BRAILLO 650 SW

User's Guide

BRAILLO ● NORWAY

BRAILLO ● NORWAY

Dear Valued Customer,

Thank you for purchasing a Braillo Braille embosser and placing your trust in our company and products.

I know that the purchase of a production Braille embosser is a big one, and we are proud that you have chosen us. You have joined a close community that includes the largest and most important Braille production centers in the world.

Since 1980, Braillo has manufactured the finest Braille embossers available, many of which are still being used today. We provide a comprehensive 3 year warranty, which is unmatched in this industry. For further peace of mind, your Braillo is upgradeable, meaning that as technology changes, your embosser will have the ability to change with it. Our goal is to manufacture a Braille embosser that when properly maintained by following the instructions in this manual, will not only last decades, but will also produce Braille that is recognized as the highest quality available.

We rely on a close cooperation with our customers and we encourage your suggestions for improvements. Please take a moment to register your embosser so we can provide a lifetime of technical support, updates and special prices.

Again, thank you for giving us this opportunity to serve you.

Best regards,

Patrick N. Nunnelly
Managing Director

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1.　　PRINTER BASIC

Thank you for your purchase of a Braillo 650 SW. Please read this manual carefully before installing and operating this Printer.

Features

Prints interpoint, both sides of the page are printed simultaneously.
Specially designed to print 4 pages/sheet (like e.g. newspapers, magazines).
Prints 650 characters/second.
Self-test system checks the magnets continuously during printing.
Reliable, sturdy construction.
Safety switches that will turn the Printer off if somebody accidentally opens the cover.

Maximizing the operational life of your Braillo printer

Many 30-year-old Braillo printers are still in daily operation – a testament to their quality. To maximize the life of your Braillo printer, we strongly recommend using the correct tools, which come with your printer; as well as following the correct procedures, which we prescribe in the manual and reinforce in our training courses.

Additionally, just as the wrong wrench can ruin a nut, using poor quality Braille paper can ruin the printer's pins, print shoes and moveable parts by causing them to wear out prematurely. Failures due to user negligence of this nature, just as repairs carried out by untrained personnel, may compromise your warranty rights.

Braillo recommends using our specialized Braille paper and having your printer serviced by certified technicians who have successfully completed our training course.

More information regarding our training courses can be found on our website:

http://braillo.com/braillo-services/
http://braillo.com/event-registration/

More information on our Braille paper can be found on our websites:

http://braillo.com/braille-paper/
http://braillepaper.com/

Printer overview

Please see the figure below:

Note that the "right-hand" and "left-hand" side are referred to as if you were standing behind the Printer facing the opening where the paper is inserted into the Printer.

Right-hand side

Left-hand side

HORIZONTAL
STACKER

Label with
serial number
(inside door)

PRINTER/
CUTTER
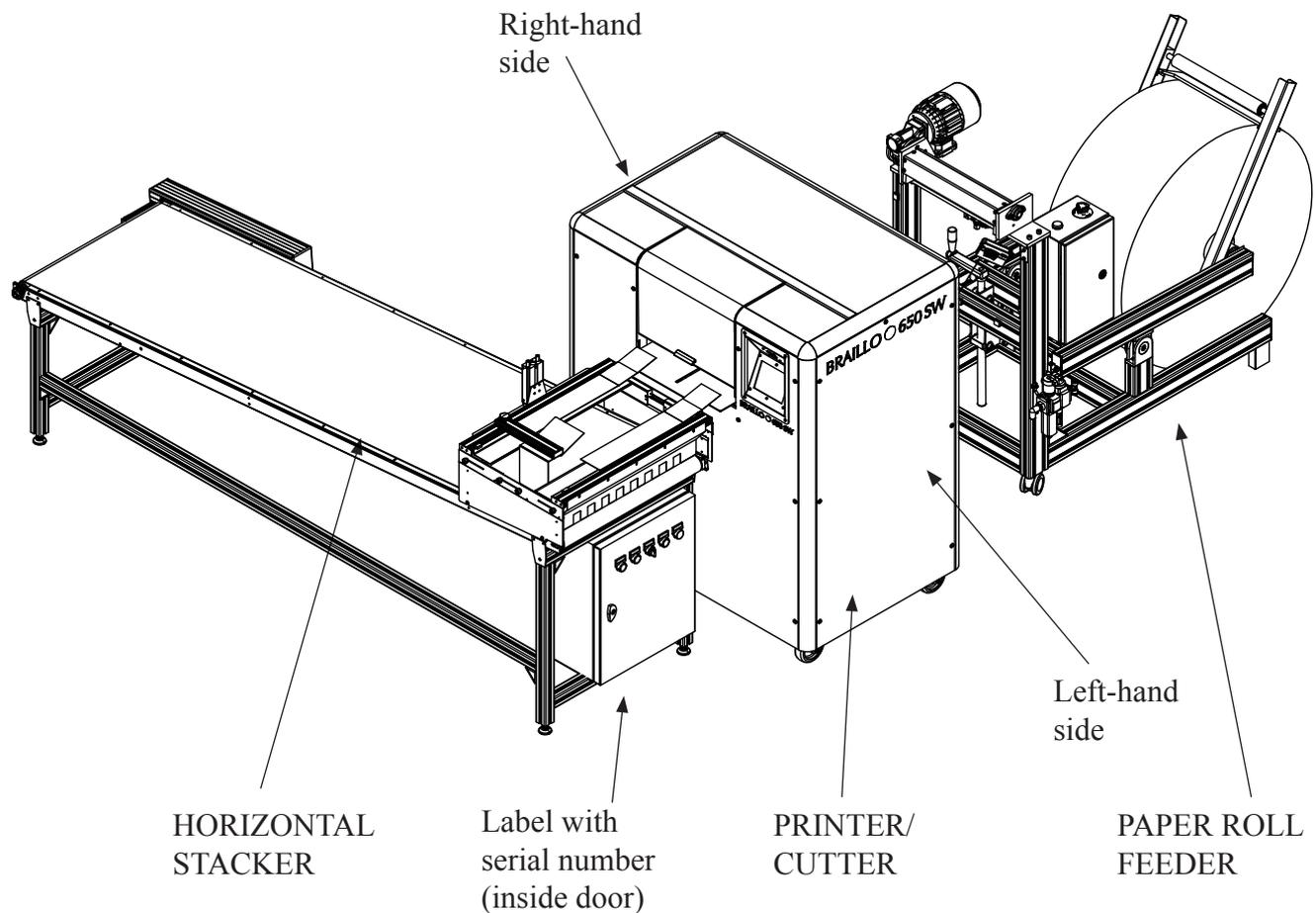
PAPER ROLL
FEEDER

How the paper travels through the machine.
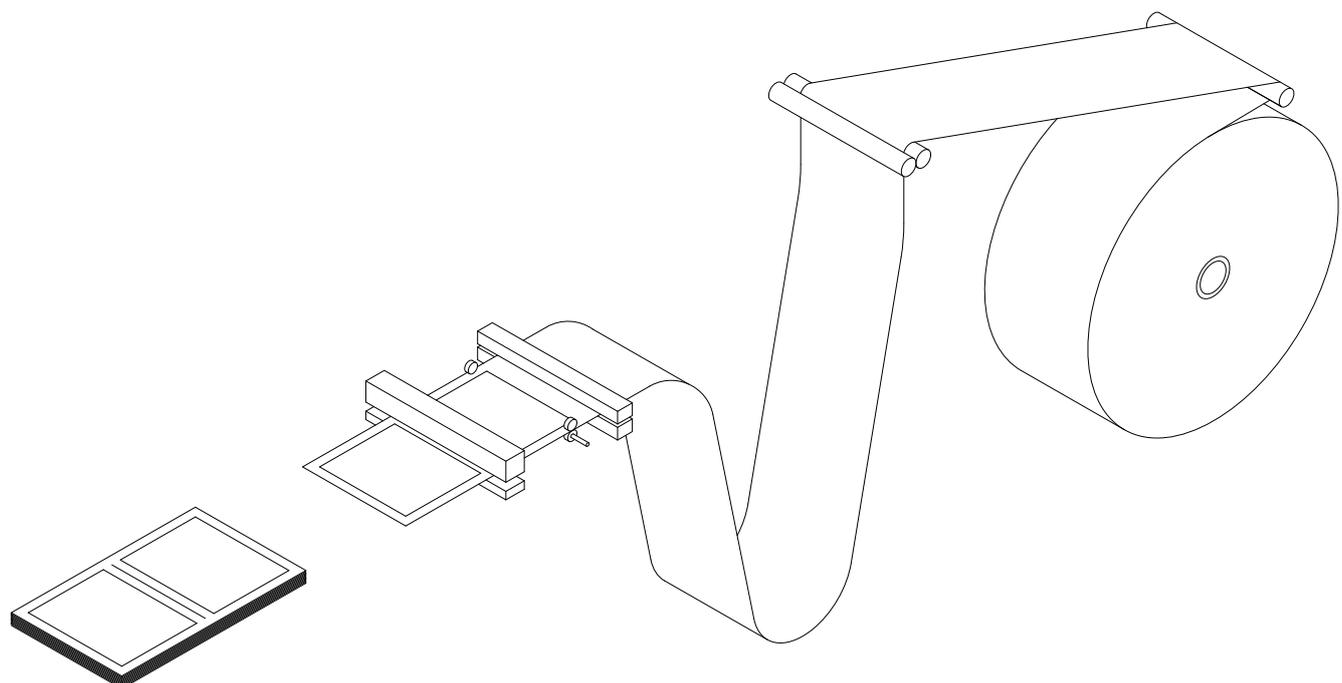
2.   INSTALLATION

Space:
The minimum space required for the Braillo 650 SW is approximately **4.7m X 3.0m** (16 X 10 feet). It is required at least 1.5m free space behind the paper roll feeder (so that the paper roll can be replaced).

Environment:
Braillo Printers are made to operate continuously and to be reliable for many years. However, sensitive electronic and mechanical parts require a suitable installation environment to ensure long and trouble-free operation. Temperature should be between 15° - 30° C (60° - 86° F), and relative humidity between 40 and 60%.
Maintain a clean environment because dust may clog the Printer - especially with high humidity. Too low humidity should also be avoided to prevent electrostatic problems.
Some paper qualities may generate excessive paper dust. This should be removed with a vacuum cleaner and a damp cloth. (About every 50,000 Sheets).

Electrical:
Single phase 230 volt (+/- 10%), 50/60 hertz, circuit breakers should be about 10 amperes.

Be sure to consult your distributor/supplier for further details concerning the installation site.

Failure to meet the installation requirements may relieve the supplier of any warranty responsibilities.

630 mm

Paper
Roll
Feeder

Top
view

3200 mm

Printer

720 mm

Horizontal
stacker

2700 mm
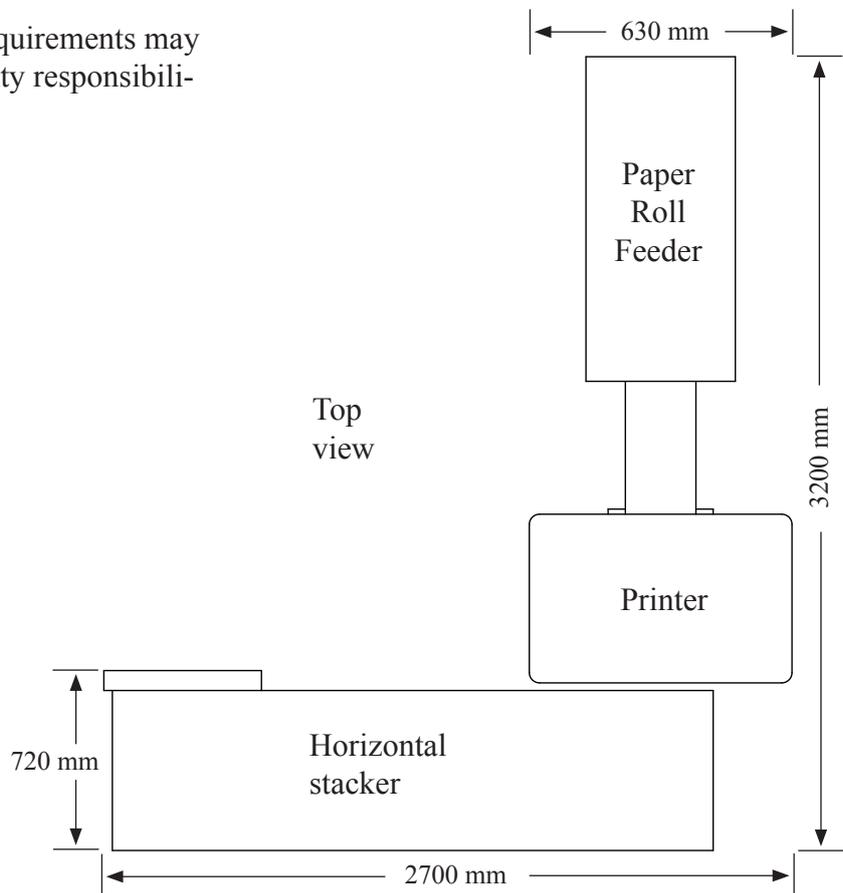
2.1   Unpacking

Unpacking and installation can be done by the user.
After unpacking the Printer, the cover must be removed before lifting the Printer. See chapter 2.2
"Removing the Printer cover".
Any kind of lifting of the Printer must always be done from the baseboard at the bottom of the Printer,
or from the steel frame, and should be done with extreme care.

Make sure that your Braillo Printer has not been damaged in transport. Check if the outer packing is
damaged. If so, it is possible that the Printer has also been damaged or scratched. If any damages are
found, please contact your distributor or Braillo Norway AS immediately.

Also check that the shipment contains the following items:

1   Printer
         1   Ethernet cable 5m (shielded)
         1   USB cable 5m
         1   User's guide B650 SW
         1   Tool kit for service and maintenance
         1   Test and packing list

1   Paper roll feeder
         1   Friction bar / correction roll
         1   Shaft, for the paper roll
         1   Paper sample
         1   Compressor (optional)

1   Stacker unit

If any of these items are missing, please contact your distributor or Braillo Norway AS.

⚠ **Important !**

It is very important that the Printer's specified voltage value (230V, +/- 10%) corresponds with the
local mains power supply available.

If the plug on the mains power cable is to be replaced, note that the yellow/green wire is the grounding
(earthing) wire.

⚠ **THE PRINTER MUST ALWAYS BE CONNECTED TO GROUND !**

After the items are unpacked, make sure that the transport boxes is stored for eventual later use.

2.2   Removing the Printer cover

See figures below and on the next pages.

The cover is constructed of an aluminium frame which is fastened with four screws (G) under the baseboard of the printer, there are one screw in each corner. Onto this frame the sides, front and back panels are fastened. Some of these panels can be taken off for a better access e.g. for smaller repairs or to connect to the electrical unit.

However, if the printer is going to be lifted or moved, and the printers own wheels cannot be used, the cover must be taken off completely.

It can be done like this:

Disconnect the mains.
Open the panel (A) by turning the seven screws (B) 1/4 of a revolution - use a coin or a screwdriver. Pull out the panel. Place it aside.
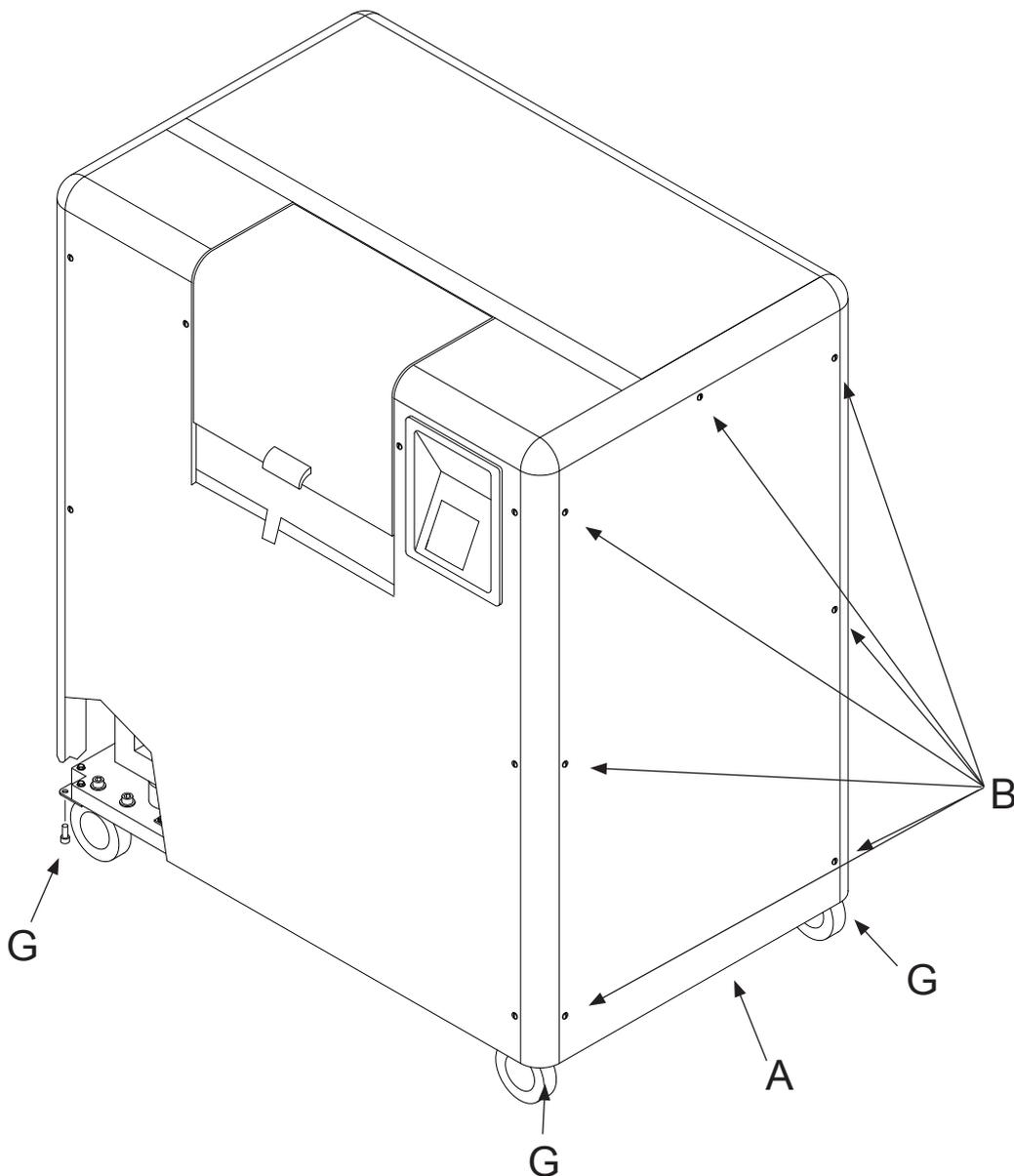
See the figure below for details.
- Disconnect the cable to the fans.
- Disconnect the two cables to the operating panel.
- Disconnect the cable to the safety switches in the cover.
Unscrew the four screws (G) (use a 6 mm hex key) and very carefully lift the cover upwards.
The Printer can now be moved to the desired location.
Please observe that it is possible to lock the wheels to secure the Printer when it is positioned.

To release,
press here

G   G

Cable for cover
safety switches

Fans
connector

Operator panel
connectors

To release,
press here

To release,
press on both sides
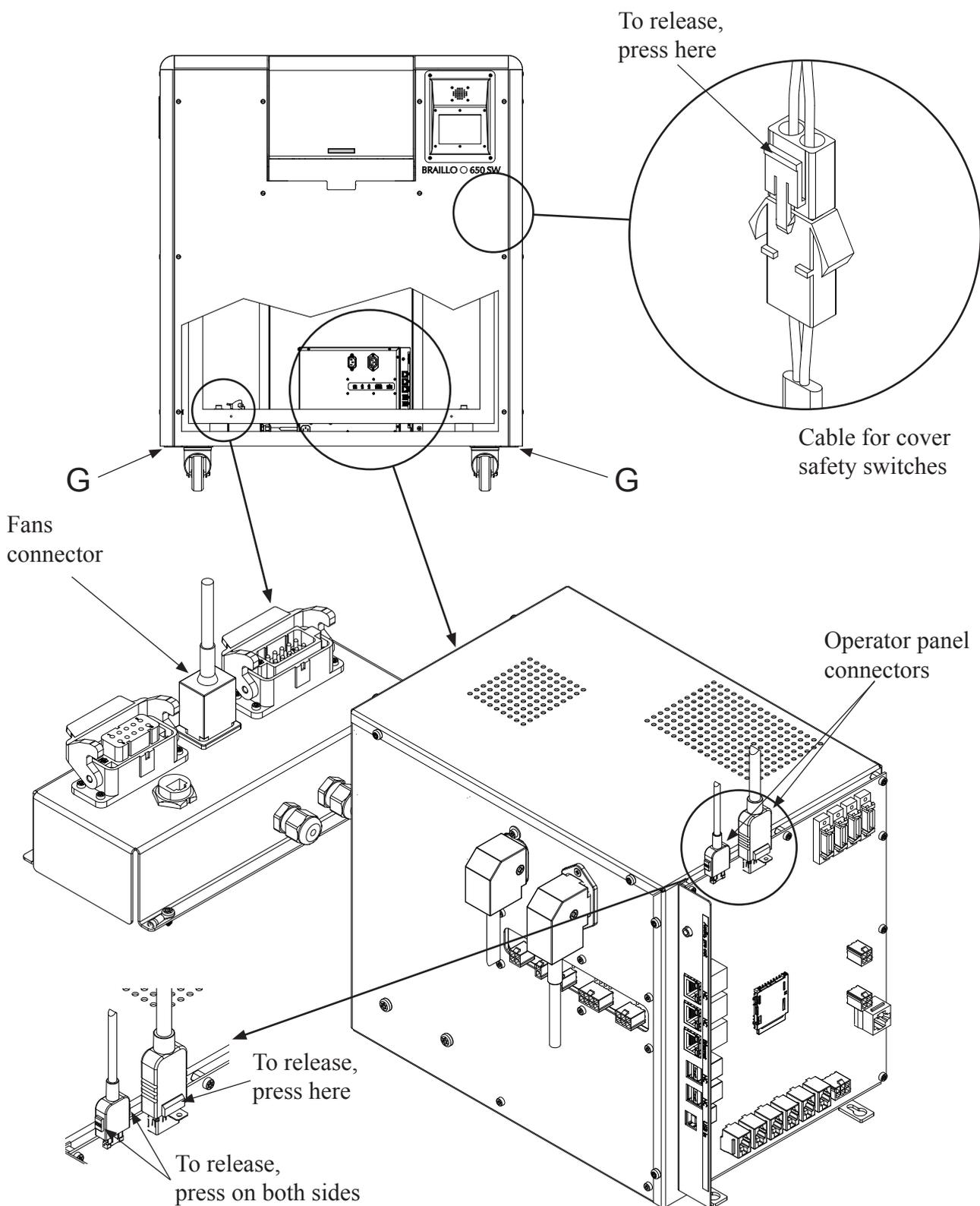
2.3   Removing the transport locks

⚠️ **This Printer has eight transport locks. All eight must be removed before starting the Printer!**

There are four between the base plate and the steel frame, and four between the steel frame and the printing mechanism.

Please see figures below:
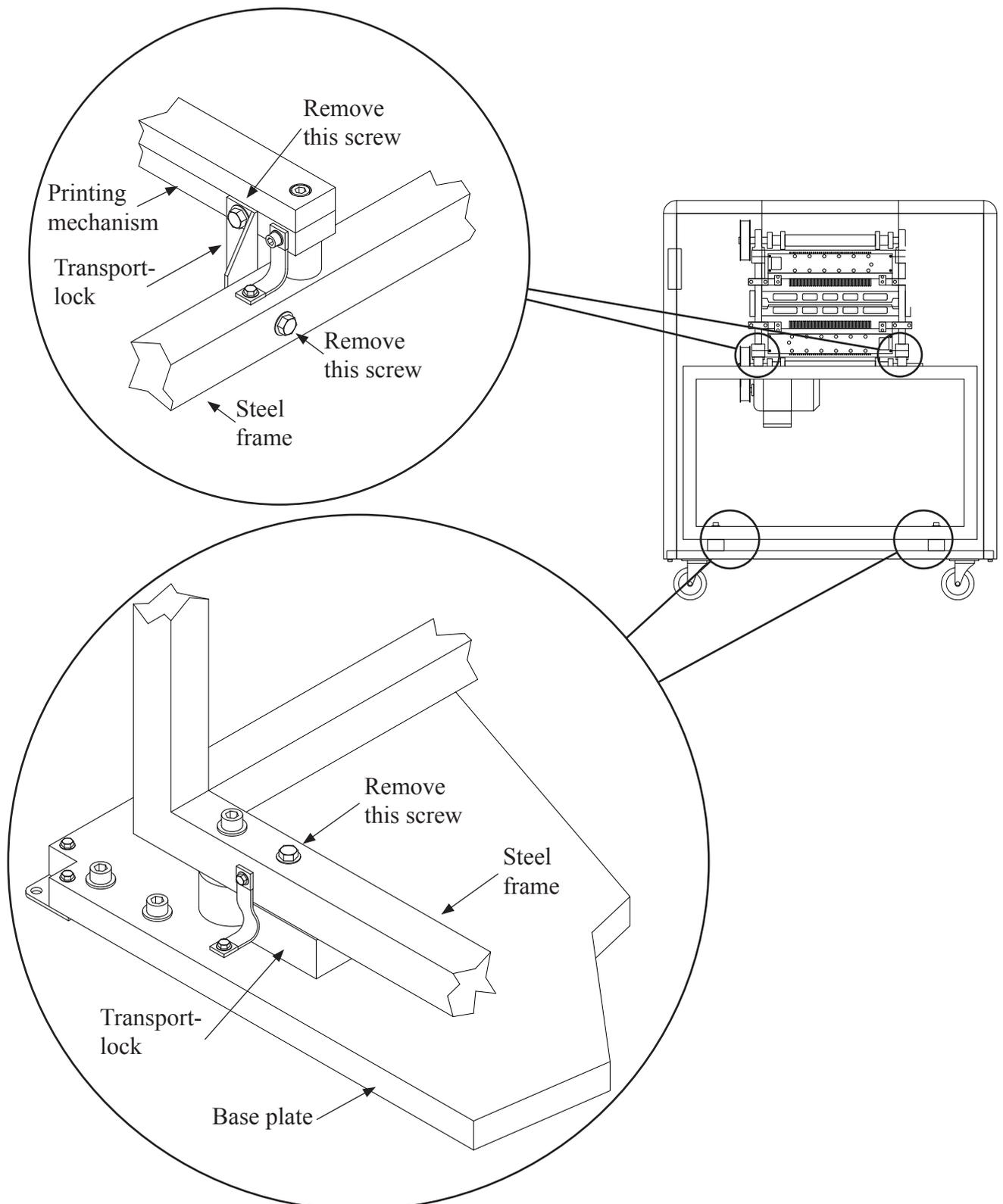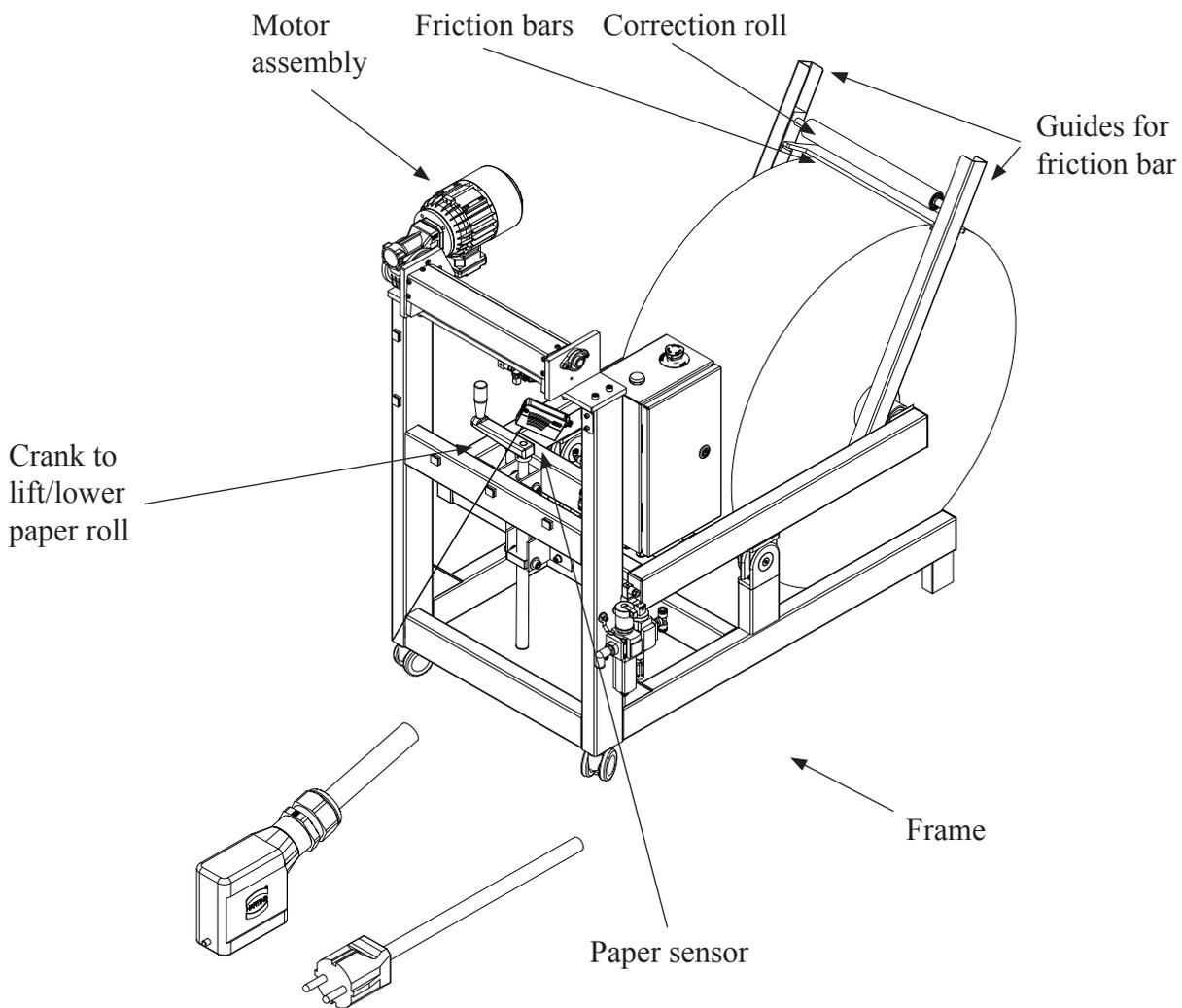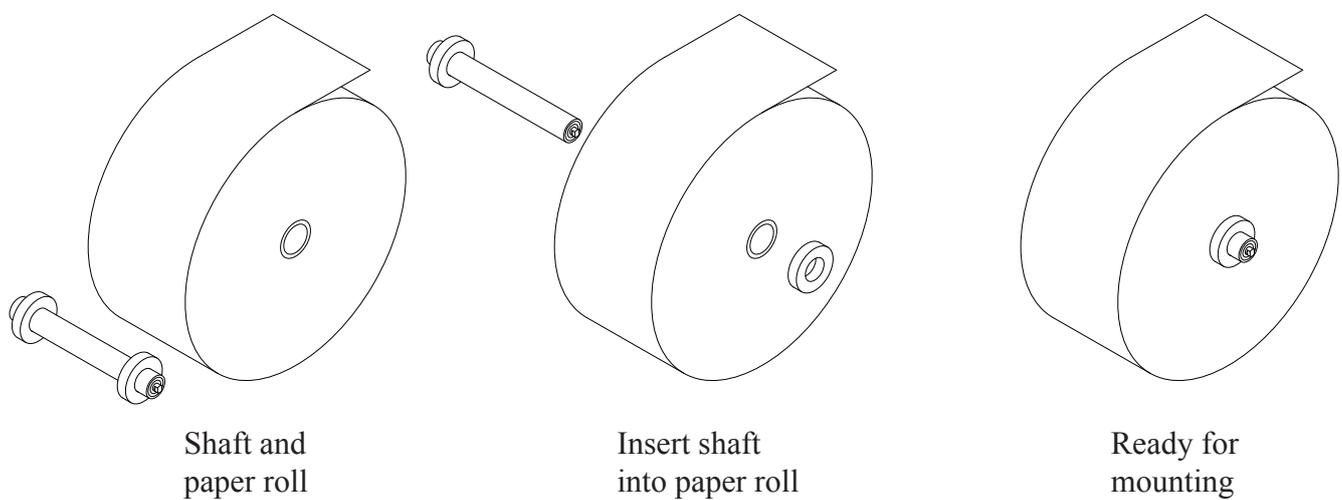
Remove
this screw

Printing
mechanism

Transport-
lock

Remove
this screw

Steel
frame

Remove
this screw

Steel
frame

Transport-
lock

Base plate

2.4   Paper roll feeder

Motor assembly   Friction bars   Correction roll

Guides for friction bar

Crank to lift/lower paper roll

Frame

Paper sensor

Placing the paper roll

Shaft and paper roll

Insert shaft into paper roll

Ready for mounting

Put the shaft in the center of the roll, and ensure that the shaft is approximately in the centre sideways. Fasten the shaft. The roll must be placed so that the paper is rolled off at the top. (See figure).

Place the paper roll with the shaft already fastened just behind the Paper Roll Feeder. Lift off the correction roll with the friction bar and set aside. Use the crank to lower the roll lift until the lift is below the shaft in the roll. Move the roll forward, make sure that the shaft is situated just above the notches, while turning the crank to raise the roll lift. Turn the crank until the roll is lifted above the floor. Put the correction roll with the friction bar on top of the paper roll like on the figure below.
Remove and throw away the first rounds of paper on the paper roll (to get rid of e.g. sand, dust and dirt after rolling the paper roll on the floor).

The paper line must go in between the friction bar and the correction roll. Ensure that the friction bar is resting on top of the roll.
Now the paper must go through the feeder rolls. If turned on, the motor will feed some paper, and the paper can be inserted into the Printer.

Paper sensor   Feeder rolls   Correction roll
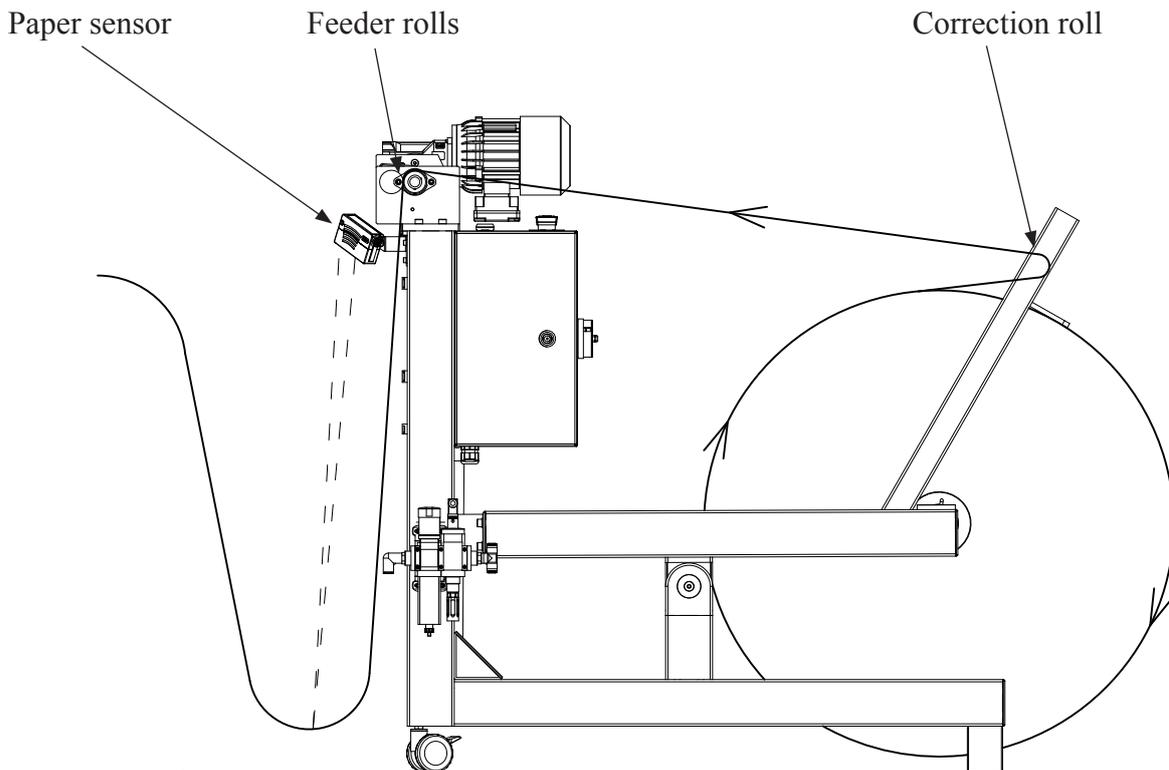
The paper sensor is a laser distance sensor, and is using a laser beam to check the distance to the paper. If the distance is long (the paper is close to the floor) feeding speed is slow (or it will stop completely) and if the distance is short, feeding speed is high. This will ensure that there is a constant slack of paper between the Paper Roll Feeder and the Printer.

The paper is clamped between the feeder rolls with a compressed air cylinder. After a short period of stand still, the pressure on the feeder rolls will be released. This is done to prevent deformation of the paper.

2.5   Compressed air

This equipment requires clean, compressed air, minimum 7.0 bar @ 100 l/min., and max. temperature 50° C to the regulator to function. To make this compressed air, you will need to use some sort of compressor. No matter what kind of compressor is chosen, there are some important things to remember.

⚠️ **First, please read the enclosed instruction manual for the compressor!**

There are many different compressor types on the market, and this chapter will not deal with a particular compressor, but will discuss the topic more in general. Please see the figure below for an example, but refer to your compressor manual for the specific information.

Normally a compressor have two pressure gauges and a pressure regulator fitted. The first gauge is measuring the tank pressure (before the regulator) and the second gauge is measuring the output pressure (after the regulator). The pressure at the compressor outlet must be adjusted to approx. seven bar. This can be controlled at the output pressure gauge.

To have long and trouble free operation, the air must be filtered and free from oil and water. When air is compressed in a compressor, the air temperature is rising. So the air entering the tank will be hot. When the air is cooling down, the humidity in the air will condensate inside the tank. So the warmer and more humid the air entering the compressor is, the more water condensates inside the tank. The compressor is lubricated with oil and small amounts of oil may also get into the tank.

⚠️ **This means that the tank must be drained for oil and water on a regular basis.**

If the air is supplied from the smaller types of compressors delivered from Braillo Norway AS, it is required to keep the compressor in a similar environment as described for the Printer itself. (Temperature 15 - 30°C (60 - 86°F) and rel. humidity 40 - 60%).

If the compressor is placed in a more harsh environment, it might be necessary to take further precautions to remove oil and water from the air.

Basic elements on a compressor:

Tank pressure gauge

Output pressure gauge (adjust to 7 bar)

Tank drainage   Filter drainage
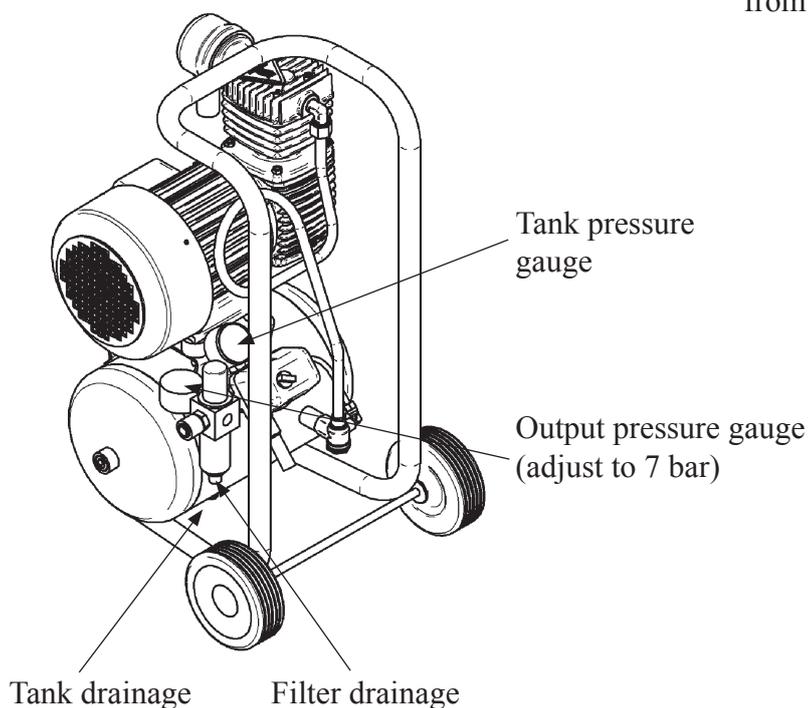
Filtering and drainage

To stop oil and water from getting into the Printer, there are filters and drainage units in the line.
Some of this filters need to be drained, and some is automatically drained.
How often the manual draining has to be done depends on many things e.g. the temperature and humidity in the environment around the compressor and the workload on the compressor. The more the compressor runs, the hotter it will be and therefore it will produce more oil and water. So the best way is to learn from experience in the different situations.

There is an additional filter/drainage/regulator inside the Printer. This one has automatic drainage, so it will empty itself whenever it is something to drain.

When the compressor is starting, the tank pressure is zero (or very low). The pressure will then start to raise slowly. Because of this slow increase, the drainage valve might leak out the pressure.
To solve this problem, a ball valve is fitted on the pipe nearby the compressor. This ball valve must be closed until the compressor has filled it's tank. Then open the ball valve and the drainage valve will be closed.

When the compressor is empty:

1. Close the ball valve.
2. Turn on the compressor.
3. Wait for the pressure to reach about 6 bar.
4. Open the ball valve.
5. Ready.

Regulator   To Paper Roll
                   Feeder

Release valve

The gauge
should read
6,0 bar

Water
drainage

From compressor   To Printer and
                       Stacker unit
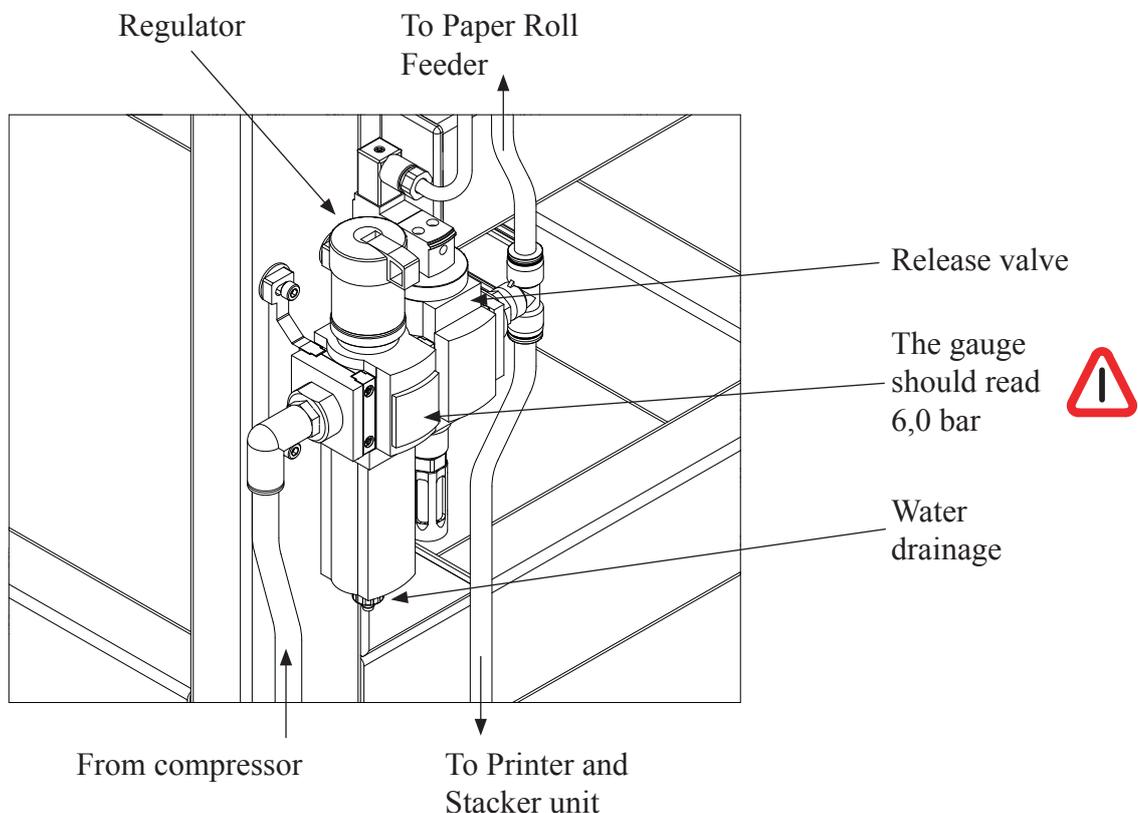
2.6   Horizontal stacker, assembly

The stacking unit is placed under the conveyor belt during transport, with all the cables and air pipes in place. Move the stacking unit up on top like on the figure below, and fasten it with the four screws.
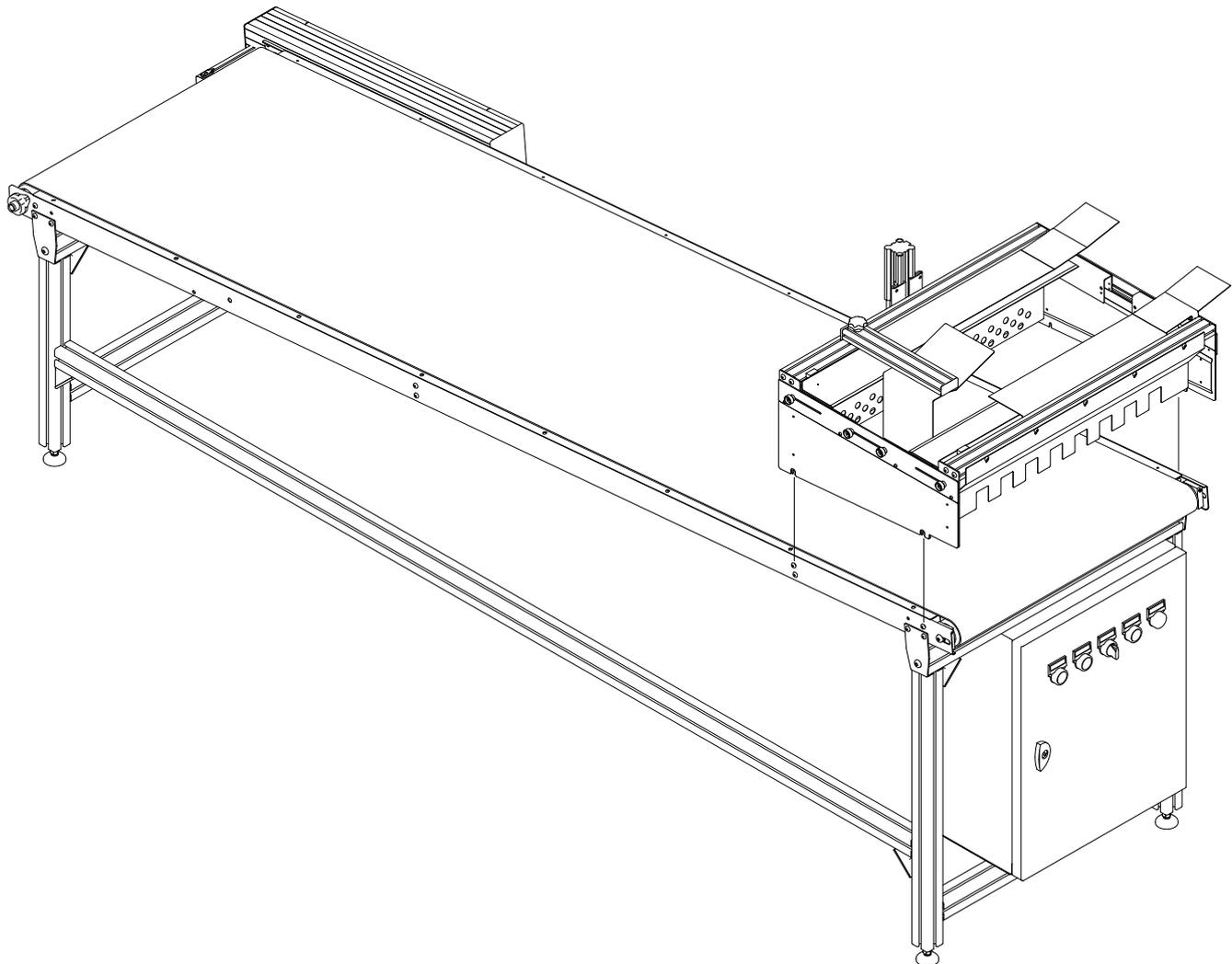
Paper cutter, assembly

The paper cutter is placed under the conveyor belt during transport, with all the cables and air pipes in place. Put the paper cutter up onto the Printer like on the figure below.

Paper cutter

Fastening
bolts (4 pcs.)
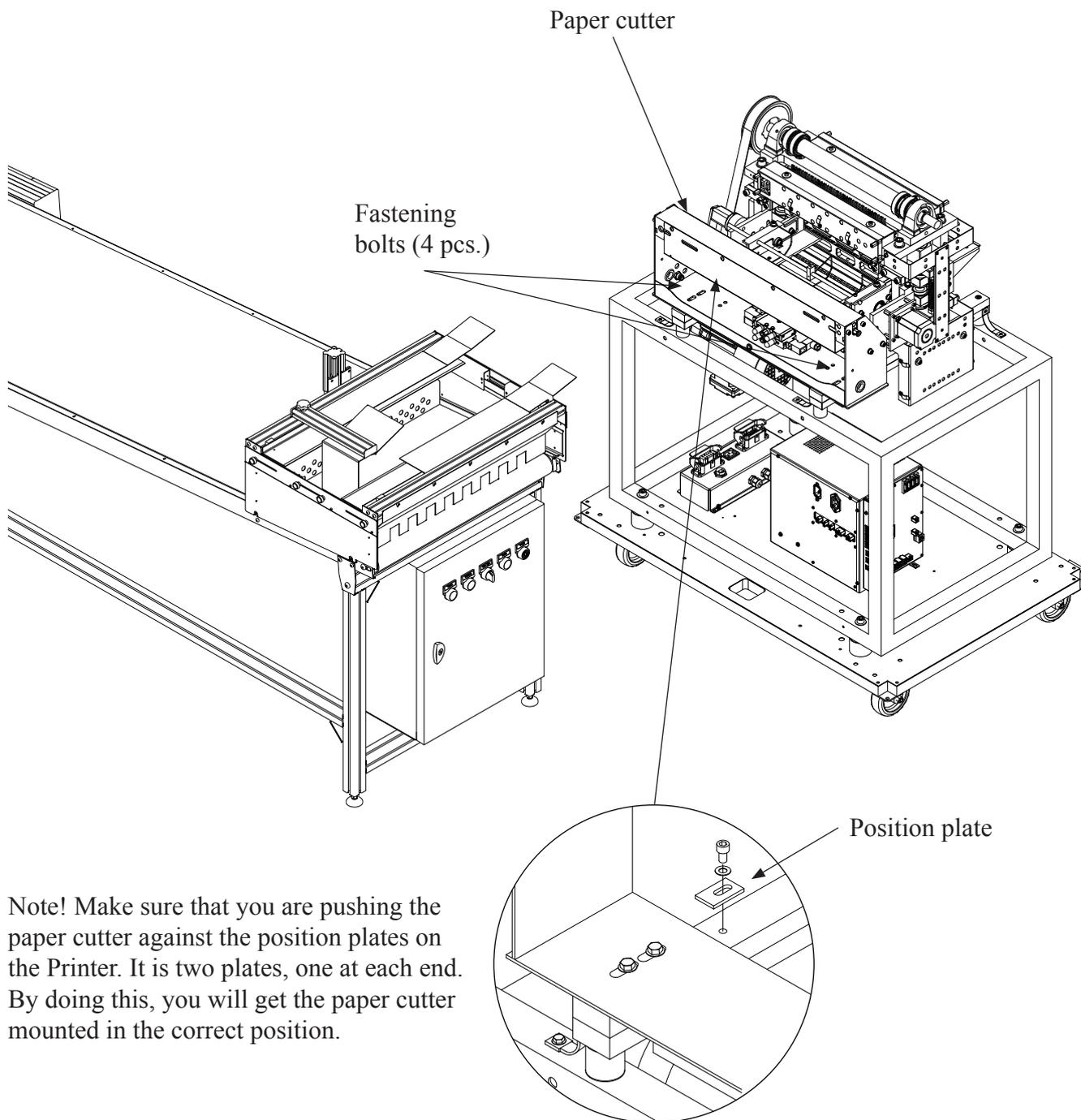
Position plate

Note! Make sure that you are pushing the paper cutter against the position plates on the Printer. It is two plates, one at each end. By doing this, you will get the paper cutter mounted in the correct position.

Paper pusher, assembly

The paper pusher is placed inside the Printer during transport, with the air pipes mounted. The screws and spacers are mounted on the underside of the cutter. Fasten the paper pusher like on the figure below. Connect the pipes to the side plate on the cutter. The pipes are marked, and the marking should correspond with the label.

Fastening screws (4 pcs.) is mounted on the underside of the cutter

Paper pusher
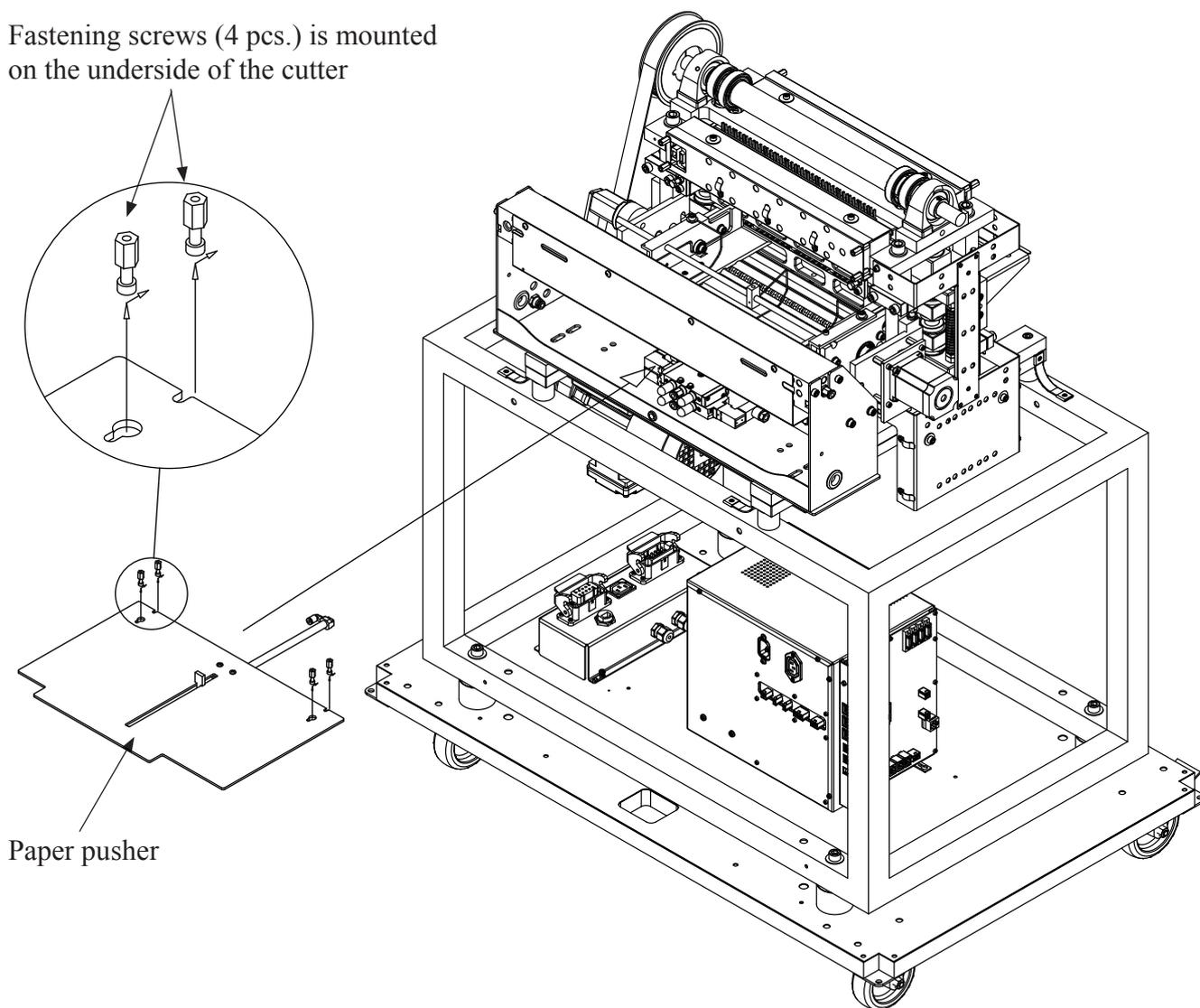
2.7   Connecting compressed air

See figures below.

The compressed air from the compressor goes to the filter, regulator and release valve unit on the Paper Roll Feeder. From there it goes to the Printer and to the Stacker unit.
If the power is turned off, or one of the emergency switches has been pushed down, the release valve will shut off and release the pressure of the compressed air on all machines.

Filter, regulator and release valve

From compressor

Regulator

To Paper Roll Feeder

Release valve

The gauge should read 6,0 bar

Water drainage

From compressor

To Printer and Stacker unit
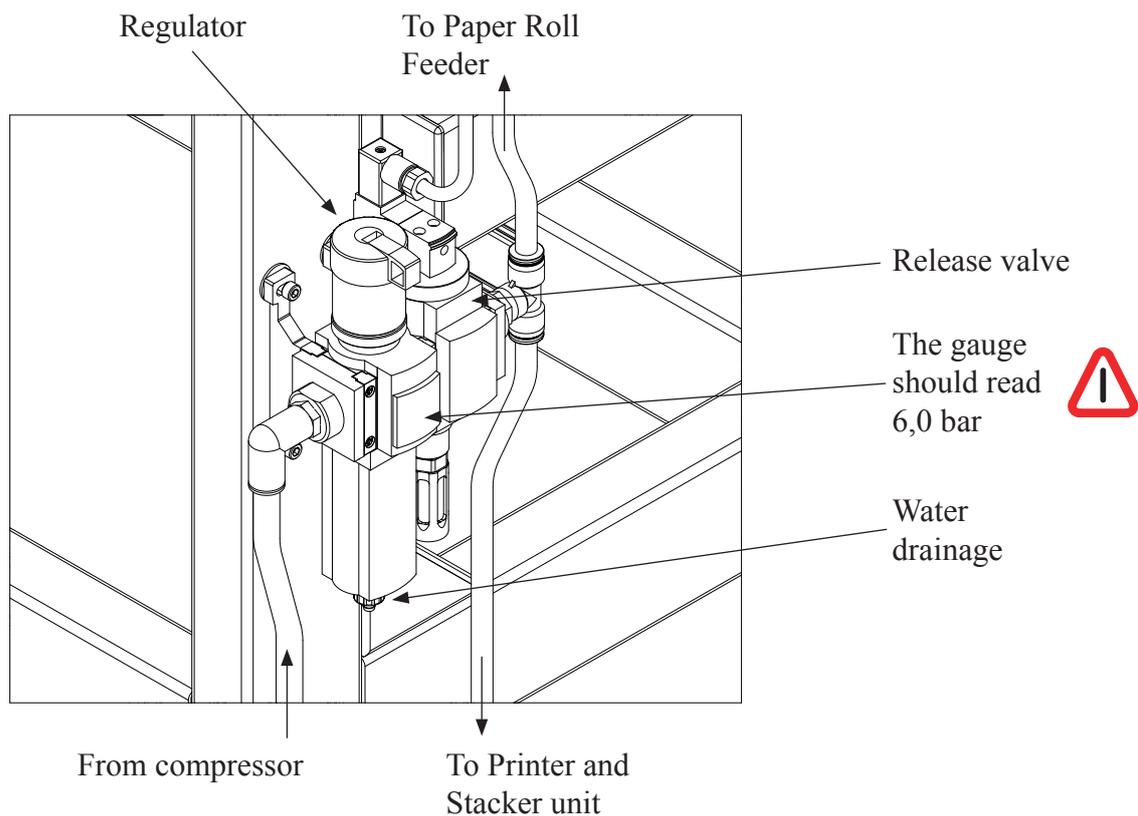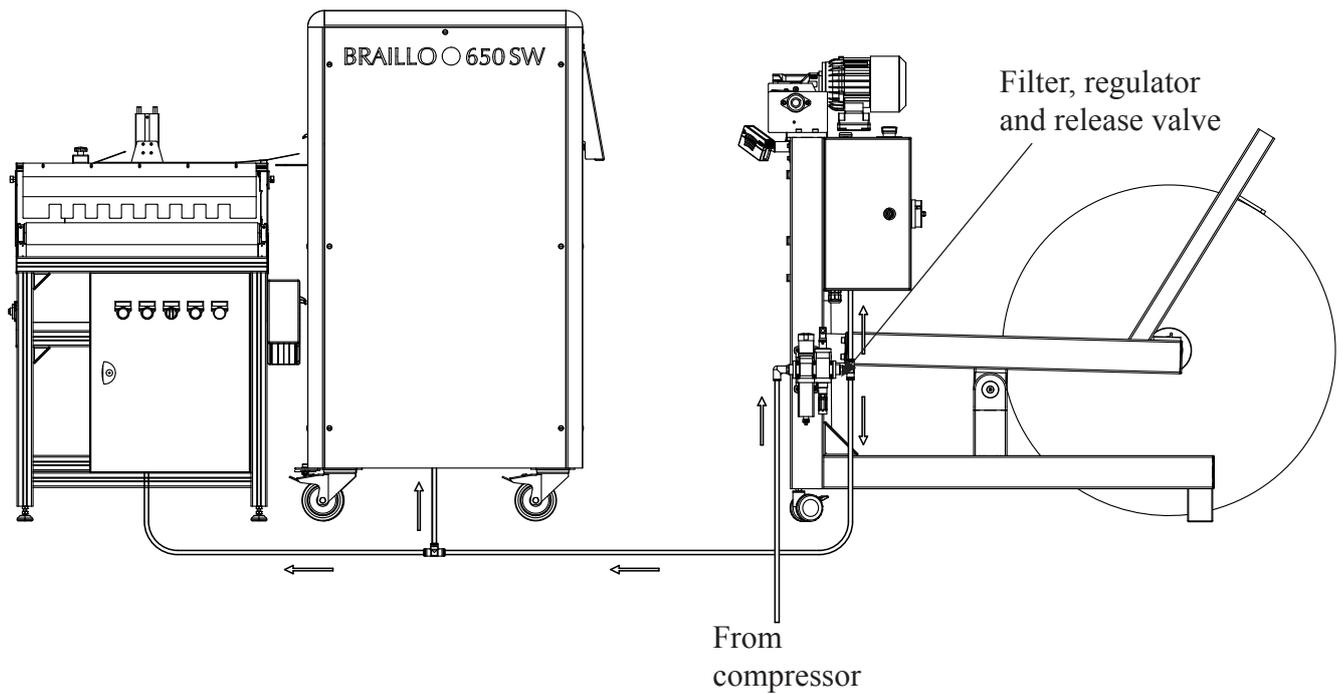
2.8   Connecting the units together

NOTE!
Mains voltage must be 230V 50/60 Hz!
Always connect the units to ground!
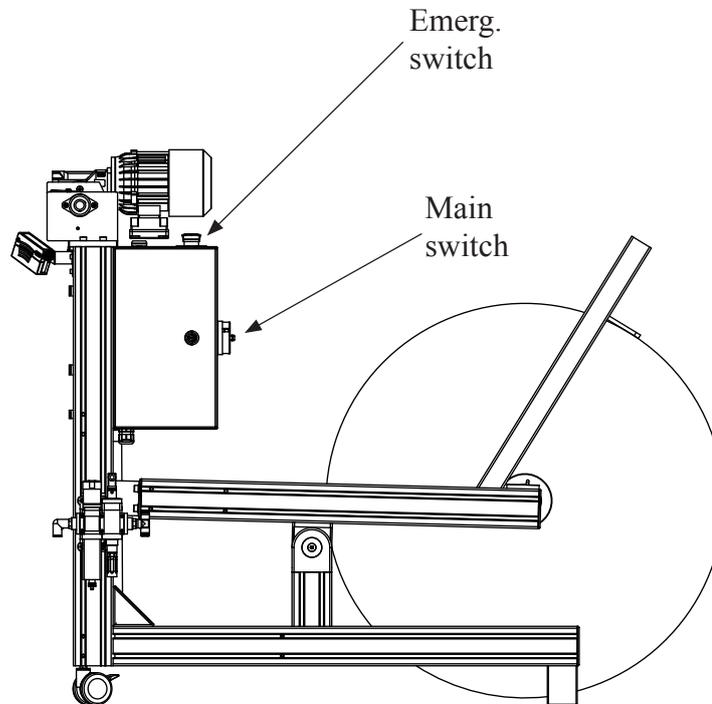
The way the units are connected regarding the 230V is explained in the figure above. Please note that the emergency switch on the Paper Roll Feeder will turn off the power and air to all machines when they are pushed down. The main switch on the Paper Roll Feeder will also turn everything off.

When power is present, the Printer operator panel will turn the Paper Roll Feeder and the stacker unit on or off.

Note! The Printer will "fall to sleep" when it has been inactive for 15 min. "Sleep" means that the Printer operator panel will go dark and the PRF and stacker unit will be turned off. To turn it on again, you can touch the operator panel, or send a document from the computer.

Paper Roll
Feeder connector

Stacker connectors

To Printer

Mains for all units
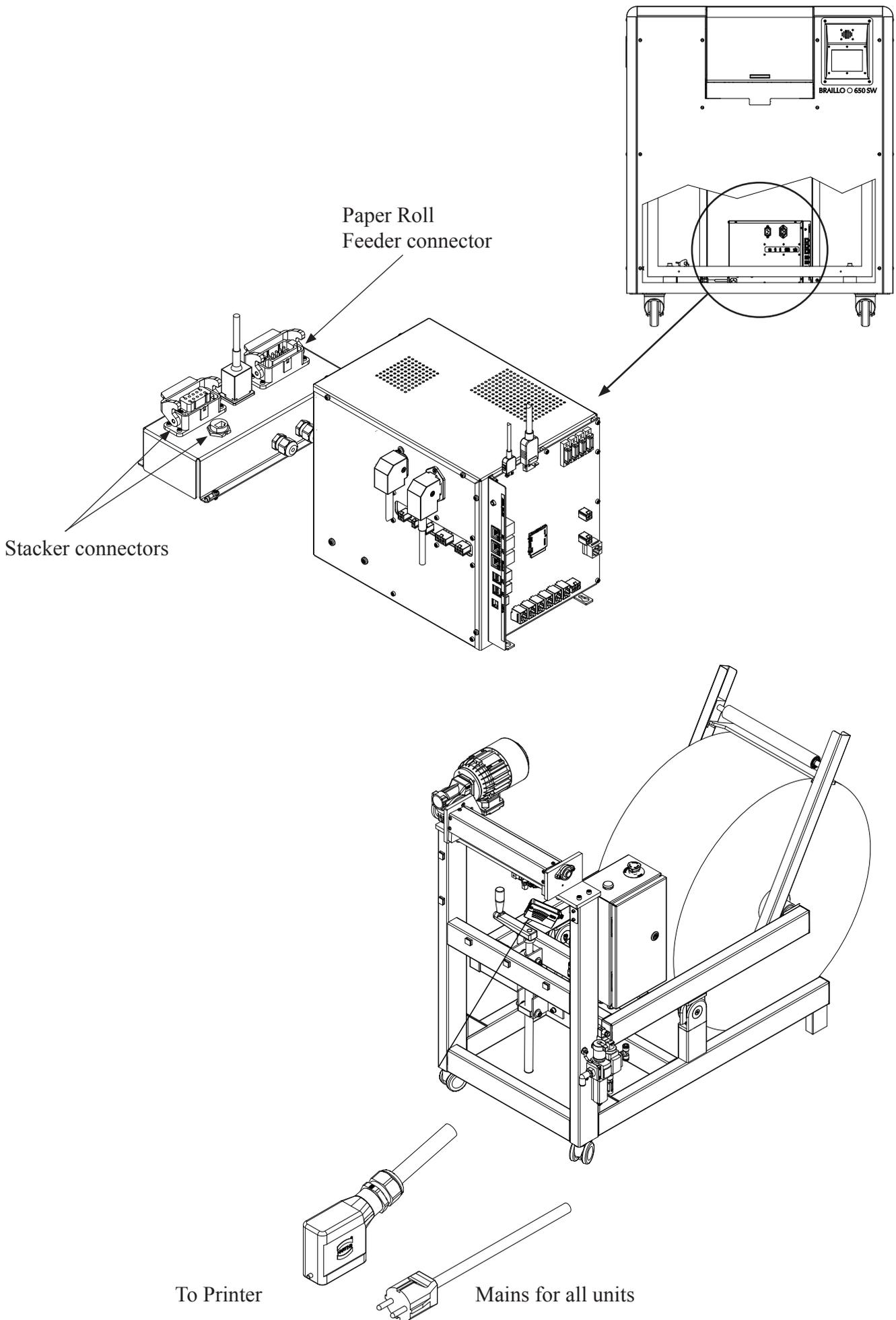
2.9   Connecting the Printer to the mains and computer

The mains is connected trough the Paper Roll Feeder for all the units.

Note! If the plug on the mains power cable is to be replaced with one that is compatible with the local electric contact points, observe that the yellow/green wire is the grounding (earthing) wire. Also make sure that you are connecting to **230V 50/60 Hz!**

⚠ **ALWAYS CONNECT THE YELLOW/GREEN WIRE IN THE MAINS CABLE TO GROUND!**

Connecting to the computer

This can be done either with USB or with Ethernet.
NB. When using the USB cable its recommended to have the cable plugged into the printer when powering up to avoid connection problems.
However, because of the better functionality on the Ethernet connection, we will recommend to use Ethernet whenever possible.
See figure below.
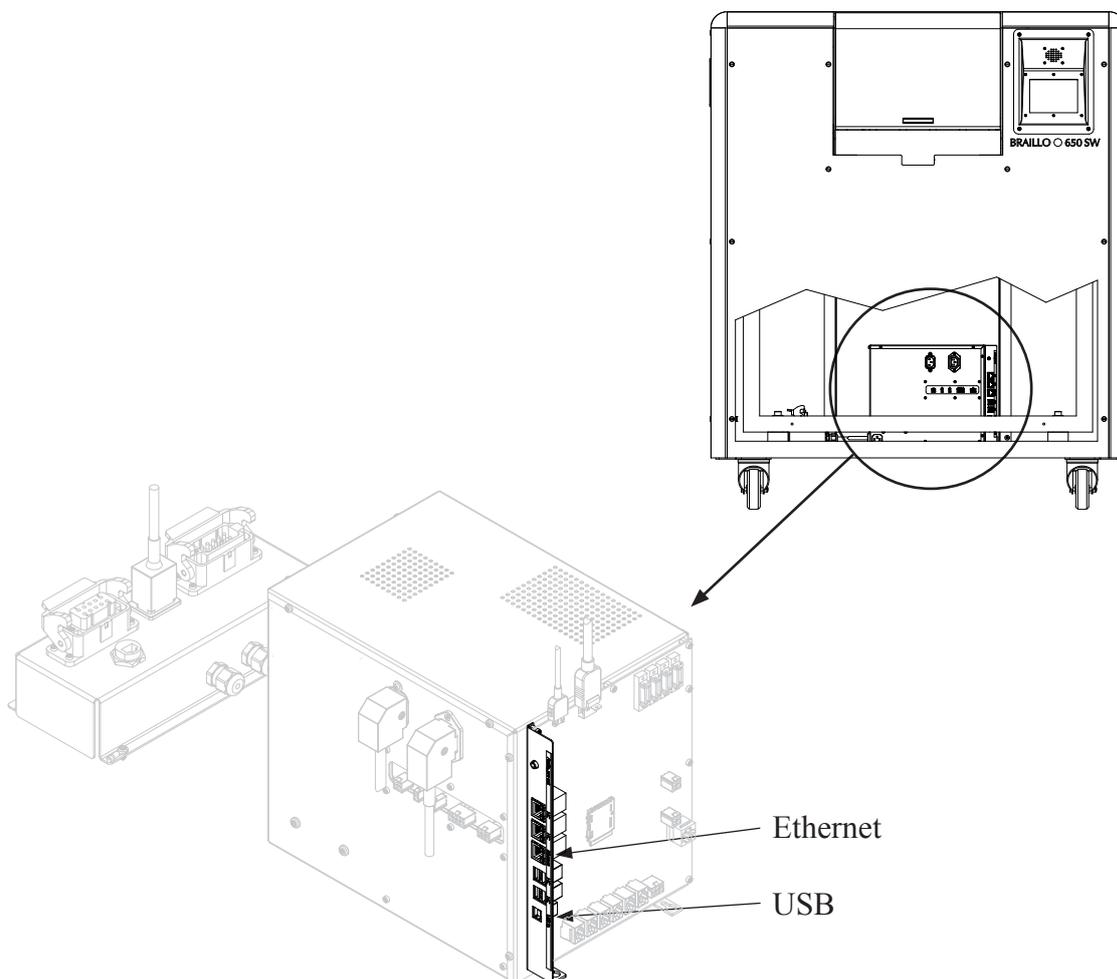
Placing the units

The units should be placed as seen on the figure below:

approx. 50 cm

How the paper travels through the machine.

Cutting   Printing

Stacking   Feeding   Unwinding
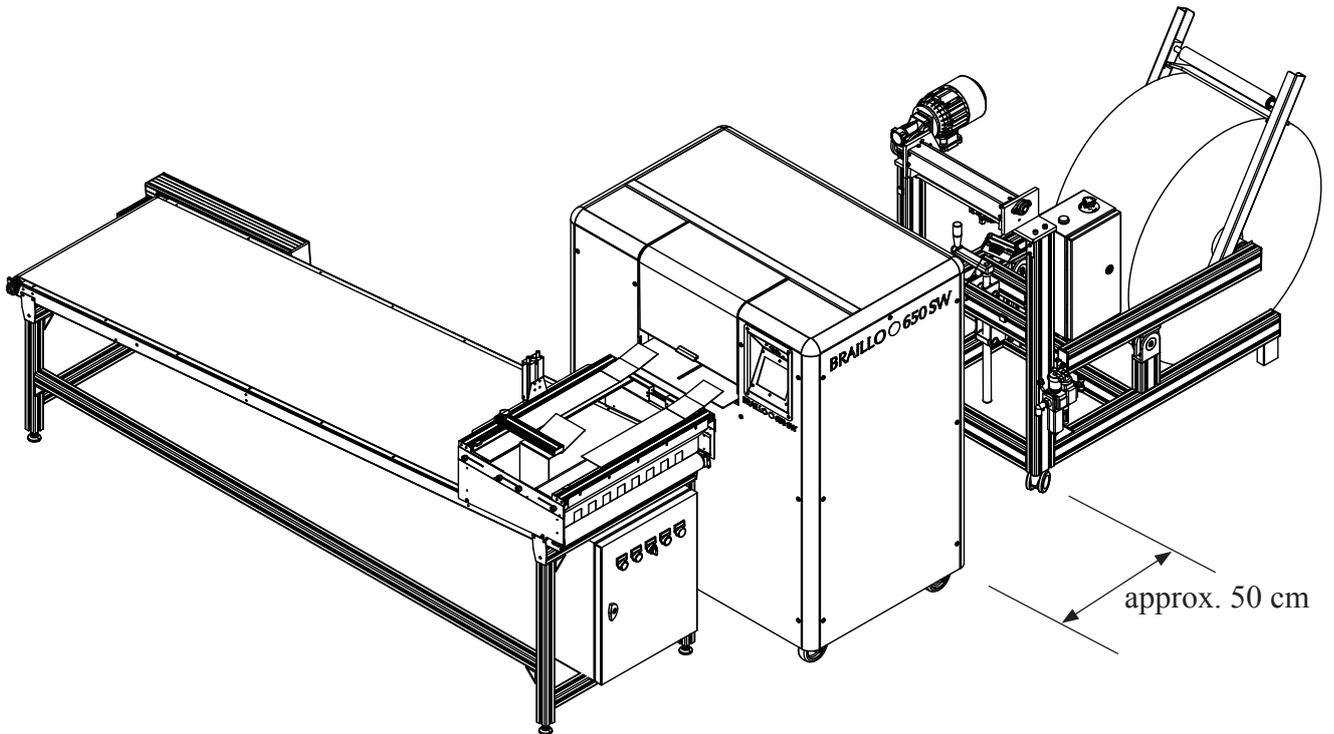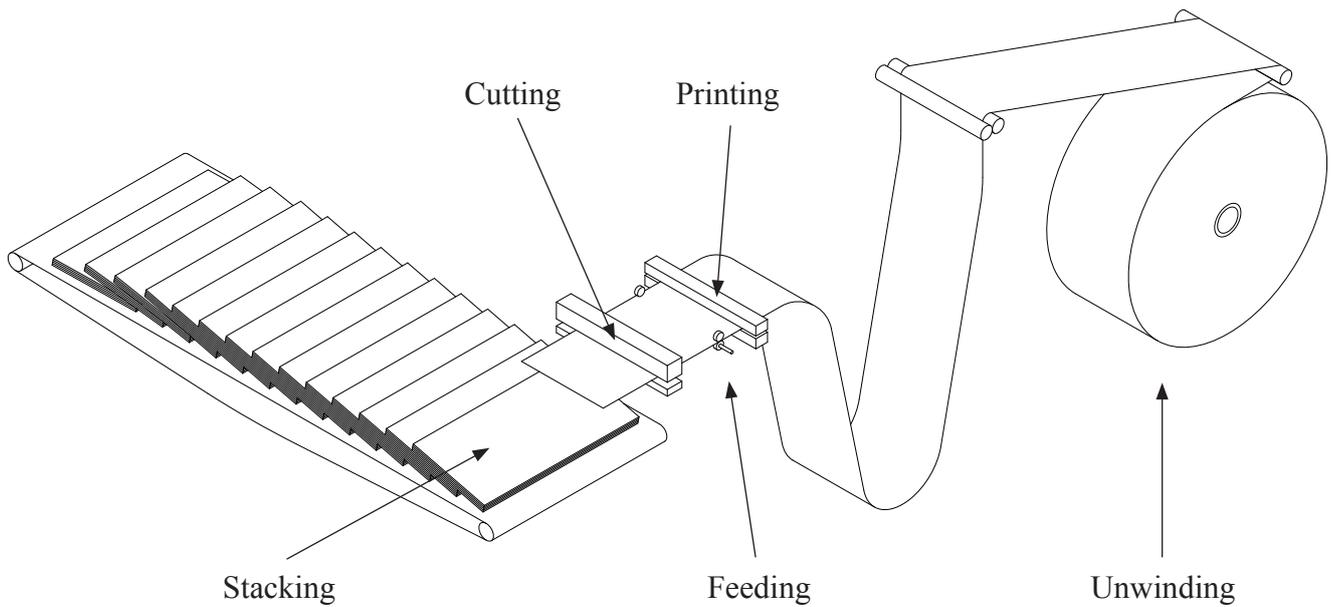
2.10   Adjust to paper width, inserting paper

All this adjustments is depending on the width on the paper roll. It is recommended to start with the paper feeder unit nearest to the main belt, because this will also determine the top margin on the sheet.

The adjustment should be done is this order:
1.   Move the feeder unit nearest to the main belt to the desired position. (Note the top margin).
2.   Adjust the other feeder unit so the distance between them is equal to the paper width.
3.   Put the paper into the Printer, and align it with the guides.
4.   Adjust the width on the stacker.
5.   Adjust the end stop.

Please see the figures on the following pages.
The numbers are indicating in which order the adjustments should be done.
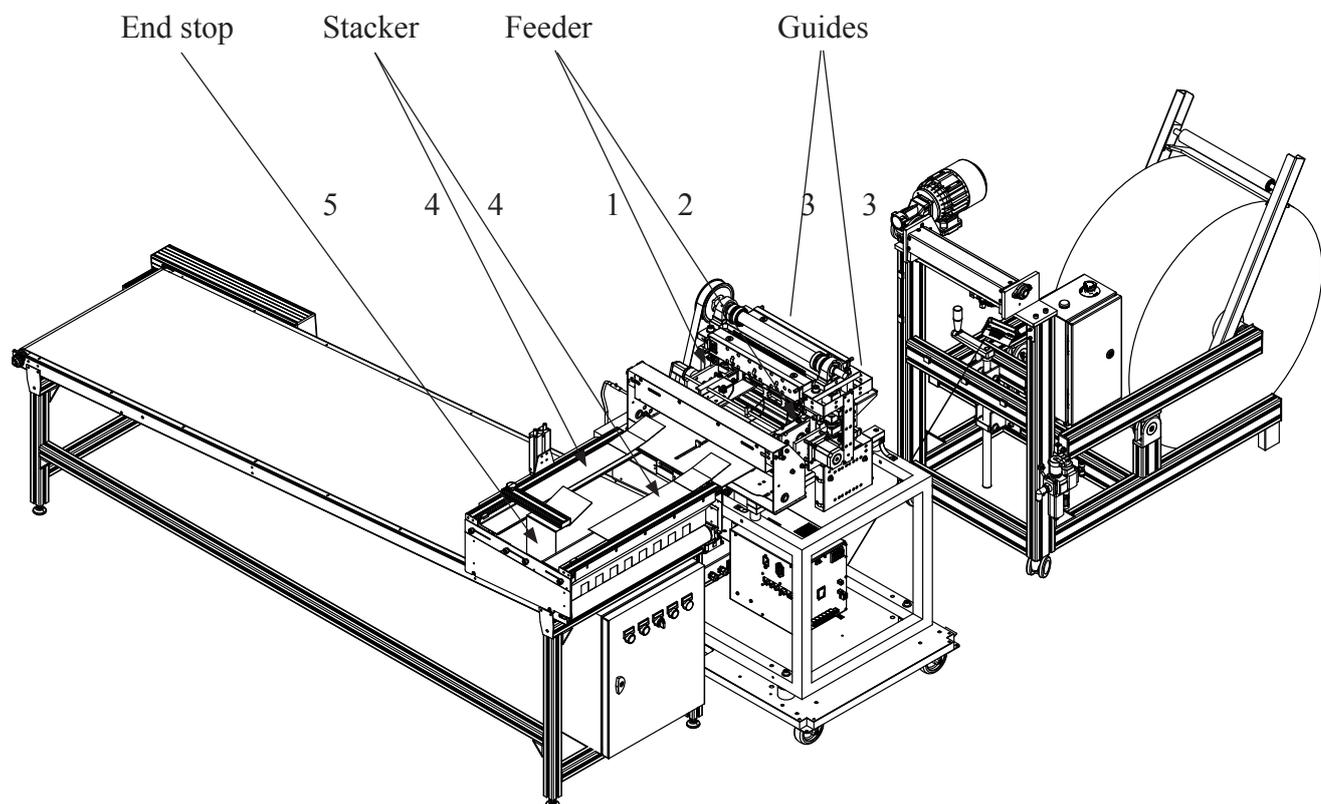
Paper feeder, adjust width

Loosen the bolts (A) without taking the bolts out. The two units can now be moved sideways. Note that the unit on the side nearest to the main belt will also determine the top margin. Use a paper sample to find the correct position for the two units. The paper sample should fit exactly in between the two units. Fix the units by tightening the bolts (A).

Adjust to
sheet width

Loosen this bolts, (A)
3 on each side.
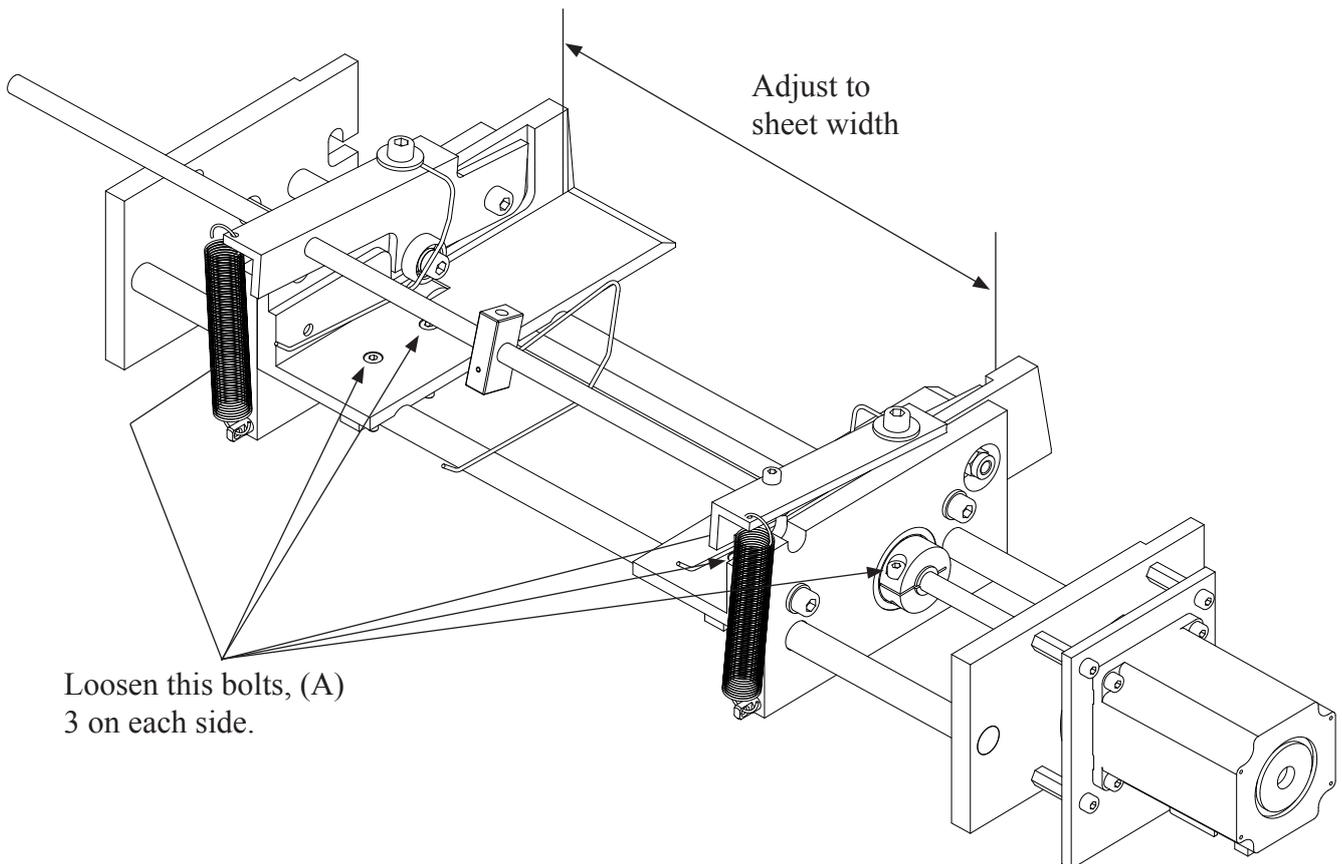
Guides on the paper input side

Before you adjust these two guides, you should do the following: Place the paper into the already adjusted feeder, make sure that the paper is aligned correctly. Now adjust the guides against the edges on the paper, this will keep the paper correct positioned and aligned during printing.

Adjust to
sheet width
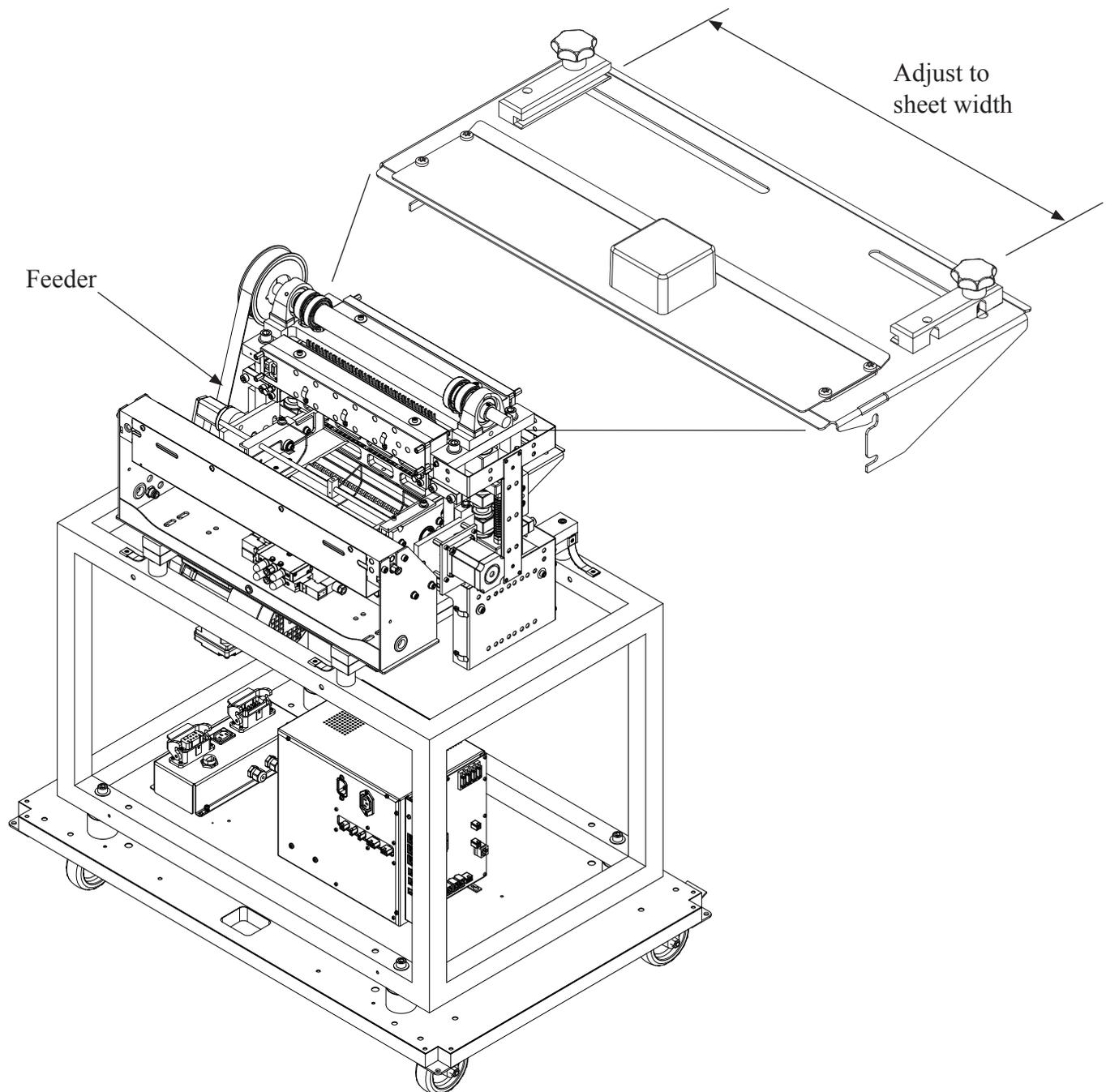
Feeder

Width on stacker and end stop

Adjust to
sheet width

Loosen this to
adjust the end
stop to fit to the
sheet length

Loosen this
on both ends
of the stacker
to be able
to adjust the
width.

Adjust to
sheet length
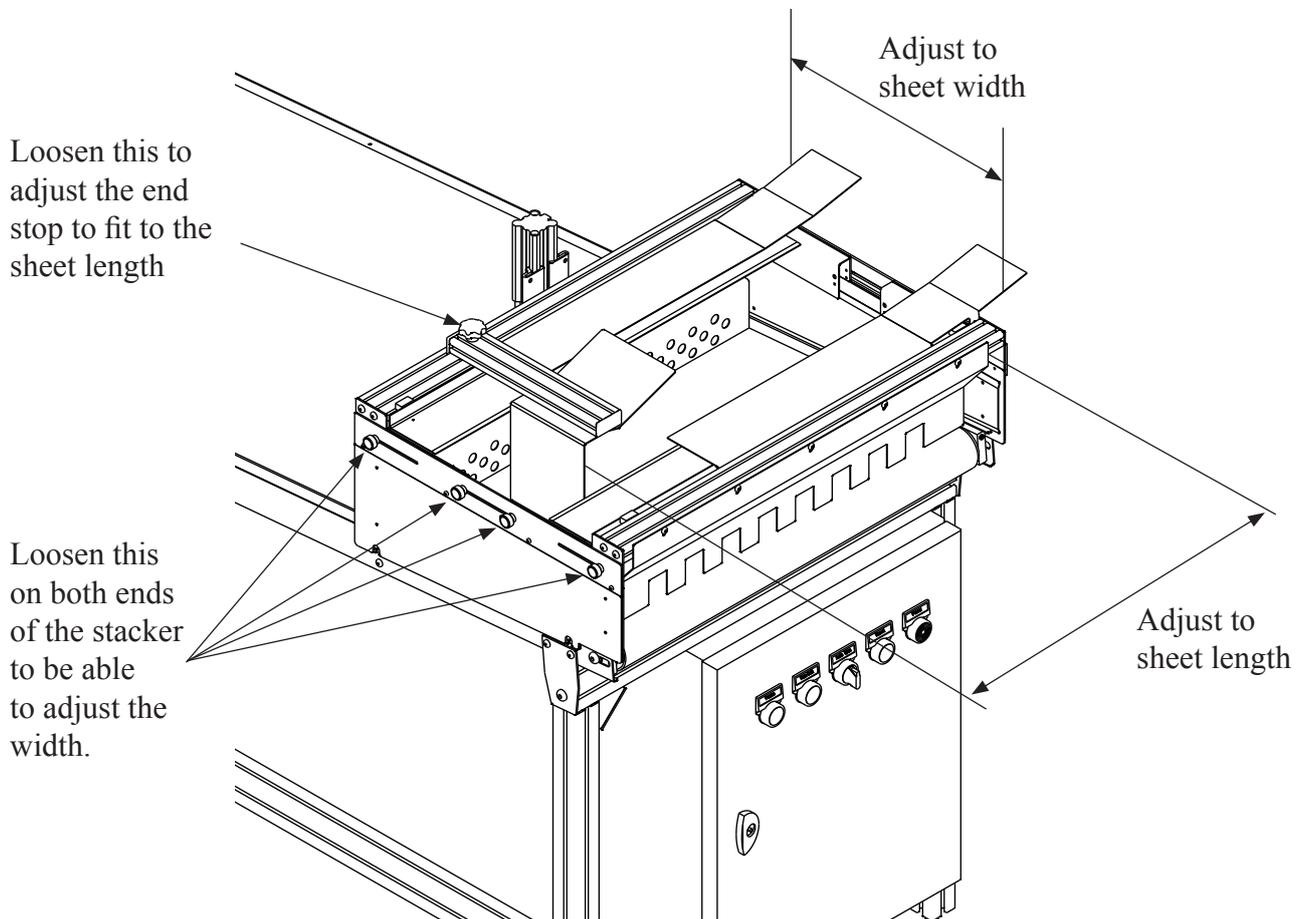
Now, after the Printer is adjusted, you should take the paper from the Paper Roll Feeder and insert the paper into the slit in the input paper guide. Insert enough so you can reach the paper on the opposite side of the Printer. Go to the output side, move the paper forward until it reaches the paper driving wheels. At the same time, push the Fine Adjust button, and the paper will move forward 0.5" for each push. Repeat this until the paper can be seen under the paper cutter's press bar.

2.11   Printing with B 650 SW

This Printer is printing interpoint. It also print the text sideways on the paper. This way of printing is creating some confusion regarding the different terms used to describe the sheet of paper. Please see the figures below to find the description on the terms Braillo are using.

The Printer can also print in two different modes. These modes are called "2-page" and "4-page". The name "2-page" is telling us that the number of pages on each sheet of paper is two. (One page on each side of the paper).

In "4-page" mode, the Printer will print four pages on each sheet of paper. (Two at each side of the paper). By doing this, it is possible to put the sheets in a stable, then stitch and fold in the middle. This way of printing makes it easy to produce e.g. a newspaper or magazine in braille.

2-page mode:
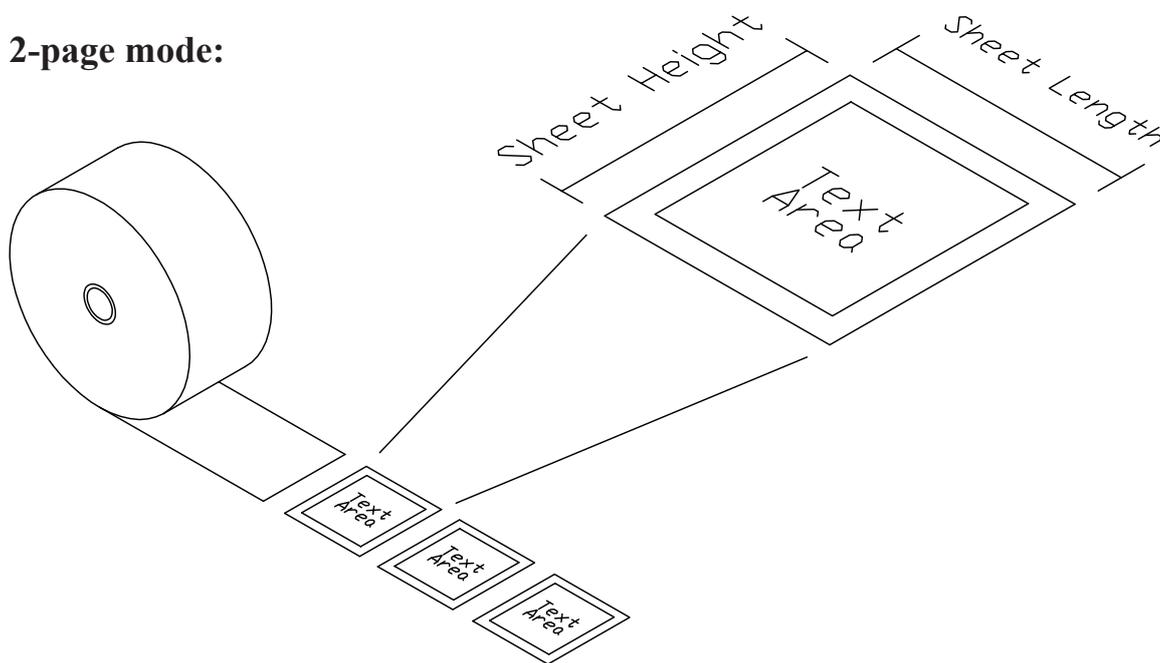
4-page mode:
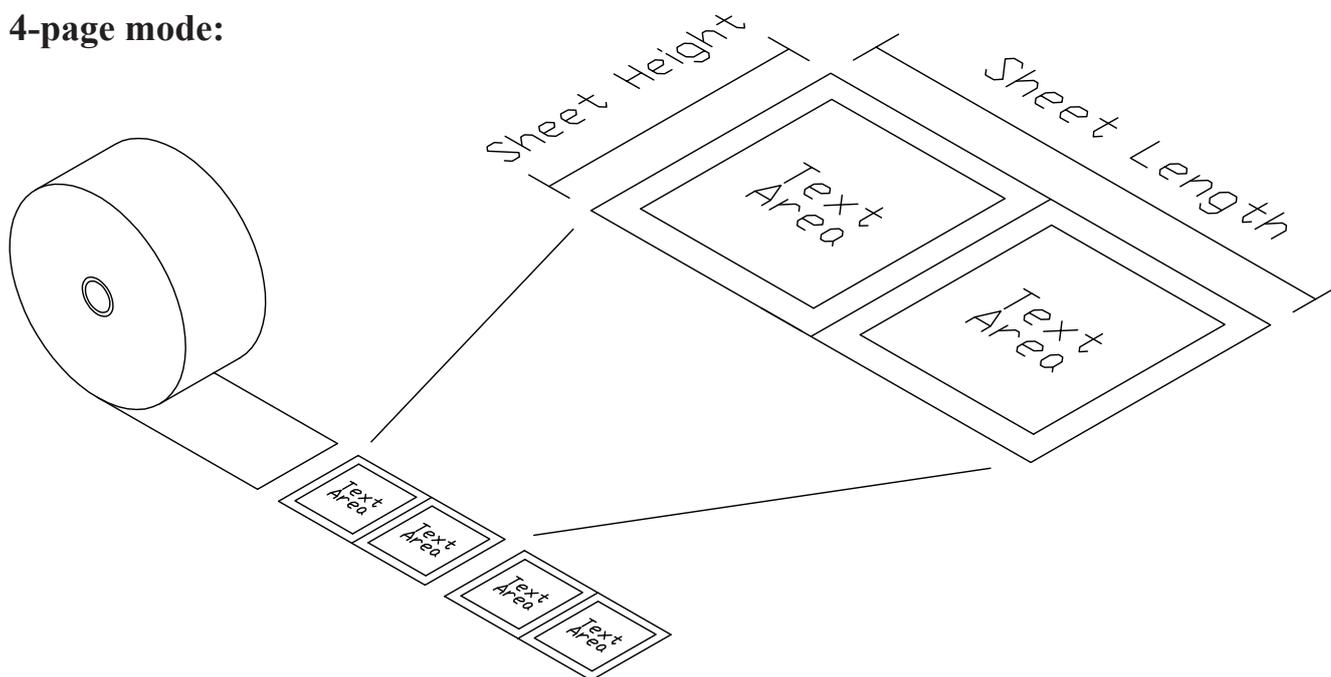
The sheet in 2-page mode:

Please see the figure below.
The "Sheet length" is not a length you can set directly, but it will be a result of the margins and line length settings.

Sheet length = Margin 1 + Line length + Margin 2
Sheet height = Paper roll width
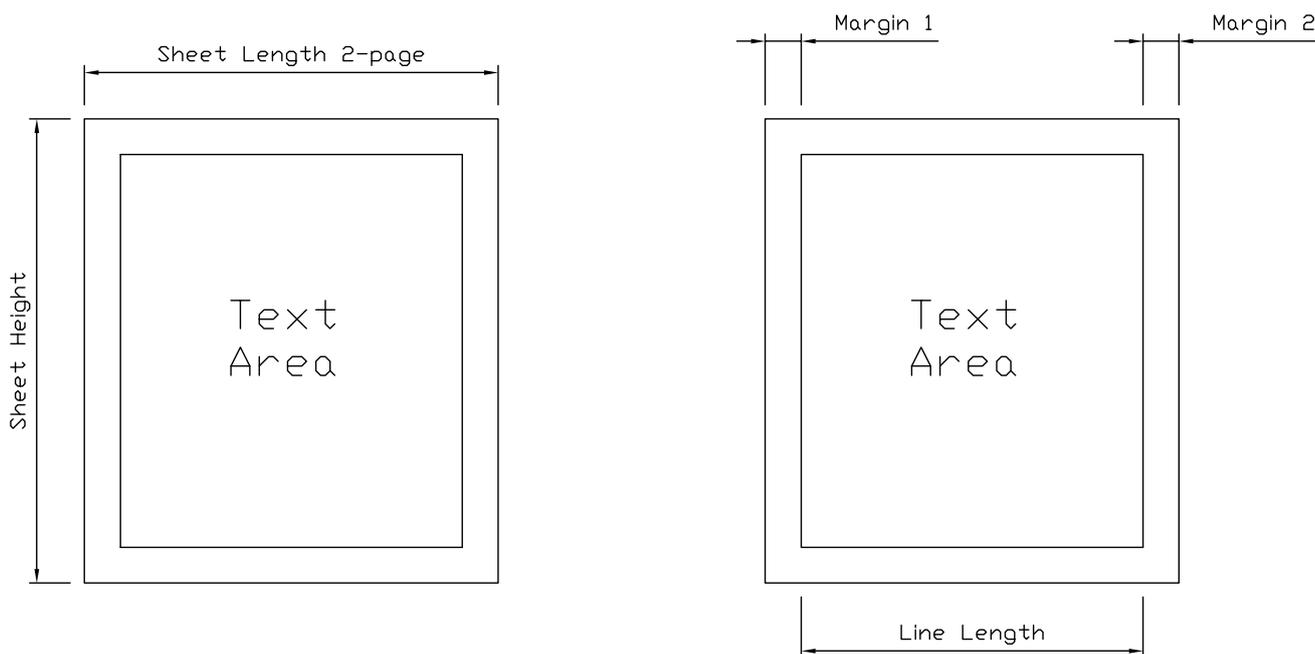
The sheet in 4-page mode:

Please see the figure below.
The "Sheet length" is not a length you can set directly, but it will be a result of the margins and line length settings.

Sheet length = (Margin 1 + Line length + Margin 2) + (Margin 2 + Line length + Margin 1)
Sheet height = Paper roll width
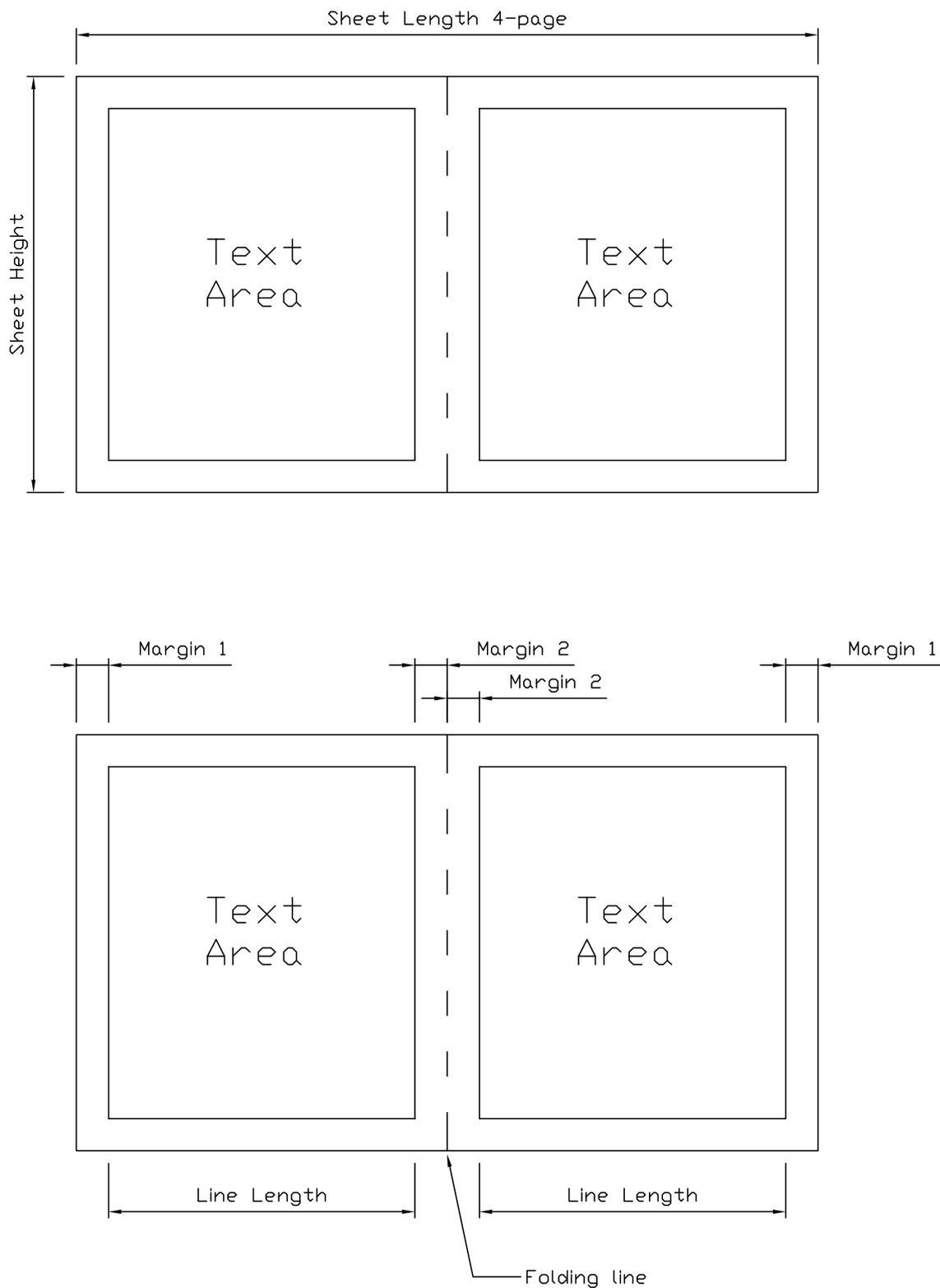
Printing in 4-page mode:

The number of pages sent to the Printer in 4-page mode, has to be a number that is possible to divide by four. E.g. a document that contains 7 pages of text, must have one empty page added to get a total of eight pages.

And those eight pages will fit on two sheets. (8 pages divided by 4 = 2 sheets).

Next, the text has to be sent to the Printer in the following sequence:
Page 1, 2, 7, 8, 3, 4, 5 and 6.

To be able to move the belt between each copy of a document, the Printer also needs a command that will tell how many sheets the document contains. This command is an escape-sequence that must be sent to the Printer in the beginning of the document. This is done by sending the ASCII value no 27, then the letter P, and then the number of sheets.
E.g. in the example above, the command would look like this: escP02

(There are software on the market that will do this formatting automatic).

Here is some physical measurements to consider when adjusting the different settings :

Max paper height: 330 mm (13.0 inch)   (This is the same as the width of the paper roll).
Max paper length: 584 mm (23.0 inch)
Max no. of characters per. line: 44 char.
Margins are adjustable from 12.7 mm (0.5 inch) to 50.8 mm (2.0 inch) in 2.54 mm (0.1 inch) step.

3.   OPERATING THE PRINTER

3.1   Functions Printer operating panel

When the Printer is powered up, you have to press the "Accept" button to make the Printer ready.

```
┌─────────────────────────────────┐
│             Welcome             │
├─────────────────────────────────┤
│                                 │
│  Press the accept button        │
│  to continue                    │
│                                 │
│                                 │
│                                 │
│                                 │
│                        ┌─────┐  │
│                        │  ✔  │  │
│                        └─────┘  │
└─────────────────────────────────┘
```

Accept
button

After pressing "Accept" the window below appears. Please see the explanation on the figure below:

Time   Date

```
┌─────────────────────────────────┐
│  14:55:33     Tue Nov 22 2011   │
├─────────────────────────────────┤
│                                 │
│  Sheet counter 1: 000032        │
│  Sheet counter 2: 000248        │
│                                 │
│  Ready to emboss                │
│   ┌──────┐                      │
│   │ Fine │                      │
│   │ adj.+│                      │
│   └──────┘                      │
│   ┌──────┐ ┌──────┐  ┌─────┐┌─────┐│
│   │ Fine │ │ Main │  │Reset││Reset││
│   │ adj.-│ │ menu │  │cnt 1││cnt 2││
│   └──────┘ └──────┘  └─────┘└─────┘│
└─────────────────────────────────┘
```

Sheet counters, will count upwards as the printing goes on

Status information — Ready to emboss

Moves the paper 12.7 mm (0,5 inch) forwards

Moves the paper 12.7 mm (0,5 inch) backwards

Enters the Main menu

Reset for the sheet counters
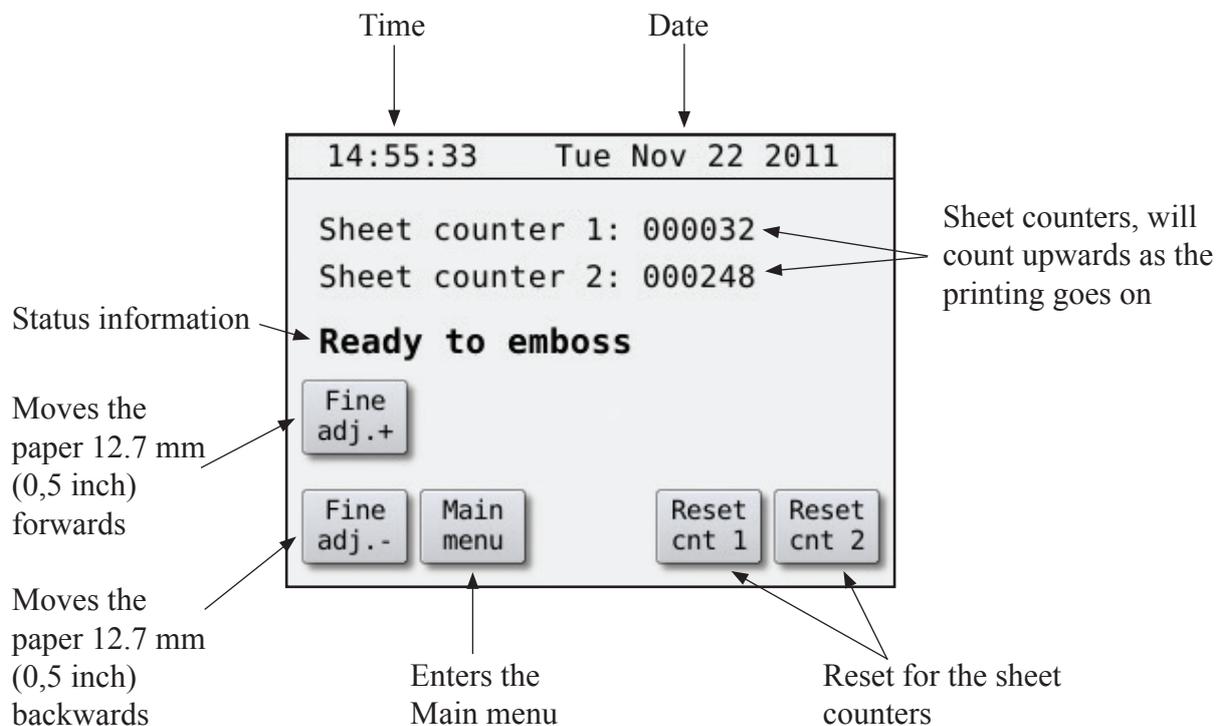
Navigating in the menu

Move the cursor to the desired sub menu, and then press the accept button.

```
              Main menu
   ┌──────────────────────────────┐
   │ Paper layout                 │
   │ Service/diagnostics          │
   │ Date and time settings       │
   │ Sound                        │
   │ Printer setup                │
   │ Counters                     │
   │ Enter sleep mode             │
   │                              │
   │   ↑      ↓        ✔    ←      │
   └──────────────────────────────┘
```

Move the cursor up in the menu	Move the cursor down in the menu	Accept or "select" button	Jump back to the previous menu without saving
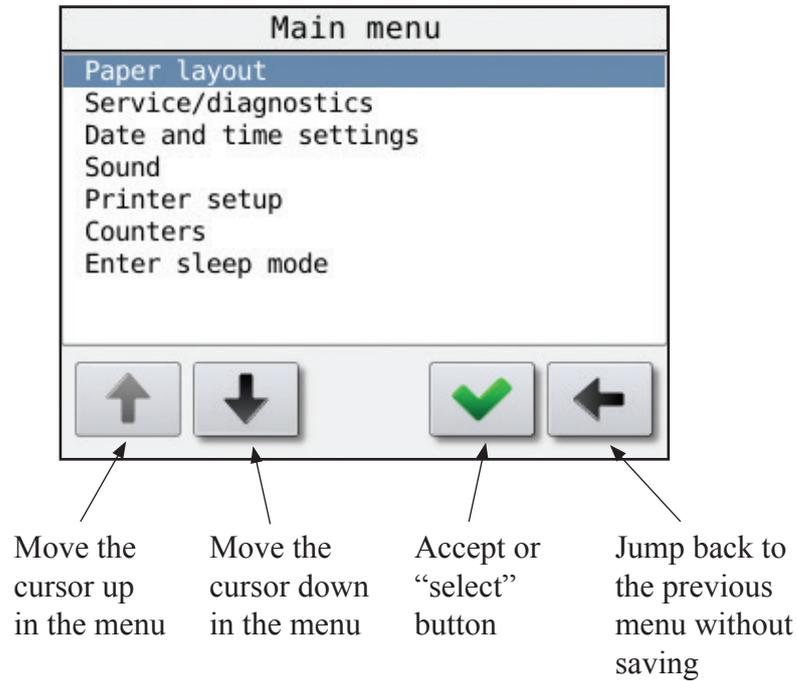
To change a variable setting

If a setting can have more than two values, the display will look like below.

```
            Paper layout
   ┌──────────────────────────────┐
   │          Line length         │
   │              ↑               │
   │             38               │
   │              ↓               │
   │                              │
   │              ✔    ←          │
   └──────────────────────────────┘
```

Increase the value

Decrease the value

Accept or "select" button

Jump back to the previous menu without saving
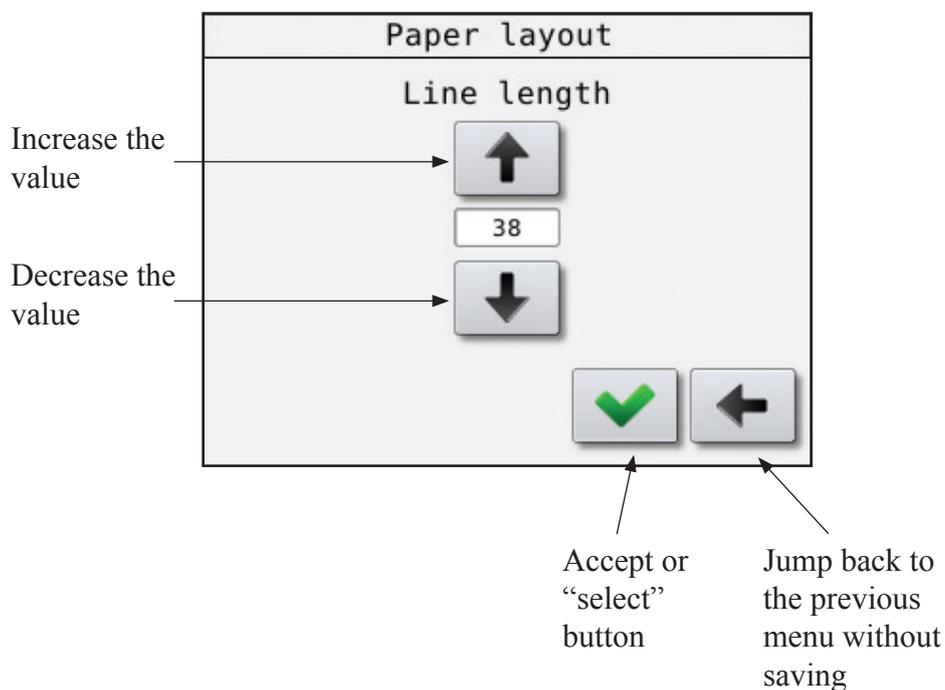
To change a setting with just two alternatives

If a setting can have just two variables, the display will look like this.

Active
button

Inactive
button, press to
activate, and then
press "Accept"

Accept or
"select"
button

Jump back to
the previous
menu without
saving
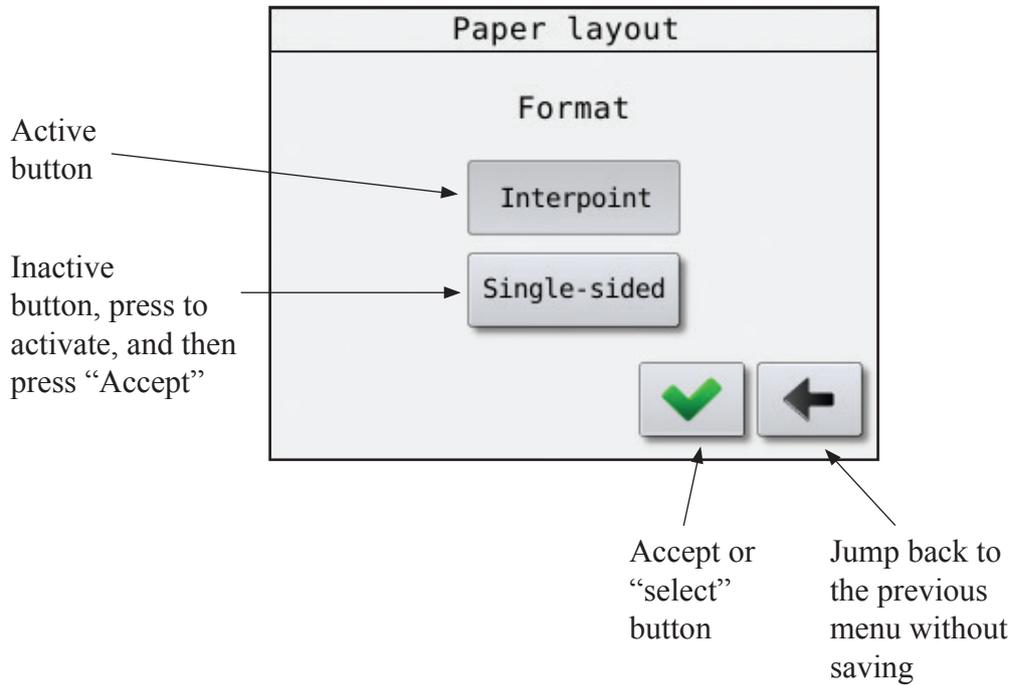
The very first time the Printer is powered up, you have to select the Printer model.
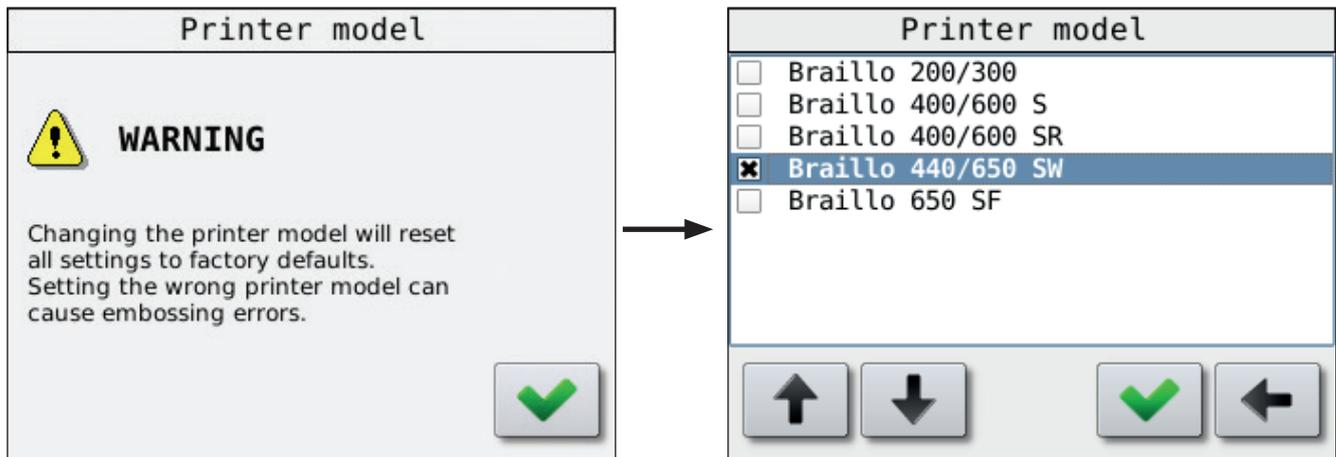
Note!
The settings set by the operator panel is the default values. However, when sending a text file from the computer, some parameters for this specific job is sent along with the file. The parameters that comes with the file will be active during the print job. When the job is finished, the settings will return to the default settings.

Operator panel during printing

Please see the figure below:
Embossing Sheet 1 / 5 means that the Printer are now printing Sheet 1 of a book with 5 sheets in total. Copy 1 / 1 means there will be just one copy.

If you would like to pause a print job, press the "Pause" button. When the Printer is paused, the button will change to "Continue". Press "Continue" to continue with the printing. If you would like to cancel the rest of the print job, press "Reset".

```
09:42:53     Mon Dec 5 2011

Sheet counter 1: 000421
Sheet counter 2: 000637

Embossing ...

    Sheet        1  /        5
    Copy         1  /        1

 Pause                Reset    Reset
                      cnt 1    cnt 2
```

Press this button if you want to pause the print job.

```
10:58:10     Mon Dec 5 2011

Sheet counter 1: 000430
Sheet counter 2: 000646

Paused

    Sheet        5  /        5
    Copy         1  /        1

 Cont.       Reset   Reset    Reset
                     cnt 1    cnt 2
```
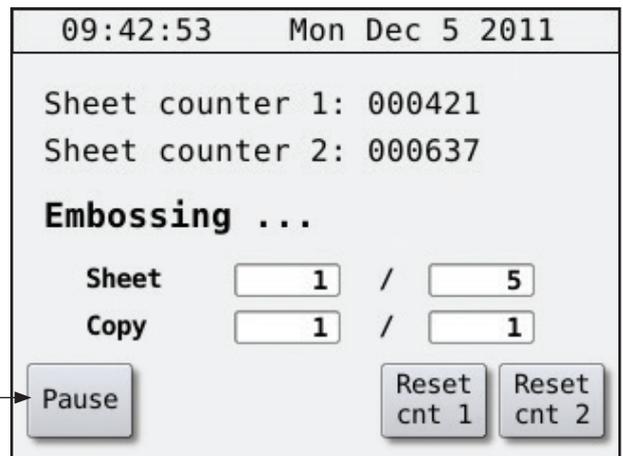
Press this button if you want to continue the print job.
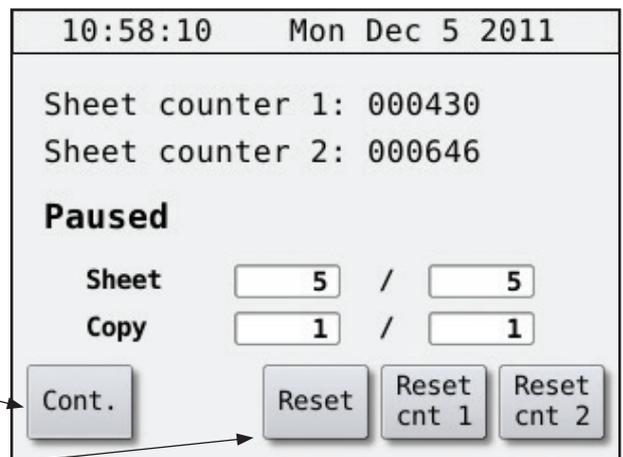
Press this button if you want to cancel the rest of the print job.

```
14:24:39     Thu Aug 9 2012

Screen locked!

Unlock by pressing the buttons below in order

  1                            2
```

The display screen will automatively lock after a certain amount of time. To unlock press button 1 and then 2.

3.2   Overview of menu structure

```
Set printer        Warning!         Welcome
model              Set printer
                                        │
                                   Ready to    Screen
                                   Emboss      locked
                                        │
                                   Main
                                   Menu
```

| Paper Layout | Service diagn | Warning! | Sleep | Date Time | Sound | Printer Setup | Counters |

Paper Layout:
- Line length
- Page margin 1
- Page margin 2
- Format
- Foldline
- Cell Spacing

Service diagn:
- Embossing disabled! — Print test pattern
- Embossing disabled! — Manual running
- View log — Event details
- Test sensors
- Status software
- Clear magnet failure

Date Time:
- Date
- Time

Sound:
- Volume
- Pitch
- Speech
- Accessability
- Beep

Printer Setup:
- Warning! Set printer — Printer model
- Printer ID
- Stepmot current
- Sheet cal
- Ascii tables — View Ascii
- GUI style
- Backlight
- Lock screen delay

Counters:
- Printer model

3.3   Explanation of the different menu choices

The Paper Layout menu
Main Menu - Paper Layout

```
            Paper layout
Line length              38 char
Page margin 1           0.8 inch
Page margin 2           1.2 inch
Format              Interpoint
Foldline                     On
```

Line length:
Main Menu - Paper Layout - Line Length
The line length is the maximum number of characters that you
can have on a single Braille line. Normally the line length is set
by the software in the computer.
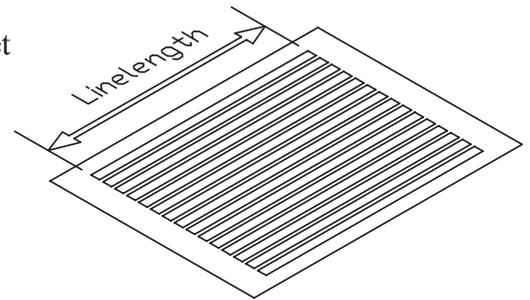
Page margin 1 and 2:
Main Menu - Paper Layout - Page margin 1/2
The margins are adjustable from 12.7 mm (0.5 inch) to 50.8
mm (2.0 inch), in 2.54 mm (0.1 inch) increments.
There are two different margins, Margin 1 and Margin 2.
Note that the value on Margin 1 will affect both the "outer"
margins. And the value on Margin 2 will affect both the "inner"
margins.
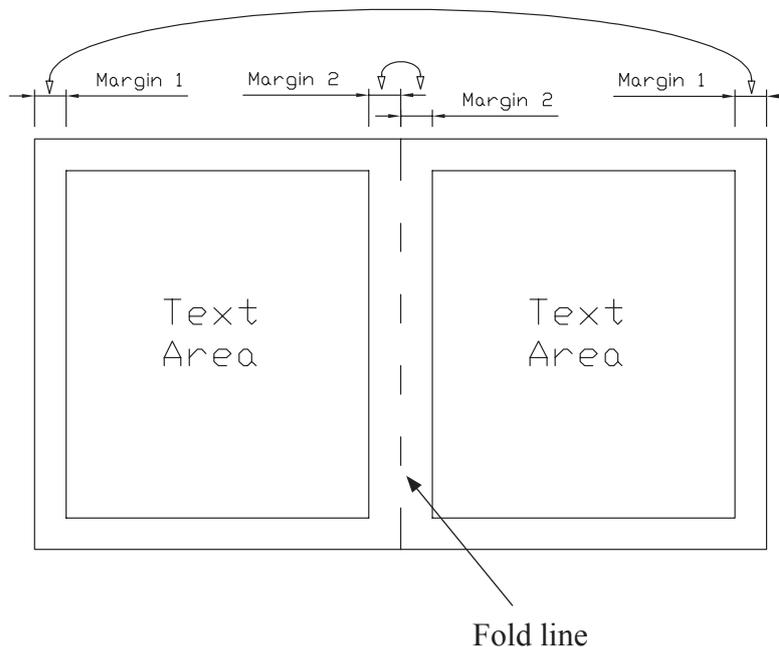
Fold line

Format:
Main Menu - Paper Layout - Format
Selects between Interpoint (dots on both sides of the sheet) and
Single sided (dots on just one side of the sheet).

Fold line:
Main Menu - Paper Layout - Fold line
Turn on or off a row of dots in the middle of the four-page
sheet. This makes it easier to fold the sheet.

The Service/Diagnostic menu
Main Menu - Warning - Service/Diagnostic

When entering this menu choice, a warning window will appear.

The purpose of this warning is make the user aware that the safety switches on the cover is now disabled. This is done to make it possible to run smaller tests during service.

Please take care for the rotating parts!
The Printer may unexpectedly be started by other users!

To make sure you have absolutely control when doing service with the power connected, please disconnect the computer cables (Ethernet and USB).

Print Test Pattern:
Main Menu - Warning - Service/Diagnostic - Warning -
Print Test Pattern

When entering this menu choice, a warning window will appear.
This is to make the user aware that print jobs from the computer will not be printed as long as you are in this sub-menu.

- X pattern.
Will print dots in a x pattern across the sheet,
useful when searching for missing dots.

- Full cell, single sided.
Prints all six dots on all characters on one side of the sheet,
useful for dot quality tests.

- Full cell, both sides.
Prints all six dots on all characters on both sides of the sheet,
useful for testing the paper quality.

- O/Ø pattern.
Prints a test pattern made of dot 1,3,5 and 2,4,6, single-sided, useful when searching for extra dots.
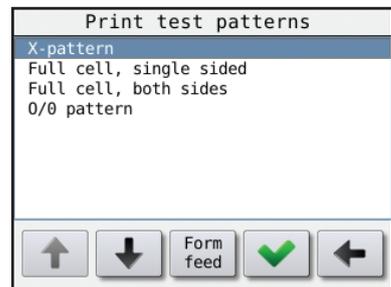
Manual Running:
Main Menu - Warning - Service/Diagnostic - Warning - Manual Running

When entering this menu choice, a warning window will appear. This is to make the user aware that print jobs from the computer will not be printed as long as you are in this sub-menu.
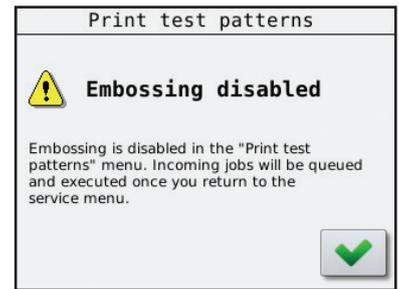
The function of this menu choice is to activate different functions manually for troubleshooting purposes.

- Main motor
Use this to manually start and stop the main motor. (Turn off the stacker unit with the stacker switch while testing this to prevent error messages).
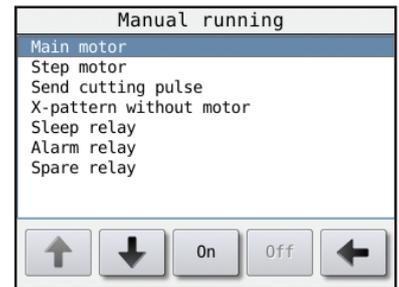
- Step motor
Will run the stepping motor forward approximately one sheet.

- Send cutting pulse
Sends a cutting pulse to the paper cutter.

- X pattern without motor
Will activate one and one magnet on the magnet racks.

- Sleep relay
Turn the Sleep relay on or off.

- Alarm relay
Turn the Alarm relay on or off.

- Spare relay
Turn the Spare relay on or off.

View Log:
Main Menu - Warning - Service/Diagnostic - Warning - View Log

The Printer remembers the different events that has happened and will store them in a log. This log can be viewed in a list like the figure to the right. If a message is repeated several times, the display will show a line with the text "last message repeated x times". Use the up and down arrow to scroll the list.
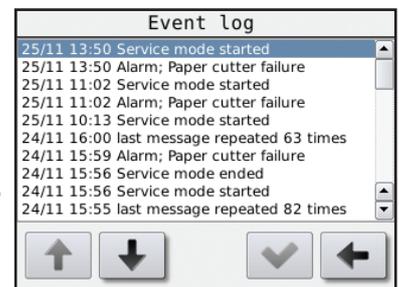
If the "OK" button is shown in green, it is also possible to view some more details about this particular event by pressing the "OK" button.

Test Sensors:
Main Menu - Warning - Service/Diagnostic - Test Sensors

```
          Test sensors
Cover open                 OFF
Beam wheel                 OFF
Paper feed 1               OFF
Paper feed 2                ON
Out of paper               OFF


                            ←
```

This is a function made for troubleshooting the sensors on the Printer.
The "On" or "Off" is indicating the current status of the sensor.

To find out if a sensor is OK, the sensor can be switched on and off
physically, and the text in the display will change between "On" and
"Off" accordingly if the sensor is functioning.

- Cover open
This is the switches on the side panels on the Printer.

- Beam wheel
This is the sensor fitted on the lower shaft on the Printer.

- Paper feed 1
This is the first sensor on the paper transportation in the Printer.

- Paper feed 2
This is the second sensor on the paper transportation in the Printer.

- Out of paper
This is a sensor that check if there is paper present in the Printer. It's fitted on the paper guide on the
input side of the Printer.

Status Software:
Main Menu - Warning - Service/Diagnostic - Status Software
A window that will show the Printers current IP address,
the MAC address and the Software version.

```
         Printer status

IP address: 172.16.32.153

MAC address:
    00:50:C2:3A:F6:80

Software version: 1214
Upgr.
softw.                      ←
```

Clear Magnet Failure:
Main Menu - Warning - Service/Diagnostic - Clear Magnet Failure

This menu choice is normally not visible, but if there has been detected a faulty magnet during print-
ing, a magnet icon will be shown in the "Ready to emboss" window. Now the "Clear Magnet Failure"
becomes visible and the magnet icon can be reset.

The Date and Time menu

Date and Time:
Main Menu - Date and Time
Used to change the date and time setting.

- Date
Main Menu - Date and Time - Date
Used to change the date.

- Time
Main Menu - Date and Time - Time
Used to change the time.
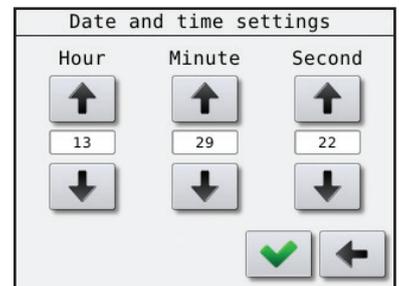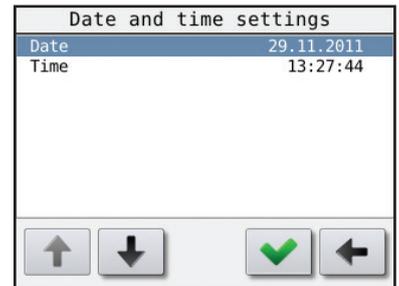
The Sound menu
Main Menu - Sound

- Volume
Main Menu - Sound - Volume
Volume setting for beep and speech.

- Pitch
Main Menu - Sound - Pitch
Sets the pitch level for the beep.

- Speech
Main Menu - Sound - Speech
Toggles Speech on or off.

- Accessibility
Main Menu - Sound - Accessibility
Toggles Accessibility on or off.

- Beep
Main Menu - Sound - Beep
Toggles Beep on or off.
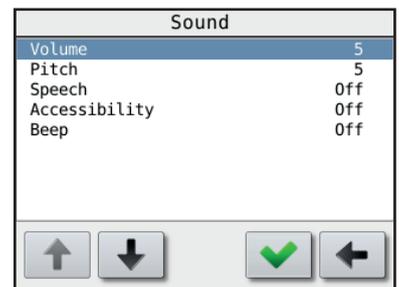
The Printer Setup menu
Main Menu - Printer Setup

In this menu the basic settings regarding the Printer is set.
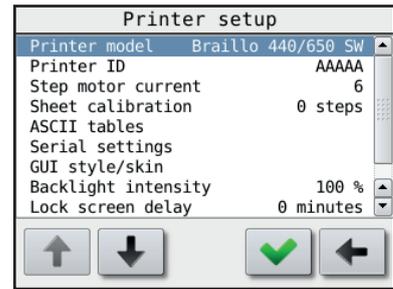
Printer model:
Main Menu - Printer Setup - Warning - Printer model

When entering this menu choice, a warning window will appear.

Braillo Norway has a number of different Printer models that can use the same electronics. But the different Printer models have different settings and different functions. This menu choice is where you select the specific Printer model. The software will then be adapted to the Printer in use.

This setting is fixed at the factory, and should under normal conditions never be changed.
However, if for some reason the main board on the Printer has been replaced, this menu will appear on the first power up.
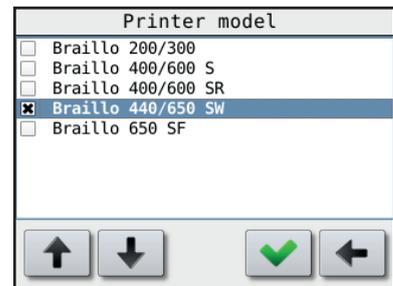
Printer ID:
Main Menu - Printer Setup - Printer ID
The Printer has a function to make it possible to identify which Printer has printed a particular Braille book. It is done by sending a command along with the Braille book that tells the Printer to print it's identification. On this setting you can set a 5 character code or name that identifies this particular Printer.
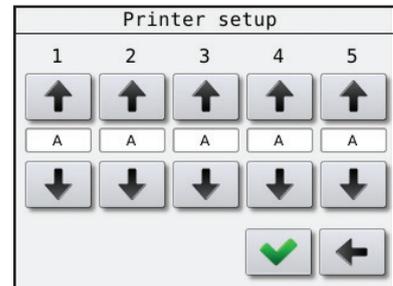
Step motor current:
Main Menu - Printer Setup - Step motor current
It is possible to adjust the current on the step motor (paper feed motor) from 0 to 11. The motors torque will be proportional to this value.
The default setting is 6. Should not need to be changed.
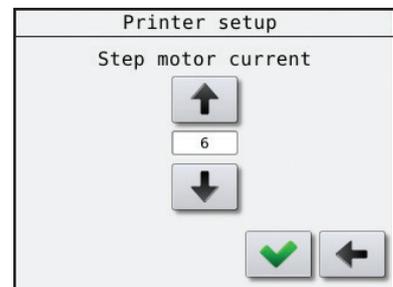
Sheet calibration:
Main Menu - Printer Setup - Sheet calibration
This is a function that makes it possible to make small adjustments on the width of the sheet. There is a value that can be set from -10 to +10. If the value is 0, there is no correction. Negative numbers will give you a narrower sheet. Positive numbers will give you a wider sheet.

ASCII tables:

Main Menu - Printer Setup - ASCII tables

An ASCII table is the same as a character set. When the Printer receives a character from the computer, it goes to an ASCII table to find out which dot pattern is corresponding to this character.

This Printer has a number of ASCII tables, and they are listed like shown in the figure to the right. To select another table, use the up or down arrow and press the green "OK" button. Now this has become the current table.

It is also possible to view the translation between characters and dots in the different ASCII tables by pressing the "View" button.
Then a list like shown on the right will appear. Use the up and down arrows to scroll the list.
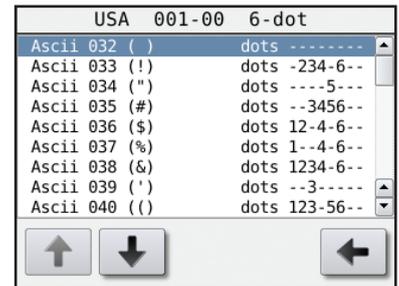
GUI style/skin:

Main Menu - Printer Setup - GUI style/skin

If any users of this Printer has low vision and/or find it a bit difficult to read the operator panel, it is possible to change the background and text colours to get better contrasts.

Back light intensity:

Main Menu - Printer Setup - Back light intensity

The back light intensity on the operator panel can be adjusted from 0 to 11.
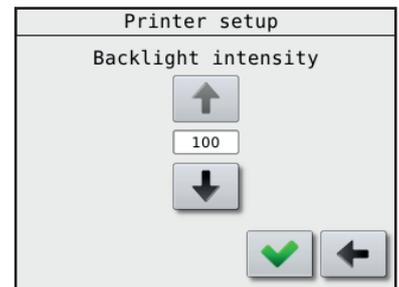
Lock screen delay:

Selecting the delay before screen get locked,
0 is screen lock off.

The Counters menu
Main Menu - Counters

Will show two different counters, the first will show the total
number of sheets printed. The second shows the total
number of hours the main motor has been running.
(The time the Printer has actually printed).

```
              Counters
Total sheets              4463
Hours running              3.3



                            ←
```

3.4   Messages/Error Messages on the Printer operator panel

Messages/Error Messages on this Printer can be divided into three groups; Messages, Error Messages
and unrecoverable Error messages.

Messages:
- Magnet failure
The magnet self test system has detected problems with a magnet and
the printer will stop. You may press Reset to continue, however you
must replace the defect magnet. Please check the log for the details.
(Main Menu - Warning - Service/Diagnostic - Warning - View Log)

```
09:35:14     Fri Jan 13 2012

Sheet counter 1: 001306
SINCE FAILURE  : 000001

Ready to emboss
Fine
adj.+

Fine   Main          Reset  Reset
adj.-  menu          cnt 1  cnt 2
```
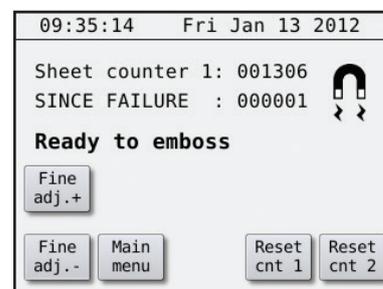
Recoverable errors:
When there is a recoverable error, the display will show what has happened e. g. "Printer halted, Printer cover open". And it will stay like that until the error is fixed. Then the display will change to "Printer halted, Press continue to resume". By pressing "Continue" the Printer will resume the printing from where it was before.

The different recoverable errors are:

- Printer cover open
This occurs when one or more side panels on the Printer cover are open. When the side panels are put back in place, the display will change to "Press continue to resume".

```
14:12:58    Thu Jan 26 2012

Sheet counter 1: 000087
Sheet counter 2: 001486

Printer halted
  Printer cover open


Cont.   🔲       Reset   Reset
                cnt 1   cnt 2
```

- Press continue to resume

```
11:20:54    Mon Dec 5 2011

Sheet counter 1: 000431
Sheet counter 2: 000647

Printer halted
  Press continue to resume


Cont.   🔲       Reset   Reset
                cnt 1   cnt 2
```
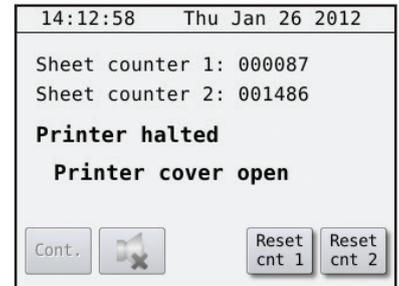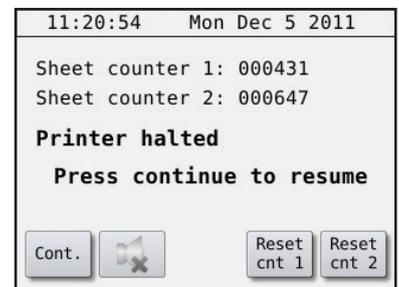
- Out of paper
The Printer has run out of paper and are waiting for more paper. When more paper is detected, the display will change to "Press continue to resume".

```
09:25:33    Fri Jan 13 2012

Sheet counter 1: 001305
Sheet counter 2: 000945

Printer halted
  Out of paper


Cont.   🔲       Reset   Reset
                cnt 1   cnt 2
```
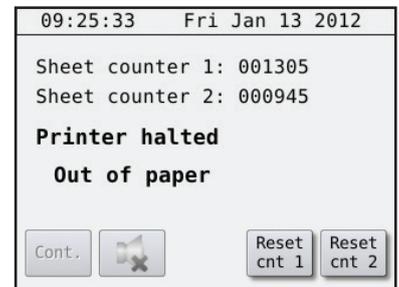
- Paused
The stacker unit has sent a Pause command, or one of the hatch has been opened during printing. When the Pause command is repeated, the display will change to "Press continue to resume".

```
13:17:16    Thu Jan 26 2012

Sheet counter 1: 000048
Sheet counter 2: 001447

Printer halted
  Paused


Cont.   🔲       Reset   Reset
                cnt 1   cnt 2
```
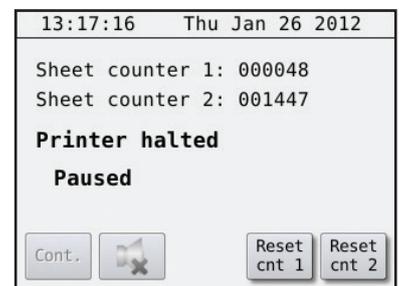
- Paper cutter failure
It has been detected a problem in the paper cutter. When the problem is solved and the hatches are closed again, the display will change to "Press continue to resume".

```
14:37:14    Thu Jan 26 2012

Sheet counter 1: 000097
Sheet counter 2: 001496

Printer halted
  Paper Cutter failure


Cont.   🔲       Reset   Reset
                cnt 1   cnt 2
```
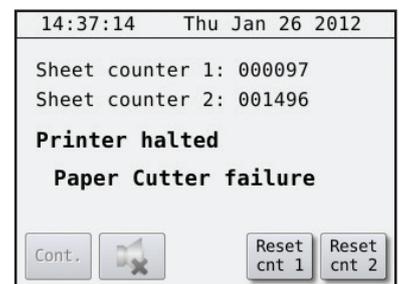
Unrecoverable errors:
When there is a unrecoverable error, the display will show what has happened e. g. "General failure, Beam wheel failure". When this kind of errors occurs, the Printer must be Reset or switched off and then switched back on again.
The job currently being printed has to be sent once more from the computer. The different unrecoverable errors are:

- Beam wheel failure
This means that the pulses from the Beam wheel sensor is not registered in the electronics. This can be caused by several reasons, e.g. defect sensor, disconnected sensor, broken main belt, defect main motor and so on. If you can hear the main motor start, it is probably something wrong with the sensor. But if you cannot hear the motor start, it is probably something wrong with the main motor. Press Reset to continue. Tip; The sensor can be tested manually on *Main Menu - Warning - Service/Diagnostic - Test Sensors.*

```
09:53:07    Fri Jan 13 2012

Sheet counter 1: 001312
Sheet counter 2: 000952

General failure
  Beam wheel failure


                          Reset
```
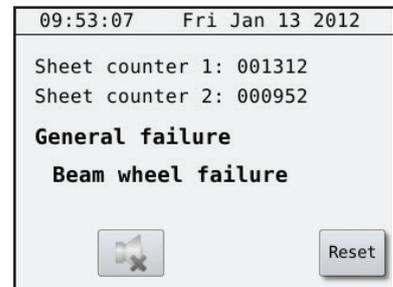
- Magnet rack failure
A defect magnet has been detected during printing. The display will say "General failure, Magnet rack failure" and the Printer will stop. Please check the log for the details.
(Main Menu - Warning - Service/Diagnostic - Warning - View Log)

```
14:17:30    Thu Jan 26 2012

Sheet counter 1: 000087
SINCE FAILURE  : 000000

General failure
  Magnet rack failure


                          Reset
```
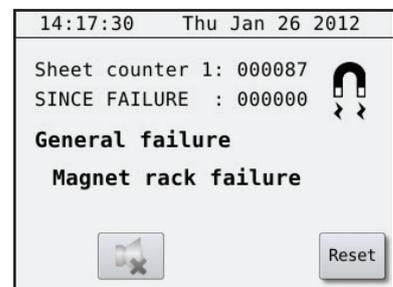
- Paper feed failure
The paper position is not where the electronics is expecting it to be. Can be caused by e.g. the paper is stuck so the stepping motor is slipping, stepping motor is disconnected or defect, one of the two sensors is disconnected or defect, and so on. Press Reset to continue.
Tip; The sensors can be tested manually on *Main Menu - Warning - Service/Diagnostic - Test Sensors.*

```
10:20:30    Fri Jan 13 2012

Sheet counter 1: 001323
Sheet counter 2: 000963

General failure
  Paper feed failure


                          Reset
```
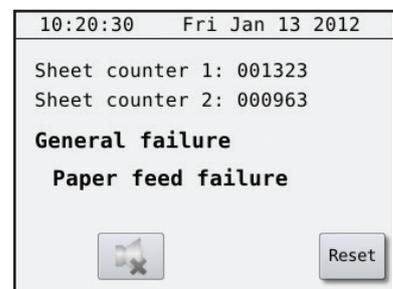
- Illegal ESC sequence
The Printer has received an ESC sequence that it doesn't recognize or is placed in wrong location on the page or with invalid parameters. Press OK to continue.

```
16:24:47    Thu Jan 26 2012

Sheet counter 1: 001393
Sheet counter 2: 000020

Job canceled
  Illegal ESC. sequence


                          OK
```
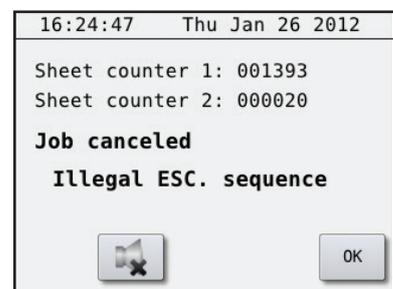
3.5   Test print

The test print program is designed to ensure that the 180 printing mechanisms functions properly.

This Printer will do an electronic test on all of it's printing mechanisms continuously during printing. However, this electrical test will not tell if something is wrong mechanically, and therefore it is recommended to print a few pages of test print before beginning the day's production.
By doing so, it's quite easy to see if all printing mechanisms are functioning mechanically.

This Printer has both single-sided and double-sided (inter point) test print patterns.
The test print consists of four different patterns. See the description below:
How to use the test print:

Print Test Pattern:

Main Menu - Warning - Service/Diagnostic - Warning - Print Test Pattern

When entering this menu choice, a warning window will appear.
This is to make the user aware that print jobs from the computer will not be printed as long as you are in this sub-menu.

- X pattern
Will print dots in a x pattern across the sheet,
useful when searching for missing dots.

- Full cell, single sided
Prints all six dots on all characters on one side of the sheet,
useful for dot quality tests.

- Full cell, both sides
Prints all six dots on all characters on both sides of the sheet,
useful for testing how the paper quality can take heavy printing.
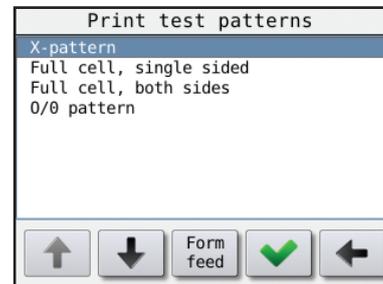
- O/Ø pattern
Prints a test pattern made of dot 1,3,5 and 2,4,6, single-sided, useful when searching for extra dots.

The chapter 4.1 "Printing principle" illustrates how the printing mechanisms are placed.

Instruction for troubleshooting will be illustrated by examples in chapter 4.2 "Troubleshooting, incorrect Braille".

4.   SERVICE AND MAINTENANCE

When doing service or maintenance, the cover must be taken off. Some procedures covered in this chapter might be done simply by removing for example a side panel. But we recommend for "bigger operations" to remove the cover completely. Please see chapter 2.2 "Removing the Printer cover" on how to do this.

When the cover is removed, the operator panel is also removed. To be able to run tests and so on, you can place the front panel beside the Printer so that you are able to connect the cables to the operator panel. Or you can unscrew the panel from the cover and keep it nearby the Printer.
Please observe that the operator panel is an electrical board, and MUST NEVER BE PLACED ON A CONDUCTIVE SURFACE! If there is a short circuit on the board, it might damage the board.

4.1   Printing principle

The figure below is a very simplified version of the printing mechanisms in this Printer.
The four "bars" across the paper indicates the magnet racks.
The magnet racks are named from A to D.
Magnet rack A and B make dots on the side of the paper facing down, and magnet rack C and D makes the dots on the side facing up.
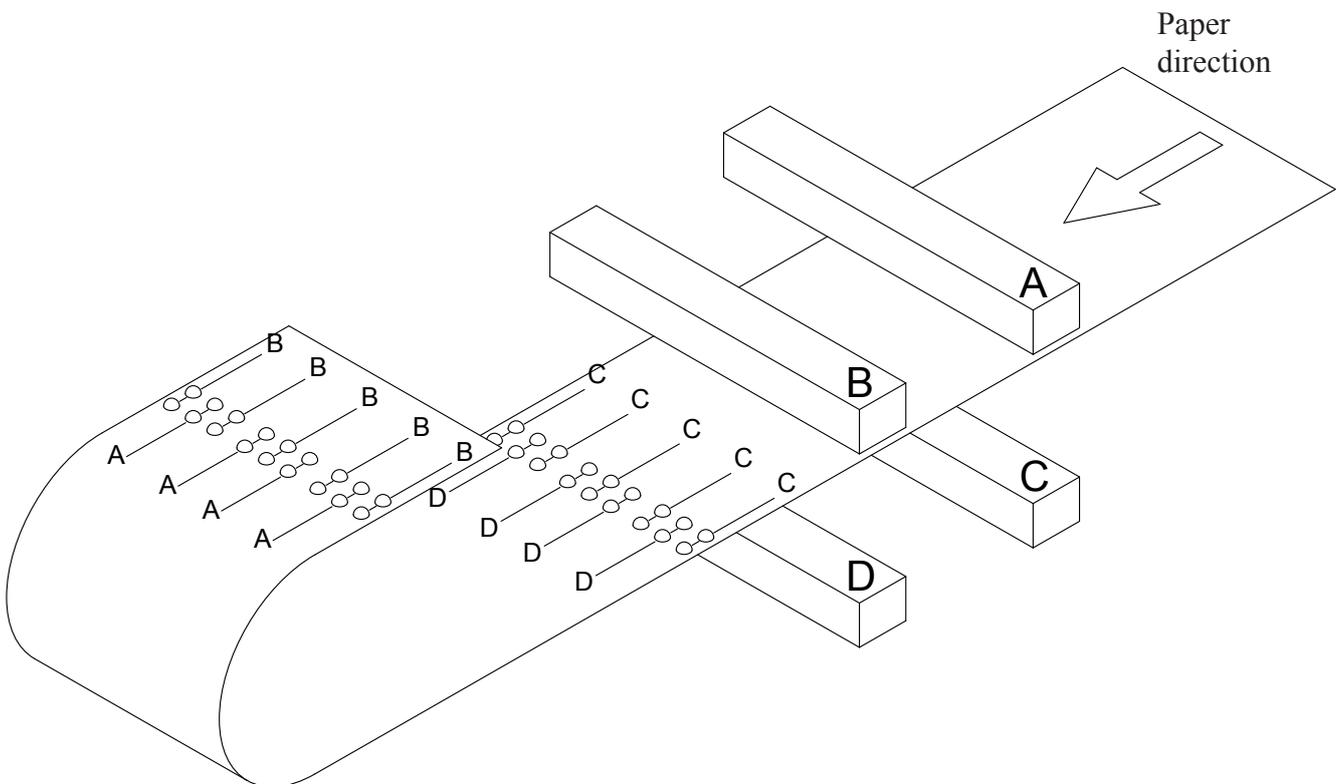
The crossection below is a "theoretical" figure showing the parts inside the printing mechanism. The Printer has been "sliced" to show more detailed of how it is constructed.
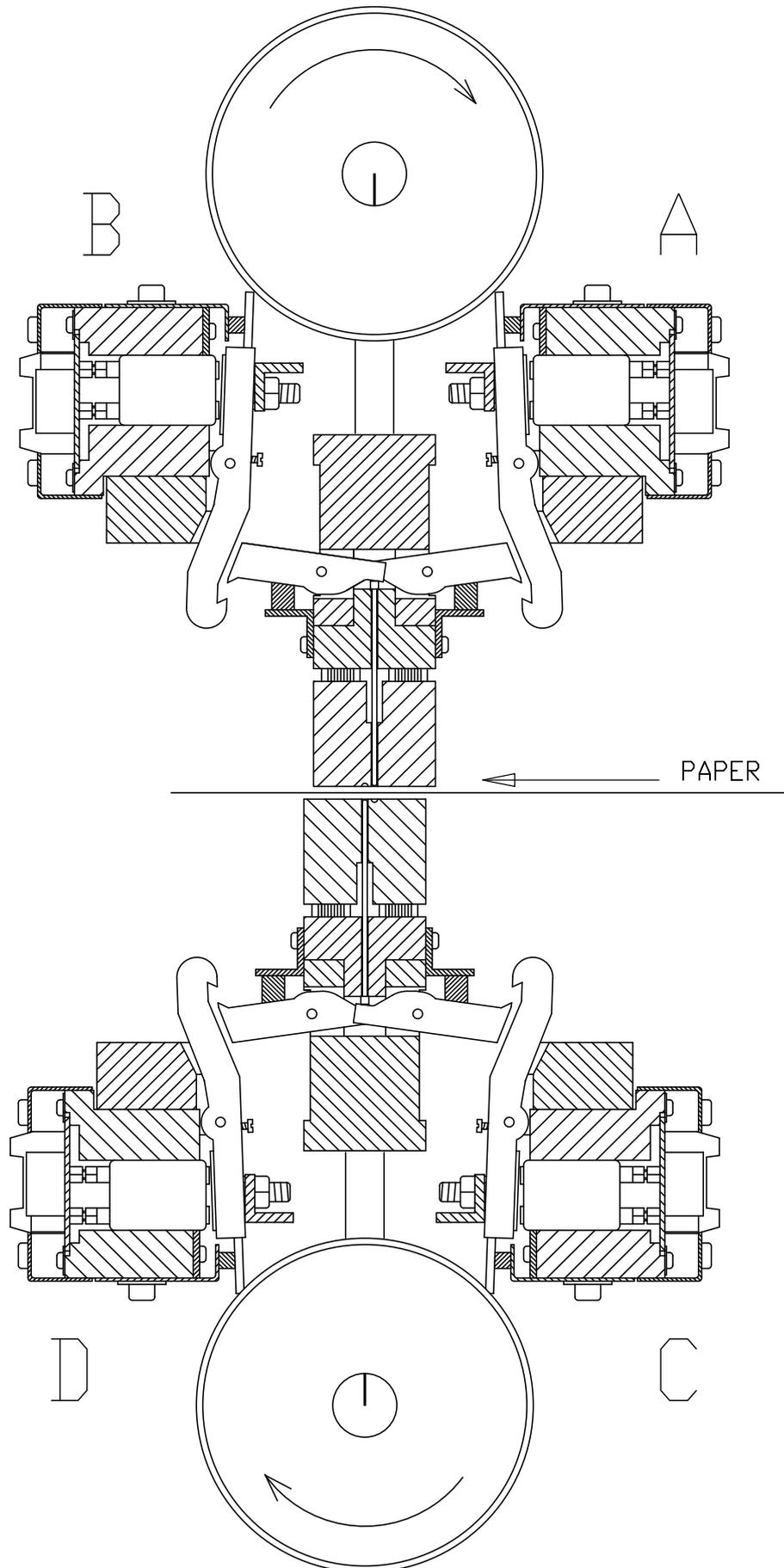
Please see the figure on the previous page.

The two shafts, one at the top and one at the bottom, are rotating synchronized. On each shaft there are eccentrics that are moving the beams and papershoes up and down. This movement is used both to hold the paper and to make the dots. A row of dots is printed for each revolution of the shafts. The shafts must rotate two times to form a complete column of characters.

Please see figure below:

ooo ooo ooo ooo ooo First revolution

ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo Second revolution

ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo Third revolution

ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo
ooo ooo ooo ooo ooo Fourth revolution

To be able to print interpoint (where both sides of paper are printed simultaneously), the back page is offset a little to the right and a little down to fit in between the dots on the front page.

Please see figure below:

Front page

Back page (dashed lines)
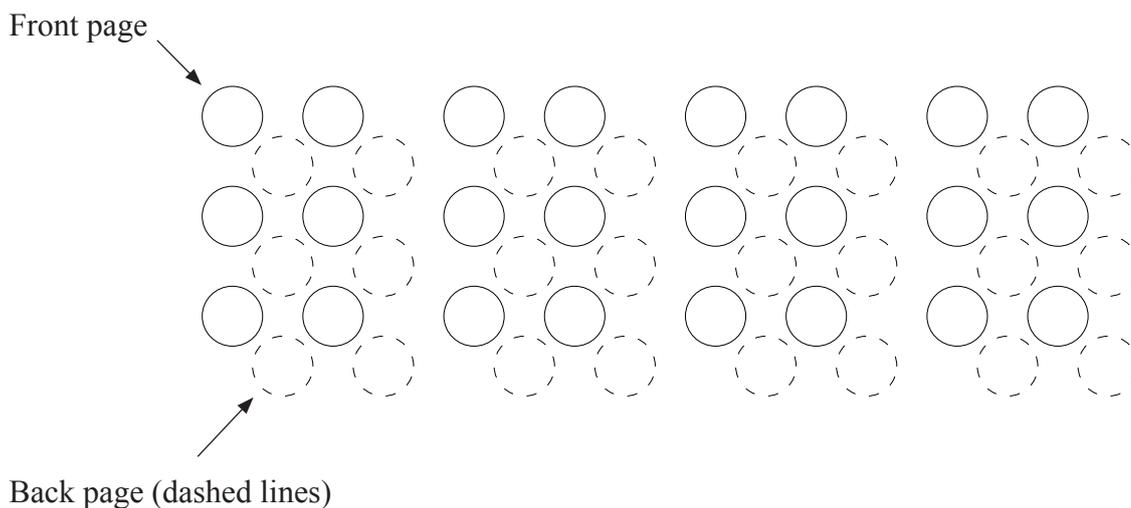
The drawing on this page is to help to understand the basic principle of how the dots are printed.
Please also see the drawings on the next page.

The parts in the upper left of this drawing is one of the magnet racks. The parts in the lower right, are the beam and paper shoes. The magnet racks do not move, but the beams and the papershoes are moving up and down for every revolution of the eccentric shafts.

Inside each magnet rack there are 45 electrical magnets. The magnets are controlling the long pivot arms.

When a dot is going to be printed, the magnet is engaged, and the long pivot arm will be drawn against the magnet poles.

At the same time, the beam and the paper shoe will start to move downwards, and the short pivot arm will catch the hook of the long pivot arm. The beam will continue to travel downwards, and will force the printing pin into the paper.

Magnet

Beam

Magnet rack

Long pivot arm

Moving up and down

Short pivot arm

Printing pin

Paper shoe

Paper sheet
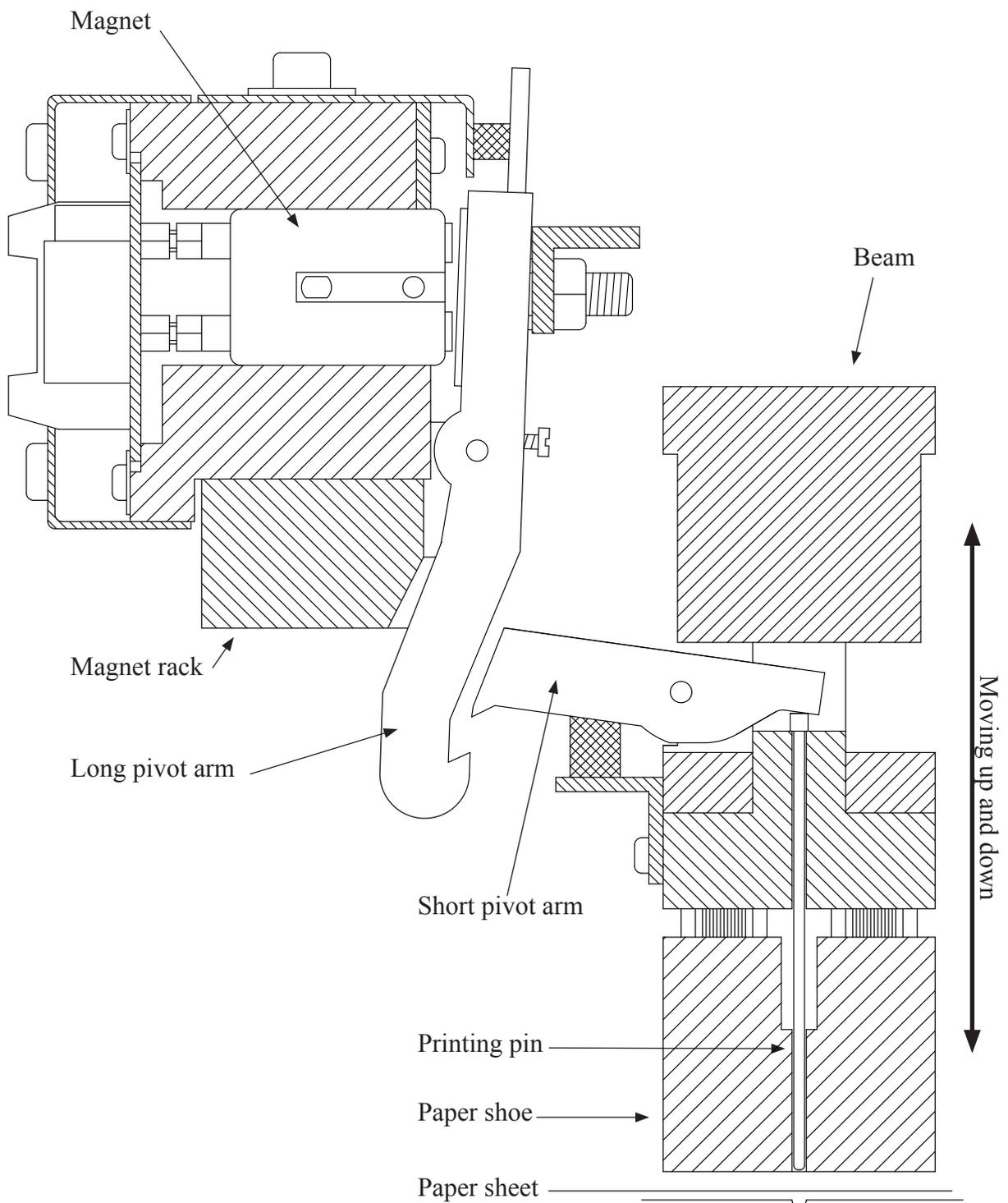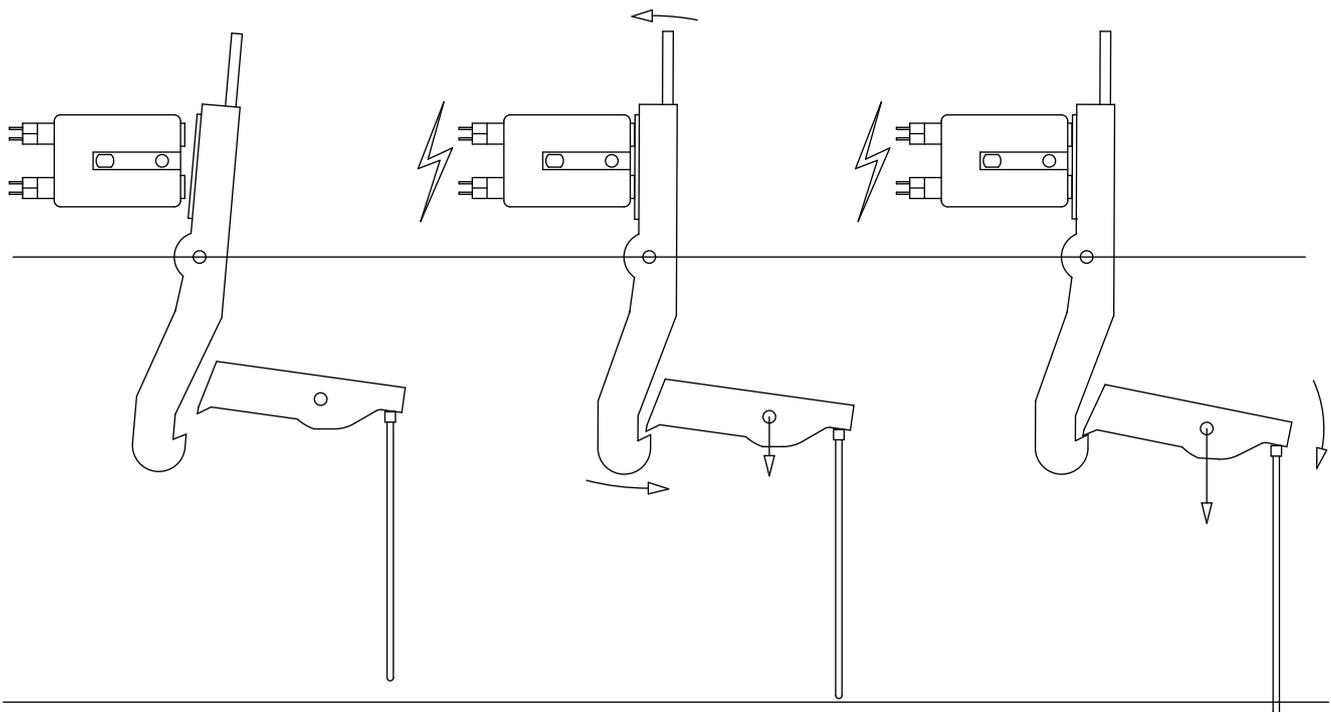
Figure A
Shows the position on the pivot arm when the Printer is not printing, and the magnet is not engaged.

Figure B
Now the magnet is engaged, and the long pivot arm has been drawn against the magnet. The short pivot arm is moving down towards the hook on the long pivot arm.

Figure C
The long pivot arm's hook catches the short pivot arm. When the short pivot arm moves further down, the printing pin will be forced down into the paper and make a dot.

General overview Printer

Main Belt

Magnet rack B

Magnet rack A

Paper cutter

Paper feed stepping motor

Main motor

Electric unit

Serial no. Printer

Main board
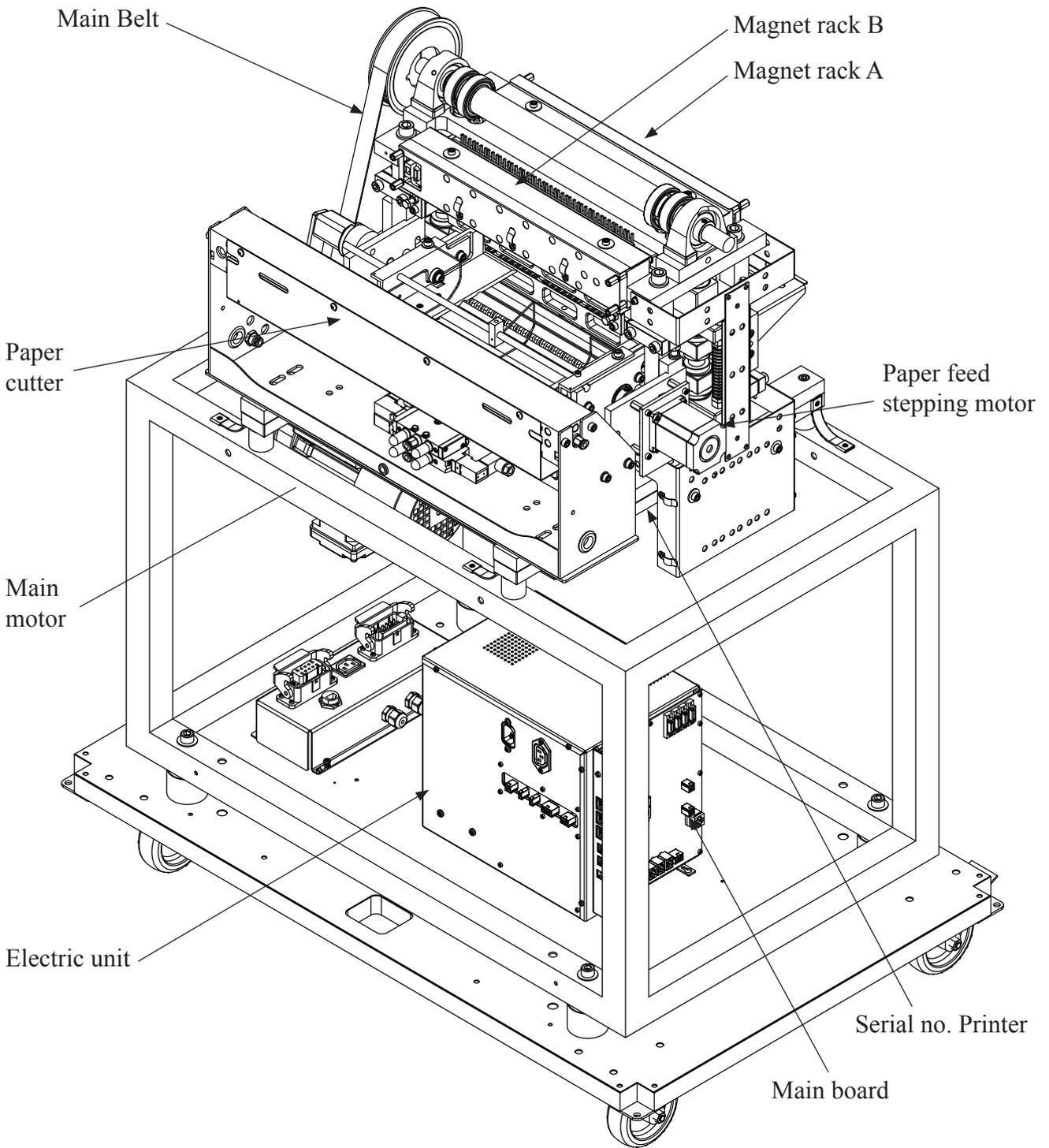
4.2   Troubleshooting, incorrect braille

Lets say that through proofreading, errors have been found in some of the characters in the printed text. The first thing to do is:
Check the characters in the text-file in your computer to find out if the error could come from the text-file and not from the Printer.
If your text-file is OK, the problem is caused by the Printer.

On earlier models of Braillo Printers, this could be caused by either a electrical problem or a mechanical problem. But on this model of Printer, there is integrated a self-diagnostic system that is checking the magnets continuously during printing, and this will trigger an alarm if it detects some electrical problems with the magnets. So, the missing dots found here are probably caused by some faulty mechanical parts or it could be dirt clogging the moving mechanisms.

Inside the Printer there are four identical magnet racks, named from A to D. Each magnet rack contains 45 printing mechanisms. There are totally 180 printing mechanisms to choose from when the error search begins. See chapter 4.1, "Printing principle".

If the Printer has been printing a lot (a lot could be either a year, or it could be 1000 printing hours, depending on what comes first) when this happens, it could be that the Printer just needs regular maintenance. See chapter 4.6 "Magnet rack, cleaning", and chapter 4.19 "Maintenance".

As a start, you should run the built-in Test Print. Depending on what kind of errors you have, you should use different tests.
The essential thing at this stage is to find which magnet rack(s) is causing the trouble.

If there is missing dot(s), use the X-pattern to detect which magnet rack(s) is missing the dot(s).

If there are too many dots, use the full cell lines, or the test pattern on test print no. 4, and the extra dot(s) will appear in the space between the lines.

However, the best test is ordinary text, if a proofreader is available. To locate the faulty magnet rack(s), see figures in chapter 4.1 "Printing principle".

There are several methods to make experiments to confirm that you have found the correct magnet rack(s). One good method is to disconnect the rest of the magnet racks, and see if the Printer still have problems.

To determine if a problem is electrical or mechanical.
See if the suspected pivot arm is moving like the rest of the pivot arms on the magnet rack. If it does move, but still does not make dots, then it is probably a mechanical problem. If it does not move and it is possible to pull the suspected long pivot arm with your finger during embossing and the dots appear. Then it most likely is caused by some problems in the electric circuits.

If one magnet rack is missing all the dots all the time, it could be because of a blown fuse. On the back of the magnet racks there is a red light that is indicating that the magnet rack has power. If this light is dark, check the fuse for the magnet rack.
See chapter 6.2 "Electric unit Printer - overview" for more details.

Which magnet makes what dot?

Please take some time to examine the figures below and on the next page. It is very important that you know how the magnets are arranged to be able to understand how this Printer works.

The letters and numbers on the figures is indicating the following:
The letter A, B, C and D is the name on the magnet rack. The number following the letter is the particular magnets number in that particular magnet rack.
(Note that the magnet numbers are always counted from the end where the connectors are fitted. Don't mix this with character/line/column number).

Paper direction

Magnet rack A and B are placed above the paper, and print dots that will appear on the underside of the paper.

Magnet rack C and D are placed under the paper, and print dots that will appear on the top side of the paper.
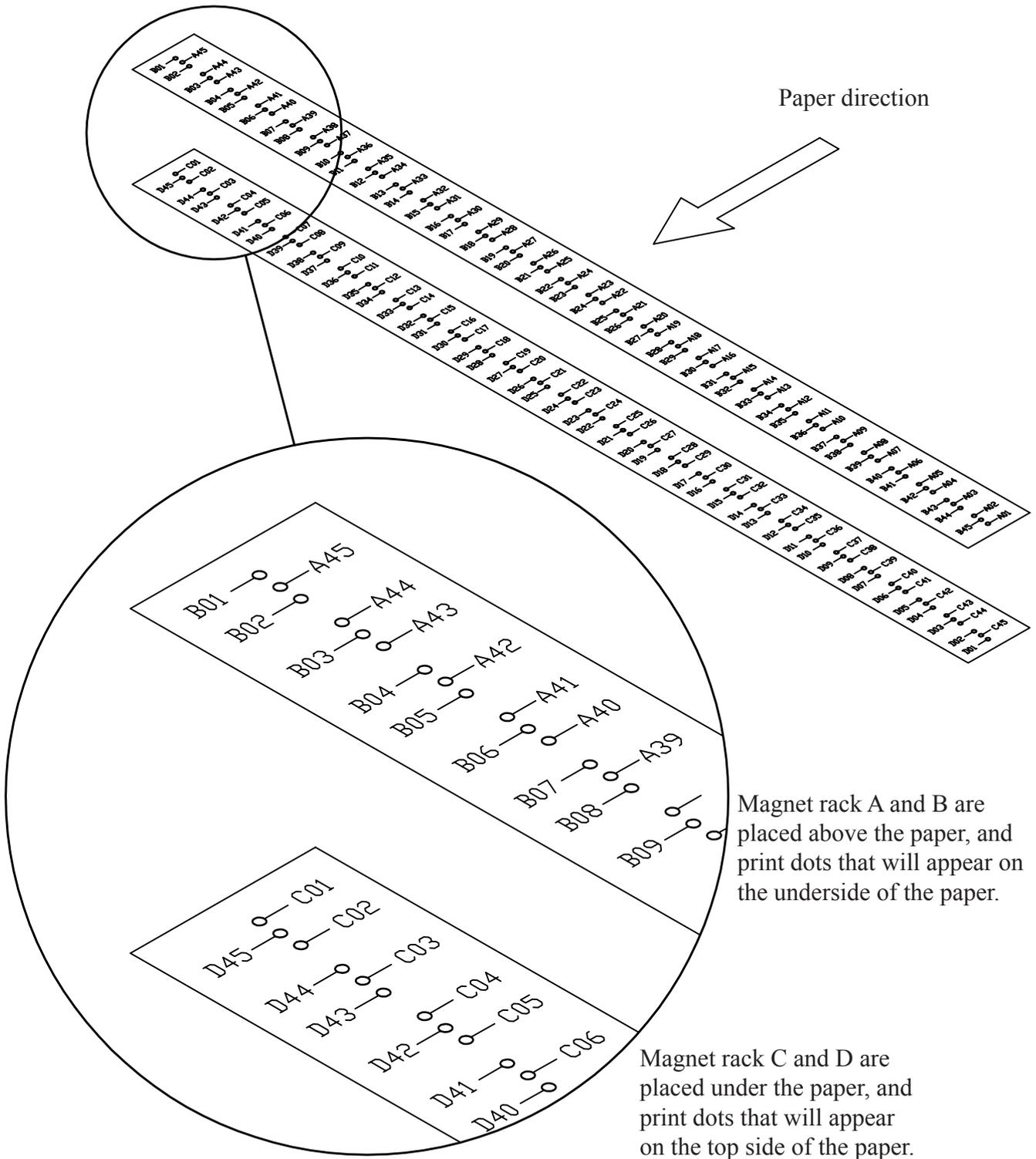
The letter "P" means page. The figure shows a sheet of paper printed in "4-page mode".
The two circles is showing which magnet that has made the different dots. Line no. one will be in the upper left corner when facing the page.
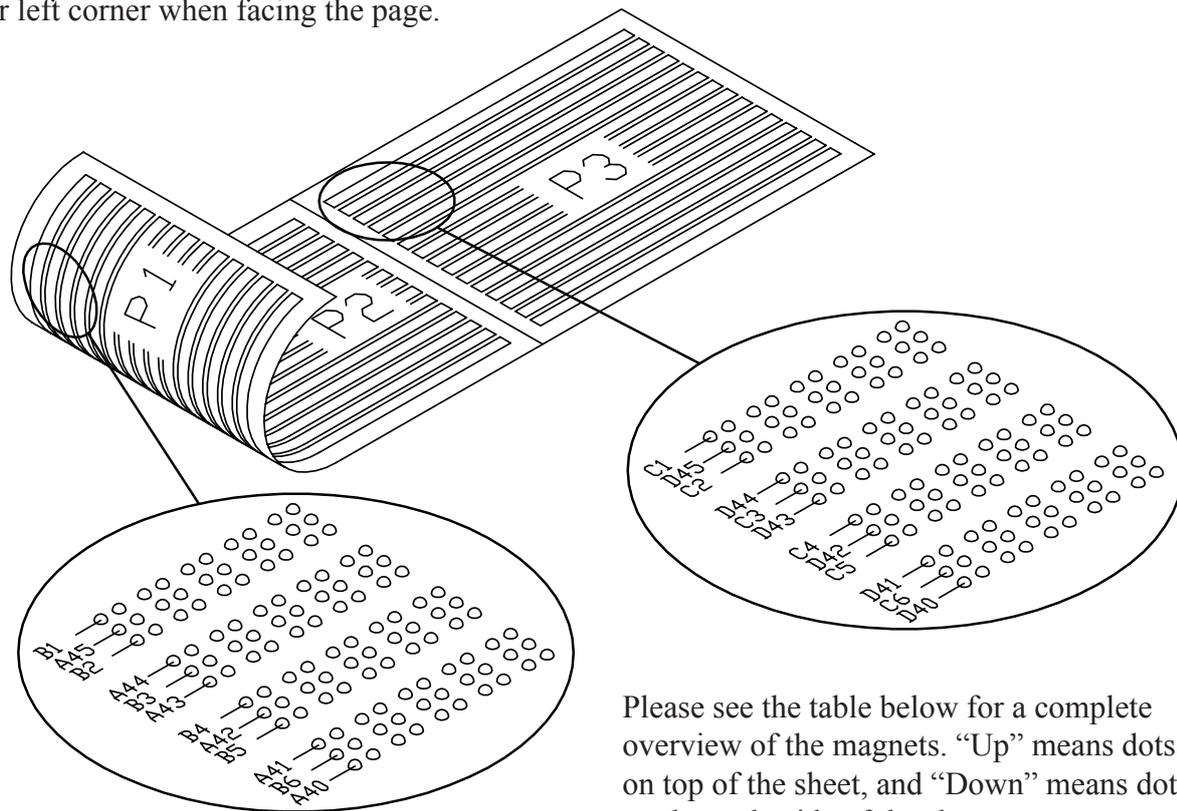
Please see the table below for a complete overview of the magnets. "Up" means dots on top of the sheet, and "Down" means dots on the underside of the sheet.

Line no.	Dot no.	Up	Down	Line no.	Dot no.	Up	Down	Line no.	Dot no.	Up	Down
1	1	C01	B01	11	1	C16	B16	21	1	C31	B31
	2	D45	A45		2	D30	A30		2	D15	A15
	3	C02	B02		3	C17	B17		3	C32	B32
2	1	D44	A44	12	1	D29	A29	22	1	D14	A14
	2	C03	B03		2	C18	B18		2	C33	B33
	3	D43	A43		3	D28	A28		3	D13	A13
3	1	C04	B04	13	1	C19	B19	23	1	C34	B34
	2	D42	A42		2	D27	A27		2	D12	A12
	3	C05	B05		3	C20	B20		3	C35	B35
4	1	D41	A41	14	1	D26	A26	24	1	D11	A11
	2	C06	B06		2	C21	B21		2	C36	B36
	3	D40	A40		3	D25	A25		3	D10	A10
5	1	C07	B07	15	1	C22	B22	25	1	C37	B37
	2	D39	A39		2	D24	A24		2	D09	A09
	3	C08	B08		3	C23	B23		3	C38	B38
6	1	D38	A38	16	1	D23	A23	26	1	D08	A08
	2	C09	B09		2	C24	B24		2	C39	B39
	3	D37	A37		3	D22	A22		3	D07	A07
7	1	C10	B10	17	1	C25	B25	27	1	C40	B40
	2	D36	A36		2	D21	A21		2	D06	A06
	3	C11	B11		3	C26	B26		3	C41	B41
8	1	D35	A35	18	1	D20	A20	28	1	D05	A05
	2	C12	B12		2	C27	B27		2	C42	B42
	3	D34	A34		3	D19	A19		3	D04	A04
9	1	C13	B13	19	1	C28	B28	29	1	C43	B43
	2	D33	A33		2	D18	A18		2	D03	A03
	3	C14	B14		3	C29	B29		3	C44	B44
10	1	D32	A32	20	1	D17	A17	30	1	D02	A02
	2	C15	B15		2	C30	B30		2	C45	B45
	3	D31	A31		3	D16	A16		3	D01	A01

Possible reasons for errors:

See figures on the next page.

If a dot from a certain printing pin is missing regularly, the reason might be one of the following:

1. Defective magnet (The self-diagnostic system will find this one first).
2. Broken short pivot arm.
3. The long pivot arm cannot move because of dirt.
4. The printing pin is stuck because of dirt, causing the short pivot arm to miss the long pivot arm.
5. Errors in the magnet rack board.

If dots from several printing pins are missing now and then, the reason might be one of the following:

1. The sponge list is pushing too hard on the long pivot arm.
2. The gap between the two pivot arms are too large.
3. The support list has become sticky on the side against the long pivot arms, and the long pivot arm does not move properly.
4. The sponge list on the short pivot arm is so worn/compressed so that it will not give enough tension on the pivot arm.

If there are too many dots on the paper, the reason might be one of the following:

1. The sponge list is not pressing enough against the long pivot arm.
2. The gap between the two pivot arms are too small.
3. The magnet poles have become sticky, and this causes the pivot arms to stick to the magnet.
4. The long pivot arm does not move properly.

Control:
To be sure that you have found the right mechanism after the troubleshooting, you can do the following test: Carefully pull the suspected long pivot arm against the magnet with your finger.
Note! Please be careful to avoid all other moving parts with you hair, clothes and the rest of your body!

At the same time, run a test print. The mechanism with the finger on, will make a column of dots downwards the sheet until you take the finger away. By doing this you can see if this column of dots is situated on the same place (and same side!) on the sheet as the error is.

Observe that the same printing mechanism (magnet, long pivot arm, short pivot arm and printing pin) makes all the dots in a column across the page.

Magnet rack board

Magnet

Sponge list
Magnet rack

Long pivot arm

Support list

Magnet poles

Short pivot arm

Pin guide

Gap between pivot arms

Sponge list
short pivot arm

Printing pin
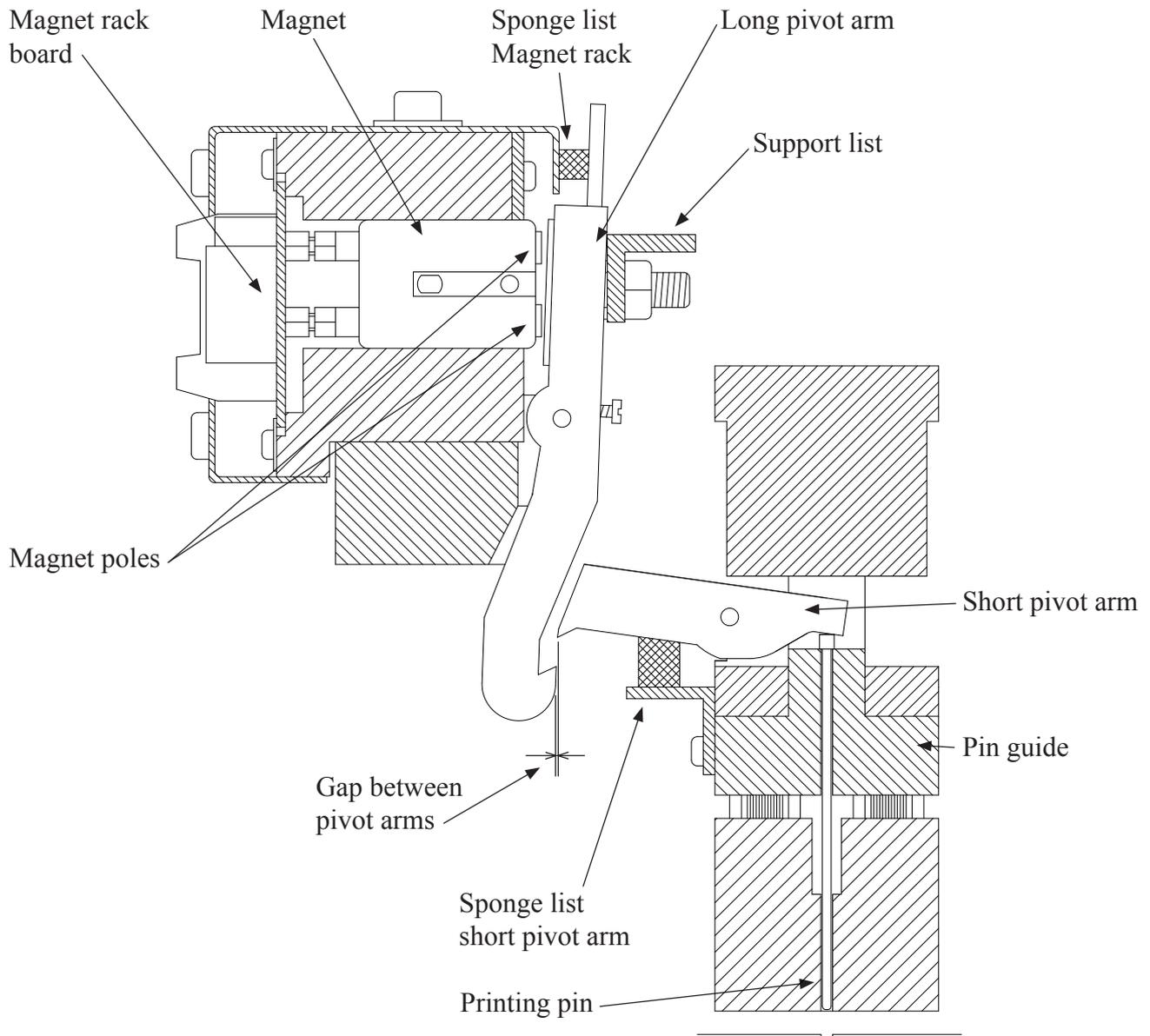
4.3   Magnet rack, removal

Please see figures below:

Magnet racks A and C (the two on the side the paper goes into the Printer) are quite easy to reach, but to remove magnet rack B and D, it is often best to first remove the paper cutter (see figure to the right) and the paper feeder.

Disconnect the cables for the magnet rack.

Make sure that the brass eccentrics at the ends of the magnet rack is touching the magnet rack on both ends. This to be able to get it back to the exact same position sideways.

Remove the magnet rack by unscrewing the four bolts shown in the figure.

Note! Before removing the cutter, make sure that the position on the cutter can be re-established by use of the position plates at the back of the cutter. Do this at both sides.

Position plate
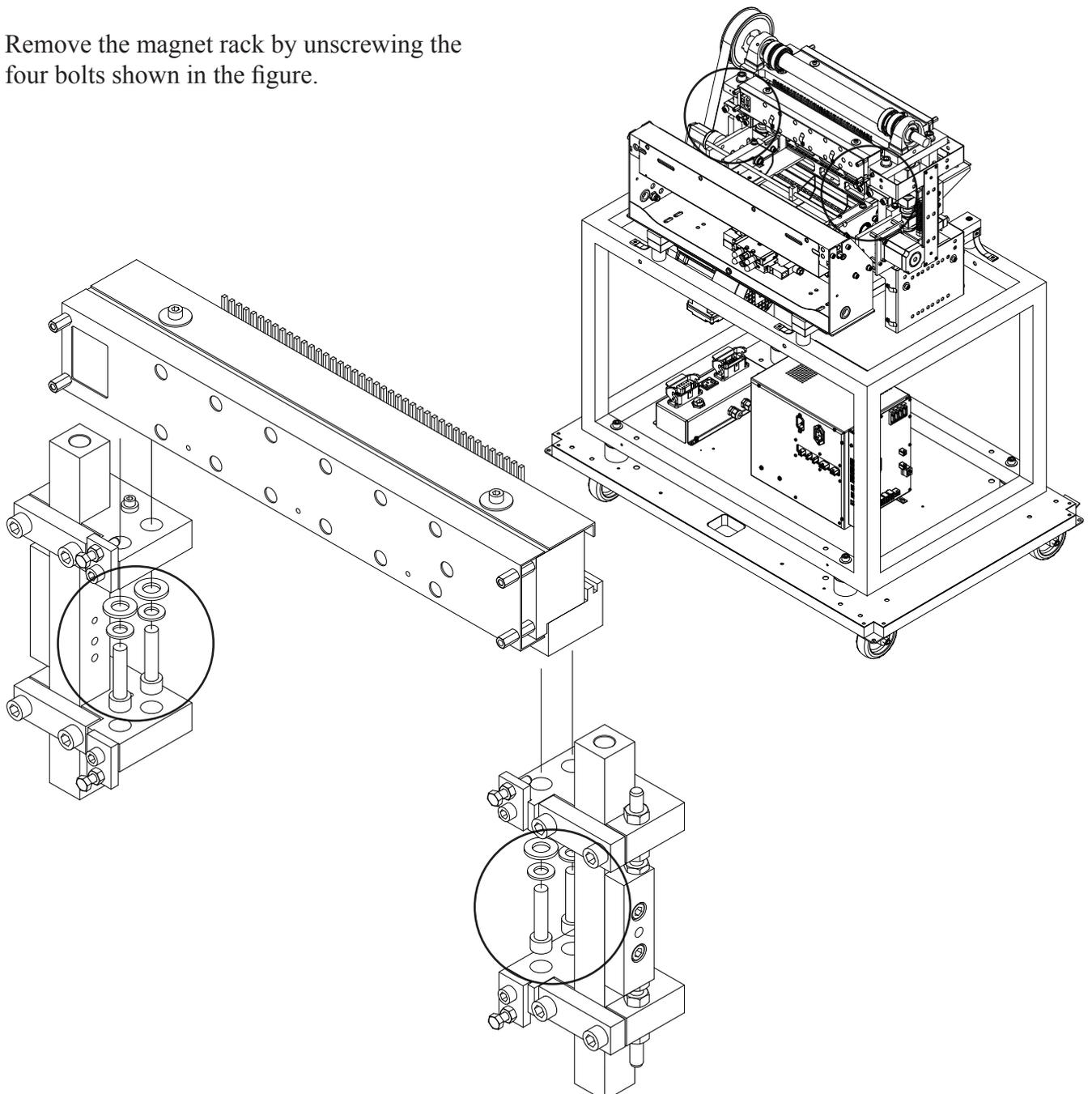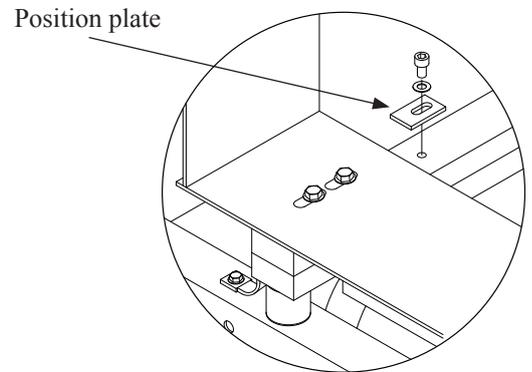
4.4   Magnet rack, disassembly, step by step

There are two main reasons for disassembling the magnet rack.
It could be to replace some parts, i.e. a defect magnet, a worn
pivot arm, or it could be for regular maintenance.

The magnet racks can be considered as the parts of the Printer
that will have the greatest influence on the dot quality, so it is
very important to know how to deal with them.
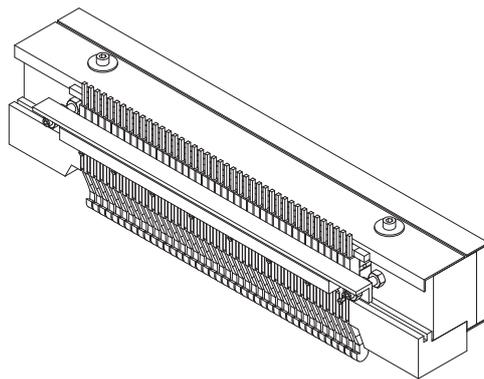
Take the magnet rack out of the Printer like described in chapter 4.3 "Magnet rack, removal".
Next, follow the instructions below.

Step 1.   Remove the two bolts holding the sponge list, and then remove the sponge list.

Sponge list
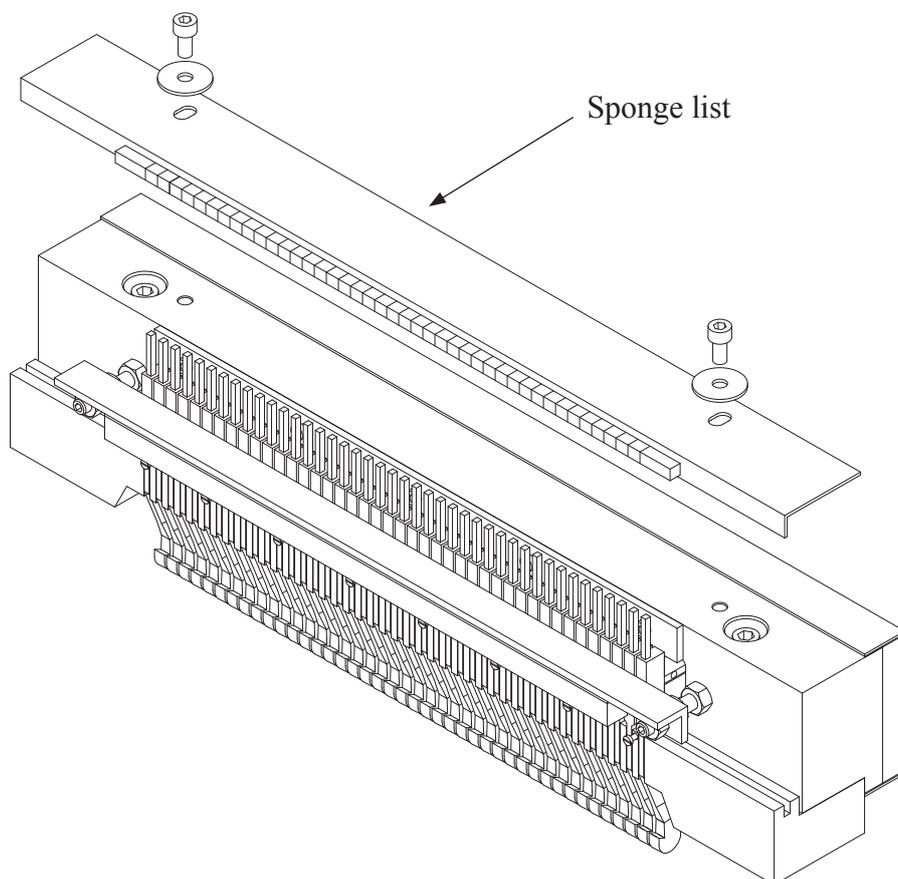
Step 2.   Remove the two nuts holding the support list, and then remove the support list.

Support list
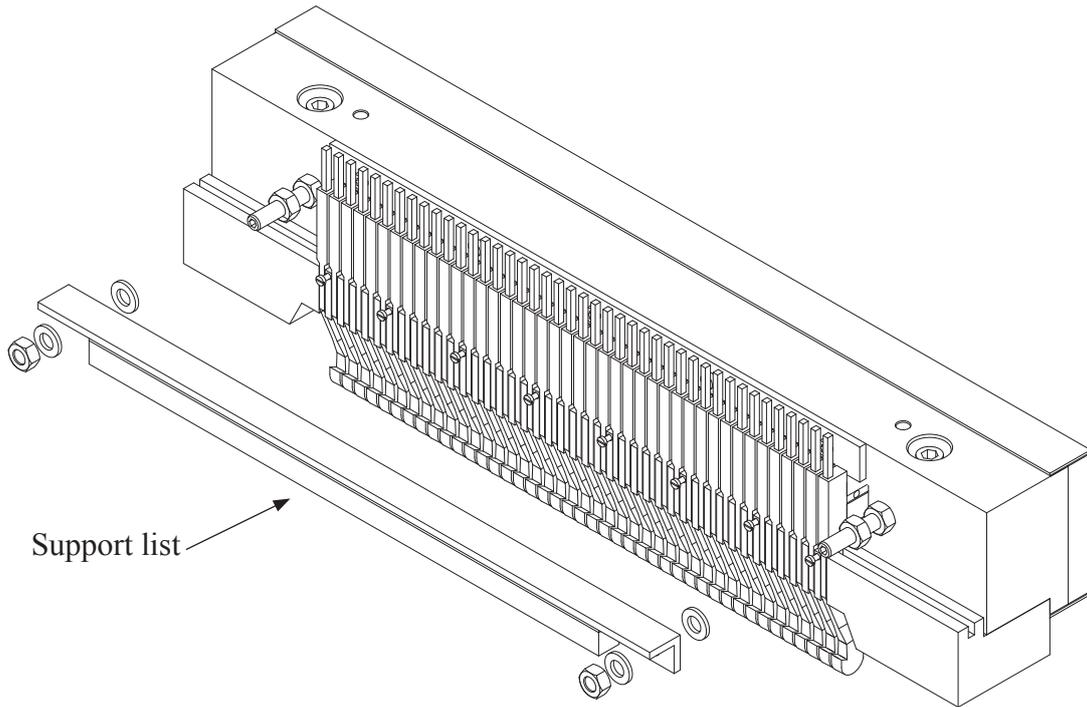
Step 3.   Remove the two bolts holding the pivot arm fastener, and then
carefully remove the pivot arm fastener. The magnet rack is now
disassembled.

Pivot arm fastener
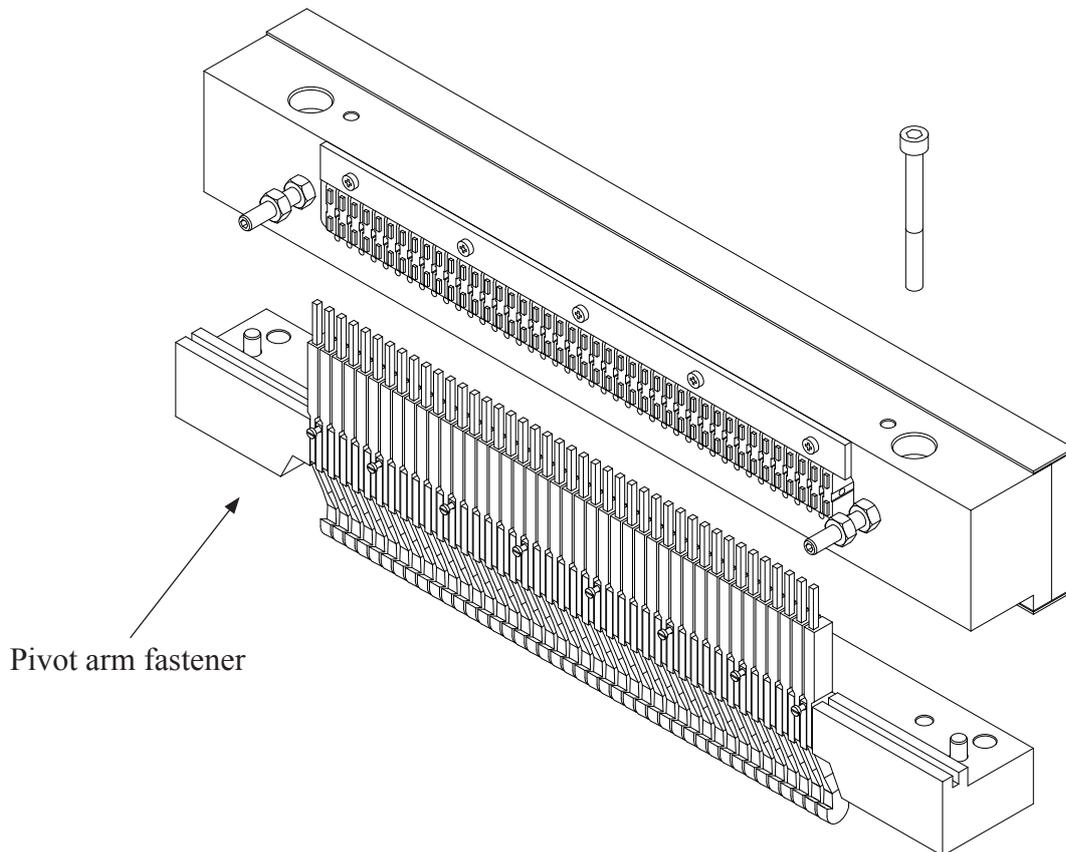
4.5   Magnet, replacement

Please observe that the numbering on the magnets in a magnet rack, always starts at "one" at the end where the connections are. (It does not refer to dot number, character number or column number!).

Disassemble the magnet rack like described in chapter 4.4 "Magnet rack disassembly, step by step". Next, follow the instructions below.

Step 1.   Remove the screws holding the list, and the list.
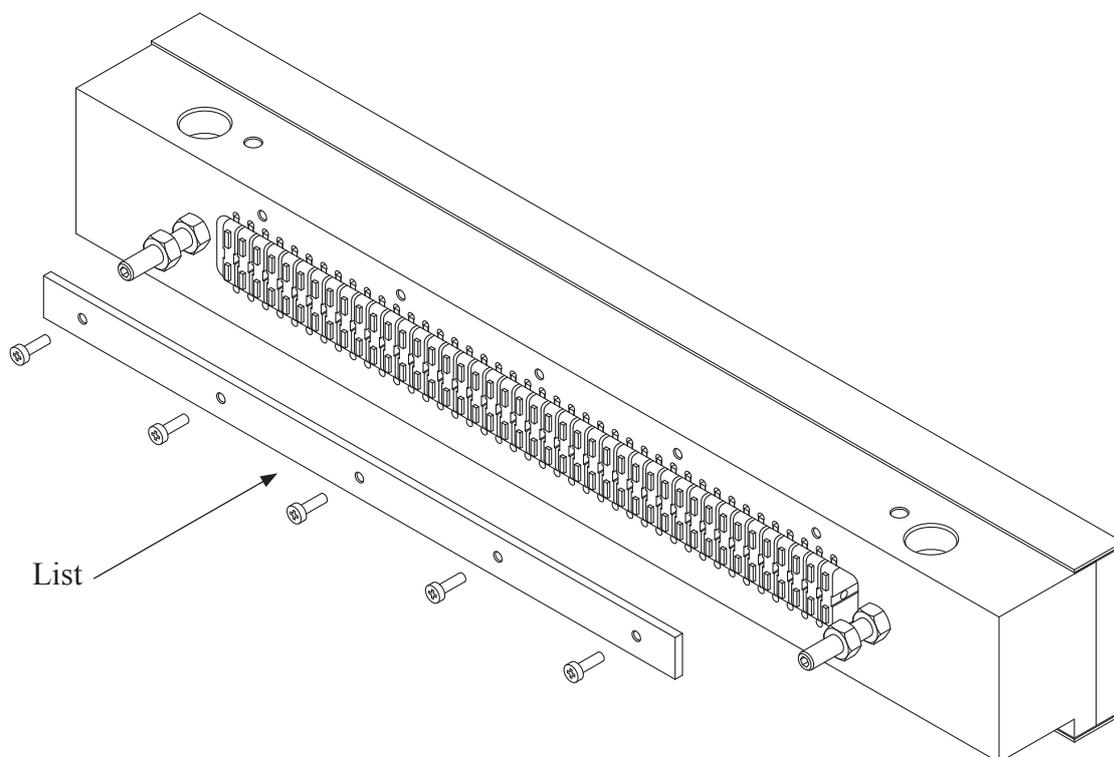
Step 2.   Pull out the defect magnet with, e.g. a narrow pair of "needle nose" pliers.
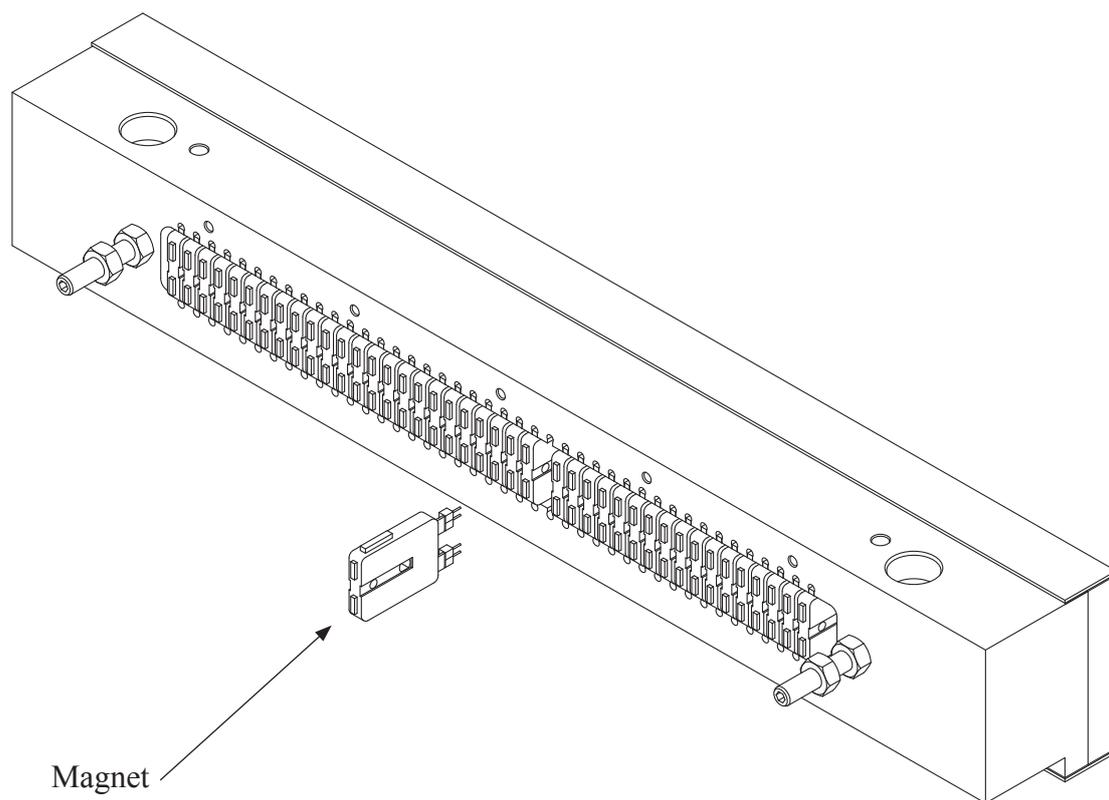
Magnet

Step 3.   Check the magnets internal resistance if you have an ohm-meter available. The resistance should be from 185 ohm up to 240 ohm. Any value outside this range indicates a defective magnet.
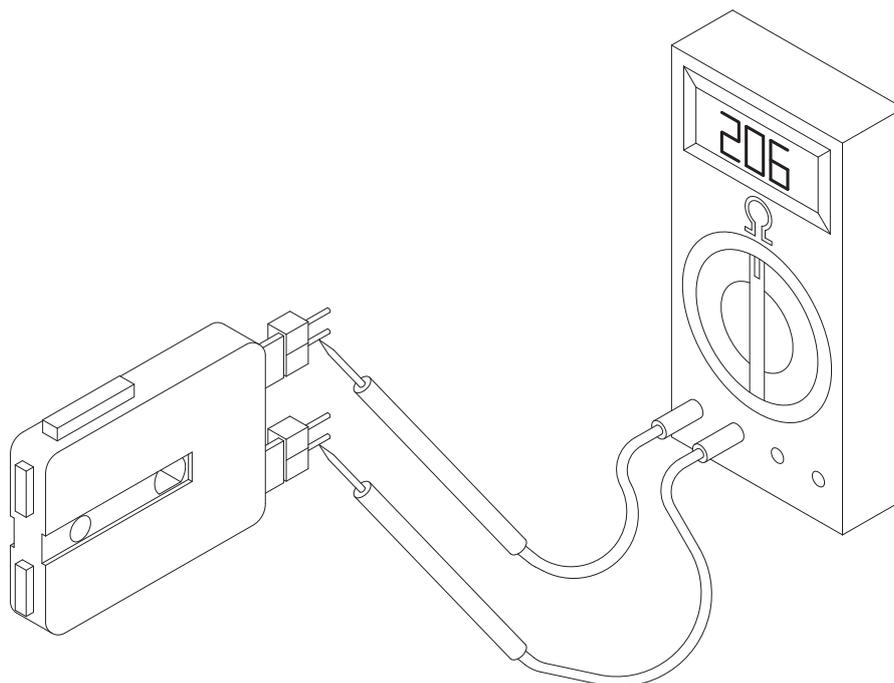
Step 4.   Replace the defective magnet with a new magnet in its place. Note: The spikes on one of the sides on the magnet. These spikes must be oriented the same direction as the rest of the magnet's spikes in the magnet rack.

Note the direction on these spikes
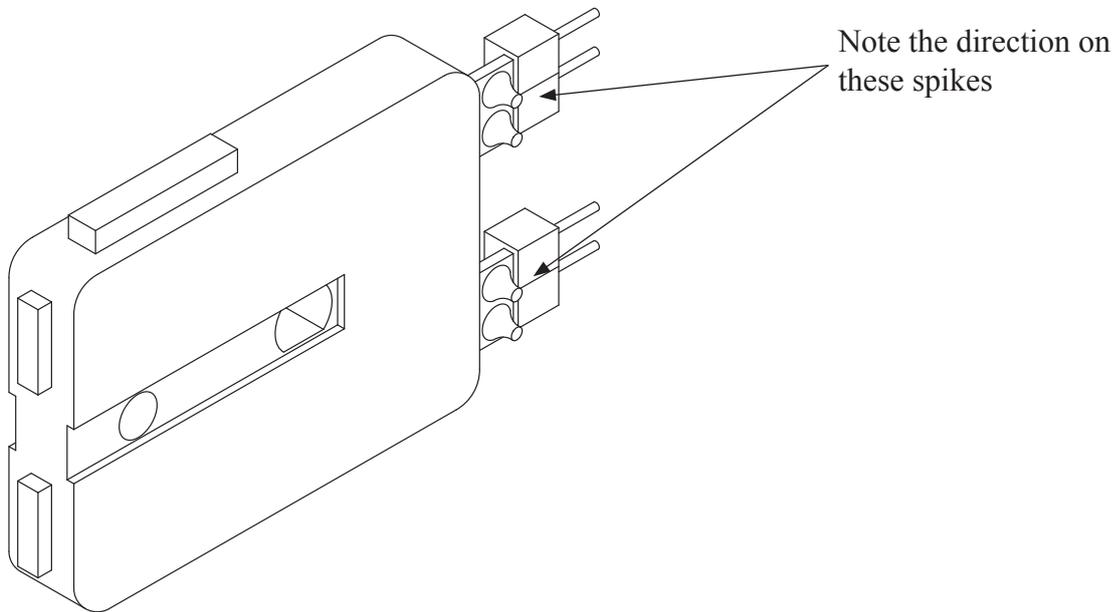
4.6   Magnet rack, cleaning

Remove the magnet rack as described in chapter 4.3 "Magnet rack, removal".
Then disassemble the magnet rack as described in chapter 4.4 "Magnet rack disassembly, step by step".

Now damp a cloth with cleaning alcohol to wipe off the surfaces as described in the figure below:

⚠ Note! Do not ever oil, grease or lubricate any of the moving parts on a magnet rack!
This will only attract paper dust.

The support list

Magnet poles on
the magnets

The iron pieces in
the long pivot arms

At the back of the long
pivot arms
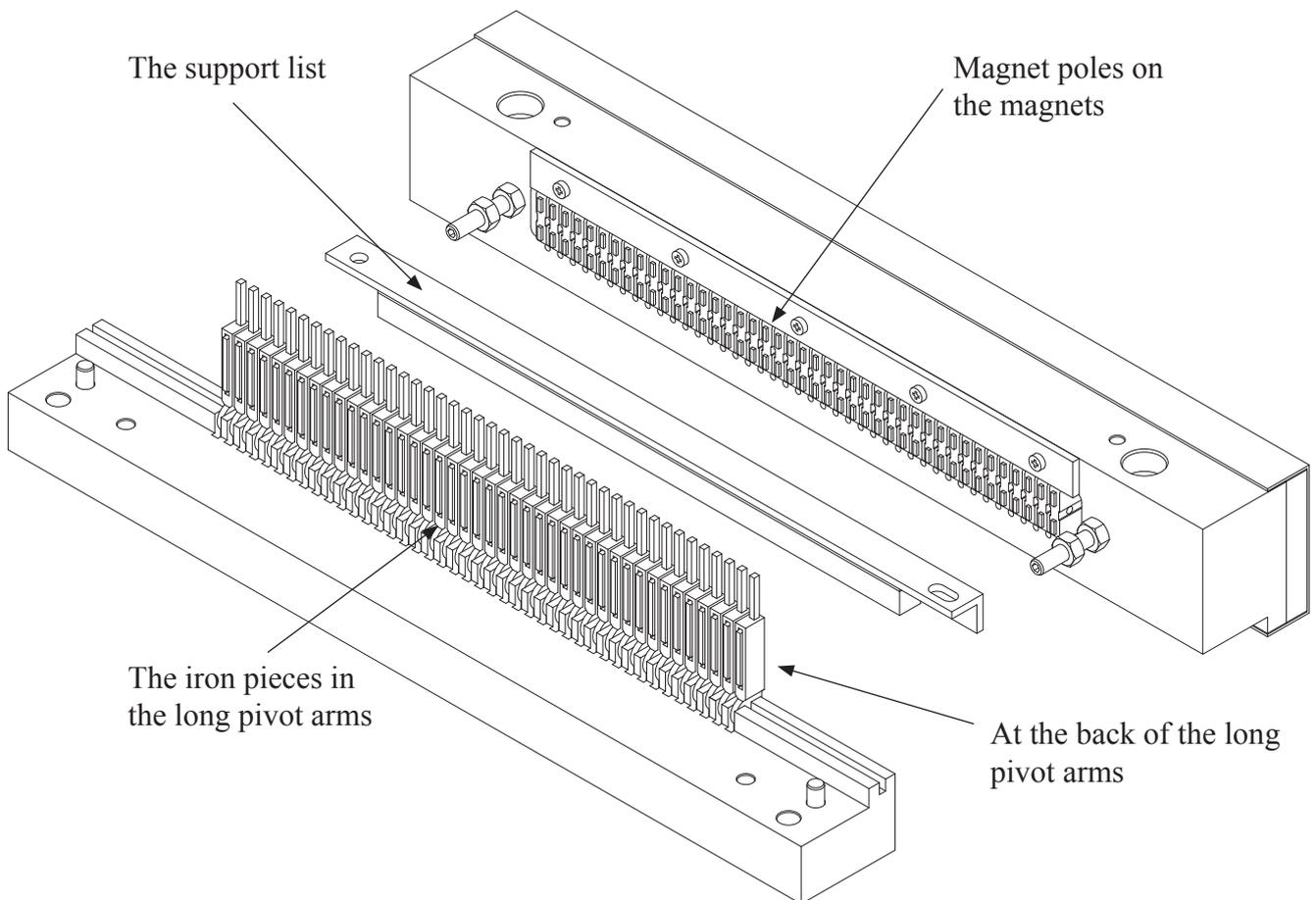
4.7   Magnet rack, adjustment

Before replacing the magnet rack in the Printer, two adjustments must be checked.
The first one is the distance between the support list and the pivot arms. This is the travelling distance for the pivot arm. And it should be adjusted to about 0.8 mm using a feeler gauge. Adjust the nuts on both ends of the magnet rack.
If the 0.8 mm feeler gauge goes in, and the 0.9 mm feeler gauge does not, consider the adjustment OK.
Make sure that the nuts are tight when you are done!

Please see figure below:

Adjust with these nuts

0.8 mm feeler gauge
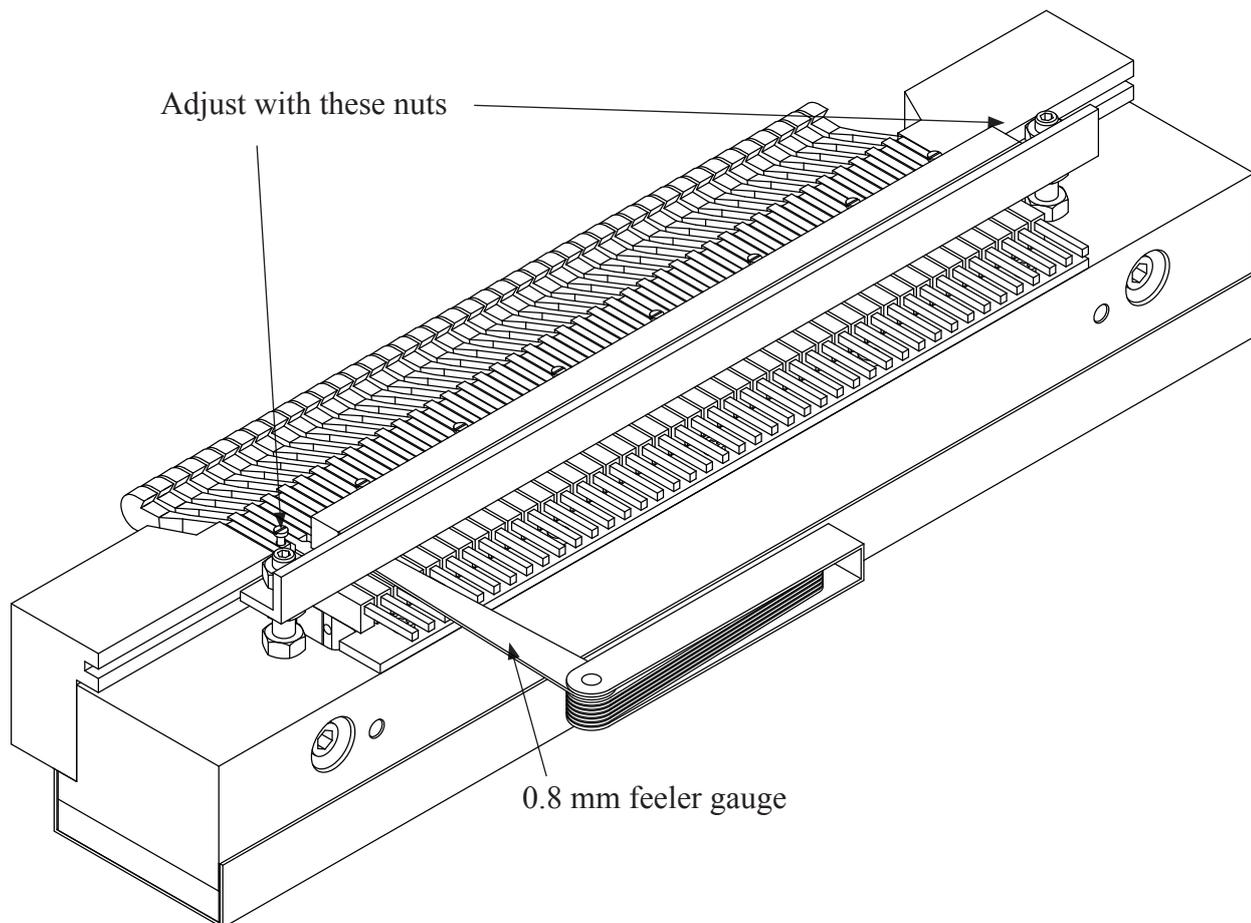
The second adjustment is the pressure the sponge list exerts against the pivot arms.
The sponge list works as a return spring for the pivot arms. The correct adjustment is when the sponge list is slightly pressing against the pivot arms, but the pivot arms can still move freely.

Please see figure below:

Loosen these screws

Pivot arms is pressed a little into the sponge
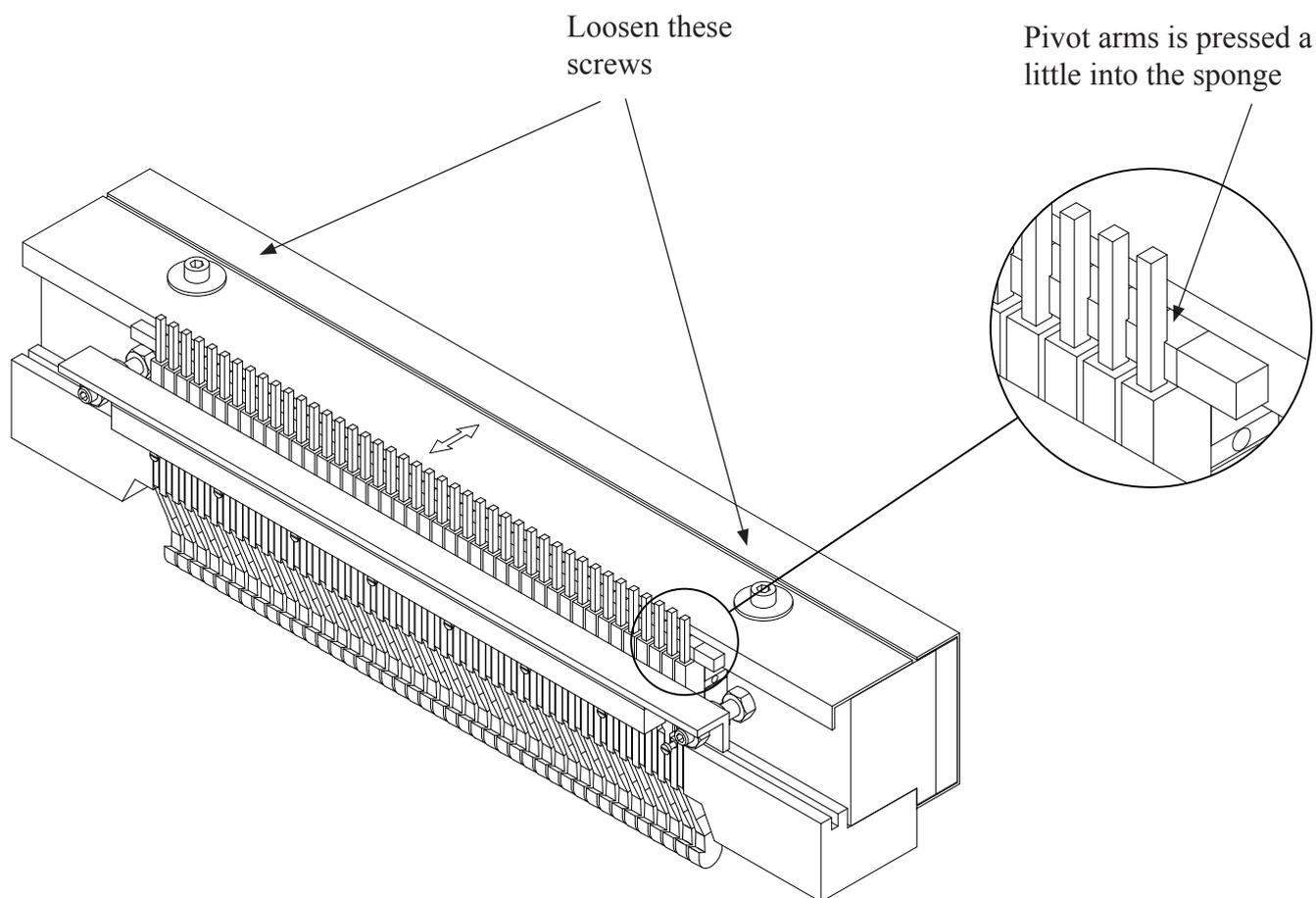
4.8   Magnet rack, refitting and adjusting

Please see figure below:

Before putting the magnet rack back on the Printer, make sure that the magnet rack itself is adjusted as described in the previous chapter.

When replacing the magnet rack in the Printer:
Put in the four fastening screws, but do not tighten them. Slide the magnet rack horizontally away from the Printer, so that the magnet rack is touching the horizontal adjustment screws. This will ensure that the magnet rack is in exactly the same position as before it was taken off the Printer.

See next chapter regarding correct adjustment of the magnet racks.

Note! All explanations refer to one magnet rack, but these adjustments must be done on all four magnet racks.

Pull back against these
positioning screws
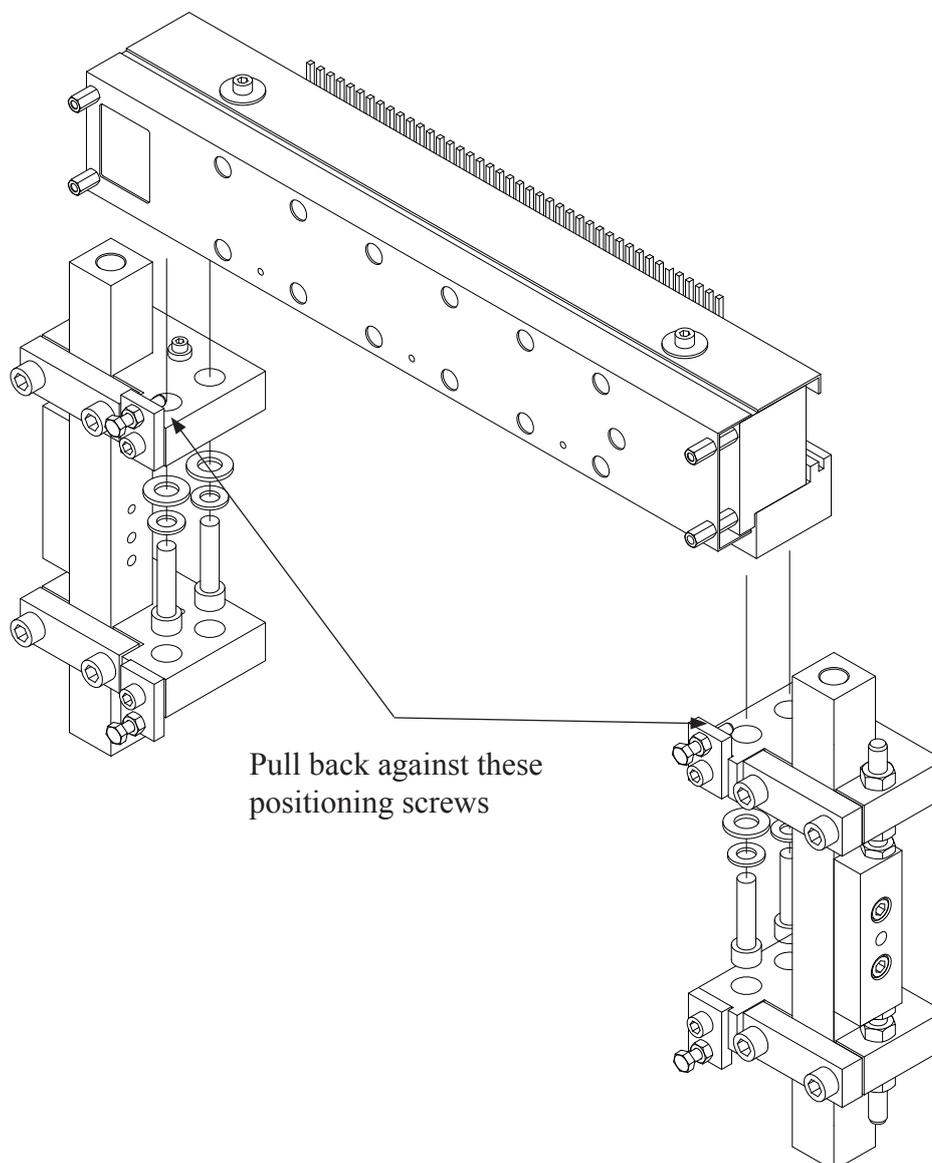
The magnet rack must be adjusted in two directions, horizontal and vertical.
The horizontal adjustment is done first. This adjustment positions the magnet rack correctly in relation to the short pivot arms. If the Printer prints too many or too few dots, the horizontal adjustment could be the problem.

Then the vertical adjustment is done. This adjustment will affect the pressure the pivot arms put on the printing pins. This directly affects the shape of the printed dots.

Horizontal

Vertical
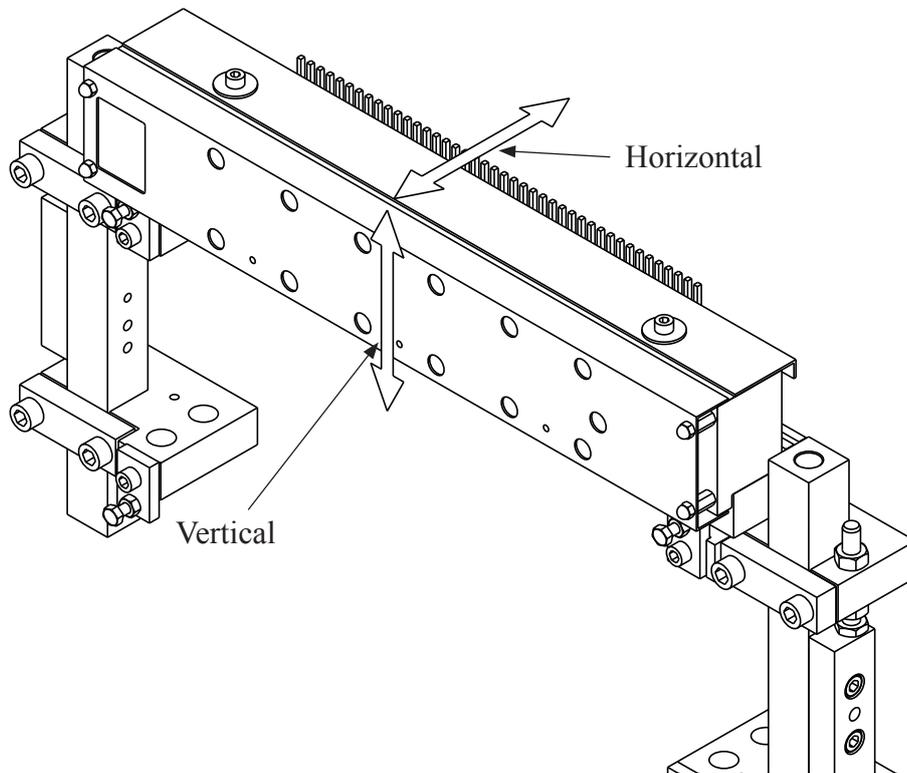
To be able to adjust the magnet rack correctly, it is necessary to put the Printer in "printing position".
This is done by rotating the main belt by hand until the arrows at the ends of the shaft are pointing in the opposite direction of each other.
It is possible to get the mechanism to balance in this place, but you can also lock the shafts with e.g. a self locking wrench ("vice-grip" pliers).
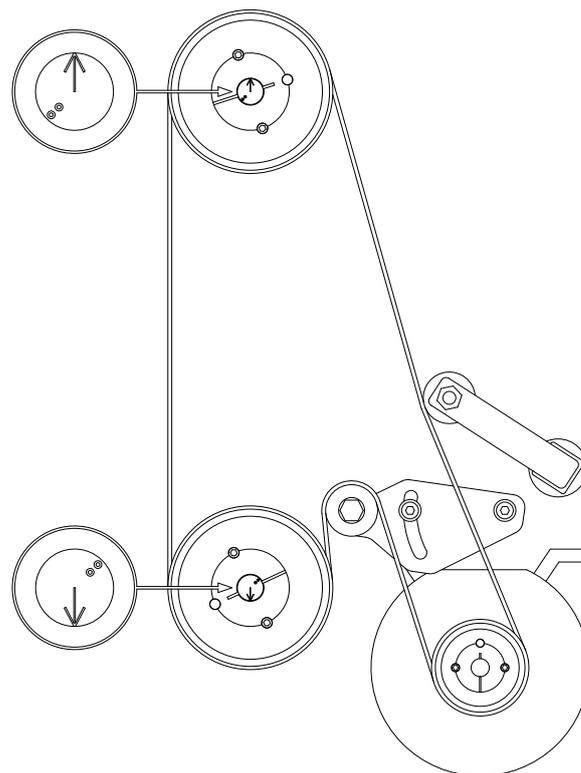
When the arrows at the end of the shafts are pointing in the opposite direction of each other, the short pivot arms will be approx. positioned like in the figure below:

Screw for horizontal adjustment

Approx. 0.2 mm
(As close as possible without touching when the short pivot arm is moving up and down).
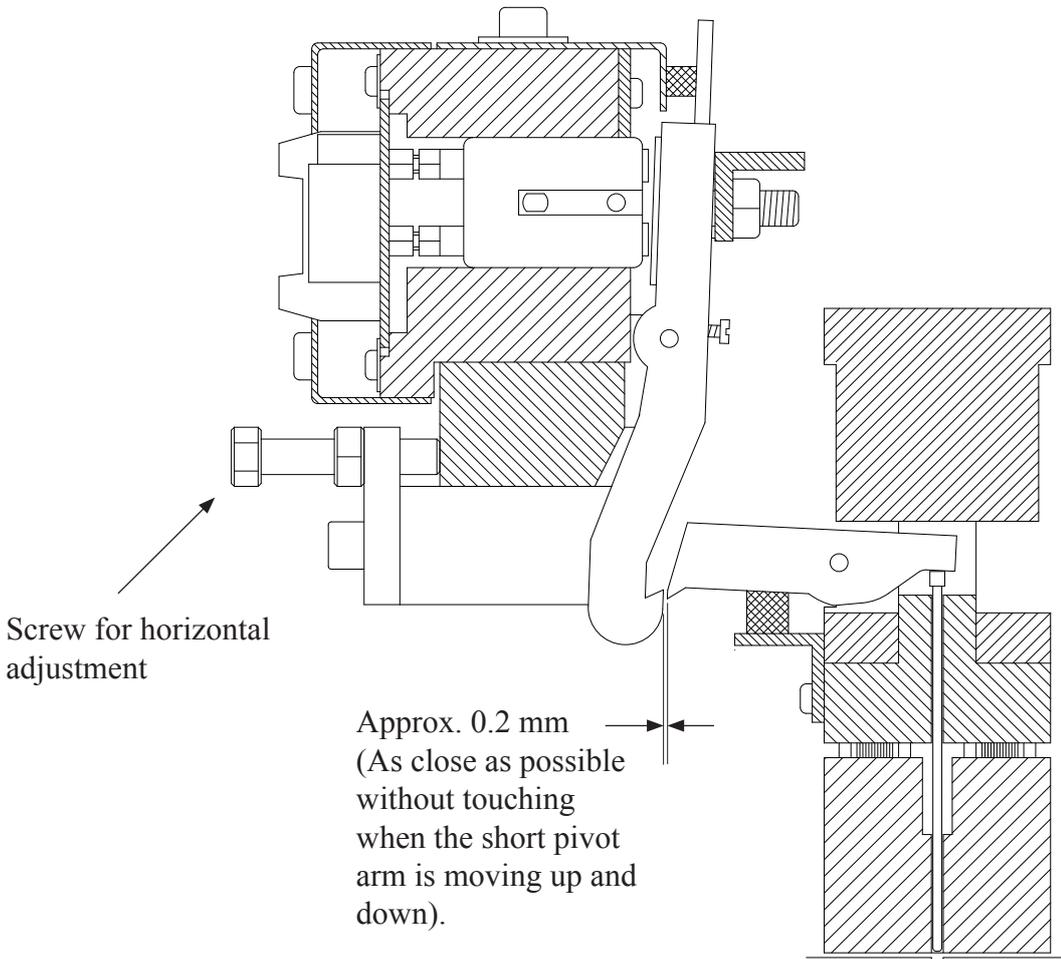
The gap between the long and the short pivot arm should be approx. 0.2 mm.
When adjusting this, make sure that the gap is even for all the pivot arms and the same on both ends of the magnet rack.

How to adjust:
Observe that the screw for horizontal adjustment will not pull the magnet rack outwards, they will only push inward.
So the best way of doing this, is to loosen the four fastening bolts holding the magnet rack. Then unscrew the horizontal adjustment screw a little. Now slide the magnet rack outward from the Printer, so it touches the horizontal adjustment screws again. Then tighten the four fastening screws just a little so the magnet rack is held firmly in place, but is still able to move. Use the horizontal adjustment screw to move the magnet rack closer to the Printer. If this is done in small steps, it is possible to watch the gap getting smaller, and the trick is to stop just before the long pivot arm is touching the short pivot arm.
When the position is correct, tighten the four fastening bolts.

Next is vertical adjustment.
Note! The Printer must be in the "printing position" when checking this distance.

Vertical adjustment
approx. 1 mm
(Will be affected by
i. e. paper quality).
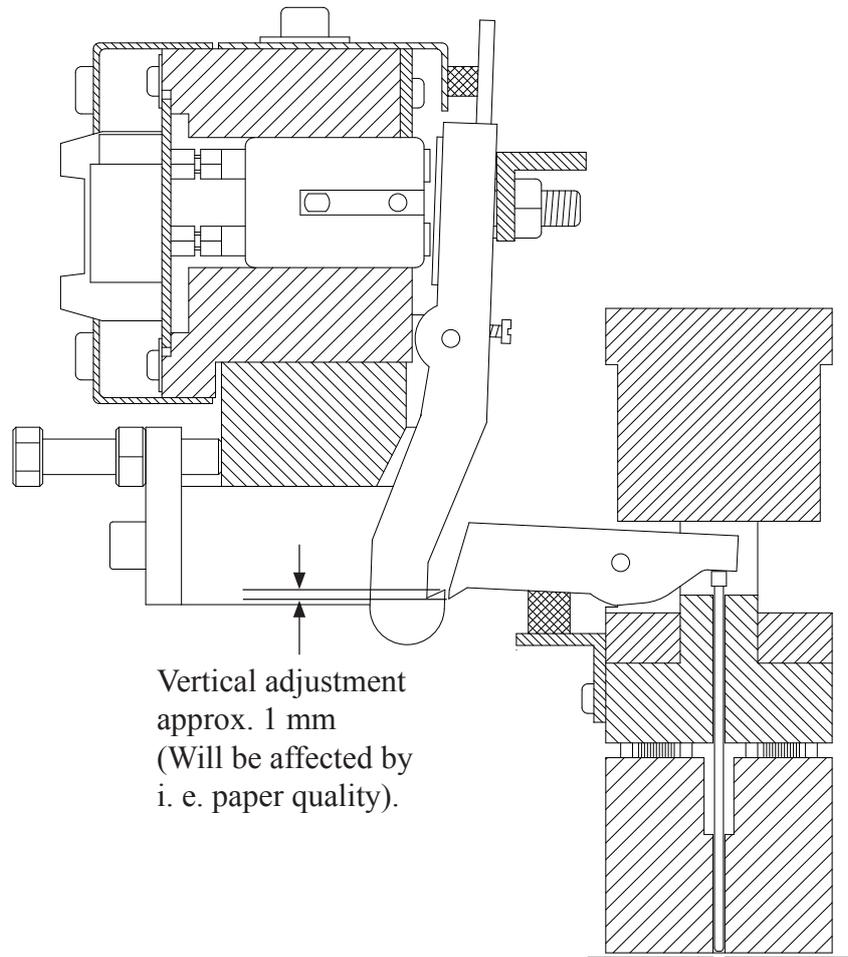
The vertical adjustment of the magnet rack sets the pressure of the printing pins when making dots.

The amount of pressure needed depend on several things. The first (and most important) is the paper quality. The second, is the personal pretences of dot quality.

So the best way to find the correct level of vertical adjustment, is to first decrease the pressure so the dots will be very faded and weak.
Then readjust the pressure up in small steps until the dot quality is satisfactory. By doing this you can make sure that you are running the Printer with just enough pressure to make good dots, but not so much pressure that the Printer will be worn/damaged.

From our experience we have found that the vertical adjustment should be approx. 1 mm, but if the braille dots are too weak, you may adjust the magnet rack tighter in small steps (increase the 1 mm distance).

Please see figure on next page:

Adjust upwards by loosening the upper nut and then tighten the lower.

Loosen these screws
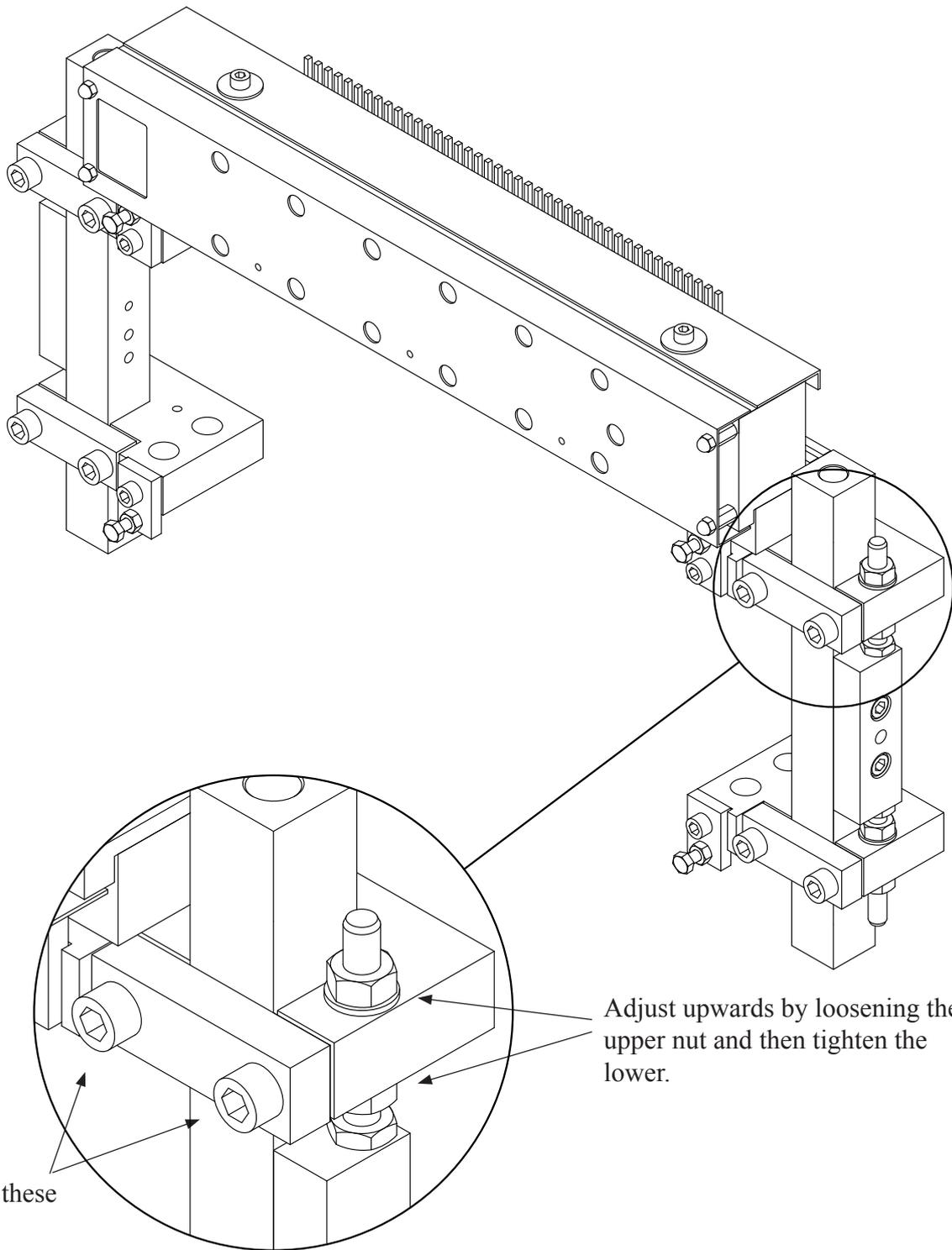
Note!   Adjust in small steps, **only 1/4 of a revolution at a time**. Then test the braille quality.

Note! When adjusting the magnet racks vertically, observe that magnet rack A and B must be moved upwards to increase the pressure, and magnet rack C and D must be moved downwards to increase the pressure.
(Moving away from the paper increases pressure).
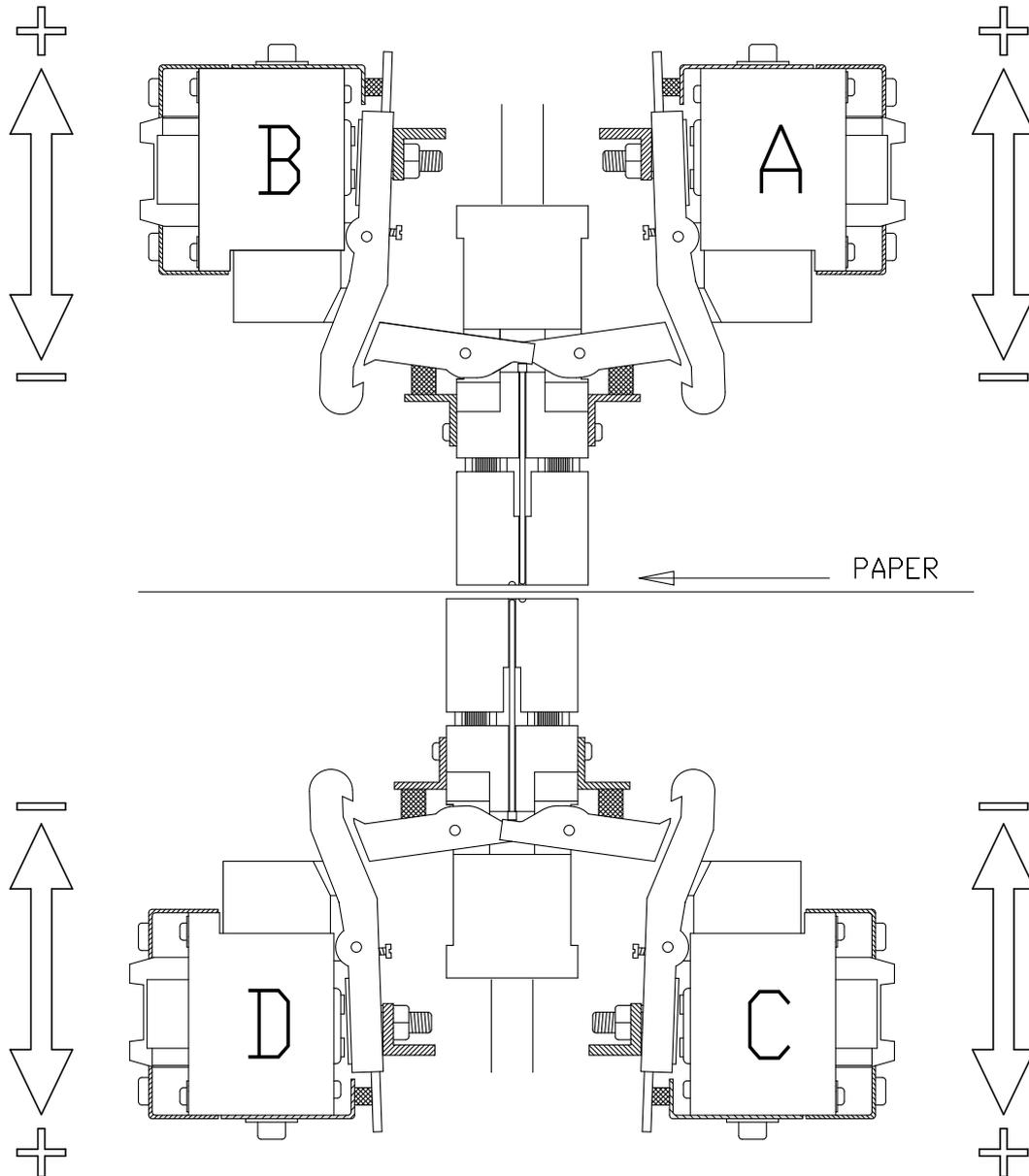
PAPER

4.9   Beam and Paper shoes - overview

Please see the figures below:

Upper Beam

Upper Paper shoe

Lower Paper shoe

Paper goes
in this
direction

Lower Beam

Metal
shims

Adiprene
springs

Plastic shims

Return springs
(blue)

Return springs
(green)
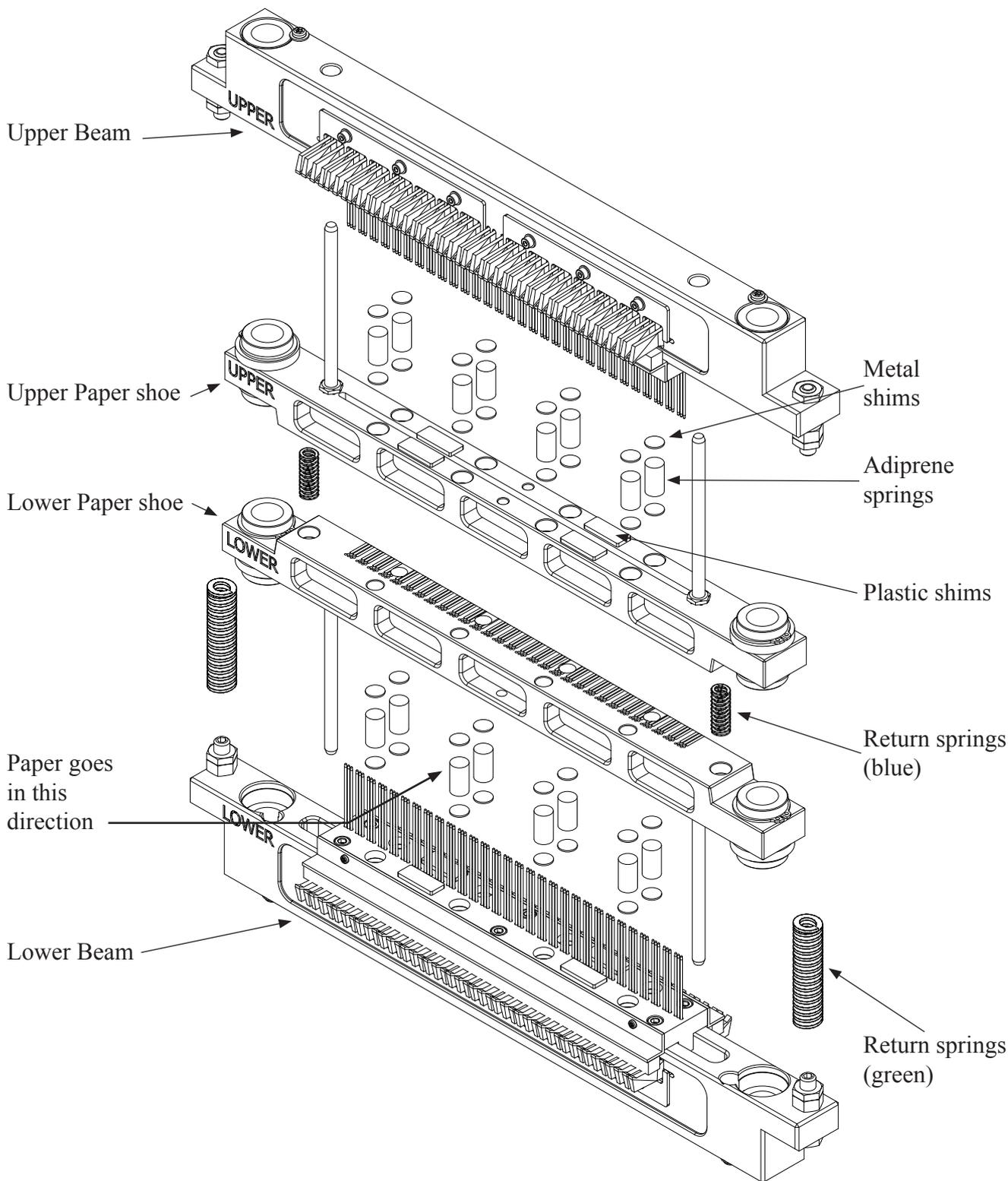
4.10   Beam and Paper shoes, removal and refitting

To remove the beam and paper shoes, some other parts
must be removed first. And it should be done in this order:

Position plate

1.   Before removing the paper cutter:
        Make sure that the position on the cutter can be
        re-established by use of the position plates at the back
        of the cutter. Do this at both sides.
        Remove the paper cutter assembly

2.   Remove the paper feeder assembly
3.   Remove the inside paper guide
4.   Remove magnet rack A and B
5.   Remove the belt
6.   Remove the top frame

2. Paper feeder assembly

1. Paper cutter
assembly

4. Magnet racks A and B

3. Inside paper guide
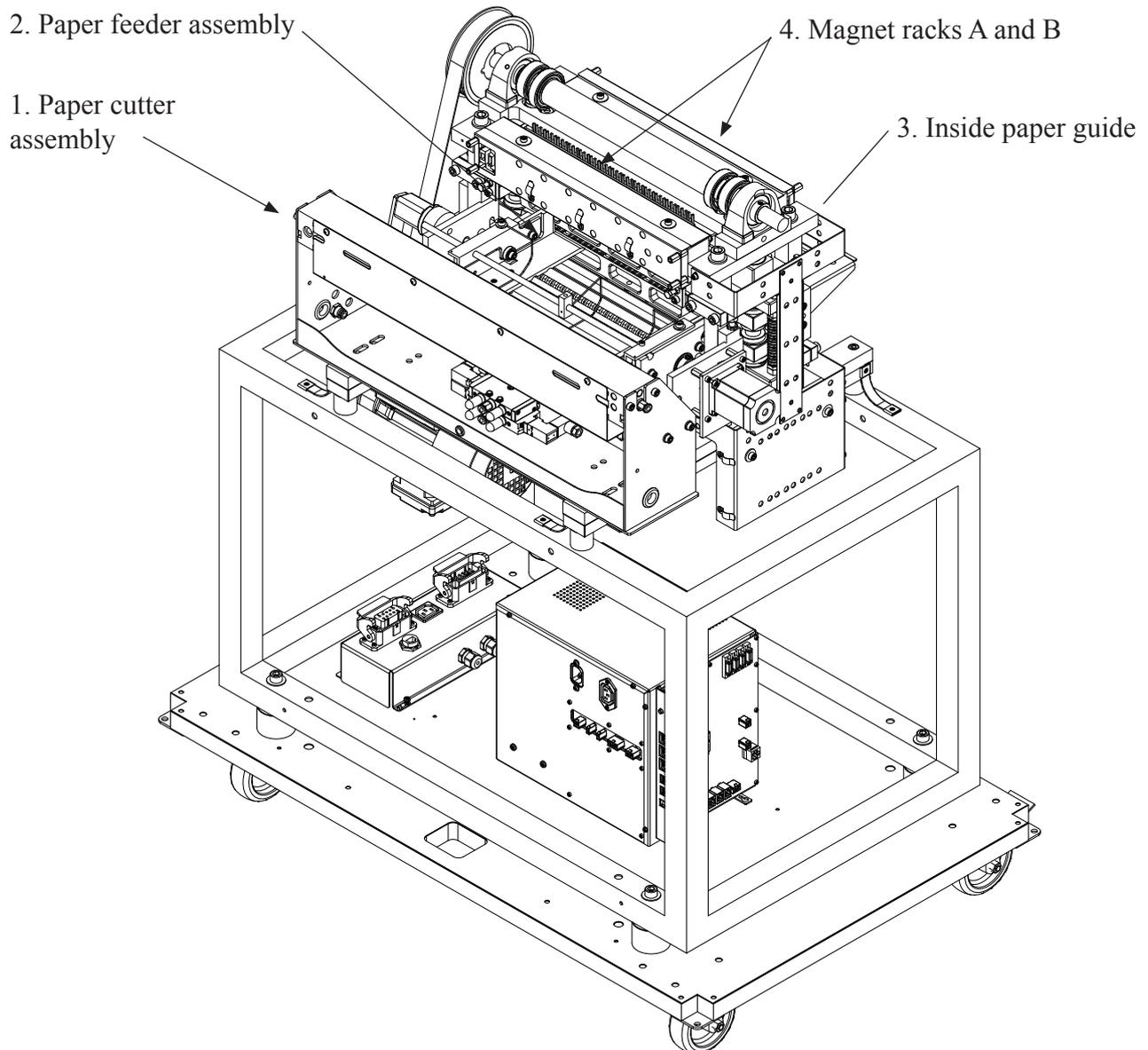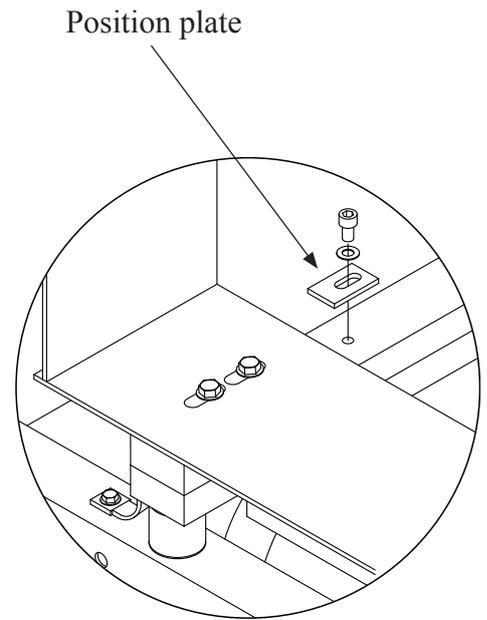
Beam and paper shoes, removal and refitting (continued)

5. Remove the belt.

This is done by loosening the belt tensioner's screws. When this is done, the belt can be lifted off the upper cogwheel. Please see figure to the right.

Loosen these two screws to take off the belt
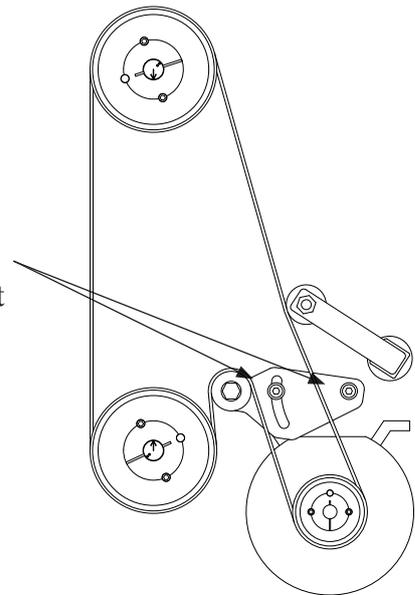
6. Remove the top frame.

Unscrew the bolts as indicated on the figure to the right, and then lift the frame carefully upwards. Place aside.
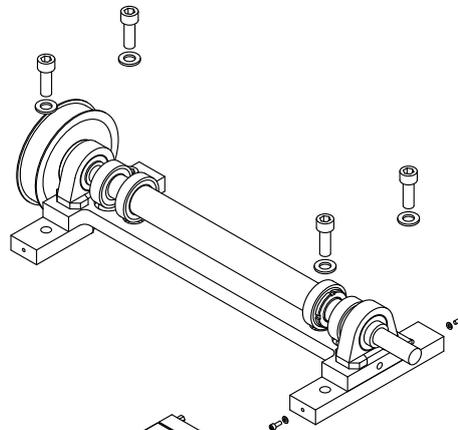
Upper/lower marking is facing this side
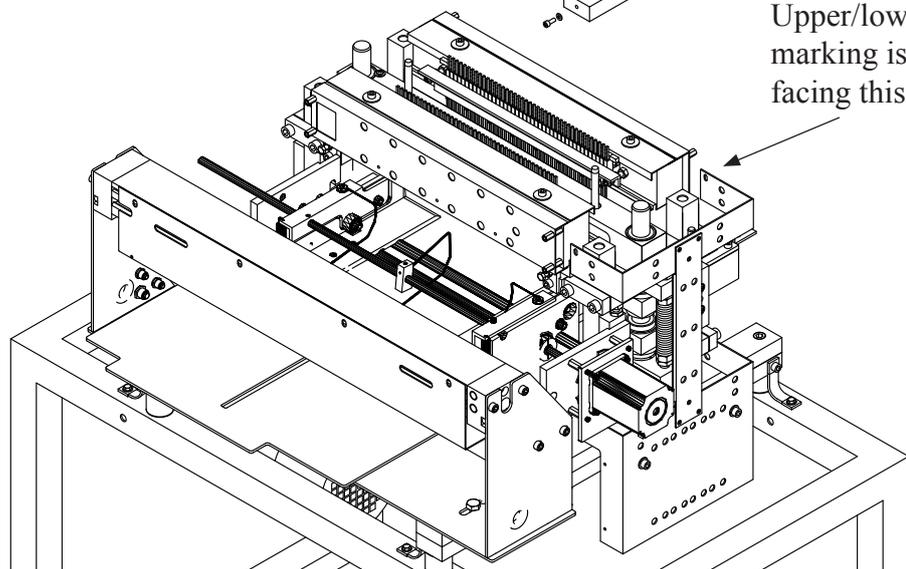
7. Now the beams and paper shoes can be lifted carefully upwards.
   Assembly is done in the reverse order.

4.11   Beam, replacement of short pivot arm

Please see the figures below:

1. Remove the six screws
as indicated on the figure.
Pull out the short pivot
arms, there are 45 pcs. on
each side.
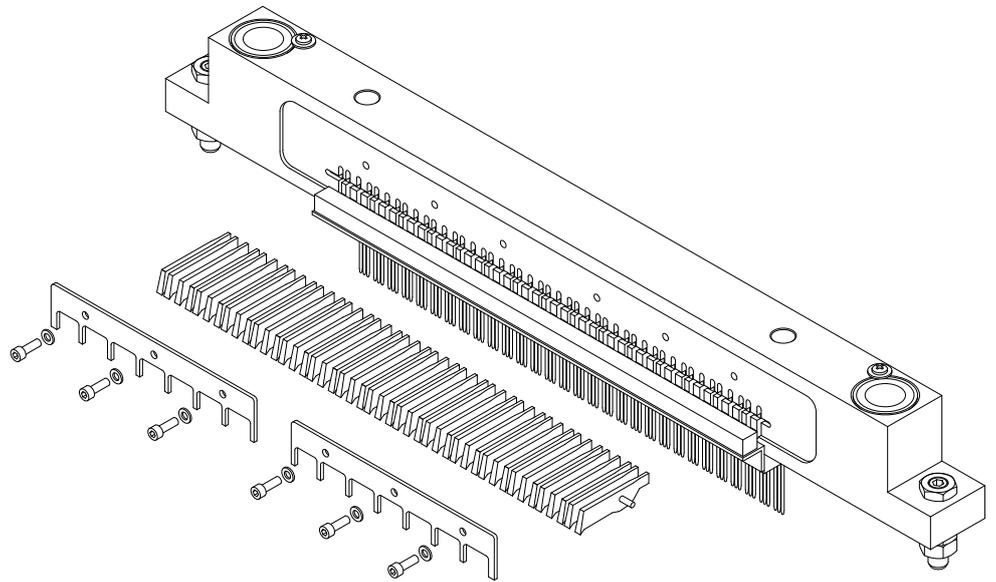
2. Pull out the shaft, and
replace the short pivot
arm(s).

Assembly is done in
reverse order.

Note! When putting the
short pivot arms back into
the beam, be sure that the
printing pins are hanging
like on the figure. This is
to make room for the short
pivot arm.
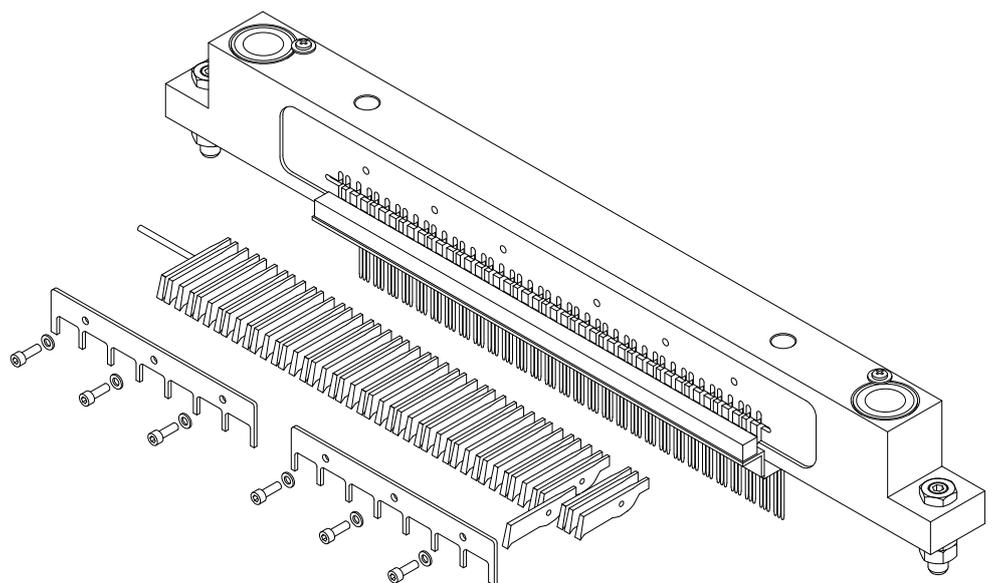
4.12   Beam, replacement of printing pin

Please see the figures below:

Remove the six screws as indicated in the figure.

Note! Before the parts are separated, make sure that the beam is held with the printing pins hanging down!

Place the pin guide with the pins on a table, do not turn it upside down or all the pins will fall out!
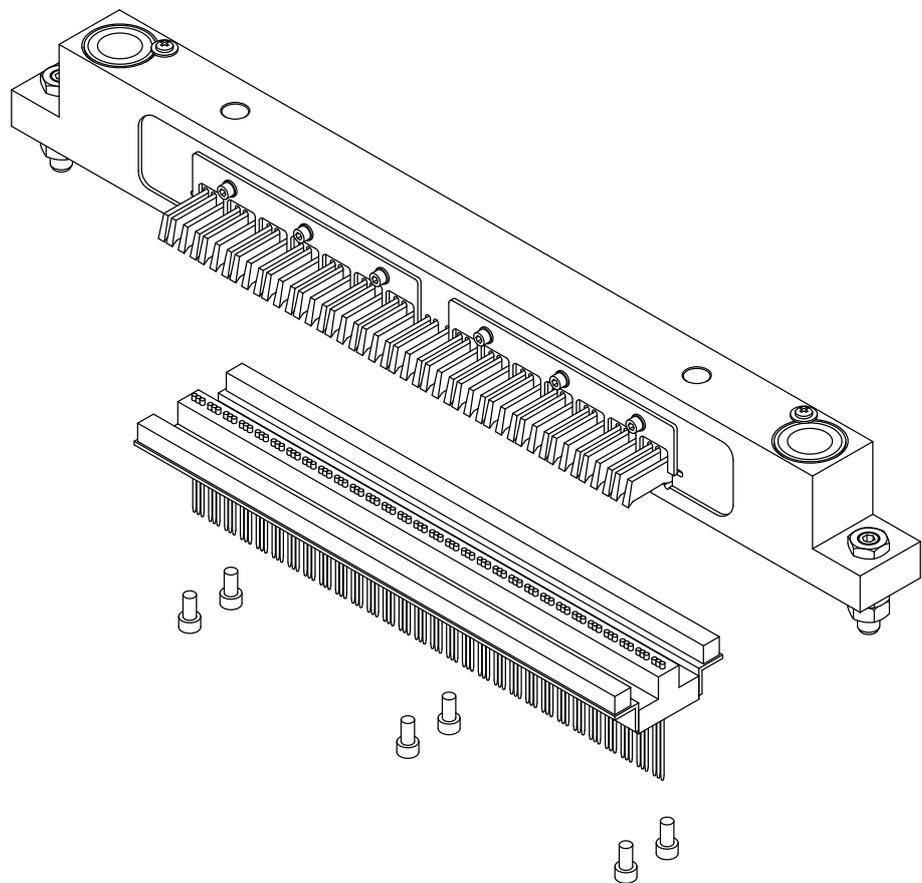
Now the defect printing pin can be replaced.

Assembly is done in reverse order.
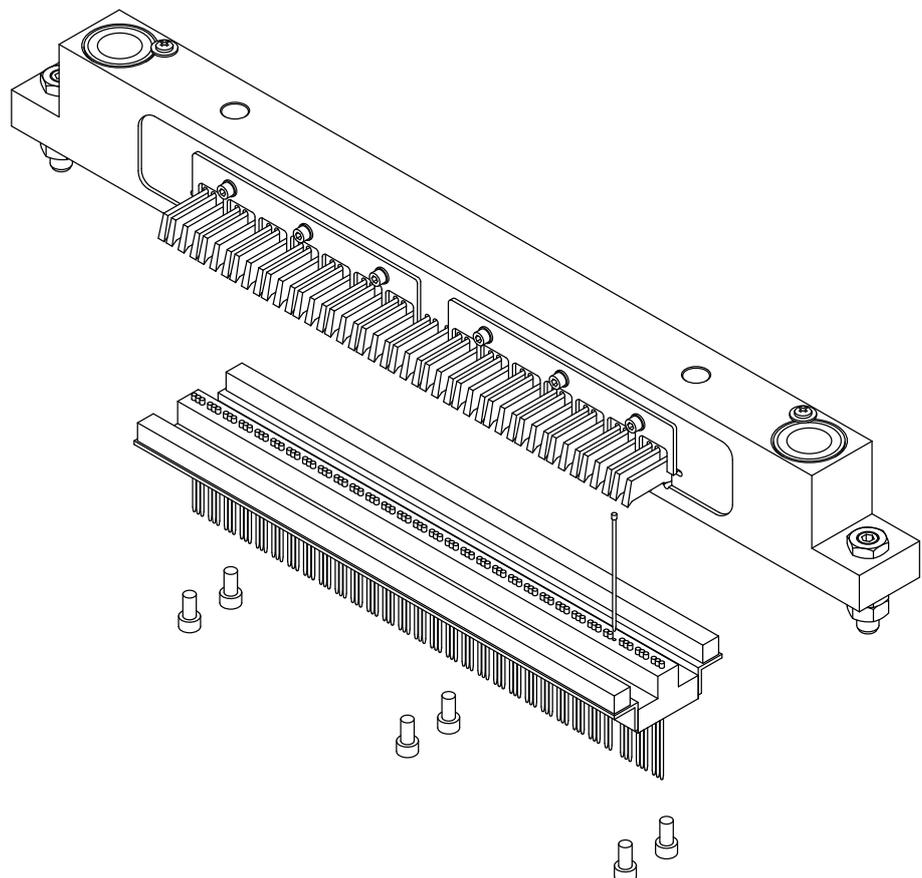
4.13   Return spring adjustment

Before performing this adjustment, make sure that the shafts are turned to the correct position.
See the marks at the end of the shafts, the arrows must point directly towards each other, like in the figure below.
Then the springs can be adjusted to the correct length, i.e. 68 mm.

⚠️   Note! It is critically that the length on these two return springs is 68 mm !
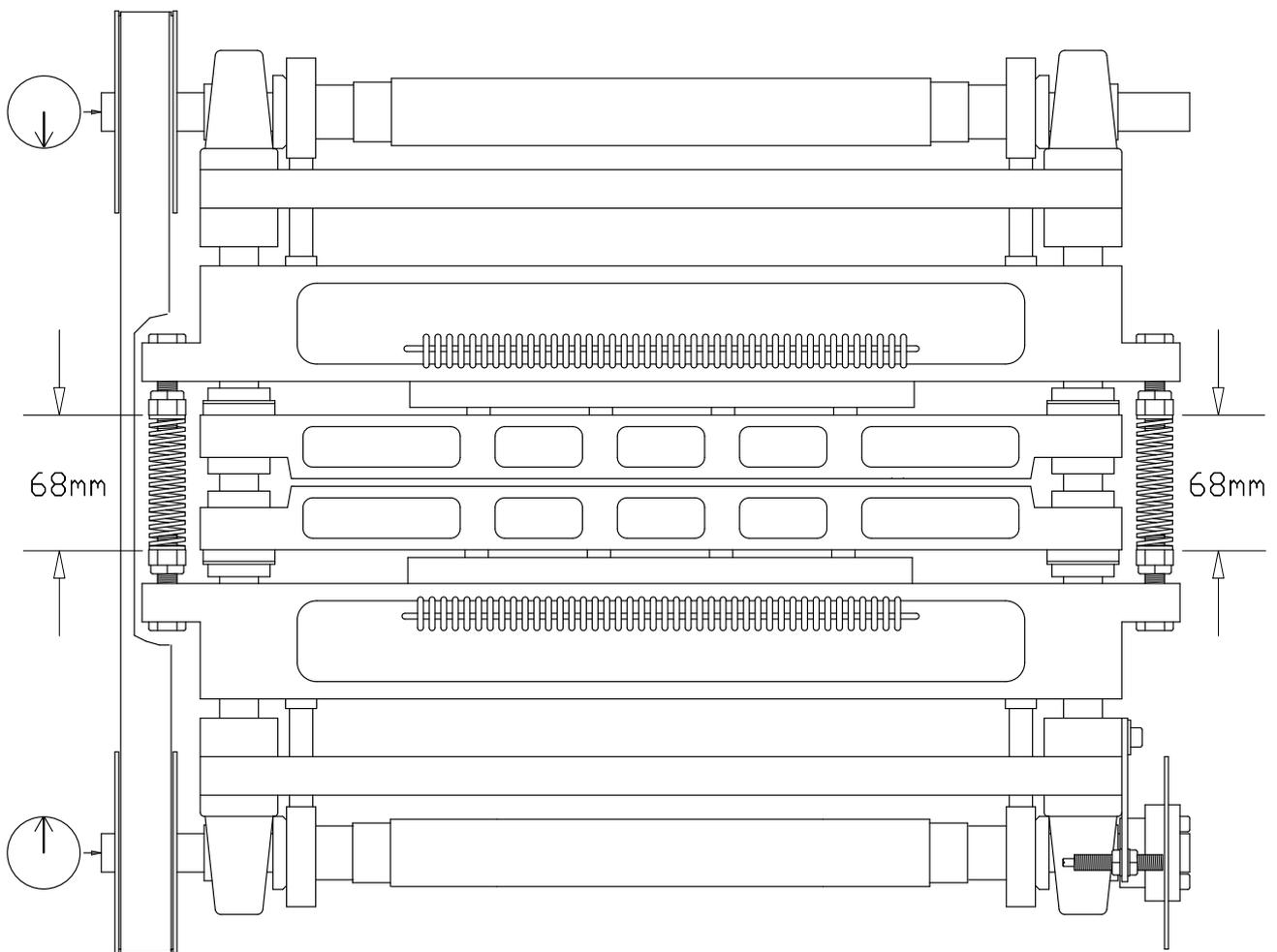
4.14   Eccentrics adjustment, belt tension

After removing the belt, it is necessary to align the eccentrics.

Put the belt back on, tighten it with the belt tensioner (2), and check that the arrows at the end of the shafts (1) are pointing towards each other. See figure below.

If the marks are not aligned like in the figure, it might be necessary to move the belt a notch or two on one of the wheels. This is done by loosening the belt tensioner (2) again, and then lift the belt up from the big wheel and move it a notch on the wheel. Then tighten the belt.

The belt tension is controlled/adjusted like this:
Remove the flexible tensioner from the belt. Now the fixed tensioner (2) should be adjusted so it is possible to press the belt inwards about 10 - 15 mm. Then adjust the flexible tensioner so the belt runs without vibration.

When pushing in by hand, the distance should be approx. 10 - 15 mm.

Hold away from belt

1

2
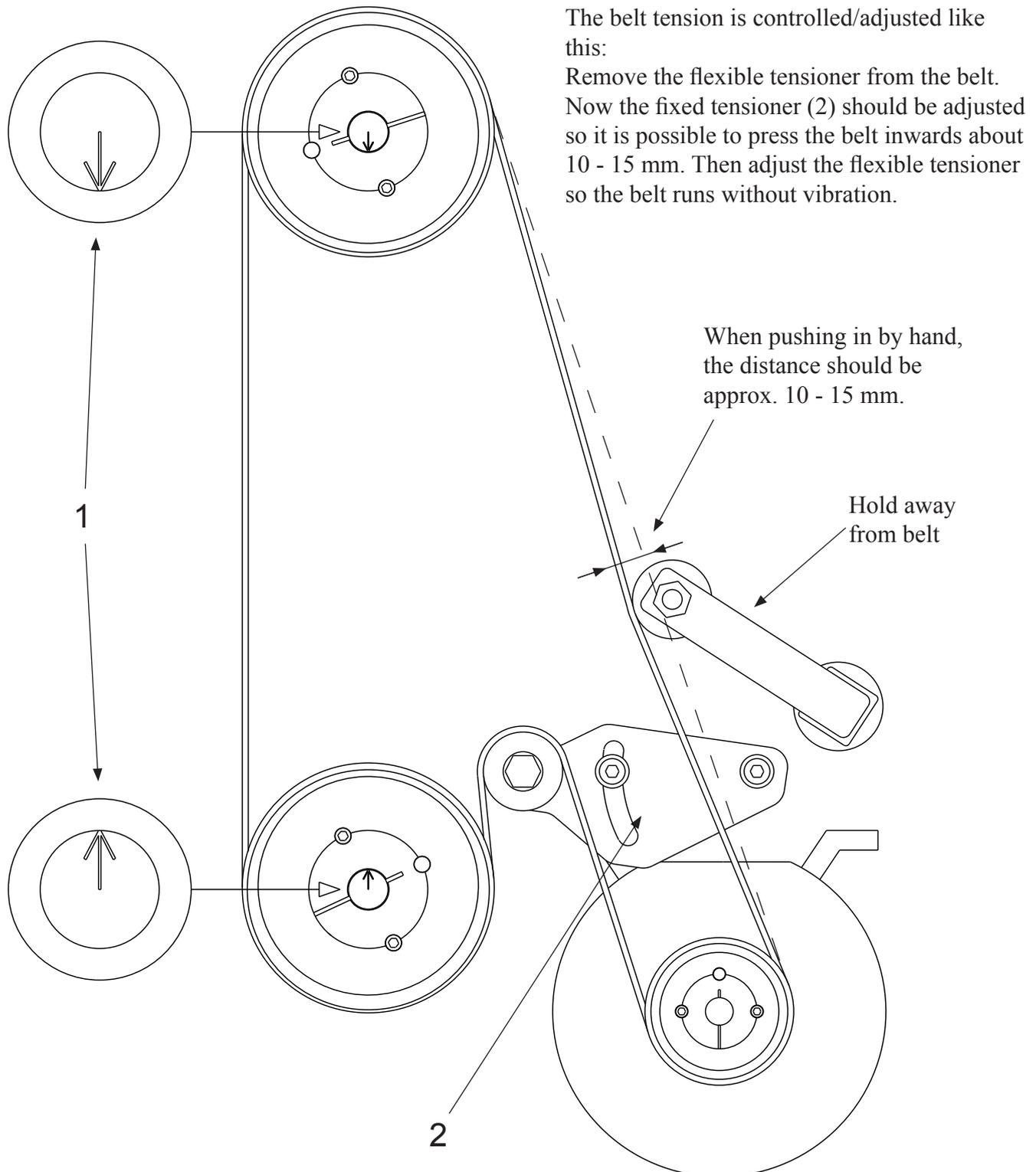
4.15   Beam wheel sensor - adjustment

The Beam wheel sensor is placed on the lower shaft, on the opposite end from the belt.
Note that this adjustment has to be done with the shafts positioned like on the figure with the arrows pointing towards each other. The notch on the beam wheel should now be placed exactly opposite the sensor like in the figure below.
If the edge is not in it's correct position, it must be adjusted.
Keep the shafts in this position while loosening the two screws holding the beam wheel. Turn the beam wheel until the notch on the beam wheel is placed in the middle of inductive sensor. Then fasten the two screws.

Keep the shafts in
this position

Sensor   The notch must be
                          in the middle of the
                          sensor
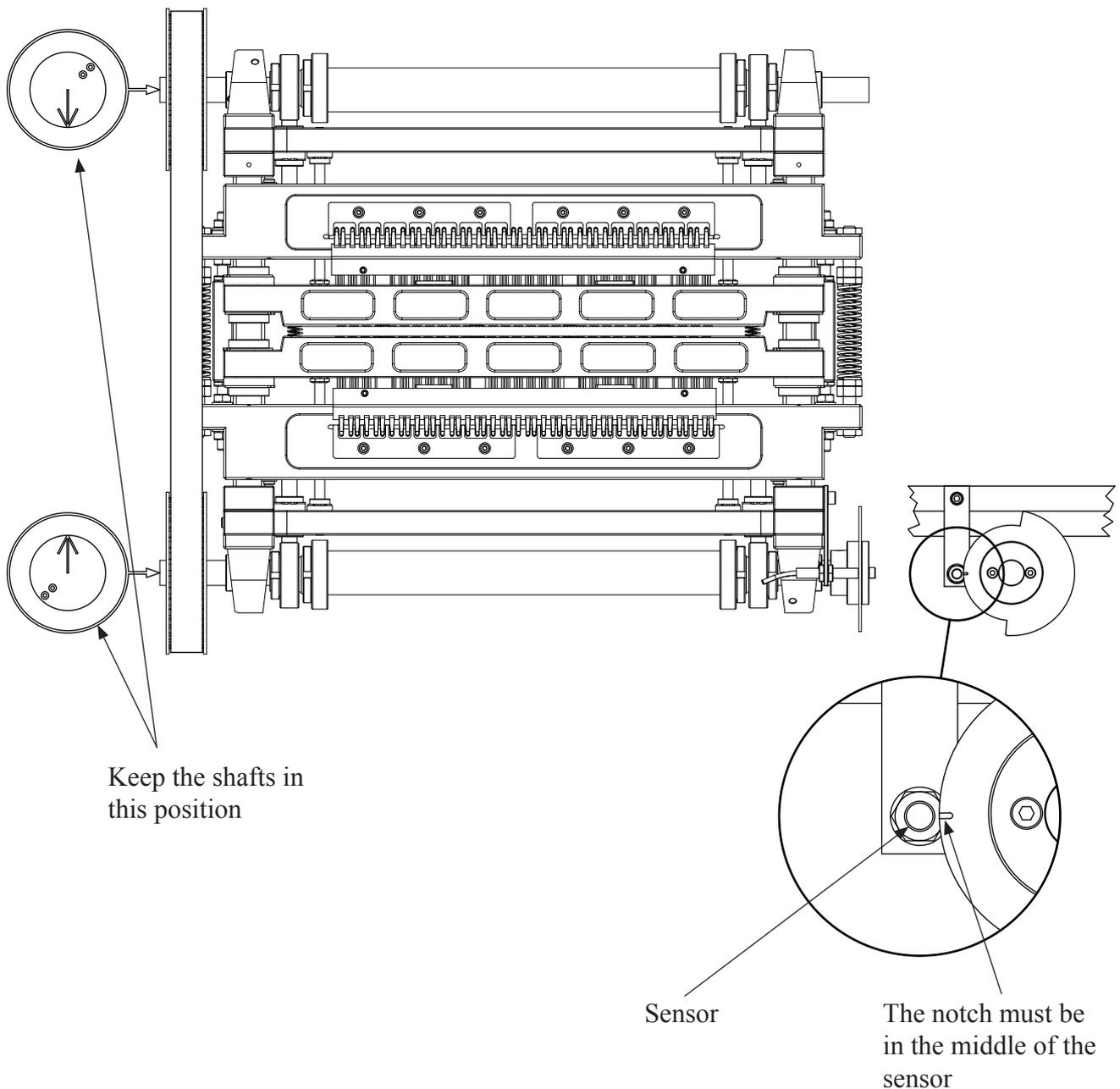
4.16   Paper shoes - adjustment

Place a sheet of paper between the paper shoes (P).
Turn the belt so the two points (6) at the end of the shafts (2) are pointing towards each other as shown in the figure below.

Lock the shafts in this position with a wrench (vice-grip), e.g. at the end of the shaft (2).
Loosen the locking nuts (1), adjust the push rods (3) by turning them. Adjust the push rods against the inner eccentric bearing (4) until the paper shoes (P) have a light pressure on the paper.
Check that the gap (5) between the press plates and the beam above, is equal on both upper and lower units.
Secure the push rods (3) with the locking nuts (1).

⚠ Note! The function of the bearings (4), is to reduce the noise the printer makes while running. It is a common misunderstanding that you can increase the pressure on the papershoes by adjusting these push rods. This does not have any influence on the dot quality!
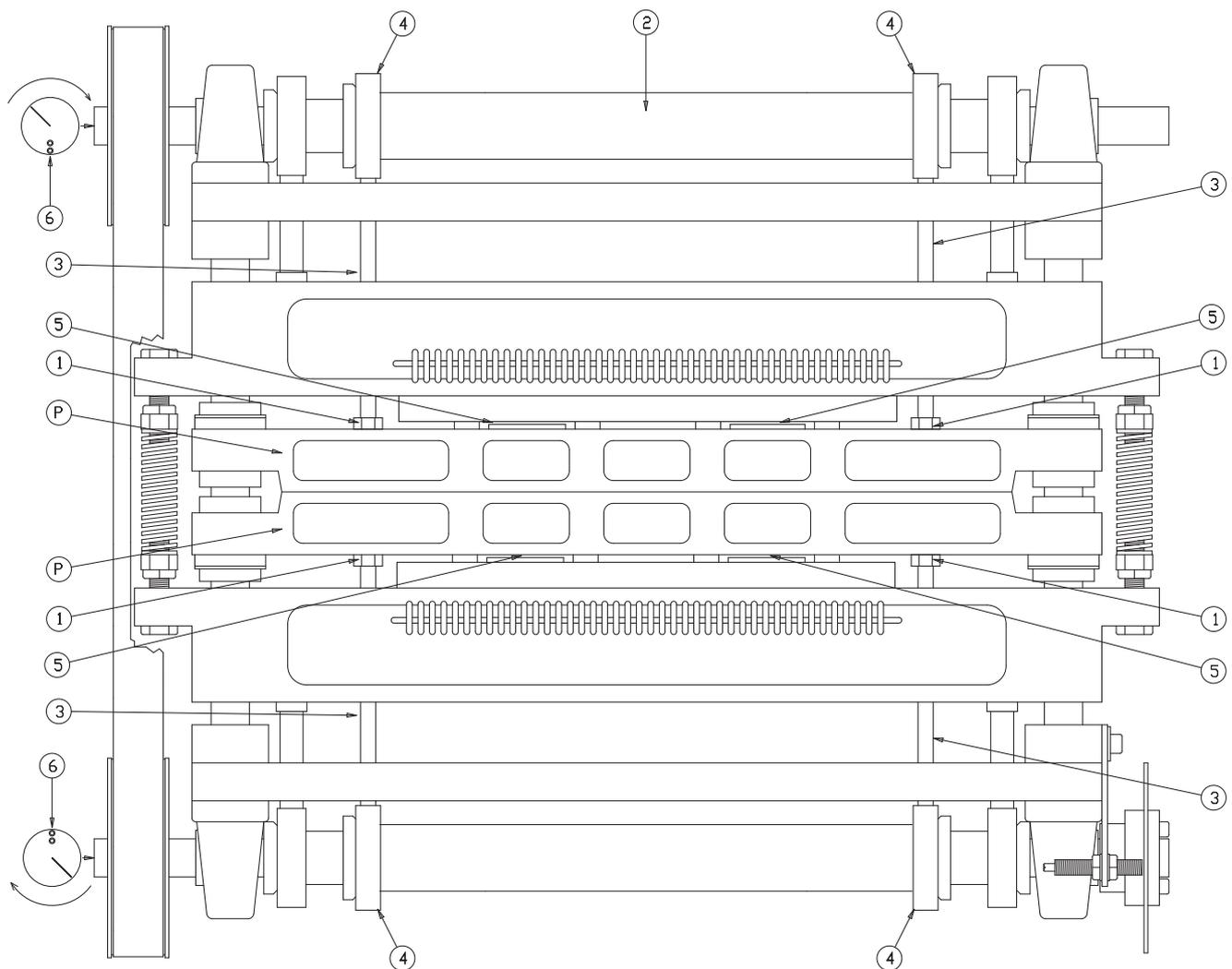
4.17   Inductive sensors, adjustment

This Printer uses inductive sensors in three places. One for the main timing wheel on the lower shaft, and two are controlling the movement of the paper feed mechanism.

It is possible to check if the inductive sensors are functioning, by looking at the rear end where the cable enters the sensor. Inside the sensor is a little LED lamp that will be lit if a magnetic object is in front of the sensor. The light comes out through some transparent plastic around the cable.
So by having the power turned on, and at the same time turning the shafts, the light should go on and off.

When replacing/adjusting the sensors, the gap between the timing wheel and the sensors can be maximum 0.6 mm. See figure below.

Inductive
sensor

Timing wheel

Max. gap 0.6mm
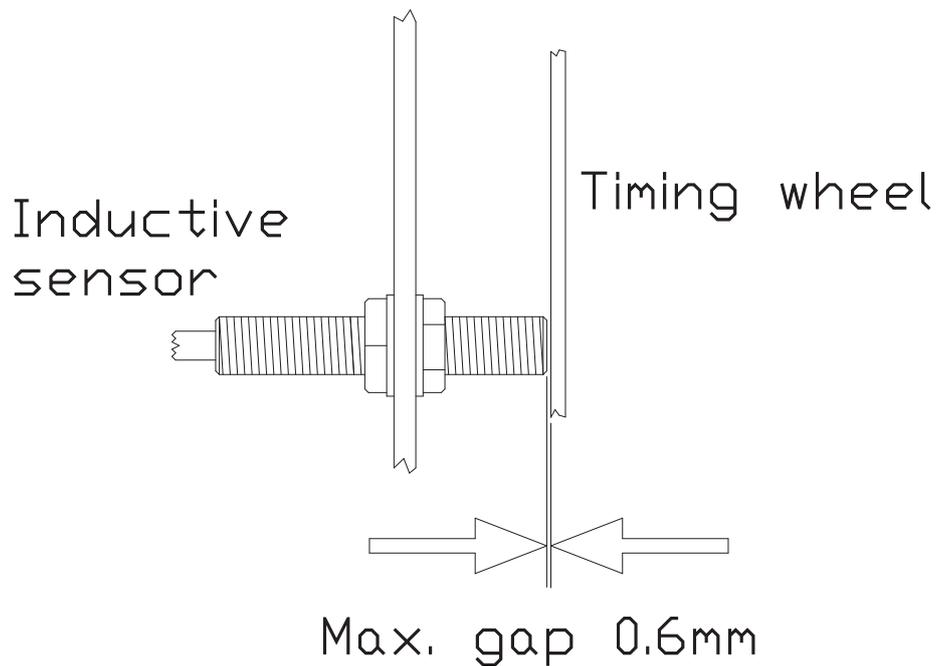
4.18   Paper sensor, replacing

This Printer has a sensor to detect if paper is present in the Printer.

This sensor is situated on the paper guide where the paper enters the Printer.
The sensor is an infrared, reflective type, and it functions like this: A little infrared lamp is sending
light downward. If there is paper present, the light will be reflected back, and detected by a photo tran-
sistor. If the sensor is defective, it must be replaced. It can be done like this:
Take the paper guide out of the Printer. Unscrew first the screws (A), then (B) and then (C). Now the
sensor is loose. The assembly is done in reverse order.
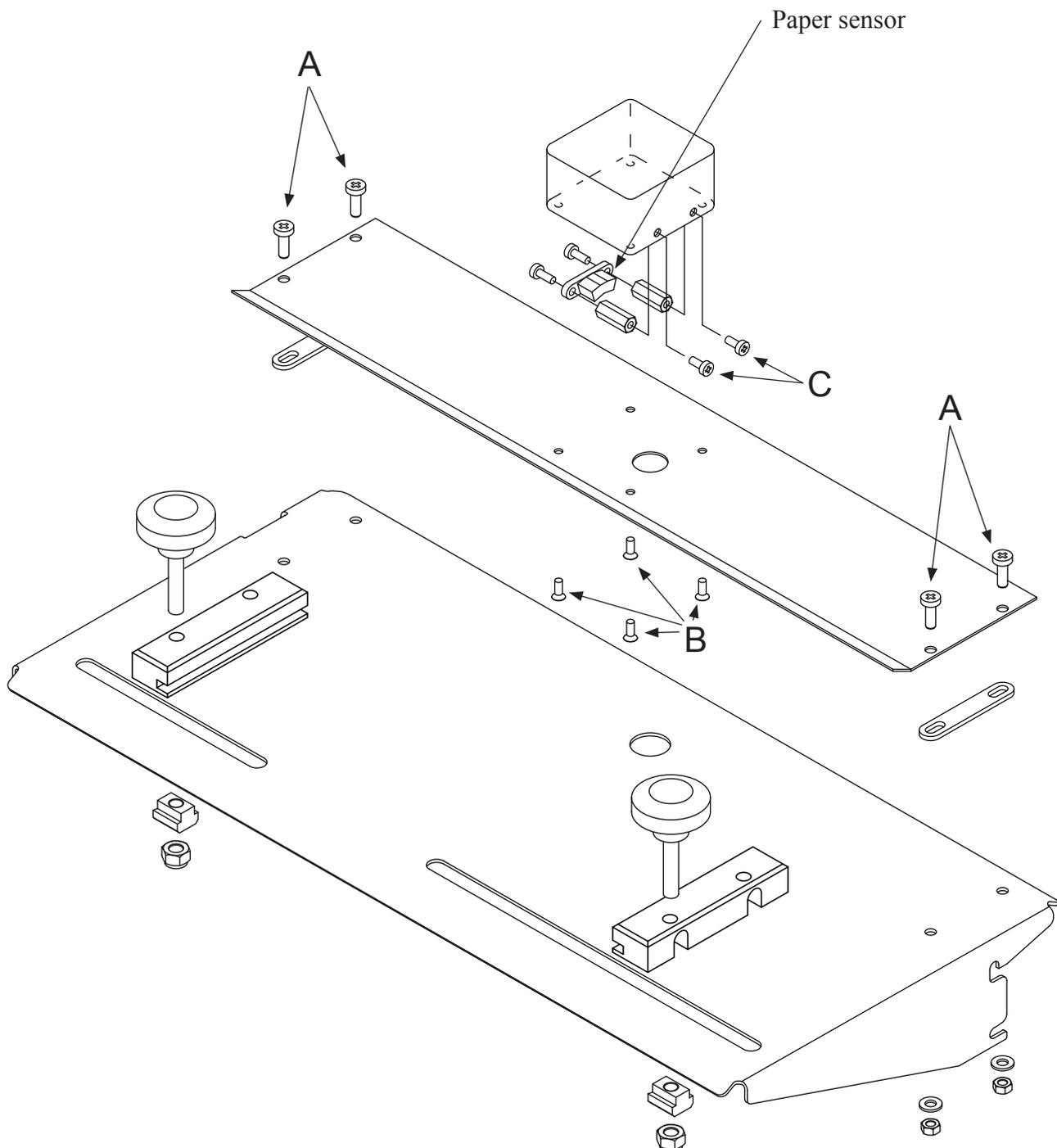
4.19 Maintenance

Weekly (without taking the cover off)

Does the Printer print correct Braille?
How is the Braille dot quality?
Check for any damages on the outside of the cover.
Are the operator panel and display functioning and are power lamps illuminated?
Do the fans work? Are the fans clean?
If there is a lot of dust from the paper on the paper guides, use a vacuum cleaner.
Drain the compressor tank and filter regulator.

Every 500 hours or six months

All of the weekly maintenance.
Is the Printer mechanism, electric unit, base plate and so on clean? Use a vacuum cleaner to remove dust.
Check the main belt for wear, tear, cracks and check the tension.
Clean the magnet racks.
Check the sponges for the long pivot arms on the four magnet racks, the sponges should be able to keep the long pivot arms pressed against the support list.
When putting the magnet racks back in, check all the magnet rack adjustments.
Check if the printing pins move freely, and if not clean the printing pin guide.

Every 1000 hours or twelve months

All of the 500 hours or six months maintenance.
Check the four sponges for the short pivot arms, the sponge should be able to keep the short pivot arm pressed all to the end of its travelling distance.
Check the wear and tear on the push rod (12 x 56). This can be measured with a calliper. The length must be between 55.90 and 56.00 mm.
Check if the paper shoes are worn. The Printer should be able to give good Braille dot quality, but if not, worn papershoes could be the reason.
Check the length on the printing pin. This can be measured with a calliper, and the length must be between 64.40 and 64.50 mm.
Check sharpness of the knives on the paper cutter. Replace if necessary.
Lubricate all the stroke ball bearings, using a universal grease with molybdensulfid.
Lubrication should be done as described in the figure on the next page.

Lubrication

This should be done every 1000 running hours, or approximately once a year.
Lubricate all items marked "grease" on the figure below. (These are the only locations on the Printer grease may be applied!). The Printer needs to be disassembled to do this lubrication, so it is recommend to do this at the same time as the regular 1000 hour service.
Use a universal grease with molybdensulfid. Use no oil.
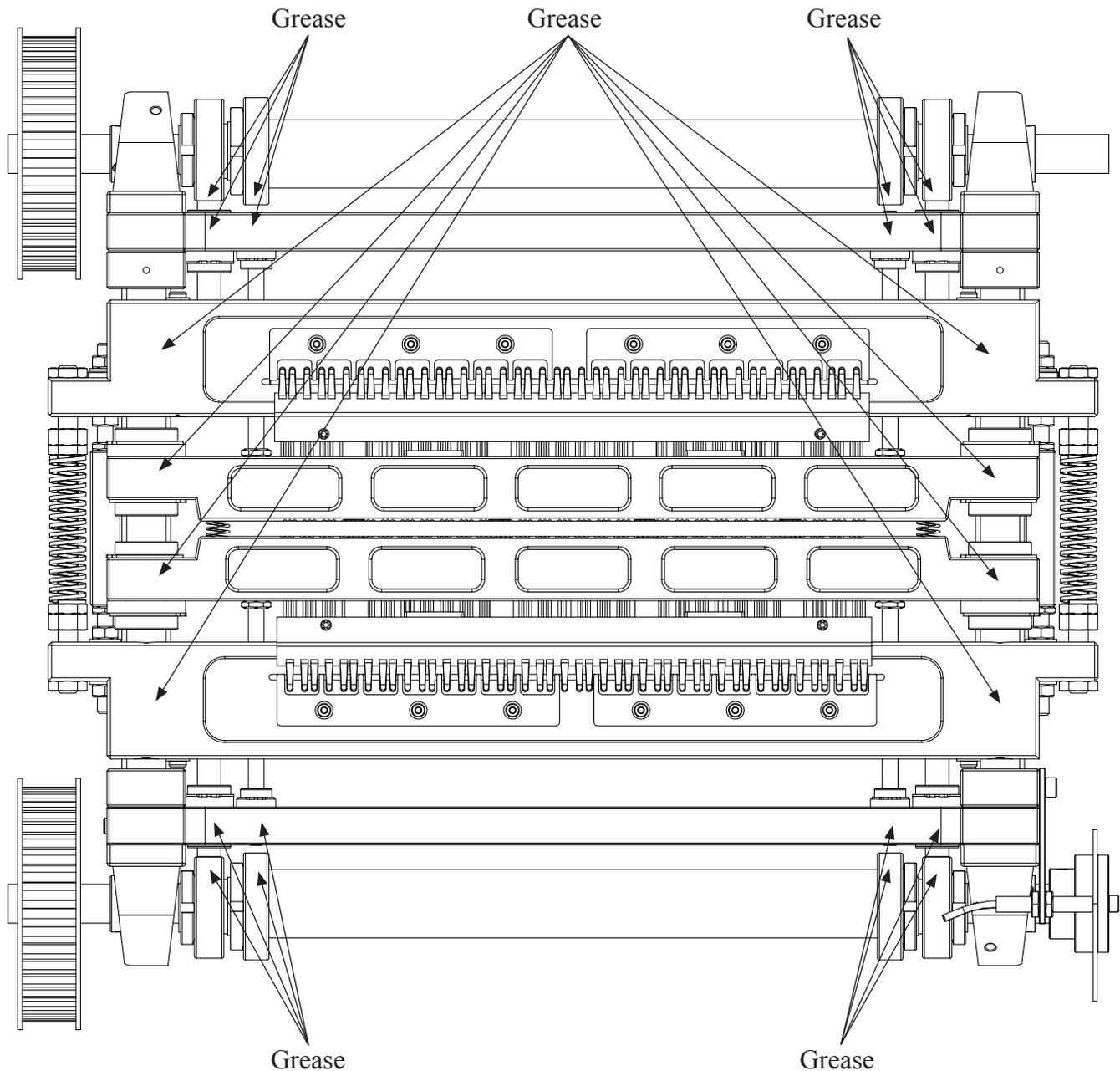
5.   PARTS - EXPLODED VIEWS

5.1   Magnet rack
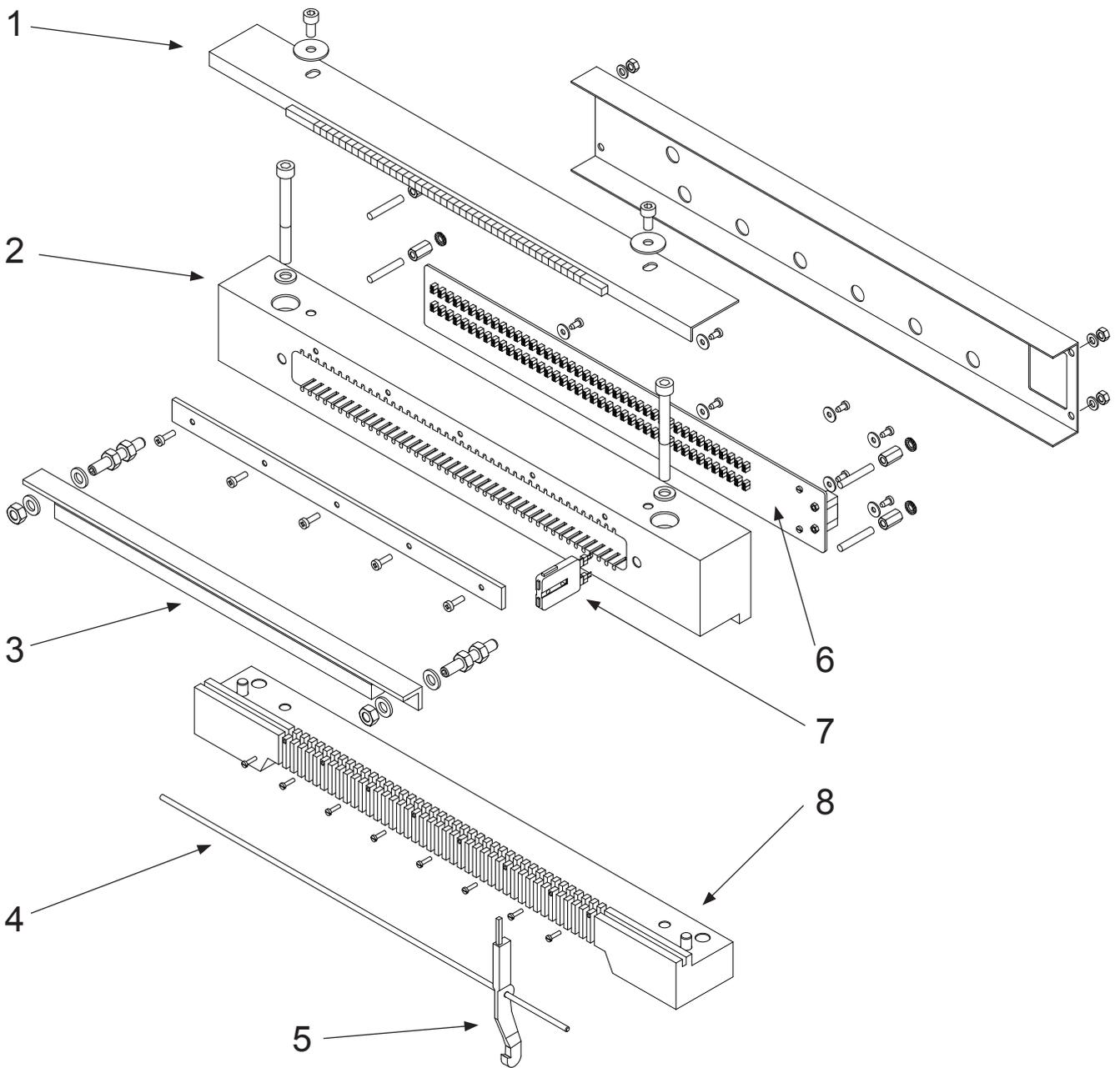
Parts magnet rack

Pos.	Name	Quantity per. rack
1	Sponge list, magnet rack	1
2	Magnet rack	1
3	Support list, magnet rack	1
4	Shaft, long pivot arm	1
5	Pivot arm, long	45
6	Electronic board, magnet rack	1
7	Magnet	45
8	Guide list, magnet rack	1

5.2   Beam
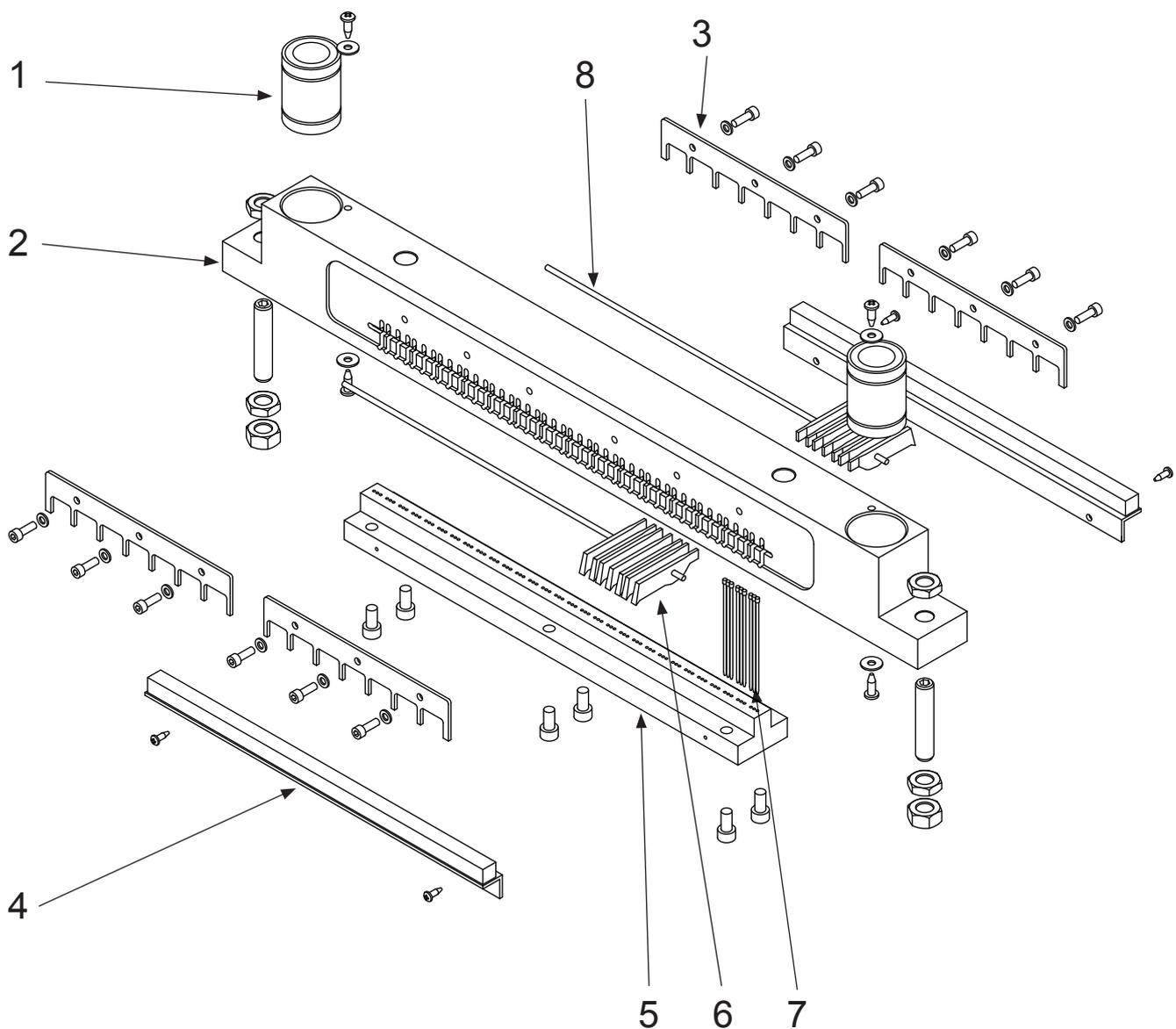
Parts beam (upper or lower)

Pos.	Name	Quantity per. beam
1	Stroke ball bearing Ø20	2
2	Beam, (upper or lower)	1
3	Fastener for shaft short pivot arm	4
4	Sponge list for short pivot arm	2
5	Pin guide	1
6	Short pivot arm	90
7	Printing pin	90
8	Shaft, short pivot arm Ø3x305	2

5.3   Paper shoe
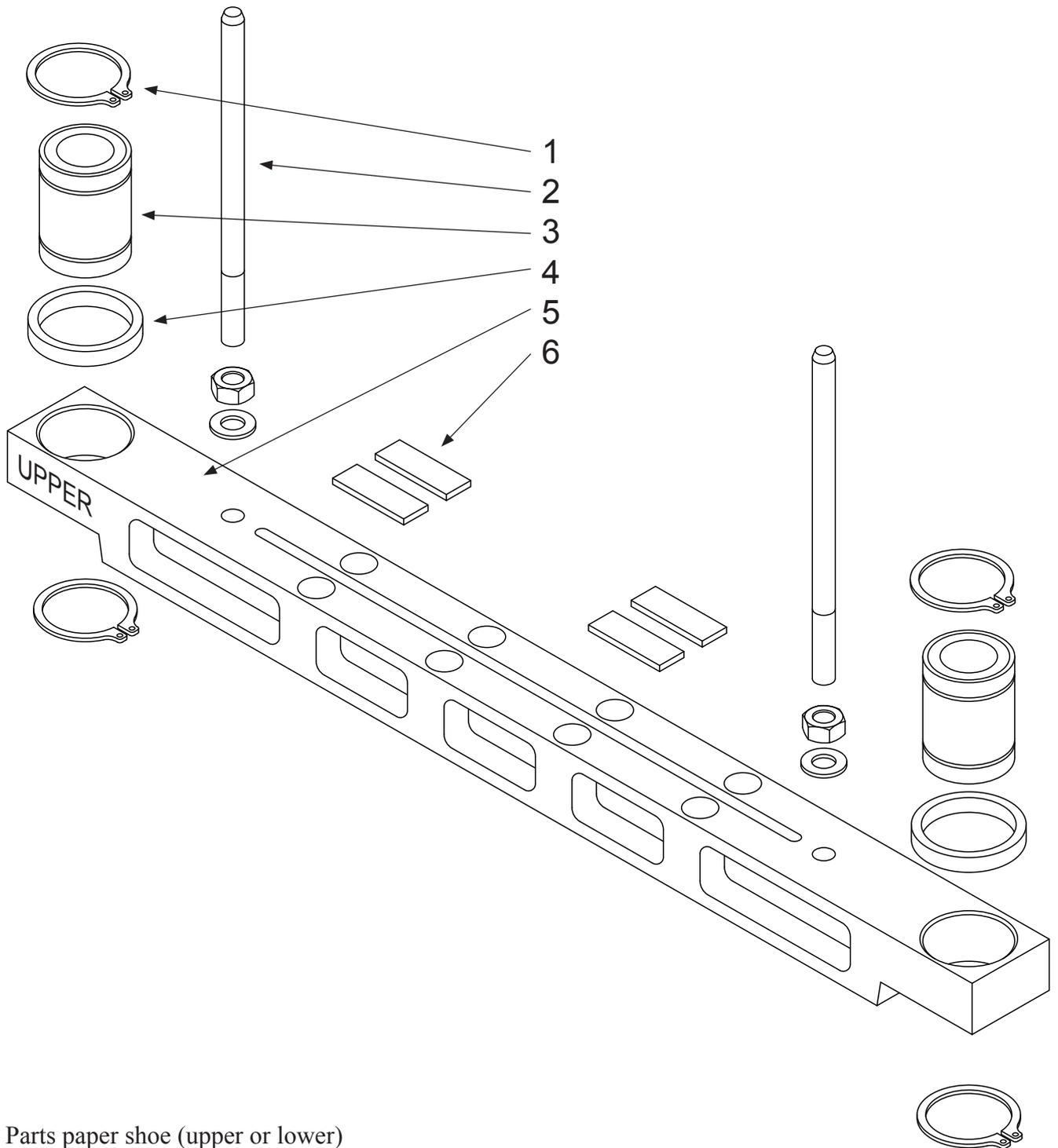
Parts paper shoe (upper or lower)

Pos	Name	Quantity pr. shoe
1	Retaining ring	4
2	Adjustment screw (push rod)	2
3	Stroke ball bearing Ø20	2
4	Spacer	2
5	Paper shoe (upper or lower)	1
6	Plastic shims	4

5.4   Paper feeder
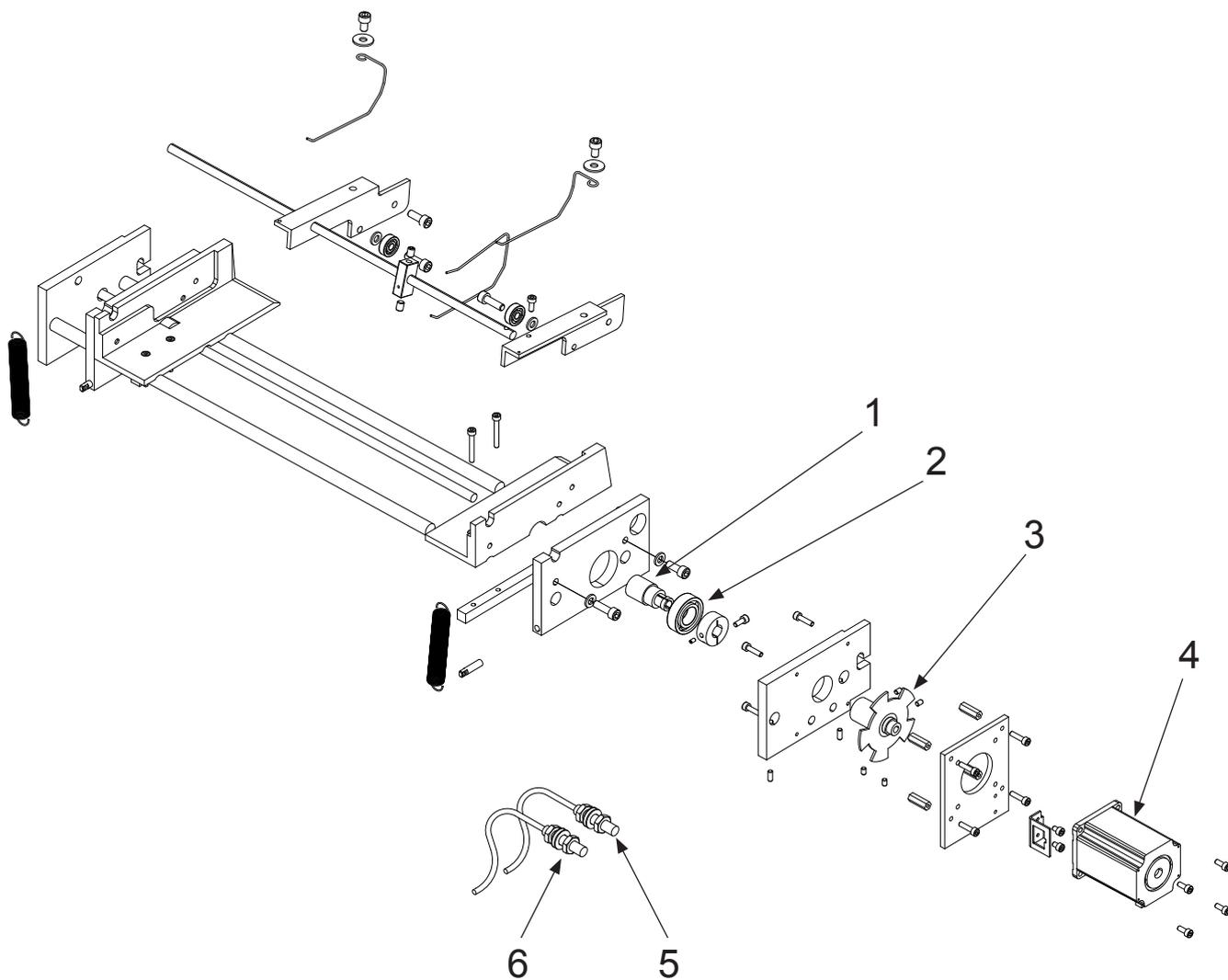
Parts paper feeder

Pos.	Name	Quantity
1	Pulling wheel 2	
2	Bearing 6003 2Z 2	
3	Timing wheel 1	
4	Stepping motor 1	
5	Paper feed sensor no. 1 1	
6	Paper feed sensor no. 2 1	

5.5   Shafts, belt

Direction
of rotation
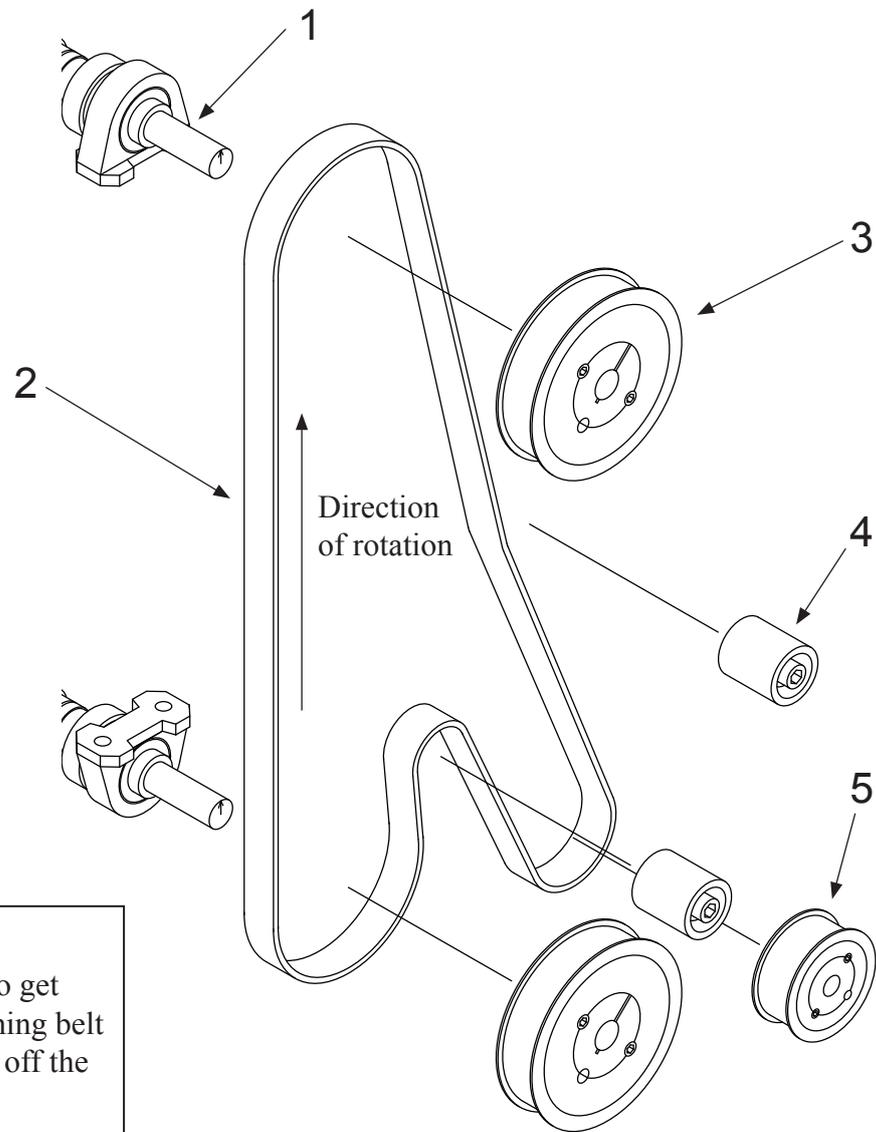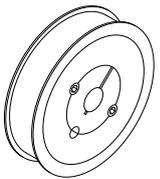
How to get
the timing belt
pulley off the
shaft.
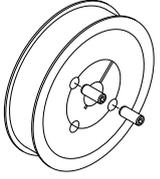
Unscrew the
two screws.
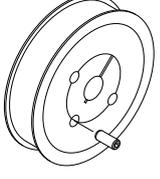
Place one of
the screws in
the third hole,
and screw it
inwards until
the wheel is
loose.

Parts shaft, belt

Pos.	Name	Quantity
1	Shaft 2	
2	Belt 640 L...1	
3	Timing belt pulley 40 L 100....................................2	
4	Belt tensioner 2	
5	Timing belt pulley 22 L 100......................................1	

Shaft, exploded view
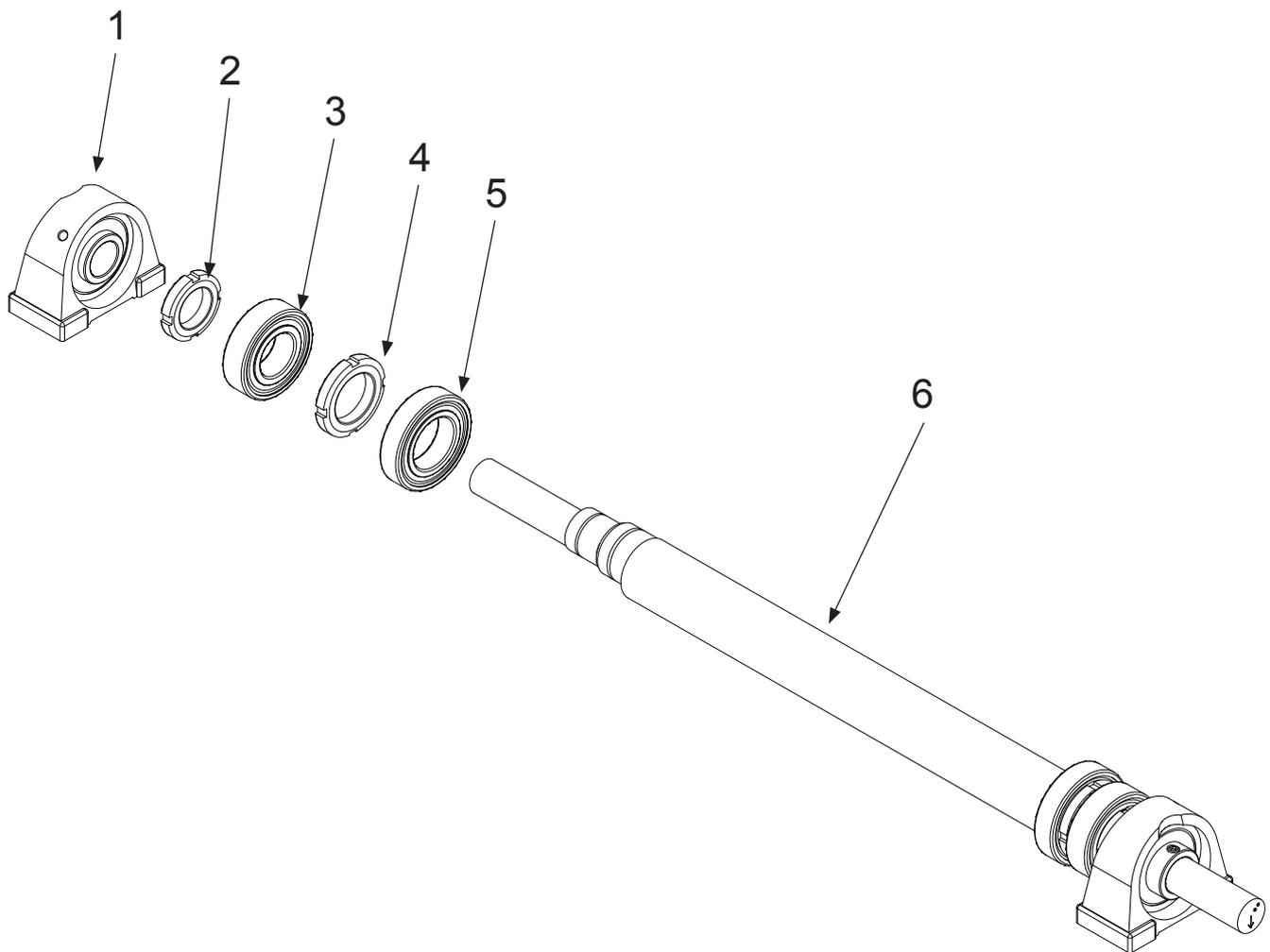
Parts shaft, exploded

Pos.	Name	Quantity per. shaft
1	Main bearing with housing	2
2	Nut KM5	2
3	Bearing outer eccentric 6205 2Z...............................	2
4	Nut KM6	2
5	Bearing inner eccentric 6006 2Z	2
6	Shaft	1

5.6   Top and bottom frame
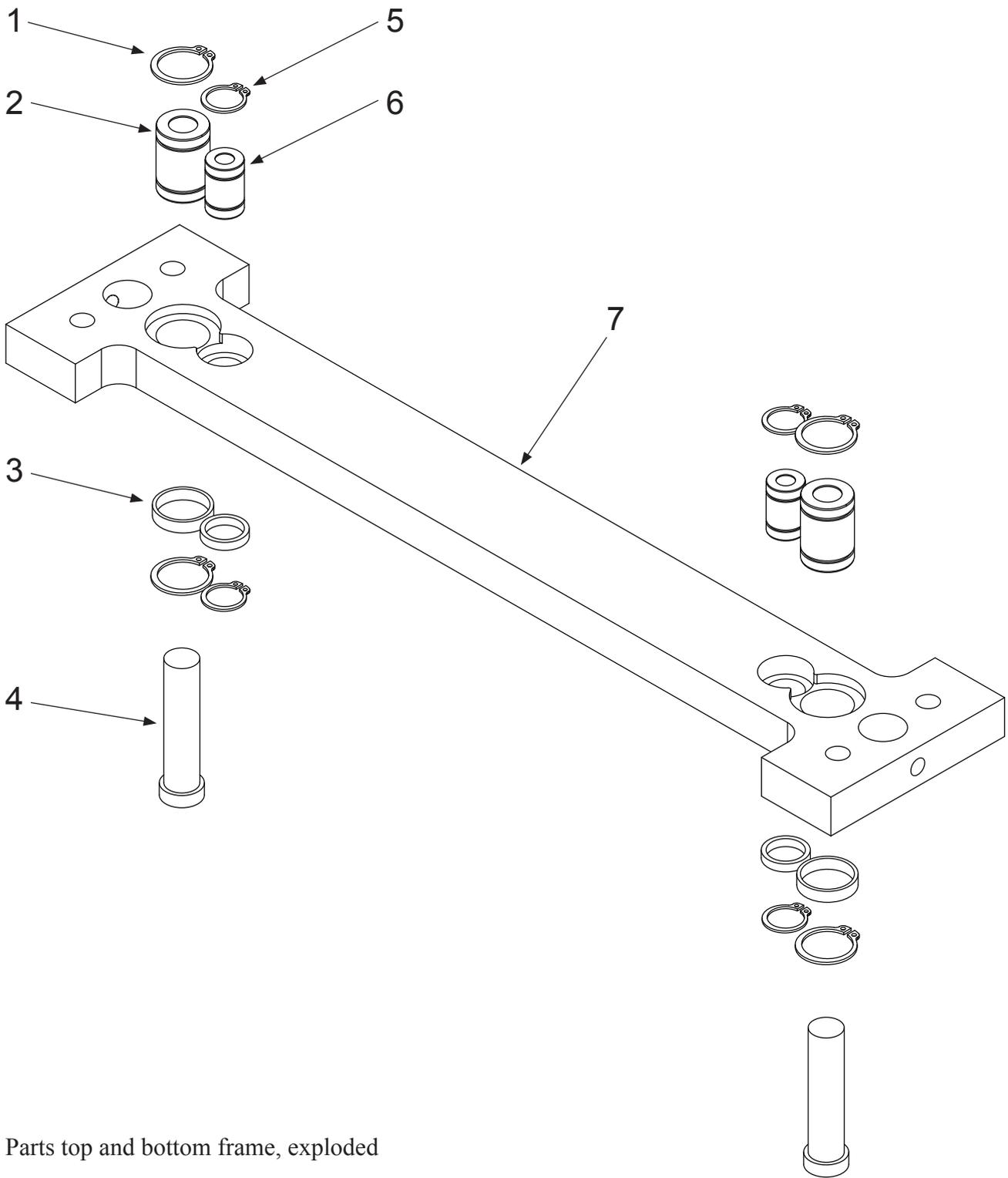
Parts top and bottom frame, exploded

Pos.	Name	Quantity per. frame
1	Retaining ring Ø22	4
2	Stroke ball bearing Ø12	2
3	Spacer Ø22	2
4	Push rod Ø12X56 ceramic	2
5	Retaining ring Ø16	4
6	Stroke ball bearing Ø8	2
7	Frame	1

Frame, complete
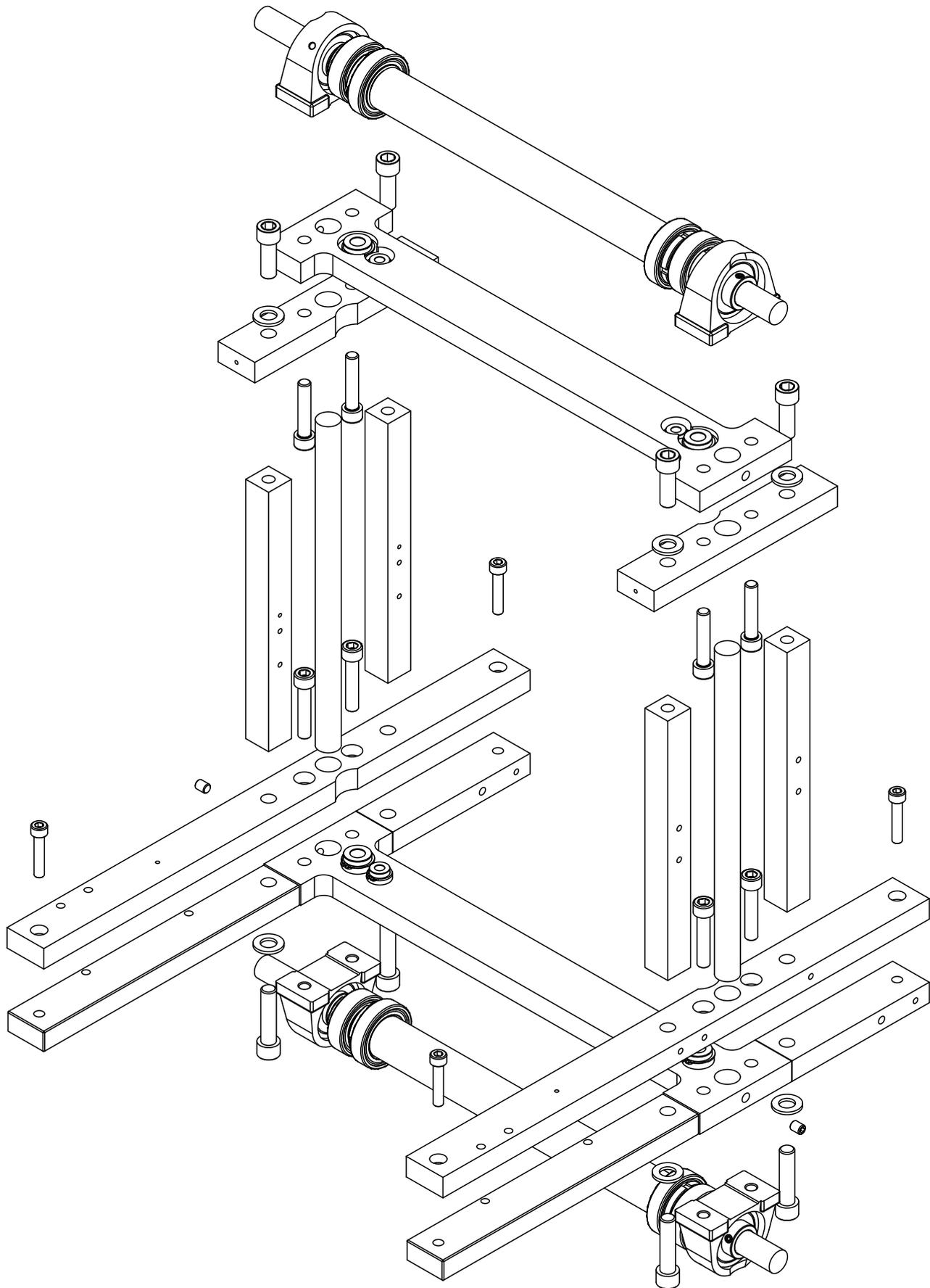
5.7   Paper cutter, exploded views, part 1 of 4
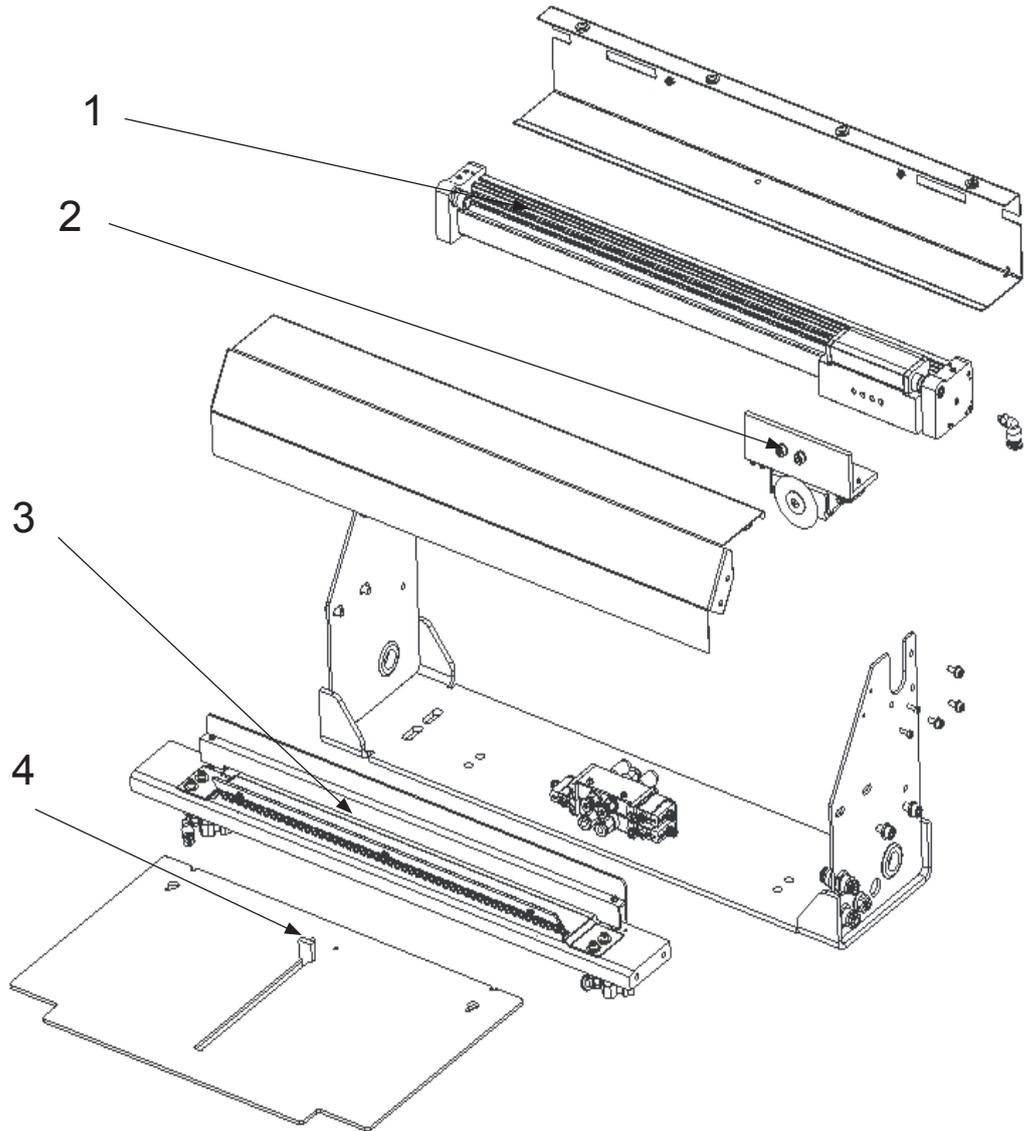
Pos	Name	Quantity
1	Cylinder 1	
2	Roller blade assembly 1	
3	Paper holder 1	
4	Paper pusher 1	

Paper cutter, exploded views, part 2 of 4, roller blade assembly
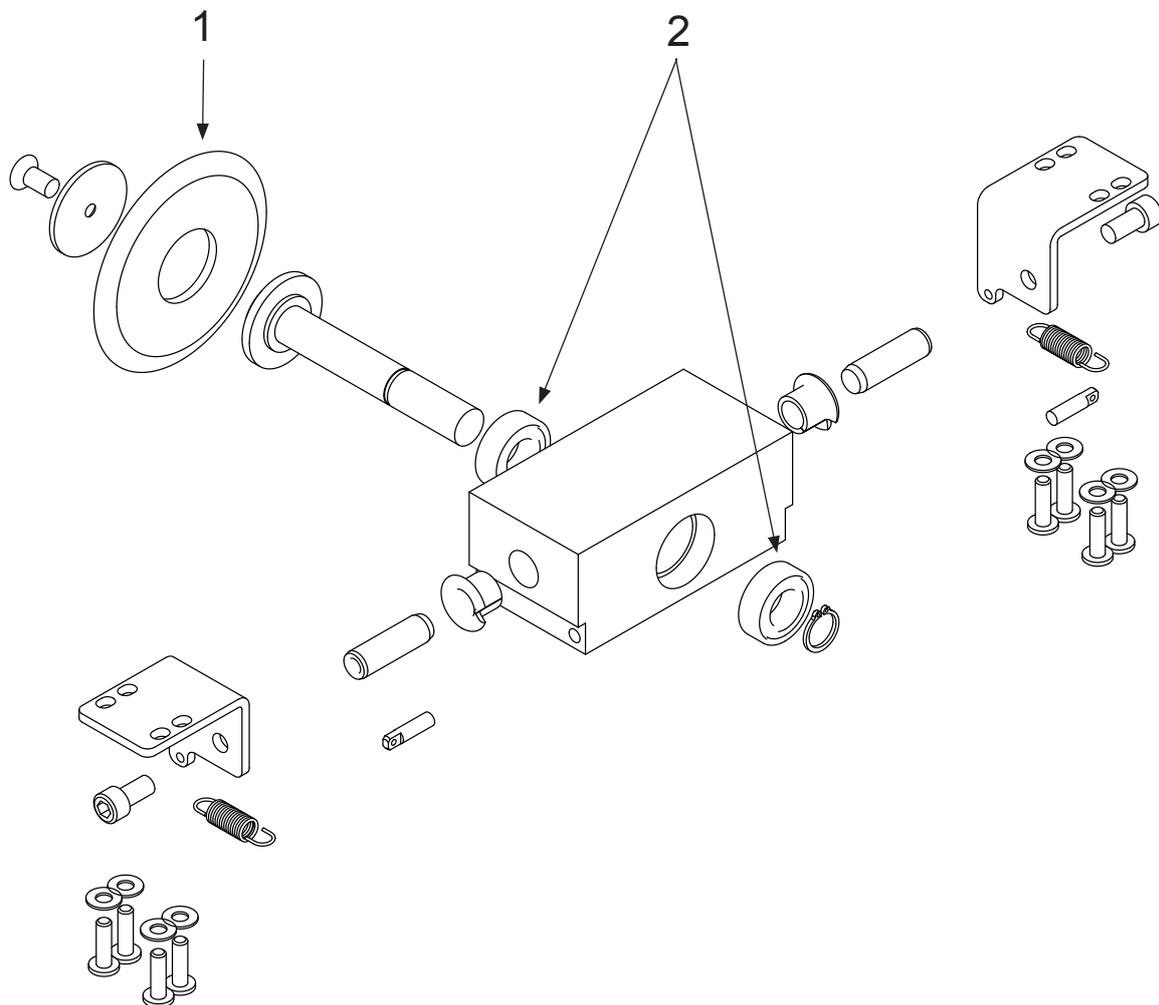
Pos	Name	Quantity
1	Roller blade 1	
2	Bearing 688 2Z 2	

Paper cutter, exploded view, part 3 of 4, paper holder
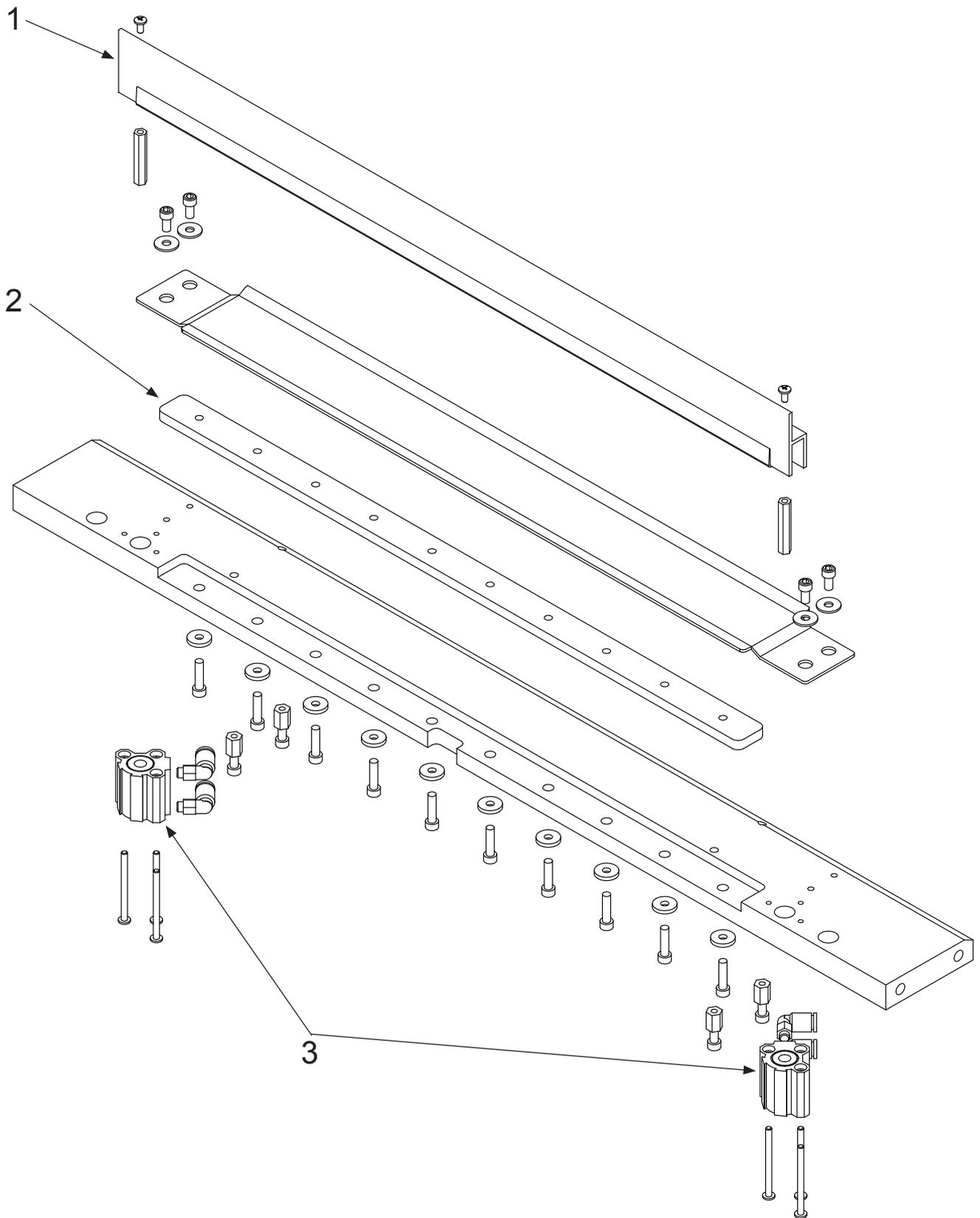
Pos	Name	Quantity
1	Paper holder 1	
2	Blade fixed 1	
3	Paper holder cylinders 2	

Paper cutter, exploded view, part 4 of 4, paper pusher

1

2
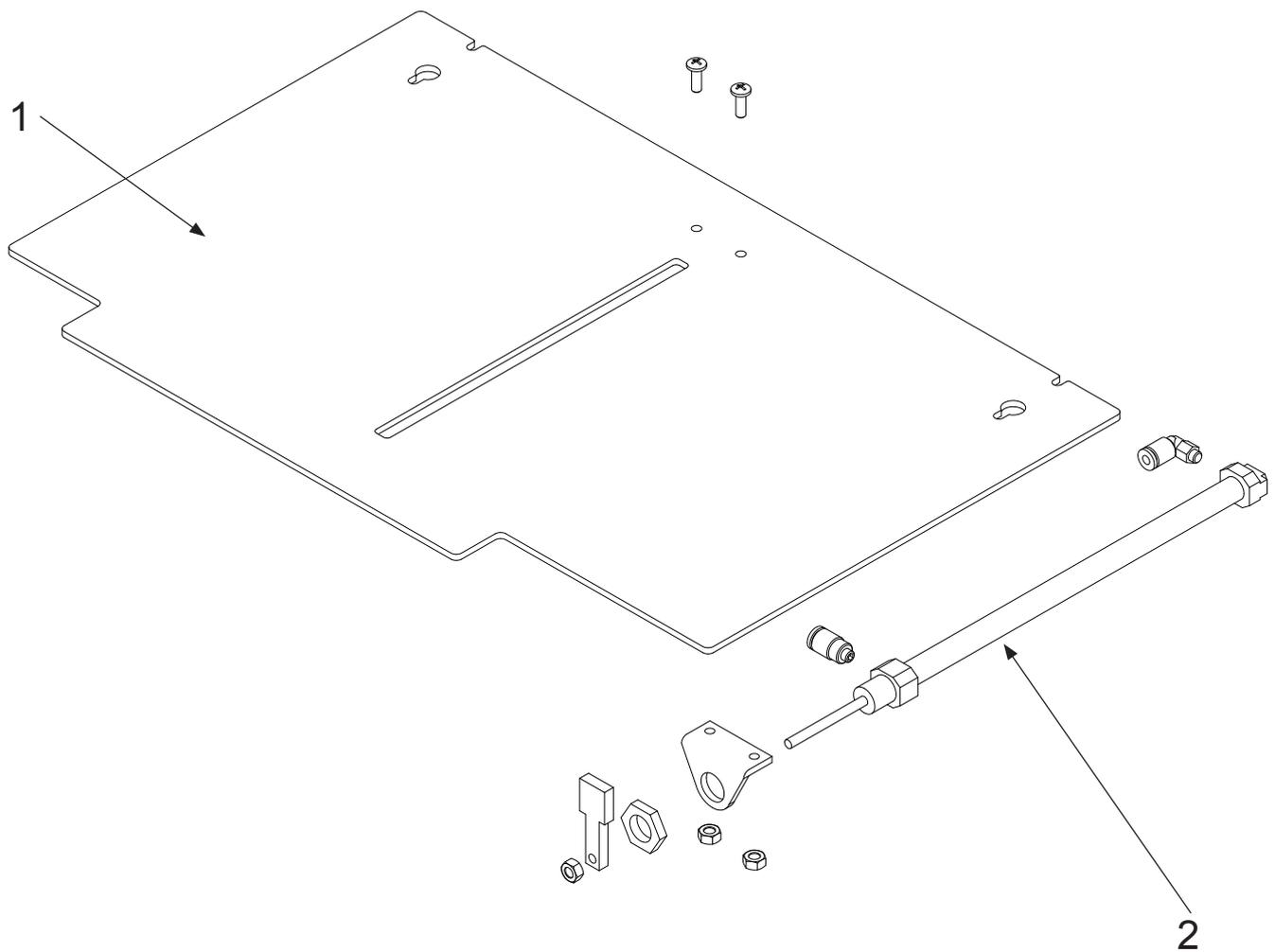
Pos	Name	Quantity
1	Paper pusher plate 1	
2	Paper pusher cylinder 1	

6.   TECHNICAL SPECIFICATIONS

6.1   Technical specifications

Format:
Paper roll:	Max. diameter 1100 mm (43 inches)
	Inner core diameter min. 70 mm (2.75 incehs), max. 84 mm (3.3 inches)
Paper (roll) width:	Min. 260 mm (10.2 incghes), max. 330 mm (13 inches)
Sheet width:	Min. 417 mm (16.4 inches), max. 585 mm (23 inches)
Line length:	Min. 10, max. 44 characters
Printing Mode:	Single / Inter point
Margins:	Inner/Outer min. 12.7, max. 50.8 mm (0.5 - 2 inches)
Page height:	Max. 30 lines per page
Braille cell:	Standard medium 6 dot, see dimensions below
Line spacing:	Fixed 5 mm
Paper Weight:	Min. 120 - max. 180 g/m², Recommended 150 g/m²

Printing Speed:
Characters/sec.:	650 char/sec.
Pages/hour:	No. of pages per hour is dependent on page format and speed

Electrical:
Voltage:	Single phase 230 V (+/- 10 %), 50/60 Hz
Current:	Approximately 8.5 A max.
Fuse Printer:	10 A
Power:	Approximately 2000 W max.

Compressed air:
Clean air without oil or water,
min. 7.0 bar @ 100 l/min., max. temperature 50° C.

Communication with the computer:
USB
Ethernet

Environment:
Temperatures:	15° - 30° C (60° - 86° F)
Rel. Humidity:	40 - 60 %

Measurements:
Height:	1900 mm
Width:	1030 mm
Length:	4200 mm
Weight:	570 kilos

6.2   Electric unit Printer - overview

The electric unit is placed on the base plate of the Printer, and contains connections, fuses and power supply. Note that you must disconnect the mains when working on this unit.

Cables
to operator panel

Magnet
rack power
connector

Main
board
connector

Main
board

SD memory card
with software

6.3   How to replace fuses

The fuses are placed on a PCB inside the Electric Unit. See figures below for how to open the box. Remember to disconnect the mains cable first!

Remove screws

Remove screws

Lift the lid upwards
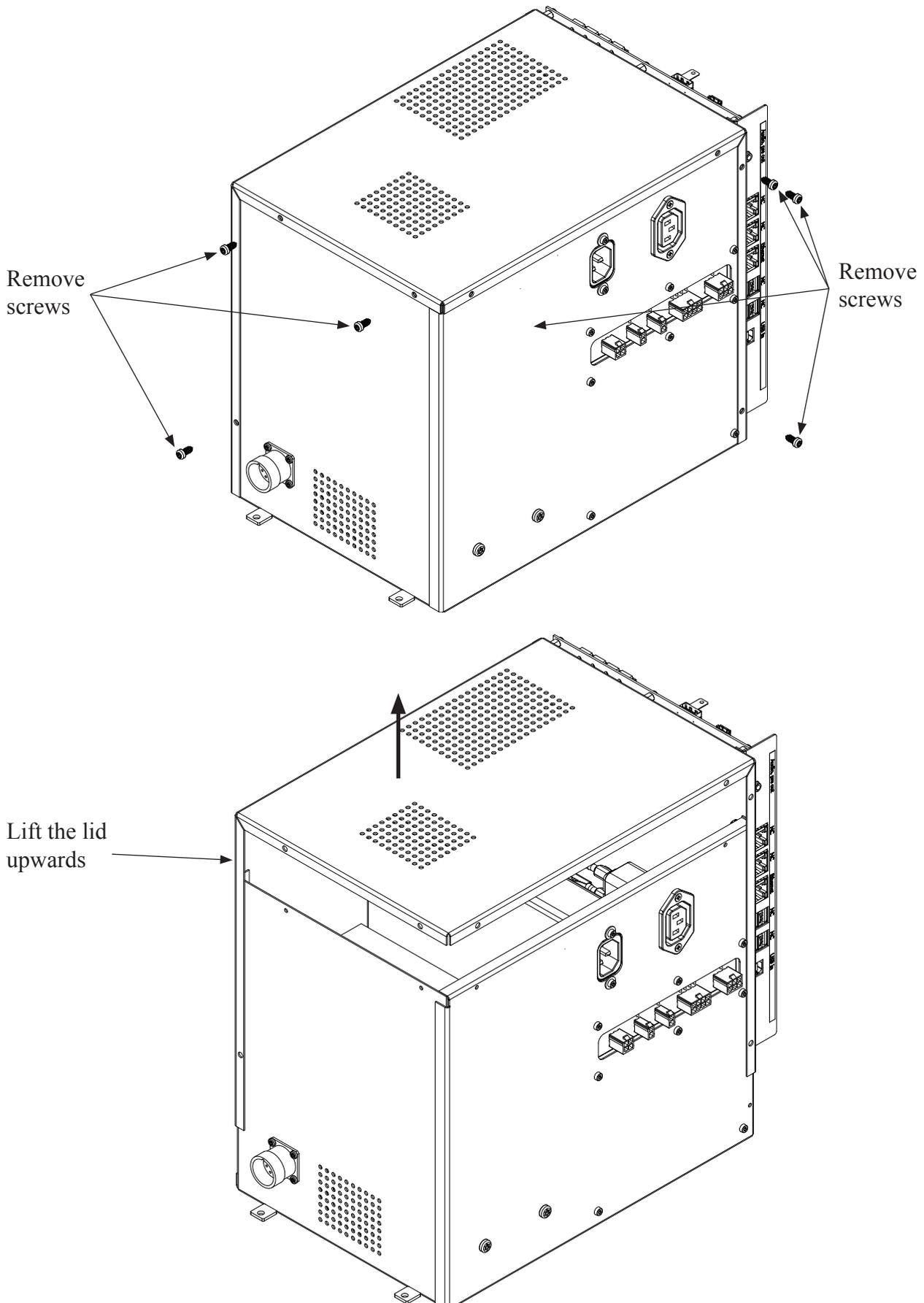
The fuses

Note that the two mains fuses are placed under transparent lids. All the fuses are 5 x 20 mm and can be of glass or ceramic type.

Mains - 10 AT

Board - 3,15 AT

Spare 1 - 1 AT

Spare 2 . 1 AT

M.rack A - 3,15 AT

M.rack B - 3,15 AT

M.rack C - 3,15 AT

M.rack D - 3,15 AT
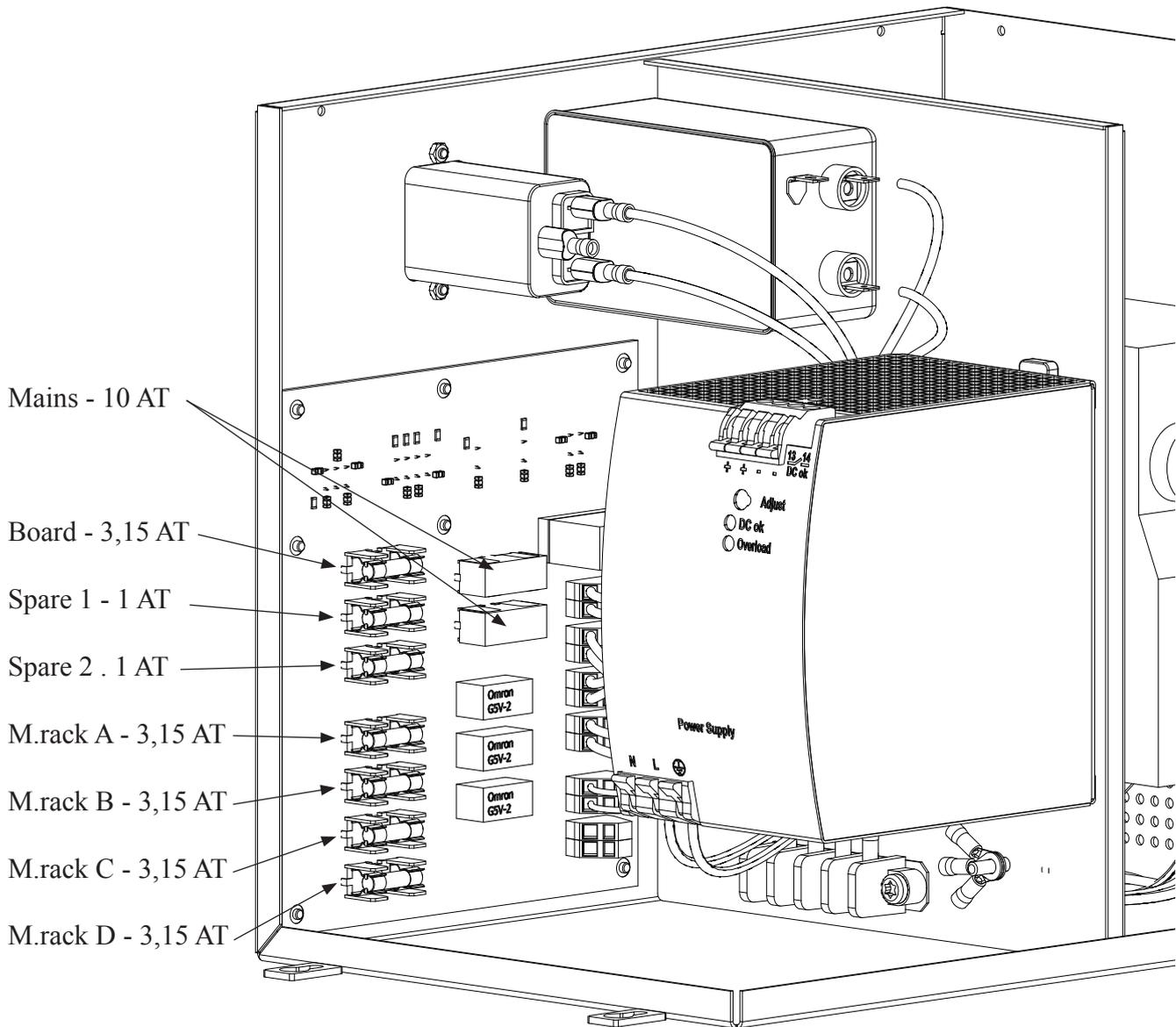
6.4   Main board - connections

Power operator panel

Signal operator panel

Data Magnet racks
A   B   C   D

Audio pre out

Not in use

Not in use

Ethernet

Not in use

Not in use

USB

SD memory card with software

Not in use

Step motor

Sync. External equip. (SW)

El-unit connect.

Spare sensor

Cover sensor

Beam wheel sensor

Paper feed 2 sensor

Paper feed 1 sensor

Out of paper sensor
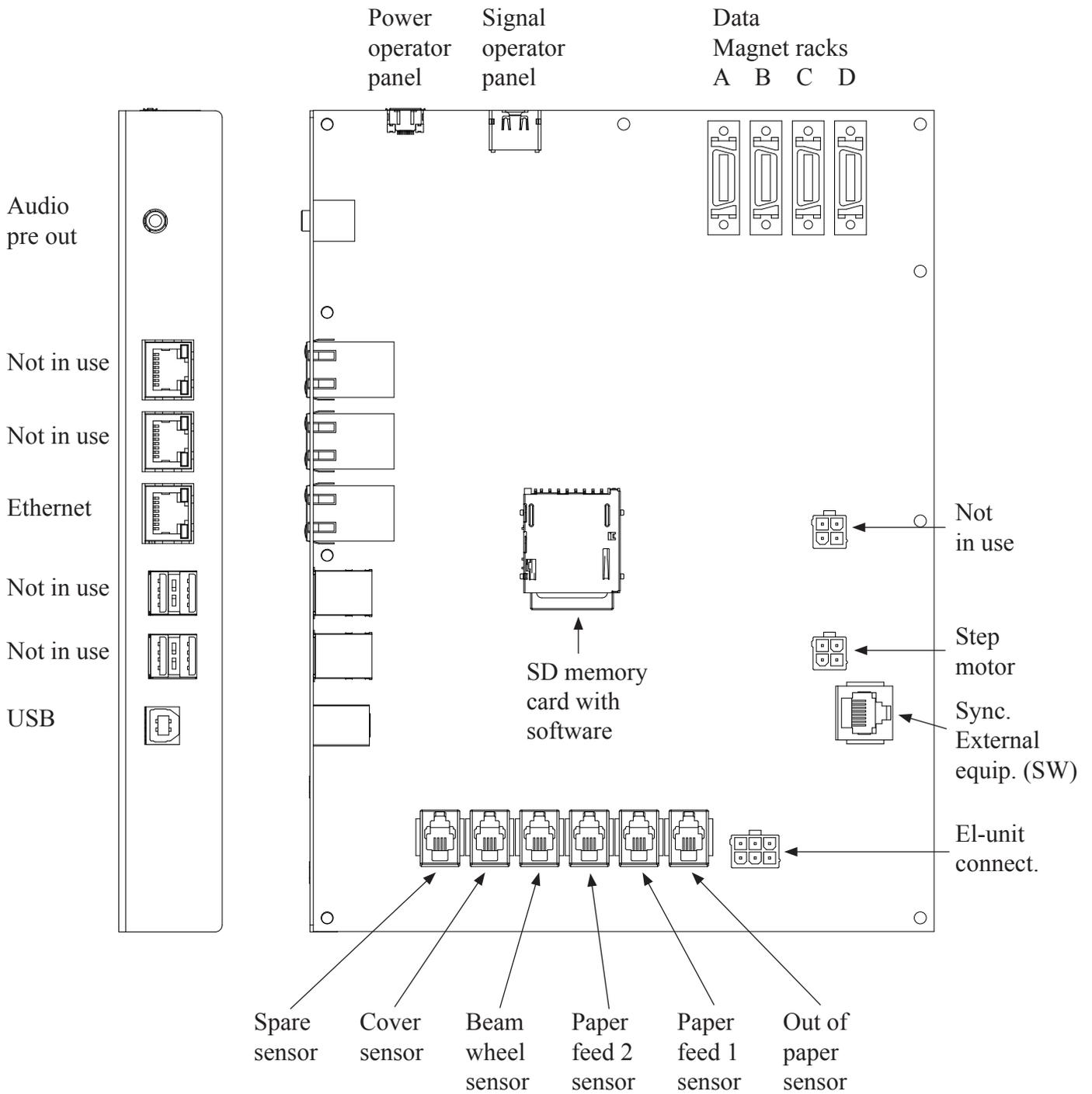
6.5   Escape-sequences

What is an escape-sequence?

An escape-sequence is just a name for a code that is sent to the Printer from the computer to change the parameters that control the way the Printer works. Many parameters that can be set via the operator panel, can also be changed with escape-sequences. Note that the escape-sequences will be active on the print job they are enclosed, but the Printer will go back to what the operator panel dictates when finished with the job.

This makes it possible to have different codes (read; escape-sequences) stored in a document. So, when the document is sent to the Printer, these codes are sent first and the Printer sets itself in the correct mode and format automatically.

Note! When the Printer receives an escape-sequence, it will have first priority. This means, regardless of the setting made before and regardless what the operator panel dictates, the most recent escape-sequence will take precedence.

Note! Escape-sequences should be placed at the very beginning of the first page on the sheet, (e.g. page 1, 3, 5, 7 ...). However, a software form feed can be placed wherever needed. (If there is a command on the other pages, it will be skipped).
All page formatting which is done on the front page will also format the back of the same sheet.

An overview of the different escape-sequences:

ESC A n	- Sheet Width.	n can be 0 (2-page mode) or 1 (4-page mode).
ESC B nn	- Line length.	nn can be from 10 to 44 characters.
ESC D nn	- Margin 1.	nn can be from 0.5" to 2.0"
ESC E nn	- Margin 2.	nn can be from 0.5" to 2.0"
ESC G n	- Page 1 up or down	n can be 0 (Page 1 up) or 1 (Page 1 down).
ESC H n	- Print format	n can be 0 (Single sided) or 1 (Inter point).
ESC P nn	- No. of sheets	nn can be from 01 to 99 sheets
ESC 0	- Soft Reset	
ESC 1	- Soft Form Feed	
ESC 4	- Adding the Printer ID at the last line on the sheet	

Note! The escape-sequences will be executed immediately if the Printer is not running. However, if the Printer is running, the escape-sequences will keep their place in the document, and will be executed when this particular page is printed. Also keep in mind that any page formatting command must be kept on the front page of a sheet. Then the command will affect both the front and back page, i.e. one sheet. If there are page formatting commands on the back page of a sheet, these commands will be skipped.

Please see the following explanations on how to combine different values to get the different escape-sequences.

Sheet Width:

ESC A n   - Sheet width.
n can be 0 or 1, 2-page mode (0) or 4-page mode (1).

Page mode	ASCII	HEX
2-page	027 065 048	1B 41 30
4-page	027 065 049	1B 41 31

Default is 4-page.

Line length:

ESC B nn   - Line length.
nn can be from 10 to 44 characters.

Char	ASCII	HEX
10	027 066 049 048	1B 42 31 30
11	027 066 049 049	1B 42 31 31
12	027 066 049 050	1B 42 31 32
13	027 066 049 051	1B 42 31 33
14	027 066 049 052	1B 42 31 34
15	027 066 049 053	1B 42 31 35
16	027 066 049 054	1B 42 31 36
17	027 066 049 055	1B 42 31 37
18	027 066 049 056	1B 42 31 38
19	027 066 049 057	1B 42 31 39
20	027 066 050 048	1B 42 32 30
21	027 066 050 049	1B 42 32 31
22	027 066 050 050	1B 42 32 32
23	027 066 050 051	1B 42 32 33
24	027 066 050 052	1B 42 32 34
25	027 066 050 053	1B 42 32 35
26	027 066 050 054	1B 42 32 36
27	027 066 050 055	1B 42 32 37
28	027 066 050 056	1B 42 32 38
29	027 066 050 057	1B 42 32 39
30	027 066 051 048	1B 42 33 30
31	027 066 051 049	1B 42 33 31
32	027 066 051 050	1B 42 33 32
33	027 066 051 051	1B 42 33 33
34	027 066 051 052	1B 42 33 34
35	027 066 051 053	1B 42 33 35
36	027 066 051 054	1B 42 33 36
37	027 066 051 055	1B 42 33 37
38	027 066 051 056	1B 42 33 38
39	027 066 051 057	1B 42 33 39
40	027 066 052 048	1B 42 34 30
41	027 066 052 049	1B 42 34 31
42	027 066 052 050	1B 42 34 32
43	027 066 052 051	1B 42 34 33
44	027 066 052 052	1B 42 34 34

Default is 42 characters per. line.

Margin 1:

ESC D nn   - Margin 1.
nn can be from 0.5" to 2.0"

Margin 1	ASCII	HEX
0.5"	027 068 048 053	1B 44 30 35
0.6"	027 068 048 054	1B 44 30 36
0.7"	027 068 048 055	1B 44 30 37
0.8"	027 068 048 056	1B 44 30 38
0.9"	027 068 048 057	1B 44 30 39
1.0"	027 068 049 048	1B 44 31 30
1.1"	027 068 049 049	1B 44 31 31
1.2"	027 068 049 050	1B 44 31 32
1.3"	027 068 049 051	1B 44 31 33
1.4"	027 068 049 052	1B 44 31 34
1.5"	027 068 049 053	1B 44 31 35
1.6"	027 068 049 054	1B 44 31 36
1.7"	027 068 049 055	1B 44 31 37
1.8"	027 068 049 056	1B 44 31 38
1.9"	027 068 049 057	1B 44 31 39
2.0"	027 068 050 048	1B 44 32 30

Default is 1.0".

Margin 2:
ESC E nn   - Margin 2.
nn can be from 0.5" to 2.0"

Margin 2	ASCII	HEX
0.5"	027 069 048 053	1B 45 30 35
0.6"	027 069 048 054	1B 45 30 36
0.7"	027 069 048 055	1B 45 30 37
0.8"	027 069 048 056	1B 45 30 38
0.9"	027 069 048 057	1B 45 30 39
1.0"	027 069 049 048	1B 45 31 30
1.1"	027 069 049 049	1B 45 31 31
1.2"	027 069 049 050	1B 45 31 32
1.3"	027 069 049 051	1B 45 31 33
1.4"	027 069 049 052	1B 45 31 34
1.5"	027 069 049 053	1B 45 31 35
1.6"	027 069 049 054	1B 45 31 36
1.7"	027 069 049 055	1B 45 31 37
1.8"	027 069 049 056	1B 45 31 38
1.9"	027 069 049 057	1B 45 31 39
2.0"	027 069 050 048	1B 45 32 30

Default is 1.0".

Page 1 up or down:
ESC G n   - Page 1 up/down.
n can be 0 (up) or 1 (down).

Page 1	ASCII	HEX
Up	027 071 048	1B 47 30
Down	027 071 049	1B 47 31

Default is Page 1 Up.

Print format:
ESC H n   - Print format
n can be 0 (single sided) or 1 (inter point).

Print format	ASCII	HEX
Single sided	027 072 048	1B 48 30
Inter point	027 072 049	1B 48 31

Default is inter point.

Number of sheets:
ESC P nn   - Number of sheets
nn can be 01 to 99 sheets.

Sheets	ASCII	HEX
01	027 080 048 049	1B 50 30 31
02	027 080 048 050	1B 50 30 32
03	027 080 048 051	1B 50 30 33
04	027 080 048 052	1B 50 30 34
05	027 080 048 053	1B 50 30 35
06	027 080 048 054	1B 50 30 36
07	027 080 048 055	1B 50 30 37
08	027 080 048 056	1B 50 30 38
09	027 080 048 057	1B 50 30 39
10	027 080 049 048	1B 50 31 30
11	027 080 049 049	1B 50 31 31
12	027 080 049 050	1B 50 31 32
13	027 080 049 051	1B 50 31 33
14	027 080 049 052	1B 50 31 34
15	027 080 049 053	1B 50 31 35
16	027 080 049 054	1B 50 31 36
17	027 080 049 055	1B 50 31 37
18	027 080 049 056	1B 50 31 38
19	027 080 049 057	1B 50 31 39
20	027 080 050 048	1B 50 32 30

Software Reset:
ESC 0   - Soft Reset

This command is used to reset the Printer. It is used from the computer and has the same effect as pushing the key RESET PRINTER. Software Reset should be used with care: If the printer has not finished printing, the rest of the text in the buffer will be lost, and a new paper position will be assumed by the Printer. Because of this, the command is only to be used after a software form feed has been executed, and the Printer has stopped completely.

	ASCII	HEX
Software Reset	027 048	1B 30

Software Form Feed:
ESC 1   - Soft Form Feed

This command is to be used after all text in one volume has been transmitted to the Printer. If text corresponding to less than two pages, or text with an odd number of pages is received, and not followed by FF on the last page, the Printer will wait for more text or FF. This means that the last page may be stuck in the Printer. This is due to the double-sided printing of the Printer. This command makes the Printer to start printing the rest of the text. After this the paper position will be the same as it had when this volume of text was started. Then page no. 1 on the next volume will start out correctly. There will always be at least one blank sheet of paper between the volumes of text when finishing each volume with a Software Form Feed.

	ASCII	HEX
Software Form Feed	027 049	1B 31

Printer ID:
ESC 4   - Adding the Printer ID

When you have several Braille Printers producing the same Braille material, it is not always easy to later figure out what Printer made which book. It is therefore possible to add a Printer ID to the last line on a sheet. There is no matter where the escape-sequence is placed on the page, the ID will always be printed on the last line. Meaning, if you send this escape-sequence on the last page of every print job, you will get the Printer ID printed on the last line on the last page.

The Printer ID is a 5 digit code that has to be set in the menu choice: *Main menu - Printer Setup - Printer ID*. See figure below:
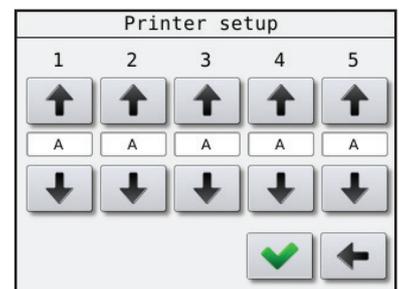
7.   PAPER CUTTER AND STACKER

The paper cutter is driven by compressed air, and is controlled from the control unit on the horizontal stacker. So it is considered to be a part of the horizontal stacker, and not a part of the Printer.

Power lamp.

Reset switch.
When pushing this switch, the program will start from the beginning and run one cycle on all cylinders.

Auto Man switch.
In "auto" position, the Printer will stop when the conveyor belt is full. In "man" position, the Printer will not check the conveyor belt at all.

Run Belt switch.
When pushing this switch, the conveyor belt will move the distance determined by the cylinder sensor.

Pause switch.
When pressing this switch, the Printer will stop. To continue the printing, press and release the "test print" button on the Printer.

Description of function.

When it's time to cut the paper, the Printer sends a signal to the Hor. stack control unit, and the paper holder will lock the paper and keep it steady. The cutter will then cut the sheet.
Then the sheet is pushed into the stacker by the paper pusher. When the sheet reaches the end stop, a sensor will detect it and the "trap doors" will open so the sheet will fall down to the conveyor belt. This is repeated until the numbers of sheets per volume is reached, then the conveyor belt will move the stack a distance. Because of this, the different volumes is separated on the conveyor belt.

If the sheet does not arrive at the sensor within a certain time after the sheet is cut, the stacker will send an alarm signal back to the Printer, and the Printer will stop. The display on the Printer will tell what has happened.

The physical movements on this cutter and stacker is done with help of compressed air. Electric signals are controlling valves that will open or close for the compressed air. The air goes trough pipes out to the cylinders.

Components inside the control unit

Main fuse

24V power supply

PLC
(programmable logic controller)

Conector for signal cable printer/stacker (RJ45)

Connection sensors and valves

Valves
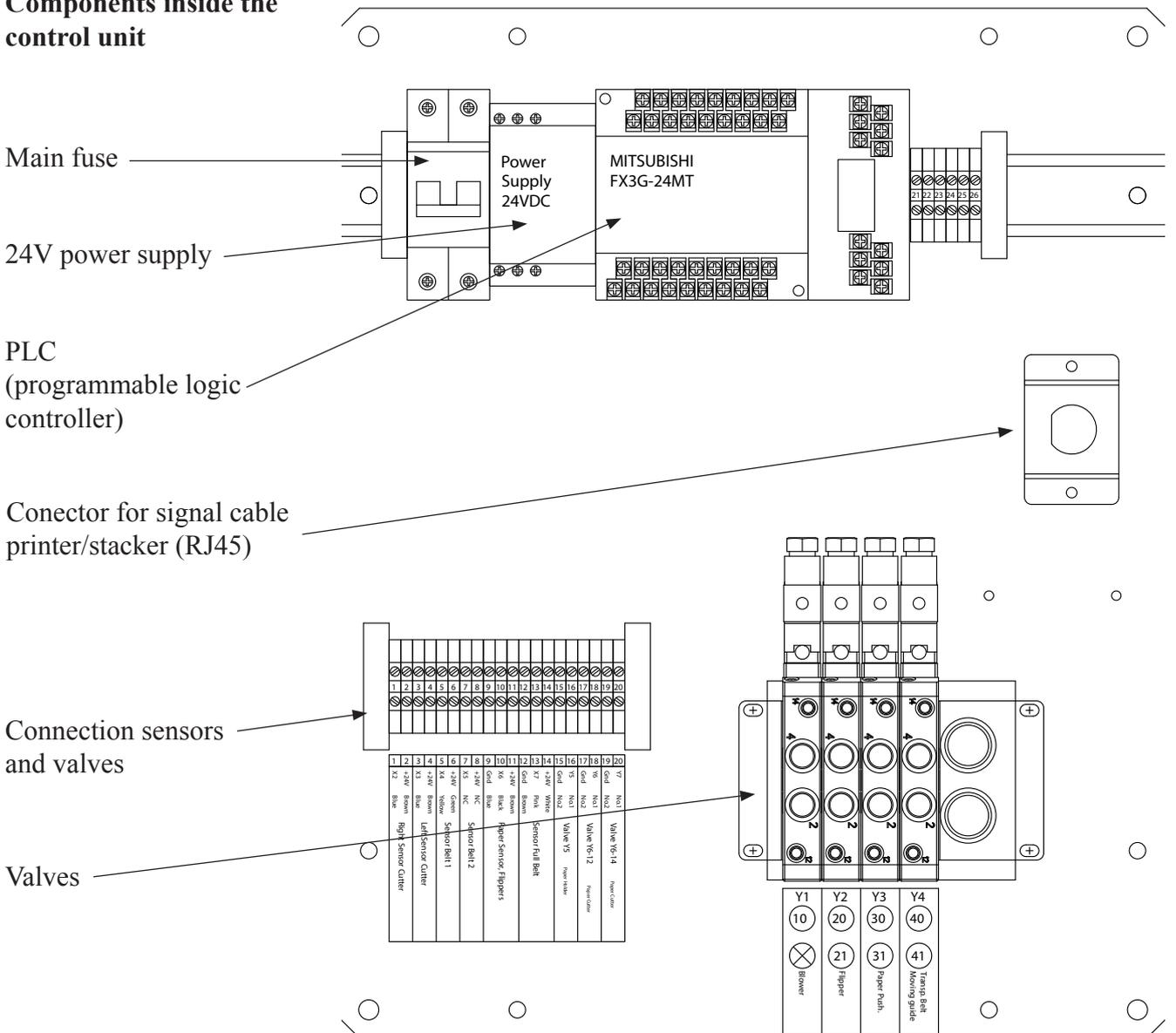
7.1   Paper cutter, adjustment

The paper cutter must be adjusted in the in/out direction, to ensure that the top and bottom margins has the correct size. It is done like this: Loosen the four fastening bolts. There is a position plate on both sides that has to be loosened. Move the cutter to the desired position. Fasten the four bolts. Fasten the position plate. Print some sheets to test. See the figures on the next page for the correct adjustment.

The adjustment is
done in this direction

Position plate
(one at each end)

Fastening bolts (four pcs.)
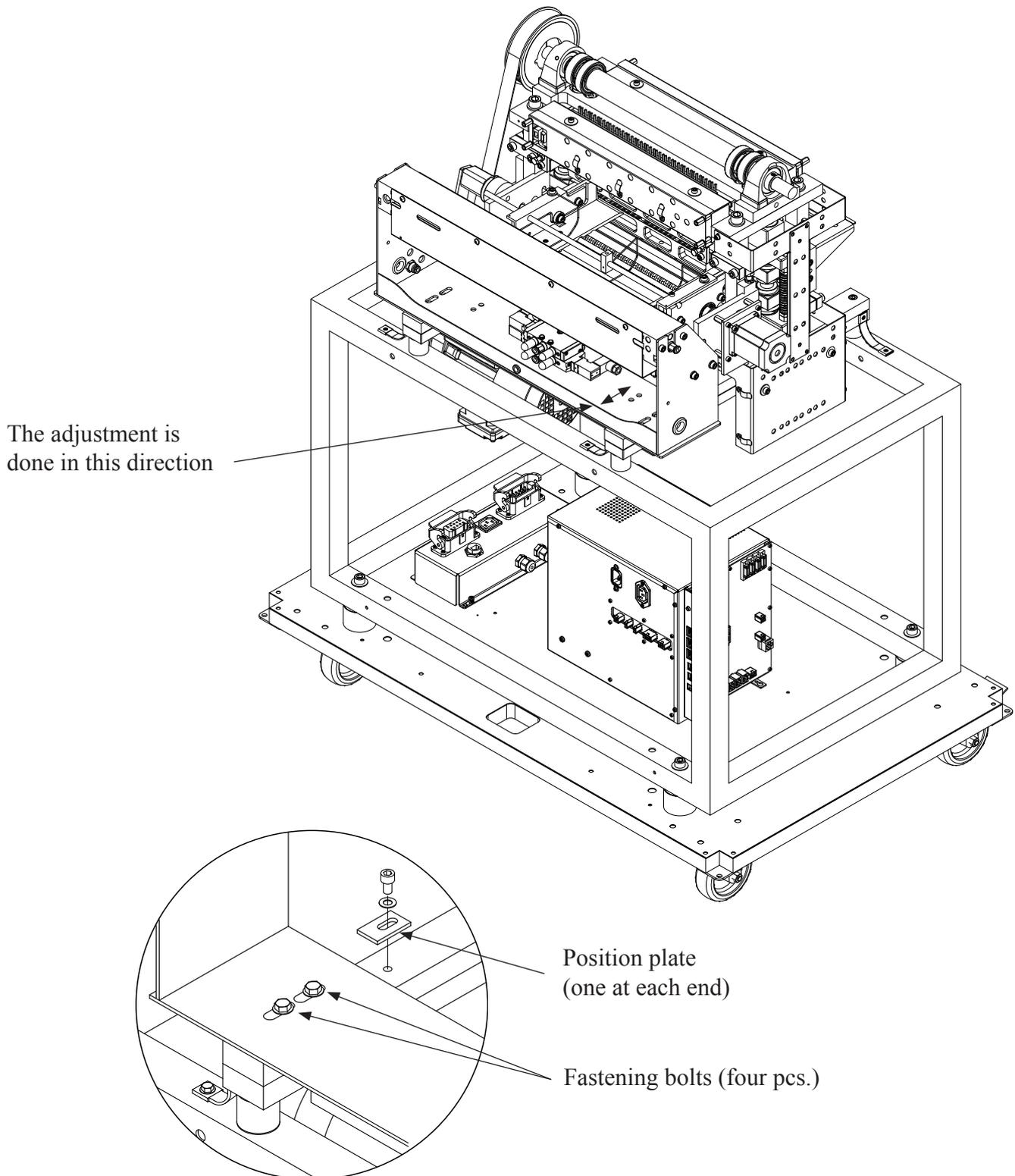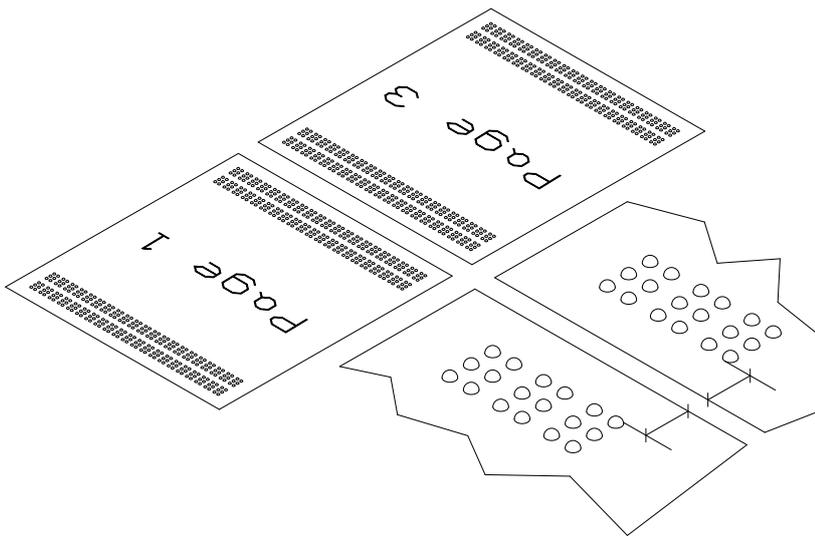
When the paper cutter is correctly adjusted, the bottom margin on page one has approx. the same size as the top margin on page 3. The edge on the sheet is also aligned with the text.

(Note that page two is at the back of page one).
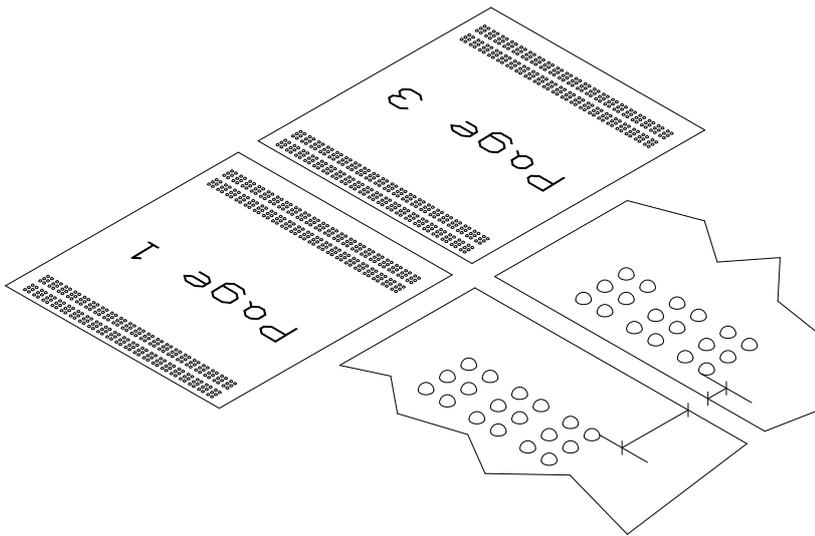
If the paper cutter is too close to the Printer, the bottom margin on page one is bigger than the top margin on page three.
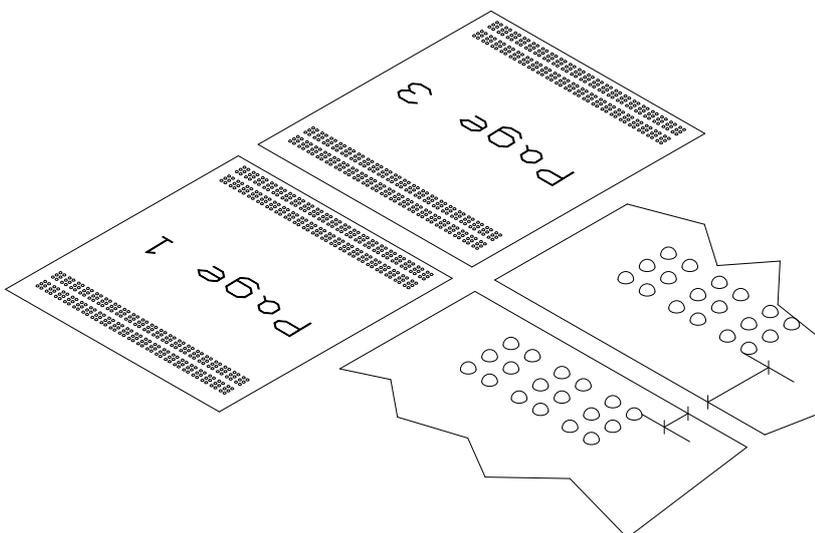
If the paper cutter is moved too far out from the Printer, the bottom margin on page one will be narrower than the top margin on page 3.

7.2 Paper pusher, adjustment

The speed of the paper pusher might need some adjustment because different paper quality and paper size will have different behaviour when the sheet is ejected from the cutter.

Speed adjustment   Paper pusher
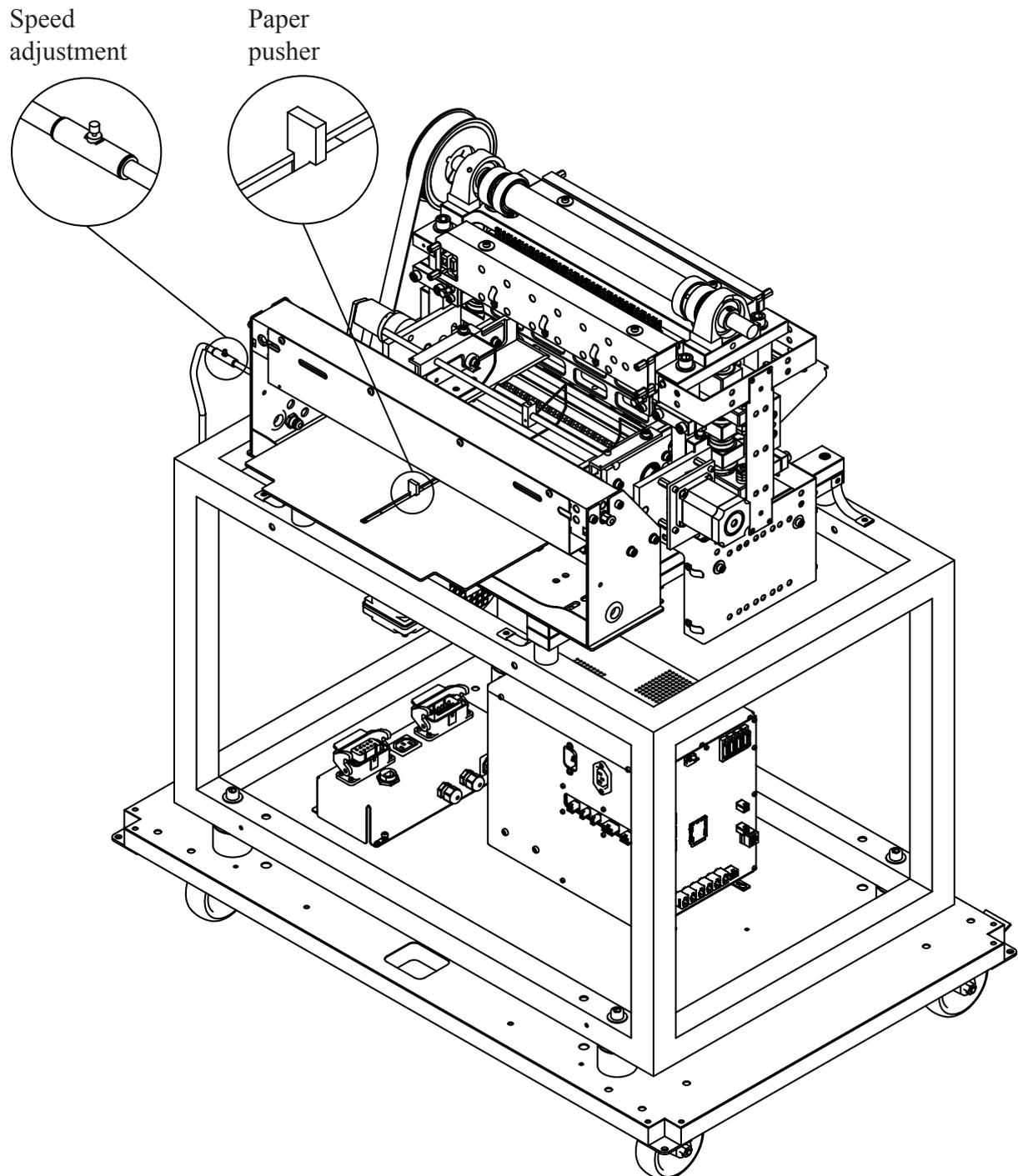
7.3 Flipper, adjustment

It is possible to adjust the moving speed on the flippers. The adjustment is done where the pipes are entering the cylinders. To make this adjustment, we recommend you to loosen the stacking unit from the conveyor belt, and turn it upside down. Then the cylinders can be seen in the area indicated on the figure below.
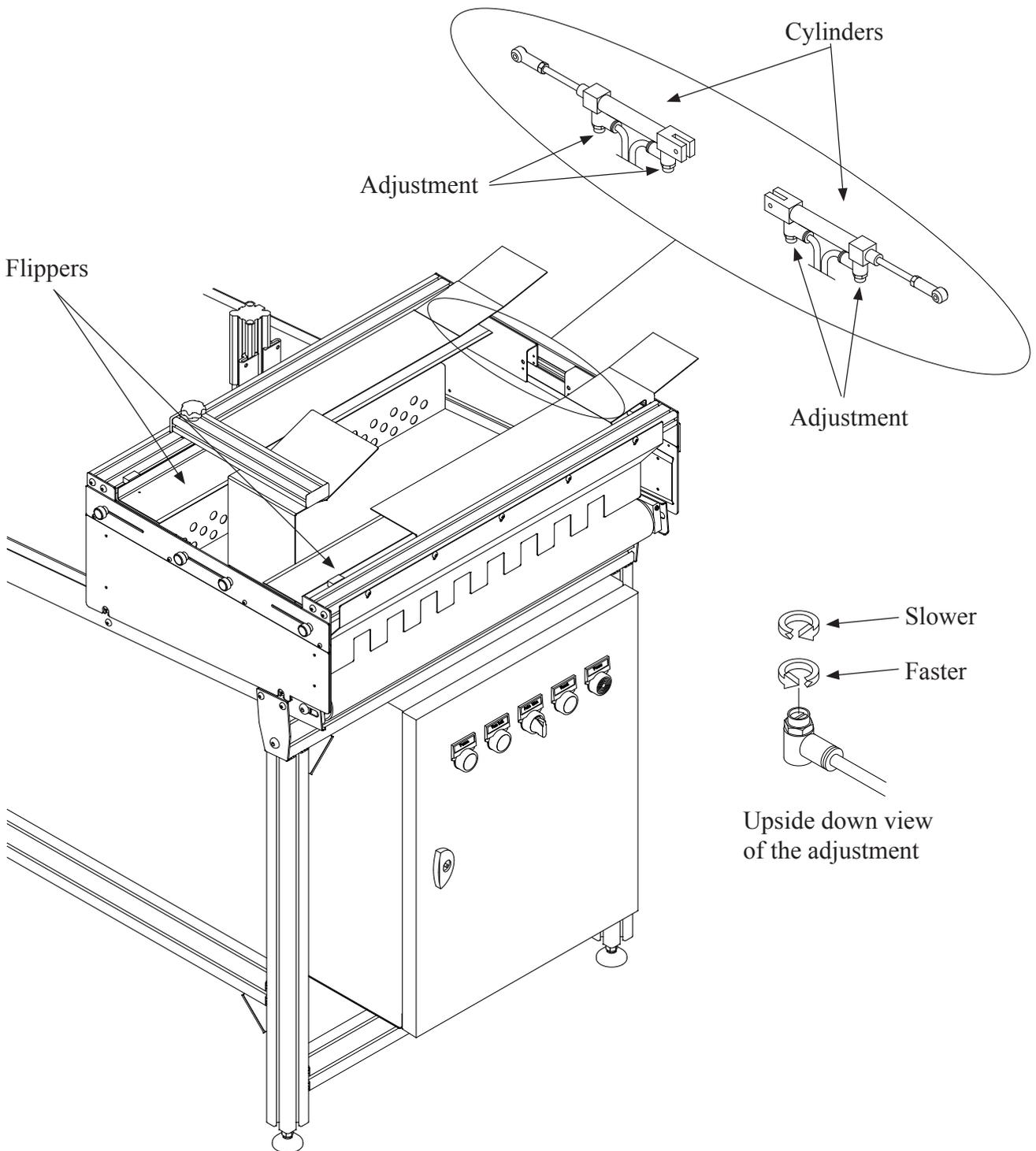
7.4   Moving guide, adjustment

With this adjustment it is possible to change the force the moving guide is pressing down onto the pile of paper laying on the conveyor belt. It is approx. correct force when you are able to lift the guide easily by hand while the air pressure is on.

Moving guide cylinder

Moving guide

More pressure

Less pressure
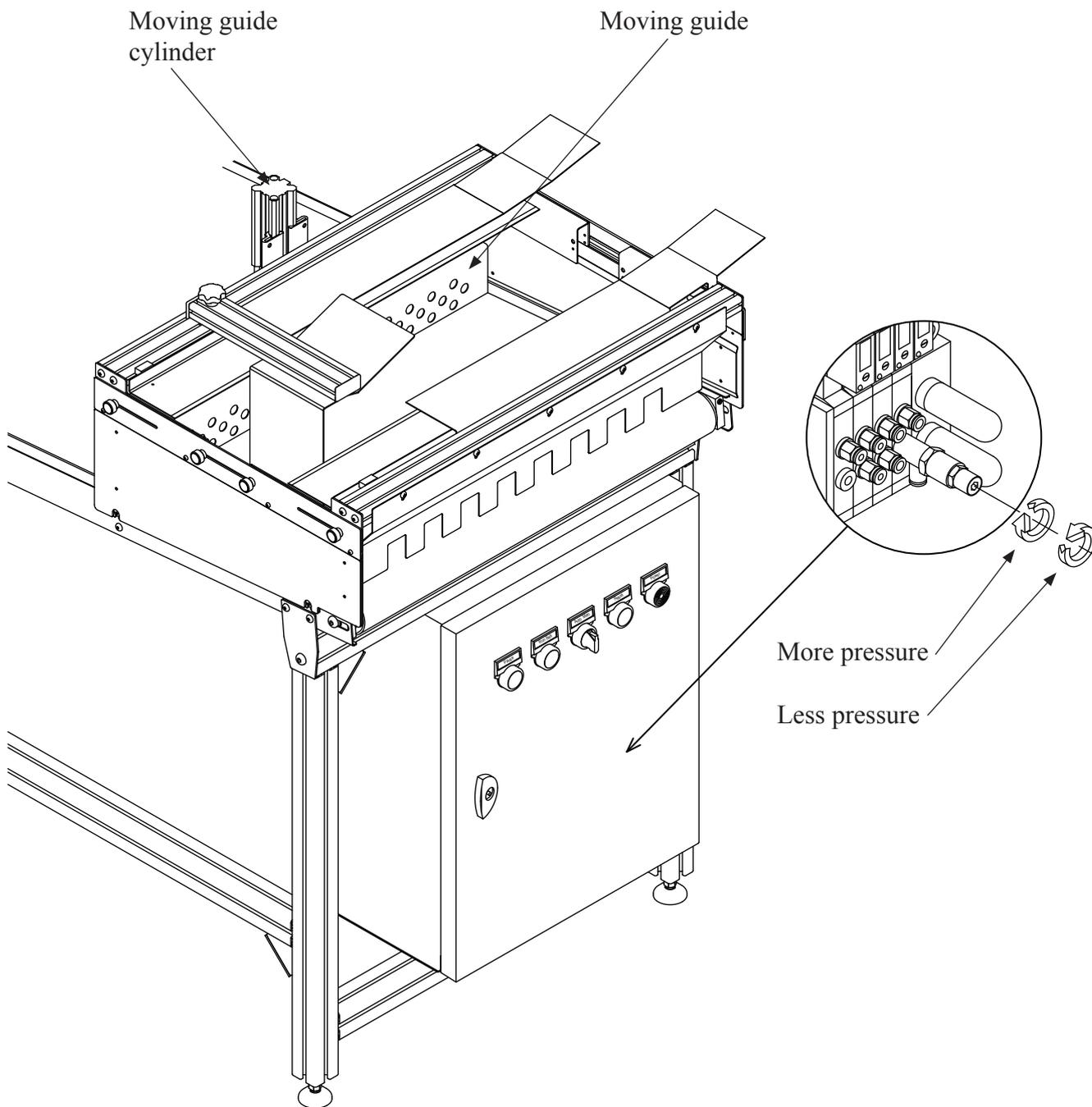
7.5   Conveyor belt tension, adjustment

Adjust the tension
with these screws
(on both sides)

Loosen these bolts on both
sides before adjustment,
and tighten them after-
wards.
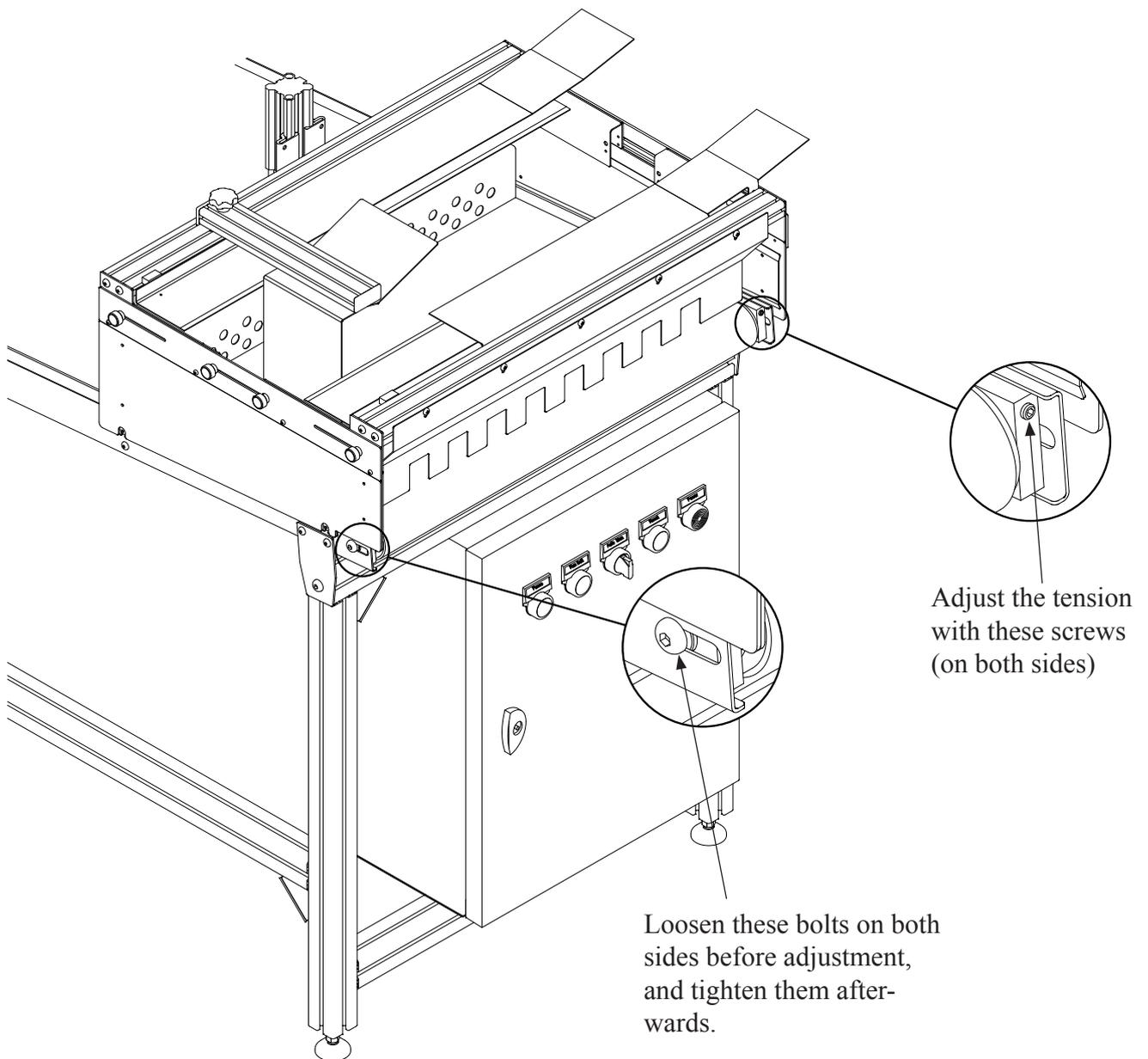
7.6   Moving distance conveyor belt, adjustment

The distance the conveyor belt will move between each volume is adjustable. The adjustment is done inside the little box at the end of the conveyor belt.

The mechanism works like this: The movement on the belt is coming from a press air cylinder. The stroke length on the cylinder is determined by the position of the sensor. So by moving this sensor back and forth you can set the stroke length on the cylinder, and hereby the movement on the belt.

There is also a possibility to adjust the speed on the movement with the speed controller.
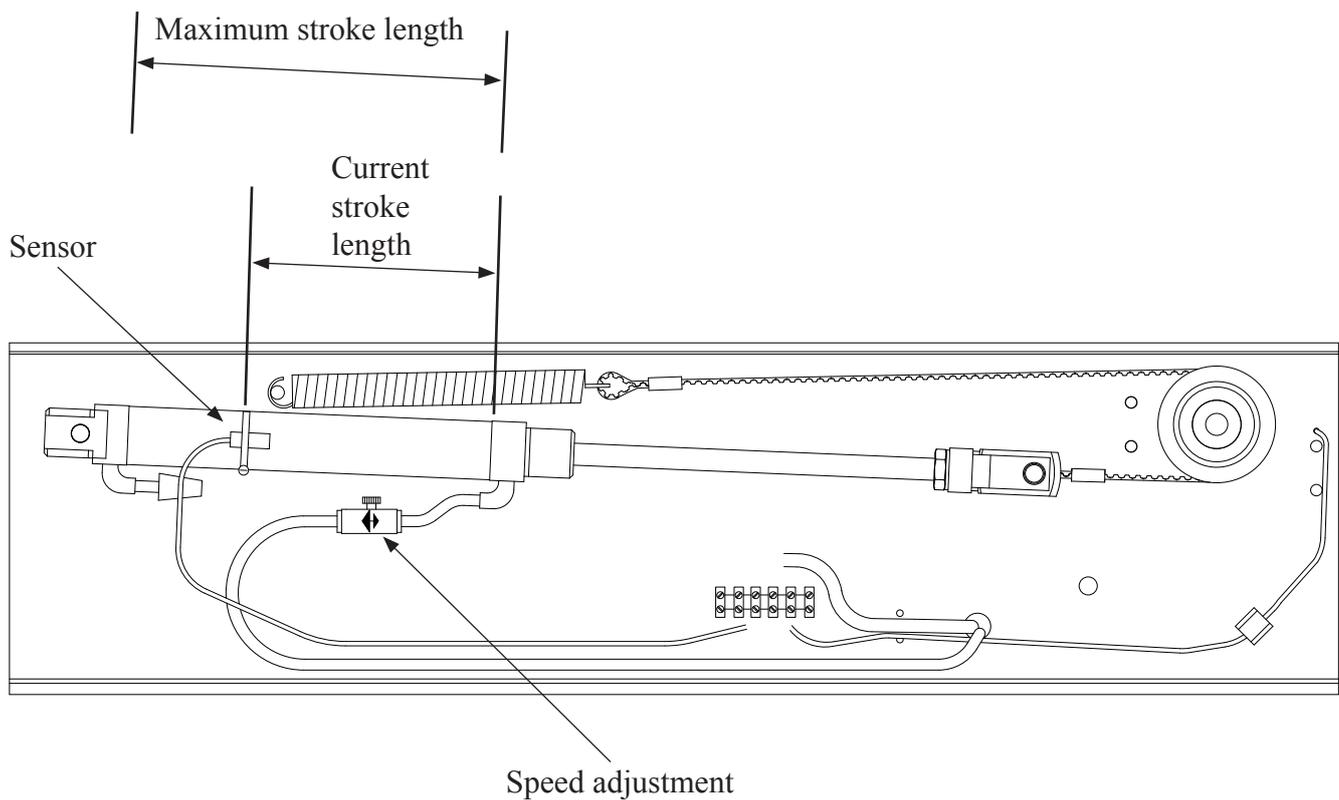
8.　PAPER ROLL FEEDER

8.1　Setting up, connections

The different units should be placed as seen on the figure below.

Paper roll feeder

Approx.
50 cm

Printer

Horizontal stacker
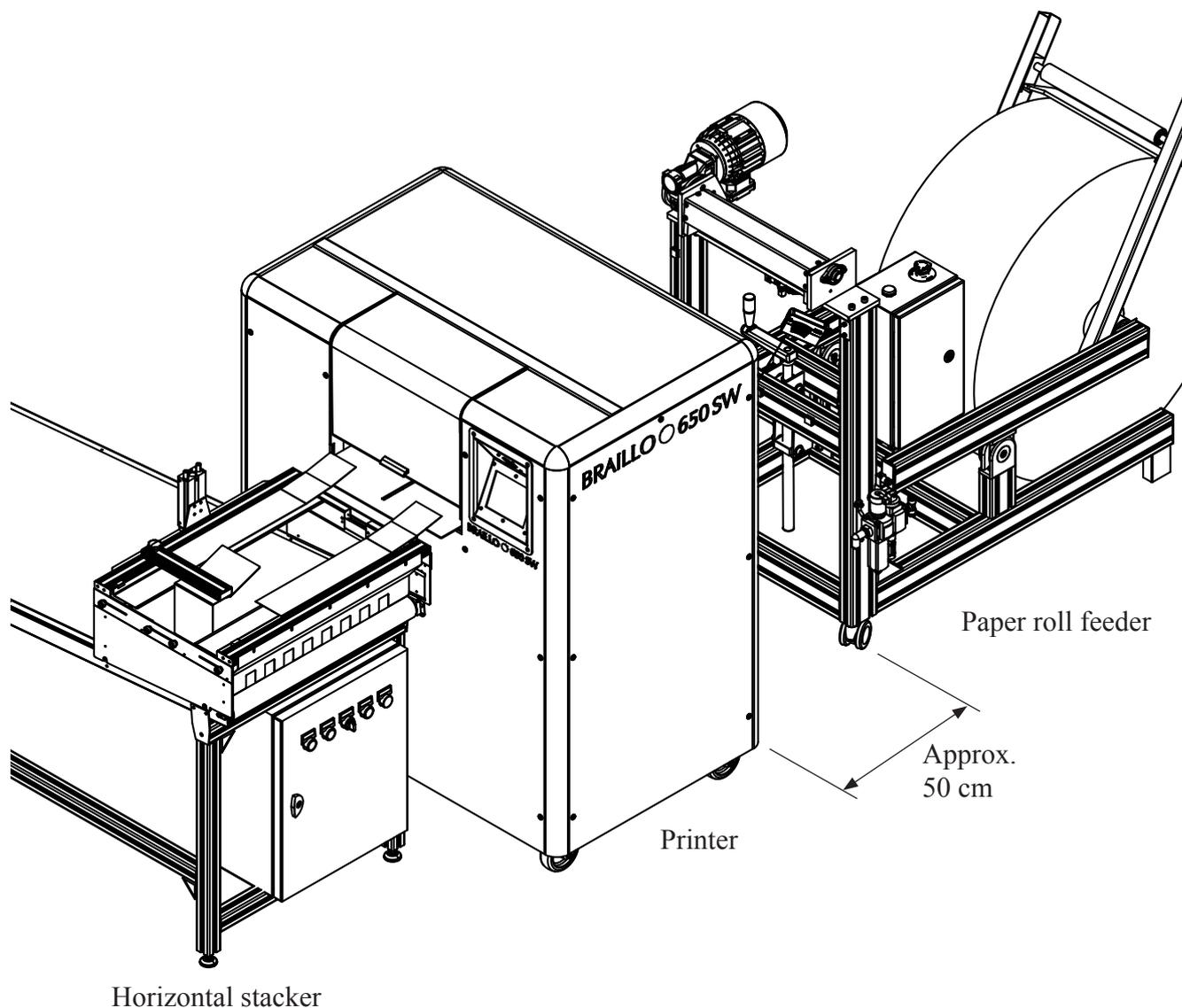
The Paper Roll Feeder may be considered as an independent unit, even though it is switched on and off with the main switch on the Printer.

The Paper Roll Feeder is also supplied with compressed air. The press air is used to keep the paper clamped between the two feeder rolls. It is a timer inside that will release this pressure on the rolls after a certain period of time. This is done to prevent the paper from being deformed around the feeder rolls.

8.2   Operating

To operate the Paper Roll Feeder, the Printer must be "awake" and the emergency switches must be in released (upper) position.

When turned on, the green power lamp will light up and depending on the paper position, the feeder motor may start. The paper feed is controlled by a laser distance sensor and this will always keep a "slack" in the paper between the Paper Roll Feeder and the Printer. The Paper Roll Feeder will automatically feed paper when needed. The paper is feed with a speed depending on the distance from the sensor to the paper. Long distance = low speed, short distance = high speed.

If the emergency stop is activated (pushed down), it has to be reset. The resetting is done by turning the knob like the arrows illustrate, until the knob "pops up" again.

Note! If any work is to be done near or at the feeder rolls, be sure to disconnect the power and the compressed air to prevent injuries.

Correction roll

Friction bar

Laser distance sensor

Laser beam

Main switch
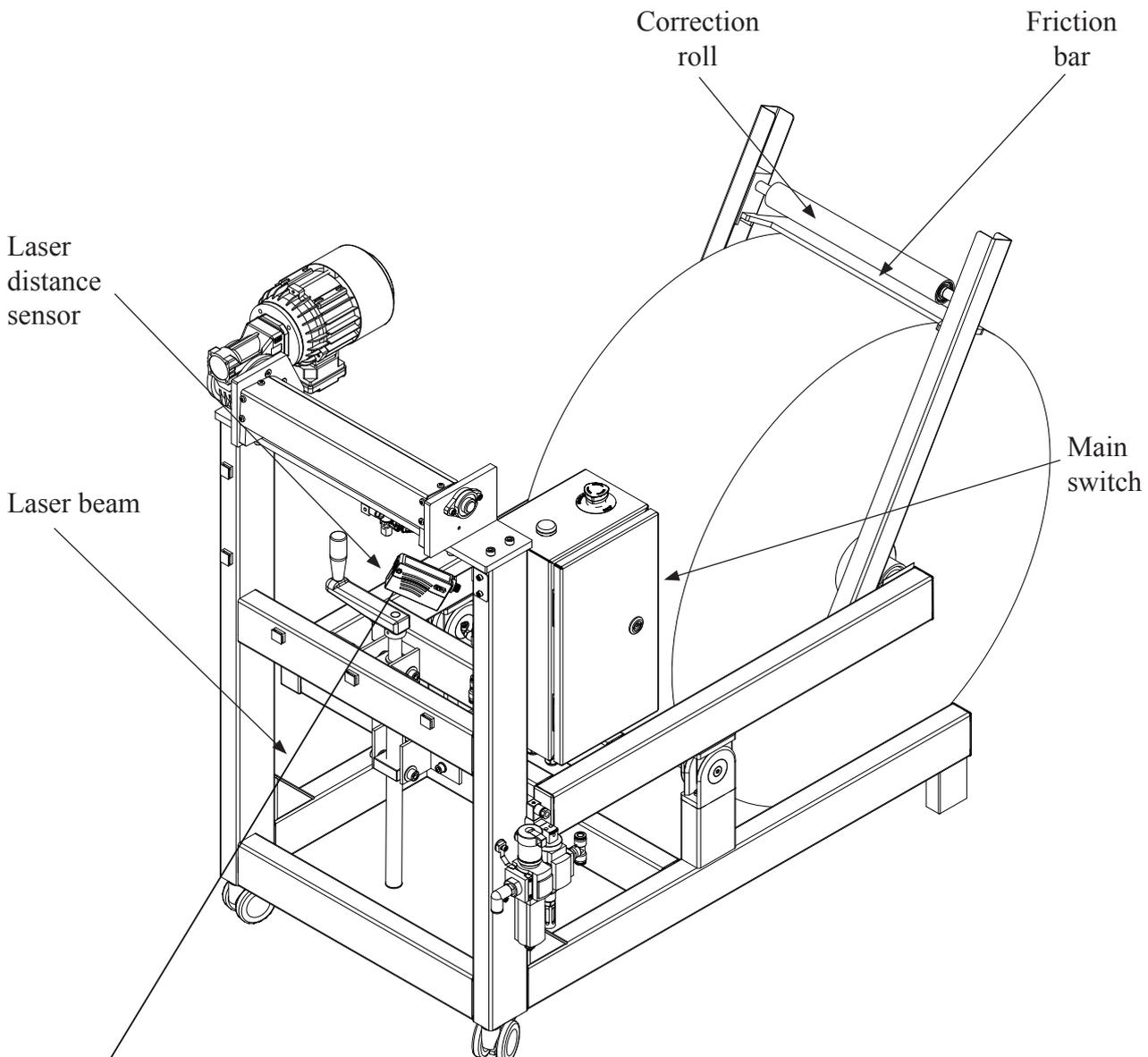
8.3   Replacement of the paper roll
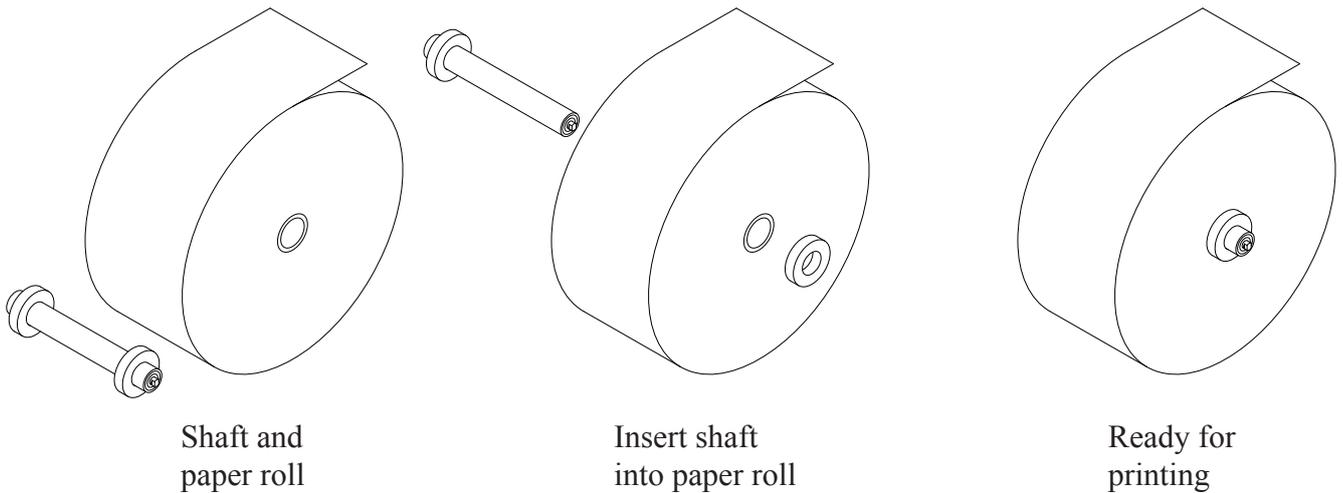
Shaft and   Insert shaft   Ready for
paper roll   into paper roll   printing

Put the shaft in the center of the roll, and ensure that the shaft is approximately in the centre sideways. Fasten the shaft. The roll must be placed so that the paper is rolled off at the top. (See figure).

Place the paper roll with the shaft already fastened just behind the Paper Roll Feeder. Lift off the correction roll with the friction bars and place aside. Use the crank to lower the roll lift until the lift is below the shaft in the roll. Move the roll forward, make sure that the shaft is situated just above the notches, while turning the crank to raise the roll lift. Turn the crank until the roll is lifted above the floor. Put the correction roll with the friction bars on top of the paper roll like on the figure below. Remove and throw away the first revolution of paper on the paper roll (to get rid of e.g. sand, dust and dirt after rolling the paper roll on the floor).

The paper line must go in between the friction bars and the correction roll. Ensure that the friction bars is resting on top of the roll.
Now the paper must go through the feeder rolls. If turned on, the motor will feed some paper, and the paper can be inserted into the Printer.
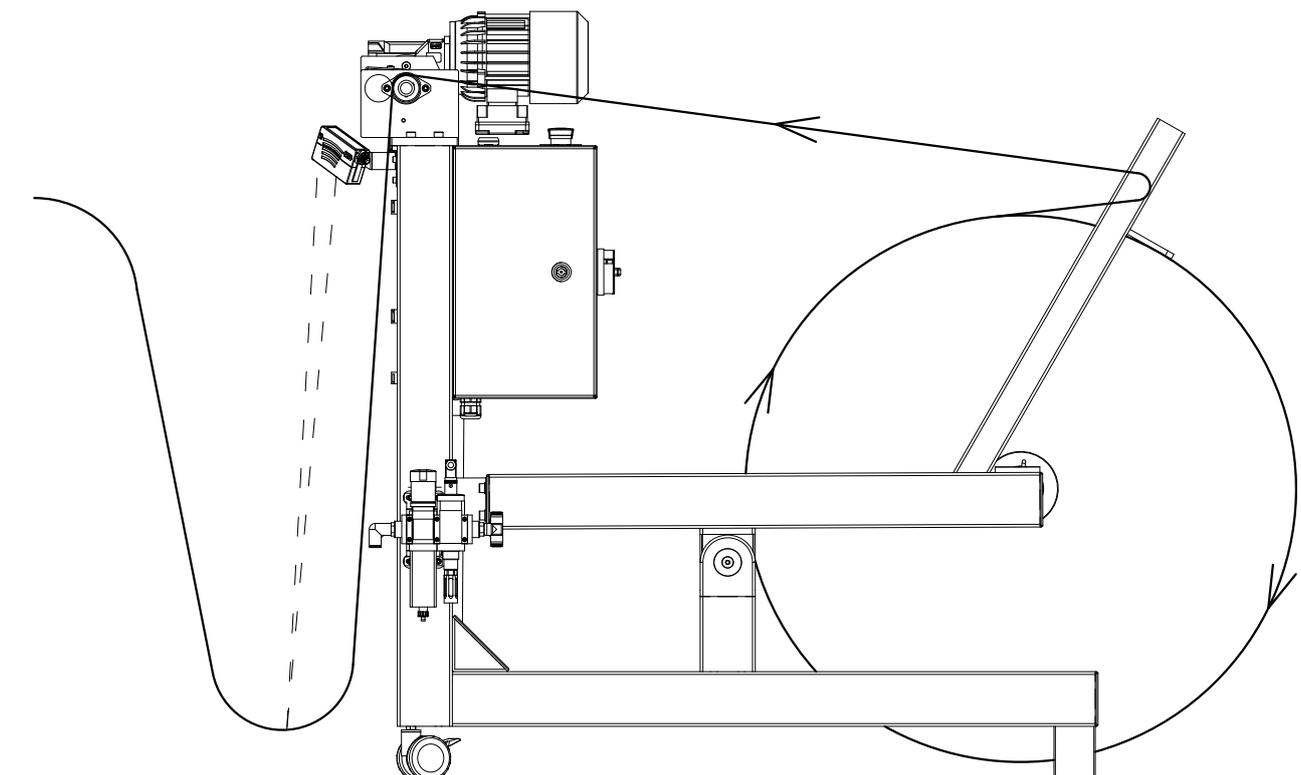
8.4   Service and maintenance

Troubleshooting Paper Roll Feeder

The Paper Roll Feeder may be considered as an independent unit, but the Paper Roll Feeder will also supply the Printer and the S&F unit with compressed air and power.

So if the Paper Roll Feeder is turned off, the two other machines will also be turned off. The same thing applies to the emergency switch, if any of the two is activated, everything will be turned off.

If the Paper Roll Feeder motor does not start, please check the following:

Is the green power lamp illuminated ?

If no;   Is the main switch turned on ?
         Is the Paper Roll Feeder connected to the mains ?
         Is one or both of the Emergency switches pressed down ?

If yes; Is the paper positioned near the floor, so it is actually in correct position ?
         Do also note that if the laser distance sensor is not finding anything between 20 cm and 80
         cm from the sensors front, the motor will not start. Try to hold a piece of paper in front of the
         sensor, approximately 30 - 40 cm away. Now the motor should start.

If the motor starts, but the paper is not moving, check the compressed air supply. The paper Roll Feeder requires compressed air to function.

Maintenance Paper Roll Feeder

The Paper Roll Feeder will not need much maintenance. The bearings are of a sealed type and will not need any lubrication.
The most important thing is to ensure that the rolls are clean and undamaged. Keep especially an eye on the rubber roll. The rolls may be cleaned with a cloth moistened with alcohol.

8.5   Measurements

All measurements in centimetres.

112 cm

77 cm

115 cm
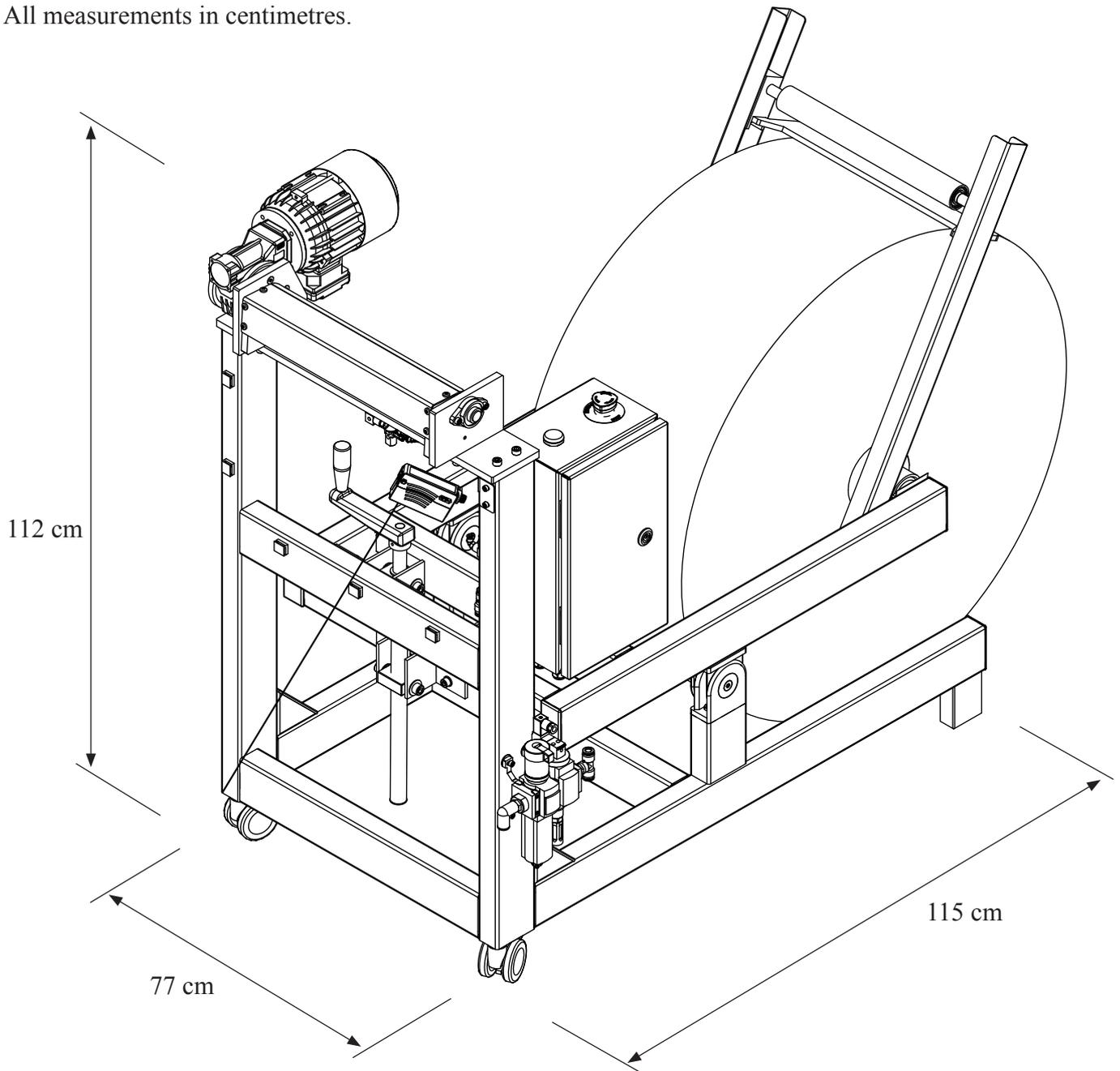
9.   GENERAL INFORMATION

9.1   Declaration of conformity

Manufacturer: **Braillo Norway as**
                       P.O. Box 93
                       N-7501 Stjørdal
                       Norway

The manufacturer hereby declares that the **Braille Production Printer B650** from **serial no: 801001** starting from production year 2012:

Is designed and produced in accordance with the in accordance with the requirement of the European Parliament and Council Directive 2006/42/EC of 29th December 2009, on the approximation of the laws of the Member States relating to machinery as implemented in Norway through Arbeidstilsynets Forskrift om Maskiner of 20th May 2009 No. 544 (implemented from 29th December 2009) and conforms to the essential health and safety requirements according to the New Machine Directive (2006/42/EC).

Is in compliance with the European Parliament and Council RoHS (Restriction of Hazardous Substances) Directive 2002/95/EC and do not contain any of the six banned substances: lead, mercury, cadmium, hexavalent chromium, poly-brominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE), in quantities exceeding maximum concentration values.

Is designed and produced in accordance with European Parliament and Council Directive 2006/95/EC of 12th December 2006 on the harmonization of the laws of the Member States relating to electrical equipment for use within certain voltage limits (The Low Voltage Directive).

Is designed for use in Office Environment and Light Industry and that it is designed and produced to comply with the European Parliament and Council EMC Directive 2004/108/EC on the approximation of the laws of the member States relating to Electromagnetic Compatibility.

Tested according to:
EN 55022 (2006) + A1 (2007) + A2 (2010)
EN 61000-3-2 (2006) + A1 (2009) + A2 (2009)
EN 61000-3-3 (2008)
EN 55024 (1998) + A1 (2001) + A2 (2003)

The CE marking is applied from year 2011.

Signed: Stjørdal, January 1st 2016 on behalf of Braillo Norway AS

Managing Director	Patrick N. Nunnelly	
Title	Name	Signature

9.2   Warranty

This product left the factory in a good working condition in accordance with the technical specifications and carries a warranty of 3 years on parts valid from the date of delivery from Braillo Norway A/S.

The warranty includes:

-    Replacement of defect part(s)
-    Shipping cost for the replaced part(s)

The warranty excludes:

-    On-site part replacement (labour, travelling and living expenses for a service engineer)
-    Shipping costs for sending the faulty unit back to Braillo Norway A/S (see below).
-    Altered product (except as authorized by Braillo Norway A/S) or product not installed or maintained in accordance with Braillo Norway's instructions.
-    Customs and duties
-    Incidents involving Force Major (for example flooding, earth quake etc. damaging the product).

Should a replacement part be required, please do the following:

Send us a "Warranty request form". Please refer to the next page to see the actual form. This form can also be found on the enclosed CD-ROM. After completing the form, please return it to Braillo Norway A/S by e-mail, fax or regular mail.
When form is received, the parts will be shipped as soon as possible.

What to do with the defective part(s):

If a communication has been made to our service department, and an approval has been given, it will not be necessary to return the part(s) to Braillo Norway A/S. In all other cases, the part(s) must be returned to Braillo Norway A/S as soon as possible. If the part(s) has/have not been received by Braillo Norway A/S within 2 months from the date of issuing the "Warranty request form", this is no longer regarded as a warranty matter and an invoice will be issued and sent.

Warranty request form
(Only one printer/part per document)

Customer name:		Date:

Contact person:

Phone number:	E-mail address:

Printer type:	Printer number:	Hours:

Part name:	Part number:

Reason for return:

Comments:

Return to: Braillo Norway A/S Wesselveg 100 7502 Stjørdal Norway	Phone number: +47 74 84 04 40 Fax number: +47 74 84 04 41 E-mail: service@braillo.com

If this document is not returned within two weeks of origination
We will assume that it is not required and it will be cancelled.

Internal use only:	
Garanti?	
Kunde belastes	
Kommentarer på reparasjon	

9.3   Addresses and phone numbers

Web: www.braillo.com

Administration/Sales department Braillo Norway AS:

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                 Norway
Phone: +47 33 00 28 70
Telefax: +47 33 00 28 71
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