INSTRUCTION MANUAL

BRAILLO
270S/400S

BRAILLO ● NORWAY
FOR BETTER BRAILLE – AND MORE

TABLE OF CONTENTS

1   TECHNICAL SPECIFICATIONS

Country: _____

Buyer: _____

EPROM Data: B274   -_____

               ASCIIT. -_____

LAYOUT:

     Sheet Length: 4 / 5 / 6 / 7 / 8 / 9 / 9.5 / 10 / 10.5 / 11 / 11.5 / **12** / 12.5 / 13 / 13.5 / 14
     Line Length: 27 / 28 / 29 / 30 / 31 / 32 / 33 / 34 / 35 / 36 / 37 / 38 / 39 / 40 / 41 / **42**
     Printing: **Normal** / Z-Fold
     Page 1:   **Up** / Down
     Printing Type: Single / **Double**
     Line Spacing: 0.1" / **Normal** / Double
     Dot: **6** / 8
     Page Length: No Form Feed / **Normal** / Normal-1 / Normal-2

RS 232 C:

     BaudRate: 150 / 300 / 600 / 1200 / 2400 / 4800 / **9600** / 19200
     Parity: **No** / Odd / Even
     Data Bit: **8** / 7
     Stop Bit: **1** / 2

Printing Speed: 270 / 400   characters per second
               Approx. 800 / 1200   printed pages per hour

Electrical: Single Phase   220V (+/- 10 %), 50Hz
Main Fuse: 6A
Power consumption during printing: Approx. 1000 W

Temperatures: 15 - 30° C (60 - 86° F)
Relative Humidity: 40 - 60 %

MEASUREMENTS:

     Height: 1250 mm
     Width: 700 mm
     Length: 1050 mm
     Weight: 210 kg

PATENT:

     Norway   no. 140335
     Great Britain   no. 2040231
     USA   no. 4261663
     Bundes.Deutschland   no. DE 2850780 C22

2   IMPORTANT

It is very important that the specified voltage and frequency values are observed.

Please read carefully chapter 3 and 4 of the manual before turning on the Printer!

3   INSTALLATION

3.1 Unpacking and Installation

Unpacking and installation is done by Supplier or by personnel instructed and authorized by him.

Any kind of lifting of the Printer must be done with utmost care.

Open the hatchway (C) by pulling it out. There are magnetic locks holding the door.

3.2 Removal of Cover

Turn off the Printer (Main Switch (G)).
Open the front and the back top cover parts (B).
Using a 13 mm wrench, loosen the nut under each corner of the top plate (A).
Lift the assembly carefully upwards, and place it aside.

Lift the middel plate (D) on both sides upwards, and pull out. Place aside.

Carefully disconnect the Earth connections (yellow/green cable).
Note how they are connected so that they may be correctly reinserted.

Slide the two side covers (E) out from the Printer. Place aside.
The Printer is now open.

The cables from the Operating Panel (F) and the Main Switch (G) should not be disconnected.
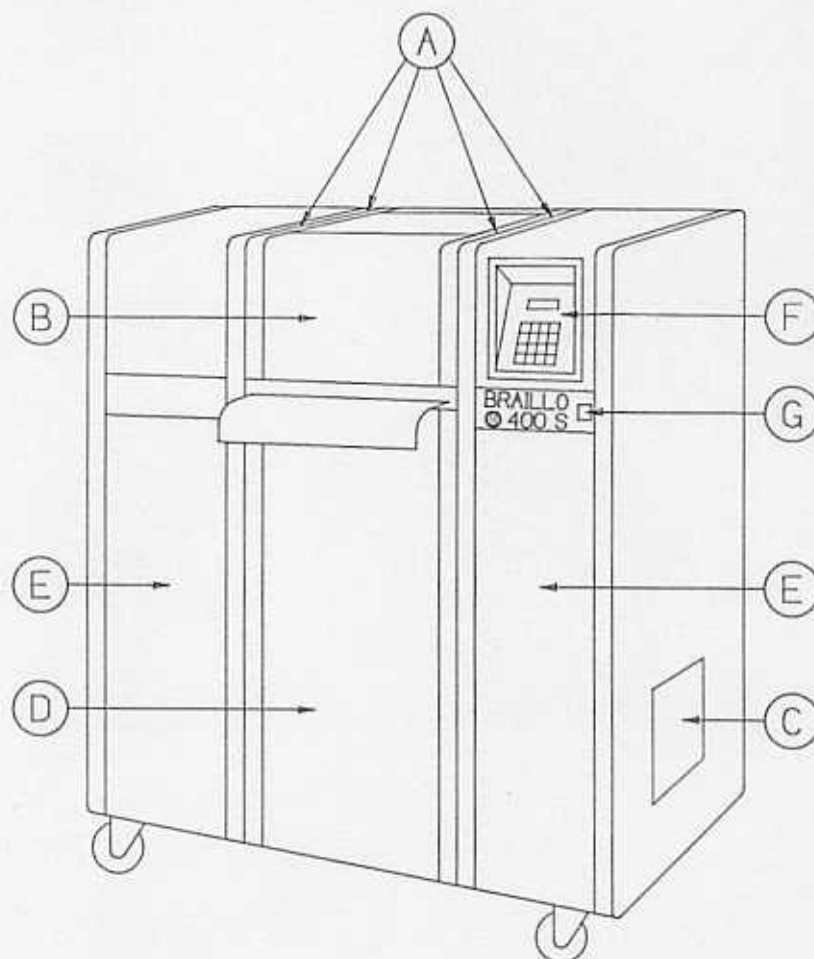
3.3 Requirements of Installation Site

Space:
The space requirements of the Printer is approx. 1.25 m x 1.50 m (4 x 5 feet).

Distance to the COMPUTER:
The Printer may be placed up to 25 meters (cable distance) from the COMPUTER without special transmission precautions.

Environment:
The BRAILLO Printers are made to operate continuously and reliably for many years. However, sensitive electronic and moving mechanical parts require suitable installation environment to ensure long and problem free operation.

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

The Printer requires normal office environmental conditions: temperatures between 15 - 30° C (60 - 86° F), and relative humidity between 40 and 60 %.

Maintain a clean environment because dust may cause clogging - 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 or a damp cloth. (About every 50,000 Sheets.)

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

3.4 Interfacing to Input System

Data transmission from the COMPUTER to the BRAILLE-Printer goes through a RS 232 C Interface. (See figure below and on next page.)

After starting the program, the receiver is turned on (during initialization), and reception is done with interrupt control.
When the reception buffer reaches the first upper limit the receiver is turned off.
The buffer will be emptied and when the lower limit is reached, the receiver is again turned on for reception of more text.

If characters are transmitted after the first upper limit is reached, forty characters may still be received before the absolute upper limit is reached and the interrupt control is turned off. Characters transmitted after this point, will be lost. The error must be corrected, and the Printer must be re-started.

The Transmission Speed, Parity, Data Bits and Number of Stop Bits may be selected by the user.

COMPUTER

BRAILLE - PRINTER

RS 232 C

	COMPUTER				PRINTER	
Receive DATA	Rx	◁	2	Tx	Transmit DATA
Transmit DATA	Tx	▷	3	Rx	Receive DATA
Signal from PRINTER		◁	4	RTS	Request To Send
Signal to PRINTER	12V	▷	8	DCD	Data Carrier Detect
Signal from PRINTER	12V	◁	20	DTR	Data Terminal Ready
	GND		7	GND	

TIME DIAGRAM

Forty characters may be received after **RTS** has been switched off, and **XOFF** is transmitted.

Rx

RTS

DCD

Tx   XON   XOFF   XON

COMPUTER

BRAILLE - PRINTER

Receive DATA (XON/XOFF) — Rx

Transfer of DATA

Transmit DATA — Tx

SIGNAL from PRINTER
Telling that it cannot
Receive more DATA
for the moment

SIGNAL to PRINTER
Telling that Computer
is turned on — 12V

SIGNAL from PRINTER
Telling that Printer
is turned on — 12V

GND

Tx — Transmit DATA (XON/XOFF)

Rx — Receive DATA

RTS — Req. To Send

DCD — Data Car. Det.

DTR — Data Terminal Ready

GND

SHEET N   SHEET N+1
Page A Page B Page C Page D

Receiving BUFFER

1   2   3   4   — Text BUFFERS

CPU

BUFFERS

BEAMS

System CONNECTOR
25 PIN CANNON

CABLE
5 Pairs, Twisted

Note:
Signal DCD, to PRINTER
Signal DTR, from PRINTER
May also be connected as shown below.
But, then, one cannot check from any SIDE
(Input Source or Printer)
whether the Equipment is turned on.

PRINTER
Tx
Rx
RTS
DCD
DTR
GND

When all Text BUFFERS (4 in all) are full
and/or Receiving BUFFER is full,
the RTS goes Low (-12V), and XOFF is Transmitted.
This is the signal to the COMPUTER to stop DATA Transmission.
After the RTS is turned OFF (is Low), (XOFF is Transmitted)
FORTY more Characters may still be Received.
Further Characters will be lost.
When some of the BUFFERS are Free, and more DATA can be Received,
the RTS goes high (+12V), and the XON is Transmitted.
This is a signal to the COMPUTER to start DATA Transmission.

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3.5 Electric Unit

A: Auto Fuse
  Beam A
B: Auto Fuse
  Beam B
C: Auto Fuse
  Beam C
D: Auto Fuse
  Beam D
E: Connecting Plug
  Main Switch
F: Main Switch
G: Connecting Plug
  Operating Panel

H: Connecting Plug
  Fan
I: Connection Plug
  Motor
J: Hour Counter
K: Main Fuse
L: Connecting Plug
  Power
M: Reset Switch
  Motor Fuse
N: Connecting Plug
  Control ext. alarm
O: Mother Board

P: Connecting Plug
  Control BRAILLO Cut
Q: Connecting Plug
  Operating Panel
R: Connecting Plug
  RS 232
S: Auto Fuse
  Stepping Motor
T: LED   24V
U: LED   5V
V: LED +12V
W: LED -12V
Z: Fuse Relays (1AT)

910312
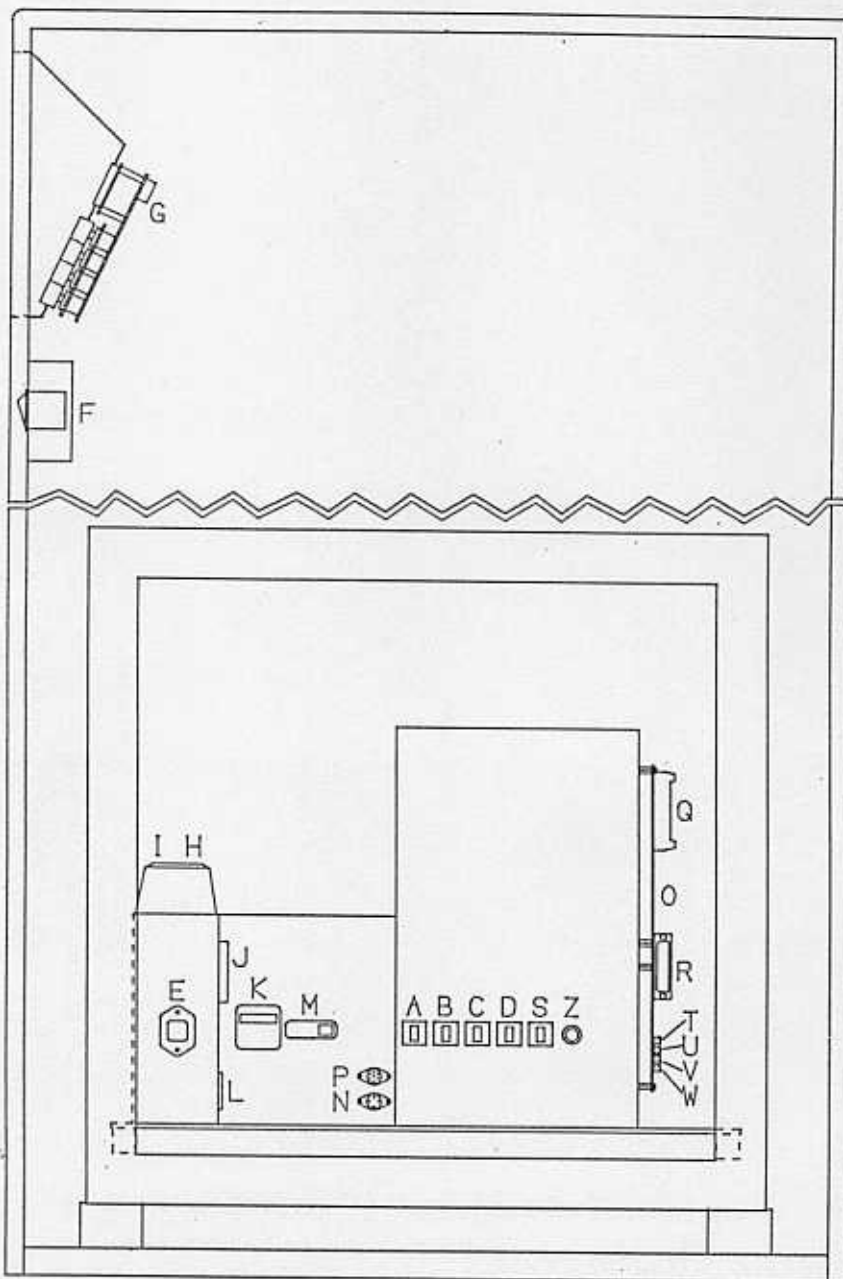
3.6 Cable Connection, Board and Fuses

OPERATING panel

STEP Motor

Paper Feed Sensors

MAIN Motor

Main Sensor

MAGNET rack

MAGNET rack

MAGNET rack

MAGNET rack

Paper out Sensor

24V

24V

24V

24V

B

A

D

C

Motherboard

RS 232 C

◎ 24V
◎ 5V
◎ +12V
◎ -12V

Power/Relay Unit

Fan

Main Switch

220V AC

24V MAGNET Power

A B C D

Power 5V +-12V

Power 24V

HOUR counter

Filter

OPTO coupler

Open Collector Emitter

OPTO coupler

Relay Max 24V/1A

Alarm Max 24V/1A

MAIN motor

PAPER CUT machine

5V

220 OHM

Main Fuse (resetable)

Fuse Main motor (resetable)

* Resetable

910312

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4   OPERATING THE PRINTER

4.1 Operating Panel
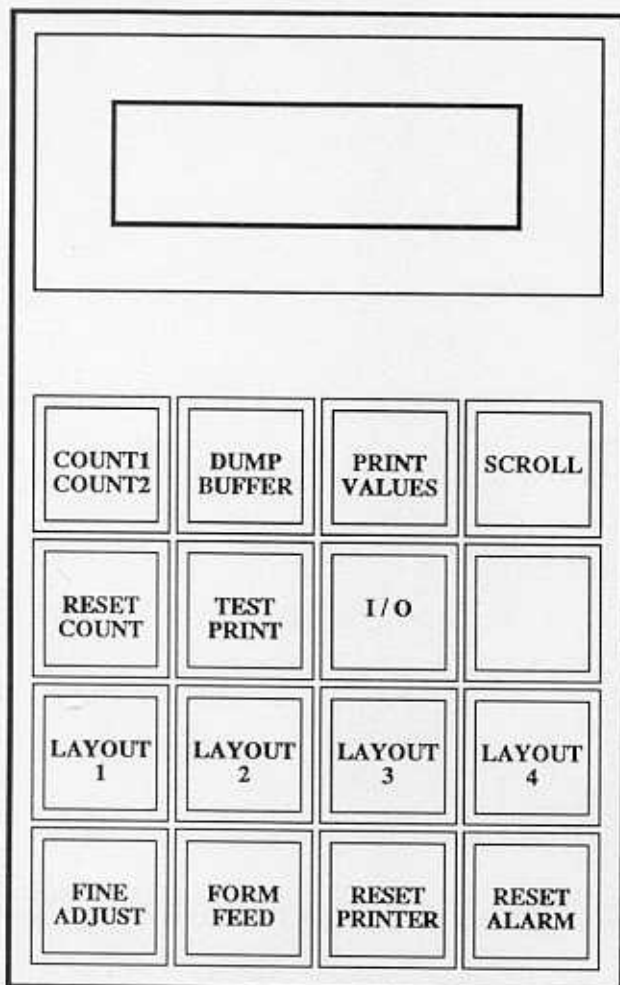
The Operation Panel contains three different groups:

Display, Keyboard and Audio Alarm.

The Printer is operated by the switches on the Keyboard, and different Functions may be selected.

The Audio Alarm gives a signal to the Operator if anything is wrong, and the Display shows what has happened.

The Counter on the righ-hand side on the Display is showing the total amount of Sheets. This cannot be reset.

COUNT1 COUNT2	DUMP BUFFER	PRINT VALUES	SCROLL
RESET COUNT	TEST PRINT	I / O	
LAYOUT 1	LAYOUT 2	LAYOUT 3	LAYOUT 4
FINE ADJUST	FORM FEED	RESET PRINTER	RESET ALARM

4.1.1 Description of Functions

COUNT1 / COUNT2
Selects between SHEET Counter 1 or 2.
(Shown on the left-hand side of the Display.)

DUMP BUFFER
During normal printing, a volume of text of less than two pages will not be printed out. The Printer is then waiting for more text. See point 4.4, Control Codes.
By pushing DUMP BUFFER, it will be printed out.

PRINT VALUES
Printing the Current Values of the LAYOUT and I/O.

SCROLL
Scrolls the menu selected by:
I/O, LAYOUT 1, LAYOUT 2, LAYOUT 3 or LAYOUT 4.

RESET COUNT
Resets the SHEET Counter, selected by COUNT1 or COUNT2.

TEST PRINT

This switch has two functions:
TEST Print and READY.

TEST Print:

1st. push down: Prints on both pages of the sheet.
                 Making X - pattern.
2nd. push down: Prints on both pages.
                 Full and empty lines together with the ASCII Table.
3rd. push down: Prints single sided.
                 Full and empty lines together with the ASCII Table.
4th. push down: As 1st. push down etc.

READY:

When the Printer runs out of paper, the Message PAPER OUT is shown on the Display.
Insert the new paper, and push TEST PRINT in and out again to continue printing.
Do Not use RESET PRINTER.

I / O

Select Current Values for the RS 232 Port.
Note: Use the SCROLL switch to choose the Current Values.

LAYOUT 1

Select SHEET Length and LINE Length.
Note: Use the SCROLL switch to choose the Current Values.

LAYOUT 2

Select Normal or Z-Fold printing.
Select Page 1, Up / Down.
Note: Use the SCROLL switch to choose the Current Values.

LAYOUT 3

Select Printing Type; Single / Double.
Select Line Spacing; 0.1" / Normal / Double.
Select 6 Dot / 8 Dot.
Note: Use the SCROLL switch to choose the Current Values.

LAYOUT 4

Select Page Length; No Form Feed / Normal / Normal -1 / Normal -2.
Note: Use the SCROLL switch to choose the Current Values.

FINE ADJUST

Switch for positioning of the Paper Feed Mechanism.
FINE ADJUST and RESET PRINTER must be used to give information about the
Tractor position to the Program System.
This must be done after switching on the Printer, or if errors occurs on the Paper Feed.
After the positioning, one push on the switch moves the paper a distance equal the
distance between the sprocket holes.

FORM FEED

Shifts to the next sheet.

RESET PRINTER

Resets the CPU Unit and Program / Buffer.
Must always be used if errors occur (ERROR on the Display).

RESET ALARM

On messages, the Audio Alarm can be reset (e.g. PAPER OUT).
On errors (ERROR on the Display), however, the RESET PRINTER switch must be
used.

4.1.2 Menu Switches

With help of the Menu Switches (I/O, LAYOUT 1, LAYOUT 2, LAYOUT 3 and LAYOUT 4) the Current Values can be changed.

The first push on one of the Menu Switches shows the Current Values.
If these settings are correct, wait for the TIME-OUT, or depress the RESET PRINTER switch.

If you want to change these values, push the switch several times, until the wanted function is shown in the Display, then hold it down.
With help of the SCROLL switch, the complete menu can be scrolled on the Display.
When the correct values is shown, then release the switch.
Wait for the TIME-OUT, or depress the RESET PRINTER switch.

The Current Values are saved in the Battery-Backup memory, and they will remain even if you turn the power off.

4.1.3 Current Values and Options

Note: Outlined Text is the default settings.

I / O

Serial RS 232 C	
9600 NP 8Db 1Sb	
Baud Rate = 150	
300	
600	
1200	
2400	
4800	
9600	
19200	
Parity = **No**	
Odd	
Even	
DATA Bit = **8**	
7	
Stop Bit = **1**	
2	

LAYOUT 1

Sheet LineLength
12   42

SheetLength = 4	Line Length = 27
5	28
6	29
7	30
8	31
9	32
9.5	33
10	34
10.5	35
11	36
11.5	37
12	38
12.5	39
13	40
13.5	41
14	**42**

LAYOUT 2

LayOut   Page 1
Normal   Up

LayOut   = **Normal**
            Z - Fold

Page 1   = **Up**
            Down

LAYOUT 3

Print   LineS Dot
Double Normal   6

Print   = Single
              Double

LineSpac= 0.1"
              Normal
              Double

Dot   = **6**
              = 8

LAYOUT 4

PageLength
Normal

PageL= NoFormFeed
              Normal
              Normal - 1
              Normal - 2

4.1.4   Messages / Error Messages

The Text on the Display can be divided into two groups;
Messages and Error Messages.
     On Messages, the Printer can be operated to a certain level.
     On Error Messages, the Printer can not be operated, and RESET PRINTER must be used.
In addition to the Text on the Display, an Audio Alarm will be heard.

4.1.4.1   Messages

1 - BUFFER empty.
When DUMP BUFFER is used, and the Printer BUFFER is empty, the message
BUFFER empty is shown on the Display.

4.1.4.2   Messages together with Audio Alarm

1 - PAPER out.
When the Printer runs out of paper, the Audio Alarm is triggered, and the Printer stops
after page shift.
To continue printing see, TEST PRINT READY, in section Operating Panel.

2 - BUFFER overflow.
When the Printer is full of text, it sends a message (RTS - XON/XOFF) back to the
COMPUTER that it has to stop transmitting text. If the COMPUTER does not stop the
transmission, the Printer BUFFER will overflow. The Message BUFFER overflow is
shown on the Display and the Audio Alarm is triggered.
If you would like to have a look at the text, use DUMP BUFFER switch.
Note: Some irregularities in the transmission parameters (RS 232) might also cause this
Message.

4.1.4.3   Error Messages together with Audio Alarm

On Error Messages, the Printer can not be operated, and RESET PRINTER must be used.

4.1.4.3.1 Error Input

1 - OVERRUN / FRAMING
Error in at least one of the following Transmission Parameters: Baud-Rate, No. of Data Bits and No. of Stop Bits.

2 - PARITY
Parity is the only error.

4.1.4.3.2 Other Errors

1 - FLYTT-Routine.
2 - INTER-Routine.   (All of these Error-Messages
3 - INTER-NML   are for service-personnel only).
4 - INTER-Res/SWL.

5 - Start MOTOR.
If the Main motor does not start, this Error Message is shown on the Display.
The reason might be:
  1:   The Motor Plug is not connected.
       Connect the plug.
  2:   The Motor Fuse may have been released.
       Reset Motor Fuse. See figure in section Electric Unit.
  3:   System error.

6 - Stop MOTOR
The Main Motor does not stop.
The reason might be:
  1:   The Motor Relay contacts has burned.
       The Relay must be exchanged by service personnel.
  2:   System error.

7 - PAPER-FEED
Disagreement between the Tractor Mechanism (paper) and Program System.
The reason might be:
  1:   When starting up the Printer, the Tractor Mechanism has not been trimmed
       by the FINE ADJUST switch.
  2:   The paper is stuck, and the Step-Motor has slipped. Use RESET PRINTER
       and FINE ADJUST.
  3:   System error.

4.2 Inserting Paper

Inserting the paper into the Printer should be done as follows:

1. Turn the Main switch to ON position. (Red lamp of POWER ON/OFF lights up.)

2. Place a box of paper on the floor on the right side of the Printer.

3. Insert the paper into the slot between the Printing Mechanism. Go to the opposite side of the Printer. Lock the paper into the Tractor-Feed. Using the FINE ADJUST, adjust the paper with respect to the Starting Mark (notch). (See figure below.)
    Note: The FINE ADJUST must be used to synchronize the Tractor-Feed to the Program System.

4. Push switch for RESET PRINTER.

5. Push switch for RESET COUNTER, if desired.

6. The Printer is now ready to start printing.

Note: If the Printer has run out of paper, perform point 2 and 3, without Reset the Printer. Push the TEST PRINT switch in and out to start printing text that is remaining in the Printer Buffers, and continue printing.

Starting Mark
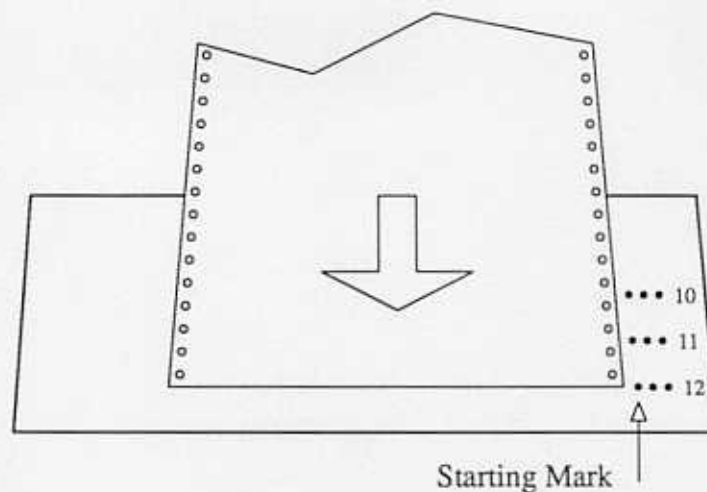
4.3 Test Print

The Braille Printer has both single sided, and double sided (interpoint) Test Printing. (See also TEST PRINT in section Operating Panel.)
The Test Print pattern consists of a X-pattern, some full cell lines, empty cell lines and the complete ASCII Table.

The Test Print program is made as a tool to control that the Printing Mechanism does function properly.

It is a good routine to print out a few pages of TEST PRINT before the day's production is starting.

The chapter 4.7 illustrates the principal design of the Printing Mechanisms. This illustration combined with the printing page sequences, enable locating the faulty Printing Mechanism. (One or more of 168.)

Instruction for Trouble Shooting will be illustrated by the example in section Trouble Shooting.

4.4 Control Codes

The Printer recognizes the following Control Codes.

4.4.1 CR: New Line (fills the rest of the Line with space).

4.4.2 LF: New Line (fills the rest of the Line with space).

If both CR and LF, in any order, follows each other immediately, only one New Line command is executed by the Printer.

4.4.3 FF: New Page (fills the rest of the Page with space).

(After 2 x FF the paper is fed one Sheet forward).

If CR, LF or FF is missing in the text, the Lines and Pages will be completely filled with text. There is no internal text formatting.

If text corresponding to less than two Pages is received, and not followed by FF on the last Page, the program will wait for more text or FF. This is due to the Double Sided printing of the Printer.

To have one Sheet (two Pages) printed or stepped out, one of the following sequences must be executed:

DOUBLE SIDED PRINTING:

a)   Two Pages full of text.

b)   More than One Page of text and one FF.

c)   Less than One Page of text and two FF.

d)   Two FF - Commands.

SINGLE SIDED PRINTING:

a)   One Pages full of text.

b)   Less than One Page of text and one FF.

**Note: When using more than one FF, use space between them.
FF FF FF etc.**

4.5 Escape - Sequences

The Printer currently recognizes those commands via ESC - Sequences.

ESC 6	**6 Dot**
ESC 8	8 Dot

ESC 0	LINE-spacing 0.1"
ESC A	**Normal LINE-Spacing (0.2")**
ESC B	Double LINE-Spacing (0.4")

ESC C	PAGE-Length, NORMAL -2
ESC D	PAGE-Length, NORMAL -1
ESC E	**PAGE-Length, NORMAL**
ESC F	No Form Feed (continuous printing)

ESC RS (n)	SHEET-Length (4 - 14 inches)
ESC US (n)	LINE -Length (27 - 42 char.)
ESC VT 0	Software Reset
ESC VT 1	Software Form-Feed

The Escape-Sequences are divided into groups. Within the groups 6-8, 0-A-B and C-D-E-F, only one sequence can be activated at the time.
For instance you must choose between ESC 6 or ESC 8.

SHEET-Length [inches] = SHEET-Length [holes] divided by 2.

ESC-Sequences (except Software Form-Feed) must only be performed while the machine is not printing.

When the Printer receives an Escape Control Code, it removes the Control Code and one or two of the succeeding characters.
It normally removes one character, but if the character following the ESC-character belongs to the set; HT, VT, RS and US (i.e. character numbers #009, #011, #030 and #031), two characters and the ESC-character are removed.

ESC [#27] RS [#30] n[$0 - F]   **ESC [#27] US [#31] n[$0 - F]**

SHEET Length [Inch]	n [Hex]	ASCII [Decimal]	LINE Length [Decimal]	n [Hex]	ASCII [Decimal]
4	0	48	27	0	48
5	1	49	28	1	49
6	2	50	29	2	50
7	3	51	30	3	51
8	4	52	31	4	52
9	5	53	32	5	53
9.5	6	54	33	6	54
10	7	55	34	7	55
10.5	8	56	35	8	56
11	9	57	36	9	57
12.5	A	65	37	A	65
12	B	66	38	B	66
12.5	C	67	39	C	67
13	D	68	40	D	68
13.5	E	69	41	E	69
14	F	70	42	F	70

4.5.1 Software Reset

This command is used to Reset the Printer without pushing the RESET PRINTER switch. This command can be used from the COMPUTER and has the same effect as pushing the RESET PRINTER switch.

This command should be used with care: If the Printer has not finished printing, the rest of the text in the buffers 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.

4.5.2 Software Form-Feed

This command is to be used after all text in one job/printout has been transmitted to the Printer. (The Printer may still be printing.) When this command is recognized by the Printer, the Printer fills the remaining line, page and buffers with space and starts printing out the rest of the text. After this the Printer will always start on the paper position it had when it started (After the last RESET) and starts filling the buffer for page 1 on the next volume. There will always be at least one blank sheet of paper between the printout jobs when finishing each job with a Software Form-Feed.

4.6 Lines per Page, example

SHEET Length	Normal LINE Spacing		Double LINE Spacing	
[inch]	6 Dot	8 Dot	6 Dot	8 Dot
4	9	7	6	5
5	11	9	7	6
6	14	11	9	8
7	16	13	11	9
8	19	15	12	11
9	21	17	14	12
9.5	23	18	15	13
10	24	19	16	13
10.5	25	20	17	14
11	26	21	17	15
11.5	28	22	18	16
12	29	23	19	16
12.5	30	24	20	17
13	31	25	21	18
13.5	33	26	22	18
14	34	27	22	19

4.7 Printing Mechanisms

The Printing Mechanisms are numbered from the end where the cable is connected (magnet number).

Printing-
mechanisms

Paper in
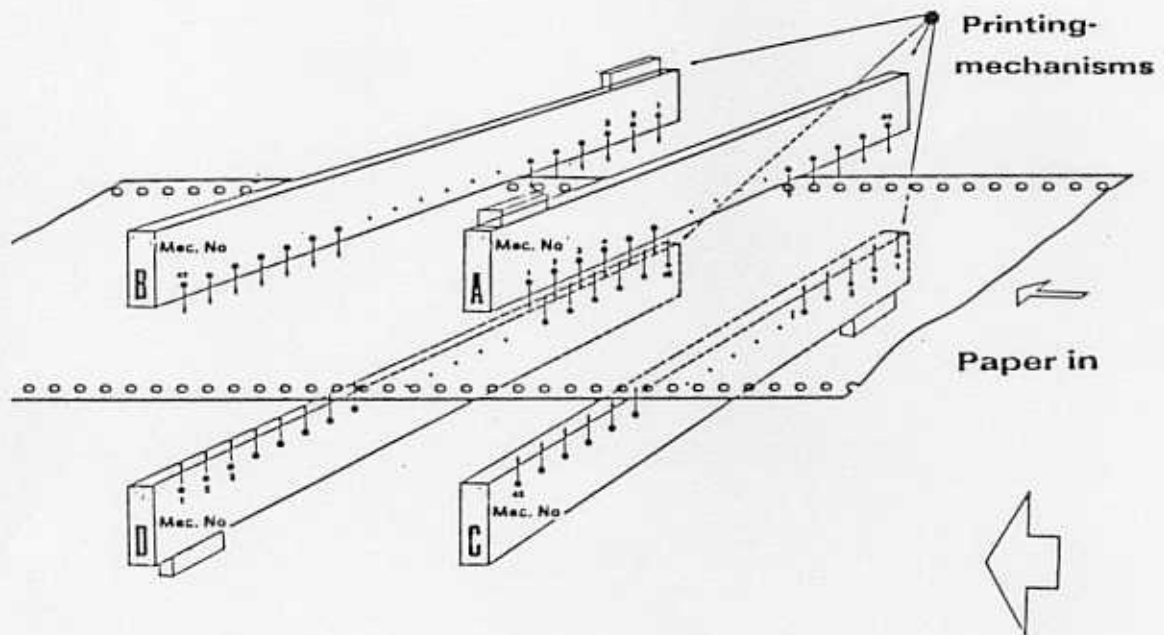
4.8 Table of Page Sequences

PAGE LAYOUT:

Note: The table is made for 1st. Page Up.

Z-FOLD

Page: 1-5-9-13-17-21-25-29-33-37-41-45-49-53-   DOT 1 - 2 - 3 - 7 Magnet Rack C
57-61-65-69-73-77-81-85-89-93-97-101-   DOT 4 - 5 - 6 - 8 Magnet Rack D

Page: 4-8-12-16-20-24-28-32-36-40-44-48-52-56- DOT 1 - 2 - 3 - 7 Magnet Rack D
60-64-68-72-76-80-84-88-92-96-100-104-   DOT 4 - 5 - 6 - 8 Magnet Rack C

1	4	5	8	9	12
2	3	6	7	10	11
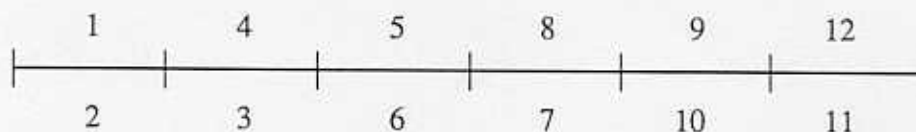
Page: 2-6-10-14-18-22-26-30-34-38-42-46-50-   DOT 1 - 2 - 3 - 7 Magnet Rack A
54-58-62-66-70-74-78-82-86-90-94-98-102- DOT 4 - 5 - 6 - 8 Magnet Rack B

Page: 3-7-11-15-19-23-27-31-35-39-43-47-51-55- DOT 1 - 2 - 3 - 7 Magnet Rack B
59-63-67-71-75-79-83-87-91-95-99-103-   DOT 4 - 5 - 6 - 8 Magnet Rack A

NORMAL

Page: 2-4-6-8-10-12-14-16-18-20-22-24-26-28-30- DOT 1 - 2 - 3 - 7 Magnet Rack A
32-34-36-38-40-42-44-46-48-50-52-54-56-   DOT 4 - 5 - 6 - 8 Magnet Rack B
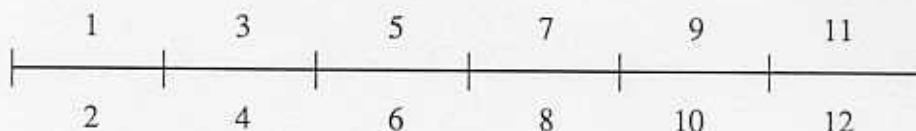
1	3	5	7	9	11
2	4	6	8	10	12

Page: 1-3-5-7-9-11-13-15-17-19-21-23-25-27-29- DOT 1 - 2 - 3 - 7 Magnet Rack C
31-33-35-37-39-41-43-45-47-49-51-53-55-   DOT 4 - 5 - 6 - 8 Magnet Rack D

4.9 Trouble Shooting

Through proof reading, errors has been found in some of the characters in the 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 Braillo Printer.

Inside the Printer there is four identical Magnet Racks, named from A to D, which each contents 42 Printing Mechanisms. Totally there are 168 different Printing Mechanisms to choose among when the error search is to begin.

As a start, you should run the built-in Test Print. Depending on what kind of errors that you have, you should use different tests.
The essential thing in this stage is to find out which Magnet Rack that is causing the trouble.

If there are missing dot(s), use the Cross-Pattern to detect the Magnet Rack(s), that is missing the dot(s).

If there are to many dots, use the Full Cell Lines, and the extra dots will appear in the space between the lines.

However, the absolutely best test is ordinary text. To find out which Magnet Rack did print which dot in text, use the Table of Page Sequences.

Note: The Table is made for 1st. Page Up.

Example how to use the table

1 - Find the page with the error. (Use the pagination of the printed page.) In this example the error is assumed to be on page 10. Find the Braille dot with the error. (The Braille cell contains 2 columns of each 4 dots. Here, it is assumed that the error is found with dot 1, 2, 3 or 7.

2 - The Table of Page Sequences shows that page 10 is printed from the top and downwards. From the same table is found that Braille dot 1 (as well as dot 2, 3 and 7) in the Braille cell is printed by a mechanism in Magnet Rack A.

Braille cell

```
1  * *  4
2  * *  5
3  * *  6
7  * *  8
```

Possible reasons for errors

See figures on page 27.

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

    1 - Defect magnet (7).
    2 - Broken pivot arm (9).
    3 - The printing pin is difficult to move (dirt), causing the pivot arm (9) to miss the pin.
    4 - Errors on the Magnet Driver Board.

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

    1 - The list (5) is pushing too hard on the pivot arm (3).
    2 - Distance (11) is too large.
    3 - The list (1) has become sticky on the side against the pivot arms (3), and makes them difficult to move properly.

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

    1 - The list (5) is not pressing enough on the pivot arm (3).
    2 - Distance (11) is too small.
    3 - The magnet poles has become sticky, and this make the pivot arms (3) difficult to move.

Control
To ensure yourself that you have found the right mechanism after a search, you can do a control like this:

Push the suspected Pivot arm against the magnet with your finger. (Like the lowest figure on page 28.)
At the same time, run a Test Print, and the mechanism with the finger on, will make a column of dots downward the paper, until you take the finger away.
And by doing this you can see if this column of dots is situated on the same place on the sheet as the error was.
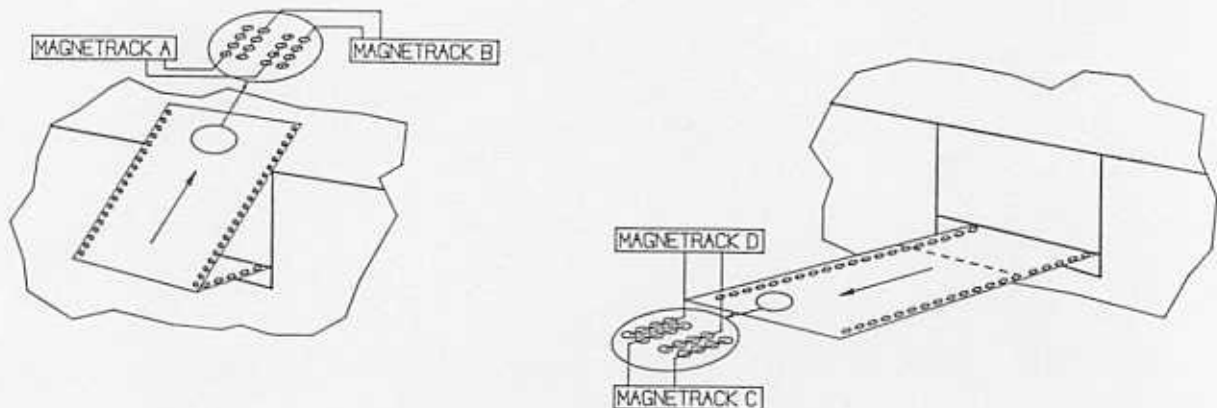
5   SERVICE AND MAINTENANCE

5.1 Magnet Rack - Removal and Refitting

To remove the Magnet Rack, unscrew two pairs of screws (13), lift out the assembly.

Refitting is the reverse of removal, but observe:

The Printer is adjusted for optimal point quality when delivered. Our service personnel will adjust the Printer when they are on site. If, however, the Printer should need adjustment and no BRAILLO NORWAY service personnel is available, it should be done like this:

Turn the belt, so the marking at the end of the shafts, is pointing in the opposite direction of each other (see figure below), and lock the Printer, e.g. with a locking wrench in this position.

The already adjusted Magnet Rack assembly, is fastened on the Printer. The distance (10) should be 1.0 mm.
But if the Braille dots are too weak, you may adjust the Magnet Rack tighter in small increments (increase the distance (10)). Adjustment of the Magnet Rack is done by loosen the screws (12), and screwing the two nuts on the outside of pillar (14) up or down.
Test the Printer for each step of 1/4 rev. of the nuts, this will move the Magnet Rack 0.3 mm.

NOTE: Do not adjust to tight, the pivot arms may be overstrained and break.

The assembly may be moved sideways using two eccentric adjusters. This is done at the factory, and should never be changed.

The distance (11) should be 0.2 mm, and may be adjusted using screw (16).
Make sure that the distance (11) is the same at both ends of the Magnet Rack.

5.2 Magnet Rack - Disassembly, Assembly and Adjusting

See figures on page 27.

Remove the Magnet Rack as described on page 25.

This is what to do if a magnet (7) is to be replaced, or a complete cleaning is to be done.

Remove the angled list (1). Remove the list (5), and remove screws hidden under the list (5).
To replace a magnet, remove the locking list (6), and pull out the magnet (7) with a narrow pair of pliers.
A magnet can be measured with a multimeter, and the internal resistance should be between 185 and 220 ohm, if the magnet is o.k.
When inserting a new magnet, be sure that the contacts on the new magnet is placed in the correct position.

The assembly is done in reverse order.

Observe the following:

When mounting the support list (8) with the pivot arms, adjust so that the pivot arms are placed directly opposite the magnet poles, and that the pivot arms (3) touches both the upper and the lower pole of the magnets (7) (when the magnet is engaged).
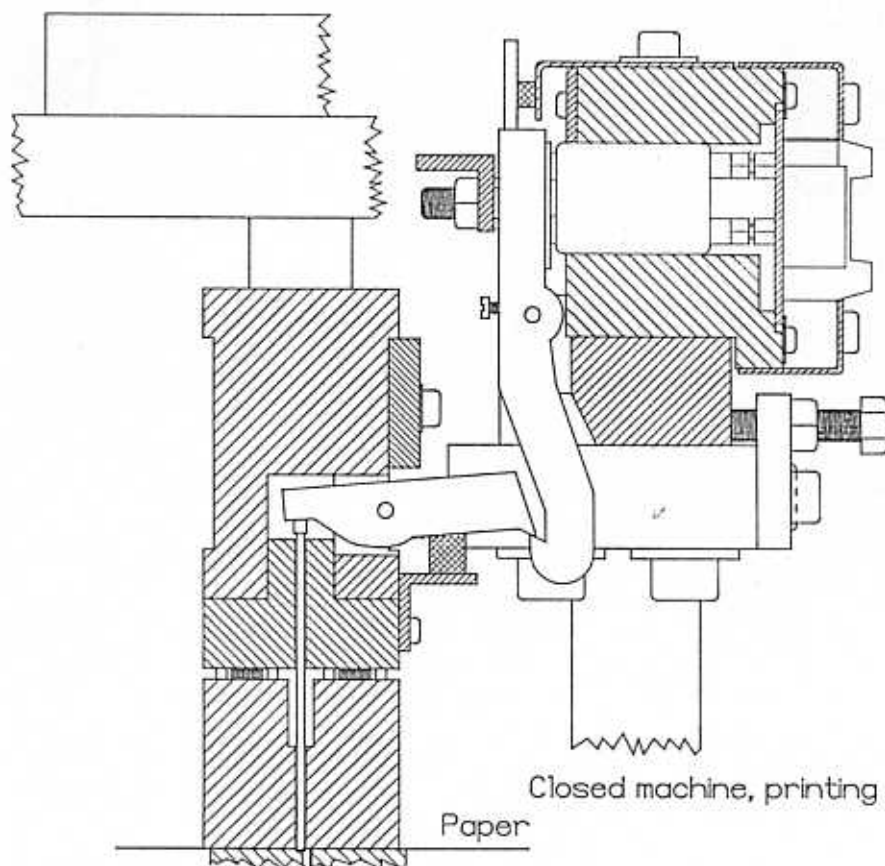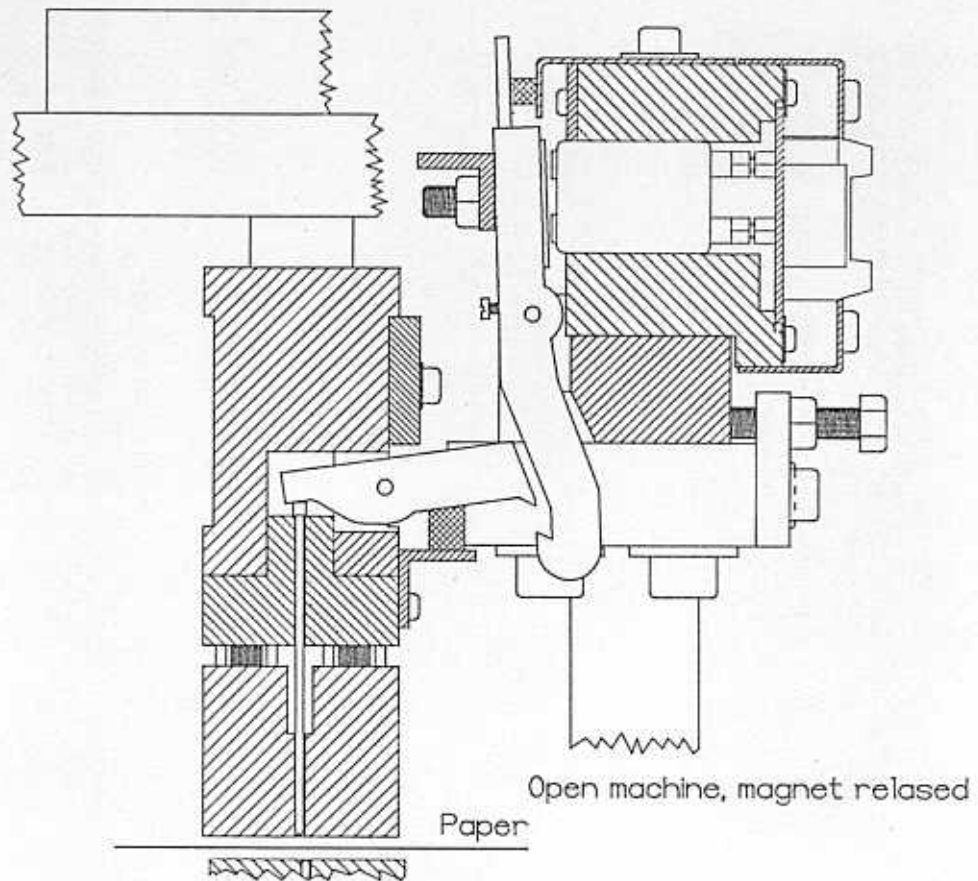
The angled list (1) is adjusted and fastened so that the distance between the list and the pivot arms (3) is 0.8 mm.

The list (5) is adjusted and fastened so that the sponges (4) barely touches the top of the pivot arms (3) when the magnets are released.

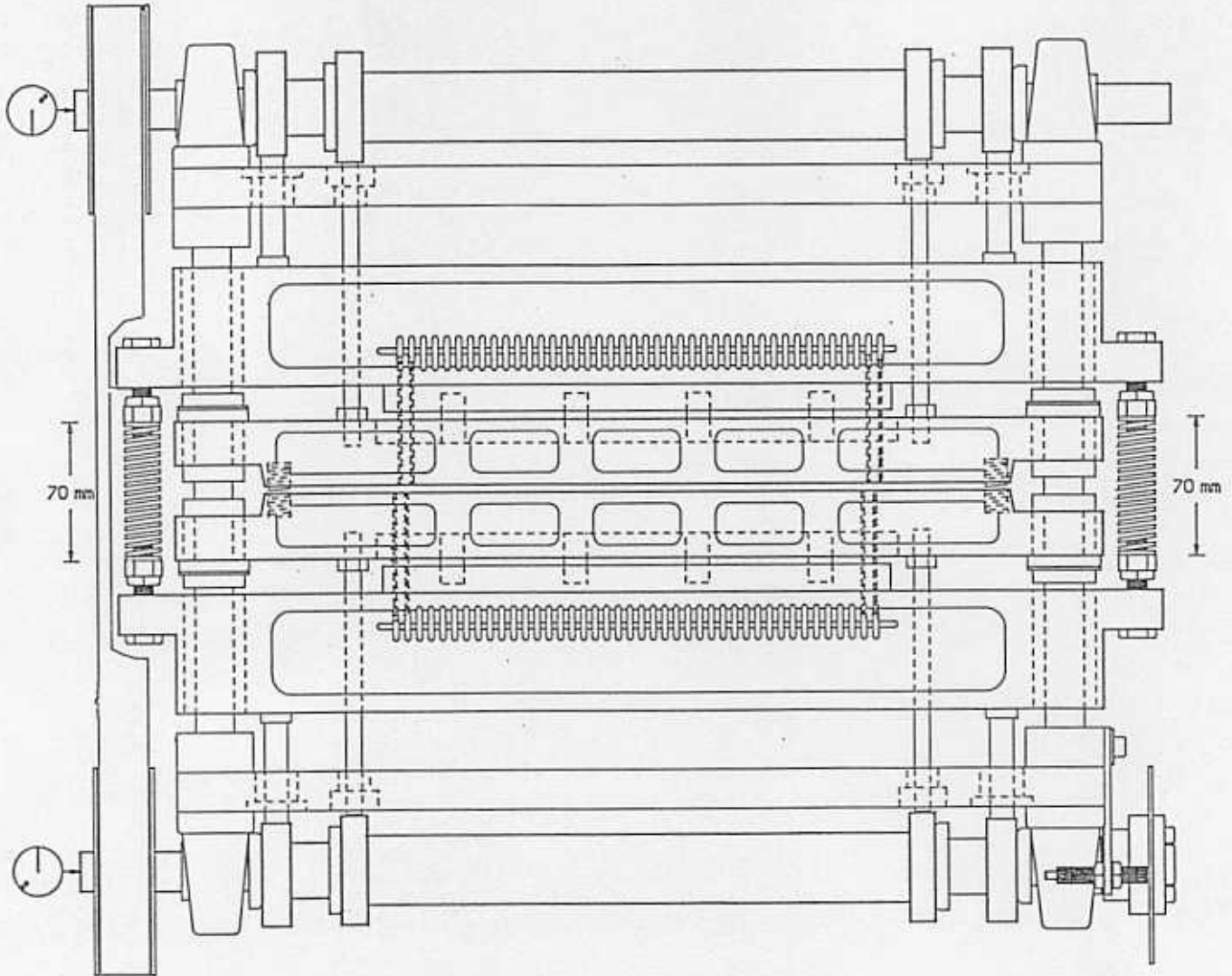## 5.2 Magnet Rack - Disassembly, Assembly and Adjusting

Open machine, magnet engaged

Closed machine, magnet relased
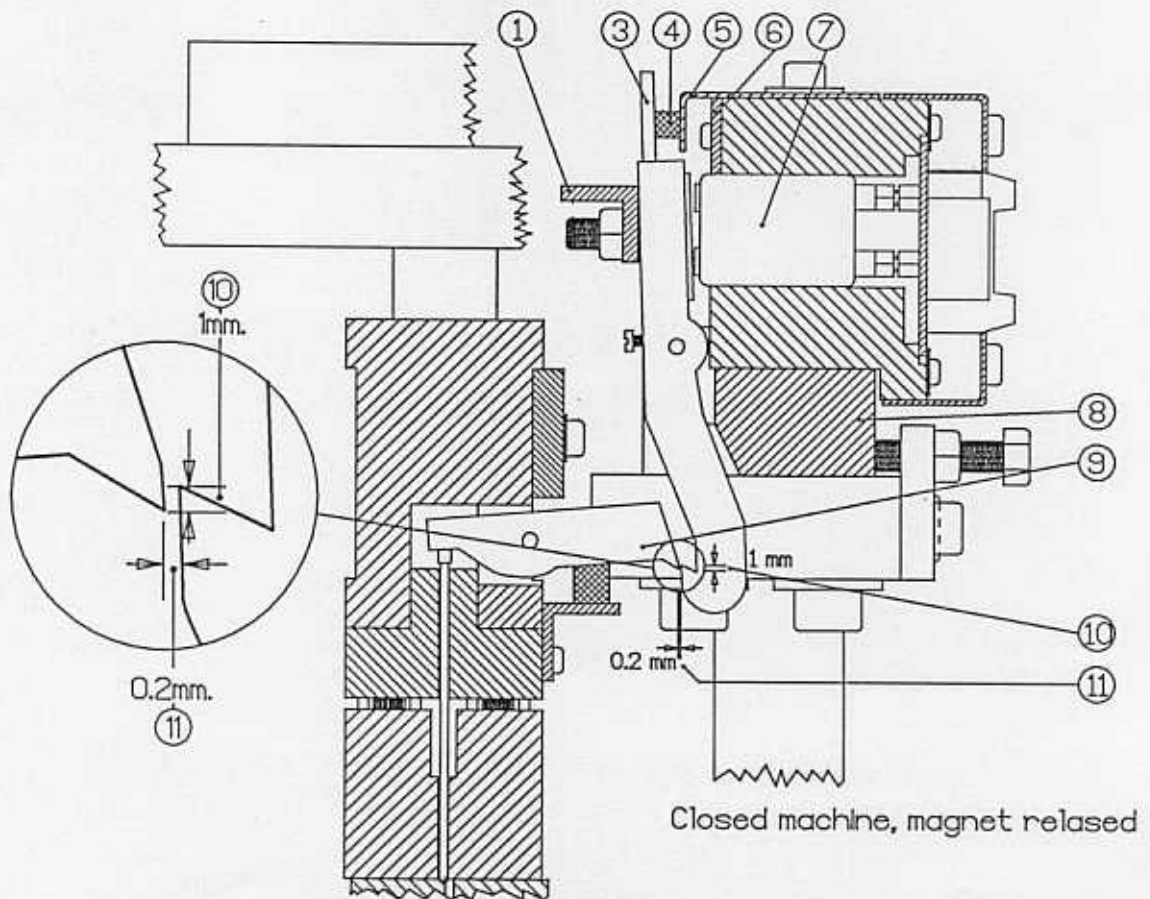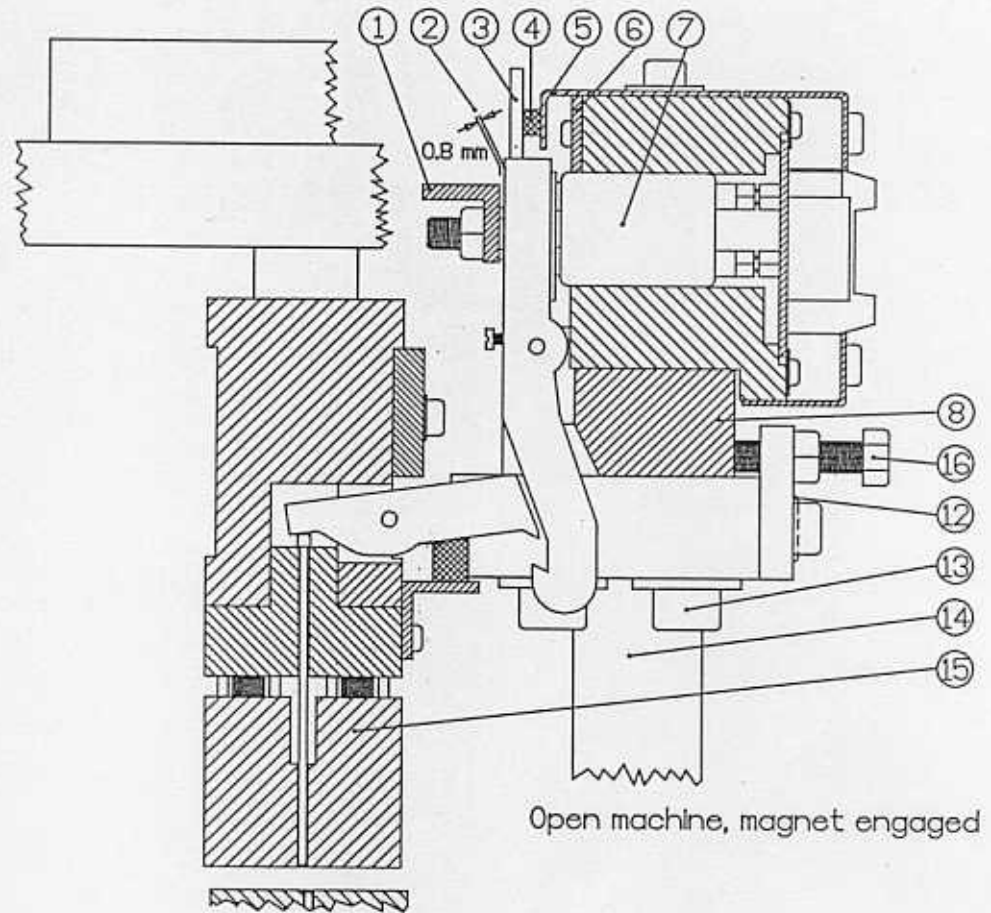
5.3 Magnet Rack - Printing Process

Open machine, magnet relased

Paper

Closed machine, printing

Paper

5.4 Return Springs, Adjustment

Adjustment has to be done when the Printer is in this position. (See figure below.)

70 mm   70 mm
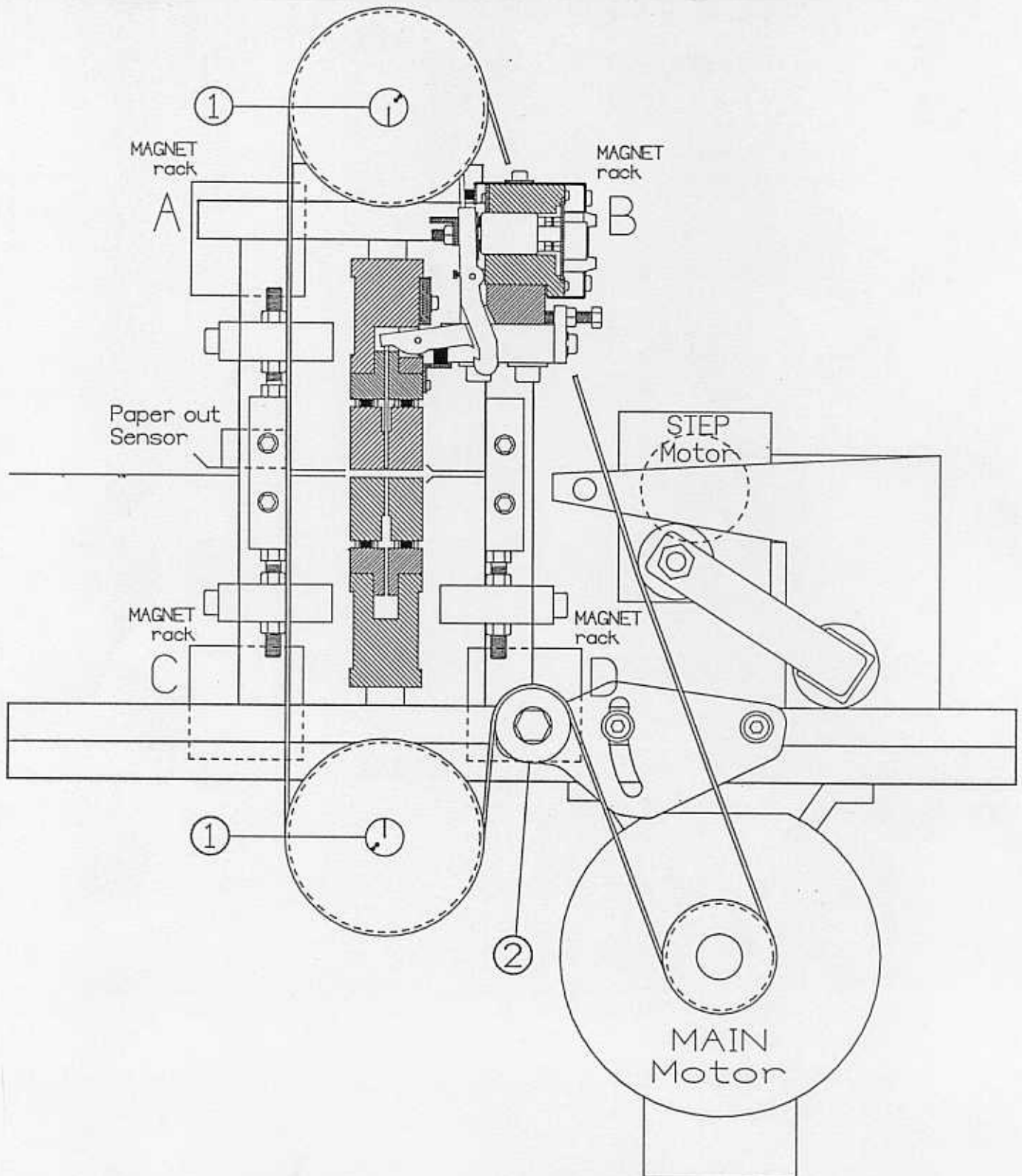
5.5 Eccentrics, Adjustment

After taking off the belt it is necessary to align the Eccentrics.

Put on the belt, and tighten it with the main tightening wheel (2), so that the marking at the end of the shafts, is pointing toward each other (1). (See figure below.)

If the marks are not aligned in the same position, it may be necessary to move the belt a notch or two on one of the wheels.

5.6 Paper Shoes, Adjustment

Place a sheet of paper between the Paper Shoes (P).
Turn the belt, so that the two points at the end of the shafts, is pointing towards each other, as shown on figure below.

Lock with a wrench e.g. at the end of the shaft (2).
Loosen the nuts (1), and adjust the rods (3) against the bearing (4), until the Paper Shoes have a light pressure on the paper.
Check that the space (5), between the pressure plates and the item above, is equal on both upper and lower units.
Tight the rods with the nuts.
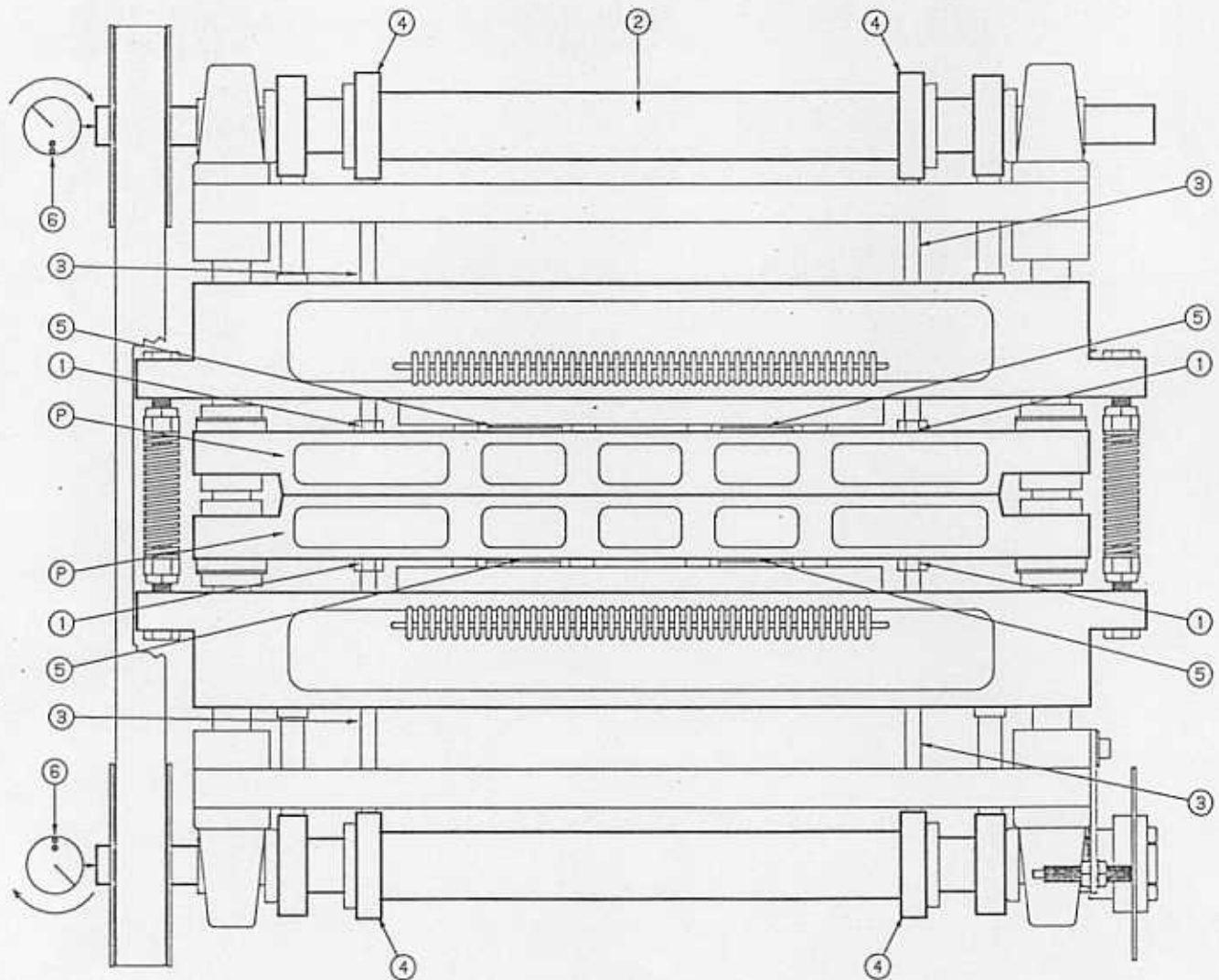
5.7 Beam Sensor Wheel, Adjustment

The Beam Sensor Wheel is placed on the lower shaft behind the Electronic Unit.

Turn the belt, so that the Marks at the end of the shafts (D), is pointing towards each other, as shown on figure below.
Loosen the screws (A), turn the Wheel (C), until the Sensor (B) is placed in the middle of the open part of the Wheel. (See figure below.)
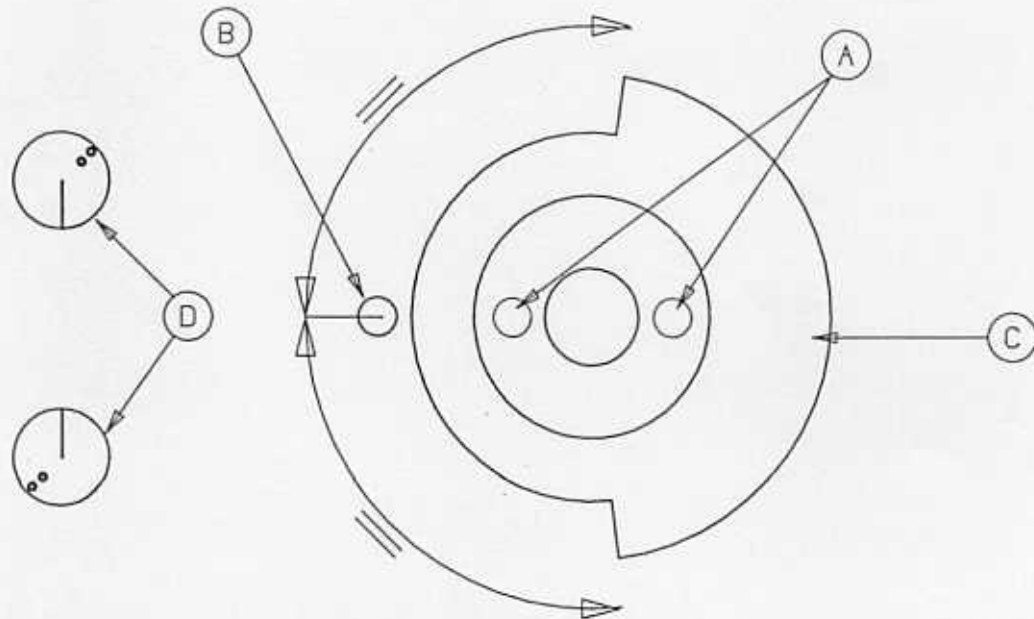
5.8 Paper Feed Mechanism, Adjustment

To make an adjustment on the relation between the top margin and the end margin on a page that is full of text, could be done like this:

Loosen the Tractor-Shaft by unscrewing the two left screws (B) on the Sensor Wheel.
Note: Do not loosen the screws for the Motor-Shaft.

Now the Tractor-Shaft can be moved forward and backward to the wanted position.

Note: The Marks to indicate the positioning of the paper on the paper-guide, may not be correct after this adjustment.

33
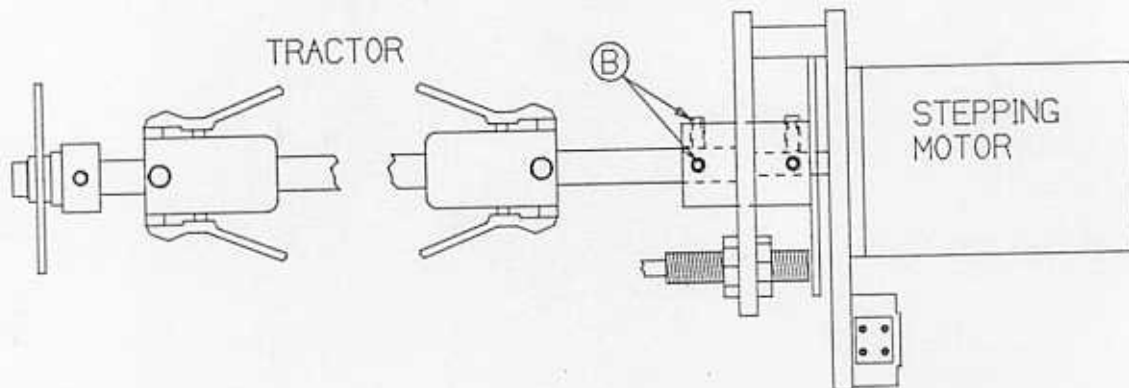
5.9 Inductive Sensors, Replacing and Adjusting
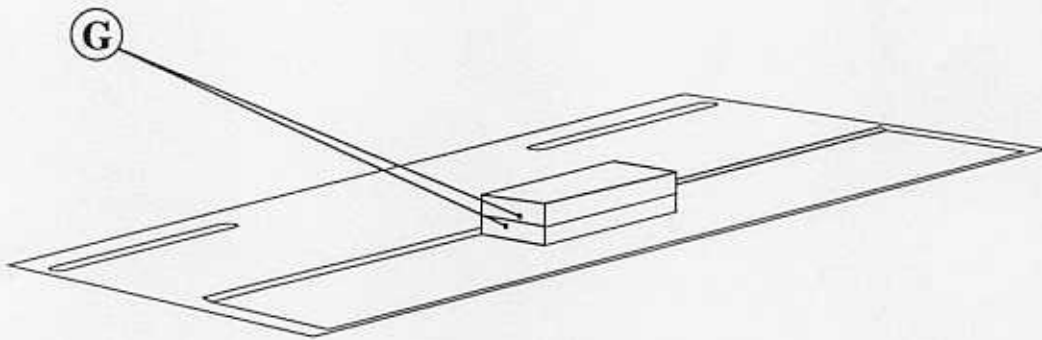
When replacing the Sensors, the distance to the Wheel should be maximum 0.6 mm.

TRACTOR

STEPPING
MOTOR

SENSORS

MAX 0.6 mm.
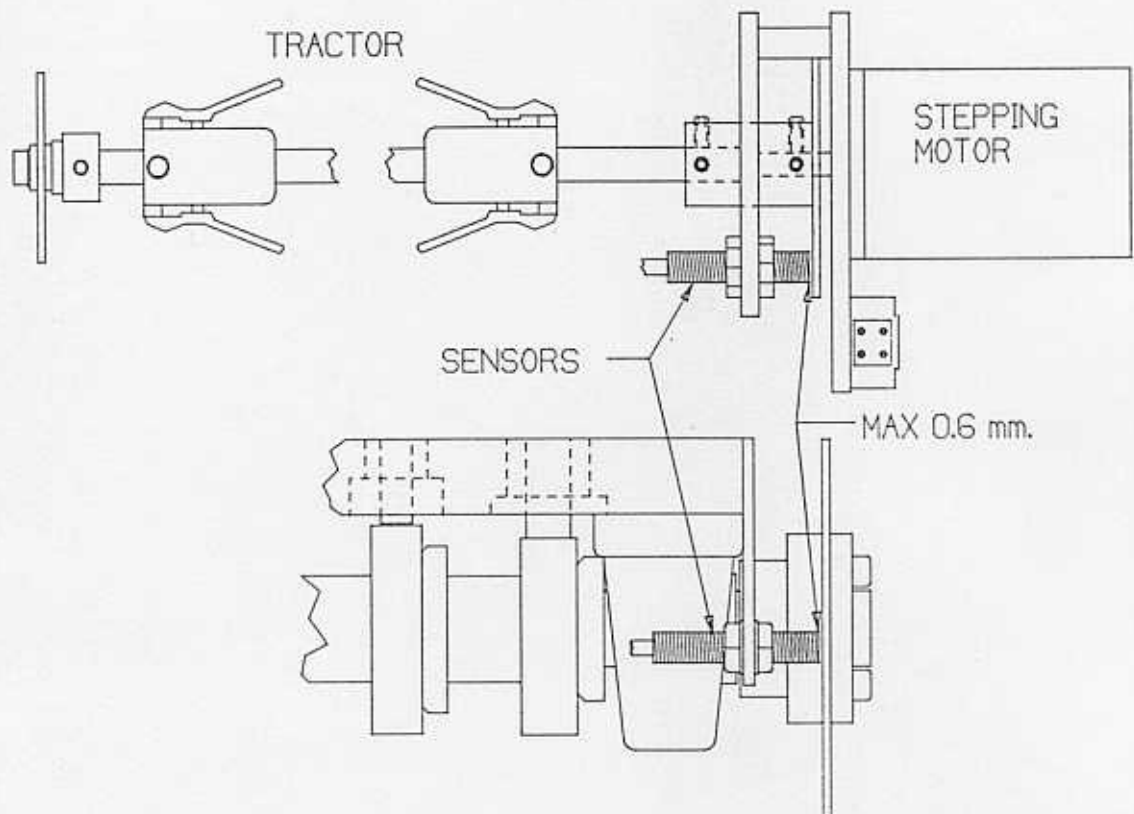
5.10 Paper Sensor, Replacing

Dismount the top of the paper guide. (Press G.)

Replace the Sensor.

5.11 Maintenance

The printing of paper produces paper dust, which stick to the mechanical parts of the Printing Mechanisms and to the paper-guides. Depending on the paper type used, it is necessary to clean the Printer regularly with a vacuum cleaner.

Lubrication of Printer.

Bearing   (1): Lubricate (grease) every 2000 hours
Tractor-Feed (2): Lubricate (oil)   every   150 hours

Note: Only one BEARING is to be lubricated at the Tractor-Feed Mechanism, and that is the one on the left-hand side.
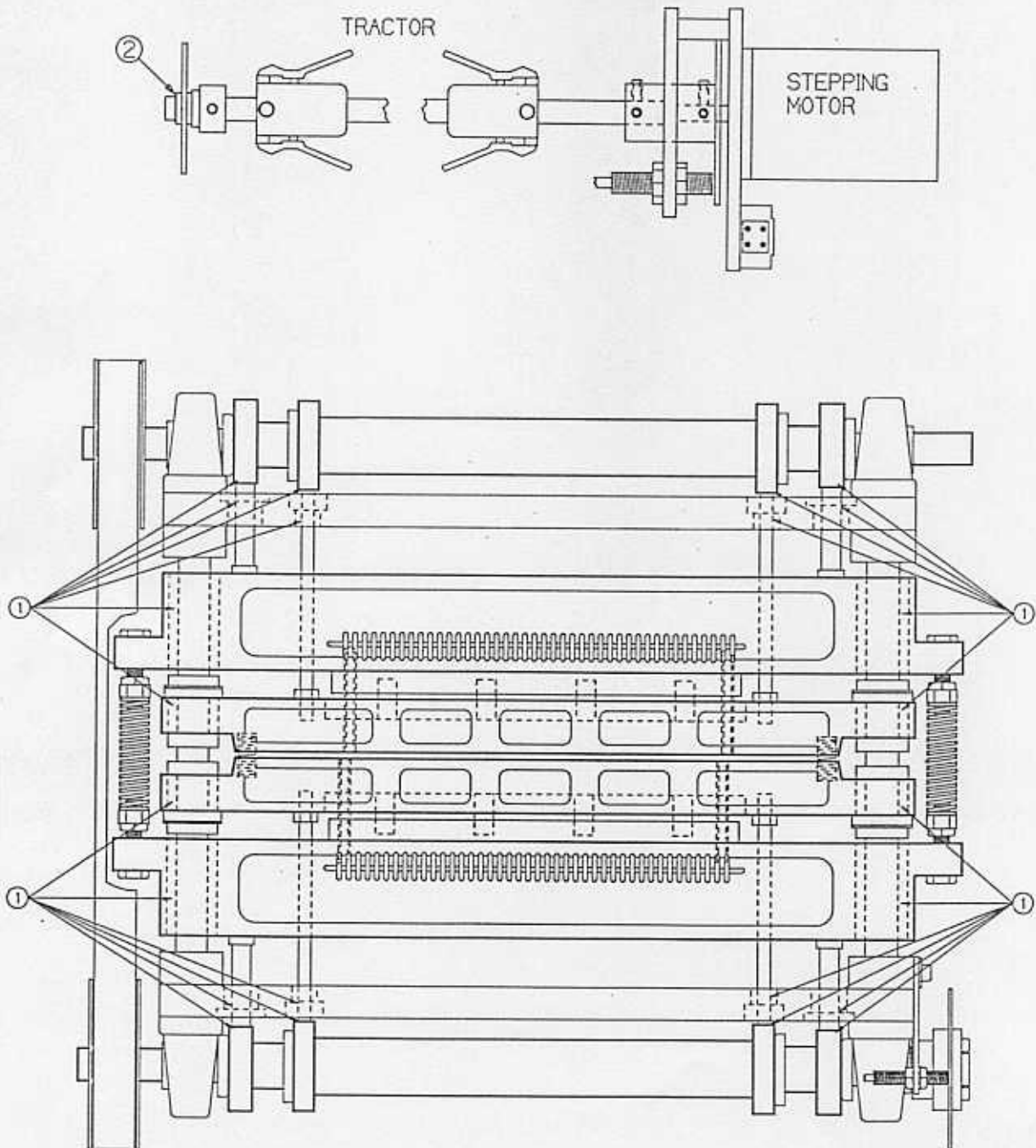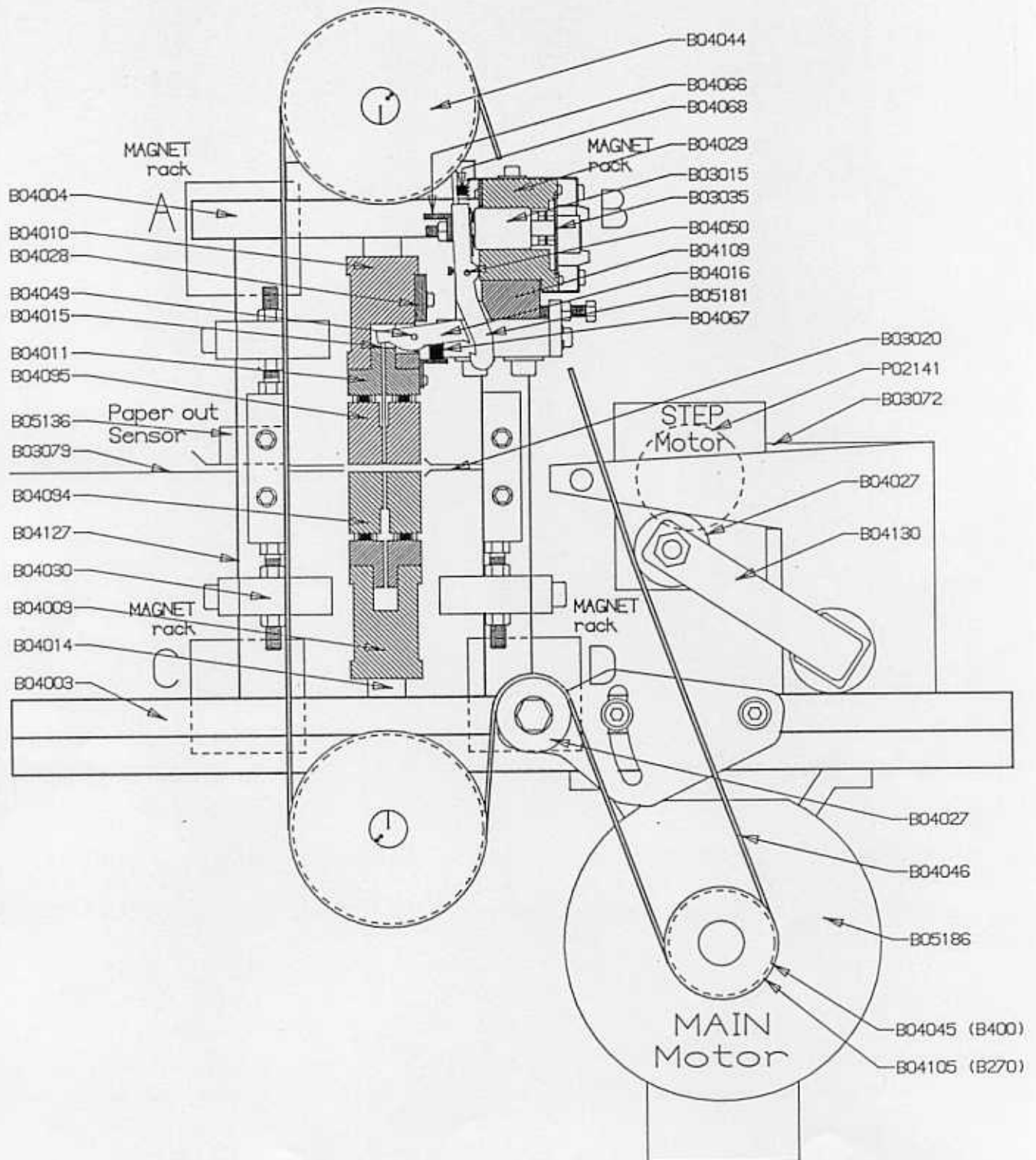
6 SPARE PARTS

No.	Name	Number of parts
B03015	Magnets	168
B03020	Paper guide	1
B03022	Inductive Sensor	3
B03032	Fan cover	2
B03035	Magnet Rack Board	4
B03072	Tractor	1
B03073	Power Unit	1
B03074	Mother Board	1
B03076	Operating Panel	1
B03079	Paper guide In / Out	1
B03085	Sensor Wheel, Tractor	1
B03088	Cable Magnet Rack, flat set	1
B03089	Cable Magnet Rack, round set	1
B03090	Main Cable	1
B03111	Main Fuses	1
B03112	Main Motor	1
B03127	Relay, Alarm / Paper-Cut	2
B04003	Frame lower	1
B04004	Frame upper	1
B04005	Shaft lower	1
B04005	Shaft upper	1
B04006	Main Bearing with housing	4
B04007	Bearing eccentric	4
B04009	Beam lower	1
B04010	Beam upper	1
B04011	Rack printing pins	2
B04013	Piston	4
B04014	Columns	2
B04015	Printing Pin	168
B04016	Pivot Arm, short	168
B04020	Pressure Spring	4
B04021	Return Spring	2
B04022	Stroke ball bearing, paper shoe	4
B04022	Stroke ball bearing, beam	4
B04023	Stroke ball bearing, piston	4
B04027	Belt Adjustment	1
B04028	Pivot arm fastening	8
B04029	Rack, magnets	4
B04030	Fastening Magnet Rack	8
B04037	Sensor Wheel, shaft	1
B04044	Pulley, shaft	2
B04045	Pulley, motor	1
B04046	Belt	1
B04049	Shaft, pivot arm	8
B04050	Shaft, pivot arm, Magnet Rack	4
B04051	Vibration absorbs	8
B04066	Support List, pivot arm, Magnet Rack	4
B04067	Support List, pivot arm, Beam	4
B04068	Sponge List	4
B04072	Adjustment Screws, Paper Shoe	4
B04094	Paper Shoe, lower	1
B04095	Paper Shoe, upper	1
B04097	Tractor Belt	2
B04109	Guide List, pivot arm	4

6   SPARE PARTS

No.	Name	Number of parts
B04121	Fuse, motor (resetable)	1
B04127	Pillar	4
B04131	Stroke ball bearing, rod, paper shoe	4
B04132	Bearing, eccentric, rod, paper shoe	4
B04134	Pressure Spring, Adiprene	16
B05052	Contactor, Motor	1
B05055	Hour Counter	1
B05128	Auto-Fuse, Magnet Rack 3A	4
B05136	Paper Sensor	1
B05181	Pivot Arm, Magnet Rack	168
P02141	Stepping Motor	1
P02181	CPU Power Supply	1
X02029	Fuse relays T1A	1
X02285	Auto-Fuse, Step Motor 1A	1

6   SPARE PARTS (Side)

6   SPARE PARTS (Front)

B04007
B04006
B04072
B04013
B04014
B04022
B04134
B04022
B04021
B04015
B04131
B04023
B04037
B03022

B04005
B04132
B04004
B04011
B04010
B04095
B04020
B04094
B04009
B04003
B04005

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