. For XON/XOFF, a particular character is sent back and forth between the host and the printer to regulate the communication. For DTR/DSR, changes in the DTR/DSR signal on the RS-232C interface coordinate the information flow.

### 5.1. XON/XOFF Protocol

The XON/XOFF characters coordinate the information transfer between the printer and the host computer. The printer sends an XON character when it is ready to receive data and it sends an XOFF character when it cannot accept any more data. The software on the host computer must monitor the communication link as shown in the following flowchart in order to send data at the appropriate times.

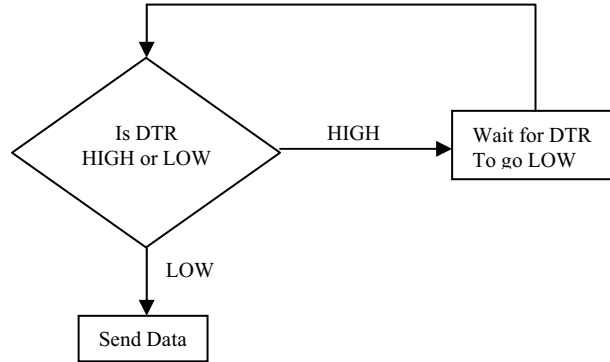
If XON/XOFF has been selected, the printer also toggles the DTR signal, as described in the next section, but it does not look at the DSR signal to transmit data.



XON character = hexadecimal 11.  
XOFF character = hexadecimal 13.

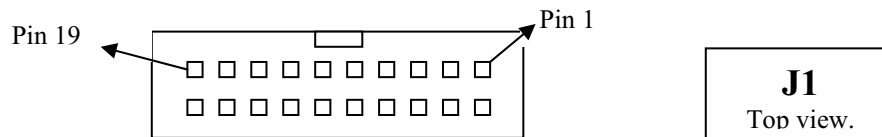
## 5.2. DTR/DSR Protocol

The DTR signal is used to control data transmission to the printer. It is driven low when the printer is ready to receive data and driven high when it cannot accept any more data. Data is transmitted from the printer after it confirms that the DSR signal is low.



## 6. Communication connector

The HE10 20 dots connector ( J1 ) is used for centronics and serial communication but the user won't be able to have only one cable for both. The user has to create two different cables for RS232 and parallel communication.



| RS232 Interface | Centronics Interface |
|-----------------|----------------------|
| Pins 1 to 5*    | Pins 5* to 20        |

\* : There is only one GND pin ( pin 5 ) on this connector that's why RS232 and centronics can't be plugged on the same cable.

## 7. PC → BOARD CONNECTION

### 7.1. Centronics

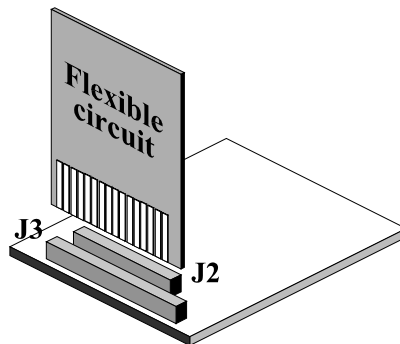
| <b>BOARD</b>     | <b>PC</b>              |
|------------------|------------------------|
| Pin 5 : GND      | Pin 23 : GND           |
| Pin 6 : /RESET   | Pin 16 : RESET         |
| Pin 7 : /ERR     | Pin 15 : Pulled to Vcc |
| Pin 8 : VCC      | Pin 13 : Pulled to Vcc |
| Pin 9 : PE       | Pin 12 : Paper Out     |
| Pin 10 : BUSY    | Pin 11 : BUSY          |
| Pin 11 : /ACK    | Pin 10 : ACK           |
| Pin 12 : D7      | Pin 9 : Data Bit 7     |
| Pin 13 : D6      | Pin 8 : Data Bit 6     |
| Pin 14 : D5      | Pin 7 : Data Bit 5     |
| Pin 15 : D4      | Pin 6 : Data Bit 4     |
| Pin 16 : D3      | Pin 5 : Data Bit 3     |
| Pin 17 : D2      | Pin 4 : Data Bit 2     |
| Pin 18 : D1      | Pin 3 : Data Bit 1     |
| Pin 19 : D0      | Pin 2 : Data Bit 0     |
| Pin 20 : /STROBE | Pin 1 : STROBE         |

### 7.2. Serial

| <b>BOARD</b> | <b>PC</b>   |
|--------------|-------------|
| Pin 1 : TXD  | Pin 2 : RXD |
| Pin 2 : DTR  | Pin 6 : DSR |
| Pin 3 : RXD  | Pin 3 : TXD |
| Pin 4 : DSR  | Pin 4 : DTR |
| Pin 5 : GND  | Pin 5 : GND |

## 8. THTP Connection

For THTP mechanism, connect the flexible circuit to J3 connector.



## 9. CONNECTORS DESCRIPTION

|  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
|--|-----------------------|------------------|-----------------|------------------|---------------|---------------|-----------------|------------------|--|------------------|--------------------------|-----------------------------------|-----------------|--------------|-----------------|--------------|-------------|----------------|---------------|------------------|--|----------------|--------------|----------------|--------------|-----------------|------------------|----------------|------------------|-------------------|---|---------------|------------------|----------------|------------------|-----------------|--------------|------------------|------------------|------------------|------------------|--------------|------------------|------------------|--------------|--------------|--------------|
| <p><b><u>J1</u> : COMMUNICATION</b></p> <table> <tr><td>Pin 1 : TXD</td><td>Pin 11 : /ACK</td></tr> <tr><td>Pin 2 : DTR</td><td>Pin 12 : D7</td></tr> <tr><td>Pin 3 : RXD</td><td>Pin 13 : D6</td></tr> <tr><td>Pin 4 : DSR</td><td>Pin 14 : D5</td></tr> <tr><td>Pin 5 : GND</td><td>Pin 15 : D4</td></tr> <tr><td>Pin 6 : /RESET</td><td>Pin 16 : D3</td></tr> <tr><td>Pin 7 : /ERR</td><td>Pin 17 : D2</td></tr> <tr><td>Pin 8 : VCC</td><td>Pin 18 : D1</td></tr> <tr><td>Pin 9 : PE</td><td>Pin 19 : D0</td></tr> <tr><td>Pin 10 : BUSY</td><td>Pin 20 : /STROBE</td></tr> </table>   | Pin 1 : TXD           | Pin 11 : /ACK    | Pin 2 : DTR     | Pin 12 : D7      | Pin 3 : RXD   | Pin 13 : D6   | Pin 4 : DSR     | Pin 14 : D5      | Pin 5 : GND  | Pin 15 : D4      | Pin 6 : /RESET           | Pin 16 : D3                       | Pin 7 : /ERR    | Pin 17 : D2  | Pin 8 : VCC     | Pin 18 : D1  | Pin 9 : PE  | Pin 19 : D0    | Pin 10 : BUSY | Pin 20 : /STROBE | <p><b><u>J2</u> : C/HTPN PRINTHEAD and MOTOR</b></p> <table> <tr><td>Pin 1 : Vch</td><td>Pin 14 : Th1</td></tr> <tr><td>Pin 2 : Vch</td><td>Pin 15 : GND</td></tr> <tr><td>Pin 3 : + 5V</td><td>Pin 16 : H_Str5V</td></tr> <tr><td>Pin 4 : H_Dout</td><td>Pin 17 : GND</td></tr> <tr><td>Pin 5 : H_Str5V</td><td>Pin 18 : GND</td></tr> <tr><td>Pin 6 : GND</td><td>Pin 19 : H_Str5V</td></tr> <tr><td>Pin 7 : A_Opto</td><td>Pin 20 : H_Str5V</td></tr> <tr><td>Pin 8 : GND</td><td>Pin 21 : GND</td></tr> <tr><td>Pin 9 : Col_Opto</td><td>Pin 22 : H_Din5V</td></tr> <tr><td>Pin 10 : H_Str5V</td><td>Pin 23 : H_Lat5V</td></tr> <tr><td>Pin 11 : GND</td><td>Pin 24 : H_Clk5V</td></tr> <tr><td>Pin 12 : H_Str5V</td><td>Pin 25 : Vch</td></tr> <tr><td>Pin 13 : GND</td><td>Pin 26 : Vch</td></tr> </table> | Pin 1 : Vch    | Pin 14 : Th1 | Pin 2 : Vch    | Pin 15 : GND | Pin 3 : + 5V    | Pin 16 : H_Str5V | Pin 4 : H_Dout | Pin 17 : GND     | Pin 5 : H_Str5V   | Pin 18 : GND  | Pin 6 : GND   | Pin 19 : H_Str5V | Pin 7 : A_Opto | Pin 20 : H_Str5V | Pin 8 : GND     | Pin 21 : GND | Pin 9 : Col_Opto | Pin 22 : H_Din5V | Pin 10 : H_Str5V | Pin 23 : H_Lat5V | Pin 11 : GND | Pin 24 : H_Clk5V | Pin 12 : H_Str5V | Pin 25 : Vch | Pin 13 : GND | Pin 26 : Vch |
| Pin 1 : TXD  | Pin 11 : /ACK         |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : DTR  | Pin 12 : D7           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : RXD  | Pin 13 : D6           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 4 : DSR  | Pin 14 : D5           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 5 : GND  | Pin 15 : D4           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 6 : /RESET   | Pin 16 : D3           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 7 : /ERR   | Pin 17 : D2           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 8 : VCC  | Pin 18 : D1           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 9 : PE   | Pin 19 : D0           |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 10 : BUSY  | Pin 20 : /STROBE      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 1 : Vch  | Pin 14 : Th1          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : Vch  | Pin 15 : GND          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : + 5V   | Pin 16 : H_Str5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 4 : H_Dout   | Pin 17 : GND          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 5 : H_Str5V  | Pin 18 : GND          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 6 : GND  | Pin 19 : H_Str5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 7 : A_Opto   | Pin 20 : H_Str5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 8 : GND  | Pin 21 : GND          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 9 : Col_Opto   | Pin 22 : H_Din5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 10 : H_Str5V   | Pin 23 : H_Lat5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 11 : GND   | Pin 24 : H_Clk5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 12 : H_Str5V   | Pin 25 : Vch          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 13 : GND   | Pin 26 : Vch          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| <p><b><u>J3</u> : THTP PRINTHEAD</b></p> <table> <tr><td>Pin 1 : GND</td><td>Pin 16 : H_Str5V</td></tr> <tr><td>Pin 2 : Sw_Door</td><td>Pin 17 : H_Str5V</td></tr> <tr><td>Pin 3 : Vch</td><td>Pin 18 : + 5V</td></tr> <tr><td>Pin 4 : Vch</td><td>Pin 19 : H_Clk5V</td></tr> <tr><td>Pin 5 : H_Din5V</td><td>Pin 20 : H_Lat5V</td></tr> <tr><td>Pin 6 : H_Str5V</td><td>Pin 21 : H_Dout</td></tr> <tr><td>Pin 7 : H_Str5V</td><td>Pin 22 : Vch</td></tr> <tr><td>Pin 8 : H_Str5V</td><td>Pin 23 : Vch</td></tr> <tr><td>Pin 9 : GND</td><td>Pin 24 : Ph_b0</td></tr> <tr><td>Pin 10 : GND</td><td>Pin 25 : Ph_a0</td></tr> <tr><td>Pin 11 : GND</td><td>Pin 26 : Ph_a1</td></tr> <tr><td>Pin 12 : GND</td><td>Pin 27 : Ph_b2</td></tr> <tr><td>Pin 13 : GND</td><td>Pin 28 : A_Opto</td></tr> <tr><td>Pin 14 : Th2</td><td>Pin 29 : GND</td></tr> <tr><td>Pin 15 : H_Str5V</td><td>Pin 30 : Col_Opto</td></tr> </table> | Pin 1 : GND           | Pin 16 : H_Str5V | Pin 2 : Sw_Door | Pin 17 : H_Str5V | Pin 3 : Vch   | Pin 18 : + 5V | Pin 4 : Vch     | Pin 19 : H_Clk5V | Pin 5 : H_Din5V  | Pin 20 : H_Lat5V | Pin 6 : H_Str5V          | Pin 21 : H_Dout                   | Pin 7 : H_Str5V | Pin 22 : Vch | Pin 8 : H_Str5V | Pin 23 : Vch | Pin 9 : GND | Pin 24 : Ph_b0 | Pin 10 : GND  | Pin 25 : Ph_a0   | Pin 11 : GND   | Pin 26 : Ph_a1 | Pin 12 : GND | Pin 27 : Ph_b2 | Pin 13 : GND | Pin 28 : A_Opto | Pin 14 : Th2     | Pin 29 : GND   | Pin 15 : H_Str5V | Pin 30 : Col_Opto | <p><b><u>J4</u> : C/HTPN MOTOR and SWITCH DOOR</b></p> <table> <tr><td>Pin 1 : Ph_b0</td></tr> <tr><td>Pin 2 : Ph_a0</td></tr> <tr><td>Pin 3 : Ph_a1</td></tr> <tr><td>Pin 4 : Ph_b1</td></tr> <tr><td>Pin 5 : Sw_Door</td></tr> <tr><td>Pin 6 : GND</td></tr> </table> | Pin 1 : Ph_b0 | Pin 2 : Ph_a0    | Pin 3 : Ph_a1  | Pin 4 : Ph_b1    | Pin 5 : Sw_Door | Pin 6 : GND  |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 1 : GND  | Pin 16 : H_Str5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : Sw_Door  | Pin 17 : H_Str5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : Vch  | Pin 18 : + 5V         |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 4 : Vch  | Pin 19 : H_Clk5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 5 : H_Din5V  | Pin 20 : H_Lat5V      |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 6 : H_Str5V  | Pin 21 : H_Dout       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 7 : H_Str5V  | Pin 22 : Vch          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 8 : H_Str5V  | Pin 23 : Vch          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 9 : GND  | Pin 24 : Ph_b0        |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 10 : GND   | Pin 25 : Ph_a0        |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 11 : GND   | Pin 26 : Ph_a1        |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 12 : GND   | Pin 27 : Ph_b2        |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 13 : GND   | Pin 28 : A_Opto       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 14 : Th2   | Pin 29 : GND          |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 15 : H_Str5V   | Pin 30 : Col_Opto     |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 1 : Ph_b0  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : Ph_a0  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : Ph_a1  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 4 : Ph_b1  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 5 : Sw_Door  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 6 : GND  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| <p><b><u>J6</u> : PAPER FEED, RESET, MENU and LED</b></p> <table> <tr><td>Pin 1 : Sw_Paper Feed</td></tr> <tr><td>Pin 2 : GND</td></tr> <tr><td>Pin 3 : Sw_Menu</td></tr> <tr><td>Pin 4 : GND</td></tr> <tr><td>Pin 5 : A_Led</td></tr> <tr><td>Pin 6 : K_Led</td></tr> <tr><td>Pin 7 : M_Reset</td></tr> <tr><td>Pin 8 : GND</td></tr> </table>   | Pin 1 : Sw_Paper Feed | Pin 2 : GND      | Pin 3 : Sw_Menu | Pin 4 : GND      | Pin 5 : A_Led | Pin 6 : K_Led | Pin 7 : M_Reset | Pin 8 : GND      | <p><b><u>J5</u> : POWER SUPPLY</b></p> <table> <tr><td>Pin 1 : GND</td></tr> <tr><td>Pin 2 : VCC( Logical 5V)</td></tr> <tr><td>Pin 3 : VCH ( Printhead power 5V)</td></tr> </table> <p><b>VCC</b> : 4.75 – 5.25 V</p> <p><b>VCH</b> : 4.1 – 7 V For HTPN<br/>4.1 – 8.5 V for THTP</p> | Pin 1 : GND      | Pin 2 : VCC( Logical 5V) | Pin 3 : VCH ( Printhead power 5V) |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 1 : Sw_Paper Feed  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : GND  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : Sw_Menu  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 4 : GND  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 5 : A_Led  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 6 : K_Led  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 7 : M_Reset  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 8 : GND  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 1 : GND  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 2 : VCC( Logical 5V)   |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |
| Pin 3 : VCH ( Printhead power 5V)  |                       |                  |                 |                  |               |               |                 |                  |  |                  |                          |                                   |                 |              |                 |              |             |                |               |                  |  |                |              |                |              |                 |                  |                |                  |                   |   |               |                  |                |                  |                 |              |                  |                  |                  |                  |              |                  |                  |              |              |              |

## 10. CONFIGURATION MENU

### 10.1. How to enter the configuration menu

In the Minicont 5V board, there is a connector ( J6 ) where you can find Paper feed, Switch menu and reset buttons.

#### **J6 connector will be used for all buttons :**

- The paper feed button will be Pins 1 and 2.
- The switch menu will be pins 3 and 4.
- The reset button will be pins 7 and 8.

In order to enter the configuration menu, press all the buttons and then release the reset button only ; the configuration menu receipt starts printing.

### 10.2. How to move the pointer

When you are in the configuration menu, a list is printed.

- Interface type
- Baud rate
- Parity
- Parity type
- Data
- Stop
- Protocol

This list only appear if the printer is set in RS232 communication. In Centronics configuration, the list will be :

- Interface type

To move the pointer, press the Paper feed button.

### 10.3. How to enter Sub-menus

When you have selected one menu, you can access to parameters by pressing the Switch menu button.

### 10.4. How to save and quit configuration menu

In order to save the configuration, go through the **End** scroll, push the menu button twice then press reset button in order to quit configuration menu.

## 11. CONTROL CODE LIST

### Print commands :

| ASCII Command | Hexa Command | Description               |
|---------------|--------------|---------------------------|
| 15 H n        | 15 n         | Feed N dot lines          |
| LF            | 0A           | Print & Line feed         |
| CR            | 0D           | Print and Carriage return |
| ESC d n       | 1B 64 n      | Print and Feed n lines    |
| DC4 n         | 14 n         | Feed n print lines        |
| ESC J n       | 1B 4A n      | Print and feed N dots     |

### Line spacing :

| ASCII Command | Hexa Command | Description                                     |
|---------------|--------------|---|
| ESC 2         | 1B 32        | Set line spacing to 1/6-inch ( <i>default</i> ) |
| 16 H n        | 16 H n       | Set line spacing                                |
| ESC 3 n       | 1B 33 n      | Set line spacing                                |

### Print position :

| ASCII Command   | Hexa Command   | Description                              |
|-----------------|----------------|--|
| BEL             | 07             | Receipt setting                          |
| HT              | 09             | Horizontal tab                           |
| ESC \ nL nH     | 1B 5C nL nH    | Set relative print position              |
| ESC D [n] k NUL | 1B 44 [n] k 00 | Set horizontal tabs                      |
| ESC \$ nL nH    | 1B 24 nL nH    | Set absolute print position              |
| GS L nl nH      | 1D 4C nL nH    | Set left margin                          |
| ESC a n         | 1B 61 n        | Select justification                     |
| GS P x y        | 1D 50 x y      | Set horizontal and vertical motion units |

### Character control :

| ASCII Command            | Hexa Command             | Description                           |
|--------------------------|--------------------------|---------------------------------------|
| DC2                      | 12                       | Select double-wide characters         |
| DC3                      | 13                       | Select single-wide characters         |
| ESC SP n                 | 1B 20 n                  | Set right-side char spacing           |
| ESC ! n                  | 1B 21 n                  | Select printing modes                 |
| ESC % n                  | 1B 25 n                  | Select/cancel user-defined char set   |
| ESC & y c1 c2 x1 d1...dn | 1B 26 y c1 c2 x1 d1...dn | Define user-defined character         |
| ESC - n                  | 1B 2D n                  | Turn underline mode on/off            |
| ESC ? n                  | 1B 3F n                  | Cancel user-defined char              |
| ESC { n                  | 1B 7B n                  | Turn on/off upside down printing mode |
| ESC DC2                  | 1B 12                    | Rotate Characters counter-clockwise   |
| ESC E n                  | 1B 45 n                  | Bold Print mode on/off                |
| ESC G n                  | 1B 47 n                  | Turn on/off double strike             |
| ESC I n                  | 1B 49 n                  | Italic Print mode on/off              |
| ESC V n                  | 1B 56 n                  | Turn 90 degrees clockwise mode on/off |
| GS B n                   | 1D 42 n                  | Turn white/black reverse print mode   |

**Bit image :**

| ASCII Command              | Hexa Command                | Description               |
|----------------------------|-----------------------------|---------------------------|
| GS * <i>x y [d] .xxyxδ</i> | 1D 2A <i>x y [d] .xxyxδ</i> | Define download bit image |
| GS / <i>m</i>              | 1D 2F <i>m</i>              | Print download bit image  |
| DC1                        | 11 H                        | Graphic printing mode     |

**Bar code :**

| ASCII Command             | Hexa Command               | Description                           |
|---------------------------|----------------------------|---------------------------------------|
| GS H <i>n</i>             | 1D 48 <i>n</i>             | Select printing position for HRI char |
| GS f <i>n</i>             | 1D 66 <i>n</i>             | Select font for HRI char              |
| GS h <i>n</i>             | 1D 68 <i>n</i>             | Select bar code height                |
| GS k <i>m dl...dk</i> NUL | 1D 6B <i>m dl...dk</i> NUL | Print bar code                        |
| GS w <i>n</i>             | 1D 77 <i>n</i>             | Set bar code width                    |

**Other commands :**

| ASCII Command | Hexa Command            | Description  |
|---------------|-------------------------|--|
| ESC @         | 1B 40                   | Initialise printer   |
| ESC [ }       | 1B 5B 7D                | Switch to boot mode  |
| DLE           | 10                      | Clear Printer buffer   |
| US STX        | 1F 02                   | Interface configuration  |
| US t          | 1F 74                   | <b>AUTOTEST</b>  |
| US f          | 1F 66                   | Power mode and Top of form   |
| US ETX ñ      | 1F 03 A4 <i>n</i>       | Adjust brightness (saved only in the RAM)  |
| US ETX Ñ      | 1F 03 A5 <i>n nh nl</i> | Multi heat configuration (saved only in the RAM)                                   |
| US ETX a      | 1F 03 A6 <i>n</i>       | Select Autoload (only THTE mechanism)  |
| US a          | 1F 61 <i>n</i>          | Clear/Increment ticket counter   |
| US b          | 1F 62                   | Return the contents of 16-bits Ticket Counter                                      |
| US {          | 1F 7B                   | Select busy on (only IEEE Interface)   |
| US ETX ï      | 1F 03 8B <i>n</i>       | Select printer mechanism type  |
| GS ` <i>n</i> | 1D 22 <i>n</i>          | Select memory type ( SRAM / FLASH )<br>where to save logos or user's defined fonts |
| EM <i>n</i>   | 19 <i>n</i>             | Adjust brightness (permanent)  |
| GS % <i>n</i> | 1D 25 <i>n</i>          | Multi heat configuration (permanent)   |
| ESC v         | 1B 76                   | Status returned  |

## 12. CONTROL CODE DESCRIPTION

### 11h

**Description** High speed raster print mode

**Format** <11h> <n1>, <n2> ... <n48> (where  $n_i$  represents 8 dots)

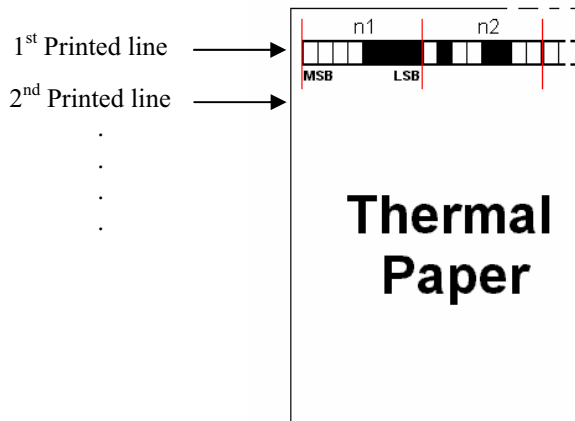
|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 1     | 0     | 1     | 1     | 0     | 0     | 1     | 1     |
| Black | White | Black | Black | White | White | Black | Black |

MSB

LSB

**Comments** This command specifies a single line of graphic data for 384 dots, the print zone for the printer. The data is sent as 48 bytes, or 384 bits, representing the dots to be “on” or “off”.

Example : 11 0F 4C .....



### 15 h n

**Description** Feed n dot lines

**Format** <15> <n>

**Comments** This command allows the user to feed n dot lines (  $n / 8\text{mm}$  ;  $n / 203$  inches ) before printing another line.

$00 \leq n \leq 7F$

### 16 h n

**Description** Set line spacing

**Format** <16> <n>

**Comments** This command allows the user to define line spacing as character height plus  $n/203$ ..

$00 \leq n \leq 0C$

## 19 h n

---

**Description** Adjust brightness

**Format** <19> <n>

**Comments** This command allows the user to adjust the brightness of the receipt from 50% to 200% of the nominal value.  
32H <n < C8H where n represent the % of the nominal value.

## BEL

---

**Description** Receipt setting

**Format** <07> <n1> <n2> <n3>

**Comments** This command allows the user to set its receipt only in the case of top of form tickets.

| Value | Description  |
|-------|--|
| n     | Length of the receipt (mm)<br>00 < n < FF                              |
| n1    | Distance (mm): last printed line / Cutting<br>00 < n1 < FF             |
| n2    | Distance (mm): Top of the receipt / first printed line<br>00 < n2 < FF |

## CR

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Print and carriage return                          |
| <b>Format</b>      | < 0D h>  |
| <b>Comments</b>    | This command print the buffer and carriage return. |

## DC2

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Double Wide Print   |
| <b>Format</b>      | < 12 h>   |
| <b>Comments</b>    | This command doubles the size of characters. The printer is reset to single-wide mode after a line has been printed or the Clear Printer (10) command is received. Double-wide characters may be used in the same line with single-wide characters. |

Ex :    41 41 41 41                      12 41 41 41 41  
         ⇒ AAAA                              ⇒ AAAA

## DC3

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Single Wide Print  |
| <b>Format</b>      | <13 h>   |
| <b>Comments</b>    | This command allows to return to single wide mode when the double wide mode has been selected. |

Ex :    12 41 41 41 41                      13 41 41 41 41  
         ⇒ AAAA                              ⇒ AAAA

## DC 4

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Feed N Print Lines  |
| <b>Format</b>      | <14 h> <n>  |
| <b>Comments</b>    | This command feeds n lines forward only before text.<br>00 < n < 7F |

Ex :    14 02 41 41 41 41                      41 41 14 02 41 41  
         ⇒    .    .                              ⇒ AAAA  
            .    .                              2 lines  
            AAAA

## DLE

---

**Description** Clear printer buffer

**Format** <10 h>

**Comments** This command clears the buffer of the printer.

- Double-Wide command (12) is cancelled
- Line Spacing, Pitch, and User-Defined Character Sets are maintained at current selections (RAM is not affected)
- Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
- Printer is restarted and error status is cleared in a fault condition
- Printing position is set to column one

## ESC ?

---

**Description** Cancel user-defined character

**Format** <1B h><3F h><n>

**Comments** This command cancels the user-defined characters defined for the character code n. After the user-defined characters are canceled; the internal character set is printed.

## ESC !

---

**Description** Set print mode

**Format** <1B h><21 h><n>

**Comments** n is a 8 bits word converted in hexadecimal. It can be set to vary the printing mode according to the table below. Default value is n=0 (i.e. Font A in standard mode)

| Bit | Function       | Bit =0    | Bit =1 |
|-----|----------------|-----------|--------|
| 0   | Character Font | A         | B      |
| 1   | (not used)     | -         | -      |
| 2   | (not used)     | -         | -      |
| 3   | Emphasised     | Cancelled | Set    |
| 4   | Double height  | Cancelled | Set    |
| 5   | Double width   | Cancelled | Set    |
| 6   | (not used)     | -         | -      |
| 7   | Underlined     | Cancelled | Set    |

## ESC \$

---

**Description** Set absolute position.

**Format** <1Bh> <24h> <n1> <n2>

**Comments** This command sets the printing starting position to the specified number of dots (1/8 mm units) from the beginning of the line so that the position is (n1 + n2 x 256) dots from the left hand side. If the position exceeds the printing area, the command is ignored.

| n2 | n1   |
|----|--|
| 00 | 00 - FF  |
| 01 | 00 - 80 for a printing area of 48mm ( 384 dots ) |

## ESC %

---

**Description** Set/cancel user-defined characters

**Format** <1B h> <25 h> <n>

**Comments** This command allows to choose between two fonts, the resident font and the user defined font. The user defined character set and a down-loaded bit image can not be defined at the same time.

| n (00-FF) | Function                 |
|-----------|--------------------------|
| Even      | Select resident fonts    |
| Odd       | Select user-defined font |

## ESC -

---

**Description** Underline mode on / off

**Format** <1B h> <2D h> <n>

**Comments** This command allows or not the underline mode and defines the thick of the line under the text.

| N  | Function                         |
|----|----------------------------------|
| 00 | Cancel underline print (default) |
| 01 | Begin underline 1 dot thick      |
| 02 | Begin underline 2 dots thick     |

Ex :    **1B 2D 00** 41 41 41        **1B 2D 01** 41 41 41        **1B 2D 02** 41 41 41

⇒ AAA

⇒ AAA

⇒ AAA

## ESC @

---

**Description** Initialisation of the printer

**Format** <1B h> <40 h>

**Comments** This command clears data in the buffer and initializes the printer settings.

Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set and User-defined characters or logo graphics are cleared.



## ESC \

---

**Description** Set relative position

**Format** <1B h> <5C h> <n1> <n2>

**Comments** This command sets the print starting position to the specified number of dots (1/8 mm units) from the current printing position, where position = current position + (n1 + n2 x 256). If the position exceeds the print area, the command is ignored.

| n2 | n1   |
|----|--|
| 00 | 00 - FF  |
| 01 | 00 - 80 for a printing area of 48mm ( 384 dots ) |

## ESC {

---

**Description** Upside-down character printing on / off

**Format** <1B h> <7B h> <n>

**Comments** This command rotates the printed characters by 180°. The command is valid only when it is used at the beginning of the line.

| n  | Function                            |
|----|-------------------------------------|
| 00 | Cancel rotated characters (default) |
| 01 | Begin rotated characters            |

Ex :    **1B 7B 00** 41 41 41                    **1B 7B 01** 41 41 41  
          ⇒    AAA    ⇒    VVV

## ESC &

**Description** Define user-defined characters.

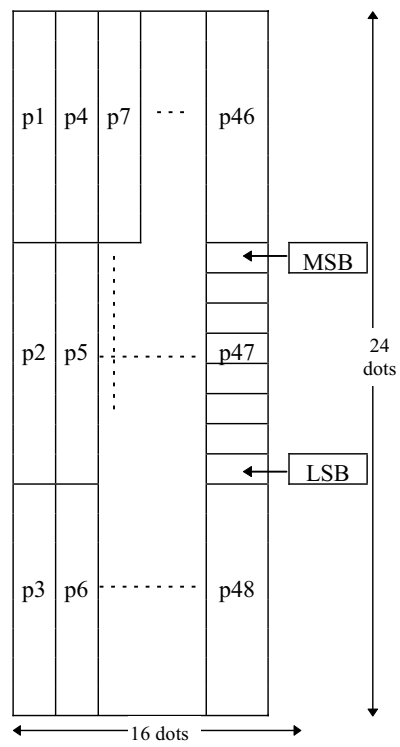
**Format** <1B h> <26 h> <s> <n> <m> [<a> <p1> <p2> ... <p(s x a)>] (m-n+1)

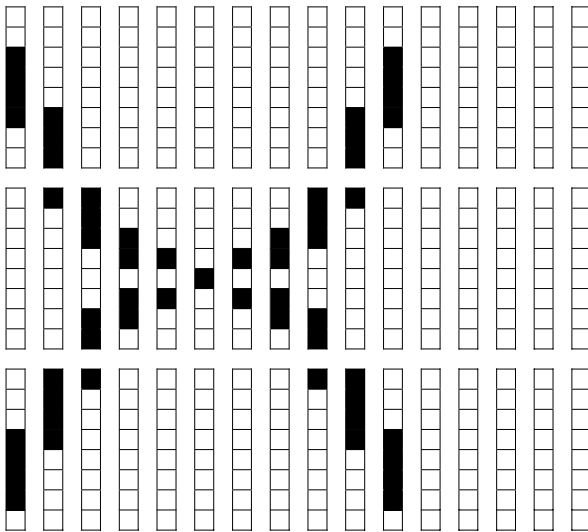
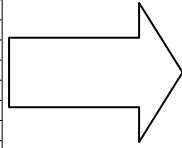
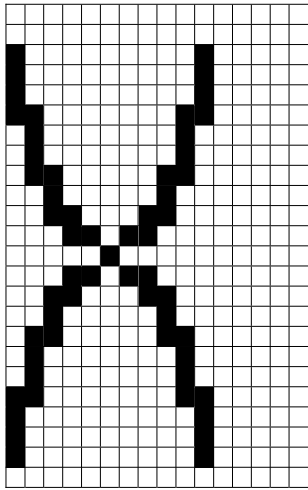
**Comments** " s " specifies the number of bytes in the vertical direction.  
 " n " specifies the beginning ASCII code for the definition and " m " the final code. If only one character is defined, use n = m.  
 The allowable character code range is from ASCII code <20 h> to <7E h> and the maximum number of characters is 95.  
 " a " specifies the number of dots in the horizontal direction.  
 " p " is the dot data for the characters. The dot pattern for a dot is in the horizontal direction from the left side ( the remaining dot pattern on the right side is space, the amount of data to be defined is s x a ).  
 After user defined characters are defined once, they are available until another definition is made, ESC @ is executed, GS \* is executed or the printer is turned off.

If  $a \leq A$  character horizontal size is A ( A : horizontal size of selected font ).  
 If  $a > A$  character horizontal size is a.

| Byte            | Description  |
|-----------------|--|
| s               | Height in octets ( s=03 h for 24 bits )                      |
| n               | $20 \text{ h} \leq n \leq m \leq 7\text{E}$                  |
| m               | Starting and final code                                      |
| a               | $0 \leq a \leq 10 \text{ h}$                                 |
| p1 ... p(s x a) | $00 \text{ h} \leq p1 \dots p_{s \times a} \leq \text{FF h}$ |

Font A is selected :



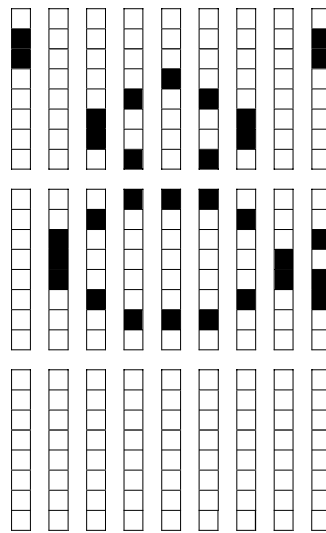
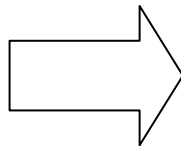
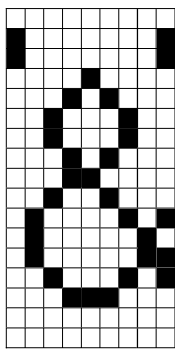
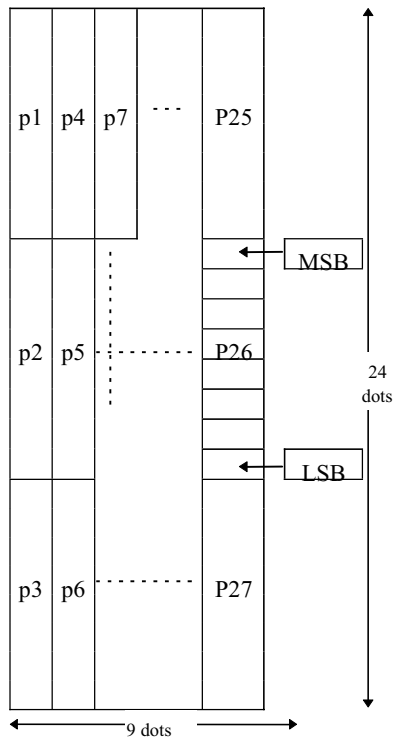


p1 = <3C>H  
 p2 = <00>H  
 p3 = <1E>H

p4 = <07>H  
 p5 = <80>H  
 p6 = <F0>H

p7 = <00>H.....  
 p8 = <E3>H....  
 p9 = <80>H....

Font B is selected :



p1 = <60>H      p4 = <00>H      p7 = <06>H...  
                   p2 = <00>H      p5 = <38>H      p8 = <44>H...  
 p3 = <00>H      p6 = <00>H      p9 = <00>H...

## ESC [ }

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Switch to Boot mode   |
| <b>Format</b>      | <1B h> <5B h> <7D   |
| <b>Comments</b>    | This command Puts the printer in flash download mode in preparation to receive commands controlling the downloading of objects into flash memory. When this command is received, the printer leaves normal operation and can no longer print transactions until the Reboot the Printer command (1D FF) is received or the printer is rebooted.<br>This command does not affect the current communication parameters. Once the printer is in flash download mode, this command is no longer available. |

## ESC 2

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Set to default line spacing                     |
| <b>Format</b>      | <1B h> <32 h>                                   |
| <b>Comments</b>    | This command sets the line spacing to 1/6 inch. |

## ESC 3

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Set line spacing n dots   |
| <b>Format</b>      | <1B h> <33 h> <n>   |
| <b>Comments</b>    | This command sets the line spacing to n/360 of an inch. Minimum line spacing is 7.5 lines per inch. The line equals the character height when n is too small. |

## ESC a

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Set left, centred or right justification                                     |
| <b>Format</b>      | <1B h> <61 h> <n>  |
| <b>Comments</b>    | This command should be at the start of a new line, and is otherwise ignored. |

| n  | Function             |
|----|----------------------|
| 00 | Align left (default) |
| 01 | Align centred        |
| 02 | Align right          |

Ex :

|               |               |               |
|---------------|---------------|---------------|
| ABC           | ABC           | ABC           |
| ABCD          | ABCD          | ABCD          |
| ABCDE         | ABCDE         | ABCDE         |
| <i>n = 00</i> | <i>n = 01</i> | <i>n = 02</i> |

## ESC d

---

**Description** Print and line feed n character lines

**Format** <1B h> <64 h> <n>

**Comments** This command prints the data contained in the buffer and performs n linefeeds so that printing will start at the beginning of the line below.

| n           | Function    |
|-------------|-------------|
| 00 ≤ n ≤ FF | n linefeeds |

## ESC D

---

**Description** Set Horizontal Tab

**Format** <1B h> <44 h> <n>

**Comments** <n> is the number of characters that the horizontal tab will jump.

## ESC DC2

---

**Description** Rotated Mode

**Format** <1B h> <12 h>

**Comments** This command rotates characters counter-clockwise. To cancel this mode, just send the clear printer buffer command : DLE ( 10H )

Ex : **1B 12** 41 41 41 41 41

⇒ A A A A A

## ESC E

---

**Description** Bold print mode on / off

**Format** <1B h> <45 h> <n>

**Comments** This command has the same effect as printing twice the character at the same printing position.

| n  | Function                    |
|----|-----------------------------|
| 00 | Cancel bold print (default) |
| 01 | Begin bold print            |

Ex :    **1B 45 00** 41 41 41                      **1B 45 01** 41 41 41  
          ⇒        AAA    ⇒        AAA

## ESC G

---

**Description** Double Strike mode on / off

**Format** <1B h> <47 h> <n>

**Comments** This command has the same effect as bold printing the character.

| n  | Function                    |
|----|-----------------------------|
| 00 | Cancel bold print (default) |
| 01 | Begin bold print            |

Ex :    **1B 47 00** 41 41 41                      **1B 47 01** 41 41 41  
          ⇒        AAA    ⇒        AAA

## ESC I

---

**Description** Italic print mode on / off

**Format** <1B h> <49 h> <n>

**Comments** When this command is set "on", the top third of each character is printed two dots to the right, the middle third is printed one dot to the right, and the bottom third is printed at the same position as standard characters.

| n | Function                      |
|---|-------------------------------|
| 0 | Cancel italic print (default) |
| 1 | Begin italic print            |

Ex :    **1B 49 00** 41 41 41                      **1B 49 01** 41 41 41  
          ⇒        AAA    ⇒        AAA

## ESC J

---

|                    |                            |
|--------------------|----------------------------|
| <b>Description</b> | Print and feed n dot lines |
| <b>Format</b>      | <1B h> <4A h> <n>          |
| <b>Comments</b>    | 1/8 mm Step.               |

## ESC SP

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Set spacing to right of characters.  |
| <b>Format</b>      | <1B h> <20 h> <n>  |
| <b>Comments</b>    | This command sets spacing to right of characters in dots. In double width mode, the amount of space is doubled also.<br>0 ≤ n ≤ 32 |

## ESC v

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Printer Status.   |
| <b>Format</b>      | <1B h> <76 h>   |
| <b>Comments</b>    | Sends status data to the host computer. The printer sends one byte to the host computer when it is not busy or in a fault condition. See the following table. |

### Values

#### Status Byte (RS-232)

| Bit | Function      | 0 Signifies   | 1 Signifies         |
|-----|---------------|---------------|---------------------|
| 0   | Receipt Paper | Present       | Out                 |
| 1   | Not used      | Fixed to Zero | Fixed to Zero       |
| 2   | Not used      | Fixed to Zero | Fixed to Zero       |
| 3   | Not used      | Fixed to Zero | Fixed to Zero       |
| 4   | Not Used      | Fixed to Zero | Fixed to Zero       |
| 5   | Receipt Cover | Closed        | Open                |
| 6   | Temperature   | Valid range   | Too cold or too hot |
| 7   | Voltage       | Valid range   | Too low or too high |

## ESC V

---

- Description** Set / cancel rotated print
- Format** <1B h> <56 h> <n>
- Comments** This command causes each character or bar code to be rotated 90° clockwise.

| n | Function             |
|---|----------------------|
| 0 | Cancel rotated print |
| 1 | Set rotated print    |

Ex :    **1B 56 00** 41 41 41                      **1B 56 01** 41 41 41  
          ⇒ AAA    ⇒ ≻ ≻ ≻

## FF

---

- Description** Form Feed
- Format** <0C h>
- Comments** This command is used to test feed a few steps.

## GS % n nh nl

---

- Description** Multi Heat Configuration
- Format** <1D> <25> <n> <nh> <nl>
- Comments** This command allows the user to set or not the multi heat process and to configure the peak current. This peak current is the maximum current the board will need to print correctly.

| Value     | Description  |                     |
|-----------|--------------|---------------------|
| <b>n</b>  | 00           | Multi heat mode OFF |
|           | 01           | Multi heat mode ON  |
| <b>nh</b> | 00 < nh < FF |                     |
| <b>nl</b> | 00 < nl < FF |                     |

The peak current value ( mA ) will be calculated as follows :

$$\mathbf{P\ Current = ( nh \times 256 ) + nl}$$

Example : 1D 25 01 0D AC => Peak current = 3.5 A.

## GS "

- Description**     Select memory type (SRAM/Flash) where to save logos or users-defined fonts.
- Format**            <1D h> <22 h> <n>
- Comments**        This command allows the user to select the memory type where to save logos and user-defined fonts.  
 Default :            Logos are saved in Flash  
                           User-defined fonts are saved in RAM

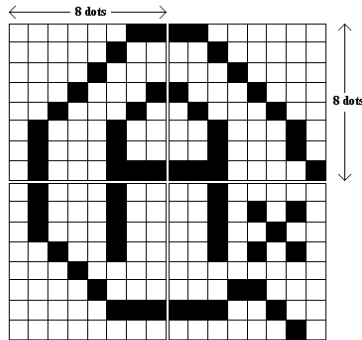
## GS \*

- Description**     Define download bit image
- Format**            <1D h> <2A h> <n1> <n2> <d> ... <d(n1 x n2)>
- Comments**        User-defined graphics are stored in volatile memory. Each graphic is stored in a “cell” which is individually addressable and may be up to 384 dots wide x 255 dots high in size (maximum 128 KB total). Each graphic cell may vary in size. The graphic cell remains available until another GS \* definition to the same cell is made, ESC @ is executed, or the printer is reset/turned off. If the command would result in exceeding available memory, it is ignored.

| Byte              | Description   |
|-------------------|---|
| n1                | Width ÷ 8 dots (1 to 48)  |
| n2                | Height ÷ 8 dots (1 to 255)  |
| d1 ... d(n1 x n2) | n1 x n2 bytes of character data. 1 bit per dot, top to bottom then left to right. |

Example :

Here is an example of a bit image ; n1 = 02, n2 = 02 and Data are given below :



**Data :** 00 00 07 E0 08 10 10 08 20 04 47 F2 89 02 91 02 91 02 89 02 47 F2 20 04 10 54 08 22 06 51 01 00

To print the download bit image use the GS / Command.

## GS /

---

- Description** Print download bit image
- Format** <1D h> <2F h><m>
- Comments** Prints the current graphics cell defined by the GS \* command.


| m | Function                      |
|---|-------------------------------|
| 0 | Print normal                  |
| 1 | Print double width            |
| 2 | Print double height           |
| 3 | Print double width and height |

## GS B

---

- Description** Set / cancel inverse printing
- Format** <1D h> <42 h>
- Comments** This command causes each character to be printed with reversed background and foreground (white characters on black background).

| n  | Function                  |
|----|---------------------------|
| 00 | Cancel inverse characters |
| 01 | Set inverse characters    |

Ex :    **1D 42 00** 41 41 41                      **1D 42 01** 41 41 41  
          ⇒    AAA    ⇒    

## GS f

---

- Description** Select HRI font
- Format** <1D h> <66 h> <n>
- Comments** This command allows the user to select font of the HRI characters.  
If n=00 Standard font  
If n=01 Compressed font.

## GS h

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Select barcode height   |
| <b>Format</b>      | <1D h> <68 h> <n>   |
| <b>Comments</b>    | This command allows the user to define the barcode height.<br>00 < n < FF |

## GS H

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Select HRI position  |
| <b>Format</b>      | <1D h> <48 h> <n>  |
| <b>Comments</b>    | This command allows the user to select the position for the barcode numbers. |

| <b>n</b> | <b>Description</b>                                 |
|----------|--|
| 00       | Numbers are not printed                            |
| 01       | Numbers are printed at the top of the barcode      |
| 02       | Numbers are printed at the bottom of the barcode   |
| 03       | Numbers are both printed at the top and the bottom |

## GS k

- Description** Print barcode
- Format** <1D h> <6B h> <k> <data> <0>
- Comments** This command allows the user to print barcode.

| <b>k</b> | <b>Code bar type</b> |
|----------|----------------------|
| 00       | Code UPC-A mode 1    |
| 01       | Code UPC-E mode 1    |
| 02       | Code EAN-13 mode 1   |
| 03       | Code EAN-8 mode 1    |
| 05       | Interleaved 2 of 5   |
| 41       | Code UPC-A mode 2    |
| 42       | Code UPC-E mode 2    |
| 43       | Code EAN-13 mode 2   |
| 44       | Code EAN-8 mode 2    |

Description of the Interleaved 2/5 bar code :

**Here is the table describing the bit representation of numbers 0 to 9.**

| Number   | Bit representation |          |          |          |          |
|----------|--------------------|----------|----------|----------|----------|
| <b>0</b> | <b>0</b>           | <b>0</b> | <b>1</b> | <b>1</b> | <b>0</b> |
| <b>1</b> | <b>1</b>           | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> |
| <b>2</b> | <b>0</b>           | <b>1</b> | <b>0</b> | <b>0</b> | <b>1</b> |
| <b>3</b> | <b>1</b>           | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> |
| <b>4</b> | <b>0</b>           | <b>0</b> | <b>1</b> | <b>0</b> | <b>1</b> |
| <b>5</b> | <b>1</b>           | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> |
| <b>6</b> | <b>0</b>           | <b>1</b> | <b>1</b> | <b>0</b> | <b>0</b> |
| <b>7</b> | <b>0</b>           | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> |
| <b>8</b> | <b>1</b>           | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |
| <b>9</b> | <b>0</b>           | <b>1</b> | <b>0</b> | <b>1</b> | <b>0</b> |

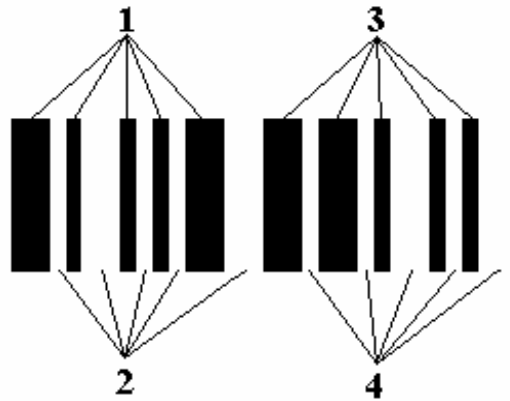
**bit representation :** "1" represent a large bar.  
"0" represent a small bar.

Here is the algorithm which is used to make a bar code from numbers :

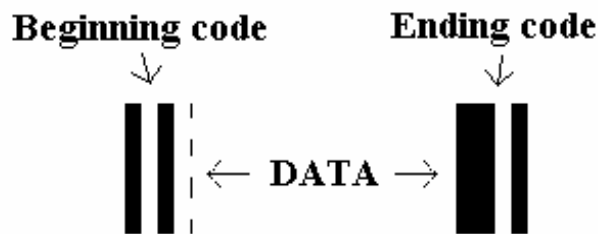
Example : 1234

- 1 - There must have an even number of digits else a zero is placed at the beginning.  
123 is traduced by 0123.
- 2 - The number is divided in two digit pairs described as follows :  
1234 -> 12 34
- 3 - Then, digits are encoded by pairs.  
1 3 (digits encoded by bars)  
2 4 (digits encoded by spaces)

figure :



The user number is between two codes : the beginning code and the ending code.



The result is :



## GS L

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Set left margin  |
| <b>Format</b>      | <1D h> <4C h> <nL> <nH>  |
| <b>Comments</b>    | This command allows the user to the left margin in standard mode.<br>The new margin is $nL + 256 * nH$ . |

## GS P

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Set horizontal / Vertical motion units   |
| <b>Format</b>      | <1D h> <50 h> <X> <Y>  |
| <b>Comments</b>    | This command allows the user to define the vertical and horizontal motion units to 1/X and 1/Y inch. |

## GS w

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Select barcode width  |
| <b>Format</b>      | <1D h> <77 h> <n>   |
| <b>Comments</b>    | This command allows the user to define the barcode width.<br>It sets the bar code module to $(n+1)/203$ inch ( $(n+1)/8$ mm).<br>The ratio between little and big bars is always 2. |
| <b>Default</b>     | $n=2$   |

## HT

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Horizontal tab.   |
| <b>Format</b>      | <09 h>  |
| <b>Comments</b>    | This command moves the printing position to the next horizontal tab position.<br>Default tabs are every 8 characters. |

Ex :   **09** 41 41 41 41 41 41 41 41 41

⇒    \_ \_ \_ \_ \_ \_ \_ \_ AAAAAAAAAA

## LF

---

- Description** Feed one line.
- Format** <0A h>
- Comments** This command prints and moves the printing position to the beginning of the next line.

Ex :    41 41 41 41 41 **0A** 41 41 41  
          ⇒ AAAAAA  
          AAA

## US 03 ñ

---

- Description** Adjust brightness (saved only in the RAM)
- Format** <1F> <03> <A4> <n>
- Comments** This command is volatile. The value is stored in the RAM memory and not saved after reset. It allows the user to adjust the brightness of the receipt from 50% to 200% of the nominal value. 32H < n < C8H where n represent the % of the nominal value.

## US 03 Ñ

---

- Description** Multi Heat Configuration (saved only in the RAM)
- Format** <1F> <03> <A5> <n> <nh> <nl>
- Comments** This command is volatile. The value is stored in the RAM memory and not saved after reset. It allows the user to set or not the multi heat process and to configure the peak current. This peak current is the maximum current the board will need to print correctly.

| Value     | Description  |                     |
|-----------|--------------|---------------------|
| <b>n</b>  | 00           | Multi heat mode OFF |
|           | 01           | Multi heat mode ON  |
| <b>nh</b> | 00 < nh < FF |                     |
| <b>nl</b> | 00 < nl < FF |                     |

The peak current value ( mA ) will be calculated as follows :

$$\mathbf{P\ Current = ( nh \times 256 ) + nl}$$

Example: 1F 03 A5 01 0D AC => Peak current = 3.5 A.

## US 03 a

---

**Description** Select Autoload (Only THTN mechanism)

**Format** <1F> <03> <A6><n>

**Comments** This command is select Autoload.

| Value | Description |              |
|-------|-------------|--------------|
| n     | 00          | Autoload OFF |
|       | 01          | Autoload ON  |

## US a

---

**Description** The ticket counter is a 16-bit counter in memory that gets incremented or cleared by sending a corresponding command to the printer.

**Format** <1F> <61> <n>

**Comments** This command may be used to monitor actual transaction completion, as it is synchronised with ticket end (print buffer is empty).  
This means that if this command is sent immediately after ticket end.

| Value | Description |                          |
|-------|-------------|--------------------------|
| n     | 00          | Clear Ticket Counter     |
|       | 01          | Increment Ticket Counter |

## US b

---

**Description** Returns the contents of 16-bit Ticket Counter.

**Format** <1F> <62>

**Comments** Returns 3 bytes: Command ID followed by the contents of Ticket Counter

Byte 1 = 62h

Byte 2 = Ticket Counter ( LSB )

Byte 3 = Ticket Counter ( MSB)

**Range :**

Decimal: 0 ≤ *Ticket Counter* ≤ 65535

Hex: 0000 ≤ *Ticket Counter* ≤ FFFF

## US {

---

**Description** Select Busy on (Only IEEE Interface)

**Format** <1F> <7B>

**Comments** This command put busy on and busy off when print buffer is empty.

## US t

---

|                    |  |
|--------------------|--|
| <b>Description</b> | Autotest   |
| <b>Format</b>      | <1F> <74>  |
| <b>Comments</b>    | This command allows the user to perform an AUTOTEST. |

## US f n

---

|                    |   |
|--------------------|---|
| <b>Description</b> | Power mode, Top of form and Heating mode configuration  |
| <b>Format</b>      | <1F> <66> <n>   |
| <b>Comments</b>    | This command allows the user to configure the Power mode, Top of form and Heating mode configuration. |

Only the first 3 bits of the byte (n) will be set. The last bits ( 3 to 7 ) are reserved for evolution.

The power down mode and Idle mode will turn your printer off if there is no action while 10 seconds.

- For power down mode, only hard reset or Centronics communication will wake up the microprocessor.
- For Idle mode, Hard reset, centronics communication, RS232 communication will wake up the microprocessor.

Top of form is used for specific application. For more details, please contact us.

| Bit | Function      | 0          | 1    |
|-----|---------------|------------|------|
| 0   | Power Control | OFF        | ON   |
| 1   | Mode          | Power Down | Idle |
| 2   | Top of form   | OFF        | ONN  |

## US STX

---

**Description**     Interface Configuration

**Format**            <1F> <02> <n1> <n2> <n3> <n4> <n5> <n6>

**Comments**        This command allows the user to configure the RS232 port.

| Number | Description   |
|--------|---|
| n1     | <b>Interface</b><br>00 : RS232<br>01 : CENTRONICS   |
| n2     | <b>Baudrate</b><br><b>Bit [0...3]</b><br>00 : 1200<br>01 : 2400<br>02 : 4800<br>03 : 9600<br>04 : 19200<br>05 : 38400<br>06 : 57600<br>07 : 115200<br><b>Stop bit</b><br><b>Bit [4]</b><br>0 : 1 stop bit<br>1 : 2 stop bits<br><b>Data bit</b><br><b>Bit [5]</b><br>0 : 8 data bits<br>1 : 7 data bits |
| n3     | <b>Parity</b><br>00 : Odd<br>01 : Even  |
| n4     | <b>Parity mode</b><br>00 : Disable<br>01 : Enable   |
| n5     | Flow control<br>00 : Xon / Xoff<br>01 : DTR / DSR   |
| n6     | Parity error management<br>00 : Ignore<br>01 : Print ?  |

**Important :**     This control code is only available in download mode.  
To enter this mode, use the control code **1B 5B 7D** before sending reconfiguration code.  
At the end, use the Hard reset Control code **1D FF** to store your configuration.

**Example :**        1B 5B 7D 1F 02 00 03 00 00 01 00 1D FF  
this syntax configure the controller board to  
Interface RS232, Baudrate 9600, 1 stop bit, 8 data bits, odd parity, no parity, DTR/DSR, Ignore.

### 13. CONNECTORS REFERENCE

| Name | Description      | Supplier        | Type   | Reference |
|------|------------------|-----------------|--------|-----------|
| J1   | HE10 20 dots     | 3M Electronique | Male   | 2520-6002 |
|      |                  |                 | Female | 3421-6000 |
| J5   | 8 dots connector | JST             | Male   | B8B-EH-A  |
|      |                  |                 | Female | EHR-8     |
| J6   | 3 dots connector | JST             | Male   | B3P-VH    |
|      |                  |                 | Female | VHR-3N    |

## 14. INDEX

### 1

|             |    |
|-------------|----|
| 11h.....    | 14 |
| 15 h n..... | 14 |
| 16 h n..... | 14 |
| 19 h n..... | 15 |

### B

|          |    |
|----------|----|
| BEL..... | 15 |
|----------|----|

### C

|         |    |
|---------|----|
| CR..... | 16 |
|---------|----|

### D

|           |    |
|-----------|----|
| DC 4..... | 16 |
| DC2.....  | 16 |
| DC3.....  | 16 |
| DLE.....  | 17 |

### E

|              |    |
|--------------|----|
| ESC -.....   | 18 |
| ESC !.....   | 17 |
| ESC ".....   | 20 |
| ESC \$.....  | 18 |
| ESC %.....   | 18 |
| ESC &.....   | 21 |
| ESC ?.....   | 17 |
| ESC @.....   | 18 |
| ESC [ }..... | 25 |
| ESC {.....   | 20 |
| ESC 2.....   | 25 |
| ESC 3.....   | 25 |
| ESC a.....   | 25 |
| ESC d.....   | 26 |
| ESC D.....   | 26 |
| ESC DC2..... | 26 |
| ESC E.....   | 27 |
| ESC G.....   | 27 |
| ESC I.....   | 27 |

|             |    |
|-------------|----|
| ESC J.....  | 28 |
| ESC SP..... | 28 |
| ESC v.....  | 28 |
| ESC V.....  | 29 |

### F

|         |    |
|---------|----|
| FF..... | 29 |
|---------|----|

### G

|           |    |
|-----------|----|
| GS %..... | 29 |
| GS *..... | 30 |
| GS /..... | 31 |
| GS "..... | 30 |
| GS B..... | 31 |
| GS f..... | 31 |
| GS h..... | 32 |
| GS H..... | 32 |
| GS k..... | 33 |
| GS L..... | 35 |
| GS P..... | 35 |
| GS w..... | 35 |

### H

|         |    |
|---------|----|
| HT..... | 35 |
|---------|----|

### L

|         |    |
|---------|----|
| LF..... | 36 |
|---------|----|

### U

|              |    |
|--------------|----|
| US {.....    | 37 |
| US 03 a..... | 37 |
| US 03 ñ..... | 36 |
| US 03 Ñ..... | 36 |
| US a.....    | 37 |
| US b.....    | 37 |
| US f.....    | 38 |
| US STX.....  | 39 |
| US t.....    | 38 |