

# **Zebra® CPM 2030**

Ticket Printer

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## **Technical Manual**



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## INTRODUCTION

The CPM is a ticket printer with versatile ticket handling. It prints text, graphics and bar codes. Finally, it cuts the ticket. The printer can be ordered for 50, 54, 60 or 63 mm wide tickets. The ticket length is variable between 25 mm and 156 mm. Separate sensors facilitate the use of the standard ticket lengths 86 and 110 mm. Fanfold or roll ticket stock can be handled.

### 1.1 Versions and configurations

The CPM comes in two basic versions (see Figure 1):

1. CPM 2030 OEM mechanism with control board for kiosk applications.
2. CPM 2030 Desktop printer with built-in power supply, and control board.

Both versions can be modified according to customer requests.

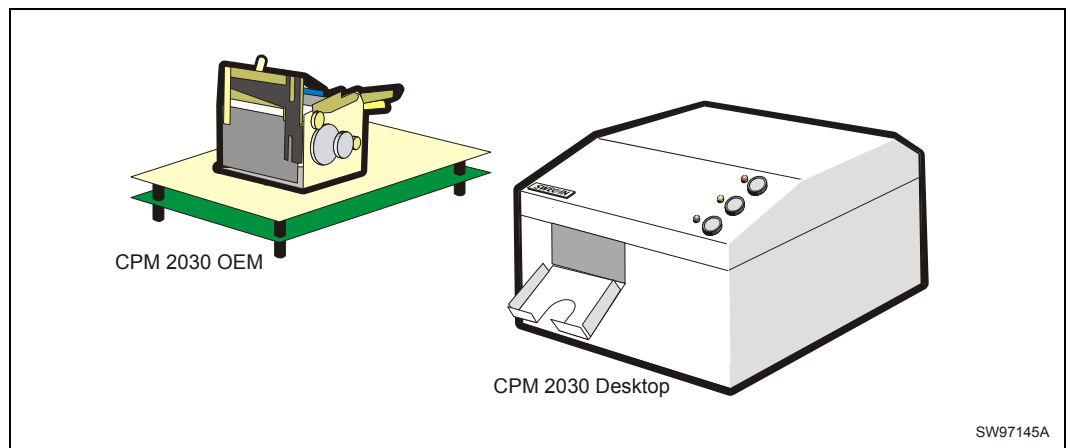


Figure 1. Front view of the different CPM-versions.

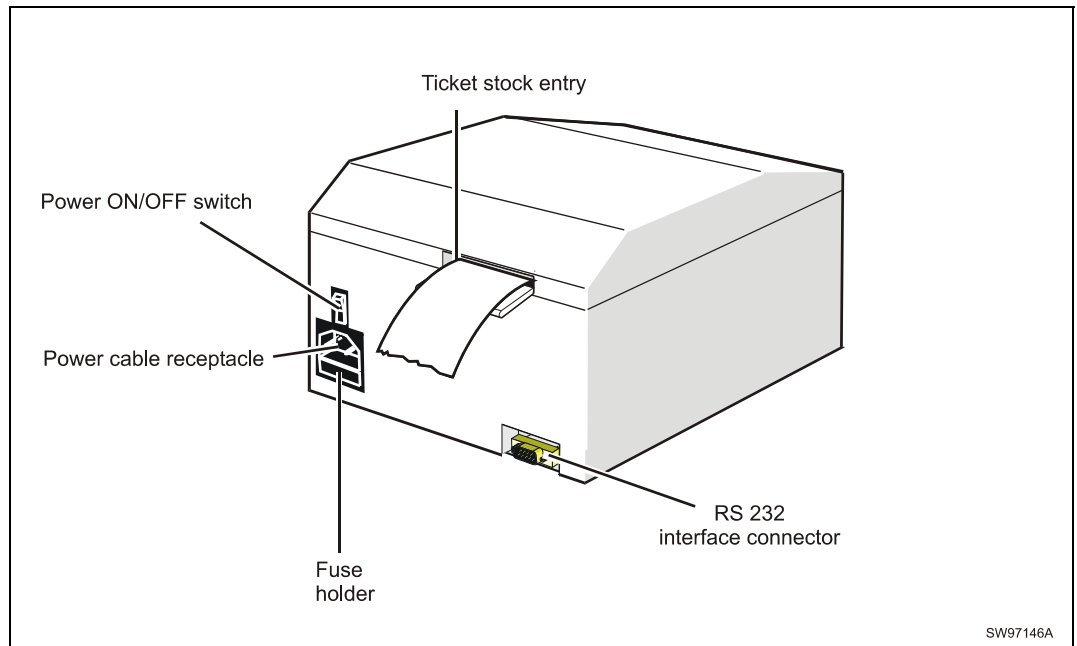


Figure 2. Rear view, CPM 2030 Desktop

## 1.2 Printer design

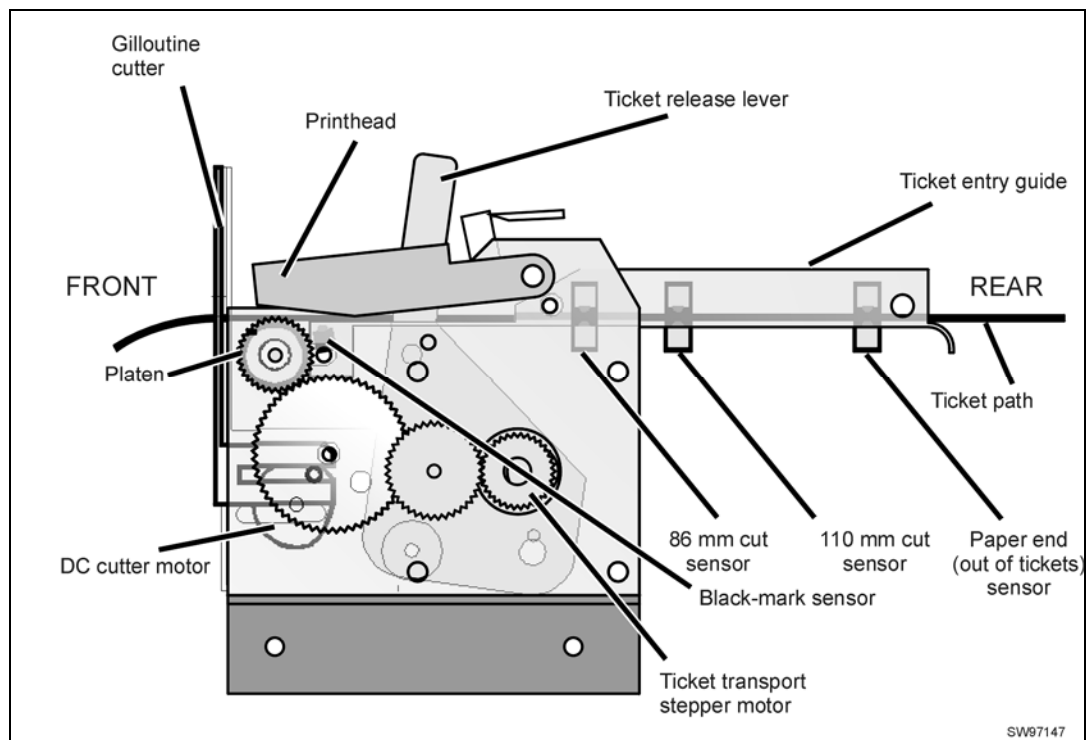


Figure 3. Printer interior.

The CPM prints with direct thermal printing, requiring no consumables other than the paper itself. It uses a highly advanced long life print head with built in history control<sup>1</sup>.

<sup>1</sup> History control means that the activity of each heating dot is logged. Based on this log, the heating time of consecutive dots are adjusted to compensate for heat accumulated in the heating dot.

To avoid paper jam, the CPM has a straight paper path where tickets pass virtually without bending. The straight paper path also enables the use of ticket thickness of up to 0.4 mm. A total of four optical sensors supervise the paper transport through the printer.

### 1.3 Installation considerations

The CPM 2030 OEM printer mechanism is designed to be installed in some kind of enclosure such as a self service kiosk.

Preventing ESD and ground currents from affecting the printer operation requires proper connection of the printer chassis to protective ground through a mounting platform or through a separate ground conductor.

Trouble free printer operation also requires that the printer's optical sensors are shielded from ambient light.

The printer additional space for paper stock. Consider mounting the printer on a movable platform so that the printer can be maintained outside the printer enclosure.

#### 1.3.1 Connections

The printer mechanism is connected to the control board through eight connectors according to Figure 4.

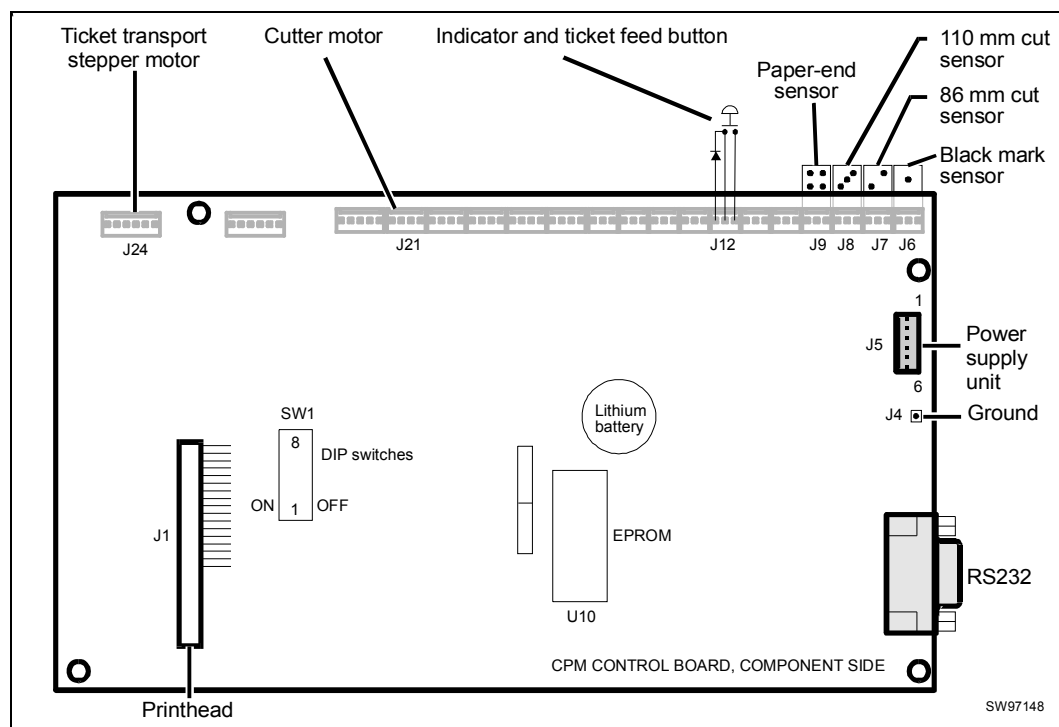


Figure 4. Control board connections

### 1.3.2 Power supply

The printer mechanism requires +5 Vdc 0.3 A, and +24 Vdc 2 A continuous, 10 A peak.

With a Swecoin power supply unit (see ordering information on page 41, and dimensional drawing on page 34), just connect the cable from the power supply to control board connector J5.

If you use another type of power supply unit, connect the voltages according to the following table. At the CPM end of the cable, use a Molex 22-01-2065 crimp terminal housing, and six Molex 08-50-0032 crimp terminals.

| Pin | Voltage           |
|-----|-------------------|
| 1   | +5 V              |
| 2   | Ground (for 5 V)  |
| 3   | +24 V             |
| 4   | +24 V             |
| 5   | Ground (for 24 V) |
| 6   | Ground (for 24 V) |

**NOTE!** – Both the 5 V and 24 V ground, as well as the chassis of the printer, must be connected to ground potential (safety ground).

### 1.3.3 Communications cable

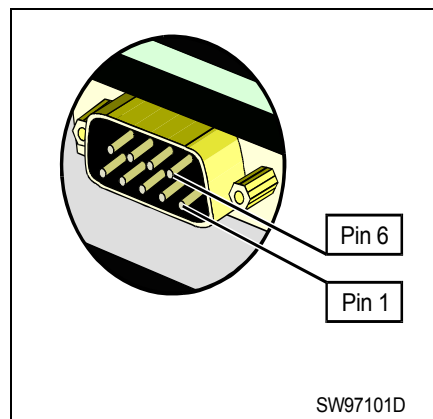


Figure 5. RS232 serial interface connector pin assignment

| Pin | Function                  |
|-----|---------------------------|
| 2   | RXD (Receive data)        |
| 3   | TXD (Transmit data)       |
| 4   | DTR (Data terminal ready) |
| 5   | Ground                    |
| 7   | RTS (Request to send)     |
| 8   | CTS (Clear to send)       |

A serial communications cable is available from Swecoin. See ordering information on page 41. The cable is 1.5 m long with 9-pole D-sub connectors at both ends.

9-pole to 25-pole D-sub adapters are commercially available.



## 2.1 Operator controls

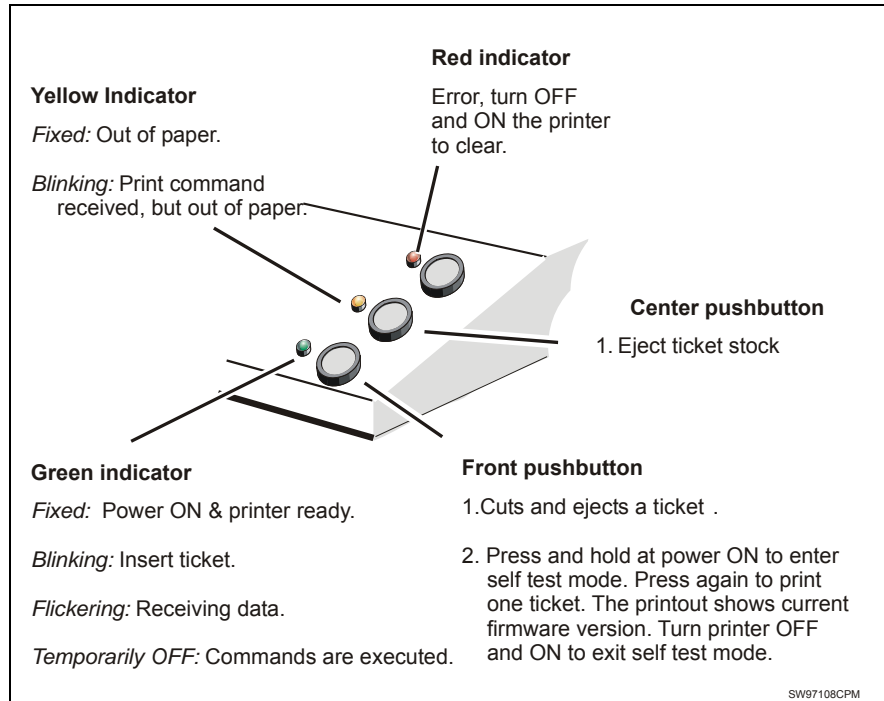


Figure 6. Indicators and pushbuttons

## 2.2 General reset

A general reset of the CPM, restoring all parameters to their default value, is effectuated if when a self test is done, that is when the front button is kept depressed at power ON. After the self-test, the power has to be turned OFF and ON once more. The CPM is then reset.

<sup>1</sup> **Do not** hold the front button depressed! Doing so will result in erroneously cut tickets often resulting in paper jam.

## 2.3 Paper loading

The yellow indicator indicates paper out.

Press the center button to eject remaining tickets if you want to replace paper stock before paper is out.

### 2.3.1 Paper stock positioning

The ticket stock should be oriented with the thermal coating upwards. The pile of fanfold tickets should be placed at a distance of at least one ticket length behind the printer.

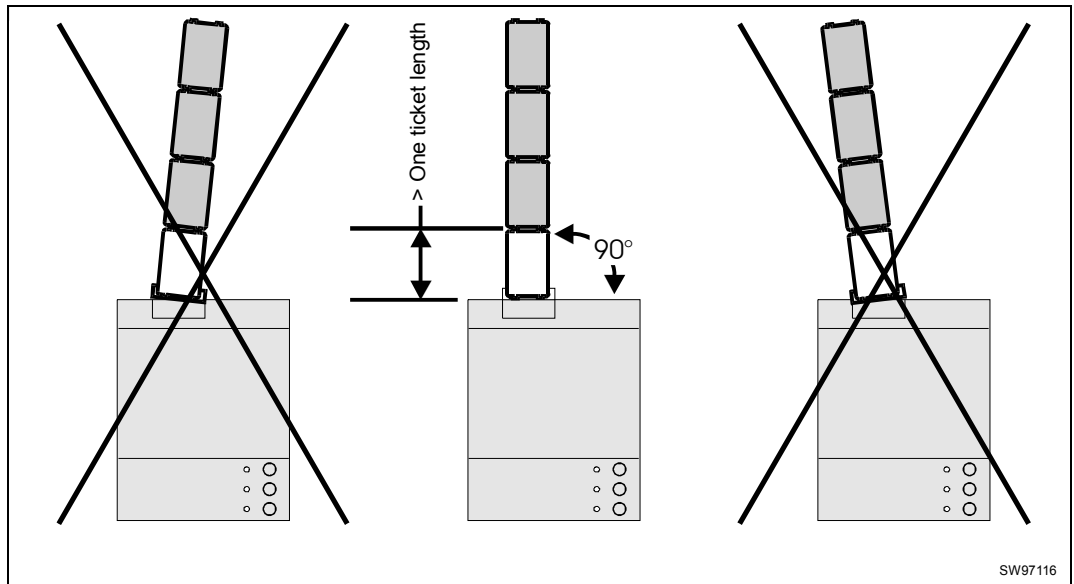


Figure 7. Positioning the ticket stock

### 2.3.2 Loading through rear document entries

Insert the ticket stock into the document entry until it stops. Press the front button and the printer will cut and eject one ticket.

### 3

## PERFORMANCE

Typical throughput      43 tickets/minute (1.4 s/ticket) when printing already downloaded information on 86 mm tickets, and cutting the tickets.

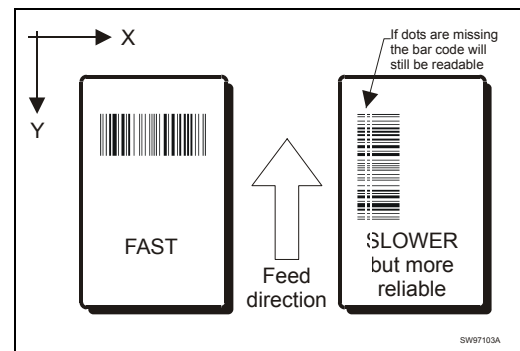
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**NOTE!** – Data transfer time is not included in the above throughput. At 9600 bps, typically add 0.3 s fixed time + 1 s / Kbytes of transferred data.

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Cut time      0.2 s

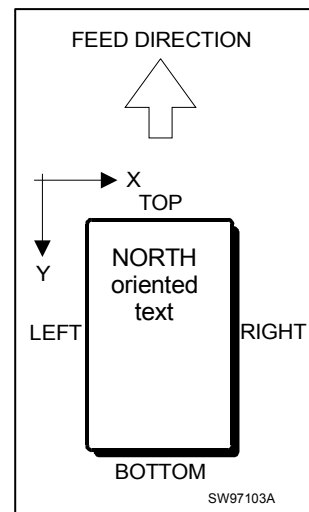
Bar codes      For east and west oriented bar codes, print speed is reduced to approx. 50 mm/s. Firmware up to version 905-200 slows down all printing of tickets with bar codes to 50 mm/s.



## PRINT DATA

### 4.1 General

|                 |   |
|-----------------|---|
| Printing method | Direct, parallel, thermal print   |
| Ticket width    | 50, 54, 60 or 63 mm   |
| Print width     | 384 pixels = 51.06 mm, centered on ticket width   |
| Print margins   | Top: 12 mm (can be reduced by reversing the motor, see command !H)<br>Bottom: 0 mm              |
| Ticket length   | Fixed 86, or 110 mm. Software selectable 25–156 mm, or controlled by black-mark or punched hole |



### 4.2 Graphics printing

|                           |  |
|---------------------------|--|
| Pixels / line             | 384  |
| Resolution, X-axis        | 7.52 pixels/mm (191 dpi)   |
| Resolution, Y-axis        | 5.7 pixels/mm (145 dpi), or 7.52 pixels/mm, software selectable. |
| Max graphics size         | Full width (51 mm) and full length (183 mm)                      |
| No. of graphical elements | Limited only by the size of the ticket memory.                   |

Figure 8. Margins are defined with the ticket in portrait orientation.

### 4.3 Bar code printing

|                    |   |
|--------------------|---|
| Bar code standards | <p>EAN-13 (UPC-A): 13 digits printed as bar code. Check digit (digit 13) must be calculated in host computer and sent to the printer. Automatic wide/narrow bar ratio setting.</p> <p>Code 39: Variable No. of characters in upper case alphanumeric coding. Leading and trailing asterisk added automatically. Independently selectable bar width (narrow or wide).</p> <p>Interleaved 2-of-5. Digits, even no of digits must be encoded.</p> <p>Code 128 and EAN 128.</p> |
| Basic height       | 16 pixels (2.8 mm for north and south orientated bar codes, 2.1 mm for east and west orientated bar codes)  |
| Scaling            | From 1 to 16 x basic height   |
| Orientation        | North, South, East and West oriented bar codes (see also "Performance" on page 11).   |
| No. of bar codes   | Up to 15 bar codes/ticket   |

## 4.4 Text printing

|                       |   |
|-----------------------|---|
| Fonts                 | Three mono spaced and one proportionally spaced font. Custom designed fonts can be ordered.   |
| Character size, W x H | Font 1 and 3 = 8 x 16 pixels. Font 2 = 16 x 30 pixels.<br>Font 4, width = 4 to 8 pixels depending on character, height = 16 pixels.   |
| Scaling               | Font 1 and 4: From 1 to 16 x nominal size. Scaling in X and Y direction are independent of each other.<br><br>Fonts 2 and 3: Width from 1 to 3 x nominal size, height from 1 to 16 x nominal size |
| Text orientation      | Fonts 1 and 4 can be printed in any of the four orientations North, South, East and West. Fonts 2 and 3 can only be printed in North orientation.   |
| Text field contents   | Fixed, or variable text   |
| No. of text fields    | Up to 16 text fields and 16 variable fields / ticket  |

## Basic character set

The table below shows the basic characters stored in PROM on the printer control board. The set contains characters from decimal position 32 (space) through 255.

|                   |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |                    |
|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Dec<br>Hex<br>Key | 0<br>0<br>NUL      | 1<br>1<br>□        | 2<br>2<br>□        | 3<br>3<br>ETX      | 4<br>4<br>□        | 5<br>5<br>ENQ      | 6<br>6<br>ACK      | 7<br>7<br>□        | 8<br>8<br>□        | 9<br>9<br>□        | 10<br>a<br>LF      | 11<br>b<br>□       | 12<br>c<br>□       | 13<br>d<br>CR      | 14<br>e<br>□       | 15<br>f<br>NAK     |
| Dec<br>Hex<br>Key | 16<br>10<br>□      | 17<br>11<br>□      | 18<br>12<br>□      | 19<br>13<br>□      | 20<br>14<br>□      | 21<br>15<br>□      | 22<br>16<br>□      | 23<br>17<br>□      | 24<br>18<br>□      | 25<br>19<br>□      | 26<br>1a<br>□      | 27<br>1b<br>□      | 28<br>1c<br>□      | 29<br>1d<br>□      | 30<br>1e<br>□      | 31<br>1f<br>□      |
| Dec<br>Hex<br>Key | 32<br>20<br>SPACE  | 33<br>21<br>!      | 34<br>22<br>"      | 35<br>23<br>#      | 36<br>24<br>\$     | 37<br>25<br>%      | 38<br>26<br>&      | 39<br>27<br>'      | 40<br>28<br>(      | 41<br>29<br>)      | 42<br>2a<br>*      | 43<br>2b<br>+      | 44<br>2c<br>,      | 45<br>2d<br>-      | 46<br>2e<br>.      | 47<br>2f<br>/      |
| Dec<br>Hex<br>Key | 48<br>30<br>0      | 49<br>31<br>1      | 50<br>32<br>2      | 51<br>33<br>3      | 52<br>34<br>4      | 53<br>35<br>5      | 54<br>36<br>6      | 55<br>37<br>7      | 56<br>38<br>8      | 57<br>39<br>9      | 58<br>3a<br>:      | 59<br>3b<br>;      | 60<br>3c<br><      | 61<br>3d<br>=      | 62<br>3e<br>>      | 63<br>3f<br>?      |
| Dec<br>Hex<br>Key | 64<br>40<br>@      | 65<br>41<br>A      | 66<br>42<br>B      | 67<br>43<br>C      | 68<br>44<br>D      | 69<br>45<br>E      | 70<br>46<br>F      | 71<br>47<br>G      | 72<br>48<br>H      | 73<br>49<br>I      | 74<br>4a<br>J      | 75<br>4b<br>K      | 76<br>4c<br>L      | 77<br>4d<br>M      | 78<br>4e<br>N      | 79<br>4f<br>O      |
| Dec<br>Hex<br>Key | 80<br>50<br>P      | 81<br>51<br>Q      | 82<br>52<br>R      | 83<br>53<br>S      | 84<br>54<br>T      | 85<br>55<br>U      | 86<br>56<br>V      | 87<br>57<br>W      | 88<br>58<br>X      | 89<br>59<br>Y      | 90<br>5a<br>Z      | 91<br>5b<br>[      | 92<br>5c<br>\<br>] | 93<br>5d<br>^      | 94<br>5e<br>_      | 95<br>5f<br>-      |
| Dec<br>Hex<br>Key | 96<br>60<br>,      | 97<br>61<br>a      | 98<br>62<br>b      | 99<br>63<br>c      | 100<br>64<br>d     | 101<br>65<br>e     | 102<br>66<br>f     | 103<br>67<br>g     | 104<br>68<br>h     | 105<br>69<br>i     | 106<br>6a<br>j     | 107<br>6b<br>k     | 108<br>6c<br>l     | 109<br>6d<br>m     | 110<br>6e<br>n     | 111<br>6f<br>o     |
| Dec<br>Hex<br>Key | 112<br>70<br>p     | 113<br>71<br>q     | 114<br>72<br>r     | 115<br>73<br>s     | 116<br>74<br>t     | 117<br>75<br>u     | 118<br>76<br>v     | 119<br>77<br>w     | 120<br>78<br>x     | 121<br>79<br>y     | 122<br>7a<br>z     | 123<br>7b<br>{     | 124<br>7c<br>      | 125<br>7d<br>}     | 126<br>7e<br>~     | 127<br>7f<br>A0127 |
| Dec<br>Hex<br>Key | 128<br>80<br>A0128 | 129<br>81<br>A0129 | 130<br>82<br>A0130 | 131<br>83<br>A0131 | 132<br>84<br>A0132 | 133<br>85<br>A0133 | 134<br>86<br>A0134 | 135<br>87<br>A0135 | 136<br>88<br>A0136 | 137<br>89<br>A0137 | 138<br>8a<br>A0138 | 139<br>8b<br>A0139 | 140<br>8c<br>A0140 | 141<br>8d<br>A0141 | 142<br>8e<br>A0142 | 143<br>8f<br>A0143 |
| Dec<br>Hex<br>Key | 144<br>90<br>A0144 | 145<br>91<br>A0145 | 146<br>92<br>A0146 | 147<br>93<br>A0147 | 148<br>94<br>A0148 | 149<br>95<br>A0149 | 150<br>96<br>A0150 | 151<br>97<br>A0151 | 152<br>98<br>A0152 | 153<br>99<br>A0153 | 154<br>9a<br>A0154 | 155<br>9b<br>A0155 | 156<br>9c<br>A0156 | 157<br>9d<br>A0157 | 158<br>9e<br>A0158 | 159<br>9f<br>A0159 |
| Dec<br>Hex<br>Key | 160<br>a0<br>A0160 | 161<br>a1<br>A0161 | 162<br>a2<br>A0162 | 163<br>a3<br>A0163 | 164<br>a4<br>A0164 | 165<br>a5<br>A0165 | 166<br>a6<br>A0166 | 167<br>a7<br>A0167 | 168<br>a8<br>A0168 | 169<br>a9<br>A0169 | 170<br>aa<br>A0170 | 171<br>ab<br>A0171 | 172<br>ac<br>A0172 | 173<br>ad<br>A0173 | 174<br>ae<br>A0174 | 175<br>af<br>A0175 |
| Dec<br>Hex<br>Key | 176<br>b0<br>A0176 | 177<br>b1<br>A0177 | 178<br>b2<br>A0178 | 179<br>b3<br>A0179 | 180<br>b4<br>A0180 | 181<br>b5<br>A0181 | 182<br>b6<br>A0182 | 183<br>b7<br>A0183 | 184<br>b8<br>A0184 | 185<br>b9<br>A0185 | 186<br>ba<br>A0186 | 187<br>bb<br>A0187 | 188<br>bc<br>A0188 | 189<br>bd<br>A0189 | 190<br>be<br>A0190 | 191<br>bf<br>A0191 |
| Dec<br>Hex<br>Key | 192<br>c0<br>A0192 | 193<br>c1<br>A0193 | 194<br>c2<br>A0194 | 195<br>c3<br>A0195 | 196<br>c4<br>A0196 | 197<br>c5<br>A0197 | 198<br>c6<br>A0198 | 199<br>c7<br>A0199 | 200<br>c8<br>A0200 | 201<br>c9<br>A0201 | 202<br>ca<br>A0202 | 203<br>cb<br>A0203 | 204<br>cc<br>A0204 | 205<br>cd<br>A0205 | 206<br>ce<br>A0206 | 207<br>cf<br>A0207 |
| Dec<br>Hex<br>Key | 208<br>d0<br>A0208 | 209<br>d1<br>A0209 | 210<br>d2<br>A0210 | 211<br>d3<br>A0211 | 212<br>d4<br>A0212 | 213<br>d5<br>A0213 | 214<br>d6<br>A0214 | 215<br>d7<br>A0215 | 216<br>d8<br>A0216 | 217<br>d9<br>A0217 | 218<br>da<br>A0218 | 219<br>db<br>A0219 | 220<br>dc<br>A0220 | 221<br>dd<br>A0221 | 222<br>de<br>A0222 | 223<br>df<br>A0223 |
| Dec<br>Hex<br>Key | 224<br>e0<br>A0224 | 225<br>e1<br>A0225 | 226<br>e2<br>A0226 | 227<br>e3<br>A0227 | 228<br>e4<br>A0228 | 229<br>e5<br>A0229 | 230<br>e6<br>A0230 | 231<br>e7<br>A0231 | 232<br>e8<br>A0232 | 233<br>e9<br>A0233 | 234<br>ea<br>A0234 | 235<br>eb<br>A0235 | 236<br>ec<br>A0236 | 237<br>ed<br>A0237 | 238<br>ee<br>A0238 | 239<br>ef<br>A0239 |
| Dec<br>Hex<br>Key | 240<br>f0<br>A0240 | 241<br>f1<br>A0241 | 242<br>f2<br>A0242 | 243<br>f3<br>A0243 | 244<br>f4<br>A0244 | 245<br>f5<br>A0245 | 246<br>f6<br>A0246 | 247<br>f7<br>A0247 | 248<br>f8<br>A0248 | 249<br>f9<br>A0249 | 250<br>fa<br>A0250 | 251<br>fb<br>A0251 | 252<br>fc<br>A0252 | 253<br>fd<br>A0253 | 254<br>fe<br>A0254 | 255<br>ff<br>A0255 |

Table 1 Character set used from firmware versions 220

**NOTE!** – Decimal 34 / HEX 23 (") cannot be used in messages as it is used as string identifier in the programming language of the printer.

**5.1 Gapped tickets**

For specification of gapped tickets, see page 40.

|                        |   |
|------------------------|---|
| Cutter                 | Guillotine-type, DC-motor operated, with cam shaft, micro-switch controlled |
| Cutter position        | Between print head and ticket exit  |
| Cutter life expectancy | 1 000 000 cuts or more  |

**5.2 Non-gapped tickets**

For specification of non-gapped ticket, see page 40.

|                           |  |
|---------------------------|--|
| Burst separator           | Strikes the ticket stock across the tabs so that the tickets burst apart. DC-motor operated, with cam shaft, micro-switch controlled |
| Separator position        | Between print head and ticket exit   |
| Separator life expectancy | 1 000 000 separations or more  |

## 6

## CONTROL BOARD

|                    |   |
|--------------------|---|
| Controller         | 8-bit microcontroller type 80C320                   |
| Firmware memory    | 512 Kbytes EPROM                                    |
| Page memory        | 128 Kbytes nonvolatile (battery backed up) RAM      |
| Backup battery     | CR2025 (3V Lithium). Expected life is 7 years.      |
| Interface          | Serial: RS232C (V.24)                               |
| Data format        | 8 data bits, 1 stop bit, no parity                  |
| Transmission speed | 1200, 9600, 19200, or 115200 bps, switch selectable |
| Handshaking        | Hardware (RTS/CTS) or software (XON/XOFF)           |
| Connection         |   |

| CPM (9 pole D-sub) |   | PC (25 pole D-sub) |  | PC (9 pole D-sub) |   |            |
|--------------------|---|--------------------|--|-------------------|---|------------|
| RXD                | 2 | 2                  |  | TXD               | 3 |            |
| TXD                | 3 | 3                  |  | RXD               | 2 |            |
| DTR                | 4 | 6                  |  | DSR               | 6 |            |
| GND                | 5 | 7                  |  | GND               | 5 |            |
| DSR                | 6 | 20                 |  | DTR               | 4 | (not used) |
| RTS                | 7 | 5                  |  | CTS               | 8 |            |
| CTS                | 8 | 4                  |  | RTS               | 7 | (not used) |

**NOTE!** – The leads marked "Not used" make it possible to turn the cable either way around.

Set up DIP-switches are used to set up the CPM printer (default settings in parenthesis):

| Switch | 1   | 2 | Bits/s | ON  | 1200 | OFF | (9600) | ON | 19200 | OFF | 115200 <sup>1</sup> |
|--------|---|---|--------|-----|------|-----|--------|----|-------|-----|---------------------|
|        |   |   |        | OFF |      | OFF |        | ON |       | ON  |                     |
| 3      | Not used  |   |        |     |      |     |        |    |       |     |                     |
| 4      | Auto clear ON = Clear all fixed and variable data during printing (OFF) |   |        |     |      |     |        |    |       |     |                     |
| 5      | Handshaking ON = XON/XOFF, OFF = RTS/CTS (OFF)                          |   |        |     |      |     |        |    |       |     |                     |
| 6      | ACK/NAK + error code ON = enabled, OFF = Silent (ON)                    |   |        |     |      |     |        |    |       |     |                     |
| 7      | Mode OFF Default ON Res. OFF Res. ON Test                               |   |        |     |      |     |        |    |       |     |                     |
| 8      |   |   |        |     |      |     |        |    |       |     |                     |

Default = Default setting  
Res. and Test = Reserved setting, not to be used!

See also Figure 4 on page 7.

<sup>1</sup> 115200 bps from firmware version 2.35, 57600 bps in firmware 2.20.



## COMMAND SET

The command set is designed in accordance with industry standards and is enhanced with functions unique to this product. The command language uses only printable ASCII characters for easy adaptation to any host system.

### 7.1 Syntax

A command string always starts with an exclamation mark (ASCII 33 or HEX 21) serving as a command identifier.

The characters immediately following the ! (21H) is the actual command to the printer. The command consists of 1–3 characters, followed, when applicable, by sub command, formatting commands, and data separated by space characters as shown in Figure 9.

Carriage Return and Line Feed end each command.

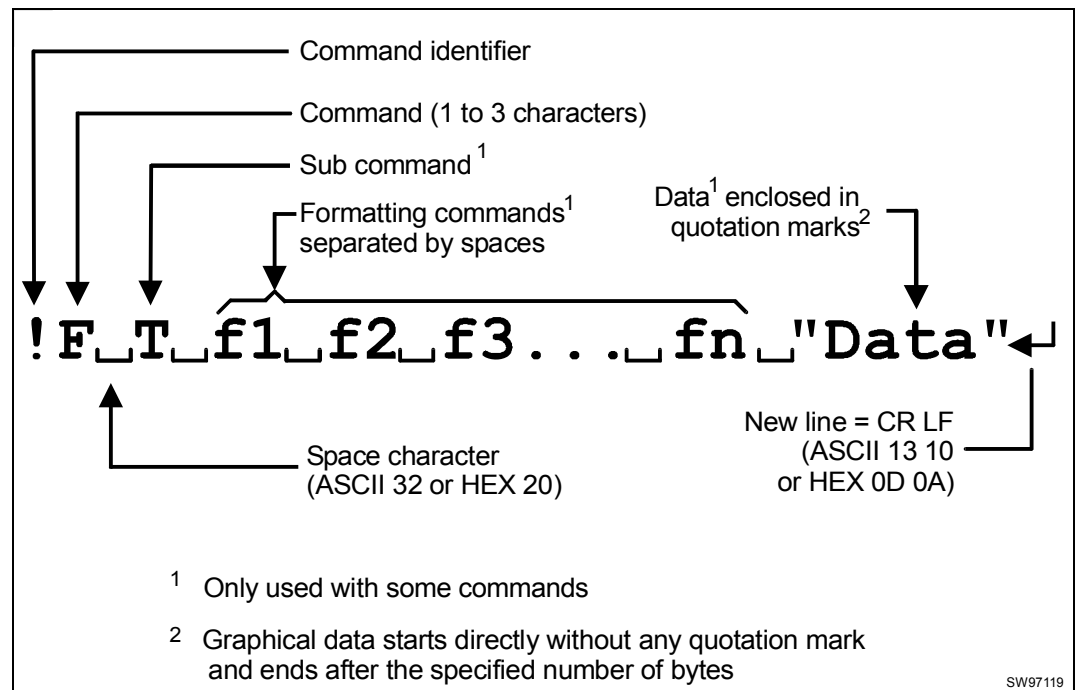


Figure 9. Command syntax

## 7.2 Summary of commands

### 7.2.1 System commands

|      |   |    |
|------|---|----|
| CAN  | General reset, equivalent to power OFF/ON (takes 20 s to execute) |    |
| ENQ  | Status request immediate  | 19 |
| !C   | Clear all   | 19 |
| !C A | Clear all and enable extended acknowledgement <sup>1</sup>        | 19 |
| !F A | Feed- acceleration and speed <sup>1</sup>                         | 22 |
| !H   | Top of form detection and ticket length                           | 19 |
| !H C | Feed reverse  | 20 |
| !P   | Print document  | 20 |
| !P S | Print slow <sup>2</sup>   |    |
| !P M | Print medium <sup>2</sup>   |    |
| !P F | Print fast <sup>2</sup>   |    |
| !Q   | Writes a transaction string to RAM                                | 20 |
| !S   | Status request  | 20 |
| !U   | Firmware version query <sup>1</sup>                               | 21 |
| !V   | Reads the transaction string written by !Q <sup>1</sup>           | 21 |
| !W   | Reads thermal print progress indicator <sup>1</sup>               | 21 |
| !X   | Set resolution  | 21 |
| !Y   | Read ticket counter <sup>1</sup>                                  | 21 |
| !Z   | Burn time <sup>1</sup>  | 22 |

### 7.3 Print-parameter commands

|      |                |    |
|------|----------------|----|
| !F T | Print text     | 24 |
| !F G | Print graphics | 26 |
| !F C | Print bar code | 28 |

---

<sup>1</sup> Introduced in firmware xxxxx-235

<sup>2</sup> Obsolete commands, please use !F A instead

## 8.1 System related commands

**ENQ** Status request, immediate

The CPM responds by sending one byte to the host computer, indicating the status of the various CPM sensors according to the following table.

The ENQ command is effected immediately after receipt, whereas the !S command gives the same response but is effected in sequence when received.

| Bit     | Sensor            | Value "1"                | Value "0"                                      |
|---------|-------------------|--------------------------|--|
| 0 (LSB) | Black mark sensor | <del>White paper</del>   | <del>black mark or no paper</del> <sup>1</sup> |
| 1       | 86 mm sensor      | Paper present            | No paper at sensor                             |
| 2       | 110 mm paper      | <del>Paper present</del> | <del>No paper at sensor</del> <sup>1</sup>     |
| 3       | Paper end sensor  | Paper present            | No paper                                       |
| 4       | Not used          | -                        | -  |
| 5       | Cutter            | Cutter home              | Cutter not home                                |
| 6       | Print head        | OK                       | Error  |
| 7(MSB)  | Not used          | -                        | -  |

**!C** Clear all

All definitions are cleared. Stored layout is erased. Subsequent !C's are ignored.

The !C command is also used to initialize the printer after a power ON. If existing print layout shall be saved, !P shall be used for printer initialization.

If no fixed data is used on the tickets, Autoclear can be used to clear the memory between tickets instead of using !C. Autoclear executes faster than !C. When autoclear is enabled any !C commands in the received data will be ignored, apart from when initiating the printer. Setting DIP-switch 4 to ON enables Autoclear.

!CA, adding an A to the !C command enables extended acknowledgement.

**!H** Top of form detection and ticket length

**!H n1 n2 n3** n1 = Select sensor, 0=No sensor, 1=Black mark, 2=86 mm and 3=110 mm  
 n2 = Sets No. of 0.93 mm steps after TOF detection, or sets ticket length if no sensor is used.  
 n3 = Reverse.  
 0 = Reverse feed disabled.  
 1 = 7 mm reverse feed after cut (to minimize top margin on next ticket).  
 3 = Variable reverse. A number after 3 sets reverse in 0.93 mm steps.<sup>2</sup>

Example for 86 mm gapped ticket according to ticket specification on page 40:

!H 2 2 1

<sup>1</sup> Not implemented in firmware versions up to 905-200. Here bits 1 and 3 are always 1.

<sup>2</sup> Introduced in firmware 2.43, where variable reverse replaces the fixed reverse.

|                         |                     |
|-------------------------|---------------------|
| <b>!H C<sup>1</sup></b> | <b>Feed reverse</b> |
|-------------------------|---------------------|

**!H C n1**

Feeds the paper in the reverse direction

n1 = No. of pixel lines to feed

|           |              |
|-----------|--------------|
| <b>!P</b> | <b>Print</b> |
|-----------|--------------|

This command triggers both the printing, cutting and ejecting of a ticket.

The Print command can also be used to initialize the CPM after power OFF (as an alternative to !C) in order to save any ticket layout stored in the printer. If !P is received and the printer is out of paper, it will give error code NAK P and discard the received data.<sup>2</sup>

**SET PRINT SPEED<sup>3</sup>**

Adding letters S, M, or F adjust the print speed:

!PS Print slow

!PM Print medium

!PF Print fast.

Print quality is very much dependent on speed. The normal print speed is used unless you select Fast or Slow with this command.

|           |                                 |
|-----------|---------------------------------|
| <b>!Q</b> | <b>Write transaction string</b> |
|-----------|---------------------------------|

!Q writes a string with up to 15 ASCII characters to a buffer memory in the printer.

Example: !Q asdfgh <CR><LF>

After the ticket has been correctly printed, the string is copied to a buffer in the battery backed up RAM. This buffer can be read by the !V-command.

The transaction string is committed at the precise point where a useable ticket has been produced. The only way to reset a transaction string is to successfully print another useable ticket that was initiated with !Q. Loss of power or a reset or any other instruction leaves the string intact.

|           |                       |
|-----------|-----------------------|
| <b>!S</b> | <b>Status request</b> |
|-----------|-----------------------|

The printer responds by sending two bytes to the host computer. Byte 1 indicates the status of the various sensors according to the table under the ENQ command above. Byte 2 reports the temperature of the thermal print head and is only used internally in the printer.

See also: ENQ

---

<sup>1</sup> Introduced in firmware version 2.48

<sup>2</sup> Introduced in firmware version 2.35

<sup>3</sup> Introduced in firmware version 2.35

|            |  |
|------------|--|
| <b>!SD</b> | <b>Status request, DIP-switch settings</b> |
|------------|--|

The CPM responds with one byte containing 1 bit for each switch. 1 = on, 0 = off.

|                |   |   |   |   |   |   |   |   |
|----------------|---|---|---|---|---|---|---|---|
| Bit            | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Dip switch No: | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

|           |   |
|-----------|---|
| <b>!U</b> | <b>Firmware version query<sup>1</sup></b> |
|-----------|---|

The CPM responds by sending the following string:

00905\_320 CPM Ticket Printer

Where 00905 is the firmware number for the standard CPM , and 320 is the firmware revision, in this case 3.20.

|           |  |
|-----------|--|
| <b>!V</b> | <b>Read transaction string<sup>1</sup></b> |
|-----------|--|

Reads the string stored by !Q from the memory in the printer.

|           |  |
|-----------|--|
| <b>!W</b> | <b>Read thermal print progress indicator<sup>2</sup></b> |
|-----------|--|

Reads a value indicating the number of bytes actually printed on the ticket (both blank and non blank). The number consists of 4 hexadecimal digits and should normally be equal to 5BE0. A lower number together with the absence of the 03H indicates that the last ticket was not fully printed and a decision may be taken whether the system should reissue the ticket or alert the supervisor.

This is a safety feature to minimize the risk of valid tickets being duplicated without attention from the system, by turning off the power at a certain point.

|           |                       |
|-----------|-----------------------|
| <b>!X</b> | <b>Set resolution</b> |
|-----------|-----------------------|

Sets the resolution of the print. This only affects the resolution in the transport direction of the ticket. 0=normal resolution, (5.7dots/mm). 1=high resolution (8.5 dots/mm).

|           |  |
|-----------|--|
| <b>!Y</b> | <b>Read ticket counter<sup>3</sup></b> |
|-----------|--|

Reads out the internal ticket counter from the control board. This counter starts from 0 when the printer is new and is incremented by one fore each completed !P sequence.

The result is sent as 12 decimal digits + CR + LF

---

<sup>1</sup> Introduced in firmware version 2.35

<sup>2</sup> Introduced in firmware version 2.35

<sup>3</sup> Introduced in firmware version 3.60

|           |                              |
|-----------|------------------------------|
| <b>!Z</b> | <b>Burn time<sup>1</sup></b> |
|-----------|------------------------------|

The burn time controls the print density. It is used to set the heating so that it is adequate for the thermal paper used as ticket material. Set it to the lowest burn time that gives acceptable print quality.

Example: `!Z 20 <CR><LF>`  
sets burn time 640 µs

The burn time setting is stored in the non-volatile memory.

Printing a self test ticket returns the setting to default value.

| Setting | Burn time | Print density |                |
|---------|-----------|---------------|----------------|
| 16      | 512 µs    | Test          | Lightest print |
| 17      | 544 µs    | Test          |                |
| 18      | 576 µs    | Test          |                |
| 19      | 608 µs    | Test          |                |
| 20      | 640 µs    | Test          |                |
| 21      | 672 µs    | Test          |                |
| 22      | 704 µs    | Test          |                |
| 23      | 736 µs    | Test          |                |
| 24      | 768 µs    | Test          |                |
| 25      | 800 µs    | Test          |                |
| 26      | 832 µs    | Test          |                |
| 27      | 864 µs    | Test          | Default        |
| 28      | 896 µs    | Test          |                |
| 29      | 928 µs    | Test          |                |
| 30      | 960 µs    | Test          |                |
| 31      | 992 µs    | Test          | Darkest print  |

---

**CAUTION!** – A longer burn time put more load on the printhead, so do not use a longer burn time than required for a clearly legible print. Settings over 27 are not recommended.

---

|             |   |
|-------------|---|
| <b>!F A</b> | <b>Feed- acceleration and speed<sup>2</sup></b> |
|-------------|---|

CPM has two feed motors, one for encoding and one for printing. This command sets the start-frequency and the top speed of each motor.

---

**NOTE1!** – **This command should not be used!** Suitable speed is selected by Swecoin and set as default parameters in the firmware. The speed setting has to reflect the motors fitted in the printer and the mechanical buildup of the printer. A single unit may be tunable to a higher speed but it is not certain that the settings work on the next printer.

---

**NOTE2!** – Printing a self test ticket will set the values to factory default.

---

Syntax for defining and downloading graphics data is as follows:

**!F A N <start freq> <top speed> <motor> 1 1 1\_ "remark"**

- |              |  |
|--------------|--|
| !F           | Command to load print-parameter information.   |
| A            | Indicates acceleration and speed mode.   |
| N            | Print orientation. This is ignored in acceleration and speed mode. Orientation is always North (N). The printer requires the N to be inserted. |
| <start freq> | Start frequency. Set the base frequency from where the acceleration starts. A value of 30 indicates a start frequency of 300 Hz.               |

---

<sup>1</sup> Introduced in firmware version 3.84

<sup>2</sup> This command was introduced in firmware version 4.49d

|           |   |
|-----------|---|
| Top speed | Top speed is the frequency at which the acceleration stops. A value of 190 sets top speed to 1900 Hz. |
| motor     | Must be set to 2.   |
| 1         | Not used. Must be set to 1.   |
| 1         | Not used. Must be set to 1.   |
| 1         | Not used for graphics printing. Must be set to 1.   |
| space     | One space has to follow the "1" before the graphics data.   |
| Remark    | Here you can enter a remark describing the setting you just did. It will not be printed.              |

#### Example:

```
!C<CR><LF>
!F A N 30 190 2 1 1 1 "Print speed (half-step)"<CR><LF>
!P<CR><LF>
```

## 8.2 Print related commands

### INTRODUCTION

!F is the general command for formatting the ticket print.

#### !F<type> <data>

The parameters are used as follows:

|        |   |
|--------|---|
| !F     | Indicates that this is the start of a print field definition                |
| <type> | Specifies the type of the field<br>T = Text<br>G = Graphics<br>C = Bar code |
| <data> | Depends on the type of field specified. See the following pages.            |

## 8.2.1 Text printing

|      |                          |
|------|--------------------------|
| !F T | Format text for printing |
|------|--------------------------|

**!F T <orientation> <xpos> <ypos> 1 <height> <width> <font> <"text">**

The parameters are used as follows:

**!F** Indicates that this is the start of a print field definition

**T** Indicates text mode

**<orientation>** Specifies the way in which the text is to be oriented. This can be either N(orth), E(ast), S(outh) or W(est). This terminology is described in detail in the examples given in this document. Specific fonts may be limited to one orientation only, see <font> below.

**<xpos> <ypos>** Specifies starting position for the text on the ticket. That is, the distance in pixels from the upper left corner of the printable area to the upper left-hand pixel of the bounding box of the first character to be printed. Note that the resolution is 7.52 pixels/mm on the X-axis and 5.7 pixels/mm on the Y-axis.

**<fixed pitch>** No. of pixels from the start of one character to the start of the next. Range 6 to 16. A value below 6 sets the default pitch.<sup>1</sup>

**NOTE!** – Only used for font 1.  
Must be set to 1 for all other fonts.

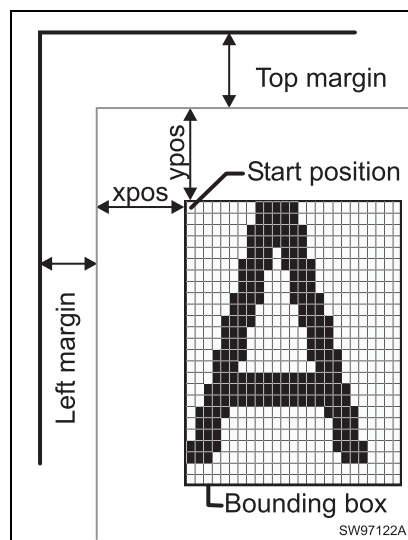


Figure 10. Bounding box of a character.

Note that the space to the following character is included in the bounding box, and that the pixels are not square.

**<height> <width>** Specifies the height and width expansion of characters to be printed. The height range is 1–16 times the default value. The width range is 1–16 for fonts 1 and 4, and 1–3 for fonts 2 and 3.

**<font>** Selects the font (text appearance). Fonts 1, 2, 3, and 4 apply. Font 2 and 3 can only be North oriented. Fonts 1 and 4 can be set to any orientation. Font 4 is a proportional character font. Font appearance may differ from the font samples if you have custom firmware in your printer.

**<"text">** Text to be printed, or definition of a variable text field. Both plain text and variable definitions have to be enclosed in quotes (" ").

Variable data to be printed as plain text is represented by "%V" in the format data string. The information that should replace the variable are sent before the !P print command at printout time.

<sup>1</sup> Introduced in firmware version 3.2



Example of a command for fixed text: !F T N 150 150 1 1 1 1 "Text"

Example of a command for variable text: !F T N 150 150 1 1 1 1 "%V"

### TEXT ATTRIBUTES

CPM does not handle word processor-like text attributes. In version 4.07 of the firmware, reversed text has been added, and you can make bold text according to the procedure described below. Bold and reversed cannot be combined.

#### Printing Bold text

Bold text is created by repeating the text you want bold, but with new coordinates:

```
!C
!C
!F T E 370 087 10 02 01 1 "This text is normal"
!F T E 309 087 10 02 01 1 "This text is bold"
!F T E 309 088 10 02 01 1 "This text is bold"
!P
```

You can increase the "boldness" by changing the coordinates more than one pixel, or by repeating the text more times with a shift also in the vertical direction.

#### Reversed text<sup>1</sup> Reverse print

Reversed text. If an R character is appended to the font selection digit (no space between), the text is reversed.

```
!C
!C
!F T E 100 110 1 02 02 1R "Reversed text"
!F T E 200 110 1 02 02 1 "Normal text"
!P
```

---

**NOTE 1!** – Only reverse single words. Reversing a complete line may reset the printer due to the high current consumption when printing all black.

---

**NOTE 2!** – Reverse work with fonts 1, 2, and 4.

---

---

<sup>1</sup> Introduced in firmware version 4.07

## 8.2.2 Graphics printing

|      |                              |
|------|------------------------------|
| !F G | Format graphics for printing |
|------|------------------------------|

CPM can print bit map graphics. Graphic images are stored in the fixed memory area and will therefore be repeated on every ticket until the next !C command is received.

Remember, when creating graphics for the printer, that the pixels are not square but have a height/width ratio of 1.32:1 in normal, and 1:1.13 in high resolution mode.

Syntax for defining and downloading graphics data is as follows:

**!F G <orientation> <xpos> <ypos> 1 <height> <width> 1\_<Graphic\_data>**

|               |   |
|---------------|---|
| !F            | Command to load print-parameter information.  |
| G             | Indicates graphics mode.  |
| <orientation> | Print orientation. This is ignored in graphics mode. Orientation is always North (N). The printer requires the N to be inserted.  |
| xpos          | Horizontal starting position in pixels for the upper left-hand corner of the graphics block. Position will automatically be rounded off to be divisible by 8 as a graphic block has to start at the first bit in a byte.  |
| ypos          | Vertical starting position in pixels for the upper left corner of the graphics block.   |
| 1             | Not used for graphics printing. Must be set to 1.   |
| height        | Height in pixel lines of the graphic block. The length of the ticket determines maximum height. For an 86 mm ticket the maximum height is approximately 500 pixel-lines.  |
| width         | Width <b>in bytes</b> of the graphic block. Maximum width is 48 <b>bytes</b> .  |
| 1             | Not used for graphics printing. Must be set to 1.   |
| space         | One space has to follow the "1" before the graphics data.   |
| Graphic_data  | This is a block of bit mapped graphics data. The block is stored in the printer starting at <xpos>, <ypos>. The numbers of bytes specified by <width> are stored in one pixel line. The <ypos> is then incremented and the next line is stored. This is repeated <height> number of times. It is up to the user to send the correct number of bytes to the printer, that is, <height> × <width>, as the printer will scan the input character stream for the correct number of bytes. |



### 8.2.3 Printing bar codes

|      |                          |
|------|--------------------------|
| !F C | Format bar code printing |
|------|--------------------------|

Bar code printing can be used as a machine readable ticket data carrier

---

**NOTE!** – *To produce sharp code bars, the CPM printer automatically reduces the print speed by approx. 50% when printing tickets with east and west oriented bar codes. The speed reduction is only valid for bar widths 1 and 2. Wider bar codes are printed at full speed.*

---

Bar code data is treated as fixed data. You can however replace a bar code by overlaying the previous data with new bar code data on the same X- and Y-coordinates. This way you avoid deleting the complete ticket with a reset (!C) when you want to update the bar code.

The syntax for defining and downloading of bar code data is as follows:

**!F C <orientation> <xpos> <ypos> <bar 1> <height> <bar 2> <type> \_ <"bar code data">**

!F            Command to load print parameter information

C            Indicates bar code mode

<orientation> Indicates print orientation. Can be north (N), east (E), south (S), or west (W).

xpos        Starting position (pixel) for the upper, left-hand corner of the first code bar in the string. Automatically rounded off to be divisible by 8, (first bit in a byte).

ypos        Starting position (pixel) for the upper, left-hand corner of the first code bar

Bar 1        Width in pixels of both black and white bars, range 1–16.  
For EAN13 and EAN/Code 128 the value must be set to 1.  
For Code 39 and Code 2-of-5 this sets the **wide bars**.

height      Code bar height in pixels

|       |      |              |         |
|-------|------|--------------|---------|
| Value | 1 =  | 16 pixels =  | 2.7 mm  |
|       | 2 =  | 32 pixels =  | 5.3 mm  |
|       | 3 =  | 48 pixels =  | etc.    |
|       | 4 =  | 64 pixels =  |         |
|       | 5 =  | 80 pixels =  |         |
|       | ...  |              |         |
|       | 16 = | 256 pixels = | 42.7 mm |

Bar 2        Width in pixels of both black and white bars, range 1–16.  
For EAN13 and EAN/Code 128 the wide/narrow ration is fixed and this sets the width of the entire code.  
For Code 39 and Code 2-of-5 this sets the **narrow bars**.

type        Selects type of bar code. The following types are available:

|       |     |  |
|-------|-----|--|
| Value | 1 = | EAN13 (partly implemented, no check sum) |
| Value | 2 = | Code 2-of-5 interleaved                  |
| Value | 8 = | EAN 128 <sup>1</sup>                     |

---

<sup>1</sup> Code 128 and EAN 128 is only implemented in firmware 905-235, and it replaces font 2.

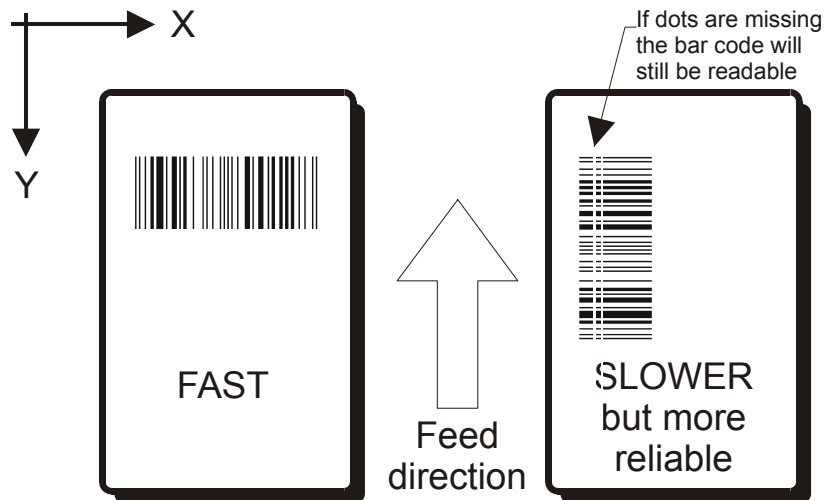
Value 9 = Code 128<sup>1</sup>  
 Value 11 = Code 39

space A space (blank) has to be inserted between the type parameter and the data string.

bar code data This is a block of data to be converted by the CPM and printed in bar code form in accordance with the parameters identified. For available characters and data string formats, please refer to the specific type of bar code.

The following command string produces the ticket illustrated to the left below:

```
!C
!L1
!F C N 12 102 1 4 3 1 "1234567890128"
!P
```



SW97103A

Figure 12. EAN13 bar code. Use east or west oriented bar codes wherever possible, to guarantee readability.

Code 39 example

```
!F C N 100 230 6 2 2 11 "12345"
```

Code 128 example<sup>1</sup>

```
!F C N 100 320 1 5 2 9 "abc123"
```

Code 2-of-5 example

```
!F C N 100 410 5 2 2 2 "123456"
```

**NOTE!** – Code 2-of-5 must have an even number of digits.

---

## ERROR CODES

CPM reports error conditions in the form of error codes. If no error condition exists, the CPM sends an "ACK" (06H) to the host after each received print command !P. An error condition is reported as a NAK (15H) followed by a one-character error code. The error codes have been defined, starting with ASCII character "1" (31H) according to the following table:

|     |  |
|-----|--|
| "1" | No tickets in the input path.  |
| "2" | Paper jam.   |
| "3" | Reserved.  |
| "4" | Cutter error. No full cut performed. Cutter blade returned to home position by reversing the cutter motor.   |
| "5" | Cutter error. Cutter blade not returned to home position.  |
| "6" | Cutter error. Cutter blade not moving. If this error code is received immediately after power ON, it indicates that something is wrong with the +24V supply. |
| "7" | Paper jam when executing the !P command.   |

---

**NOTE!** – For CPM to send ACK, or NAK + error codes, the DIP-switch 6 on the CPM control board must be set to ON. Position OFF places the unit in a silent mode preventing these codes from being transmitted to the host computer.

---

---

## POWER REQUIREMENTS

### 10.1 CPM 2030 Desktop

|                   |  |
|-------------------|--|
| Supply voltage    | 115 Vac or 230 Vac, switch selectable  |
| Supply current    | Up to 4A at 115 Vac, and 2A at 230 Vac   |
| Fuse              | 5x20 mm 3.15A / 250V slow blow. Replacement fuse inside power cable receptacle |
| Power consumption | 50–190 W depending on print density  |
| Frequency         | 50–60 Hz   |

### 10.2 CPM 2030 OEM printer

|                  |  |
|------------------|--|
| 24 Vdc $\pm 5\%$ | Text printing: Average 2A, peak 10A<br>All black printing: 10A                                       |
| 5 Vdc $\pm 5\%$  | 300 mA   |
| Power connector  | 6-pin Molex KK type connector, 2.54 mm division. Positioned at the rear bottom of the control board. |

## 11.1 CPM 2030 OEM printer

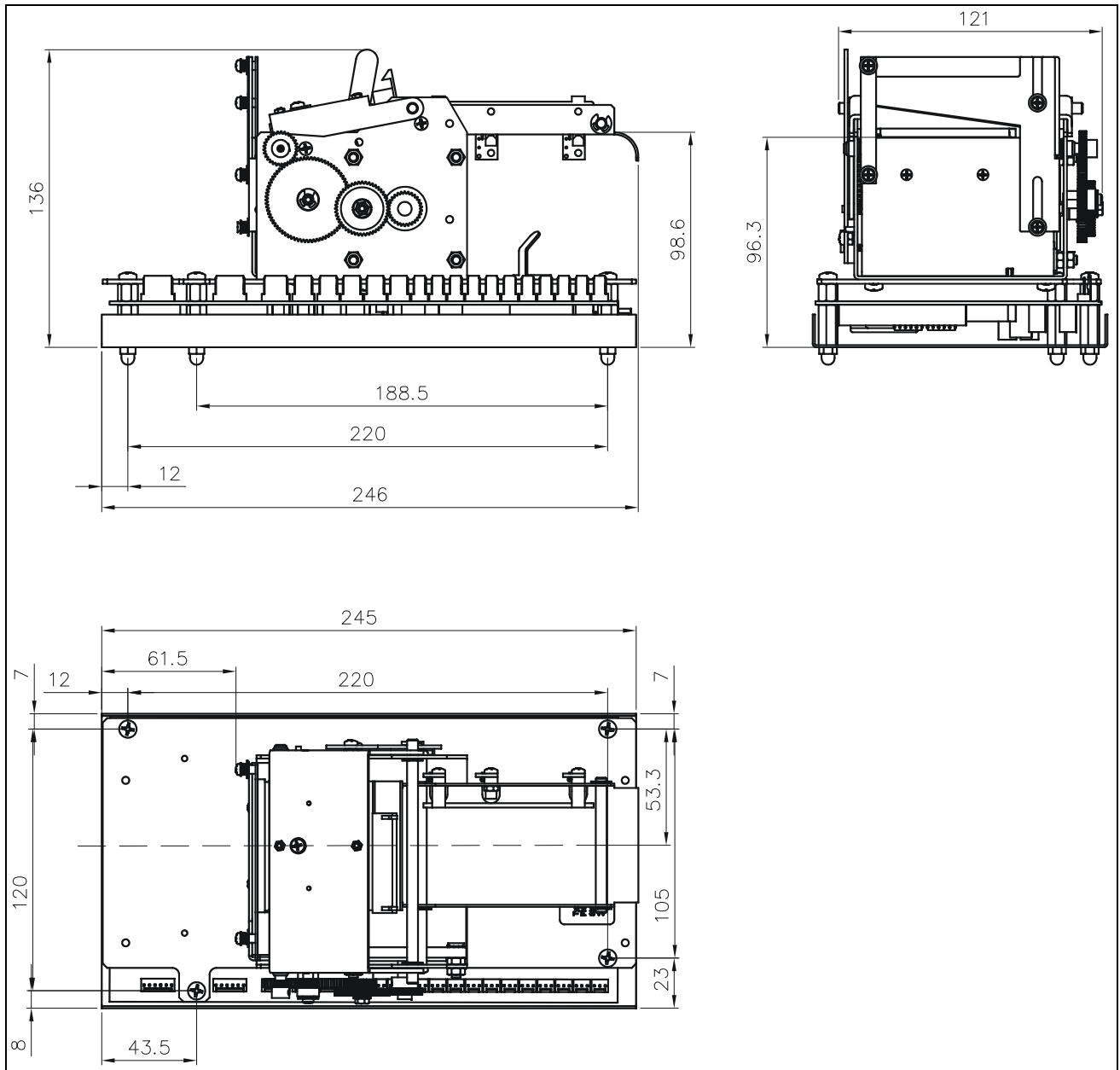


Figure 13. CPM 2030 OEM dimensions



### 11.1.1 Printer mechanism

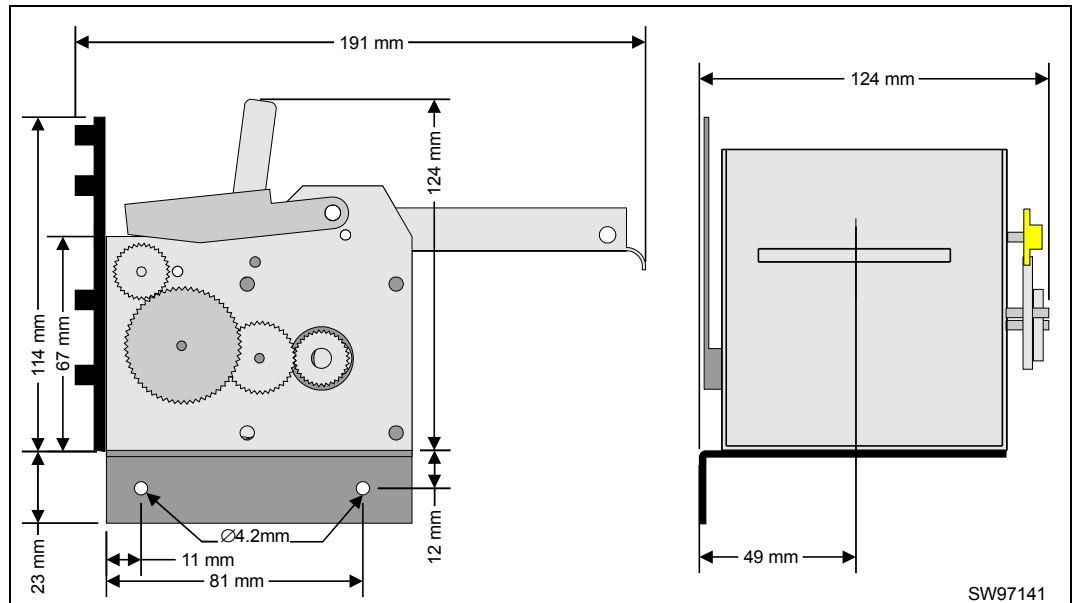


Figure 14 . Print mechanism from CPM 2030

### 11.1.2 Control board for printer mechanism

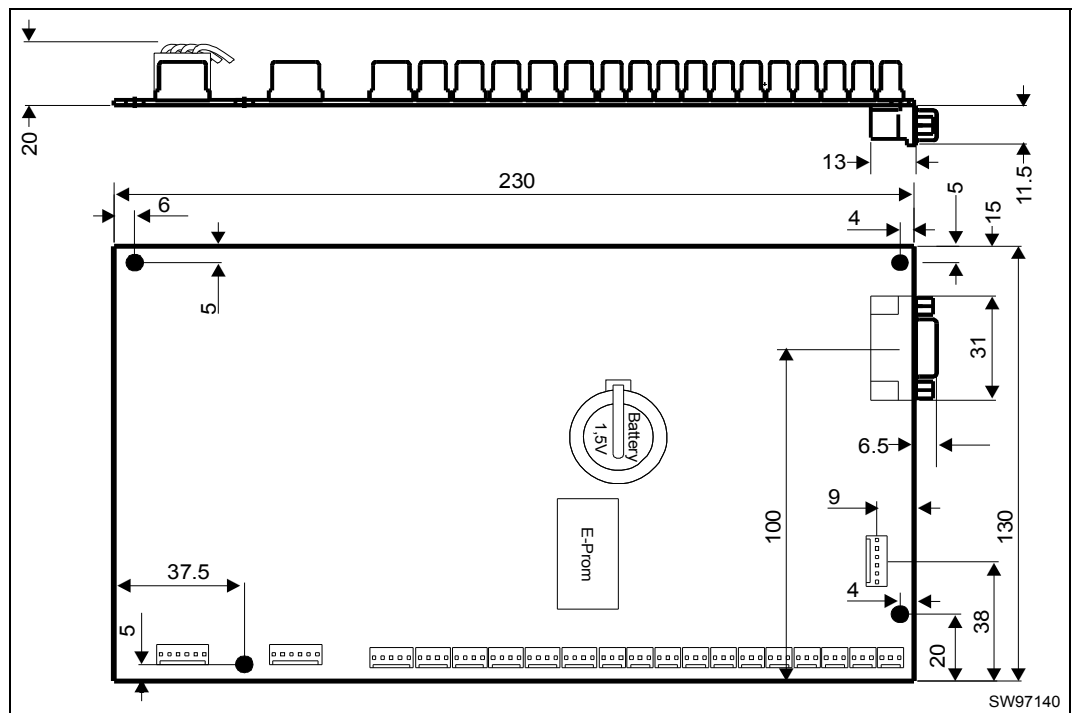


Figure 15. Control board dimensions. All measurements are in mm.

### 11.1.3 Power supply for CPM 2030 OEM printer mechanism

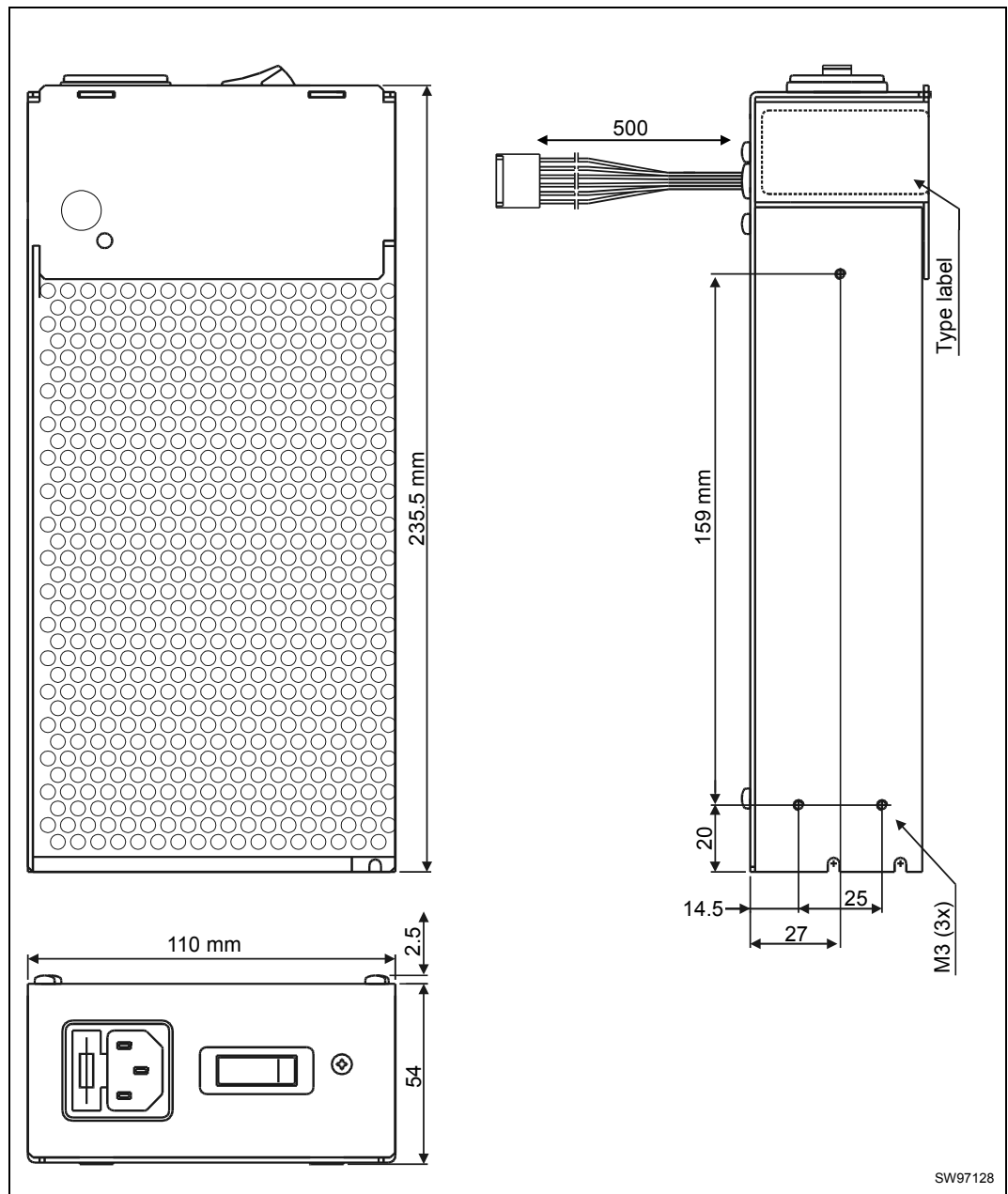


Figure 16. Power supply 01035-002 dimensions. All measurements are in mm.

## 11.2 CPM 2030 Desktop

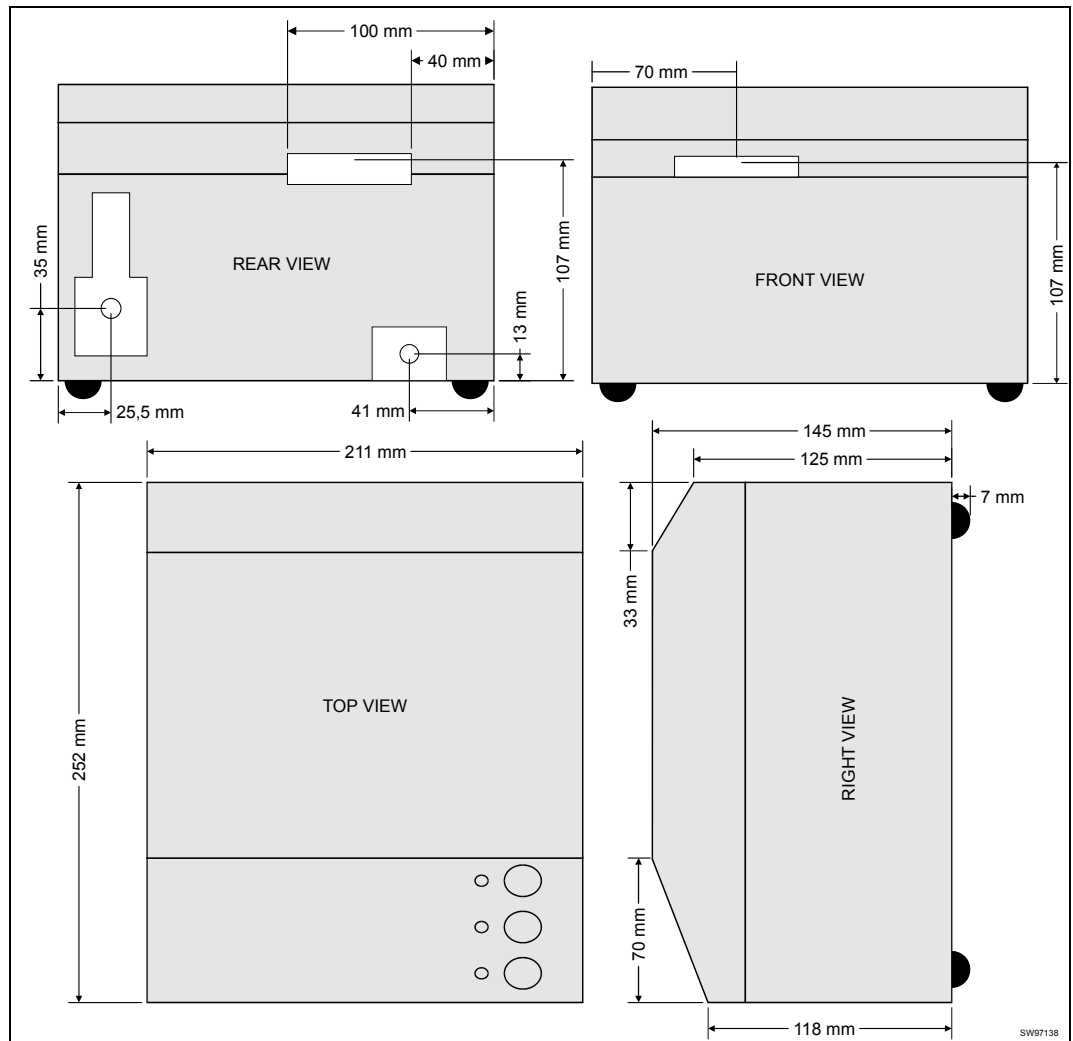


Figure 17. Dimension drawing for CPM 2030 Desktop printer. All measurements are in mm

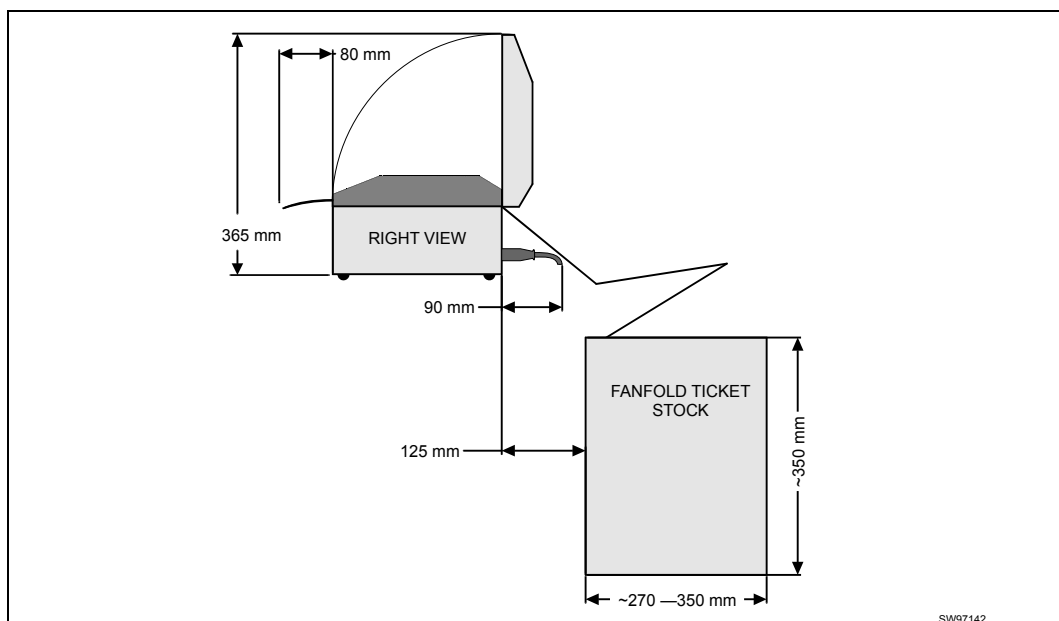


Figure 18. Approximate space required around the CPM 2030 printer

### 11.3 Weight

CPM 2030 OEM: 2.7 kg

CPM 2030: 6.1 kg

## 12

## ENVIRONMENTAL CONDITIONS

|                   |                |  |
|-------------------|----------------|--|
| Temperature       | Operation      | +5 °C to +40 °C                          |
|                   | Storage        | –10 °C to +50 °C (without tickets)       |
|                   | Transportation | –10 °C to +50 °C (without tickets)       |
| Relative humidity | Operation      | 35–75%, non-condensing                   |
|                   | Storage        | 10–90%, non-condensing (without tickets) |
|                   | Transportation | 10–90%, non-condensing (without tickets) |

### Shock and vibration

#### Vibration tolerance during operation:

From 5 to 18 Hz with a displacement of 0.3 mm.

From 19 to 100 Hz at a constant acceleration of 0.2 g, peaked, swept sine wave.

#### Shock during shipping:

Printers which are factory packaged for shipment can tolerate a drop of 800 mm without sustaining any damage.

---

**MTBF**

Complete unit

Approximately 1.4 years for the typical user profile given below.

**User profile:** Operational 12 month/year. Average 30 000 tickets /month. Average printing density 20 % black. Cleaning of printer every 2 months.MTBF for CPM  
components

Print head 1 000 000 tickets typically (54 x 86 mm)

Control board 40 000 hours typically

Cutter 1 000 000 cuts typically

---

**NOTE!** – Type of ticket stock affects the life of the CPM to a high degree. For maximum MTBF, avoid abrasive inks and coatings, and inks with whiteners. Also clean the printer from paper dust and residue regularly.

---

## TICKET STOCK

### 14.1 Ticket base material

|           |  |
|-----------|--|
| Material  | Paper, 100 % chemical pulp, no ground wood permitted<br>Laminate (Triplex)<br>Plastic (PVC)                            |
| Stiffness | 18–36 g/cm (in grain direction)  |
| Thickness | Paper and laminate: 0.18–0.40 mm, 170–210 g/m <sup>2</sup><br>Plastic (PVC): 0.18–0.25 mm                              |
| Curl      | Deviation from flatness < 3 mm across the length, or diagonal of the ticket, and <1 mm across the width of the ticket. |

### 14.2 Coating and preprint

|                 |  |
|-----------------|--|
| Thermal coating | Shall meet or exceed the ANSI 3.11 specification<br><br>Smoothness: Max. 75 Sheffield units<br>Properties: Same as fax grade 3                                   |
| Top coating     | The thermo-sensitive surface of the ticket stock can be provided with a protective UV or moisture proofing top coating .   |
| Preprint        | Tickets can be preprinted on one, or both sides.<br>Ink for thermo-sensitive side: Laser printer approved ink without whiteners<br>Ink for rear side: Offset ink |

---

**CAUTION!** – Never use abrasive inks as they reduce the life of the thermal print head.

---

#### Thermal print to preprint alignment

Tolerances in the printer, and in the ticket stock itself, can cause misalignment between the preprint of the ticket stock and the thermal print.

The ticket guides in the printer are 0.5 mm wider than the nominal ticket width. Narrower tolerances would cause paper jam when the relative humidity changes the ticket width. A ticket width tolerance of  $\pm 0.2$  mm gives a maximum total misalignment of 0.7 mm (0.5 +0.2).

---

**TIP!** – Avoid designing tickets that require excessively close alignment between preprint and thermal print.

---

### 14.3 TOF detection (if used)

|                            |  |
|----------------------------|--|
| General                    | Black marks or holes can be used to position the paper before cutting. There shall be one mark or hole for each ticket to be printed. The size and position is given below.  |
| Print side for black marks | Opposite side to thermal coating   |
| Density of black marks     | <p>Standard wet offset mode is recommended for printing of the mark. The full mark area must be printed. Screen printing is not allowed. Measurement of print density shall be performed relative to the white paper background.</p> <p>Using a MacBeth densitometer, the print density shall be greater than 1.3. Anti-gloss filter is not allowed. Using a Gretag densitometer, the print density shall be greater than 1.5. The reflection from the black mark shall be less than 10%. The reflection from the paper shall exceed 80%. Preprinting in the zone passing over the black mark sensor is not recommended. If required, OCR blind type of ink shall be used (outside 700-1100 nm range).</p> |
| Holes                      | Punching shall be done from the thermo-coating side. Distorted print can be expected within a zone of approximately 2 mm around the edges of the hole. The function shall be tested.   |

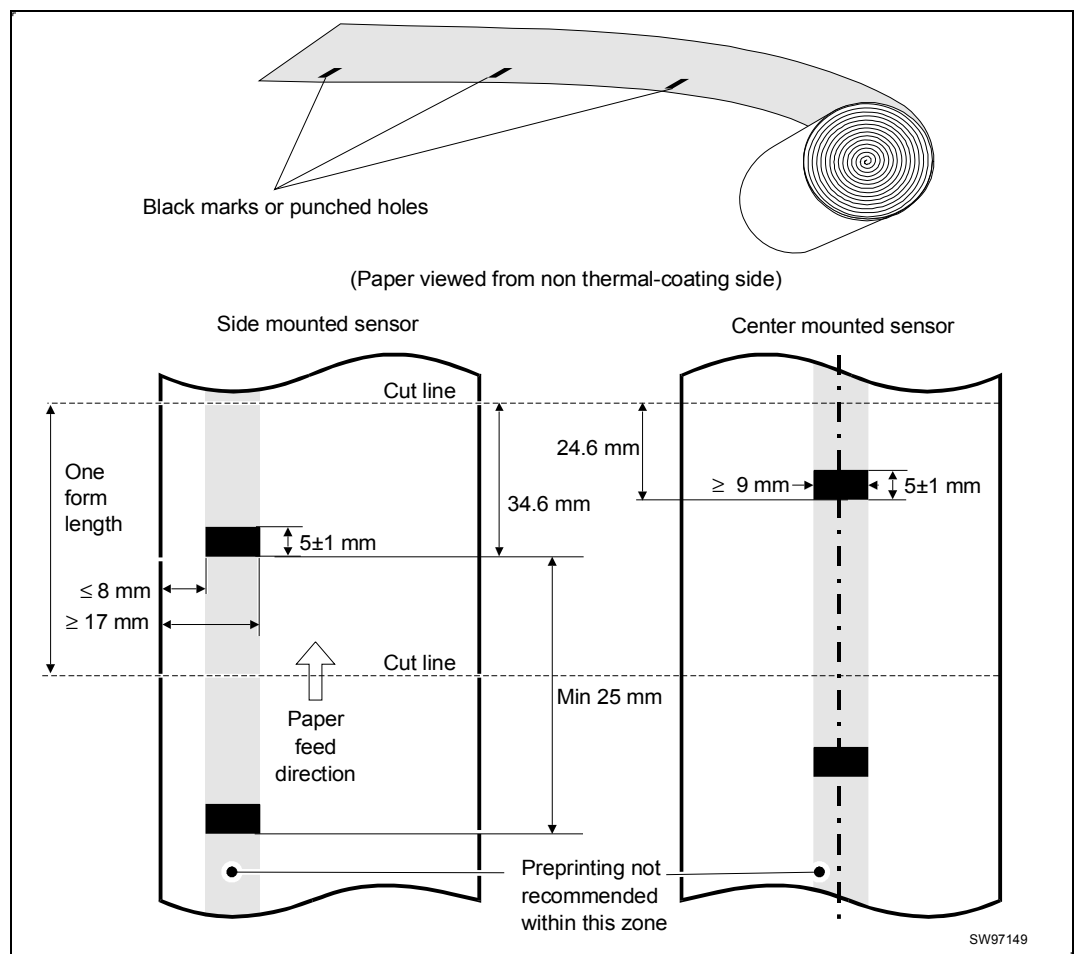


Figure 19. Position and size of black mark.

## 14.4 Ticket dimensions and perforation

|                               |  |
|-------------------------------|--|
| Stock format                  | Fanfold or roll, gapped or non-gapped consecutive form tickets.  |
| Ticket width (W)              | 50 +0/-0.4 mm, 54 ± 0.2 mm, 60 +0/-0.4 mm or 63 +0/-0.4 mm   |
| Ticket length                 | 25 to 156 mm, with synchronized cut triggered by black mark sensor, or with unsynchronized cut (without using sensors).<br>85.6 and 110.0 mm with cut triggered by optical edge sensors. |
| Corner radius, gapped tickets | 3.15 ± 0.3 mm. Used for optical detection of top-of form.  |
| Gapped tickets                | Two tabs according to Figure 20.   |
| Non gapped tickets            | Equal distance between tabs according to Figure 21.  |

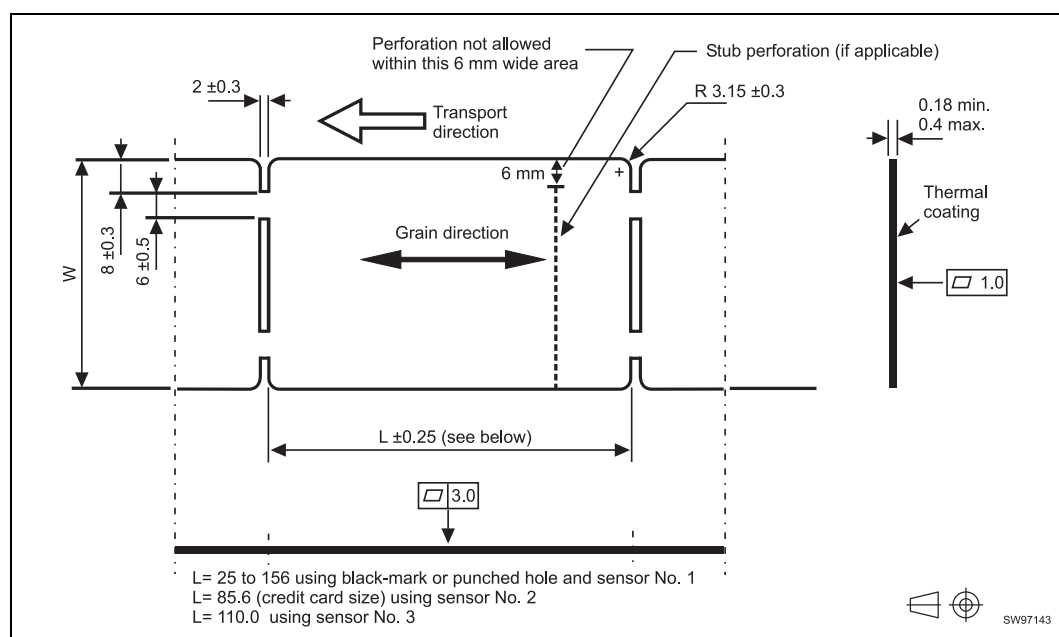


Figure 20. Gapped tickets (for printers with cutter)

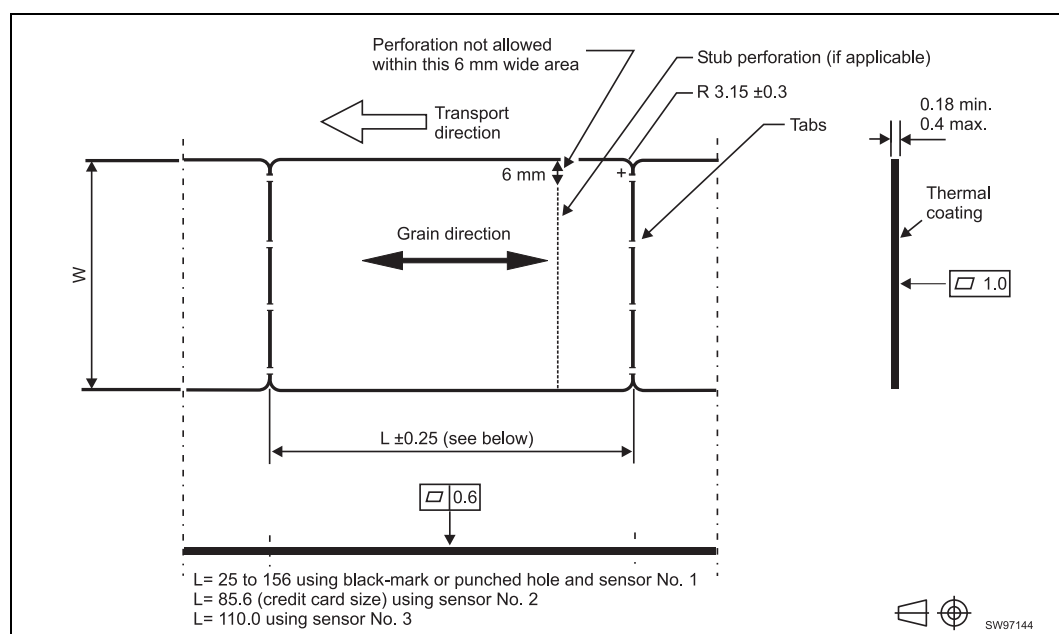


Figure 21. Non gapped tickets (for printers with burst separator)



## ORDERING INFORMATION

The following printer versions were released when this manual was printed. If you need another configuration, or any other modifications, contact Swecoin, or a Swecoin representative.

| Ordering No. | Version | CPM 2030 Desktop Evaluation kit | CPM 2030 OEM printer mechanism with control board | CPM 2030 Desktop printer with external ticket magazine. Built-in power supply unit, and control board. | Ticket width | Ticket length | Ticket loading options | Fanfold | Roll | Ticket separation | Cutter | Burst separator | No separation |
|--------------|---------|---------------------------------|---|--|--------------|---------------|------------------------|---------|------|-------------------|--------|-----------------|---------------|
| 100842       |         |                                 | ✓   |  | 50           | Variable      |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 100843       |         |                                 | ✓   |  | 54           |               |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 100820       |         |                                 | ✓   |  | 60           |               |                        | ✓       | ✓    |                   | ✓      |                 |               |
| N/A          |         |                                 | ✓   |  | 63           |               |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-000    |         |                                 |   | ✓  | 54           | 86            |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-001    |         |                                 |   | ✓  | 54           | 110           |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-002    |         |                                 |   | ✓  | 50           | 86            |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-003    |         |                                 |   | ✓  | 50           | 110           |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-004    |         |                                 |   | ✓  | 63           | Variable      |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-005    |         |                                 |   | ✓  | 60           |               |                        | ✓       | ✓    |                   | ✓      |                 |               |
| 01030-006    |         |                                 |   | ✓  | 60           |               |                        | ✓       | ✓    |                   |        | ✓               |               |
| 01030-800    | ✓       |                                 |   |  | 54           |               |                        | ✓       | ✓    |                   | ✓      |                 |               |

| Ordering No. | Accessory description  |
|--------------|--|
| 01493-000    | Side mounted black mark sensor (TOF), instead of the standard center mounted sensor. |
| 01035-002    | Power supply for OEM printer mechanism, 150 VA (preferred model)                     |
| 10828-050    | Power supply for OEM printer mechanism, 50 VA (obsolete, only replacement part)      |
| 10825-000    | Serial RS232 cable, 1.5 m  |
| 01024-001    | Ticket tray assy (Output tray from CPM 2030 Desktop)                                 |

## FAULT FINDING

The CPM informs the host of some error symptoms with status reports and error codes. Error codes are only sent if DIP-switch 6 is ON. See DIP-switches on page 16, and “Error Codes” on page 30.

The lamps in the lid indicate errors requiring assistance of the operator.

Below follow some hints on other error symptoms and how to act upon them:

---

### SYMPTOM

Fade print

### ACTION

- Clean the printhead using a cleaning card
- Check that the paper is sensitive enough (especially if you just received a new batch of tickets)

---

### SYMPTOM

White lines in the ticket transport direction

### ACTION

- A pixel in the printhead is damaged, replace the printhead

---

### SYMPTOM

No cutting, bad cutting, uneven cut edges, etc.

### ACTION

- Remove any obstructing paper particles in the cutting mechanism.
- Check that the cutting motor and home position sensor connectors are fully seated on the control board.

---

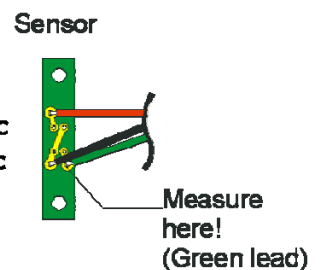
### SYMPTOM

Cut in wrong position

### ACTION

- Check sensor levels
- Clean sensors
- Verify that preprint does not disturb sensor by loading a white ticket and measure levels.

- Connect volt meter between green lead and ground
- Ticket: Below 0.7 Vdc
- No ticket: Above 3 Vdc



---

### *SYMPTOM*

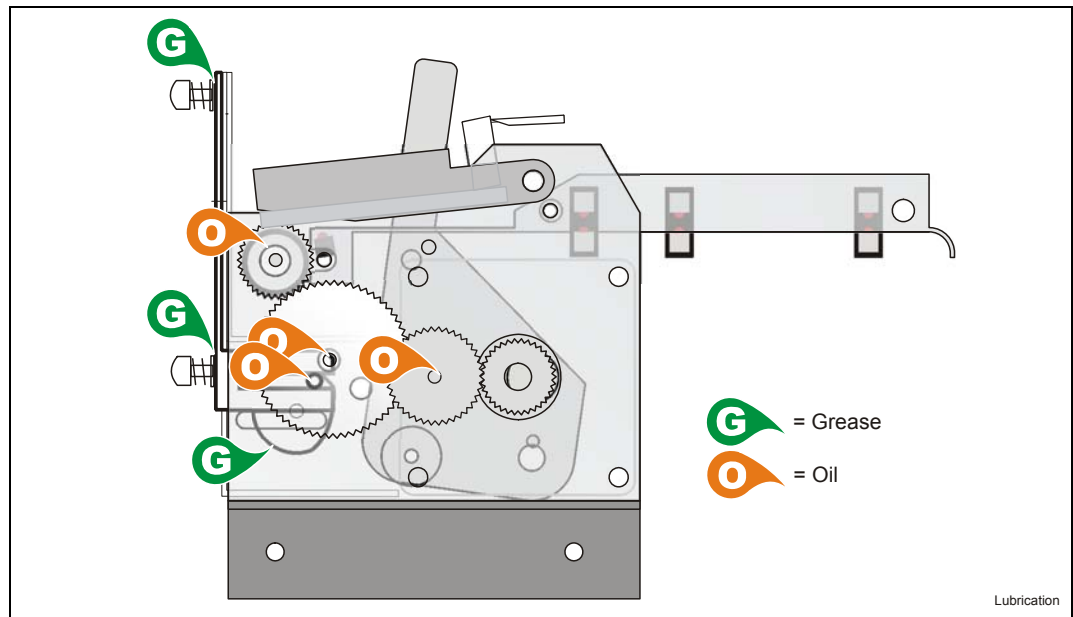
Only one self-test ticket can be done. When you press the print button again, only blank tickets are produced.

### *ACTION*

Check the setting of DIP-Switch 4, "Auto clear". If it is ON, this is the correct behavior. If DIP-Switch 4 is OFF, test the printer with another power supply unit. If the power supply fails to deliver enough current, the printer is reset when the black line at the end of the self-test ticket is printed.

**17.1 Lubrication**

When serviced, it is a good rule to clean and lubricate the printer. All bearings for the platen and the cog wheels should be lubricated with oil, for example Dexron III automatic gearbox oil. The outer surface of the cam wheel should be lubricated with a very thin layer of lithium grease. The cutter pressure plate and the washers that rub against the moving blade should also be lubricated with lithium grease.

**17.2 Functional description and disassembly****17.2.1 Print Module**

(See Figure 23)

The print module consists of a thermal printhead (24) with one line of 348 heating resistors giving the print on the thermal paper. The paper is transported past the printhead by a platen (11) driven by a stepper motor (21) via some gears (2, 15, and 20).

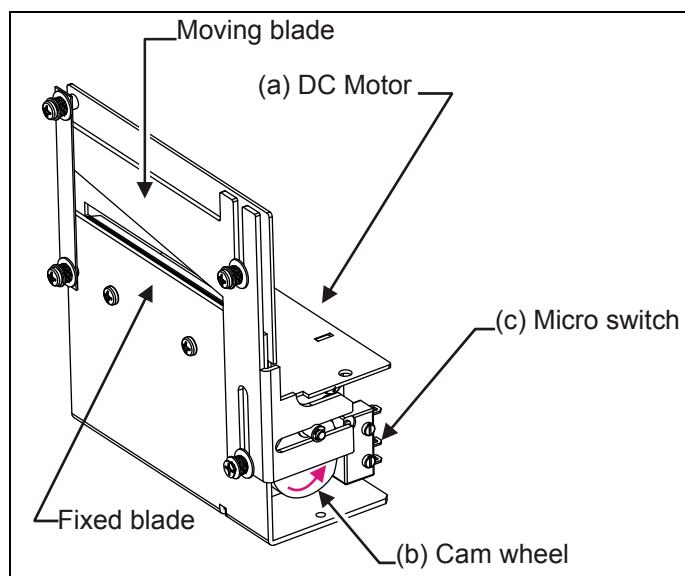
**PRINthead REMOVAL**

1. Disconnect the printhead cable from the printhead.
2. Remove the two circlips (31) from the shaft (9) connecting the pressure plate (44) with the chassis.
3. Pull the printhead release arm (43) forwards to relieve the printhead and then pull out the shaft completely.
4. Remove the screw (34) and hub (13) holding the printhead to the pressure plate.

**REPLACEMENT**

5. Mount the printhead module in the reverse order.
6. Check that the printhead engagement arm connects to the spring-loaded rod extending outside the left side of the chassis.

### 17.2.2 Cutting module



The knife in the cutting module moves by means of a DC-motor (a) with a combined carrier and cam wheel (b). The motor runs in one direction only during normal cutting operations (see arrow). A micro-switch sensor (c) detects when the knife reaches its home position. If the mechanism cannot reach its home position, possibly due to a paper jam or similar, the motor will run in the opposite direction until the mechanism reaches its home position.

#### REMOVAL

(See Figure 23)

1. Remove the printer unit from the cabinet.
2. Remove the four spacers (18) and remove the control board (25)
3. Remove the bottom plate (12) from the printer chassis (2 screws)
4. Remove the two screws (33) holding the cutter module (49) to the chassis
5. Disconnect the cable from the control board connector J21.

#### REPLACEMENT

Mount the cutter module in the reverse order.



#### **WARNING!**

**DANGER OF INJURY.** Depending on the position of the carrier wheel on the cutter module, the cutting mechanism may start moving when the mains power supply is switched ON. **KEEP HANDS AWAY WHEN SWITCHING ON THE POWER.**

**NOTE 1!** – If the cutter blades has been removed or replaced, remember to lock the screws with Locktite in the threads when assembling the cutter.

**NOTE 2!** – If the micro switch has been loosened, the screws should be locked with Locktite in the thread and lacquer at the head of the screw.

### 18.1 Control board interconnections

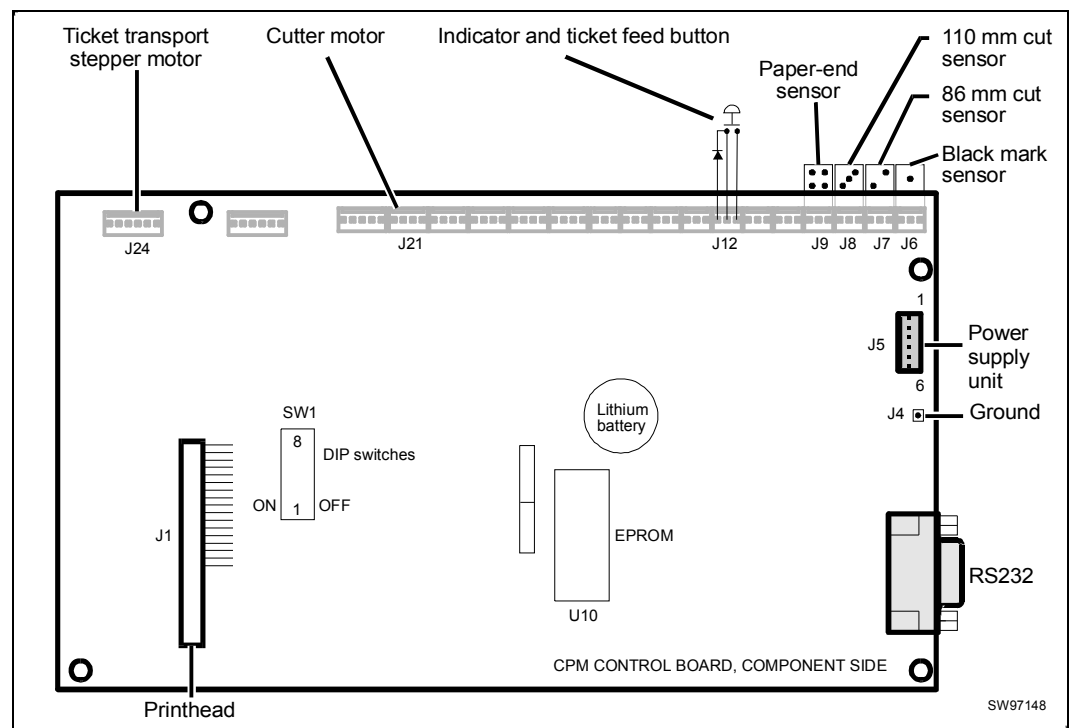


Figure 22. Control board interconnections.

**NOTE 1!** – Directly after replacing the battery, the board **MUST** be powered ON for a short while. If not, the battery will be discharged within a couple of hours. Powering on the board makes the SRAM enter low-power mode, and it retains that mode as long as it has battery voltage.

The schematic diagram illustrates the internal circuitry of the SWECOIN AB SWC-2210 printer. It features a central microcontroller (U1, 628128) connected to a RAM chip (U2, 628128) and a ROM chip (U3, 628128). The microcontroller is also connected to a 74HC373 (U5) and a 74HC30 (U6). The 74HC30 is connected to a 74HC32 (U7). The 74HC32 is connected to a MAX232 (U4). The MAX232 is connected to a serial interface (J4). The serial interface is connected to a printer (Printer Datab.). The printer is connected to a power supply (J5) and various status LEDs (H1-H5). The schematic is divided into sections A, B, C, and D, corresponding to the drawing sheets 1, 2, 3, and 4 respectively.

**Section A:** Shows the power supply section, including the +5V regulator (U8, 7805), the V+1 regulator (U9, 7805), and the V-12 regulator (U10, 7812). It also shows the connections to the printer's serial interface (J4) and the status LEDs (H1-H5).

**Section B:** Shows the microcontroller (U1, 628128) and the RAM chip (U2, 628128). It also shows the connections to the ROM chip (U3, 628128) and the 74HC373 (U5).

**Section C:** Shows the 74HC30 (U6) and the 74HC32 (U7). It also shows the connections to the MAX232 (U4) and the serial interface (J4).

**Section D:** Shows the MAX232 (U4) and the serial interface (J4). It also shows the connections to the printer (Printer Datab.) and the status LEDs (H1-H5).

**Legend:**

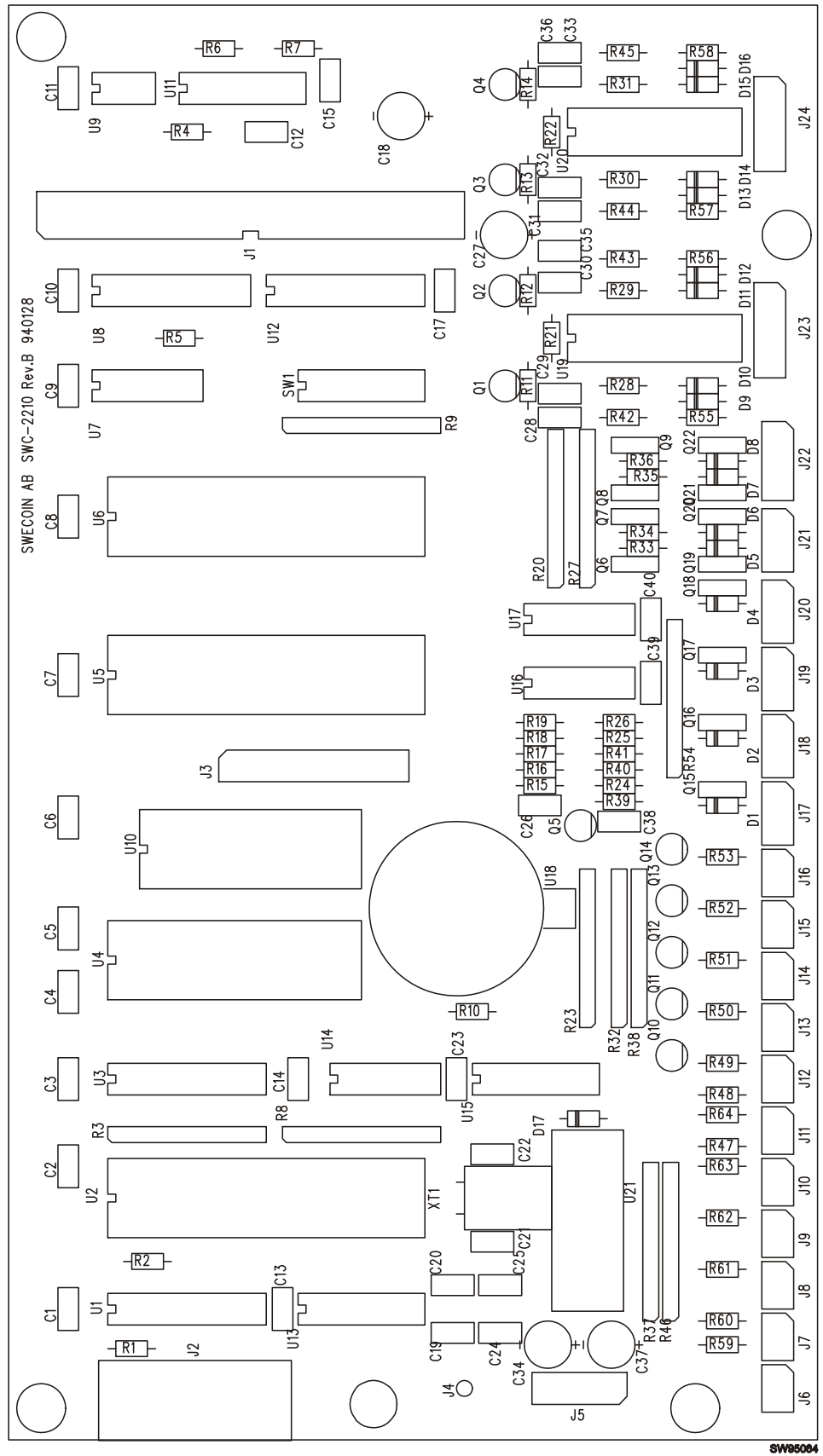
- Printer Datab.
- 2 RXD
- 3 TXD
- 5 GND
- 4 DTR
- 7 RTS
- 8 CTS

**Component List:**

- U1: 628128
- U2: 628128
- U3: 628128
- U4: MAX232
- U5: 74HC373
- U6: 74HC30
- U7: 74HC32
- U8: 7805
- U9: 7805
- U10: 7812
- J4: Serial Interface
- J5: Power Supply
- H1-H5: Status LEDs

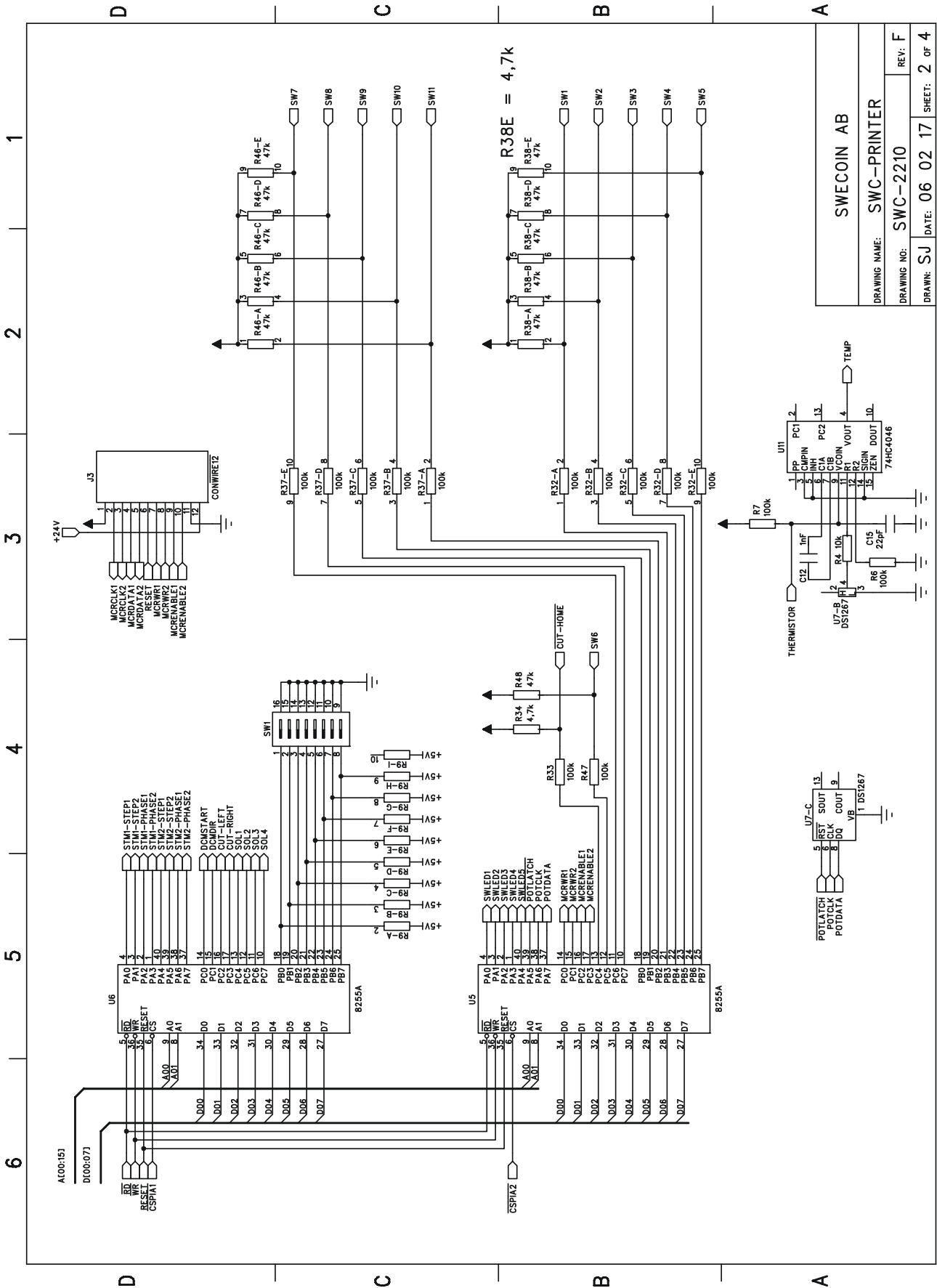
**Pin Connections:**

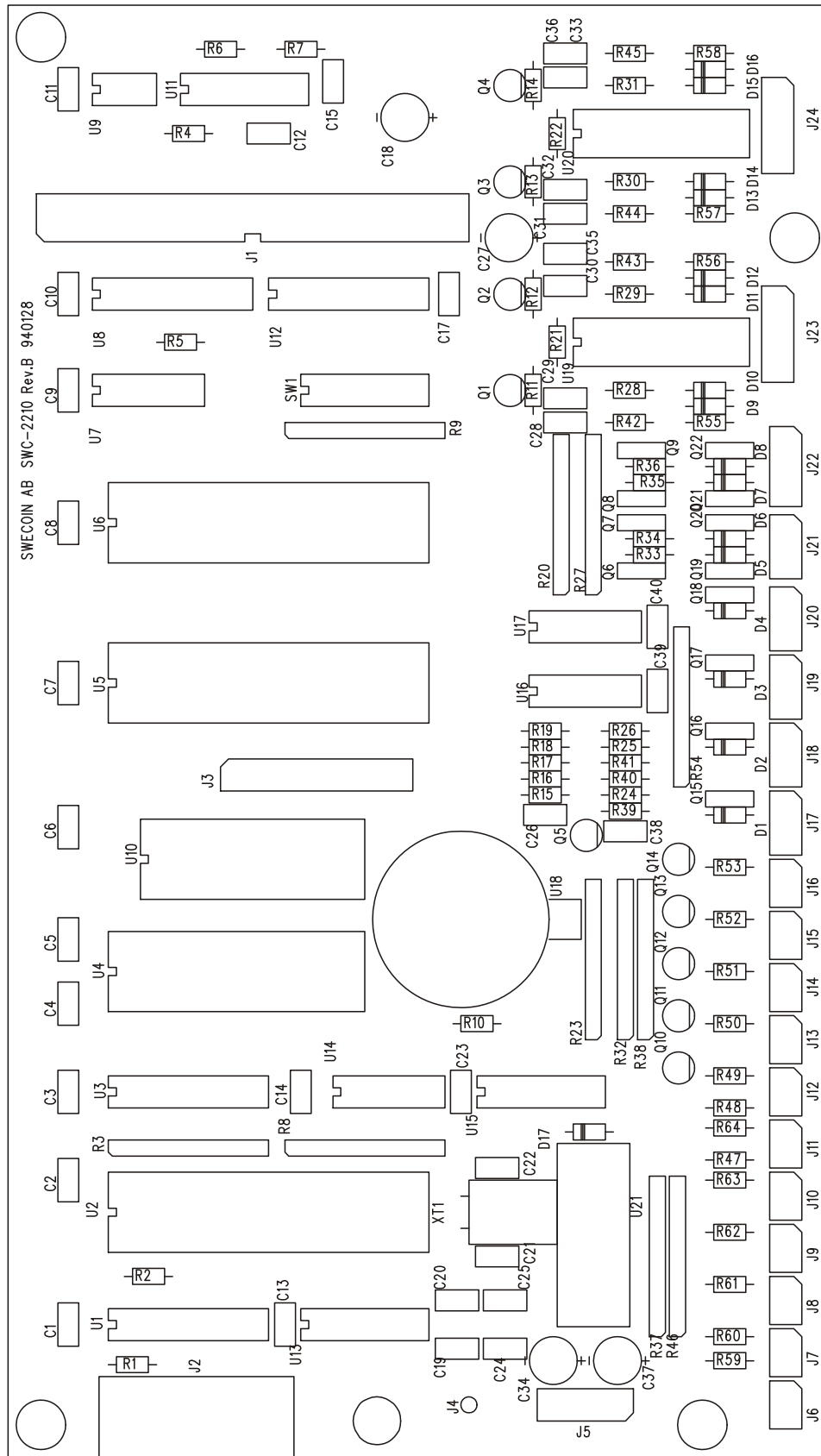
- U1: A00-A15, D00-D15, CS, WE, OE, VCC, GND
- U2: A00-A15, D00-D15, CS, WE, OE, VCC, GND
- U3: A00-A15, D00-D15, CS, WE, OE, VCC, GND
- U4: TXD, RXD, DTR, RTS, CTS, GND
- U5: Q0-Q7, VCC, GND
- U6: A00-A15, D00-D15, CS, WE, OE, VCC, GND
- U7: A00-A15, D00-D15, CS, WE, OE, VCC, GND
- U8: VCC, GND
- U9: VCC, GND
- U10: VCC, GND
- J4: TXD, RXD, DTR, RTS, CTS, GND
- J5: VCC, GND
- H1-H5: VCC, GND



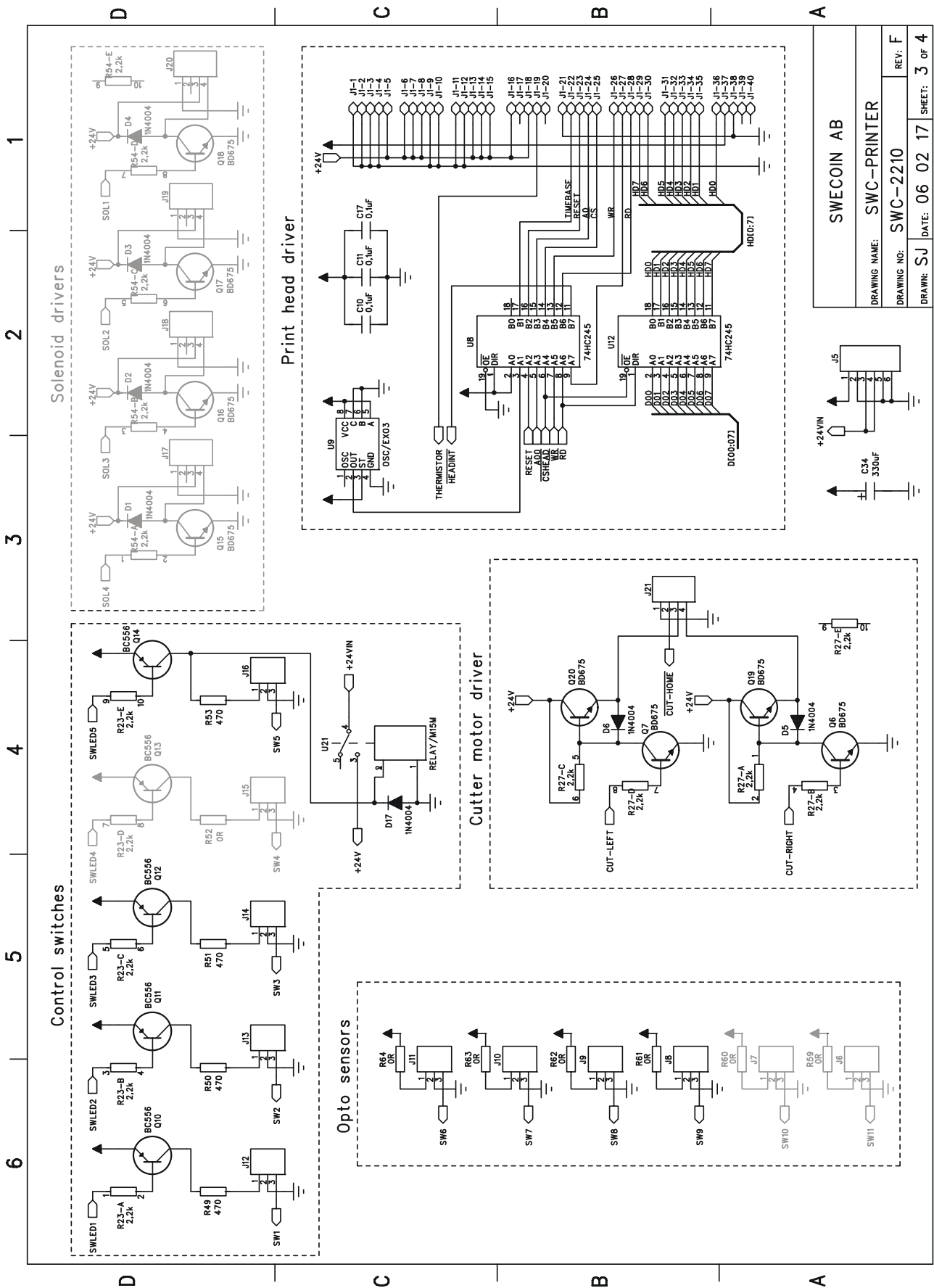


### 18.3 Control board, logic diagram SWC-2210 sheet 2



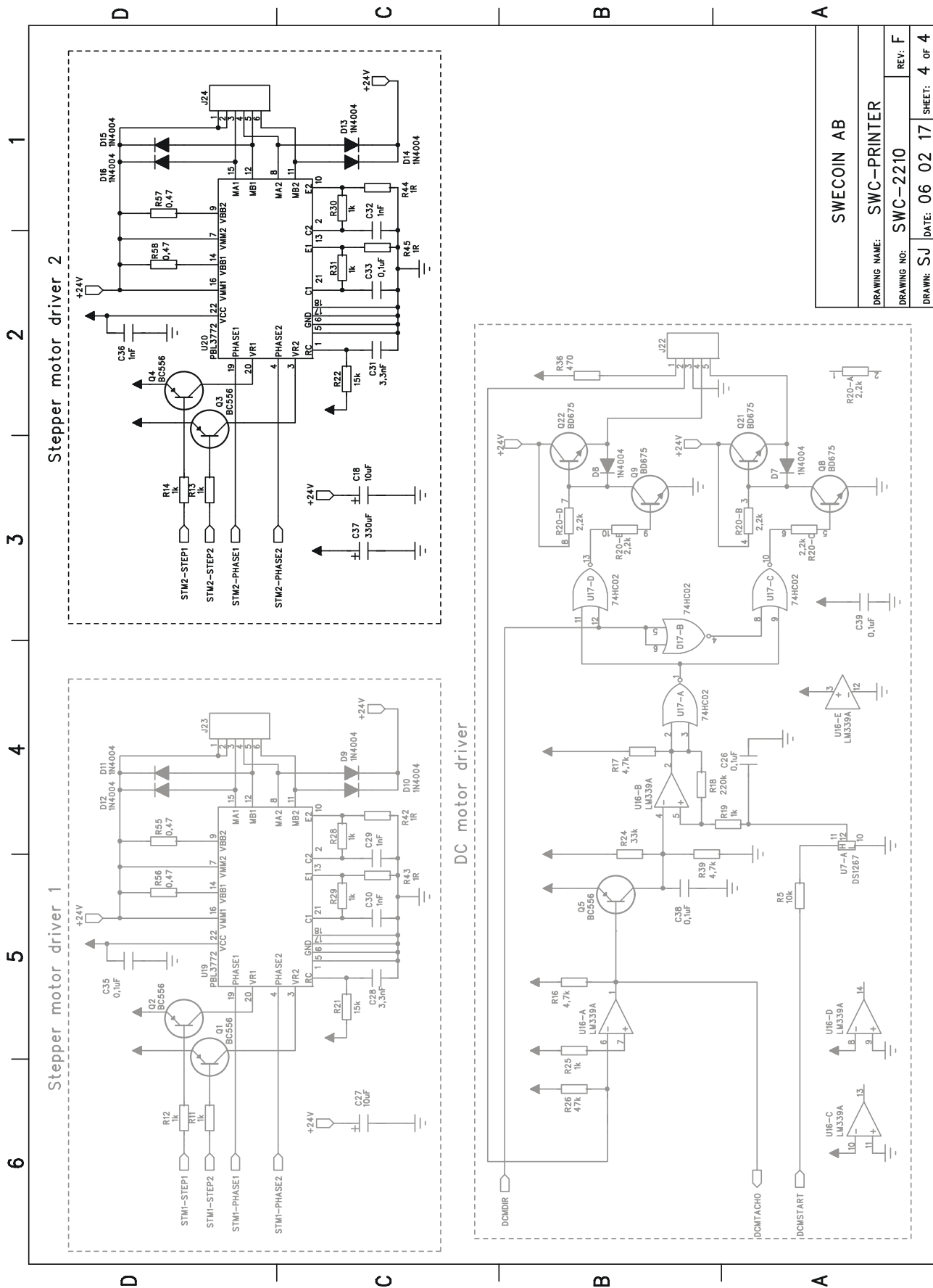


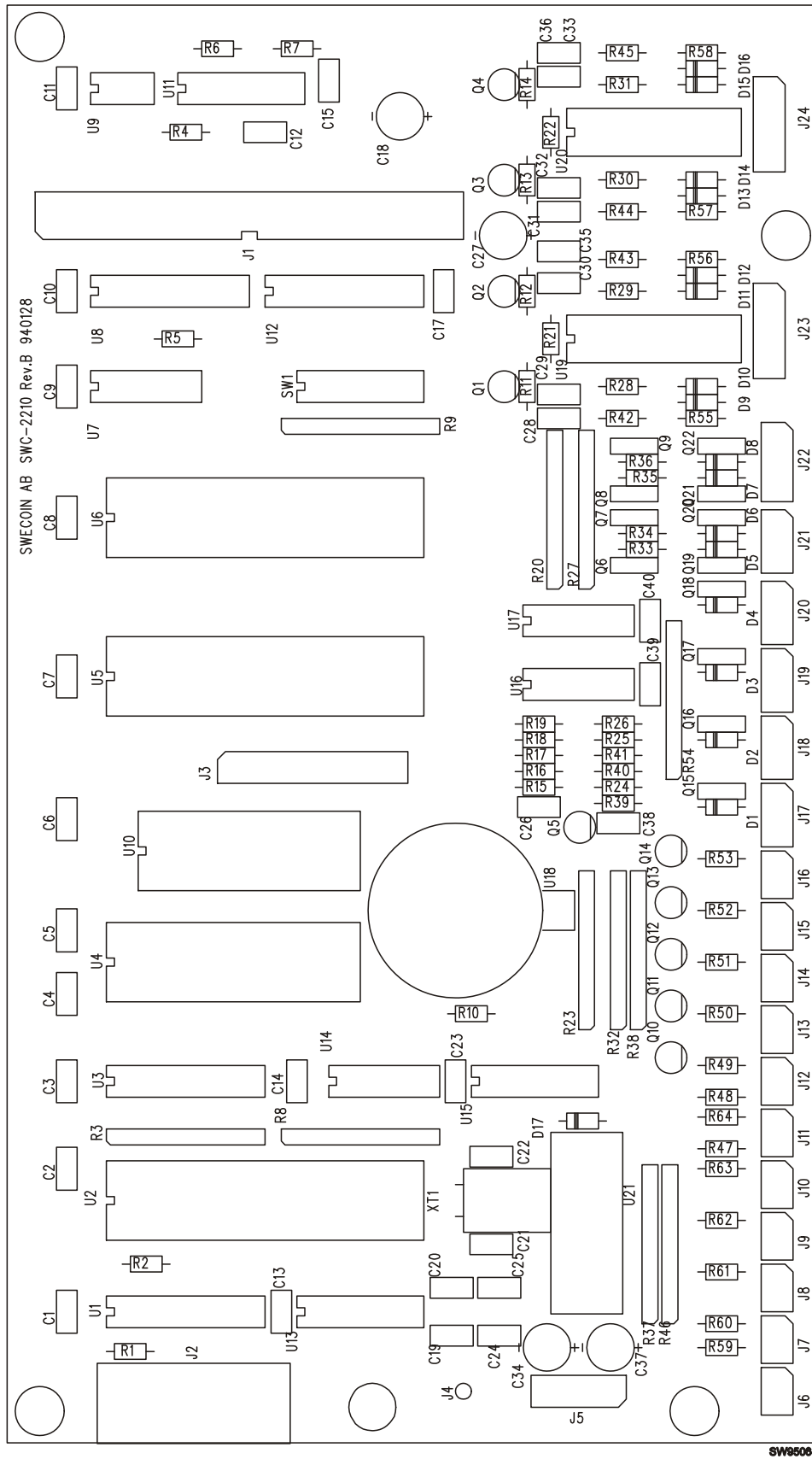
## 18.4 Control board, logic diagram SWC-2210 sheet 3





18.5 Control board, logic diagram SWC-2210 sheet 4





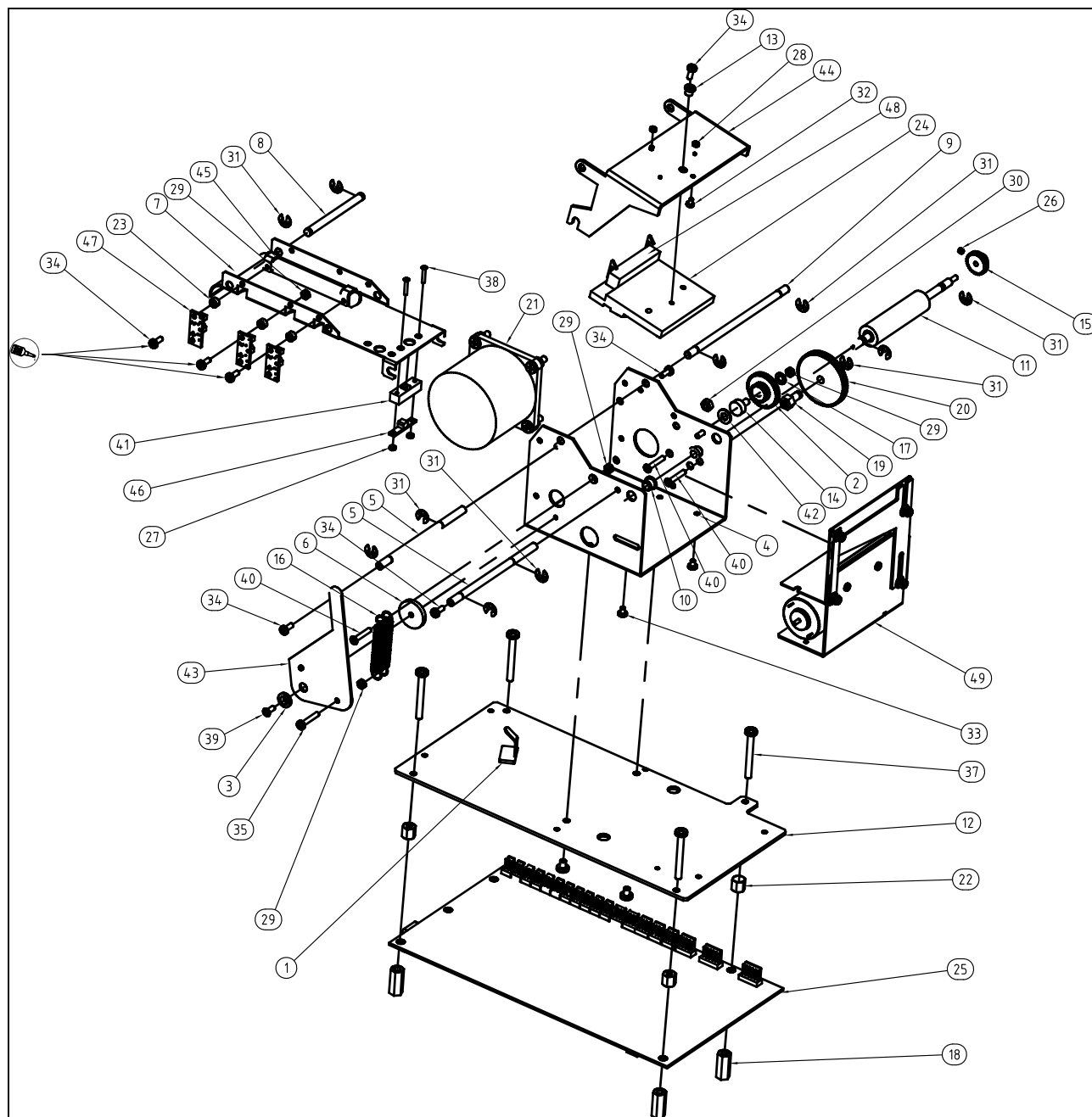


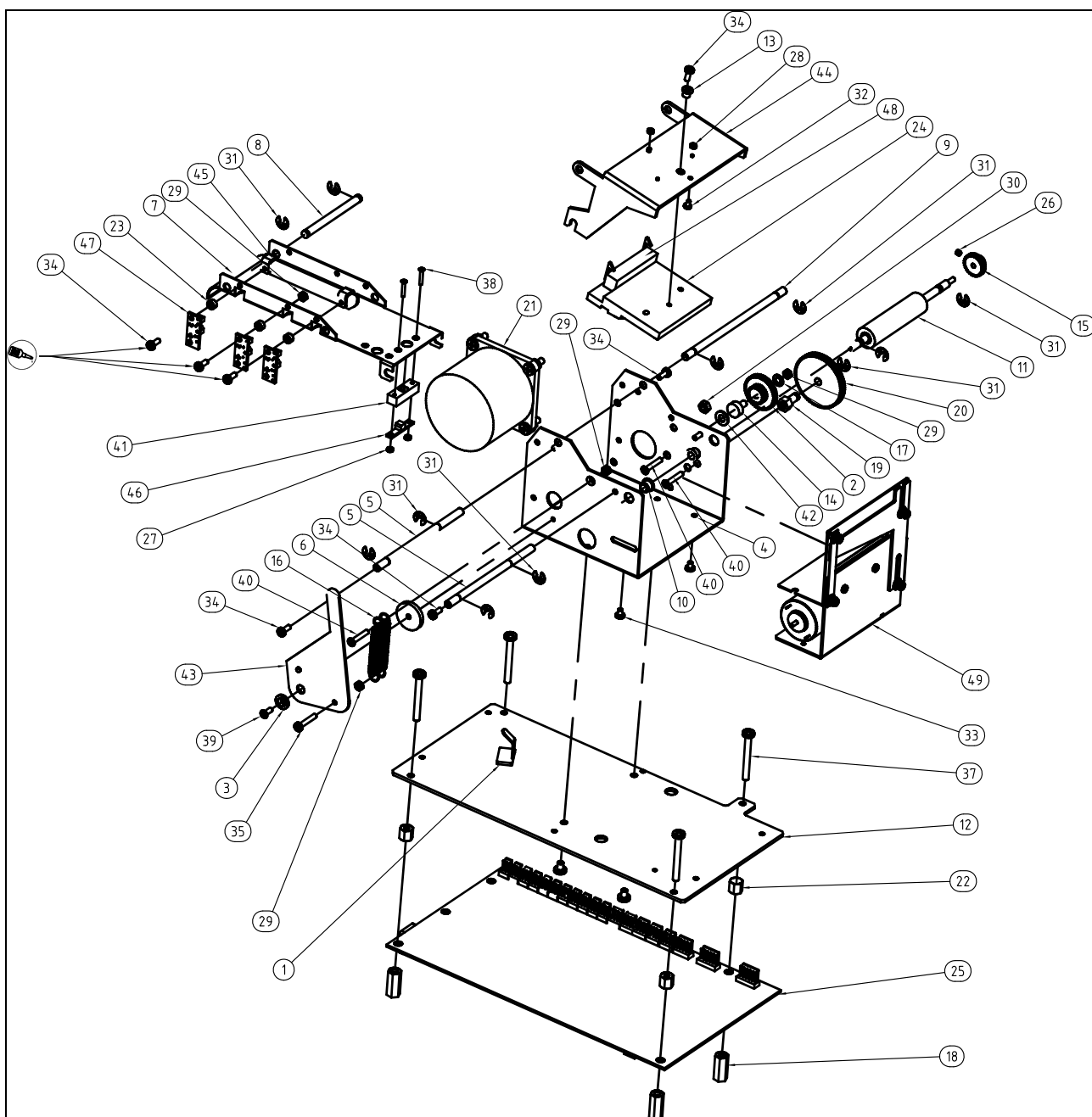
Figure 23. Replacement parts, CPM2030

## 19.1 Final assembly

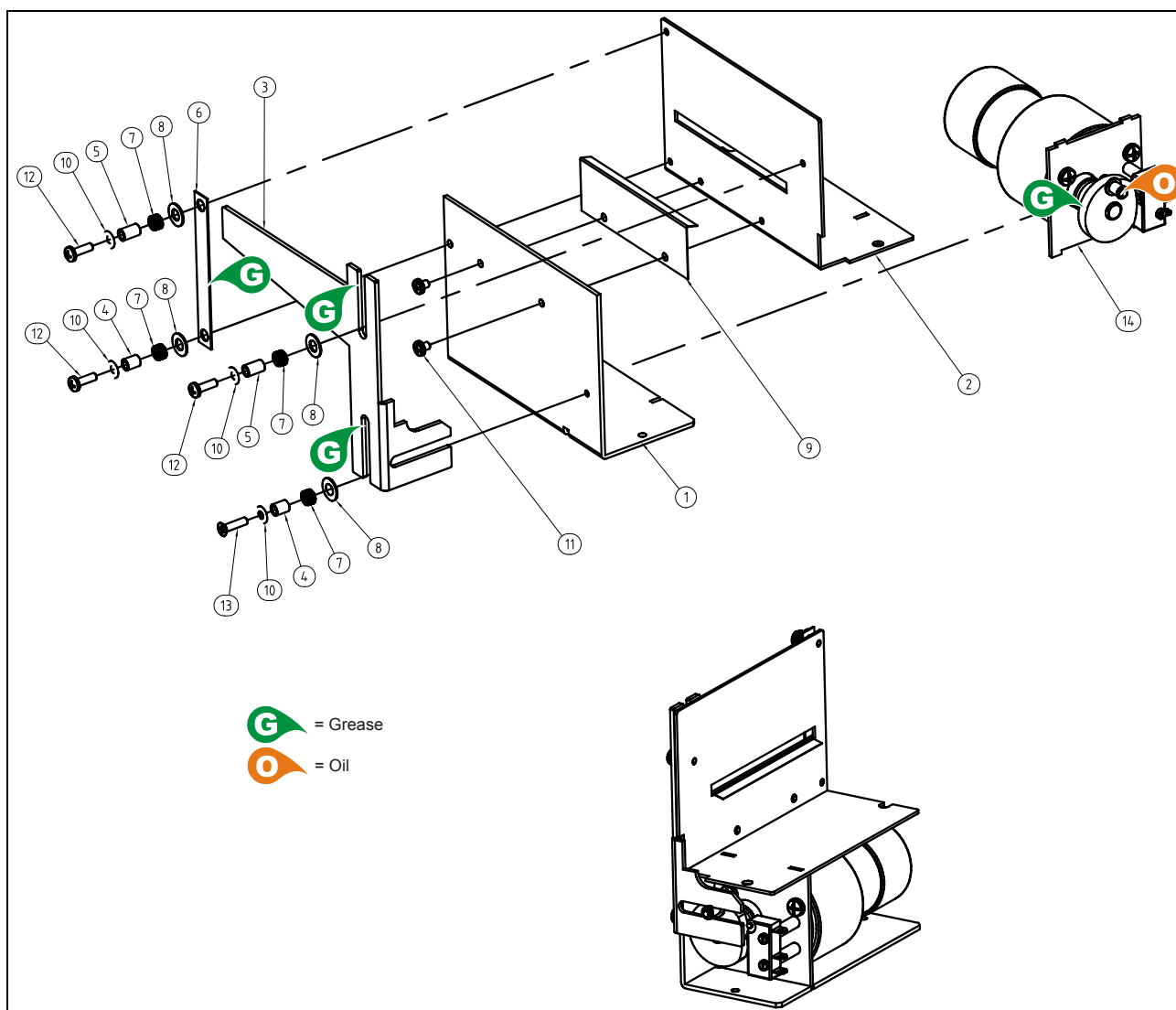
| Pos. | Part No.  | Designation                      | Quantity |
|------|-----------|----------------------------------|----------|
| 1    | 00358-000 | Cable Clamp                      | 1 Pcs.   |
| 2    | 00375-000 | Cog Wheel                        | 1 Pcs.   |
| 3    | 00515-000 | Hub                              | 1 Pcs.   |
| 4    | 00634-000 | Printer chassis                  | 1 Pcs.   |
| 5    | 00637-054 | Rod                              | 2 Pcs.   |
| 6    | 00705-000 | Distance washer                  | 1 Pcs.   |
| 7    | 00839-054 | Ticket Guide Plate, 54 mm        | 1 Pcs.   |
| 8    | 00840-054 | Shaft                            | 1 Pcs.   |
| 9    | 02204-001 | Shaft, upper                     | 1 Pcs.   |
| 10   | 02207-000 | Bearing                          | 2 Pcs.   |
| 11   | 02242-002 | Platen Assy                      | 1 Pcs.   |
| 12   | 02245-000 | Bottom Plate                     | 1 Pcs.   |
| 13   | 02254-000 | Spacer, Cylindrical              | 1 Pcs.   |
| 14   | 02257-000 | Hub                              | 1 Pcs.   |
| 15   | 02259-000 | Cog Wheel, Platen                | 1 Pcs.   |
| 16   | 02273-000 | Tension Spring 0.75x8x25         | 2 Pcs.   |
| 17   | 02279-000 | Washer BRB 4,3x8x0,5             | 1 Pcs.   |
| 18   | 02283-000 | Spacer Bolt, M4x18,5             | 4 Pcs.   |
| 19   | 02288-001 | Bolt                             | 1 Pcs.   |
| 20   | 02291-000 | Cog Wheel, Rear, Ø39 mm          | 1 Pcs.   |
| 21   | 02302-205 | Stepper Motor Assy               | 1 Pcs.   |
| 22   | 02311-000 | Spacer                           | 4 Pcs.   |
| 23   | 02336-000 | Spacer DRM 3260x3                | 3 Pcs.   |
| 24   | 02431-000 | Thermal Print Head Assy          | 1 Pcs.   |
| 25   | 02448-901 | Control Board Assy, TTPM2, CPM   | 1 Pcs.   |
| -    | 100979    | Battery 3 V Lithium, type CR2025 | 1 Pcs.   |
| 26   | 09018-217 | Screw SK6SS M3x3                 | 1 Pcs.   |
| 27   | 09022-307 | Nut M6M M2                       | 2 Pcs.   |
| 28   | 09022-309 | Nut M6M M2,5                     | 2 Pcs.   |
| 29   | 09022-310 | Nut M6M M3                       | 4 Pcs.   |
| 30   | 09022-312 | Nut M6M M4                       | 4 Pcs.   |
| 31   | 09045-108 | Circlip RS 4                     | 11 Pcs.  |
| 32   | 09100-189 | Screw MRX-H M2,5x4               | 2 Pcs.   |
| 33   | 09100-218 | Screw MRX-H M3x4                 | 2 Pcs.   |
| 34   | 09100-222 | Screw MRX-H M3x8                 | 8 Pcs.   |
| 35   | 09100-229 | Screw MRX-H M3x18                | 1 Pcs.   |
| 36   | 09100-284 | Screw, MRX-H 4x5 fzb             | 2 Pcs.   |
| 37   | 09100-301 | Screw MRX-H M4x35                | 4 Pcs.   |
| 38   | 09101-170 | Screw MFX-H M2x12                | 2 Pcs.   |
| 39   | 09101-222 | Screw MFX-H M3x8                 | 1 Pcs.   |
| 40   | 09101-229 | Screw MFX-H M3x18                | 3 Pcs.   |



| Pos. | Part No.  | Designation                  | Quantity |
|------|-----------|------------------------------|----------|
| 41   | 102035    | Light Shield                 | 1 Pcs.   |
| 42   | 102887    | Spacer DB 5X10X1             | 1 Pcs.   |
| 43   | 102888    | Free Arm assy                | 1 Pcs.   |
| 44   | 102890    | Pressure Plate Assy          | 1 Pcs.   |
| 45   | 103109    | Guide plate                  | 1 Pcs.   |
| 46   | 10620-200 | Opto Sensor Assy 390 ohm     | 1 Pcs.   |
| 47   | 10632-190 | Fork Opto Sensor Assy, 190mm | 3 Pcs.   |
| 48   | 10634-000 | Print Head Cable Assy        | 1 Pcs.   |
| 49   | 10803-060 | Cutter Module Assy           | 1 Pcs.   |

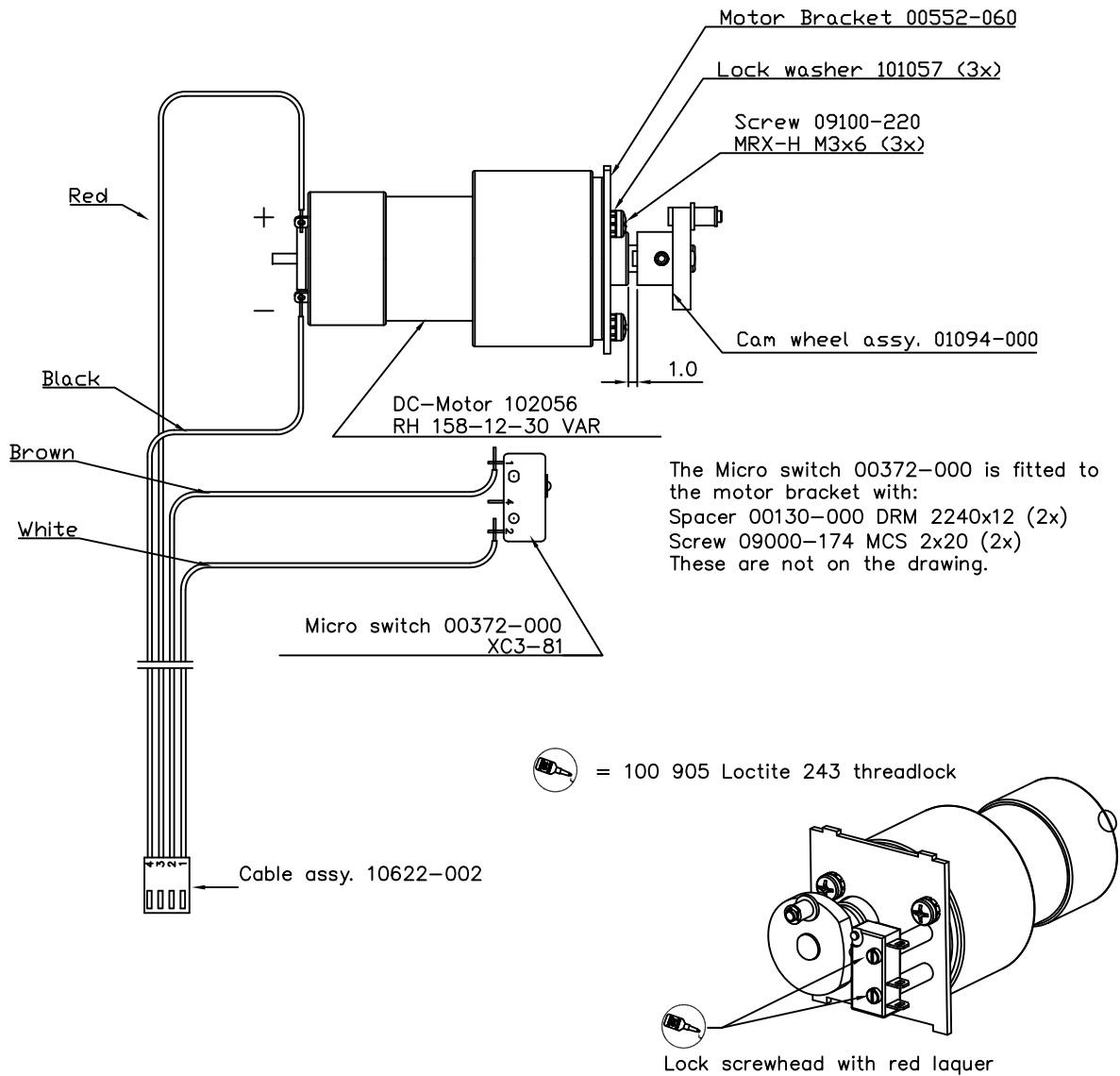


## 19.2 Cutter module 10803-060



| Pos | Part No.  | Designation                   | Quantity |
|-----|-----------|-------------------------------|----------|
| 1   | 00549-060 | Cutter Support                | 1 Pcs.   |
| 2   | 00550-060 | Print Mech. Support           | 1 Pcs.   |
| 3   | 00551-060 | Cutter Blade, Moving          | 1 Pcs.   |
| 4   | 00555-000 | Hub 5mm                       | 2 Pcs.   |
| 5   | 00555-001 | Hub 6.5mm                     | 2 Pcs.   |
| 6   | 00556-000 | Pressure Plate                | 1 Pcs.   |
| 7   | 00557-000 | Compression Spring 0.4x5x11.2 | 4 Pcs.   |
| 8   | 00559-000 | Distance washer, 4x8x0.5      | 4 Pcs.   |
| 9   | 00636-000 | Guide                         | 1 Pcs.   |
| 10  | 09023-118 | Washer BRB 2.7x6x0.5          | 4 Pcs.   |
| 11  | 09100-188 | Screw MRX-H M2.5x3            | 2 Pcs.   |
| 12  | 09100-193 | Screw MRX-H M2.5x8            | 3 Pcs.   |
| 13  | 09101-195 | Screw MFX-H M2.5x10           | 1 Pcs.   |
| 14  | 10622-003 | Cutter Motor Assy             | 1 Pcs.   |

### 19.3 Cutter Motor Assy. 10622-003



| Part No.  | Designation                       | Quantity |
|-----------|-----------------------------------|----------|
| 102056    | DC Motor RHV 158.12.30            | 1 Pcs.   |
| 10622-002 | Cable Assy, Cutter Motor          | 1 Pcs.   |
| 09100-220 | Screw MRX-H M3x6                  | 3 Pcs.   |
| 00372-000 | Micro Switch, Gold Plated XCG3-81 | 1 Pcs.   |
| 00552-060 | Motor bracket                     | 1 Pcs.   |
| 00130-000 | Spacer DRM 2240x12                | 2 Pcs.   |
| 09000-174 | Screw MCS-H M2x20                 | 2 Pcs.   |
| 01094-000 | Cam Wheel Assy                    | 1 Pcs.   |
| 101057    | Lock washer                       | 3 Pcs.   |

|                            |                          |  |
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