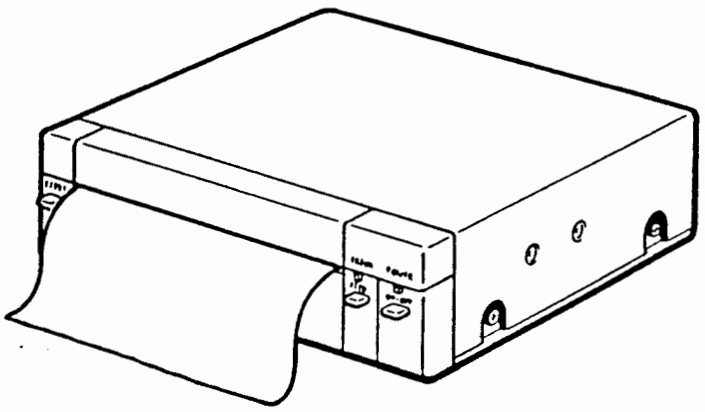
Service Manual

Ericsson Line Printer

EPU 40



ERICSSON

EN/LZB 126 1123 R1A

Preface

Service on the ***EPU 40*** (Ericsson Printing Unit 40 characters/line) will be based on module replacement. This manual contains the information required for service on this level, plus a short functional description and directions for installation.

The manual is valid for product with the designation KRY 101 1051 R3A unless otherwise stated. Printers of revision status R1A or R2A can be upgraded to the same standard of performance as R3A by changing the Upper Main Board, the Lower Main Board, and the Interface Cable.

Ordering

The Service Manual (EN/LZB 126 1123) for ***Ericsson EPU 40*** can be ordered from

Ericsson Radio Systems AB
DOCUMENTATION, X/LB
S-164 80 STOCKHOLM
SWEDEN

Service

Ericsson Printer EPU 40

SERVICE

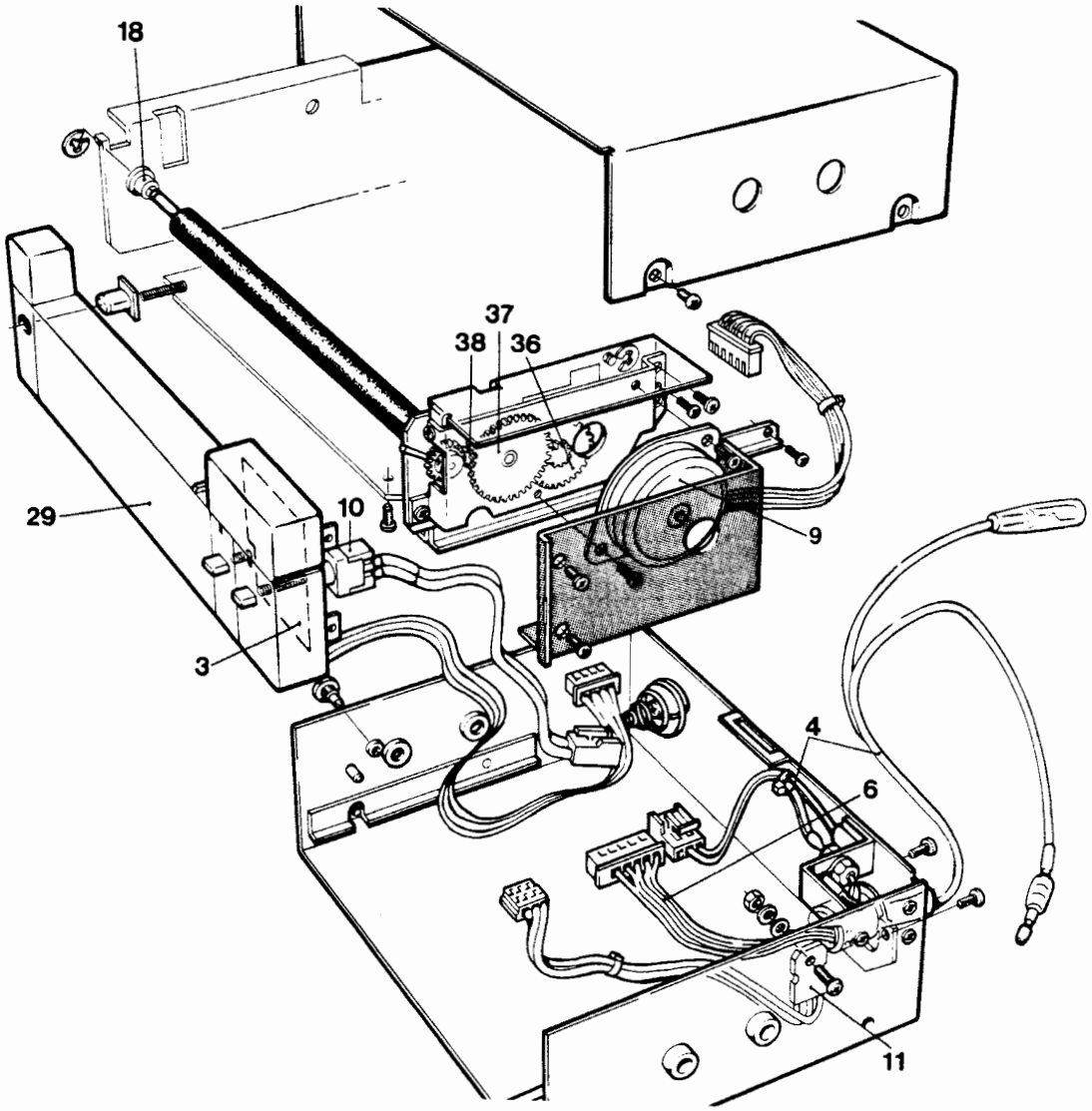
Contents

Recommended Service Equipment

Service on the ***EPU40*** will require no special equipment; the table below shows what items will come into use.

Tool/Instrument	Recommended Unit
Multimeter	Hewlett-Packard 3468A
Power Supply Unit	Oltronix B32-10R
Standard Workshop Tools	
Set of Screwdrivers for Phillips head screws	
Feeler Gauge 0.6 mm	

Spare Parts



Item	Designation	Qty	Part Number	Notes
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4	Power Cord Assembly	1	22/KRY 101 1051	
6	Interface Cable Assembly	1	23/KRY 101 1051	
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10	Power Switch Assembly	1	14/KRY 101 1051	
11	Power Transistor Assembly	1	15/KRY 101 1051	
18	Platen Bushing	2	17/KRY 101 1051	
29	Lower Cover (Front Panel)	1	25/KRY 101 1051	
36	Gear A	1	18/KRY 101 1051	
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38	Idle Gear	1	20/KRY 101 1051	

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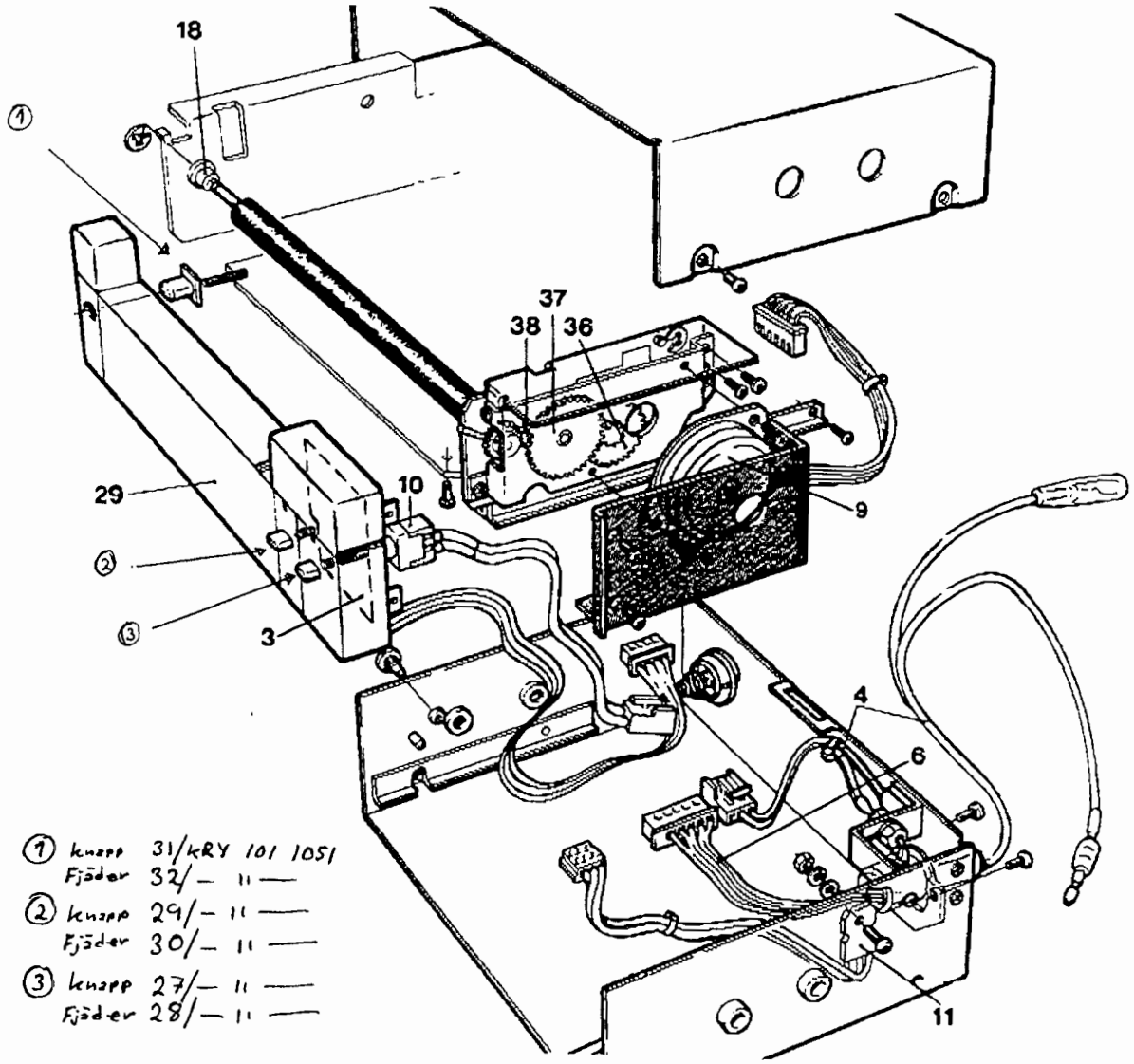

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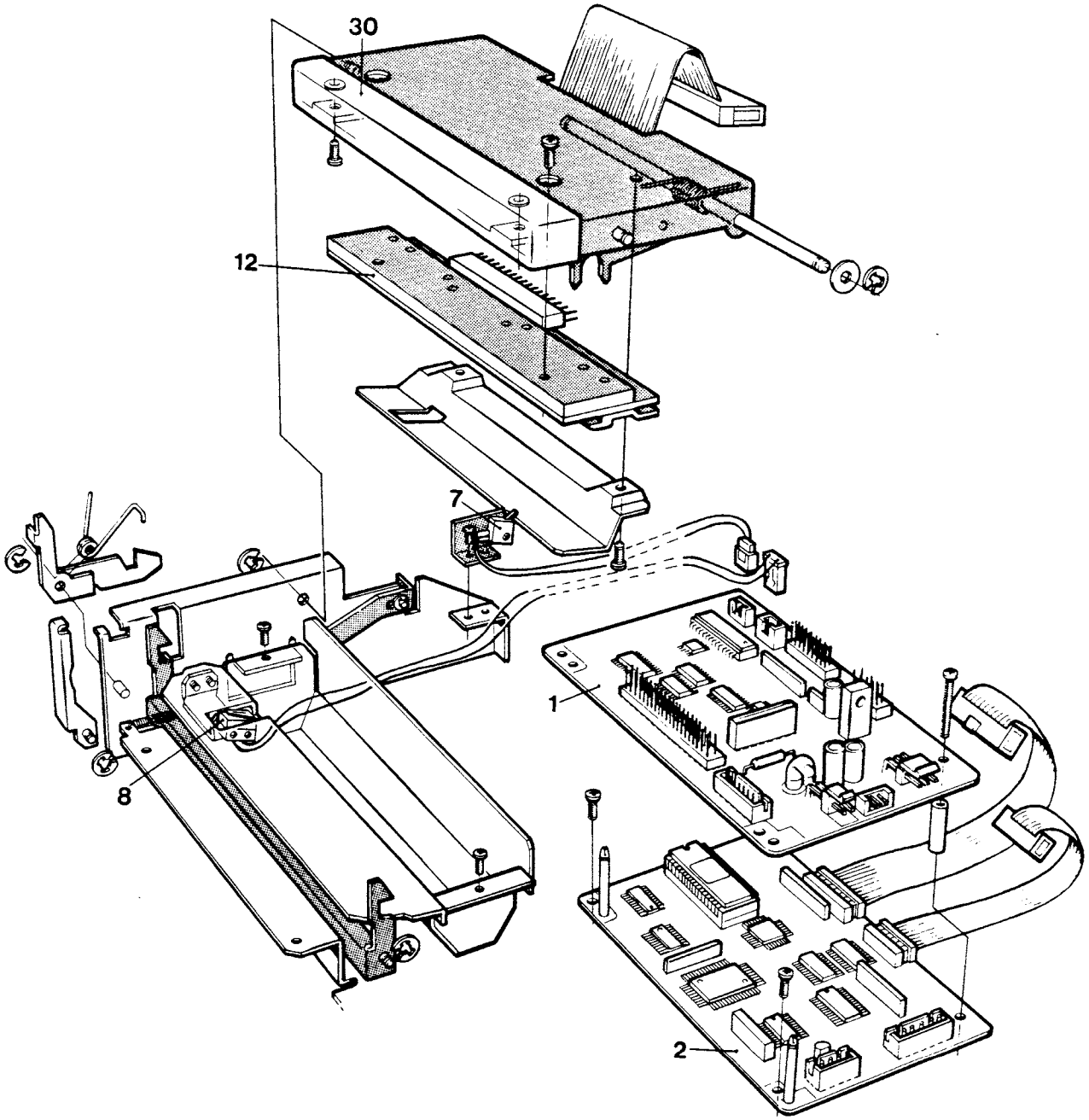

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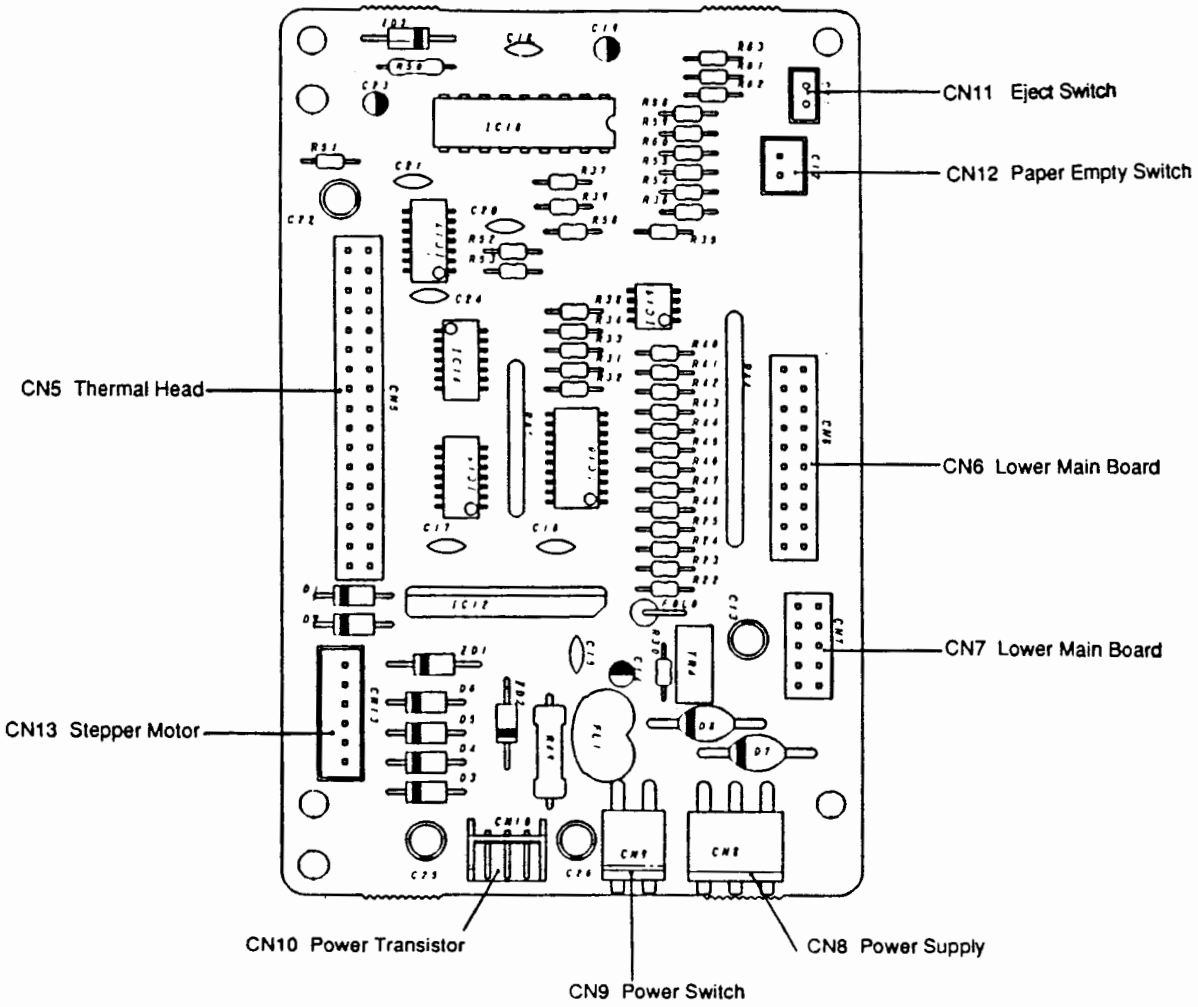
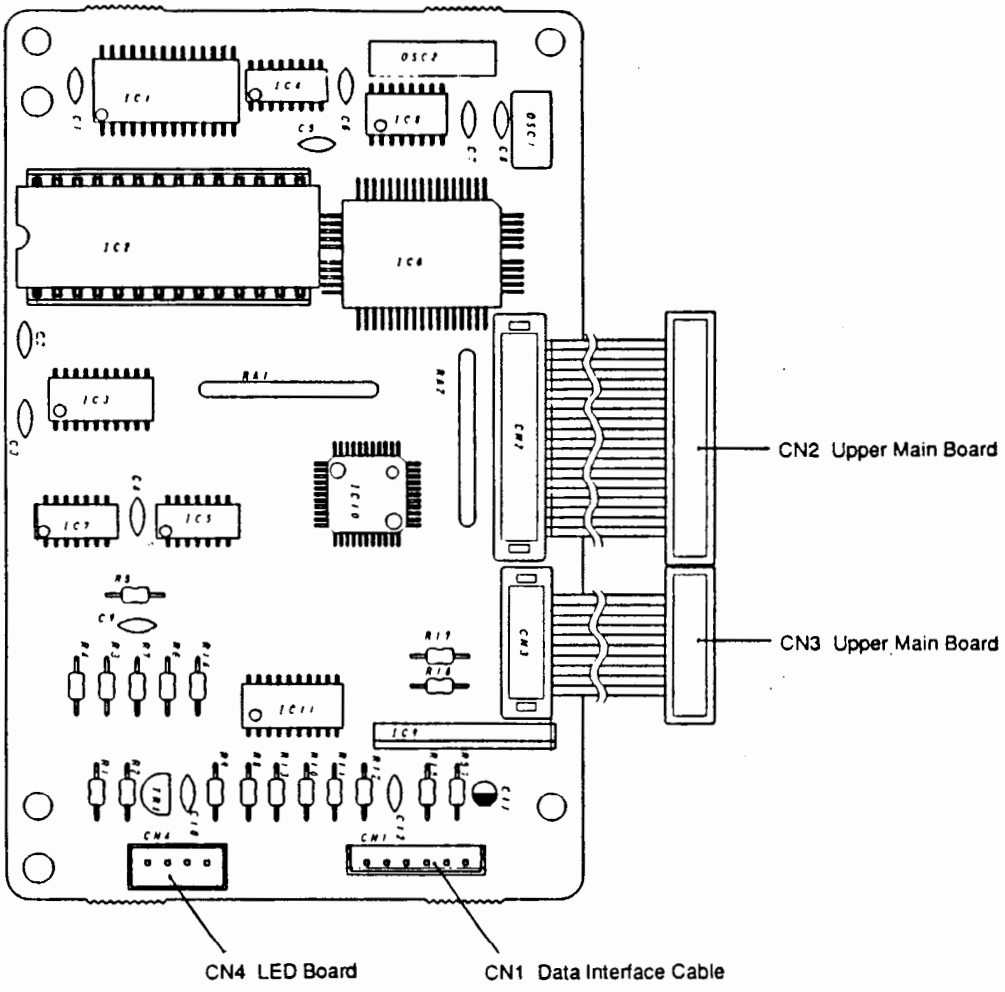
1	Mainboard Upper Assembly	1	10/KRY 101 1051	
2	Mainboard Lower Assembly	1	11/KRY 101 1051	
7	Eject Switch Assembly	1	12/KRY 101 1051	
8	Paper Empty Switch Assembly	1	13/KRY 101 1051	
12	Thermal Head	1	16/KRY 101 1051	
30	Upper Cover (Lid Front Cover)	1	26/KRY 101 1051	

Connectors

Upper Main Board

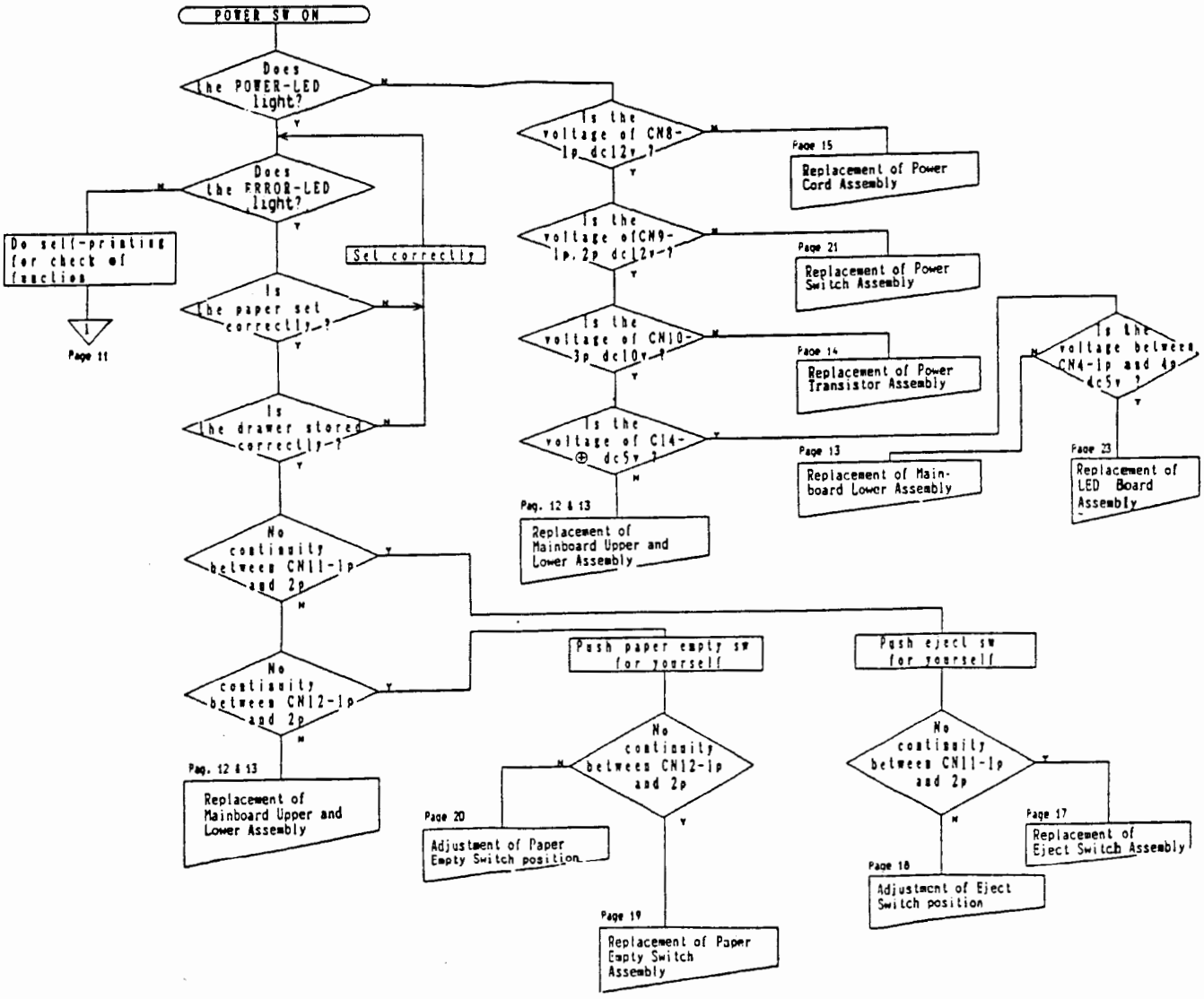


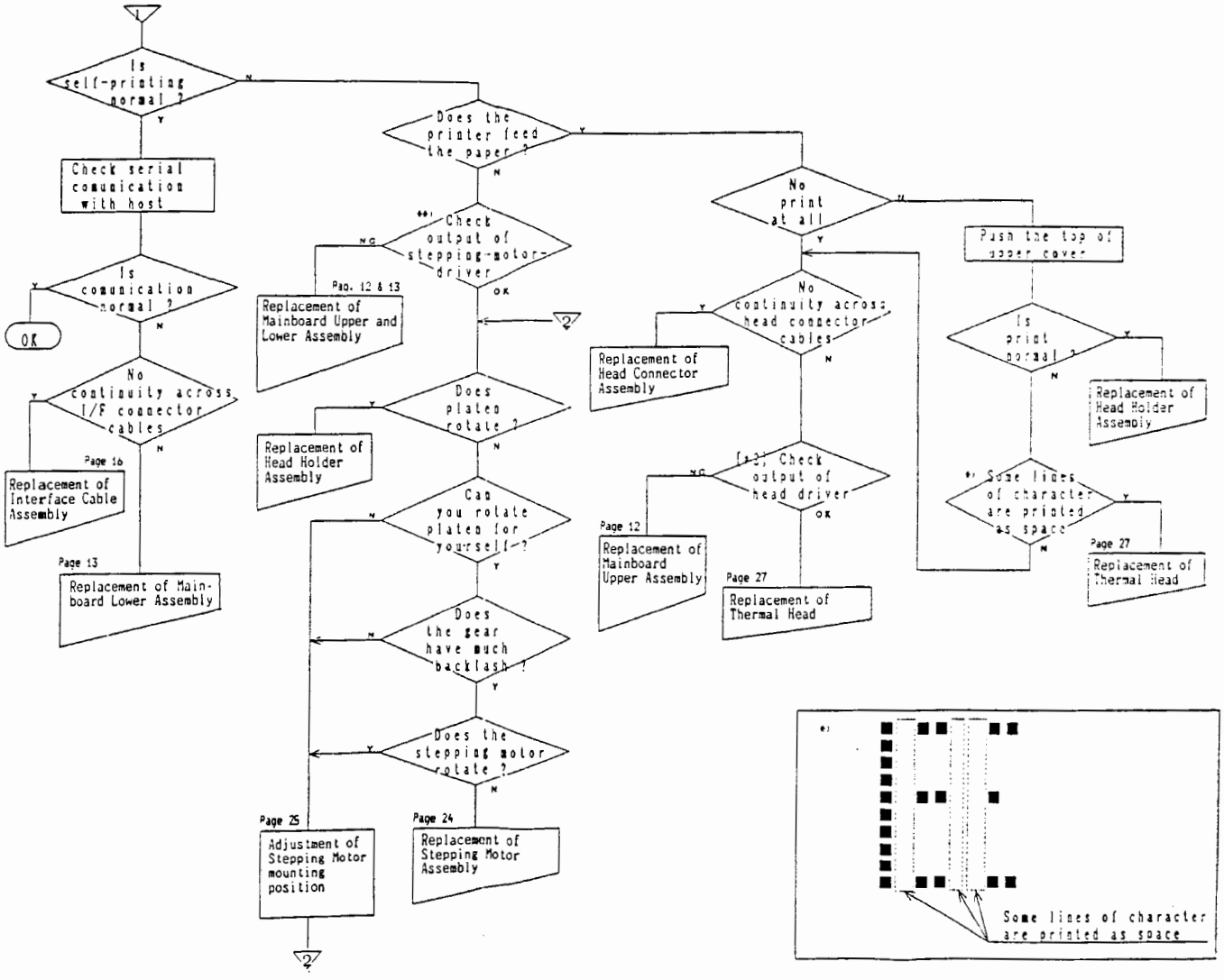
Lower Main Board



Trouble Shooting

Trouble shooting for repair on module level is performed according to the flow charts below.





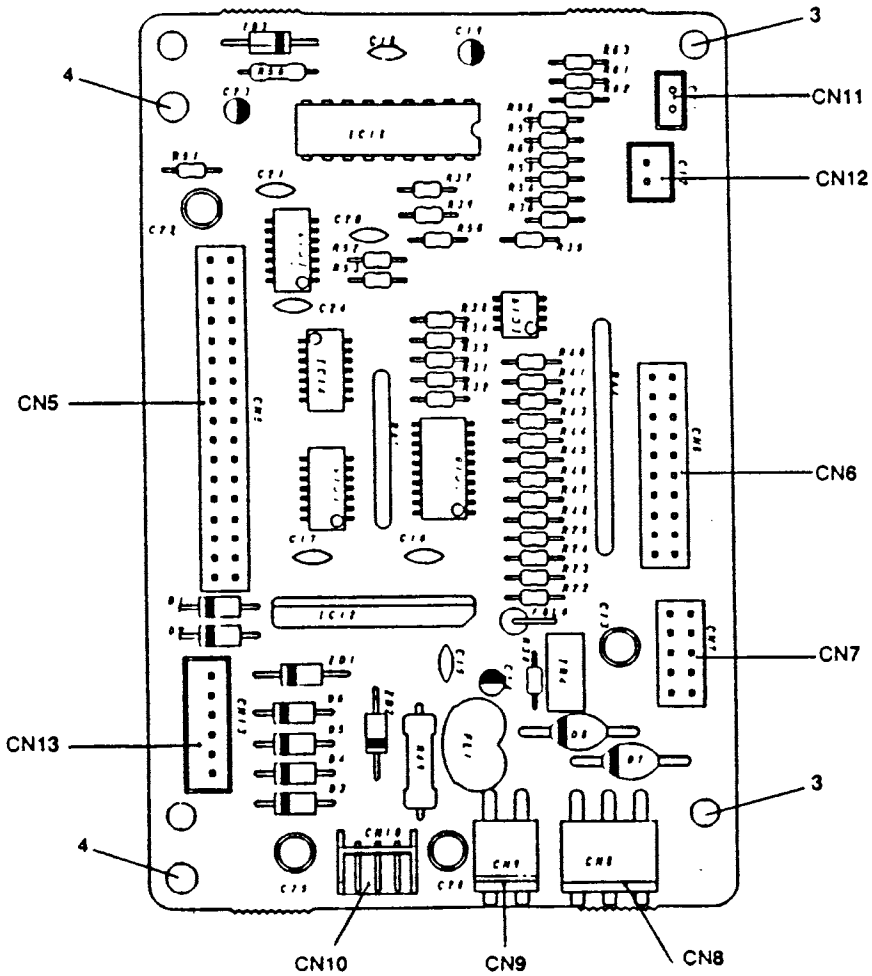
(**) See Technical Description

Module Replacement

Note: Whenever a cable strap must be opened, just cut it, and use a new strap when reassembling.

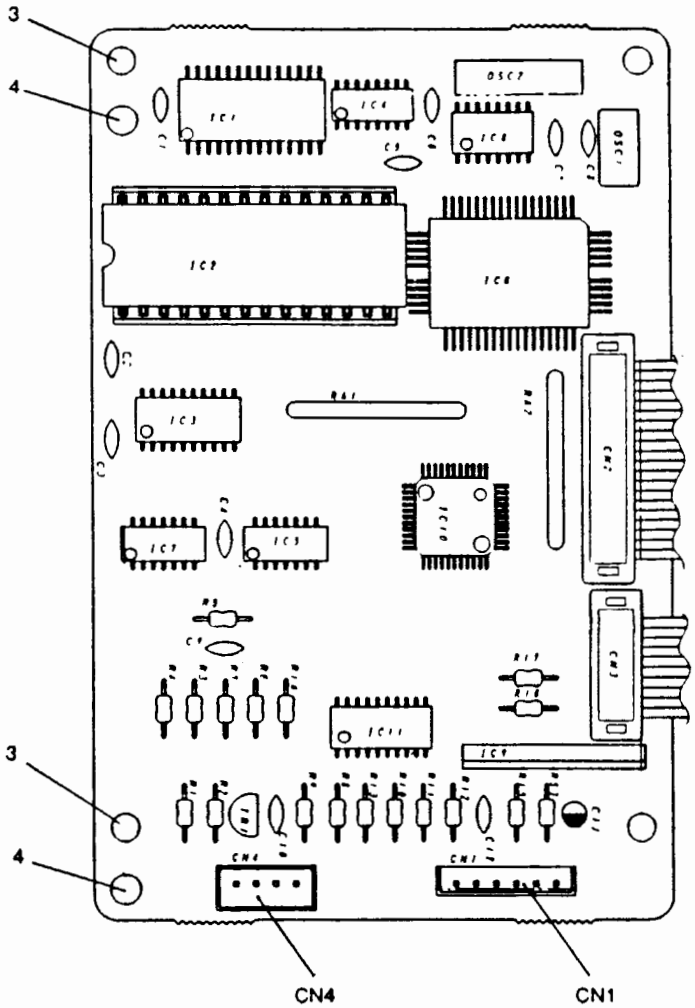
Upper Main Board

1. Remove the outer top cover (four screws).
2. Remove connectors CN5 - CN13.
3. Remove two screws and spacing collars (3).
4. Unsnap the circuit board from the support posts (4).
5. Install the replacement board in reverse order.



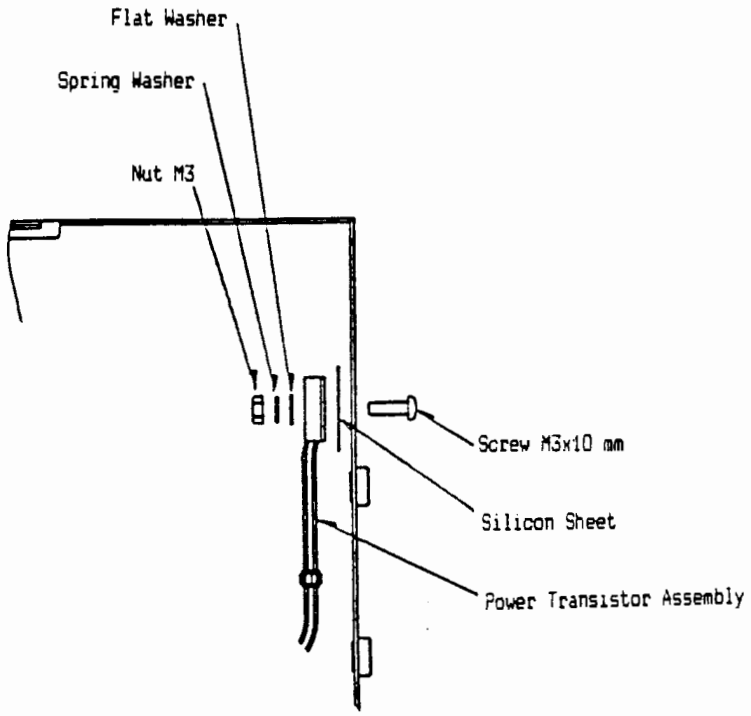
Lower Main Board

1. Remove the upper main board (previous section).
2. Remove connectors CN1 and CN4.
3. Remove two screws (3).
4. Remove two support posts (4).
5. Install replacement board in reverse order.



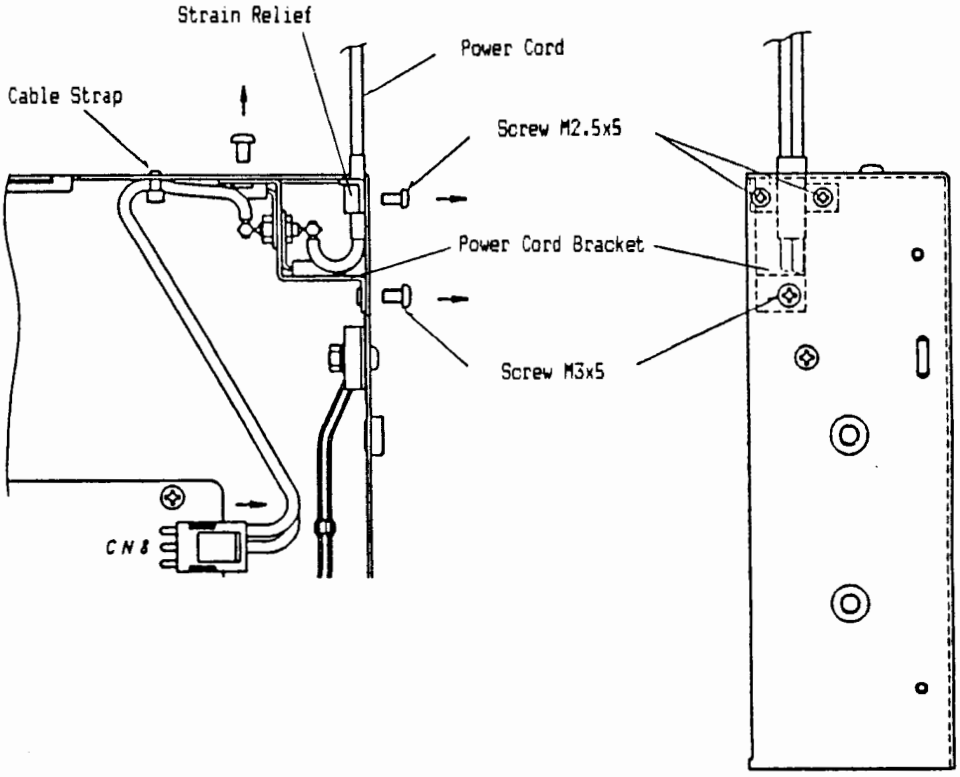
Power Transistor

1. Remove the outer top cover.
2. Remove connector from position marked CN10 on the upper main board.
3. Note the position of, and cut cable straps as requird to free the transistor cable from the other cables and from the frame.
4. Unscrew the transistor and make the replacement.
5 Reassemble in reverse order, using new cable straps to secure the cables.



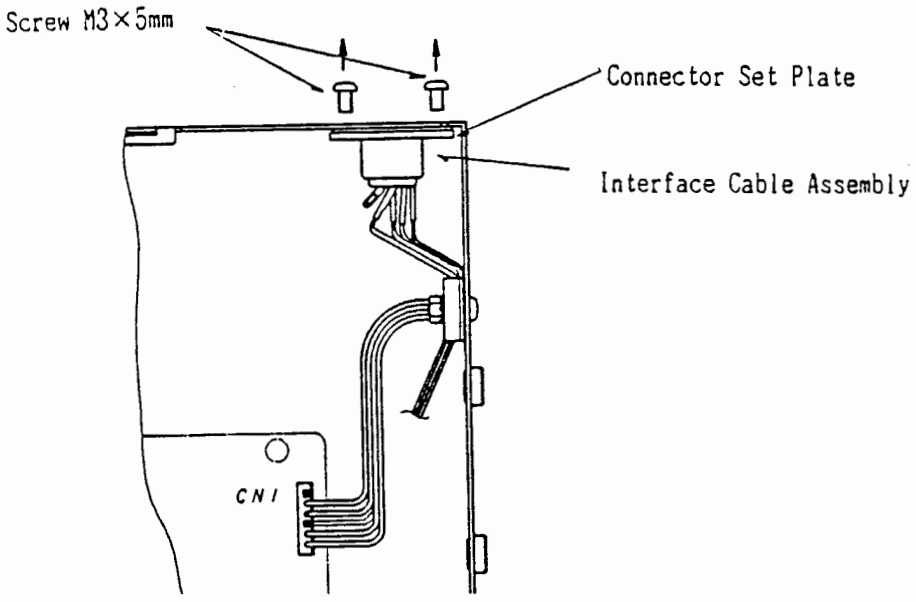
Power Cord Assembly

1. Remove the outer top cover.
2. Disconnect the power cord connector from the upper mainboard.
3. Cut off the cable strap at the rear.
4. Remove the strain relief (two scews).
5. Remove the power cord bracket (two screws), and lift out the power cord assembly.
6. Reassemble in reverse order, using a new cable strap.



Interface Cable

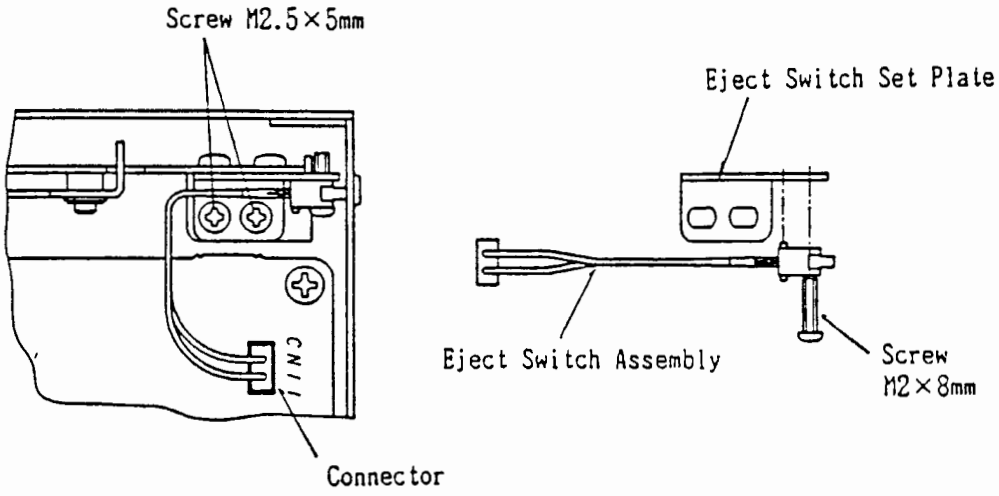
1. Remove the upper main board.
2. Cut off the cable strap attaching the interface cable and the transistor cable to the frame.
3. Remove connector CN1.
4. Remove two screws at the rear and replace the interface cable.
5. Assemble in reverse order, using a new cable strap to secure the power transistor cable and the interface cable on the frame.



Eject Switch

Replacement

1. Remove the outer top cover (four screws).
2. Remove connector marked CN11 .
3. Remove the switch assembly (two M2.5 screws).
4. Remove the switch from its holder (M2 screw).
5. Assemble in reverse order, and adjust as described in the next section.

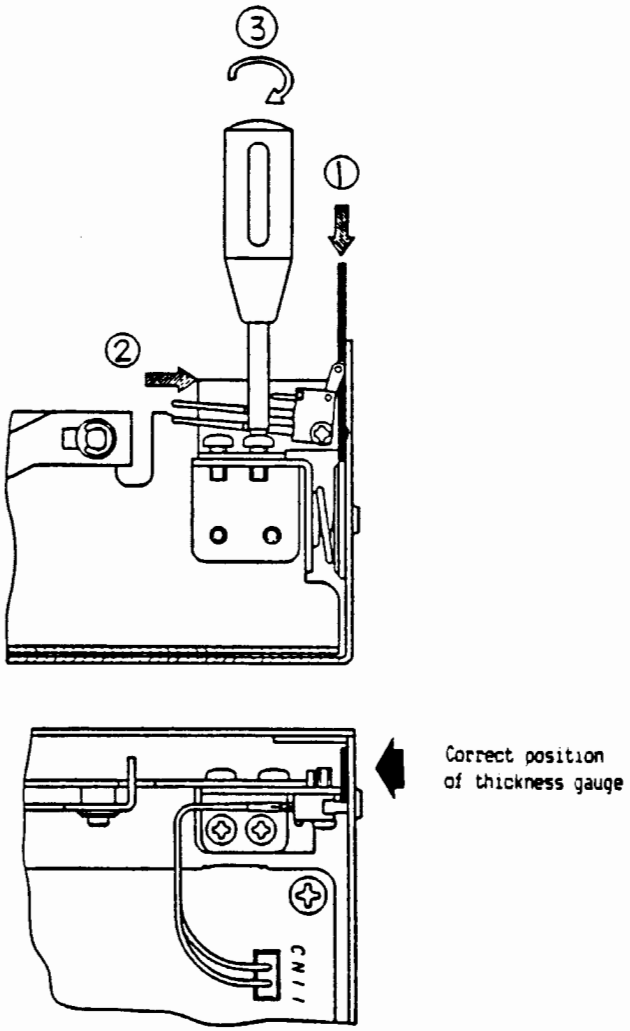


Adjustment

1. Place a thickness gauge of 0.6 mm as shown in the figure (in front of the *holder*, not the switch lever).
2. Push the holder in the direction of the arrow.
3. Tighten the two screws, and remove the gauge.

Functional Check

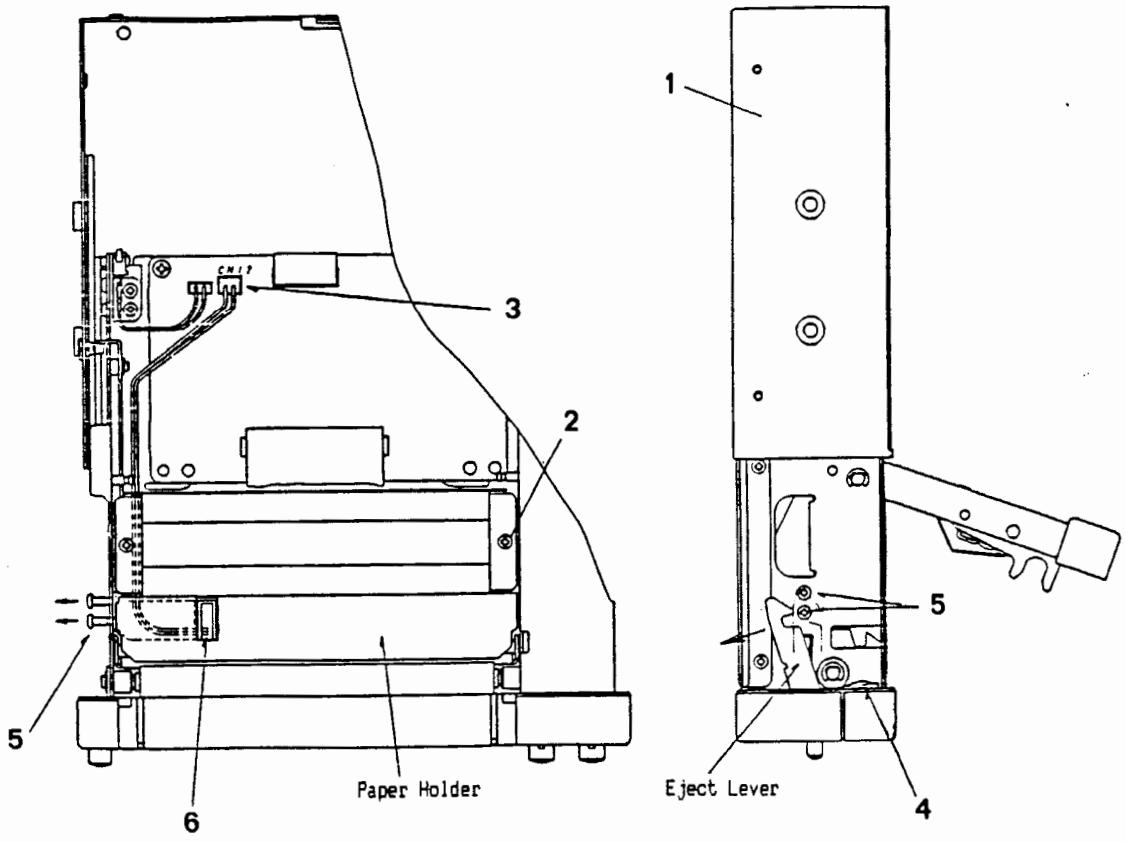
1. Insert a paper roll.
2. Reassemble the outer top cover and push the printer fully into its cassette.
3. Press the ON/OFF button and see that the indicator lights.
4. Press the Eject button. This should cause the printer to move a bit forward and the Error indicator to light.
5. Push the printer back in place and make sure that the Error indication stops.



Paper Empty Switch

Replacement

1. Remove the outer top cover.
2. Unscrew two screws and remove the paper holder, inserting a screwdriver under the holder and carefully lifting it free of the switch; no force is required.
3. Remove connector marked CN12.
4. Unhook the eject lever spring from its seating in the side frame.
5. Keep the eject lever in the "low" position and remove two M2.5 screws.
6. Remove the switch assembly.
7. Unscrew the switch from its holder and fit the replacement switch (delivered with connecting cable and connector as a spare part).
8. Reassemble in reverse order. In assembling, the rear flange of the paper holder should be located behind the lid opening springs but in front of the stop posts. Correctly located, the holder falls into place by itself.
9. Adjust as described in next section.

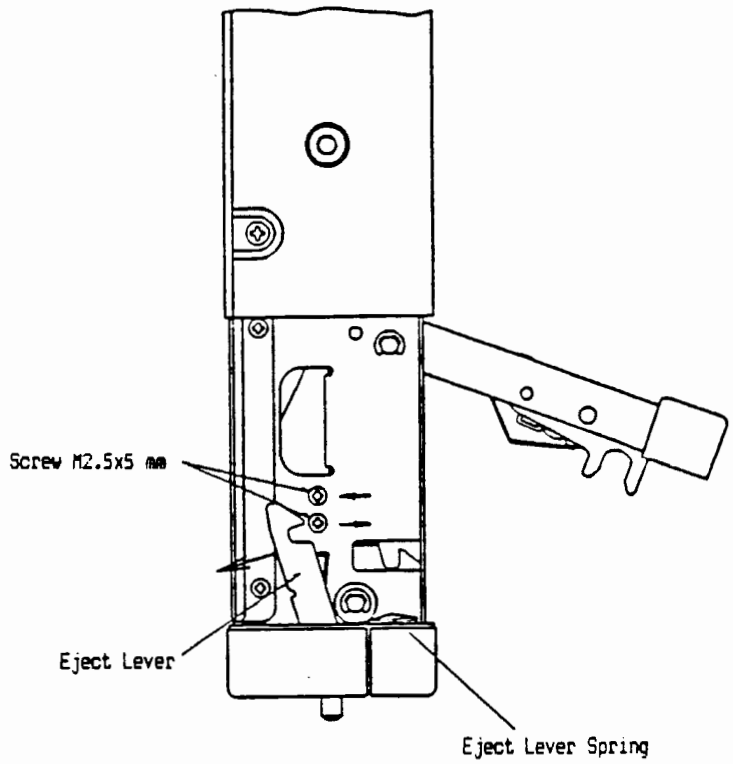


Adjustment

1. Unhook the eject lever spring.
2. Hold the eject lever in the "low" position and back off two 2.5x5 mm screws so they become just friction tight.
3. Adjust the switch as required by moving the screws in the oversize holes.
4. Tighten the screws and fit the eject lever spring.

Functional Check

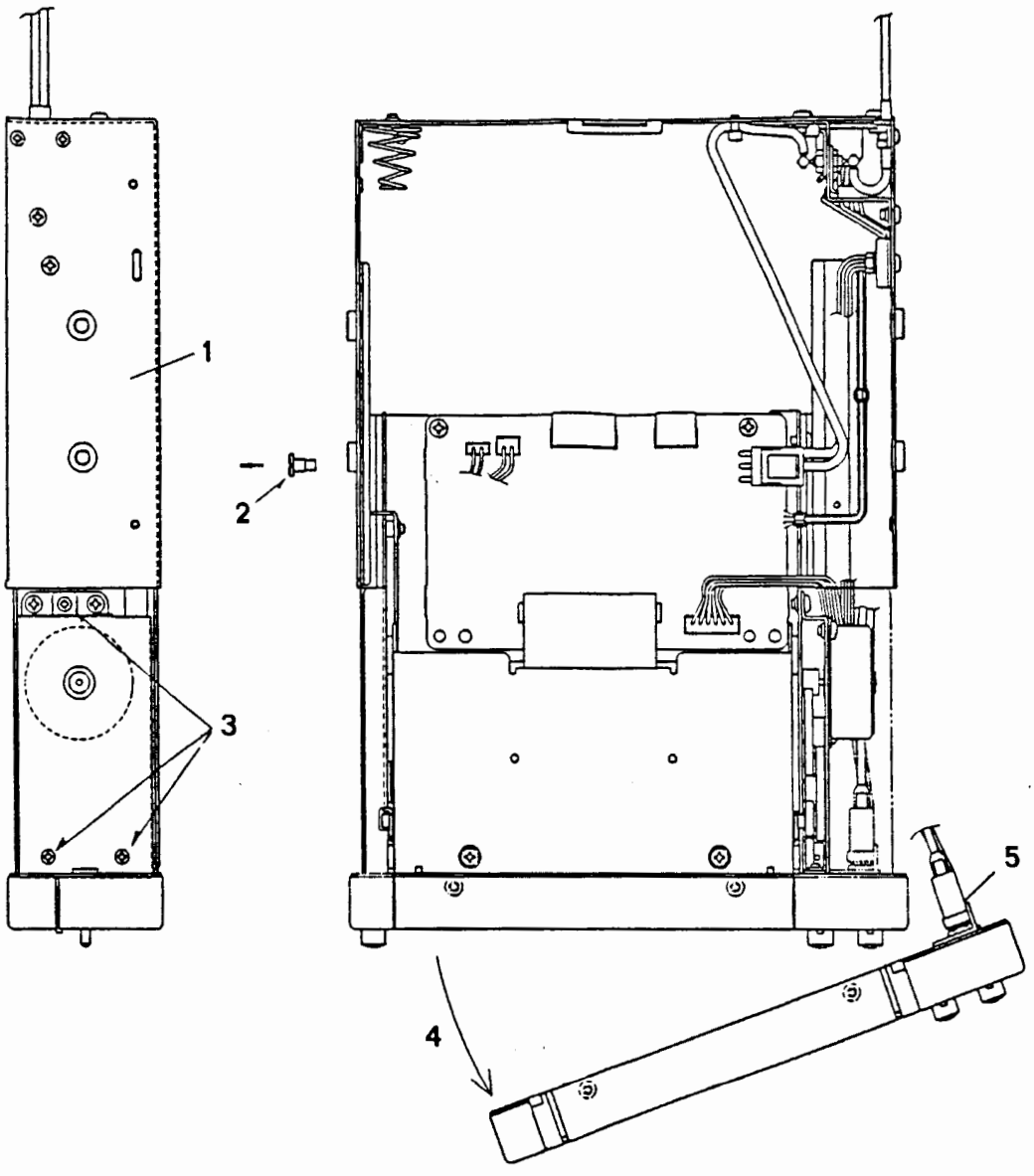
1. Eject the printer and insert a piece of paper from the front, seeing that it covers the Paper Empty switch.
2. Push the printer back into working position, pull out the paper, and make sure that the red LED goes on.



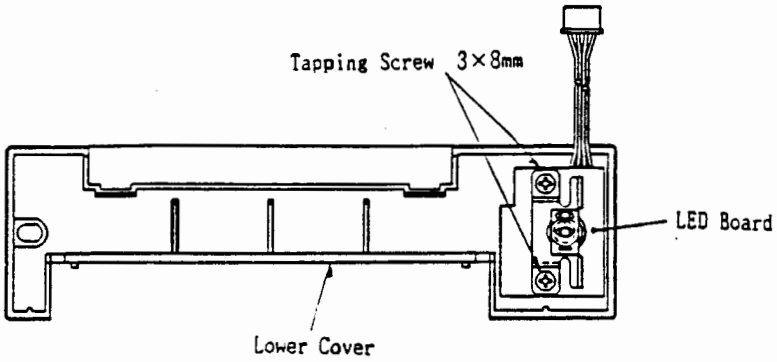
Power Switch

1. Remove the outer top cover.
2. Remove the threaded stop post on the left side.
3. Remove the side cover on the right side (three screws). If necessary, disconnect two cables from the upper mainboard and one from the lower.
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the power switch assembly from the front panel (two screws and connector marked CN9).

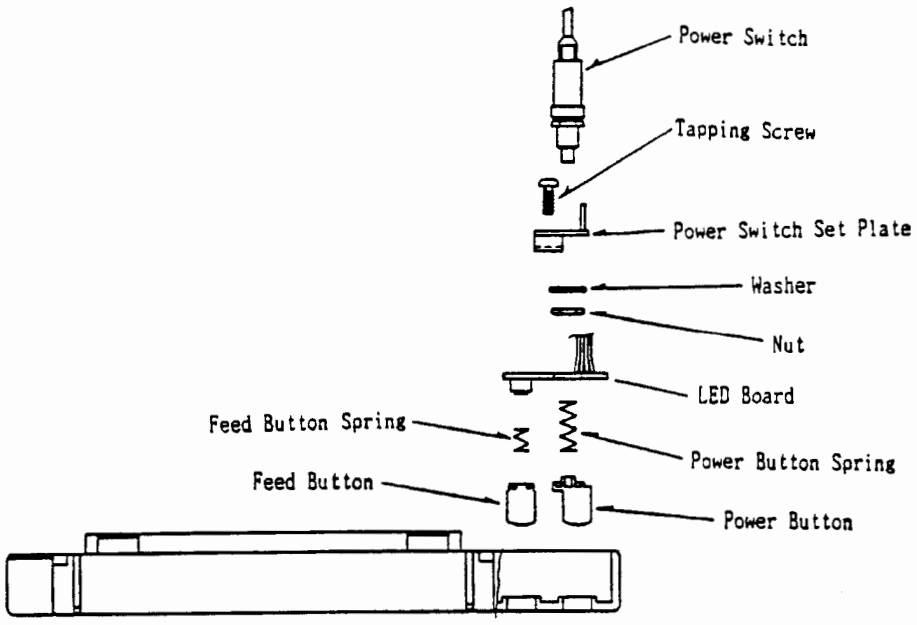
6 Remove a nut to detach the power switch from its fixing bracket, and fit the new switch (delivered with cable and connector).



7. Reassemble in reverse order. The LED board came loose when the switch was removed. Use the figure below to locate knobs, springs etc. correctly.



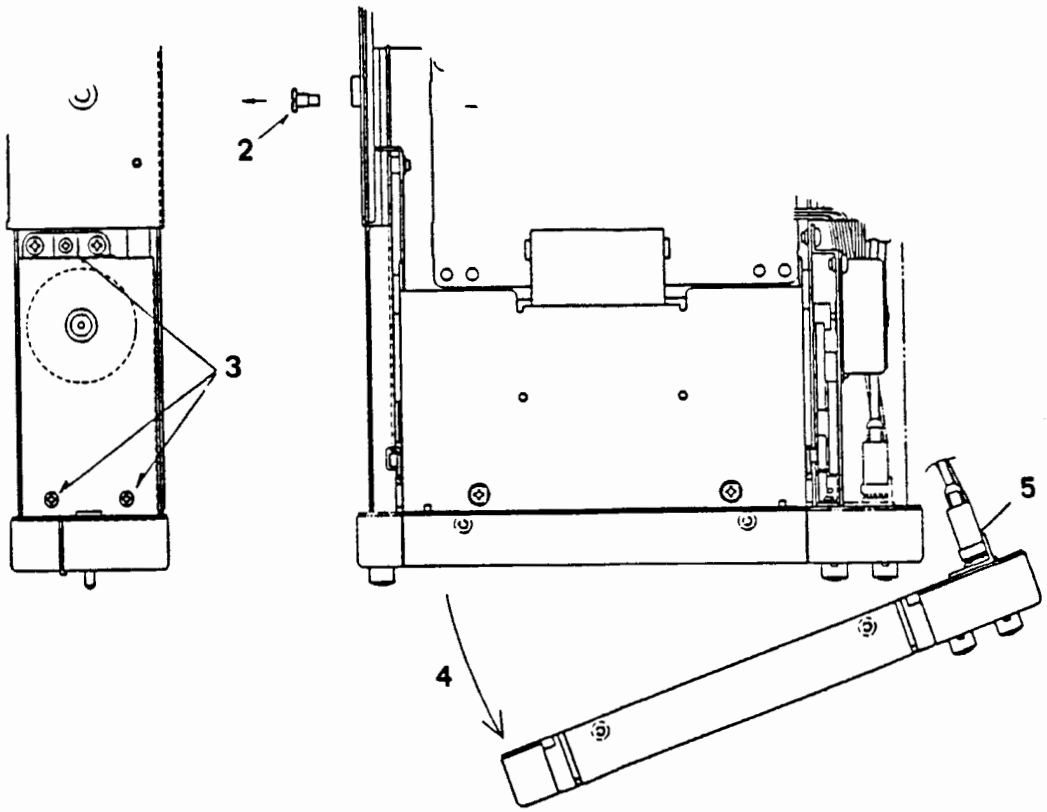
REAR VIEW



TOP VIEW

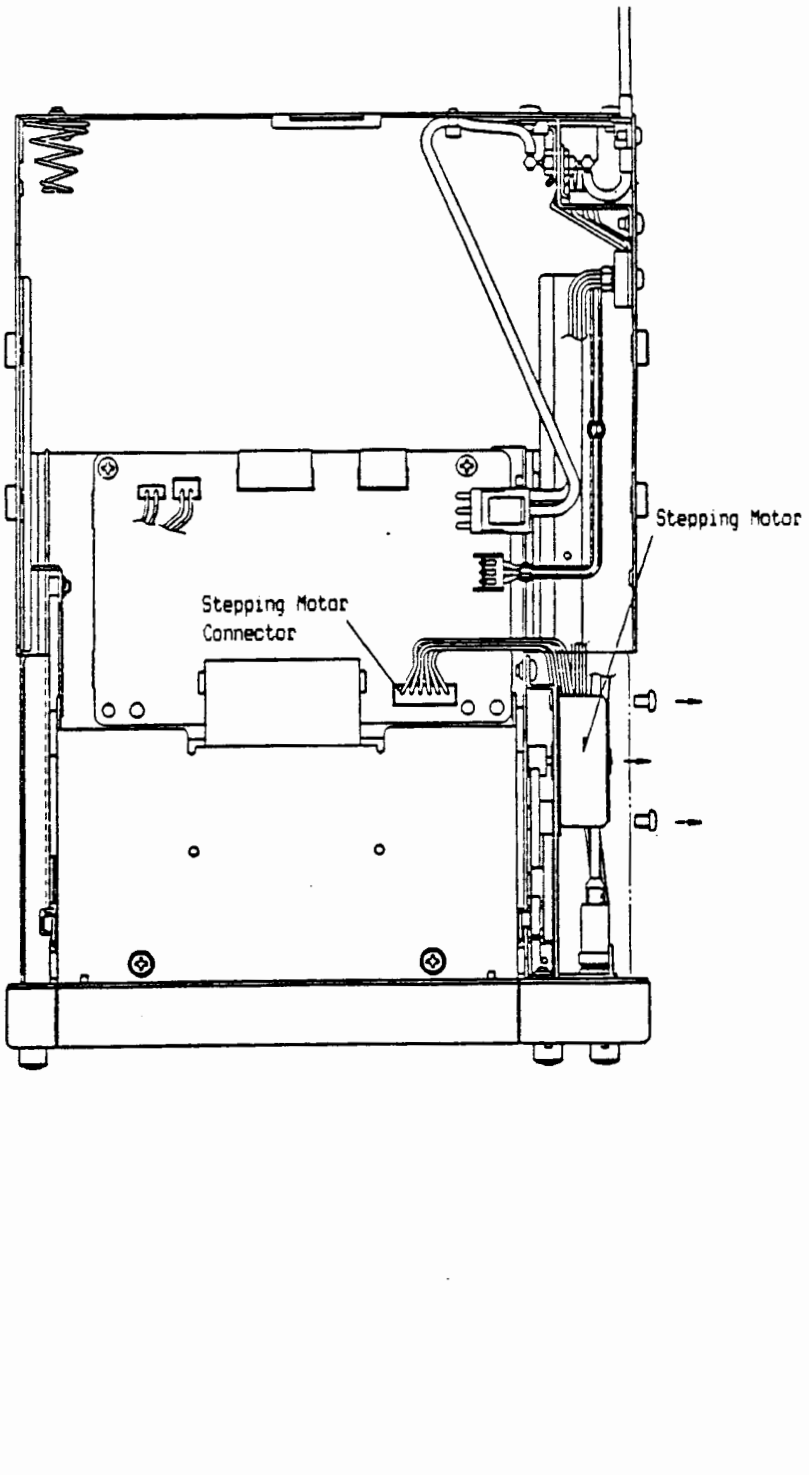
LED BOARD

1. Remove the upper main board.
2. Remove the threaded stop post on the left hand side.
3. Remove the side cover on the right hand side (three screws).
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the power switch assembly from the front panel (two screws).
6. The LED board is now free and can be replaced.
7. Reassemble in reverse order, using the figure on the opposite page to position knobs, springs etc. correctly.



Stepping Motor

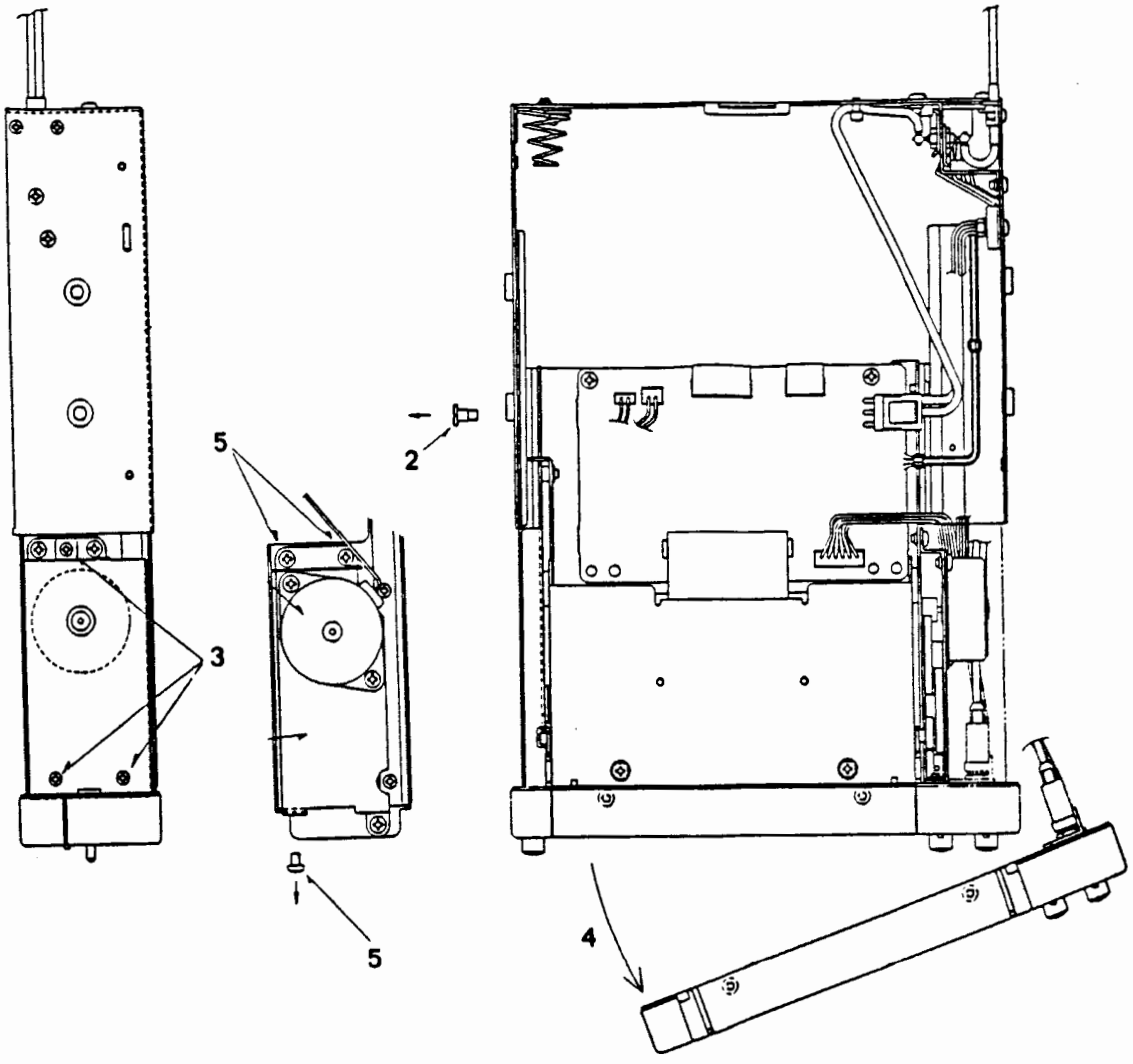
1. Disassemble as for replacement of power switch.
2. Remove motor connector from upper mainboard.
3. Remove the stepping motor (2 screws) and make the replacement.



Gear Train

Removal

1. Remove the outer top cover
2. Remove the threaded stop post on the left side.
3. Remove the side cover on the right side (three screws). If necessary, disconnect two cables from the upper mainboard and one from the lower.
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the motor mounting plate (three screws from the side and one from the front).
6. Replace gears as required.
7. Reinstall the assembled motor mounting plate, but leave the screws untightened to allow for adjustment.



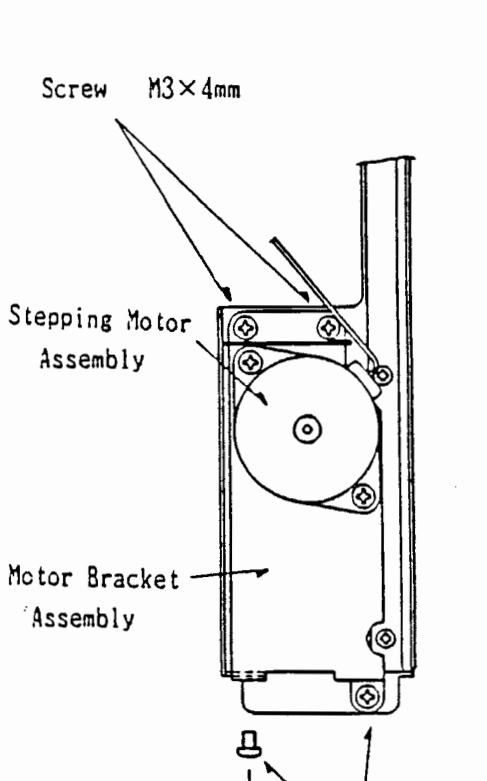
Adjustment

The motor mounting plate can be moved for an adjustment of the engagement between the idle gear and the reduction gear that provides drive to it.

1. Make positive that the three side screws and the front screw are just friction tight.

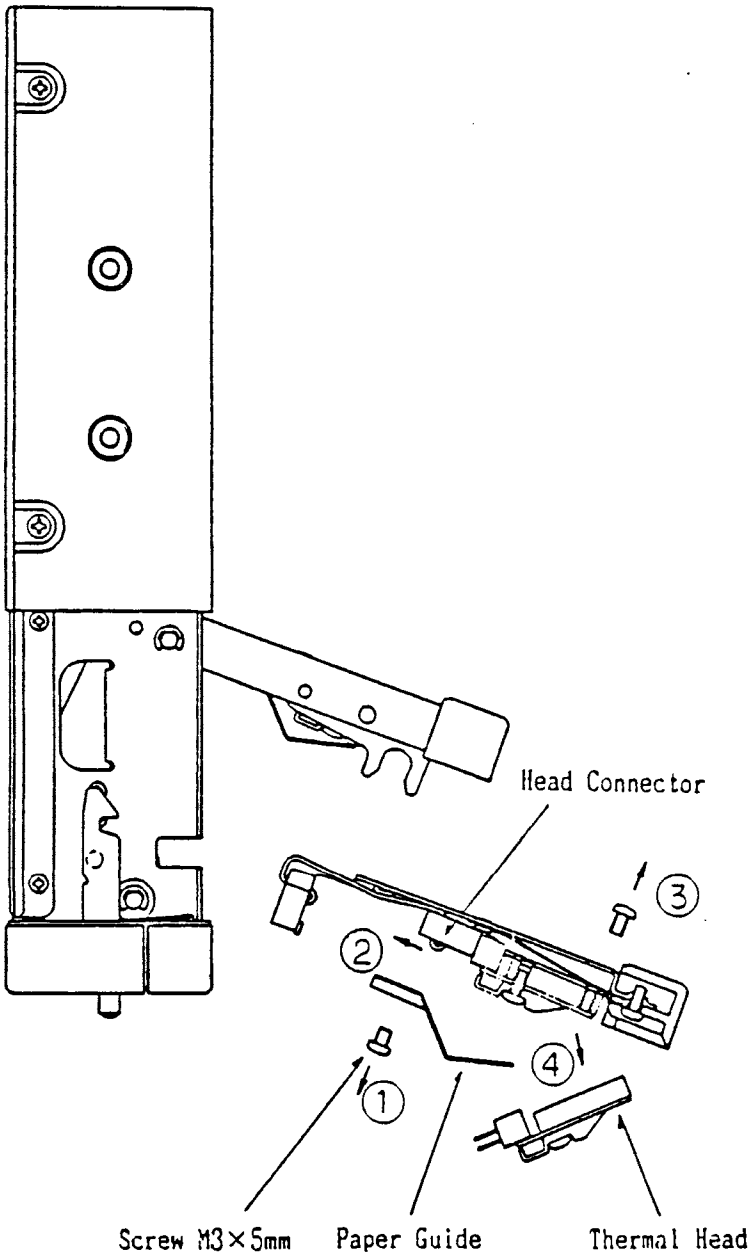
2. Oversize holes in the motor mounting plate permit a slight movement; locate the plate so that you feel that the reduction gear engages on the idle gear without strain.

3. Tighten the screws, and complete the reassembly, reversing the removal procedure.



Thermal Head

1. Remove the paper guide (two screws).
2. Disconnect the head connector.
3. Remove the thermal head (two screws).
4. Install the replacement head and reassemble in reverse order.



Built-in Test

The *EPU 40* contains a program for a functional test.

To activate the program, press the **Feed** button, keep it depressed, and apply power by actuating the **ON/OFF** button.

The following print pattern will be obtained:

```
 !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmno
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éabcdefghijklmnopqrs
tuvwxyzäöåü■ !"#$%&'
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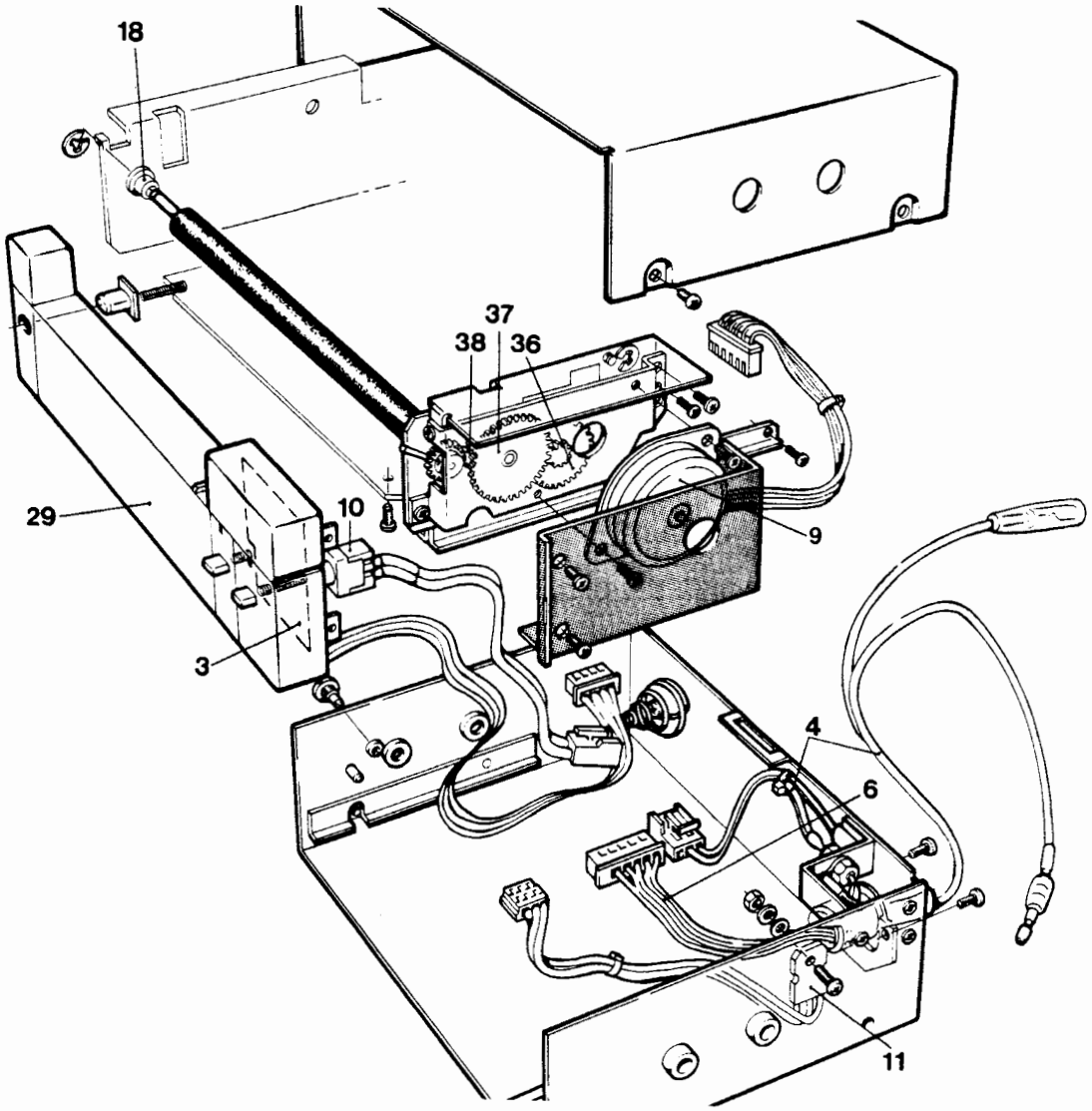

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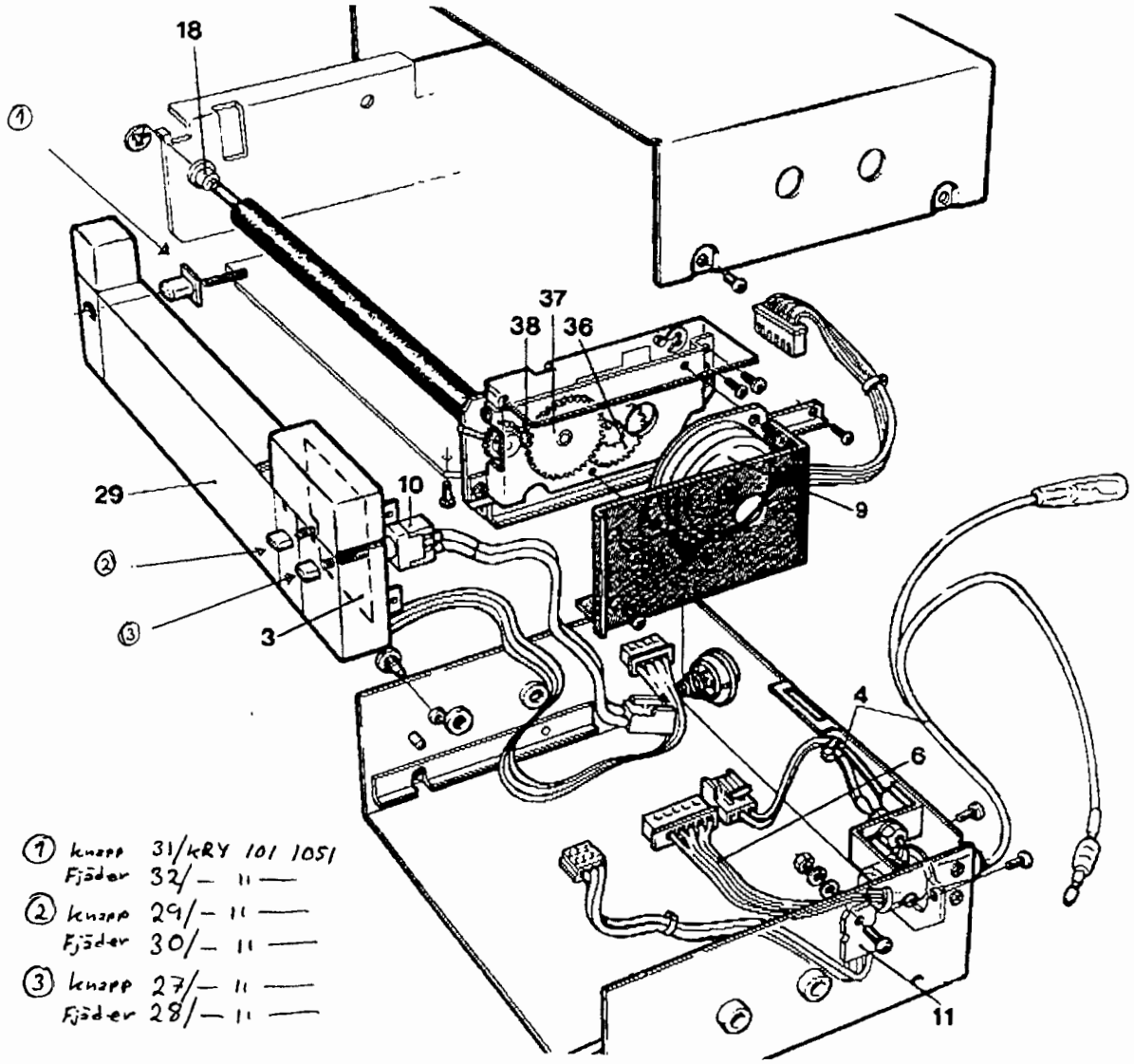

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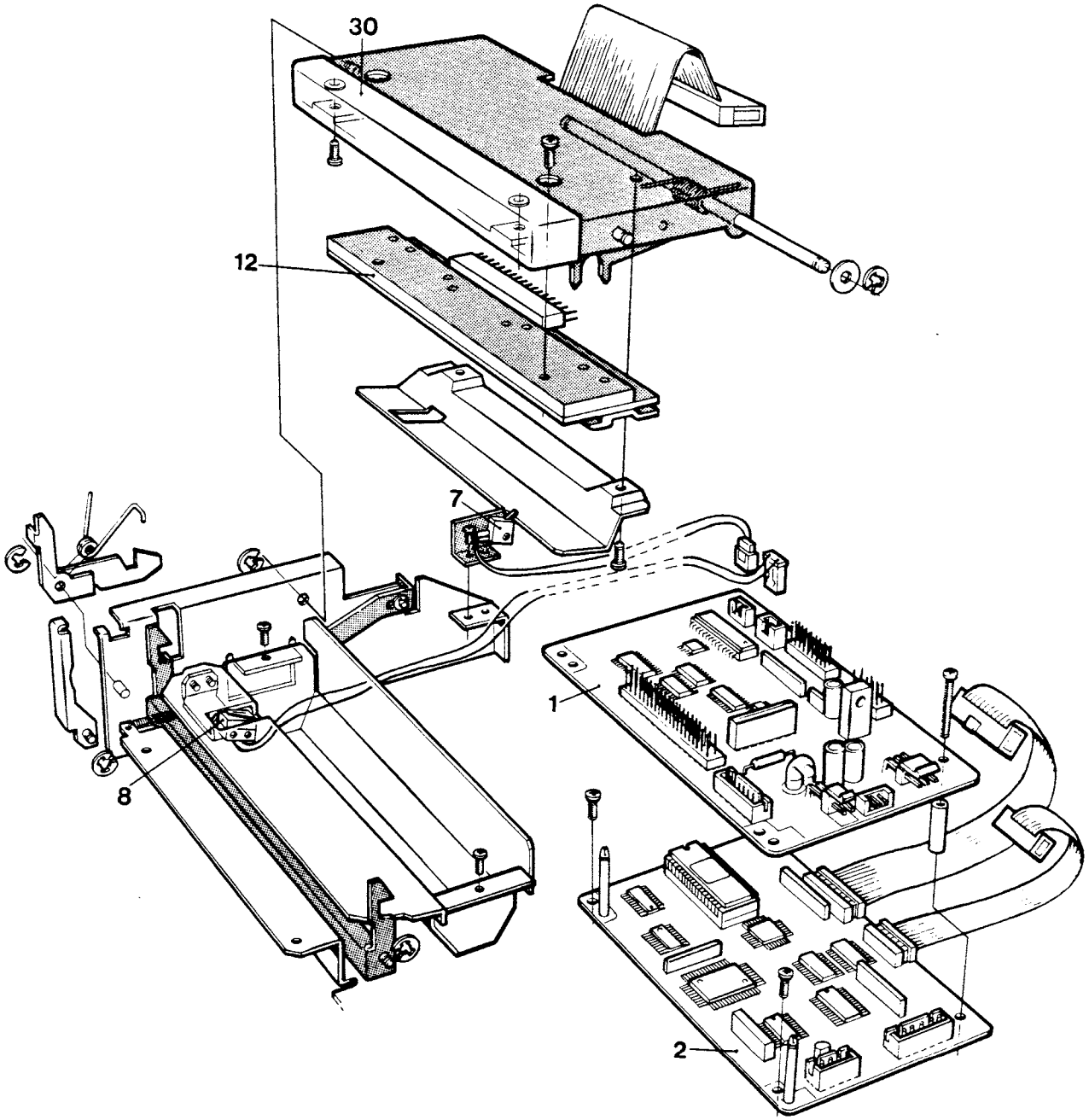

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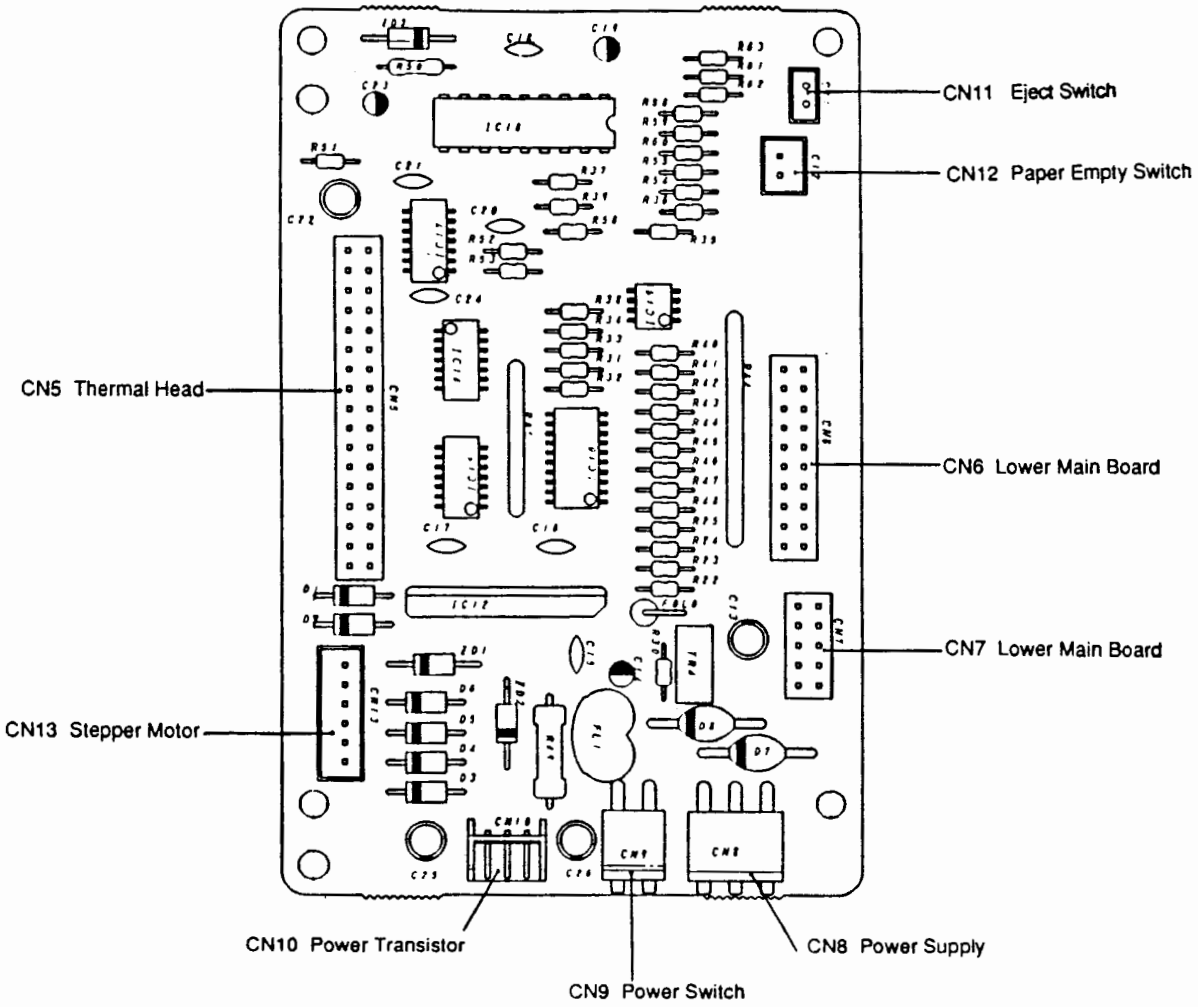
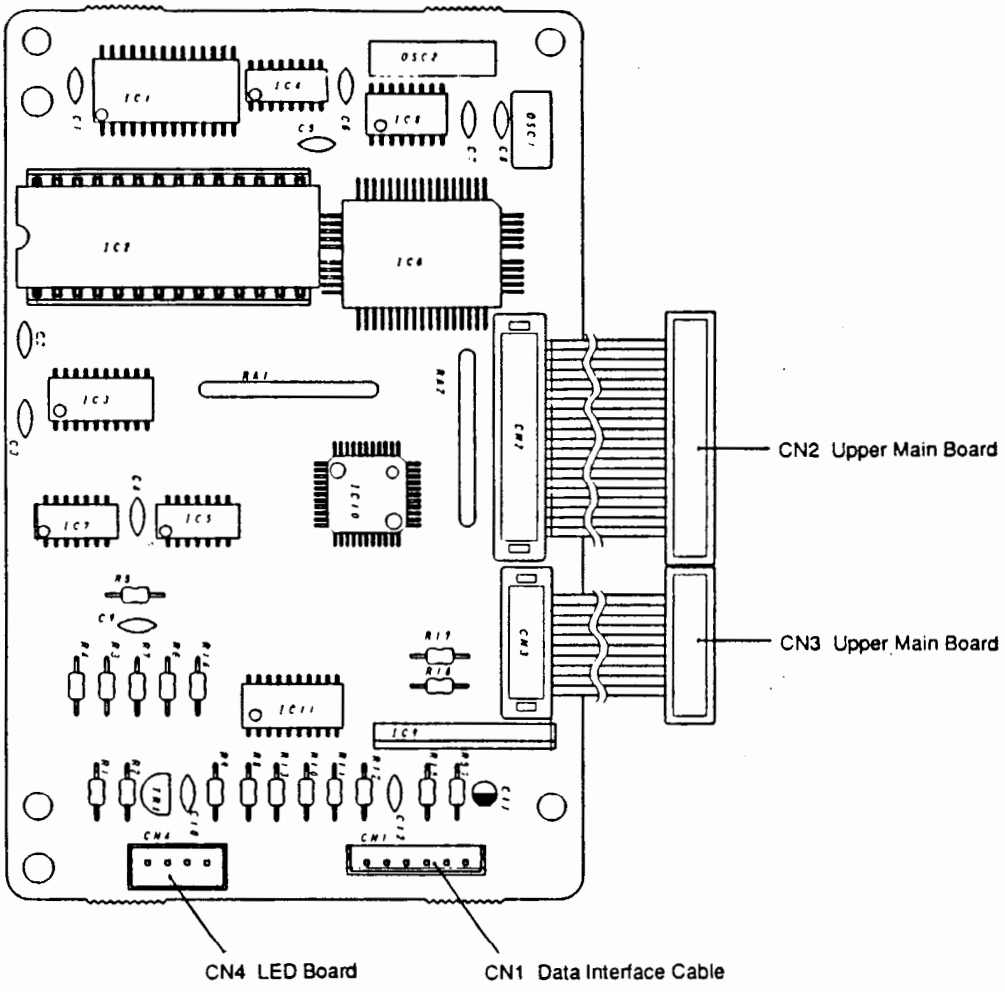
Connectors

Upper Main Board

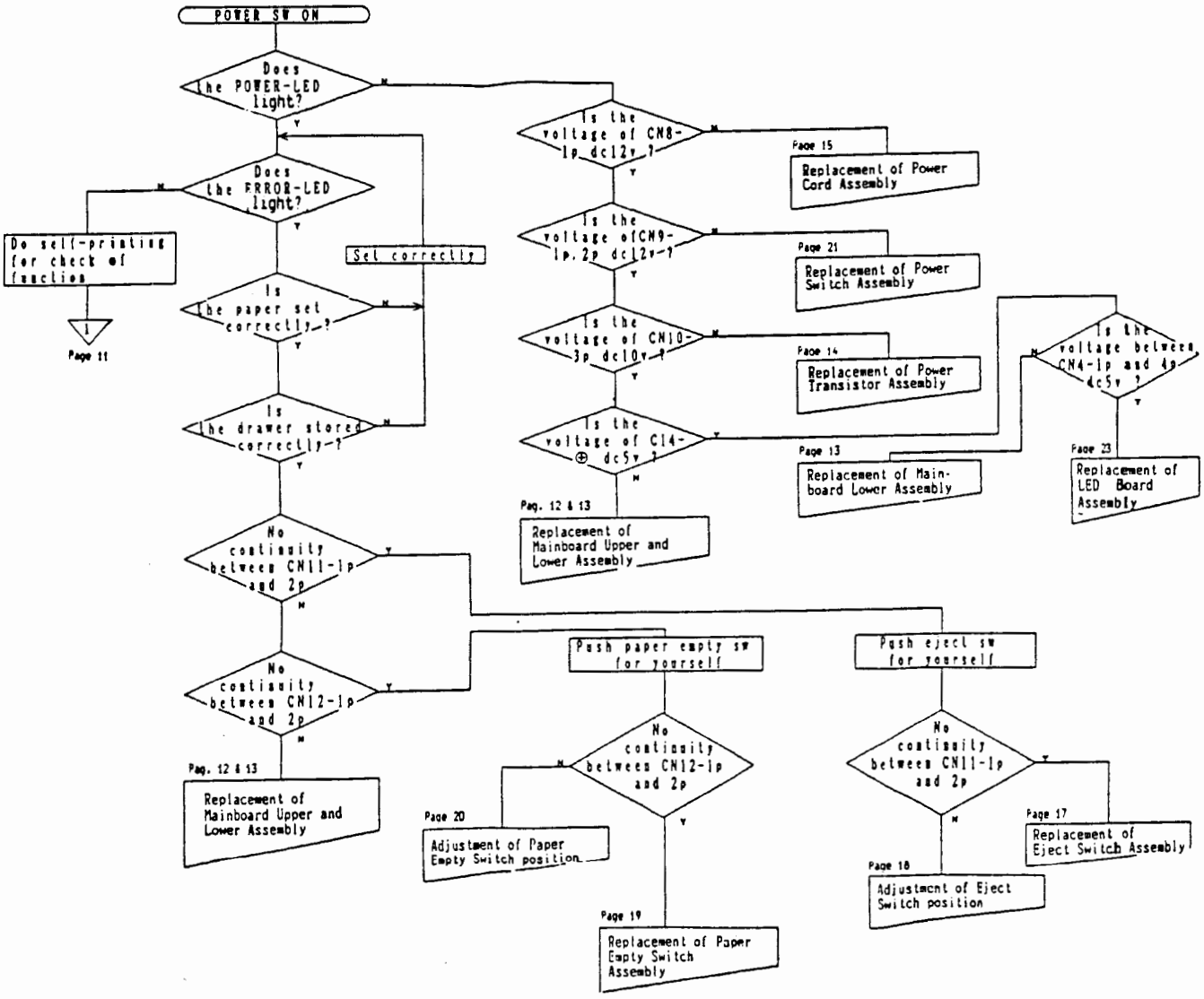


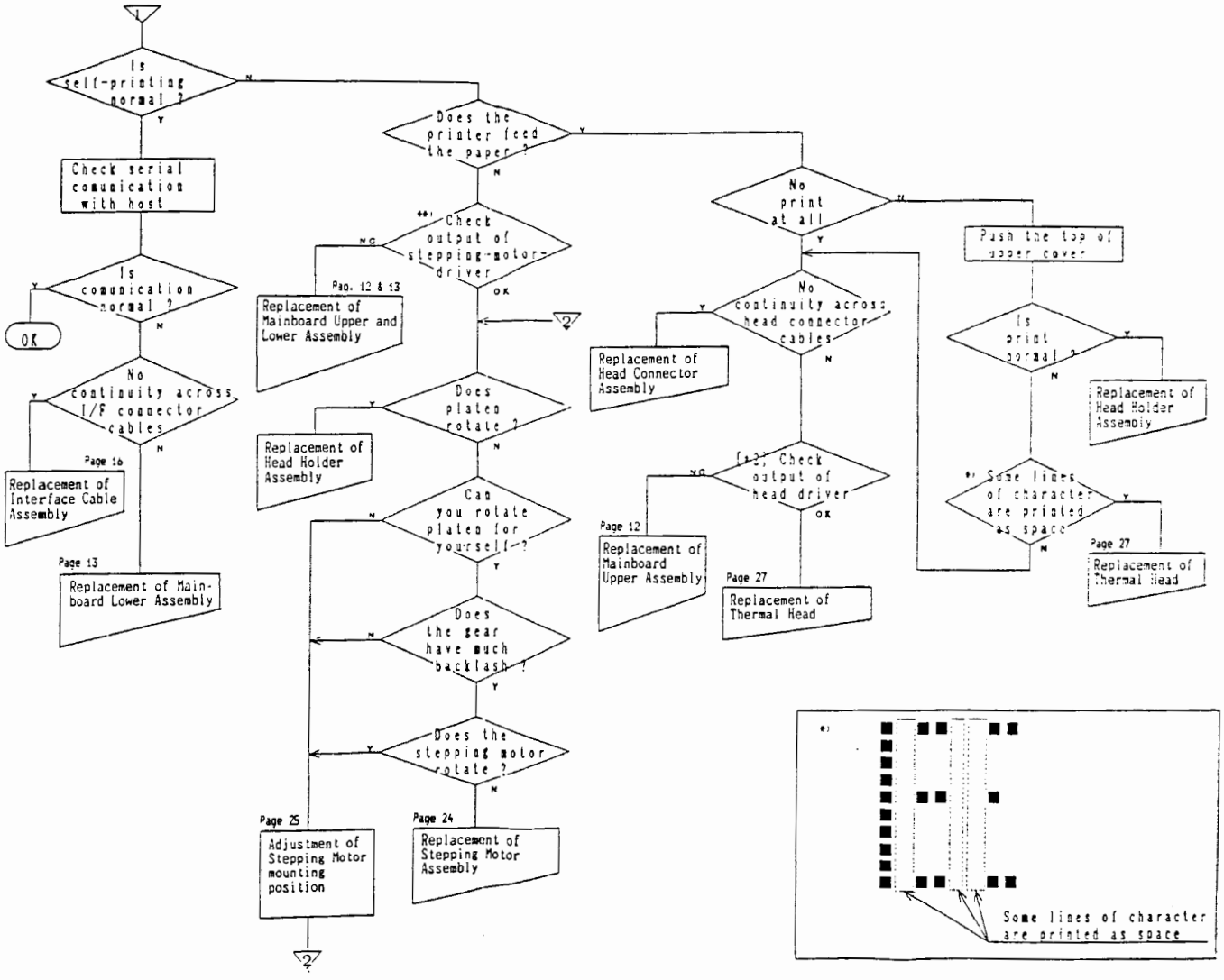
Lower Main Board



Trouble Shooting

Trouble shooting for repair on module level is performed according to the flow charts below.





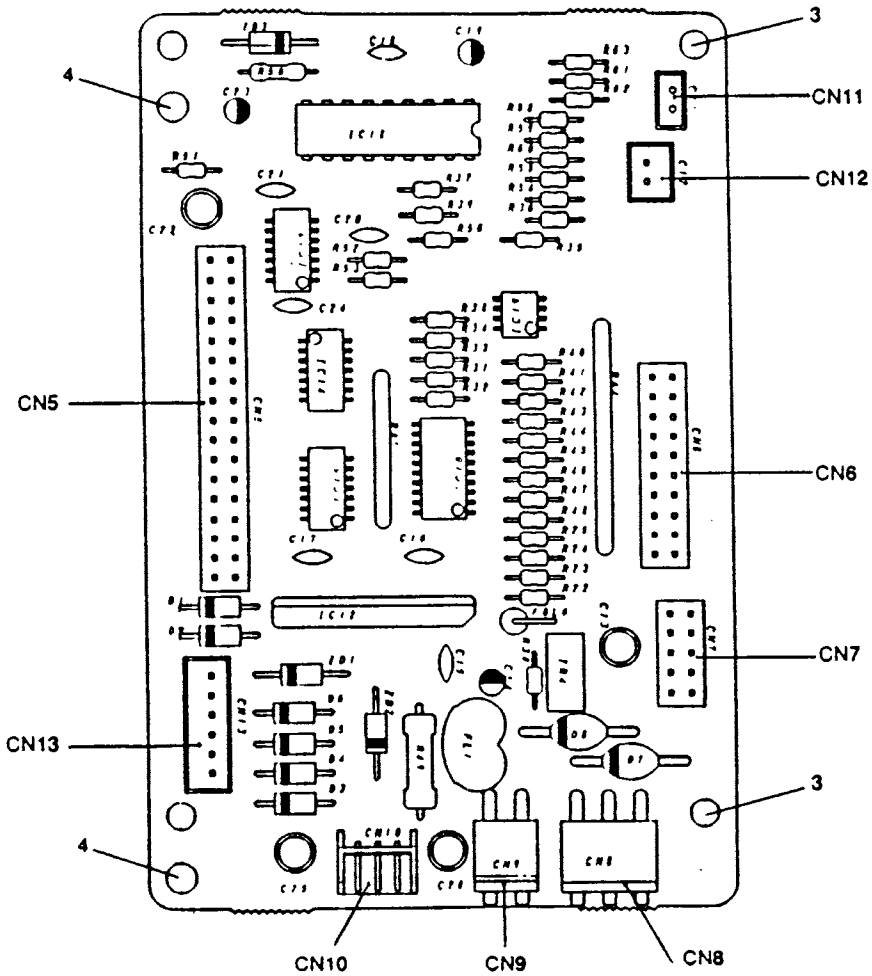
(**) See Technical Description

Module Replacement

Note: Whenever a cable strap must be opened, just cut it, and use a new strap when reassembling.

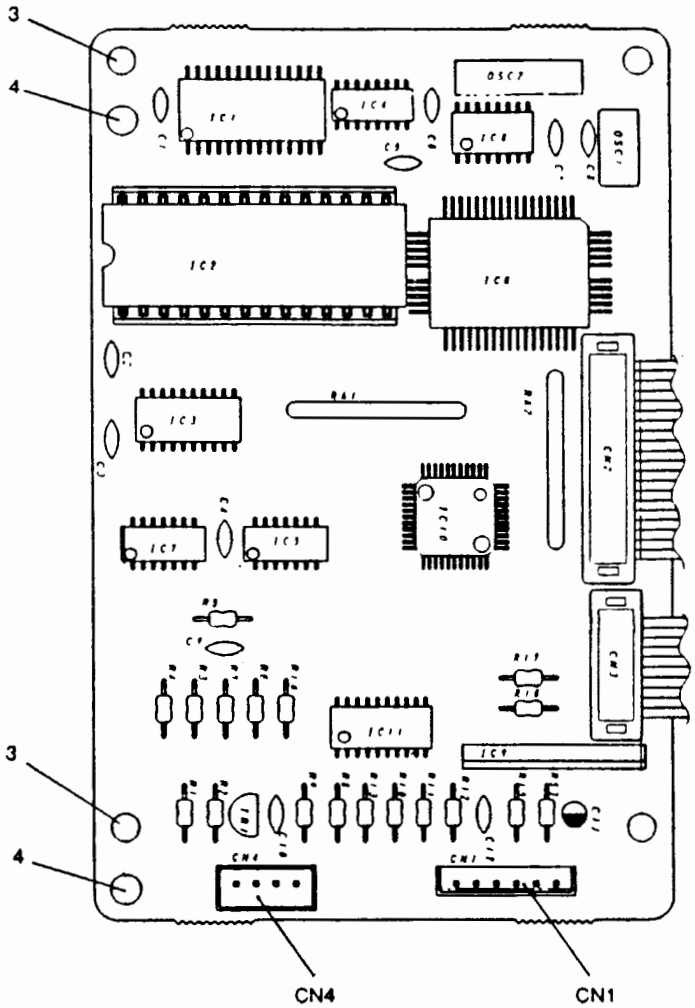
Upper Main Board

1. Remove the outer top cover (four screws).
2. Remove connectors CN5 - CN13.
3. Remove two screws and spacing collars (3).
4. Unsnap the circuit board from the support posts (4).
5. Install the replacement board in reverse order.



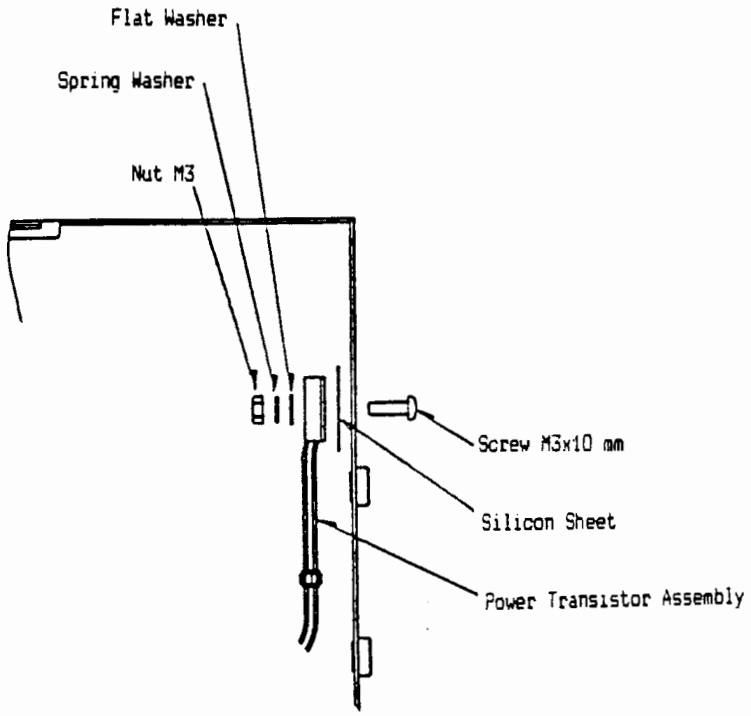
Lower Main Board

1. Remove the upper main board (previous section).
2. Remove connectors CN1 and CN4.
3. Remove two screws (3).
4. Remove two support posts (4).
5. Install replacement board in reverse order.



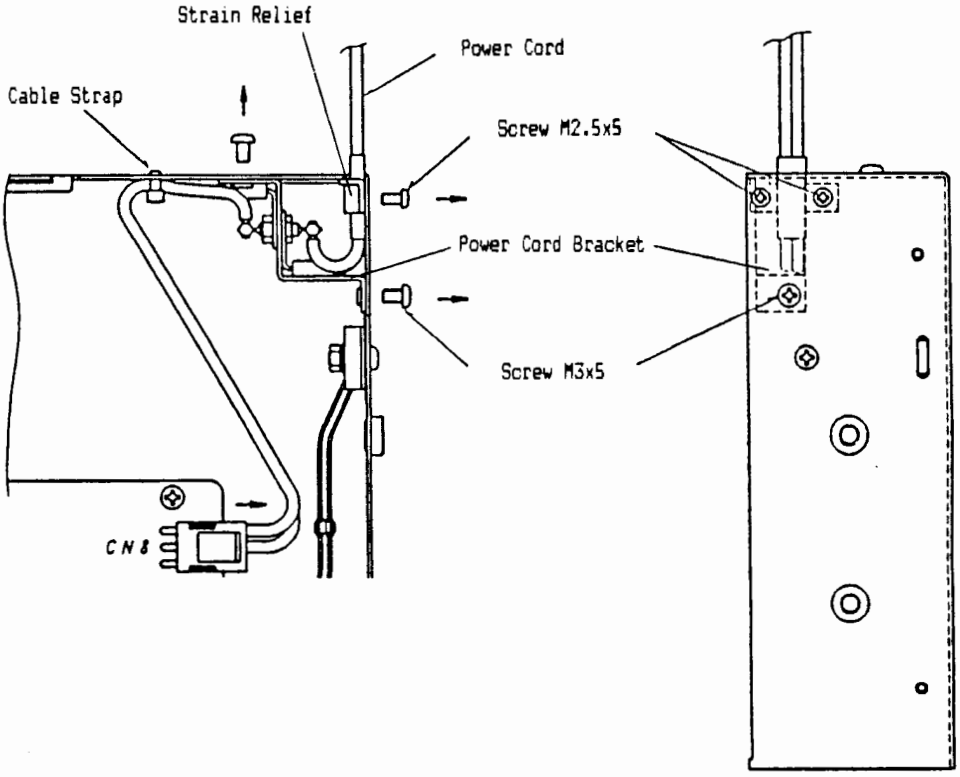
Power Transistor

1. Remove the outer top cover.
2. Remove connector from position marked CN10 on the upper main board.
3. Note the position of, and cut cable straps as requird to free the transistor cable from the other cables and from the frame.
4. Unscrew the transistor and make the replacement.
5 Reassemble in reverse order, using new cable straps to secure the cables.



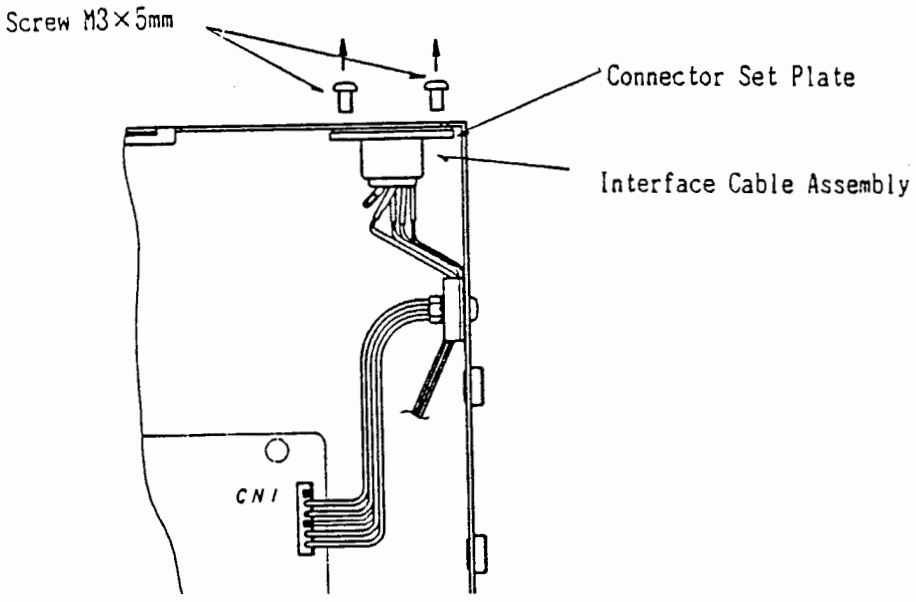
Power Cord Assembly

1. Remove the outer top cover.
2. Disconnect the power cord connector from the upper mainboard.
3. Cut off the cable strap at the rear.
4. Remove the strain relief (two scews).
5. Remove the power cord bracket (two screws), and lift out the power cord assembly.
6. Reassemble in reverse order, using a new cable strap.



Interface Cable

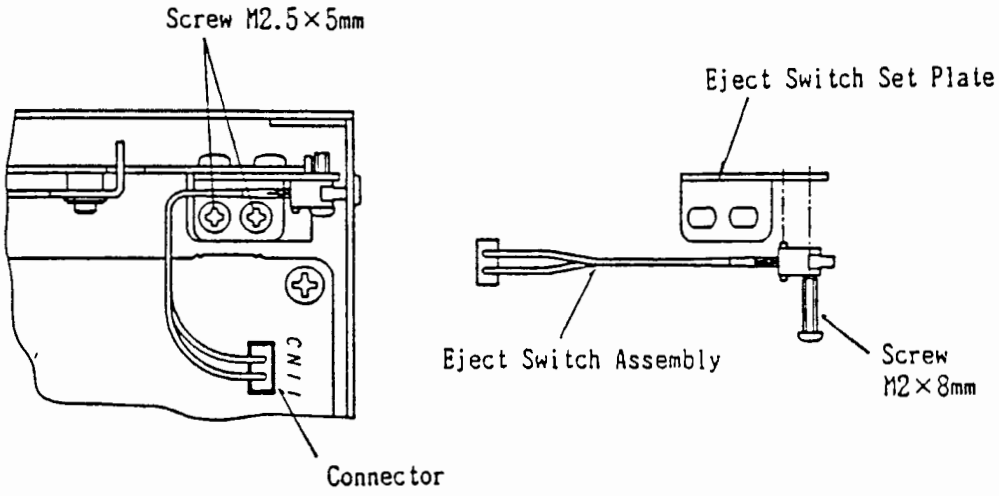
1. Remove the upper main board.
2. Cut off the cable strap attaching the interface cable and the transistor cable to the frame.
3. Remove connector CN1.
4. Remove two screws at the rear and replace the interface cable.
5. Assemble in reverse order, using a new cable strap to secure the power transistor cable and the interface cable on the frame.



Eject Switch

Replacement

1. Remove the outer top cover (four screws).
2. Remove connector marked CN11 .
3. Remove the switch assembly (two M2.5 screws).
4. Remove the switch from its holder (M2 screw).
5. Assemble in reverse order, and adjust as described in the next section.

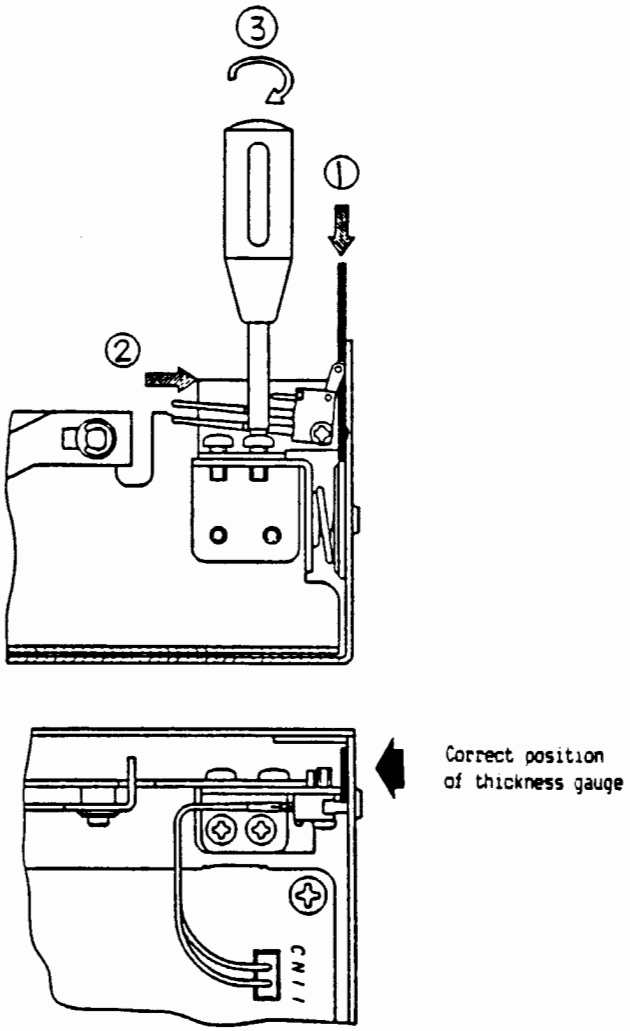


Adjustment

1. Place a thickness gauge of 0.6 mm as shown in the figure (in front of the *holder*, not the switch lever).
2. Push the holder in the direction of the arrow.
3. Tighten the two screws, and remove the gauge.

Functional Check

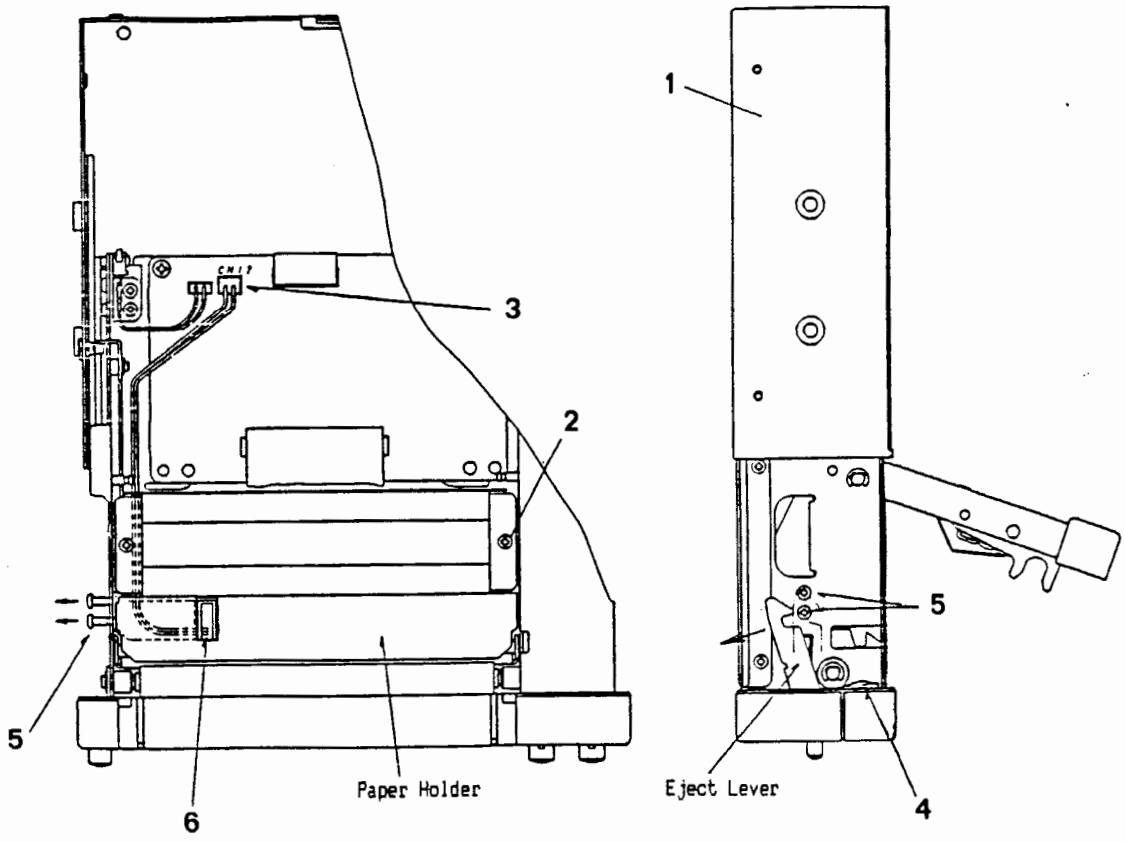
1. Insert a paper roll.
2. Reassemble the outer top cover and push the printer fully into its cassette.
3. Press the ON/OFF button and see that the indicator lights.
4. Press the Eject button. This should cause the printer to move a bit forward and the Error indicator to light.
5. Push the printer back in place and make sure that the Error indication stops.



Paper Empty Switch

Replacement

1. Remove the outer top cover.
2. Unscrew two screws and remove the paper holder, inserting a screwdriver under the holder and carefully lifting it free of the switch; no force is required.
3. Remove connector marked CN12.
4. Unhook the eject lever spring from its seating in the side frame.
5. Keep the eject lever in the "low" position and remove two M2.5 screws.
6. Remove the switch assembly.
7. Unscrew the switch from its holder and fit the replacement switch (delivered with connecting cable and connector as a spare part).
8. Reassemble in reverse order. In assembling, the rear flange of the paper holder should be located behind the lid opening springs but in front of the stop posts. Correctly located, the holder falls into place by itself.
9. Adjust as described in next section.

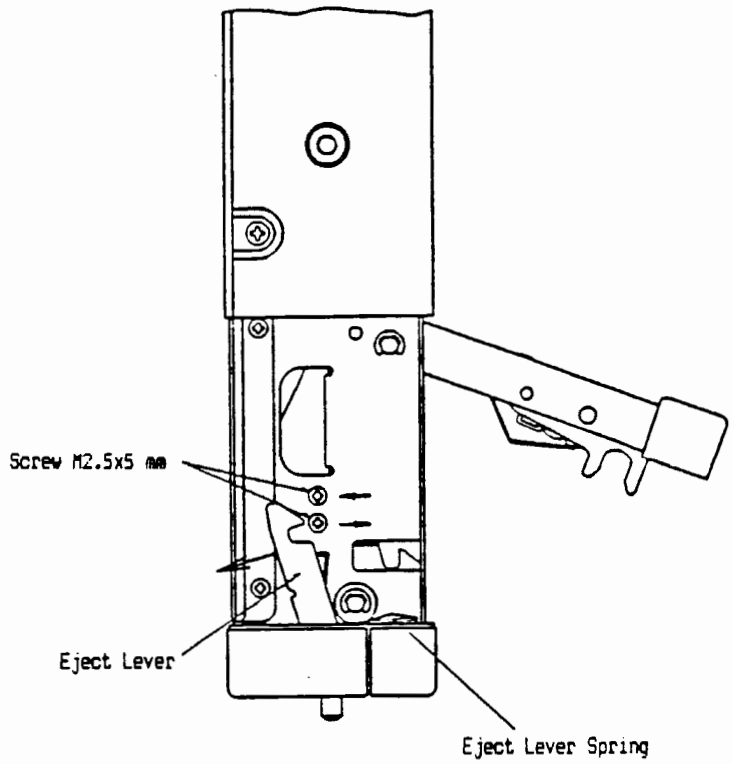


Adjustment

1. Unhook the eject lever spring.
2. Hold the eject lever in the "low" position and back off two 2.5x5 mm screws so they become just friction tight.
3. Adjust the switch as required by moving the screws in the oversize holes.
4. Tighten the screws and fit the eject lever spring.

Functional Check

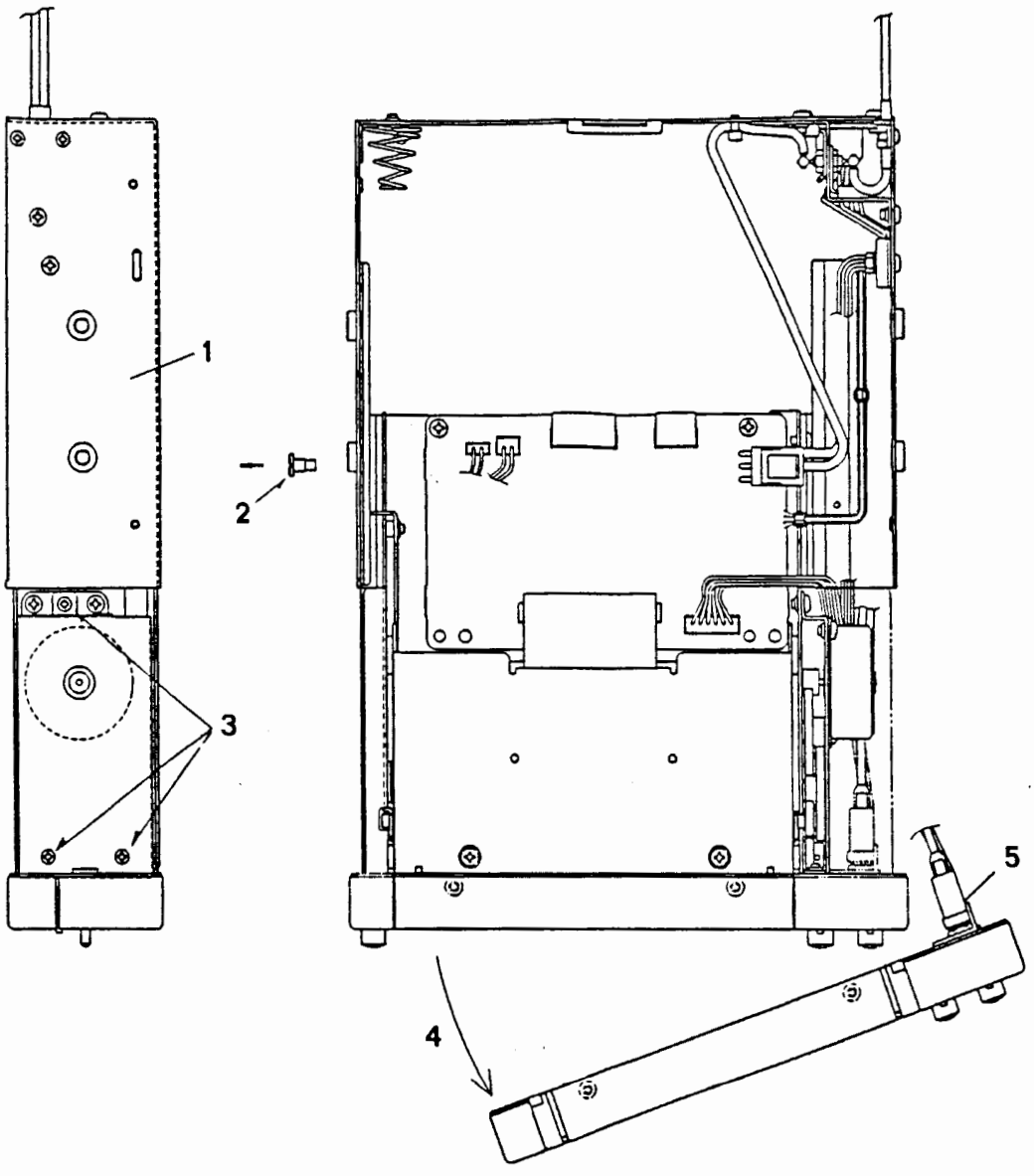
1. Eject the printer and insert a piece of paper from the front, seeing that it covers the Paper Empty switch.
2. Push the printer back into working position, pull out the paper, and make sure that the red LED goes on.



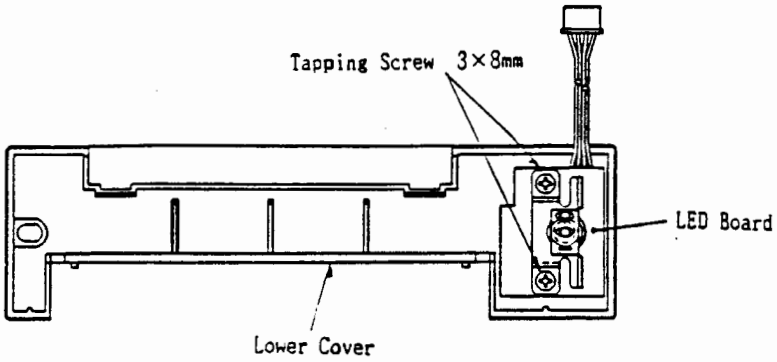
Power Switch

1. Remove the outer top cover.
2. Remove the threaded stop post on the left side.
3. Remove the side cover on the right side (three screws). If necessary, disconnect two cables from the upper mainboard and one from the lower.
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the power switch assembly from the front panel (two screws and connector marked CN9).

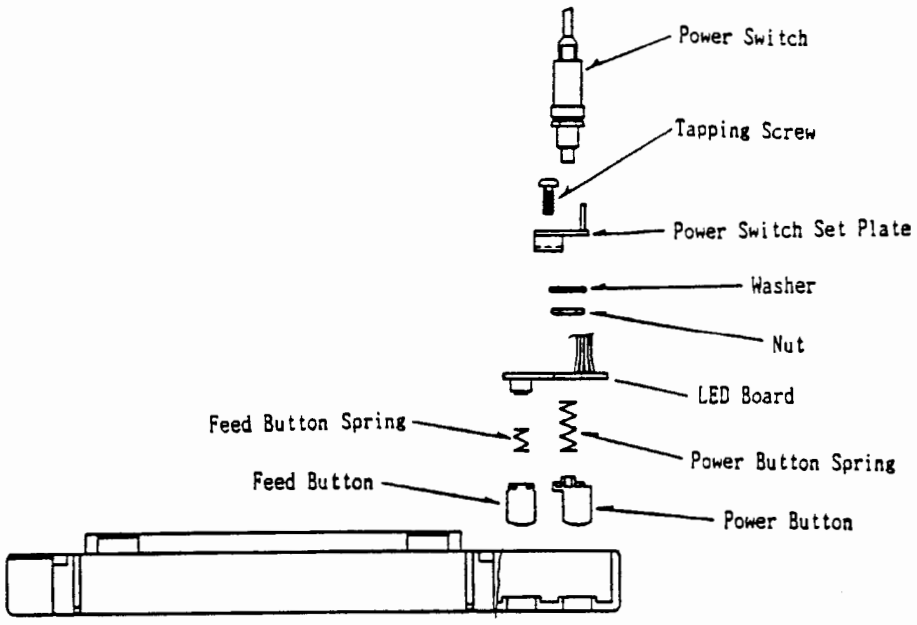
6 Remove a nut to detach the power switch from its fixing bracket, and fit the new switch (delivered with cable and connector).



7. Reassemble in reverse order. The LED board came loose when the switch was removed. Use the figure below to locate knobs, springs etc. correctly.



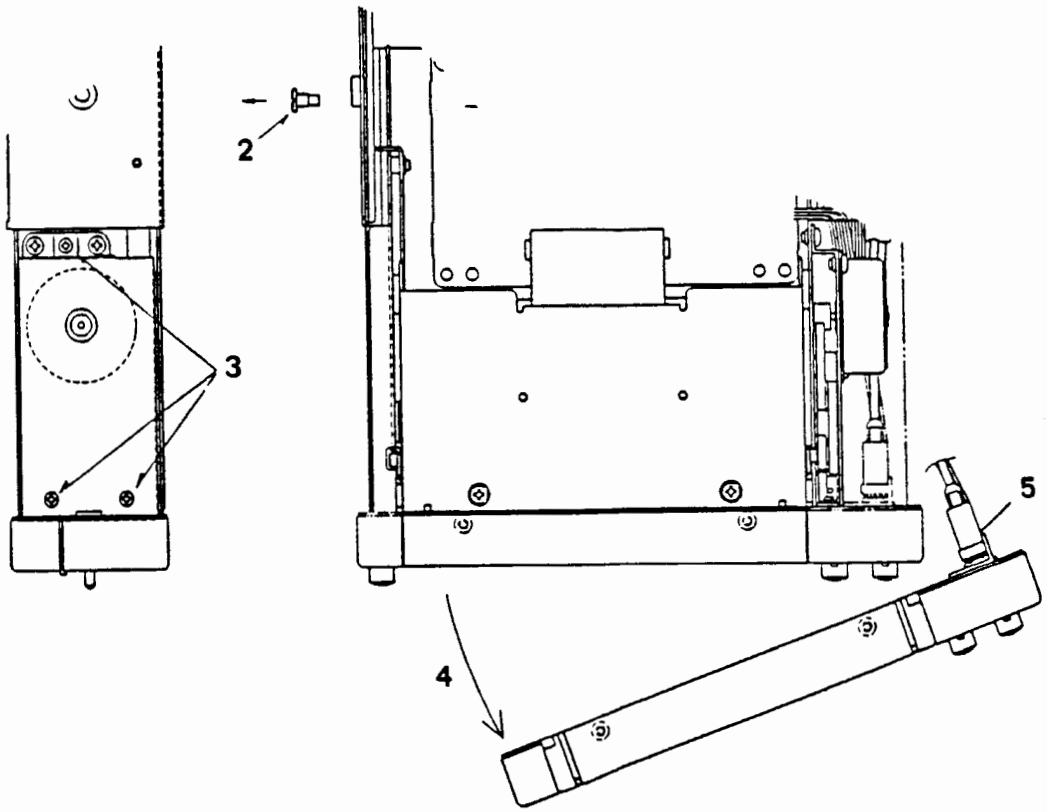
REAR VIEW



TOP VIEW

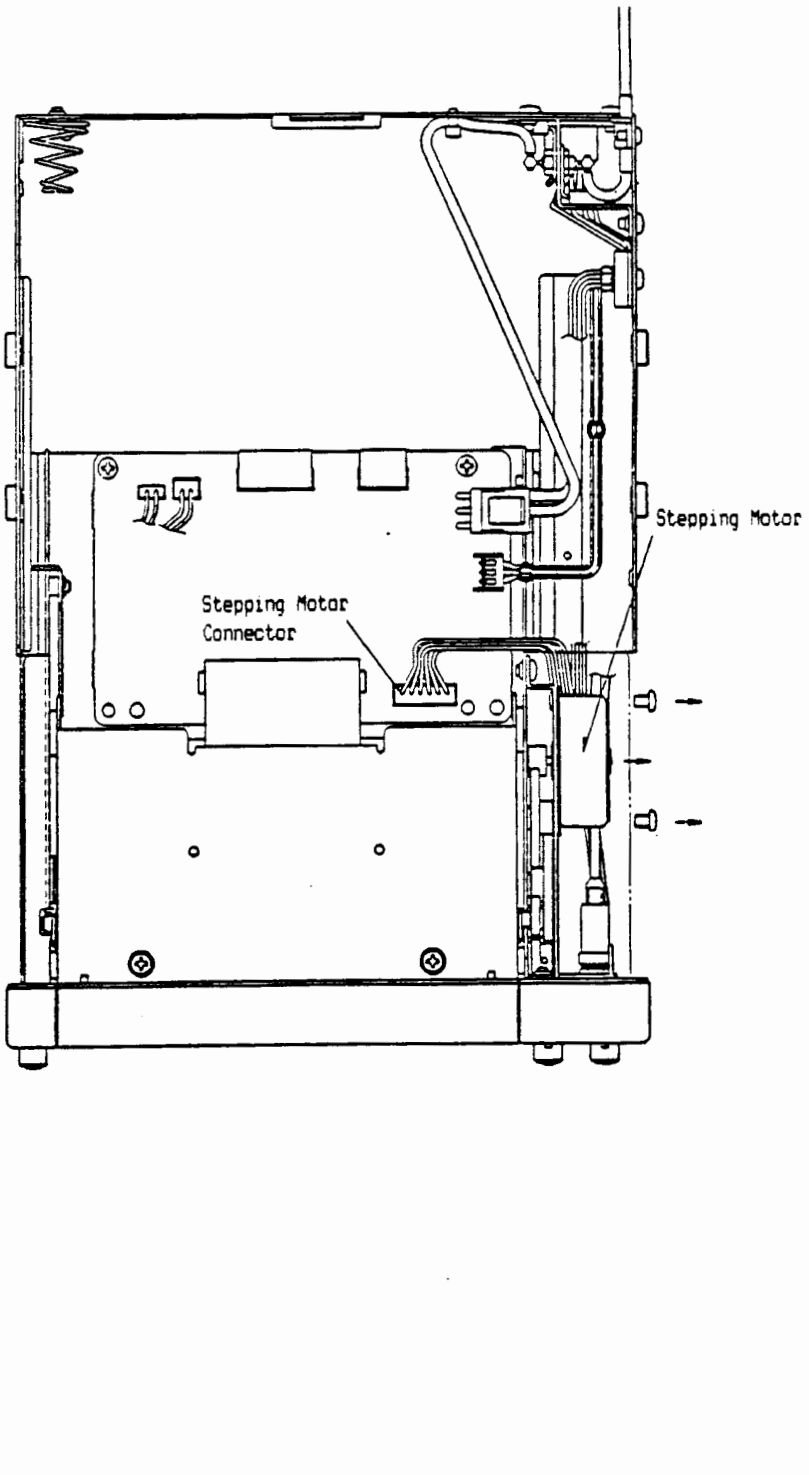
LED BOARD

1. Remove the upper main board.
2. Remove the threaded stop post on the left hand side.
3. Remove the side cover on the right hand side (three screws).
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the power switch assembly from the front panel (two screws).
6. The LED board is now free and can be replaced.
7. Reassemble in reverse order, using the figure on the opposite page to position knobs, springs etc. correctly.



Stepping Motor

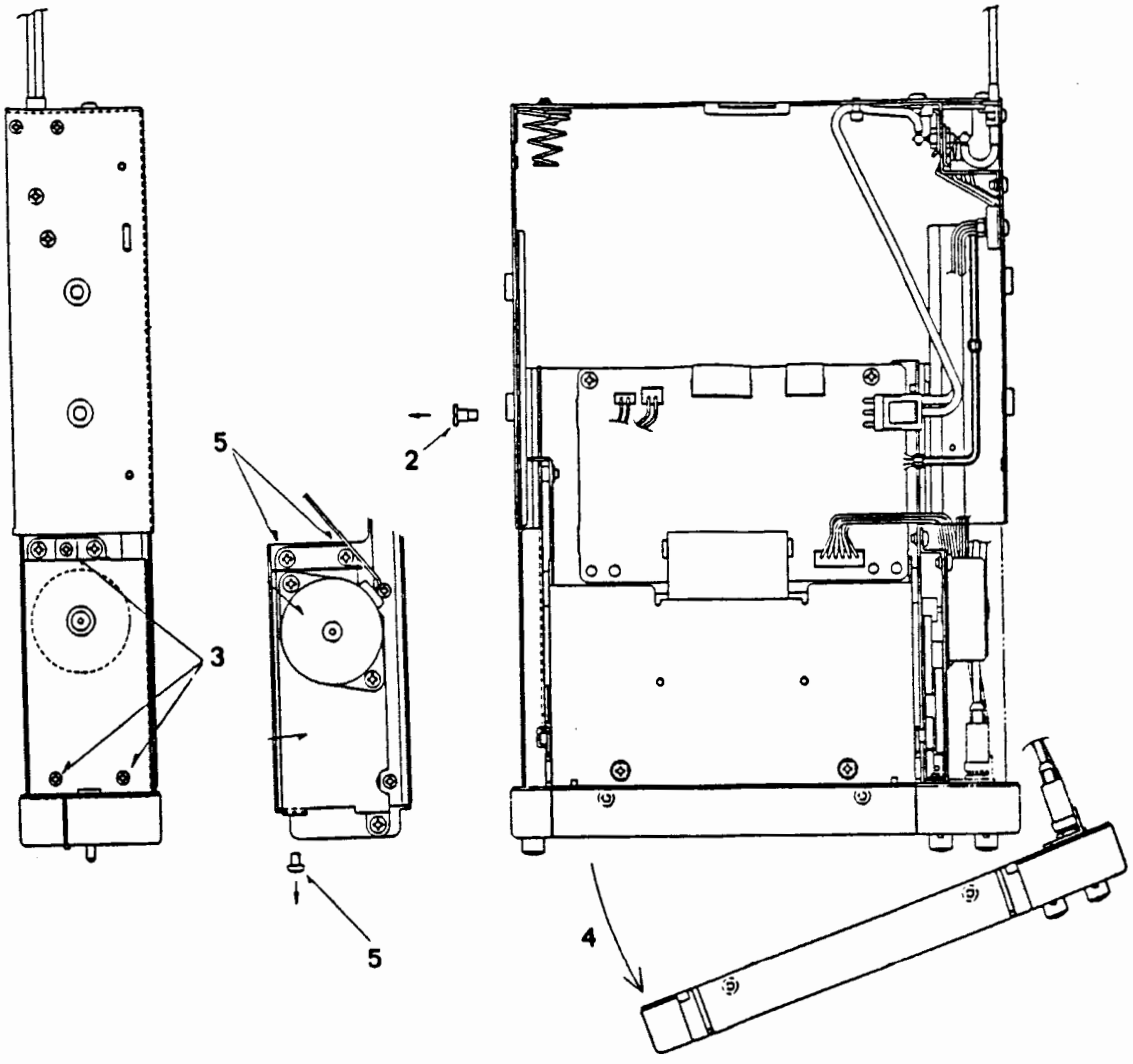
1. Disassemble as for replacement of power switch.
2. Remove motor connector from upper mainboard.
3. Remove the stepping motor (2 screws) and make the replacement.



Gear Train

Removal

1. Remove the outer top cover
2. Remove the threaded stop post on the left side.
3. Remove the side cover on the right side (three screws). If necessary, disconnect two cables from the upper mainboard and one from the lower.
4. Remove two screws from the bottom side and make free the front panel, the left side out first. Be sure not to loose the Eject button.
5. Remove the motor mounting plate (three screws from the side and one from the front).
6. Replace gears as required.
7. Reinstall the assembled motor mounting plate, but leave the screws untightened to allow for adjustment.



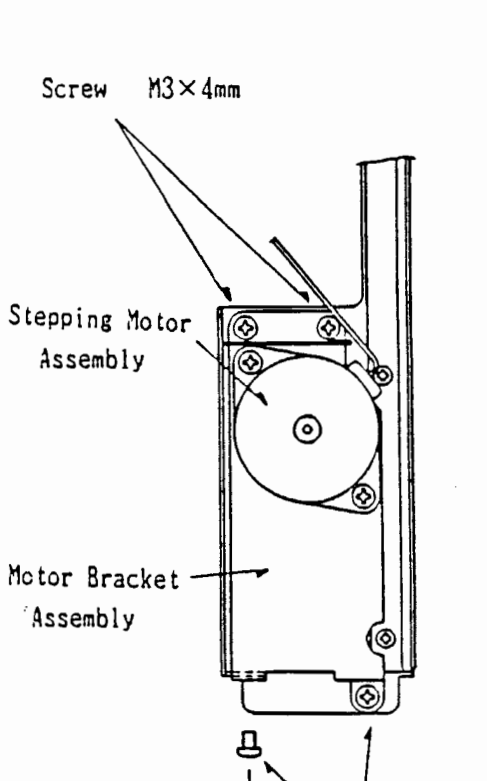
Adjustment

The motor mounting plate can be moved for an adjustment of the engagement between the idle gear and the reduction gear that provides drive to it.

1. Make positive that the three side screws and the front screw are just friction tight.

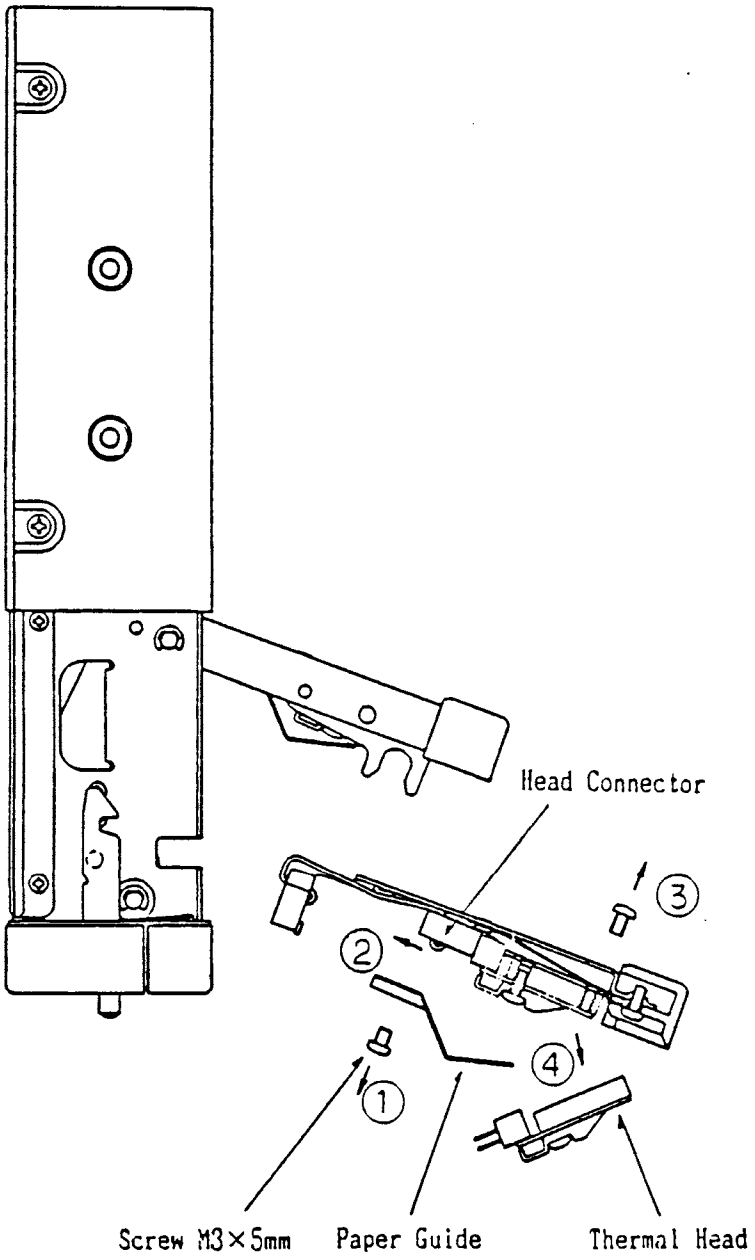
2. Oversize holes in the motor mounting plate permit a slight movement; locate the plate so that you feel that the reduction gear engages on the idle gear without strain.

3. Tighten the screws, and complete the reassembly, reversing the removal procedure.



Thermal Head

1. Remove the paper guide (two screws).
2. Disconnect the head connector.
3. Remove the thermal head (two screws).
4. Install the replacement head and reassemble in reverse order.



Built-in Test

The *EPU 40* contains a program for a functional test.

To activate the program, press the **Feed** button, keep it depressed, and apply power by actuating the **ON/OFF** button.

The following print pattern will be obtained:

```
!"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmno
pqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_
éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO
PQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?
ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./
0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnopqrstuvwxyzäöåü■
 !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmno
pqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_
éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO
PQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?
```

```
 !"#$%&'()*+,-./0123456789:;<=>?ÉABCDEFG
HIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefghijklmno
pqrstuvwxyzäöåü■ !"#$%&'()*+,-./01234567
89:;<=>?ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_
éabcdefghijklmnopqrstuvwxyzäöåü■ !"#$%&'
()*+,-./0123456789:;<=>?ÉABCDEFGHIJKLMNO
PQRSTUVWXYZÄÖÅÜ_éabcdefghijklmnopqrstuvw
xyzäöåü■ !"#$%&'()*+,-./0123456789:;<=>?
ÉABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÅÜ_éabcdefg
hijklmnopqrstuvwxyzäöåü■ !"#$%&'()*+,-./
```

```
 !"#$%&'()*+,-./0123
456789:;<=>?ÉABCDEFG
HIJKLMNOPQRSTUVWXYZÄ
ÖÅÜ_éabcdefghijklmno
pqrstuvwxyzäöåü■ !"#
$%&'()*+,-./01234567
89:;<=>?ÉABCDEFGHIJK
LMNOPQRSTUVWXYZÄÖÅÜ_
éabcdefghijklmnopqrs
tuvwxyzäöåü■ !"#$%&'
```

ERICSSON

PRODUKTÄNDRINGSINFORMATION
PRODUCT REVISION INFORMATION

Uppgjord - *Prepared*	Fakta ansvarig - *Subject responsible*	Nr - *No*				
KI/ECS/Y/TL PON	KI/ECS/Y/TL PON	109 21-KRY 101 1051/2-2 UEN				
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	R - läge *R - state*	från - *from*	till - *to*
KI/ECS/Y/TLC Lars Bratsberg		1993-01-19	A		R1A	R1B

Dokumentklass - *Document category*	Dokumentnr - *Document No.*
Kretsändringsinformation - *Circuit revision information*	1/109 21-
Materieländringsinformation - *Material revision information*	2/109 21-
Förbindningsändringsinformation - *Wiring revision information*	3/109 21-

Produktdokumentens revisionsstatus efter ändring, se 1095 -

Revision state of product documents after revision, see 1095 -

Thermal printer EPU40

1. TITLE AND ARTICEL CODE

Thermal printer EPU40, KRY 101 1051/2

2. REASON FOR REVISION

Correction in software concerning line feed. Earlier one line feed was less than one row.

Example:
7 line feed within a text was only approx 2 cm, instead of expected approx 3.1 cm.

This does not affect any existing application or installation, but the correction is neccessary if the product shall be offered as OEM.

3. OTHER PRODUCTS CONCERNED

Note. The correction does not affect any existing application or installation.

4. TECHNICAL SOLUTION

Revision changed to R1B. The printer has a new PROM.

Printers of R1A in stock are not to be upgraded.

However there is a possability to upgrade printers from KRY 101 1051/2 R1A to R1B by exchanging the prom. Also printers and package should be relabeled according to 151 86-KRY 101 1051/2 and 1/151 86-KRY 101 1051/2.

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No*				
KI/ECS/Y/TL PON	KI/ECS/Y/TL PON	109 21-KRY 101 1051/2-2 UEN				
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	R - läge *R - state*	från - *from*	till - *to*
KI/ECS/Y/TLC		1993-01-19	A		R1A	R1B

Dokumentklass - *Document category*	Dokumentnr - *Document No.*
Kretsändringsinformation - *Circuit revision information*	1/109 21-
Materieländringsinformation - *Material revision information*	2/109 21-
Förbindningsändringsinformation - *Wiring revision information*	3/109 21-

Produktdokumentens revisionsstatus efter ändring, se 1095 -

Revision state of product documents after revision, see 1095 -

Proms are produced by copying a Master Prom from the manufacturer AISIN. The Master Prom is stored by Y/TL. The prom does not have any Ericsson product number and shall only be marked with:

JB210 (Product)
1120G (Version)
E472 (Checksum)

The prom size is 27C256.

The description below is an extract from the Service manual, EN/LZB 126 1123/2 R1, which helps you to dismount the printer to be able to replace the prom on the Mainboard Lower Assembly.

SERVICE 6(38)

Replacement of mainboard upper assembly

- Remove the outer top cover (four screws).

1. Pull out connector *CN9* from *mainboard upper assembly*.
2. Pull out connector *CN10* from *mainboard upper assembly*.
3. Pull out connector *CN5* from *mainboard upper assembly*.
4. Pull out connector *CN6* from *mainboard upper assembly*.
5. Pull out connector *CN7* from *mainboard upper assembly*.
6. Pull out connector *CN8* from *mainboard upper assembly*.
7. Pull out connector *CN11* from *mainboard upper assembly*.
8. Pull out connector *CN4* from *mainboard upper assembly*.
9. Remove two screws (*M3x22mm*) and pull out two *support collars*.
10. Take out *mainboard upper assembly* and replace it.

*

- After replacement, assemble the parts in the reverse order.

* Replace the prom on the mainboard lower assembly.

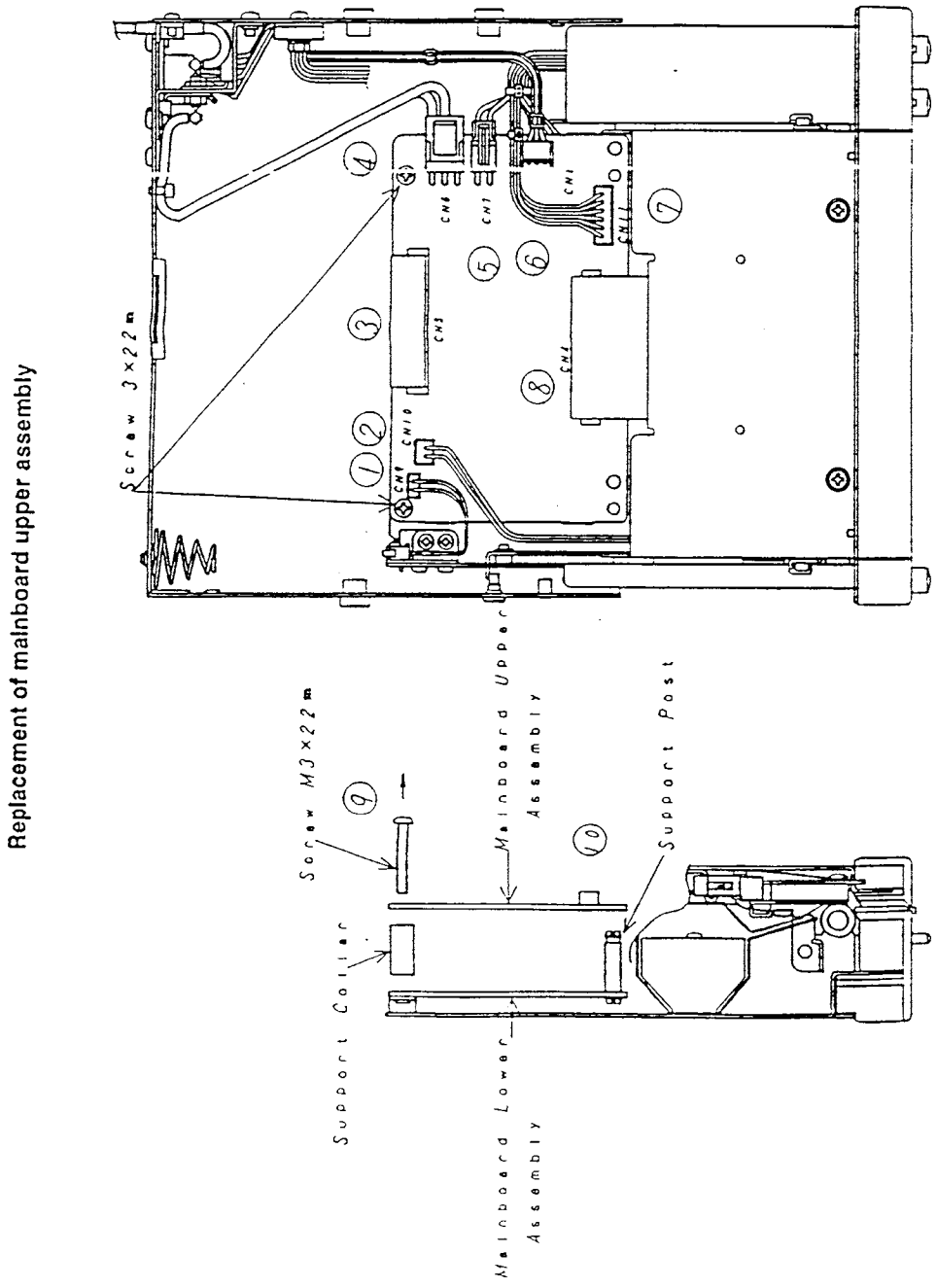
Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No*				
KI/ECS/Y/TL PON	KI/ECS/Y/TL PON	109 21-KRY 101 1051/2-2 UEN				
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	R - läge *R - state*	från - *from*	till - *to*
KI/ECS/Y/TLC		1993-01-19	A		R1A	R1B

Dokumentklass - *Document category*	Dokumentnr - *Document No.*
Kretsändringsinformation - *Circuit revision information*	1/109 21-
Materieländringsinformation - *Material revision information*	2/109 21-
Förbindningsändringsinformation - *Wiring revision information*	3/109 21-

Produktdokumentens revisionsstatus efter ändring, se 1095 -

Revision state of product documents after revision, see 1095 -

Replacement of mainboard upper assembly



ERICSSON

EN/LZB 126 1123/2 R1

ERICSSON

PRODUKTÄNDRINGSINFORMATION
PRODUCT REVISION INFORMATION

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No*				
KI/ECS/YA/TL PON	KI/ECS/YA/TL PON	109 21-KRY 101 1051/2-1 Uen				
Dokansv/Godk - *Doc respons/Approved* / Kontr - *Checked*		Datum - *Date*	Rev	R - läge *R - state*	från - *from*	till - *to*
KI/ECS/YA/TLC Lars Brabbery		1991-12-12	A		-	R1A

Dokumentklass - *Document category*	Dokumentnr - *Document No.*
Kretsändringsinformation - *Circuit revision information*	1/109 21-
Materieländringsinformation - *Material revision information*	2/109 21-
Förbindningsändringsinformation - *Wiring revision information*	3/109 21-

Produktdokumentens revisionsstatus efter ändring, se 1095 -

Revision state of product documents after revision, see 1095 -

Thermal printer EPU40

1. TITLE AND ARTICEL CODE

Thermal printer EPU40, KRY 101 1051/2

2. REASON FOR REVISION

The printer KRY 101 1051/2 R1A is similar to KRY 101 1051 R3A, but have new hardware and software. If only the revision was changed, there would be difficulties in handling the product concerning customer support and stocks.

3. TECHNICAL SOLUTION

Instead of using KRY 101 1051 R4A we use KRY 101 1051/2 R1A. A new Service manual and Spare part list describing the new hardware is produced for the new product.

4. OTHER PRODUCTS CONCERNED

None

AO PYB069R001

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*		
LD/ECS/F/TTE LR	LD/ECS/F/TTE	1301-KRY 101 1051 UEN		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
LD/ECS/F/TTEC SS		1990-07-09	C	

Page 1 2-5 6 7-24
Revision C B C B

Technical and functional specification for thermal line-printer EPU 40.

Enclosure 2 to Contract PIA 89:040.

1. Product

Manufacturer: AISIN SEIKI CO. LTD.
Model: JB 210 S
Version: 1120E

Ericsson Identification Number: KRY 101 1051 R3A

2. Applicable Documents

AISIN SEIKI Specification of built-in printer for Ericsson Radio Systems AB.
Revision *4, Dated Mar. 2, 1990.

3. Additions and changes

3.1 Each printer shall be individually packed with foam cushions in a cardboard-box suitable for further transportation.

3.2 One roll of thermal paper shall be supplied and by-packed each printer.

3.3 One of each Ericsson document: LZT 126 2147 R2, LZT 123 278/2, LZT 123 278/3 and LZT 123 278/4 shall be bypacked each printer.

3.4 Each package shall be marked with a label on one side, showing the Ericsson Identification Number.

8 EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

R

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*		
LD/ECS/F/TTE LR	LD/ECS/F/TTE	1301-KRY 101 1051 UEN		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
LD/ECS/F/TTEC SS		1990-03-15	B	

MAR. 2.1990

SPECIFICATION

OF

BUILT-IN PRINTER

FOR

ERICSSON RADIO SYSTEMS AB

(Code:KRY 101 1051 R3A)

OCT. 20. 1989
NOV. 20. 1989 *1
DEC. 25. 1989 *2
JAN. 25. 1990 *3
MAR. 2. 1990 *4

SUMITOMO CORPORATION:

AISIN SEIKI CO., LTD: Masataka Ota

SIGNATURE FOR APPROVAL

8 EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

MAR. 2.1990

1. GENERAL SPECIFICATIONS

	ITEM	SPECIFICATION	
I	Dimensions	178(W) × 50(H)×162(D)mm 1DIN	
II	Weight	approx. 1.85kg	
III	Paper Insertion	Drawing Type (see appendix E)	*3
IV	Power Requirements 1) Character mode 2) Graphic mode(full mark printing) 3) Stand-by	 1) DC12V 1.2A(average) 6.6A(max) 2) DC12V 1.6A(average) 9.4A(max) 3) DC12V 0.2A	*1
V	Printing Type	Thermal Line Dot	
VI	Paper with core 1) Type 2) Width 3) Roll Diameter 4) Roll Length	 1) Thermal Paper (class GIII, see appendix F) 2) 110 mm 3) 30 mm 4) approx. 7m	*1 *3
VII	Interface	Serial Interface	
VIII	Thermal Head 1) Number of Dots 2) Dot Pitch	 1) 832 dots/line 2) 0.125 mm/dot(8 dots/mm)	
IX	Printing Speed Operating Condition temperature:25 ℃ voltage :DC13V	 1) 1line=20 characters approx. 1.00 sec/line 2) 1line=40 characters approx. 1.28 sec/line 3) 1line=80 characters approx. 1.65 sec/line (except data receiving)	*1
X	Paper Feed Pitch	0.130 mm	
XI	Character Sets	Sweden/Finland Denmark/Norway Germany Italy France/Belgium Spain Canada(France) United States United Kingdom	*1
XII	Maintenance	Free	
XI	MTBF (Main Board Only)	16000H	*2

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*
LD/ECS/F/TTE LR	LD/ECS/F/TTE	1301-KRY 101 1051 UEN

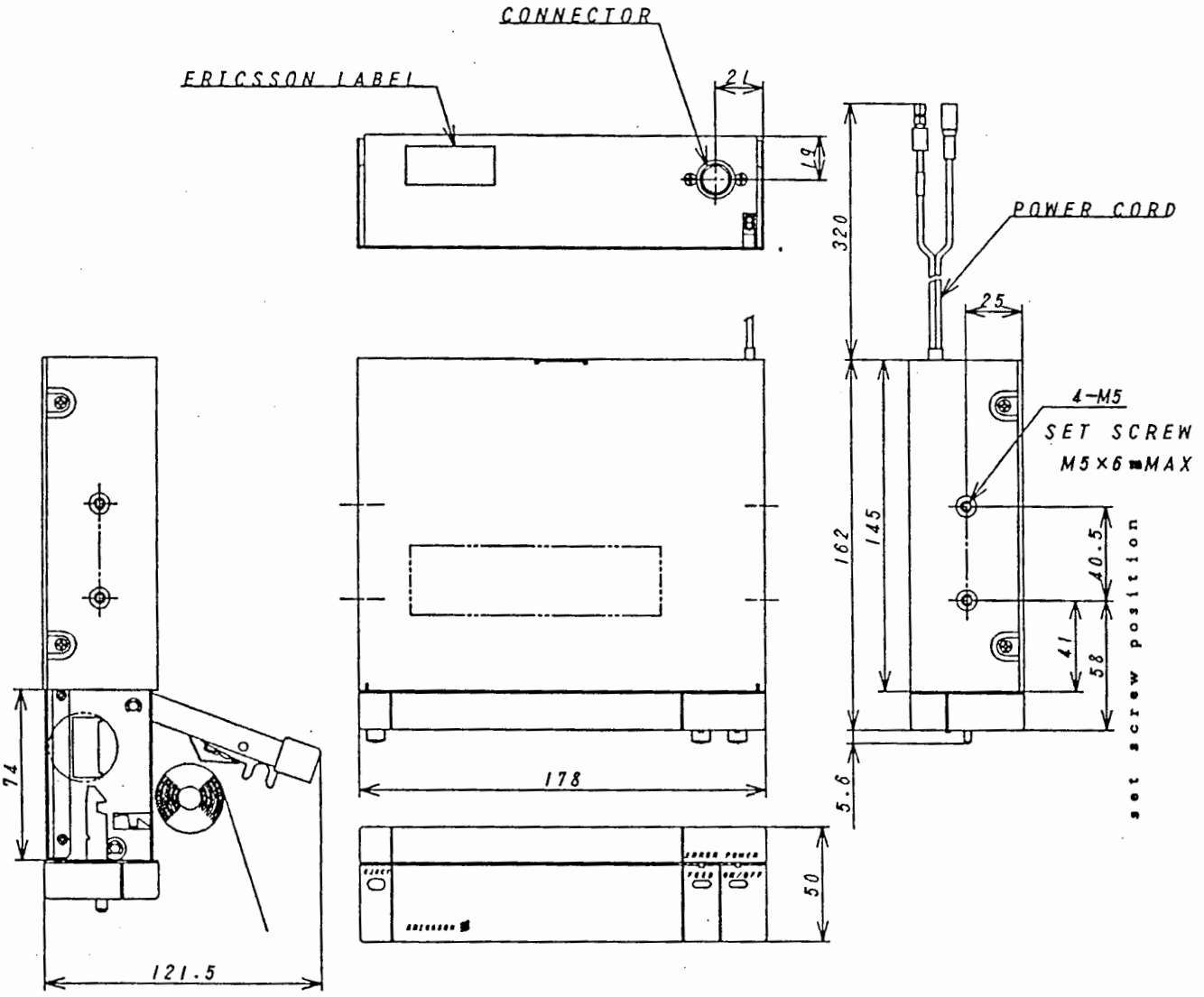
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
LD/ECS/F/TTEC SS		1990-03-15	B	

MAR.2.1990

*4

2. EXTERNAL DIMENSIONS

Unit:mm



drawing
(paper insertion)

COLOUR

upper and lower cover
:dark gray(NCS8500)

logo and characters("ERROR","POWER"etc.)
:light gray(DIC546 1/2)

EKONOMITRYCK PÅLSBODA

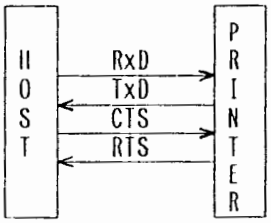
LZF 032 41/1L RE

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*		
LD/ECS/F/TTE LR	LD/ECS/F/TTE	1301-KRY 101 1051 UEN		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
LD/ECS/F/TTEC SS	S. Sundh	1990-07-09	C	

4. Interface Specification

1) Hardware Interface

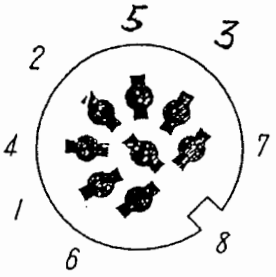
(1) Hardware Interface

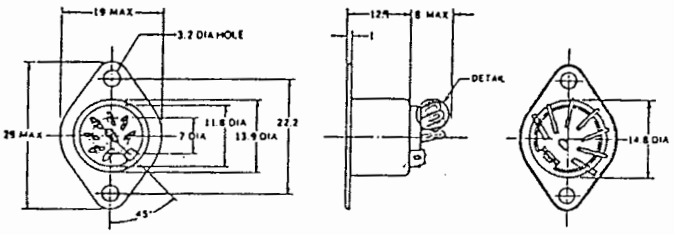


(2) Connector:DIN 8pin type

manufacturer : Hosiden Electronics Co.,Ltd.

type name : TCS2380-01-1101





(3) Pin Assignment

Pin No.	Signal Name	I/O
1	Signal GND	
2	RTS *	OUTPUT
3	N.C	
4	N.C	
5	N.C	
6	CTS	INPUT
7	RxD	INPUT
8	TxD	OUTPUT

* active HI

(4) Data Transmission Speed : 2400 BPS

(5) Syncronous System

① Asyncronous
② Start-bit : 1 bit (binary 0)
③ Data : 8 bit
④ Prity : non parity
⑤ Stop-bit : 1 bit (binary 1)

(6) Signal Condition

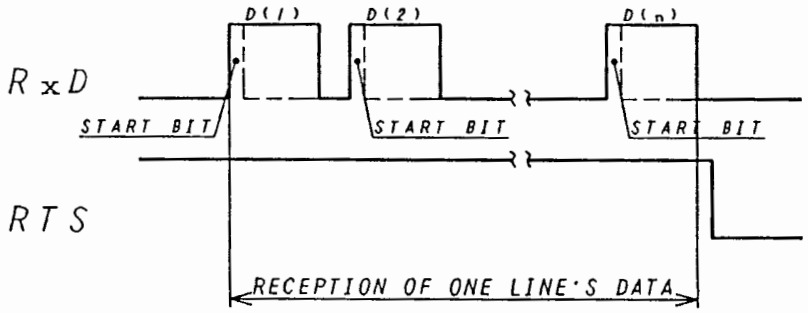
	Signal Level	
	Low	High
Binary State	1	0
Signal Condition	Marking	Spacing
Function	Off	On

(7) Signal Level

	Low Level	High Level
INPUT	0 ~0.9V	3.15 ~5.0V
OUTPUT	0 ~0.1V	4.4 ~5.0V

2) Timing Chart

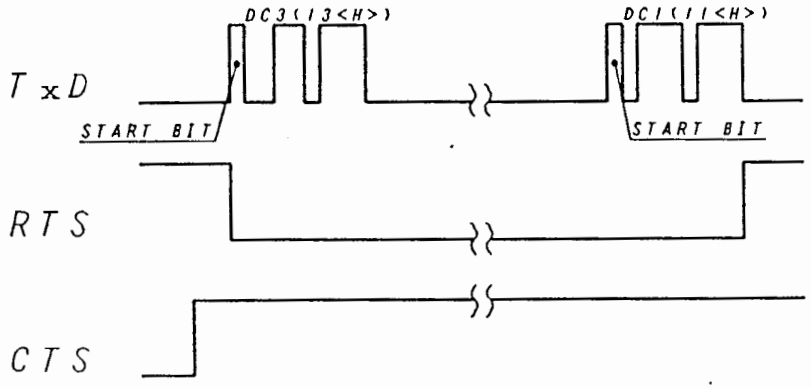
(1) When the data are being received



D(n)=D(20),D(40),D(80),"LF"
in character printing

D(31),D(80) in graphic printing

(2) When the data are being transmitted *1



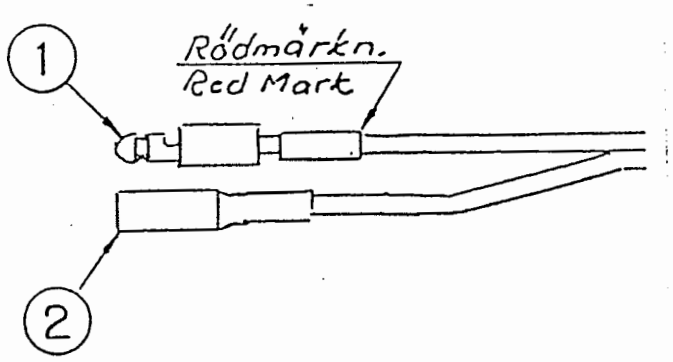
EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*	
LD/ECS/F/TTE LR	LD/ECS/F/TTE	1301-KRY 101 1051 UEN	
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date* / Rev	File
LD/ECS/F/TTEC SS		1990-03-15 B	

OCT. 20. 1989

. Power Supply Cord



Mark	Parts Name	Parts type	Manufacturer
①	Contact Pin	FVDGM 2-7	JST
②	Contact socket	CVDAGF 2-7	JST

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LZF 032 41/1L RE

6. Functions

1) Character Code and Control Code

TABLE 6-1 THE CHARACTERS *4

		0	1	2	3	4	5	6	7
		0000	0001	0010	0011	0100	0101	0110	0111
0	0000			SP	0	*a	P	*a	p
1	0001		DC1	!	1	A	Q	a	q
2	0010		DC2	"	2	B	R	b	r
3	0011		DC3	*a	3	C	S	c	s
4	0100		DC4	$	4	D	T	d	t
5	0101			%	5	E	U	e	u
6	0110			&	6	F	V	f	v
7	0111			'	7	G	W	g	w
8	1000			(	8	H	X	h	x
9	1001		EM	)	9	I	Y	i	y
A	1010	LF	SUB	*	:	J	Z	j	z
B	1011		ESC	+	;	K	*a	k	*a
C	1100	FF		,	<	L	*a	l	*a
D	1101			-	=	M	*a	m	*a
E	1110	SO		.	>	N	*a	n	*a
F	1111	SI		/	?	O	_	o	■

*a

By use of the commands, the printer can replace eleven of the special characters with special characters used in other countries. Table 6-2 shows the alternate with their hexadecimal codes. When switching on the printer, the eleven of the special characters set Swedish type.

Default at power-on is Swedish character set. *1

TABLE 6-2 ELEVEN OF THE SPECIAL CHARACTERS *3

County	Command	Character Code (HEX.)										
	<Hexadecimal Data>	23	40	5B	5C	5D	5E	60	7B	7C	7D	7E
Sweden/Finland	ESC(1 <1B,28,31>	#	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Denmark/Norway	ESC(2 <1B,28,32>	#	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Germany	ESC(3 <1B,28,33>	#	§	Ä	Ö	Ü	^	'	ä	ö	ü	ß
Italy	ESC(4 <1B,28,34>	#	@	°	§	é	^	ù	à	ò	è	ì
France/Blguim	ESC(5 <1B,28,35>	#	à	°	ç	§	^	'	é	ù	è	¨
Spain	ESC(6 <1B,28,36>	R	§	¡	Ñ	¿	^	'	°	ñ	ç	~
Canada(France)	ESC(7 <1B,28,37>	#	à	â	ç	ê	î	ô	é	ù	è	û
United Kingdam	ESC(A <1B,28,41>	£	@	[	\	]	^	'	{	|	}	~
United States	ESC(B <1B,28,42>	#	@	[	\	]	^	'	{	|	}	~

2) Bit Image Graphics (1)

(1) 640 dots/line graphics

(2) Command "ESC" "V" (N1)(N2)

(3) Hex.Decimal Data <1B><56><n1><n2>

(4) Function

This is a four byte command which sets up the bit image graphic mode.

The two bites (n1,n2) are the ASCII presentation of the number of dot lines to be printed in the graphic mode.

The size of the printing dot is 0.125 mm by 0.130 mm.

The number of transmission data bytes is specified by (n1),(n2).

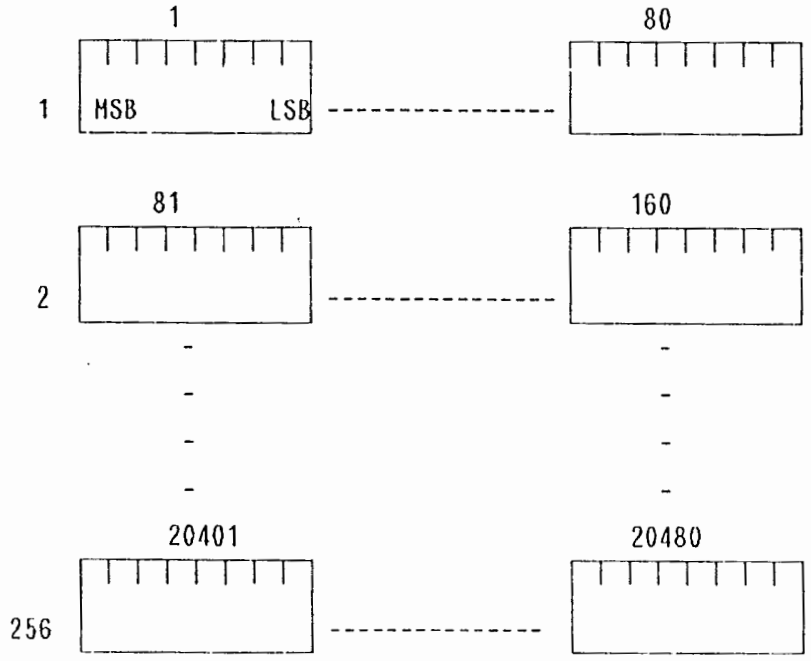
(Total data bytes)=(80 bytes)x(n1)(n2)

Example

In case of [ESC] + [V] + [00H] + [01H]

(lower) (upper)

0100H=256 lines



3) Bit Image Graphics (2)

(1) 248 dots/line graphics

(2) Command "ESC" "K" (N1)(N2)

(3) Hex.Decimal Data <1B><4B><n1><n2>

(4) Function

This is a four byte command which sets up the bit image graphic mode.

The two bites (n1,n2) are the ASCII presentation of the number of dot lines to be printed in the graphic mode.

The size of the enlarged printing dot is 0.375 mm by 0.390 mm.

The number of transmission data bytes is specified by (n1),(n2).

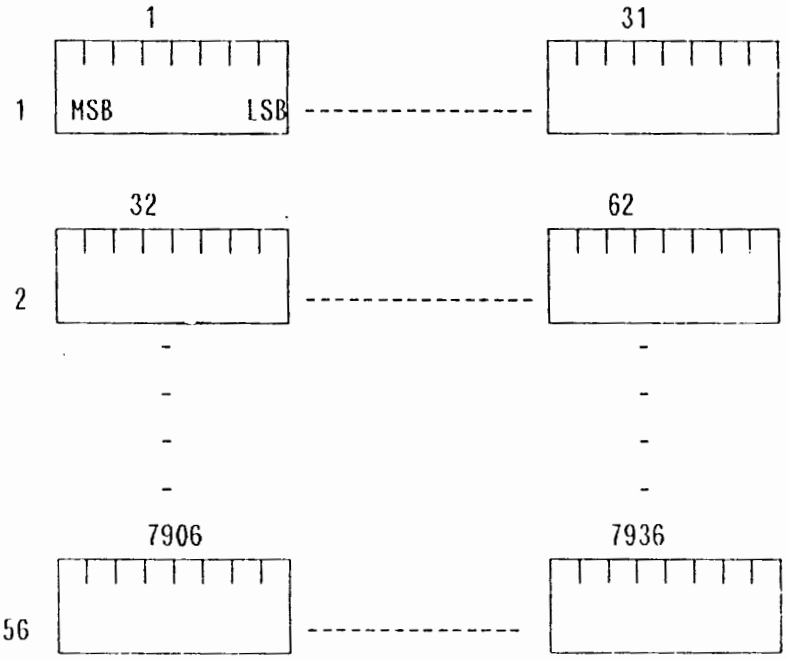
(Total data bytes)=(31 bytes)x(n1)(n2)

Example

In case of [ESC] + [K] + [00H] + [01H]

(lower) (upper)

0100H=256 lines



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LZF 032 41/1L RE

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MAR. 2.1990

4) Control Code

(1) LF

① Line Feed Command

② Hexadecimal Data <0A>H

③ Function *4

When command LF is received, the paper is fed one line.
When command LF is received in normal print mode, characters stored in the printer line-buffer will be printed.
If the printer buffer has no character, the printer makes line feed.

(2) FF

① Form Feed Command

② Hexadecimal Data <0C>H

③ Function

When command FF is received, the paper is fed approximate 30 mm.
When command FF is received, characters stored in the printer buffer will be printed.
When the printer buffer is full, characters stored in it will be printed automatically.
If the printer buffer has no character, the printer makes form feed.

(3) SO

① Shift Out Command

② Hexadecimal Data <0E>H

③ Function

When command SO is received, the mode sets in 20 characters/line.
The character data following this code shall be printed as enlarged characters untill command DC2 is received.
If SO is received in condensed mode, this command is ignored.

(4) SI

① Shift In Command

② Hexadecimal Data <0F>H

③ Function

When command SI is received, the mode sets in 80 characters/line. The character data following this code shall be printed as condensed characters untill command DC4 is received. If SI is received in enlarged mode, this command is ignored.

(5) DC1 *1

① Device Control 1 Command

② Hexadecimal Data <11>H

③ Function

When the printer buffer is empty after sending command DC3, the printer sends command DC1 to the host. This command DC1 cancels the mode of command DC3.

(6) DC2

① Device Control 2 Command

② Hexadecimal Data <12>H

③ Function

When command DC2 is received, the mode Release from 20 characters/line. ASII data following reception of this code shall be printed as normal characters(40 characters/line).

(7) DC3 *1

① Device Control 3 Command

② Hexadecimal Data <13>H

③ Function

When there is room for only 100 more characters in thr buffer, the printer sends command DC3 to the host. This command DC3 prohibits that the host must not send data to the printer.

(8) DC4

① Device Control 4 Command

② Hexadecimal Data <14>H

③ Function

When command DC4 is received, the mode Release from 80 characters/line. ASII data following reception of this code shall be printed as normal characters(40 characters/line).

(9) EM *1

① Hexadecimal Data <19>H

② Function

When the printer is "empty of paper" or "the drawer not locked" or "overrun error" occurs or any other internal error conddition is detected withen the printer, code EM is transmitted from the printer.

(10) SUB *1

① Hexadecimal Data <1A>H

② Function *2

When the reason for code EM is corrected, code SUB is transmitted from the printer.

After Power-On, when the printer is ready (RTS high), code SUB is transmitted from the printer.

5) Identity of printer *2

Request from the host by command: ESC [0 c , Hexadecimal <1B, 5B, 30, 63>H

Answer from the printer : ESC [? P ; 1 c , Hexadecimal <1B, 5B, 3F, 50, 3B, 31, 63>H

MAR. 2.1990

*4

6) Direction of Print-Out

When the printer is switched on, it is set in normal print mode. In normal print mode, the direction of print-out is the following. After the printer receives the messages of a line, it starts printing the characters of a line.

By the commands ESC. % (1B,25<H>), the printer is set in reverse print mode. In reverse print mode, the direction of print-out is the following. The printer prints out in a readable way without tearing-off the paper. The printer stores the messages in the printer buffer untill it receives the messages of 5,120 characters or the command FF. After completing the receiving, the printer starts printing.

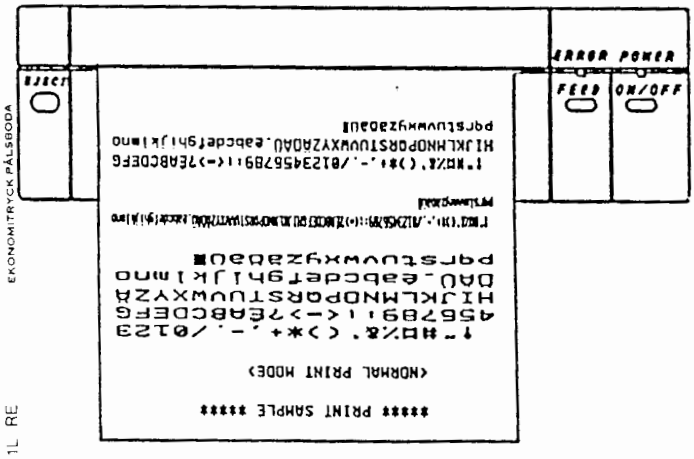
When the printer can not complete the receiving, if the message is not transmitted for 5 seconds, the printer starts printing.

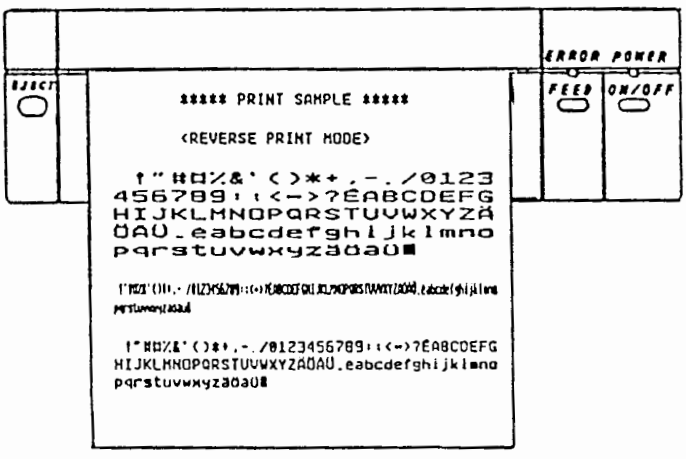
By the commands ESC. & (1B,26<H>), the reverse print mode is released.

Direction of print-out

<NORMAL PRINT MODE>

<REVERSE PRINT MODE>





MAR. 2.1990

*4

7) Overrun Error

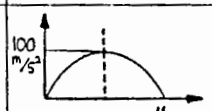
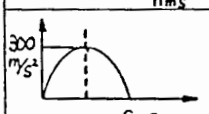
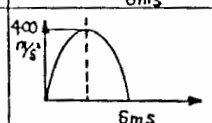
When the printer buffer is full or command LF is received, RTS-signal goes to OFF-function and the printer start printing.
After RTS-signal goes to OFF-function, the printer can not receive data except one data within 20 milliseconds and another.
If more than three data are sent to the printer, or if two data are sent to the printer later than 20 milliseconds after RTS-signal goes to OFF-function, Overrun Error will occur.
IF Overrun Error occur, the printer will continue to flash the ERROR-LED and code EM is transmitted from the printer.
For release from Overrun Error, the printer must be switched off.

8) Non-Defined Code

If non-defined code is received, it will be ignored.

MAR. 2.1990

7. Environmental Specifications (without transport package)

Environmental	Specifications	Test Items and Test Conditions		
1. Temperature Humidity	Operating -20℃ ~50℃ 10~90%RH	Low Temperature Operating	-20℃ Host Print : 350 cycles (see Appendix A)	
			- 5℃ ×96 hours Test Print : 1 roll/day(24 Hours) ×4 days (96 Hours) = 4 rolls	*4
		High Temperature Operatihg	50 ℃ 90%RH ×96 Hours Test Print : 1 roll/day(24 Hours) ×4 days (96 Hours) =4 rolls	
	Storage -30℃ ~70℃ 10 ~90%RH	Thermal Shock	-30℃ ×1 Hour ⇔ 70℃ ×1 Hour 100 cycles	
		Low Temperature Storage	-30℃ ×96 Hours	
		High Temperature Storage	70 ℃ ,90%RH×96 Hours	
2. Vibration	Operating 10 ~500Hz 2.0G	Acceleration:2.0G Frequency:10~500Hz Sweep Time:20 min Direction X,Y,Z 3 ways Time 2 Hours/way×3 Ways=6 Hours Test Print		
	Non-Operating 10 ~500Hz 3.0G	Acceleration:3.0G Frequency:10~500Hz Sweep Time 20 min Direction X,Y,Z 3 ways Time 2 Hours/way×3 Ways=6 Hours Test Print		*4
3. Shock	Operating 100m/s² 11msec 1/2 sinewave		Direction 6 ways Times 1/way ×6 ways=6 times Note:Function may be disturbed during the shock,but shall remain undisturbed after the shock.	
	300m/s² 6msec 1/2 sinewave			
	Non Operating 400m/s² 6msec 1/2 sinewave		Direction 6 ways Times 1/way ×6 Ways=6 times	
4. Life	5 years (520 rolls or 3650 m)	Life Test	Normal Temperature and Humidity Test Print	*4
5. Solar Radiation	Operating 700 w/m²	12V,50℃ Test Print		

Jan. 25. 1990

Environmental Specifications		Test Items and Test Conditions	
6. Electrostatic Discharge	6kv Discharge 150pF, 150Ω	No malfunction shall occur.	Host Print with Personal Computer (see Apendix C)
	10kv Discharge 150pF, 150Ω	Only soft errors recognizable and recoverable by normal software error handling procedures may occur.	
7. Radiated Emissions	Frequency 50MHz～ 1000MHz Peak Max.-85dBm	Cable : with Power Cable and Data Cable Test Print without Host. (see Appendix B)	
8. Ambient Field Susceptibility	Frequency: 80,160,200,450, 800,900MHz Electromagnetic Field Strength :100 V/m	An electromagnetic field generated from a transmitting antenna placed at a distance of 1 meter from the printer, shall not cause malfunction of the printer. Test Print without Host. (see Appendix D)	
9. Voltage Variations	Operating Voltage 10～16V	Voltage Variation Test	Test Print

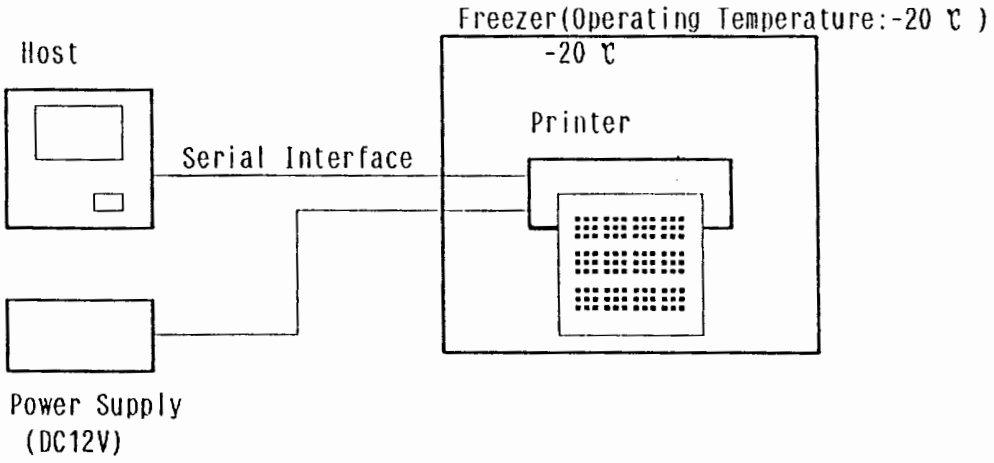
[Appendix A]

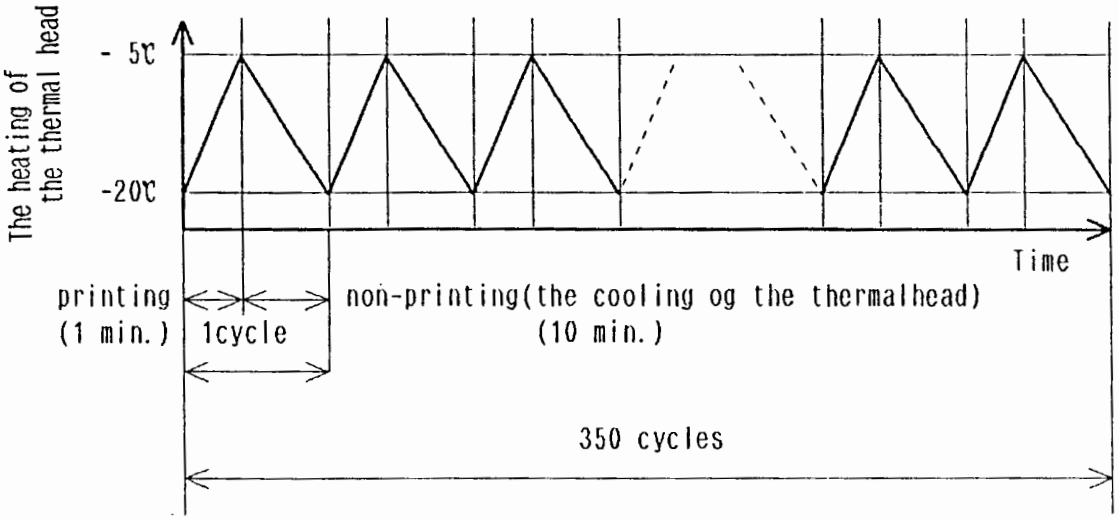
OCT.20.198

Low Temperature Operating Test 1

Testing Method

The character "■"(code <7F>H) is continuously printed.





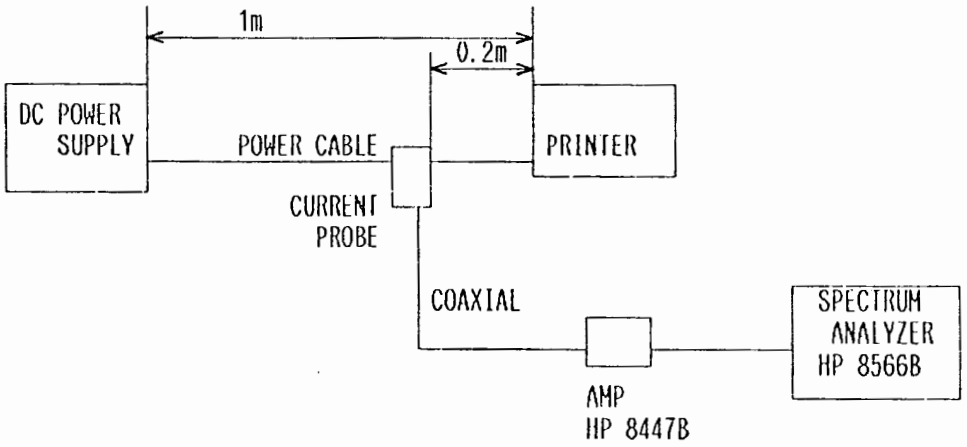
EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

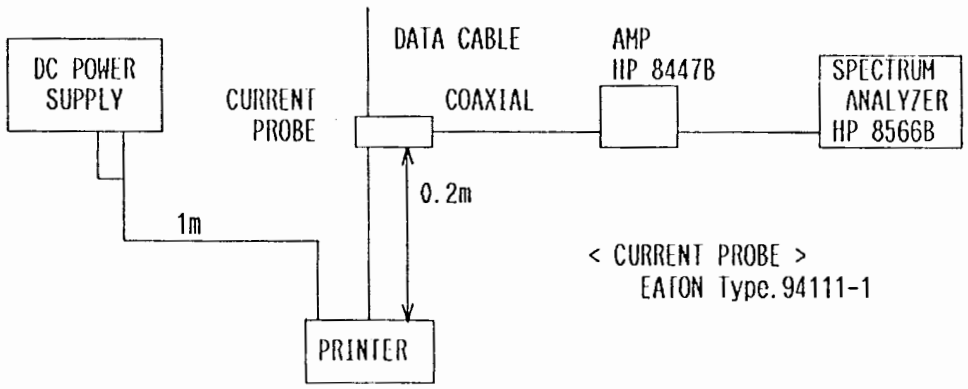
[Appendix B] OCT.20.1989

Radiation Noise Test

1. Test on Power Cable

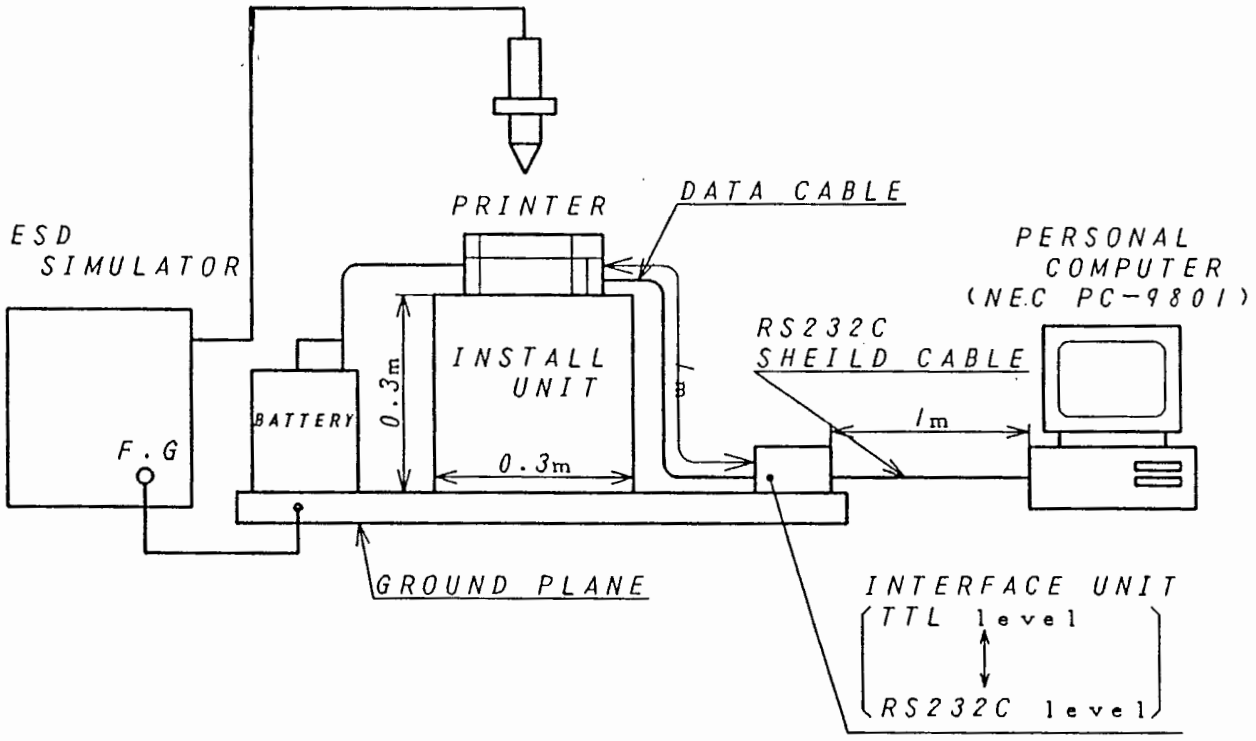


2. Test on Data Cable



[Appendix C]

Electrostatic Discharge Test



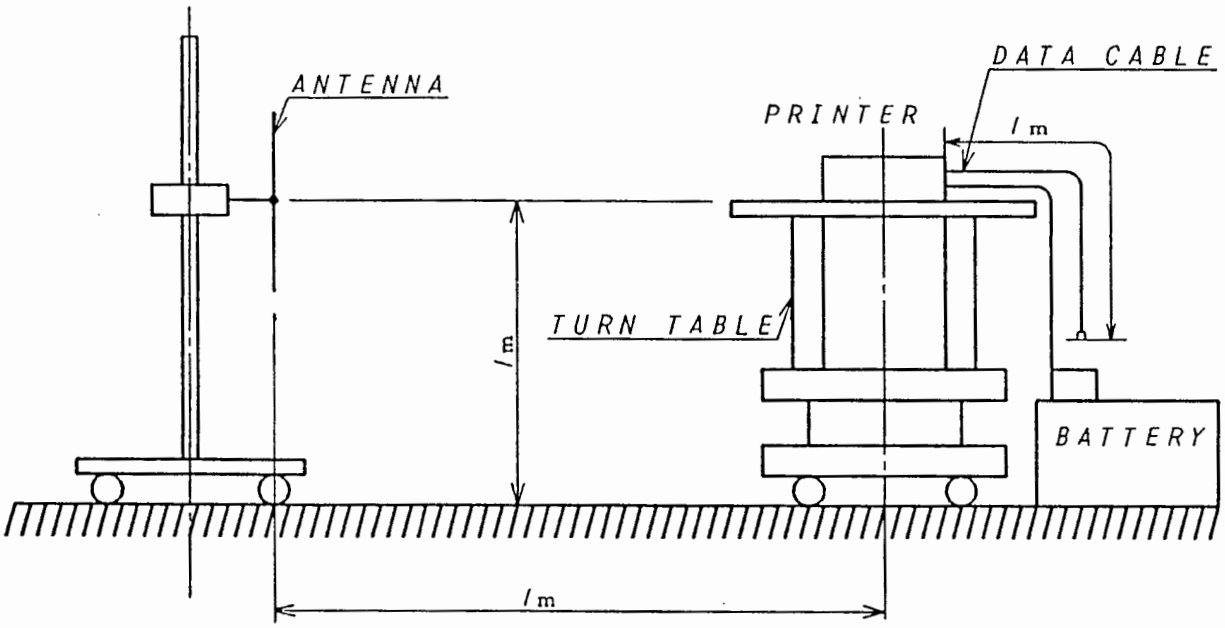
EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

JAN. 25. 1990

[Appendix D]

Ambient Field Susceptibility Test



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LZF 032 41/1L RE

[Appendix E]

JAN.25.1990

Paper Loading Instruction

1 The way of exchanging the roll paper

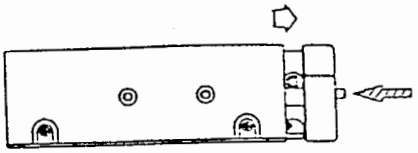
1) Push the button "EJECT " . the jump out the drawer. (fig.1)

2) Pull the drawer having the bottom of it slight strongly, then open the lid. (fig.2)

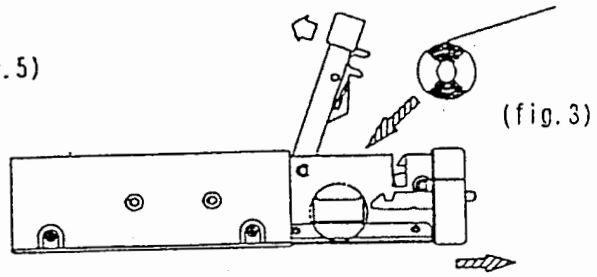
3) Put the roll paper into the "box " . (fig.3)

4) Shut the lid tightly and put the drawer holding the lid until the lid will be locked. (fig.4)

5) Put the drawer back into the main frame. (fig.5)

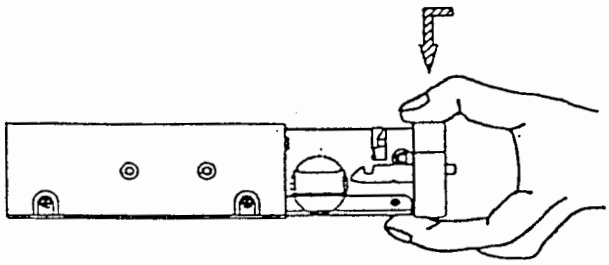


(fig.1)

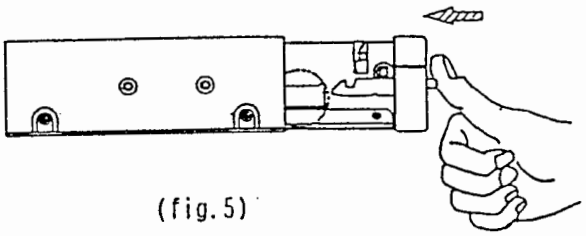


(fig.3)

(fig.2)

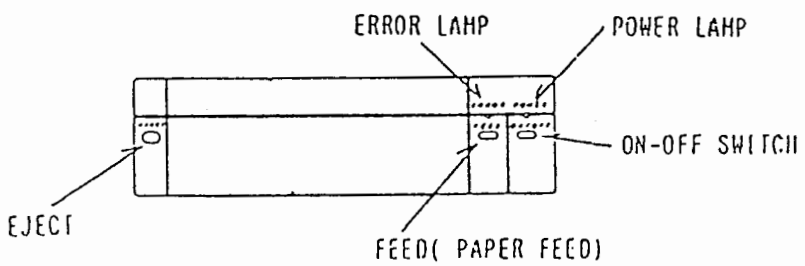


(fig.4)



(fig.5)

2. The figure of the front view



The case of flashing "ERROR LAMP" ① empty of roll paper

② eject of the drawer

③ overrun error

[Appendix F]

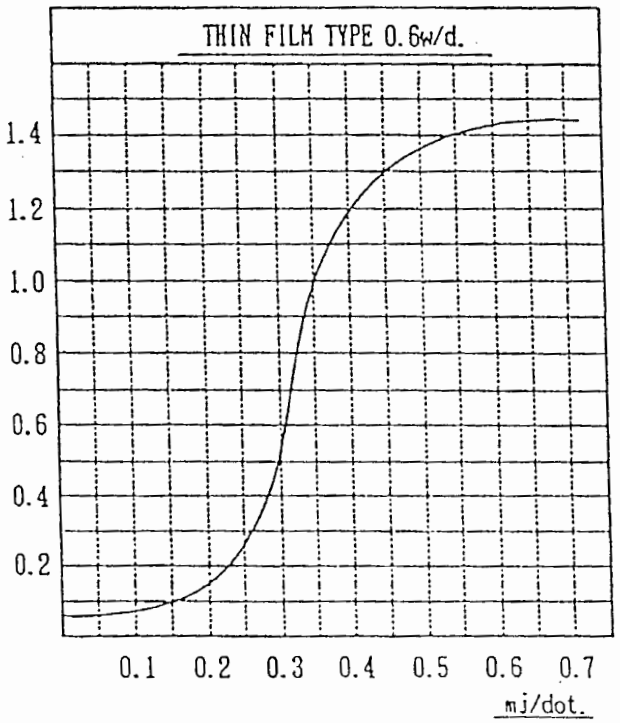
JAN.25.1990

Thermal paper specification

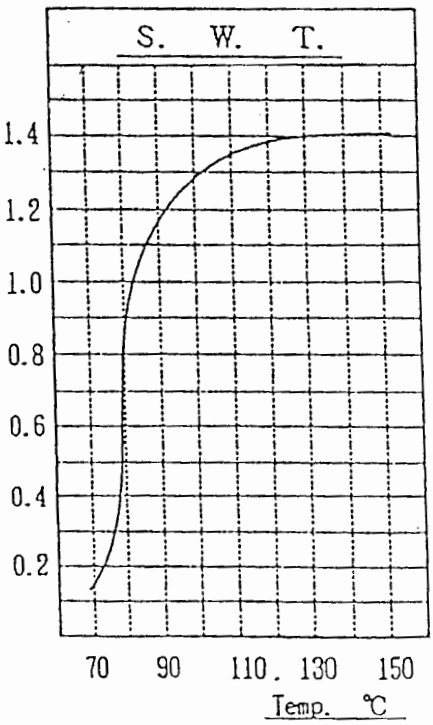
SPECIFICATION OF JUJO THERMAL

CHARACTERISTICS		UNIT	TF50KS-E4	TEST METHOD
PHYSICAL PROPERTIES	BASIS WEIGHT :	g/m²	57±5	JISP-8124
	THICKNESS	μm	65±5	JIS-P-8118
	SURFACE SMOOTHNESS	sec.	400±100	JIS-P-8119
	BRIGTHNESS	%	80±3	JIS-P-8123
	TENSILE STRENGTH	Kg	MD:Min.3.0	JIS-P-8113
	TEAR STRENGTH	g	MD:Min.25	JIS-P-8116
COLOR DEVELOPMENT PROPERTIES	IMAGE COLOR		BLACK	
	COLOR DEVELOPMENT TEMPERATURE(DENSITY)			
	0.2	℃	70±5	
	1.0	℃	82±5	
	SATURATION DENSITY		Min.1.35	
	UNPRINTED PAPER BRIGHTNESS		Max.0.10	Storing 7 days at 40℃,90%RH.
	PRINTABILITY (SATURATION DENSITY)		Min.1.20	
	PRINTED PAPER IMAGE STABILITY		Min.1.20	Storing 7 days at 40℃,90%RH.
			Min.1.20	Storing 7 days at 5000Lux. FLUORESCENT LIGHT
	WARRENTY PERIOD IMAGE AND PRINTABILITY		3 YEARS	Stored in dark place and 25℃, 65%RH. condition

DYNAMIC COLOR DEVEROPMENT



STATIC COLOR DEVEROPMENT



EKONOMITRYCK FÄLSBODA
LZF 032 41/1L RE

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*	
LD/ECS/YA/KE LR	LD/ECS/YA/KE	1301-KRY 101 1051/2 UEN	
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev / File
KI/ECS/YA/TLC LB L Bratsberg		1991-11-18	A

Technical and functional specification for thermal line-printer EPU 40.

Enclosure 2 to Contract PIA 89:040.

1. Product

Manufacturer: AISIN SEIKI CO. LTD.
Model: JB 210 S
Version: 1120F
PROM date: 11007

Ericsson Identification Number: KRY 101 1051/2 R1A

2. Applicable Documents

AISIN SEIKI Specification of built-in printer for Ericsson Radio Systems AB.
Revision *1, Dated Oct.08, 1991.

3. Additions and changes

3.1 Each printer shall be individually packed with foam cushions in a cardboard-box suitable for further transportation.

3.2 One roll of thermal paper shall be supplied and by-packed each printer.

3.3 One of each Ericsson document: LZT 126 2147 R2, LZT 123 278/2, LZT 123 278/3 and LZT 123 278/4 shall be bypacked each printer.

3.4 Each package shall be marked with a label on one side, showing the Ericsson Identification Number.

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*
LD/ECS/YA/KE LR	LD/ECS/YA/KE	1301-KRY 101 1051/2 UEN
Dokansv/Godk - *Doc respons/Approved*	**Kontr - *Checked***	**Datum - *Date*** / **Rev** / **File**
KI/ECS/YA/TLC LB		1991-11-18 A

SPECIFICATION
OF
BUILT-IN PRINTER
FOR
ERICSSON RADIO SYSTEMS AB
(Code:KRY 101 1051/2R1A)

NOV. 7. 1990

OCT. 8. 1991 *1

SUMITOMO CORPORATION:

_____

AISIN SEIKI CO., LTD:

_____

SIGNATURE FOR APPROVAL

EKONOMITRYCK PÅLSBODA

LZF 032 41/1L RE

1. GENERAL SPECIFICATIONS

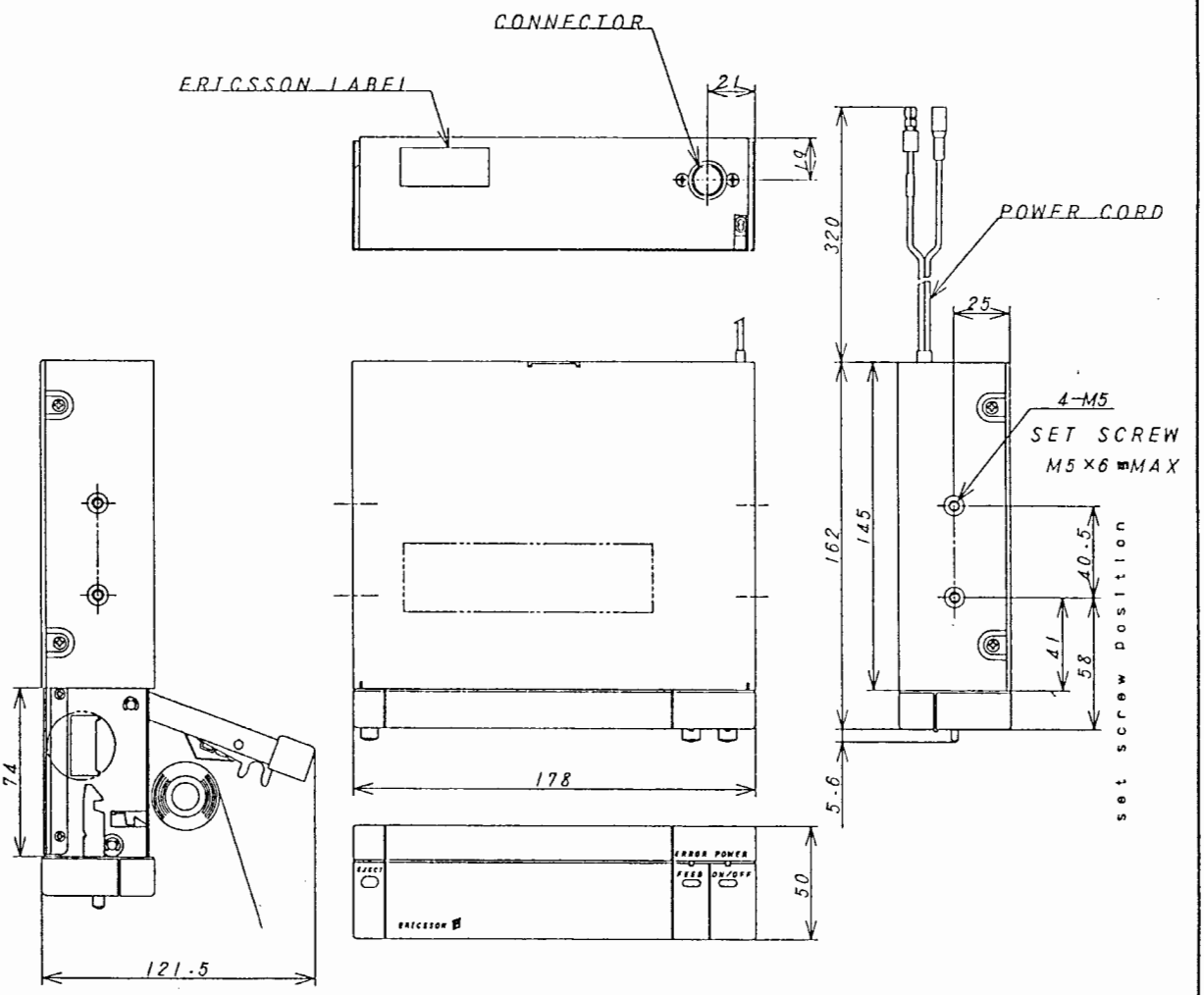
＊ : not evaluated yet

	ITEM	SPECIFICATION
1	Dimensions	178(W) × 50(H) × 162(D)mm 1 DIN
2	Weight	approx. 1.85kg
3	Paper Insertion	Drawing type (see appendix E)
4	Power Requirements 1) Character mode 2) Graphic mode (full mark printing) 3) Stand-by	♯1 1) DC12V 1.8A(average) 3.2A(max.) 2) DC12V 3.2A(average) 4.5A(max.) 3) DC12V 0.2A
5	Printing Type	Thermal Line Dot
6	Paper with core 1) Type 2) Width 3) Roll Diameter 4) Roll Length	1) Thermal Paper (class GIII, see Appendix F) 2) 110 mm 3) ϕ30 mm 4) approx. 7m
7	Interface	Serial Interface
8	Thermal Head 1) Number of Dots 2) Dot Pitch	1) 832 dots/line 2) 0.125 mm (8 dots/mm)
9	Printing Speed Operating Condition Temperature : 25 ℃ Voltage : DC 13V	1) 1 line =20characters approx. 0.55 sec/chr. line 2) 1 line =40characters approx. 0.82 sec/chr. line 3) 1 line =80characters approx. 0.91 sec/chr. line
10	Paper Feed Pitch	0.130 mm
11	Character Sets	Sweden/Finland Denmark/Norway Germany Italy France/Belgium Spain Canada(France) United States United Kingdom IBM set0 IBM set1
12	Maintenance	Free
13	MTBF (Main Board Only) ♯	16000 H

Uppgjord - *Prepared*	Faktaansvarig - *Subject responsible*	Nr - *No.*		
LD/ECS/YA/KE LR	LD/ECS/YA/KE	1301-KRY 101 1051/2 UEN		
Dokansv/Godk - *Doc respons/Approved*	Kontr - *Checked*	Datum - *Date*	Rev	File
KI/ECS/YA/TLC LB		1991-11-18	A	

2 . EXTERNAL DIMENSIONS

Unit:mm



drawing
(paper insertion)

COLOUR

upper and lower cover
:dark gray(NCS8500)

logo and characters("ERROR","POWER"etc.)
:light gray(DIC546 1/2)

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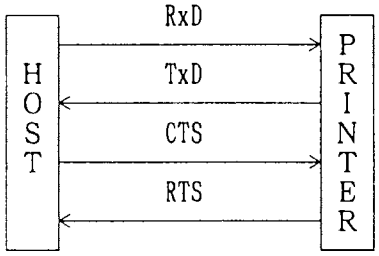
LZF 032 41/1L RE

4. INTERFACE SPECIFICATIONS

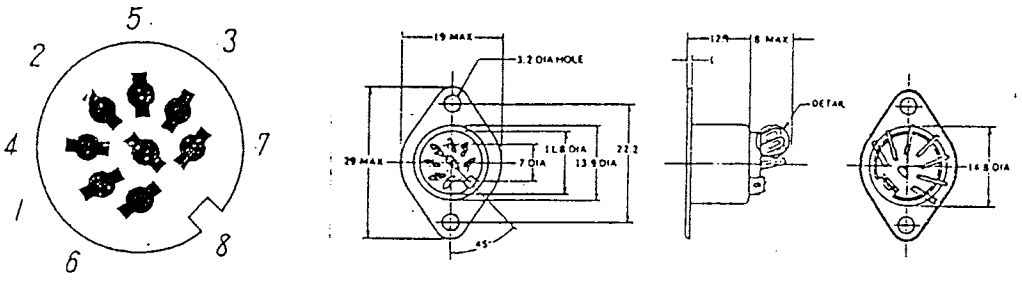
1) Hardware Interface

(1) Hardware Interface



(2) Connector:DIN 8pin type

manufacturer : Hosiden Electronics Co.,Ltd.
type name : TCS2380-01-1101



(3) Pin Assignment

Pin No.	Signal Name	I/O
1	Signal GND	
2	RTS *	OUTPUT
3	N.C	
4	N.C	
5	N.C	
6	CTS *	INPUT
7	RxD	INPUT
8	TxD	OUTPUT

* active HI

(4) Data Transmission Speed : 2400 BPS

(5) Syncronous System

① Asyncronous
② Start-bit : 1 bit (binary 0)
③ Data : 8 bit
④ Parity : non parity
⑤ Stop-bit : 1 bit (binary 1)

(6) Signal Condition

	Signal Level	
	Low	High
Binary State	1	0
Signal Condition	Marking	Spacing
Function	Off	On

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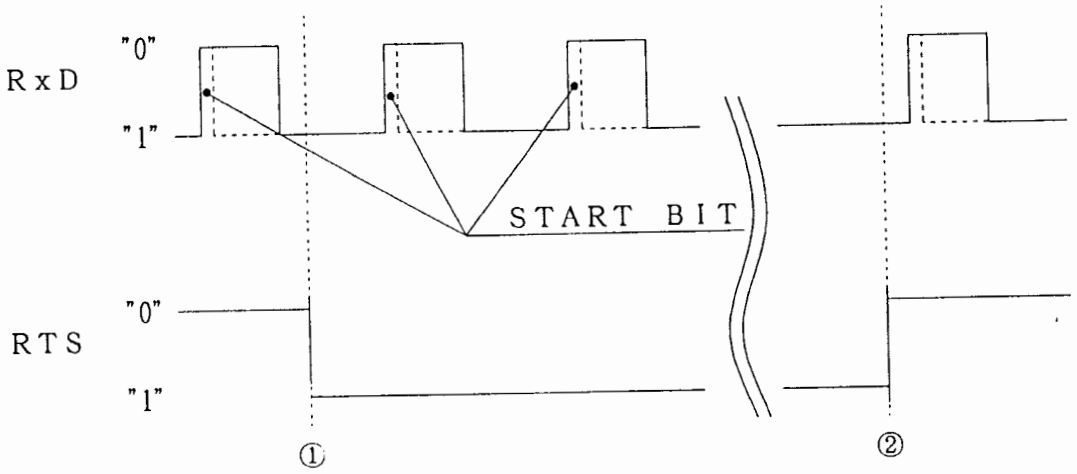
LZF 032 41/1L RE

(7) Signal Level

	Low Level	High Level
INPUT	0 ~ 0.9 V	3.15 ~ 5.0 V
OUTPUT	0 ~ 0.1 V	4.4 ~ 5.0 V

2) Timing Chart

(1) When the data are being received



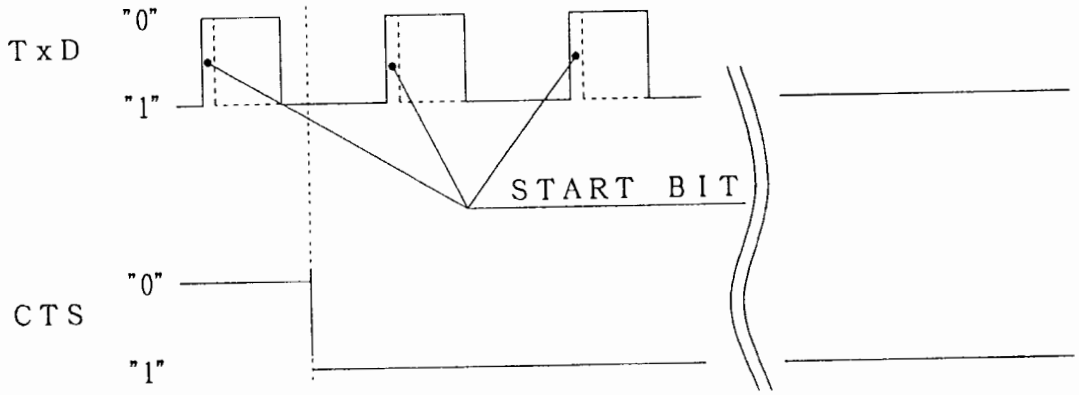
① 1) When available memory in the RAM of the printer is 100 bytes or less, the printer sets RTS low.

2) When the paper chamber is empty, the printer sets RTS low. *1

3) When the Drawer is not properly closed, the printer sets RTS low. *1

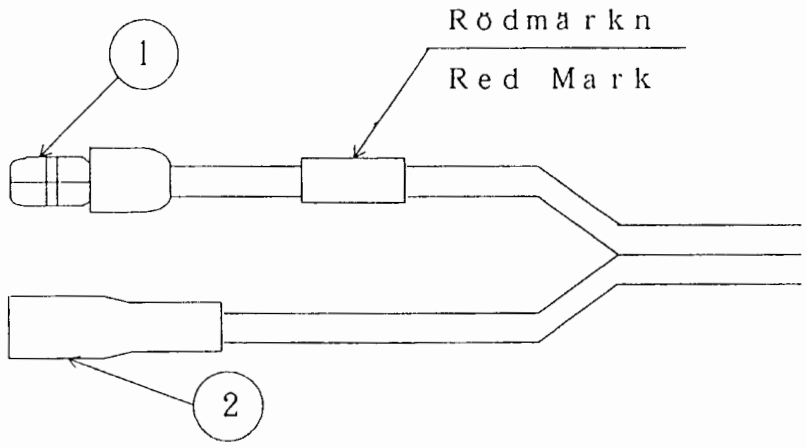
② When the available memory is 4096 bytes or more after ①, the printer sets RTS high.

(2) When the data are being transmitted



After the host sets CTS low, the printer may send 2 bytes to the host.

5. POWER SUPPLY CORD



Mark	Parts Name	Parts Type	Manufacturer
①	Contact Pin	FVDGM 2-7	J S T
②	Contact Socket	CVDAGF 2-7	J S T

*1

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LZF 032 41/1L RE

6. FUNCTIONS

1) Character Code and Control Code

The printer selects one character set from nine language and IBM character sets by commands. The default setting at power-on is Sweden/Finland character set.

(1) Nine language types

TABLE 6-1 THE CHARACTERS

		0	1	2	3	4	5	6	7
		0000	0001	0010	0011	0100	0101	0110	0111
0	0000			SP	0	*a	P	*a	p
1	0001		DC1	!	1	A	Q	a	q
2	0010		DC2	"	2	B	R	b	r
3	0011		DC3	*a	3	C	S	c	s
4	0100		DC4	$	4	D	T	d	t
5	0101			%	5	E	U	e	u
6	0110			&	6	F	V	f	v
7	0111			'	7	G	W	g	w
8	1000			(	8	H	X	h	x
9	1001		EM	)	9	I	Y	i	y
A	1010	LF	SUB	*	:	J	Z	j	z
B	1011		ESC	+	;	K	*a	k	*a
C	1100	FF		,	<	L	*a	l	*a
D	1101			-	=	M	*a	m	*a
E	1110	SO		.	>	N	*a	n	*a
F	1111	SI		/	?	O	_	o	■

*a

In the case of nine language, the printer can change eleven special characters for each language. Table 6-2 shows the alternate with their hexadecimal codes.

TABLE 6-2 ELEVEN SPECIAL CHARACTERS

Country	Command	Character Code (HEX.)									
	<Hexadecimal Data>	23	40	5B	5C	5D	5E	60	7B	7C	7D	7E
Sweden/Finland	ESC(1 <1B,28,31>	#	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Denmark/Norway	ESC(2 <1B,28,32>	#	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Germany	ESC(3 <1B,28,33>	#	§	Ä	Ö	Ü	^	'	ä	ö	ü	ß
Italy	ESC(4 <1B,28,34>	#	@	°	§	é	^	ù	à	ò	è	ì
France/Belgium	ESC(5 <1B,28,35>	#	à	°	ç	§	^	'	é	ù	è	¨
Spain	ESC(6 <1B,28,36>	₧	§	¡	Ñ	¿	^	'	°	ñ	ç	~
Canada(France)	ESC(7 <1B,28,37>	#	à	â	ç	ê	î	ô	é	ù	è	û
United Kingdom	ESC(A <1B,28,41>	£	@	[	\	]	^	'	{	|	}	~
United States	ESC(B <1B,28,42>	#	@	[	\	]	^	'	{	|	}	~

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LZF 032 41/1L RE

(2) IBM types

TABLE 6-3 IBM CHARACTER SET 0

Command	<Hexadecimal Data>						ESC (C <1B,28,43>									
CODE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	▒	└	┴	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	┬	β	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	┬	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	│	├	└	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	└	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	┤	┼	┌	σ	⌡
6	♠		&	6	F	V	f	v	å	û	ª	┤	├	┌	μ	÷
7			'	7	G	W	g	w	ç	ù	º	┐	├	┼	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	┐	└	┼	Φ	°
9		EM	)	9	I	Y	i	y	ë	Ö	⌐	┤	┌	┘	θ	•
A	LF	SUB	*	:	J	Z	j	z	è	Ü	¬	│	┴	┌	Ω	·
B		ESC	+	;	K	[	k	{	ï	¢	½	┐	┬	▉	δ	√
C	FF		,	<	L	\	l	|	î	£	¼	┘	├	▂	∞	n
D			−	=	M	]	m	}	ì	¥	¡	┘	─	▌	Ø	²
E	SO		.	>	N	^	n	~	Ä	Pt	«	┘	┼	▌	∈	■
F	SI		/	?	O	_	o		Å	ƒ	»	┐	┴	▂	∩	SP

TABLE 6-4 IBM CHARACTER SET 1

Command	<Hexadecimal Data>						ESC (D <1B,28,44>									
CODE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	É	á	▒	└	┴	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	┬	β	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	┬	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	│	├	└	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	└	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	┤	┼	┌	σ	⌡
6	♠		&	6	F	V	f	v	å	û	õ	┤	├	┌	μ	÷
7			'	7	G	W	g	w	ç	ù	Õ	┐	├	┼	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	┐	└	┼	Φ	°
9		EM	)	9	I	Y	i	y	ë	Ö	ã	┤	┌	┘	θ	•
A	LF	SUB	*	:	J	Z	j	z	è	Ü	Ã	│	┴	┌	Ω	·
B		ESC	+	;	K	[	k	{	ï	ϕ	ℓ	┐	┬	▉	δ	√
C	FF		,	<	L	\	l	|	î	£	ń	┘	├	▂	∞	n
D			−	=	M	]	m	}	ì	Ø	ı	┘	─	▌	Ø	·²
E	SO		.	>	N	^	n	~	Ä	Ł	³	┘	┼	▌	∈	■
F	SI		/	?	O	_	o		Å	ł	¤	┐	┴	▂	∩	SP

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2) Bit Image Graphics(1)

(1) 640 dots/line graphics

(2) Command "ESC" "V" (N1) (N2)

(3) Hexadecimal Data <1B><56><n1><n2>

(4) Function

This is a four byte command which sets up the bit image graphic mode.

The two bytes (n1, n2) are the ASCII presentation of the number of dot lines to be printed in the graphic mode.

The size of the printing dot is 0.125 mm by 0.130 mm.

The number of transmission data bytes is specified by (n1), (n2).

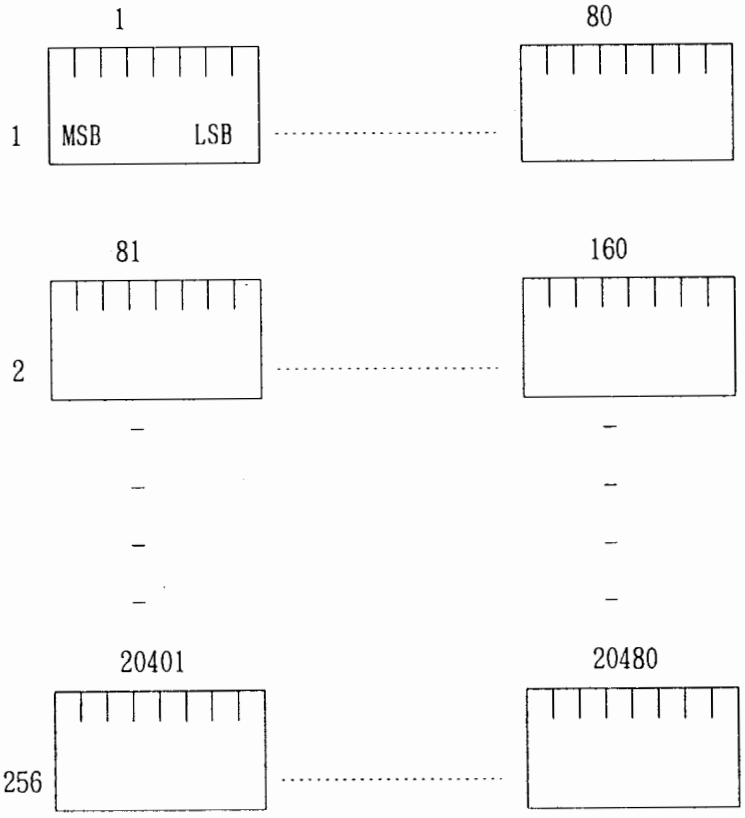
(Total data bytes)=(80 bytes)×(n1)(n2)

Example

In case of [ESC] + [V] + [00H] + [01H]

(lower) (upper)

0100H=256 lines



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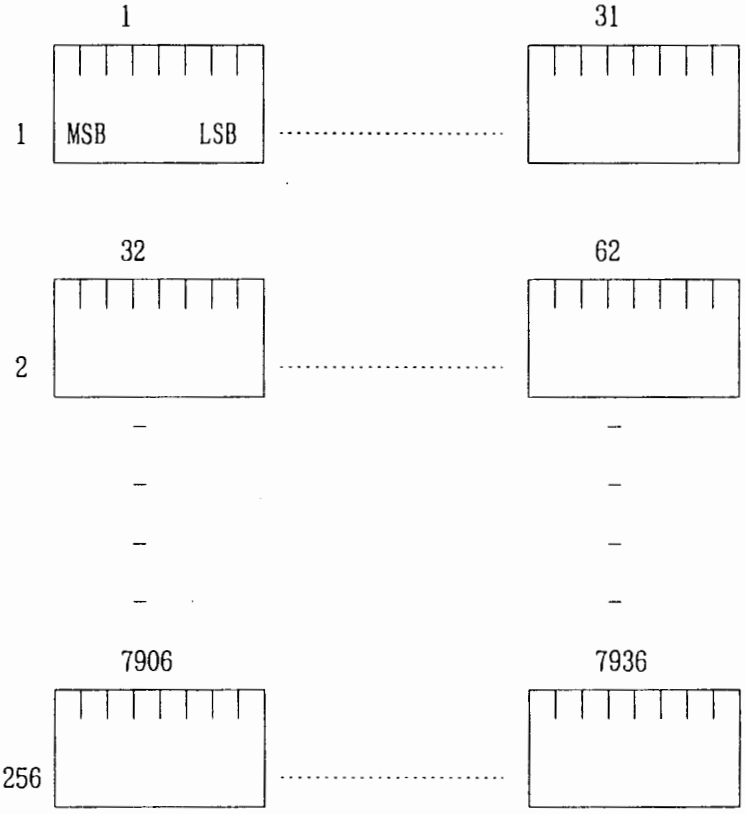
3) Bit Image Graphics(2)
(1) 248 dots/line graphics
(2) Command "ESC" "K" (N1) (N2)
(3) Hexadecimal Data <1B><4B><n1><n2>
(4) Function
This is a four byte command which sets up the bit image graphic mode.
The two bytes (n1, n2) are the ASCII presentation of the number of dot lines to be printed in the graphic mode.
The size of the enlarged printing dot is 0.375 mm by 0.390 mm.
The number of transmission data bytes is specified by (n1), (n2).
(Total data bytes)=(31 bytes)×(n1)(n2)

Example

In case of [ESC] + [K] + [00H] + [01H]

(lower) (upper)

0100H=256 lines



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4) Control Code

(1) LF
① Line Feed Command
② Hexadecimal Data <0A> H
③ Function
When command LF is received, the paper is fed one line.
When command LF is received in normal print mode, characters stored in the printer line-buffer will be printed.
If the printer buffer has no character, the printer makes line feed.

(2) FF
① Form Feed Command
② Hexadecimal Data <0C> H
③ Function
When command FF is received, the paper is fed approximate 30 mm.
When command FF is received, characters stored in the printer buffer will be printed.
When the printer buffer is full, characters stored in it will be printed automatically.
If the printer buffer has no character, the printer makes form feed.

(3) SO
① Shift Out Command
② Hexadecimal Data <0E> H
③ Function
When command SO is received, the mode sets in 20 characters/line.
The character data following this code shall be printed as enlarged characters untill command DC2 is received.
If SO is received in condensed mode, this command is ignored.

(4) SI
① Shift In Command
② Hexadecimal Data <0F> H
③ Function
When command SI is received, the mode sets in 80 characters/line.
The character data following this code shall be printed as condensed characters untill command DC4 is received.
If SI is received in enlarged mode, this command is ignored.

(5) DC1
① Device Control 1 Command
② Hexadecimal Data <11> H
③ Function
When more than 3/4 of the RAM is available after sending command DC3, the printer sends command DC1 to the host.
This command DC1 cancels the mode of command DC3.

(6) DC2
① Device Control 2 Command
② Hexadecimal Data <12> H
③ Function
When command DC2 is received, the mode release from 20 characters/line.
ASCII data following reception of this code shall be printed as normal characters(40 characters/line).

(7) DC3
① Device Control 3 Command
② Hexadecimal Data <13> H
③ Function
When less than 1/4 of the RAM is available, the printer sends command DC3 to the host.

(8) DC4
① Device Control 4 Command
② Hexadecimal Data <14> H
③ Function
When command DC4 is received, the mode release from 80 characters/line. ASCII data following reception of this code shall be printed as normal characters(40 characters/line).

(9) EM
① Hexadecimal Data <19> H
② Function
When "empty of the roll paper" or "eject of the drawer" or some other intermal error condition is detected within the printer, code EM is transmitted from the printer.

(10) SUB
① Hexadecimal Data <1A> H
② Function
When the reason for code EM is corrected, code SUB is transmitted from the printer.
After Power-On, when the printer is ready(RTS high), code SUB is transmitted from the printer.

5) Identity of Printer
Request from the host by command: ESC [0c , Hexadecimal <1B, 5B, 30, 63>H
Answer from the printer : ESC [?P;2c , Hexadecimal <1B, 5B, 3F, 50, 3B, 32, 63>H *1

6) Direction of Print-Out

When the printer is switched on, it is set in normal print mode. In normal print mode, the direction of print-out is the following. After the printer receives the message of a line, it starts printing the characters of a line.

By the command ESC. % (1B, 25<H>), the printer is set in reverse print mode. In reverse print mode, the direction of print-out is the following. The printer prints out in a readable way without tearing-off the paper. The printer stores the messages in the printer buffer untill it receives the messages of 5,120 characters or the command FF. After completing the receiving, the printer stars printing.

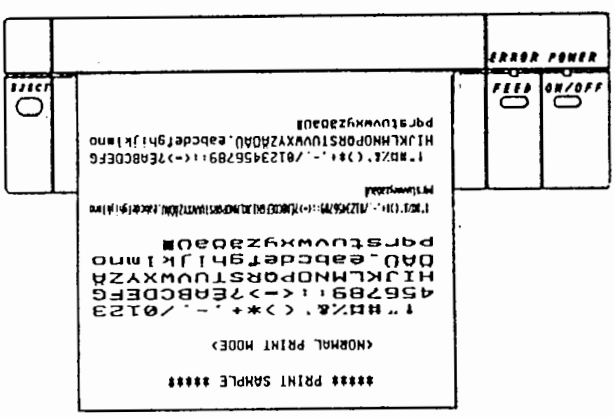
When the printer can not complete the receiving, if the message is not transmitted for 5 seconds, the printer starts printing.

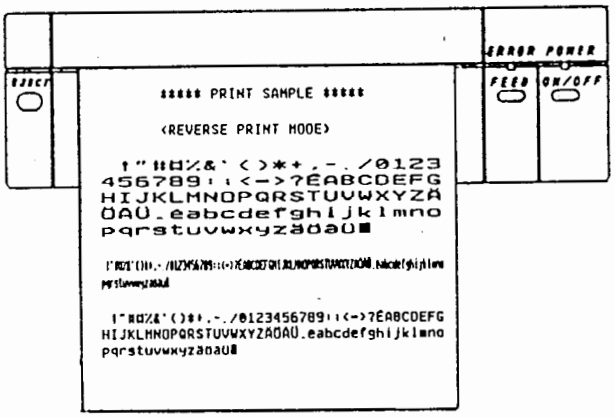
By the command ESC. & (1B, 26<H>), the reverse print mode is released.

Direction of print-out

<NORMAL PRINT MODE>

<REVERSE PRINT MODE>





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7) Underscore

(1) Begin undersoring
① Command "ESC" "-" "1"
② Hexadecimal Data <1B><2D><31>
This is a three byte command which begins underscoring.
All characters and spaces that follow are underscored.

(2) Cancel underscoring
① Command "ESC" "-" "0"
② Hexadecimal Data <1B><2D><30>
This is a three byte command which cancels underscoring.

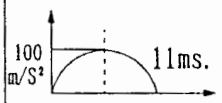
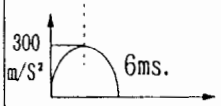
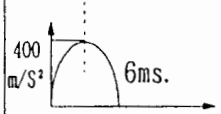
8) Non-Defined Code

If non-defined code is rceived. it will be ignored.

9) Limit Temperature for Printing *1

When the temperature of the thermal head is more than approximate 78 ℃, the printer stops printing. The ERROR-LED blinks while the printer stops printing. When the temperature falls less than approximate 75 ℃, the printer resumes printing.

7. Environmental Specifications (without transport package)

Environmental	Specifications	Test Items And Test Conditions	
1. Temperature Humidity	Operating −20℃~50℃ 10~90%RH	Low Temperature Operating	−20 ℃ Host Print : 350 cycles (see Appendix A)
			−5 ℃×96 hours Test Print : 1 roll/day(24 Hours) ×4 days(96 Hours) = 4 rolls
		High Temperature Operating	50℃ 90%RH×96 Hours Test Print : 1 roll/day(24 Hours) ×4 days(96 Hours) = 4 rolls
	Storage −30℃~70℃ 10~90%RH	Thermal Shock	−30℃ 1Hour ←→ 70 ℃ 1Hour 100cycles
		Low Temperature Storage	−30℃×96Hours
		High Temperature Storage	70℃, 90%RH×96 Hours
2. Vibration	Operating 10~500Hz 2.0G	Acceleration:2.0G Frequency:10~500Hz Sweep time:20 min Direction:X, Y, Z 3ways Times 2 Hours/way×3 ways= 6 Hours Test Print	
	None-Operating 10~500Hz 3.0G	Acceleration:3.0G Frequency:10~500Hz Sweep time:20 min Direction:X, Y, Z 3ways Times 2 Hours/way×3 ways= 6 Hours Test Print	
3. Shock	Operating 100m/S² 11msec 1/2 sinewave		Direction 6 ways Times 1/way×6 ways=6 times Note:Function may be disturbed during the shock, but shall remain undisturbed after the shock.
	300m/S² 6msec 1/2 sinewave		
	Non-Operating 400m/S² 6msec 1/2 sinewave		Direction 6 ways Times 1/way×6 ways=6 times
4. Life	5 years (520 rolls or 3650 m)	Life Test	Normal Temparature and Humidity Test Print
5. Solar Radiation	Operating 700 w/m²	12 V, 50℃ Test Print (see Appendix G)	

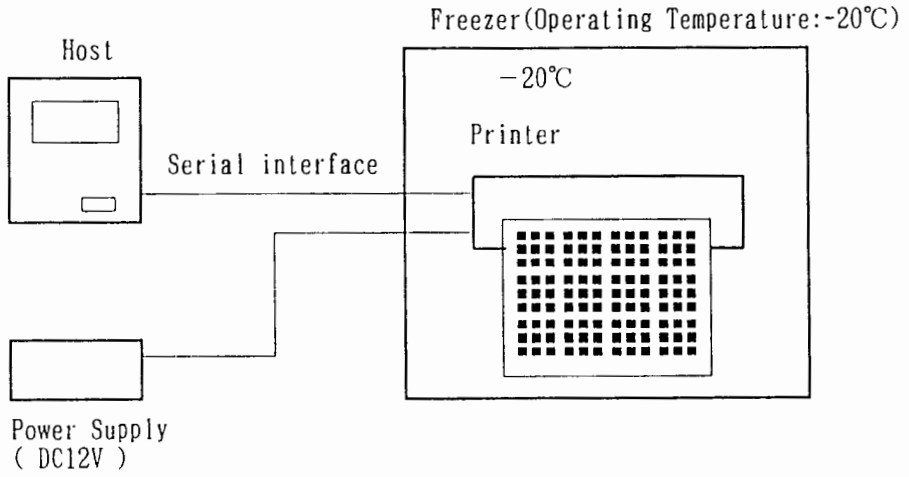
#1

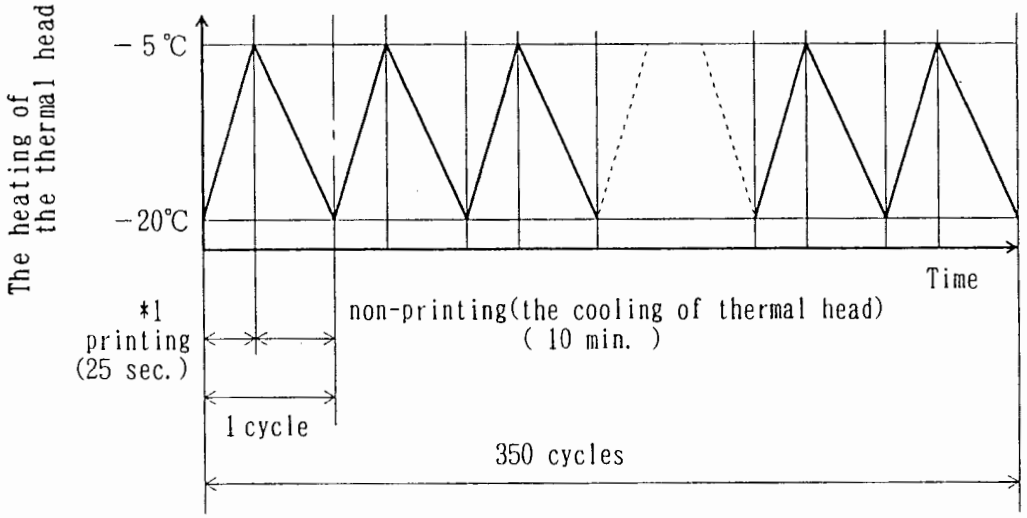
Environmental	Specifications	Test Items and Test Conditions		
6. Electro-static Discharge	6 kv Discharge 150pF , 150Ω	No malfunction shall occur.		
	10kv Discharge 150pF , 150Ω	Only software errors recognizable and recoverable by normal software error handling procedures may occur.		
7. Radiated Emissions	Frequency 50MHz ～1000MHz Peak Max. -95dBm	Cable : with Power Cable and Data Cable Test Print without Host (see Apendix B)		*1
8. Ambient Field Suscepti-bility	Frequency: 80, 160, 200, 450, 800, 900 MHz Electromagnetic Field Strength :100 V/m	An electromagetic field generated from a transmitting antenna placed at a distance of 1 meter from the printer, shall not cause malfunction of the printer.		
9. Voltage Variations	Operating Voltage 10～16 V	Voltage Variation Test	Test print	

〔 Appendix A 〕

Low Temperature Operating Test 1

Testing Method
The character "■" (code <7F>H) is continuously printed.

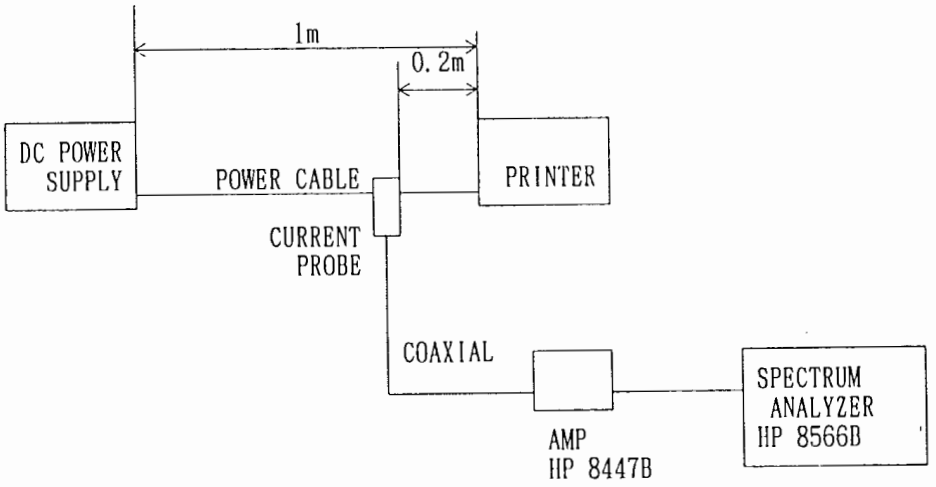




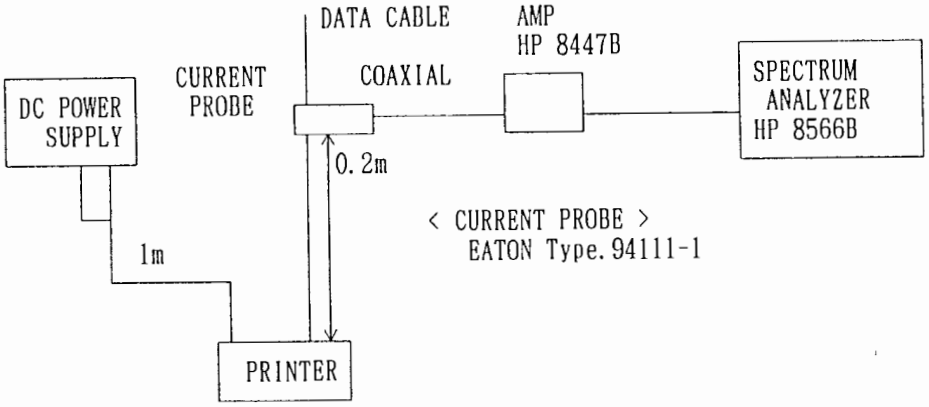
〔 Appendix B 〕

Radiation Noise Test

1. Test on Power Cable



2. Test on Data Cable



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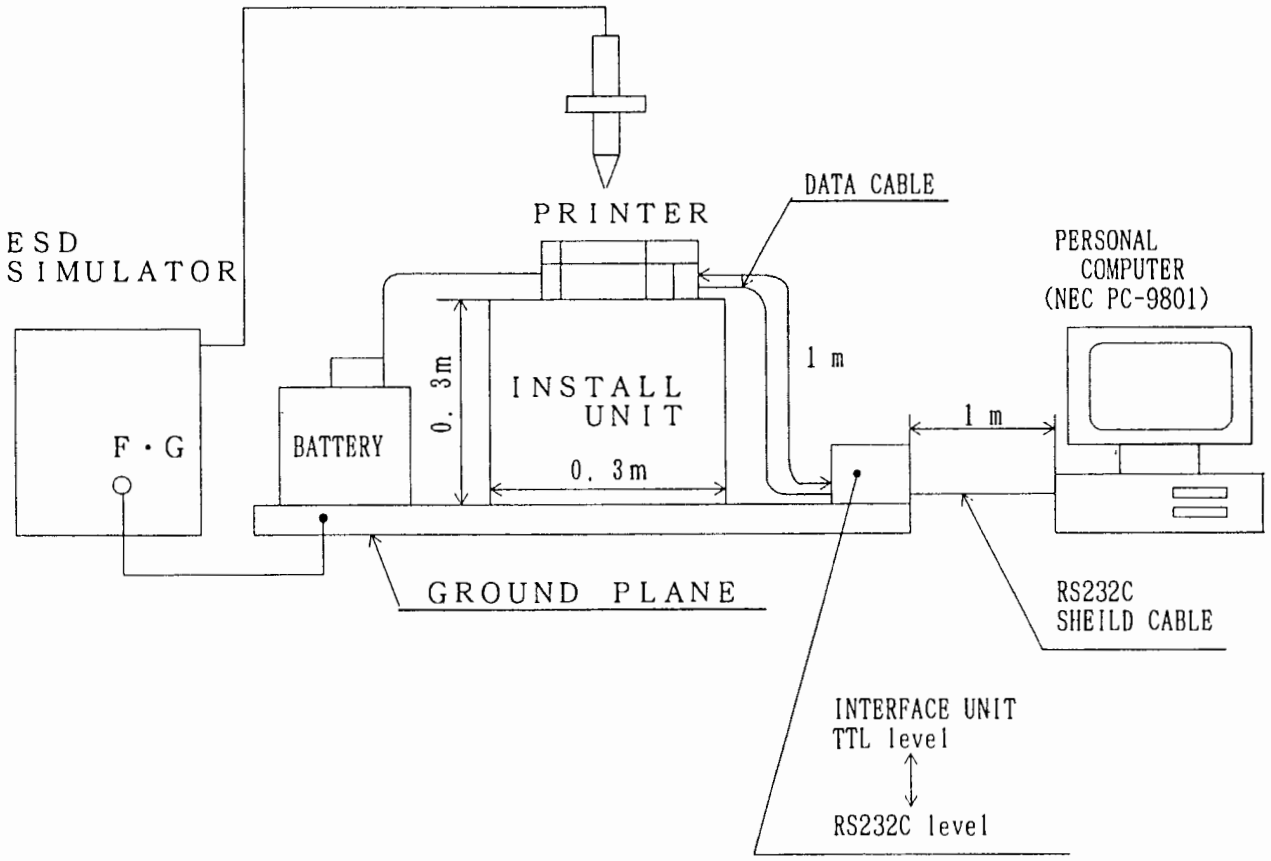
LZF 032 41/1L RE

〔 Appendix C 〕

Electrostatic Discharge Test



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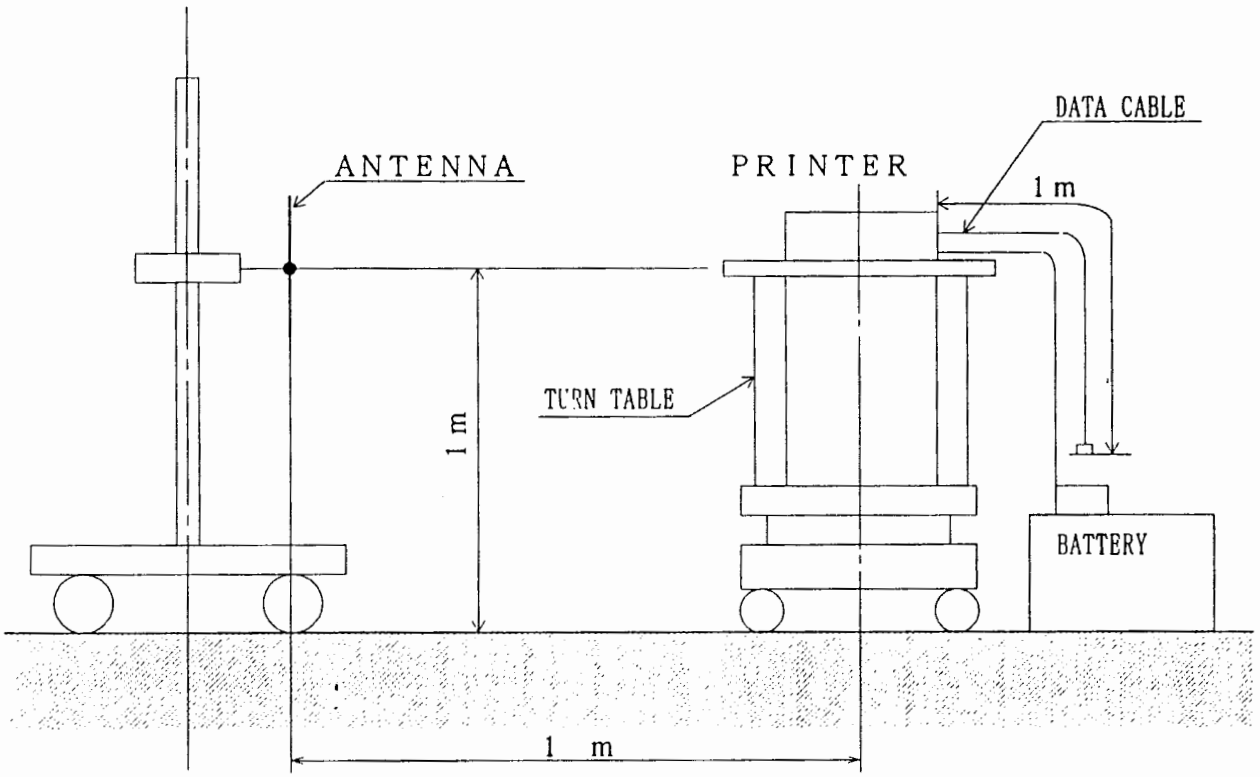
〔 Appendix D 〕

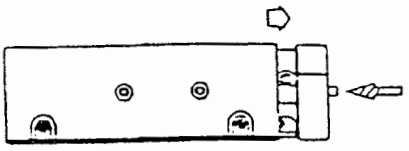
Ambient Field Susceptibility Test



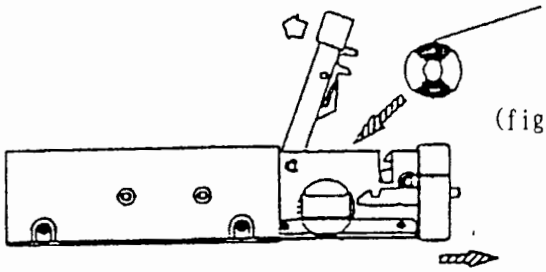
〔 Appendix E 〕

Paper Loading Instruction

1. The way of exchangeing the roll paper
   1) Push the button "EJECT", the jump out the drawer. (fig.1)
   2) Pull the drawer having the bottom of it slight strongly, then open the lid. (fig.2)
   3) Put the roll paper into the "box". (fig.3)
   4) Shut the lid tightly and put the drawer holding the lid until the lid will be locked. (fig.4)
   5) Put the drawer back into the main frame. (fig.5)

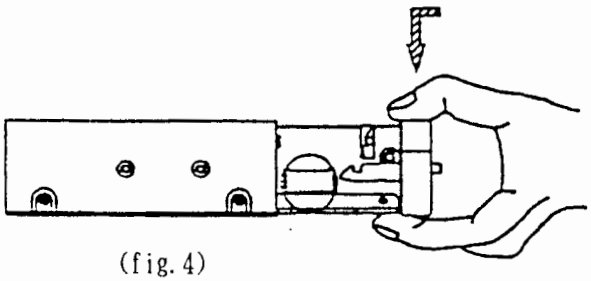


(fig.1)

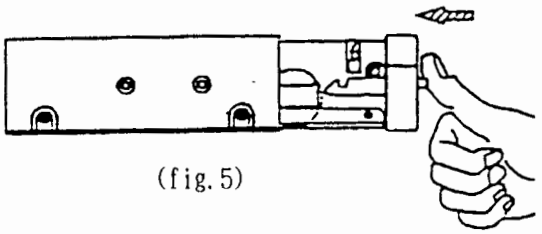


(fig.3)

(fig.2)

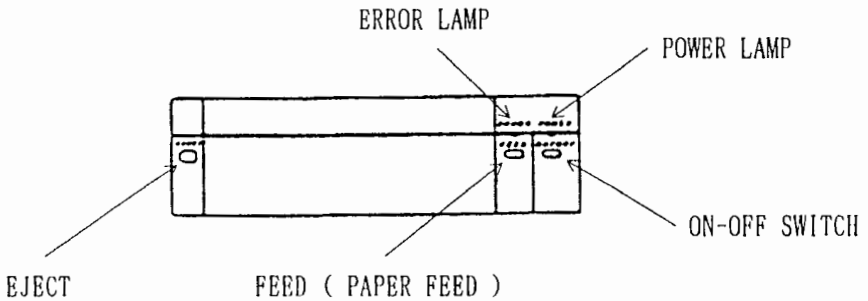


(fig.4)



(fig.5)

2. The figure of the front view



The case of flashing "ERROR LAMP"
① empty of roll paper
② eject of the drawer
③ limit tempererature

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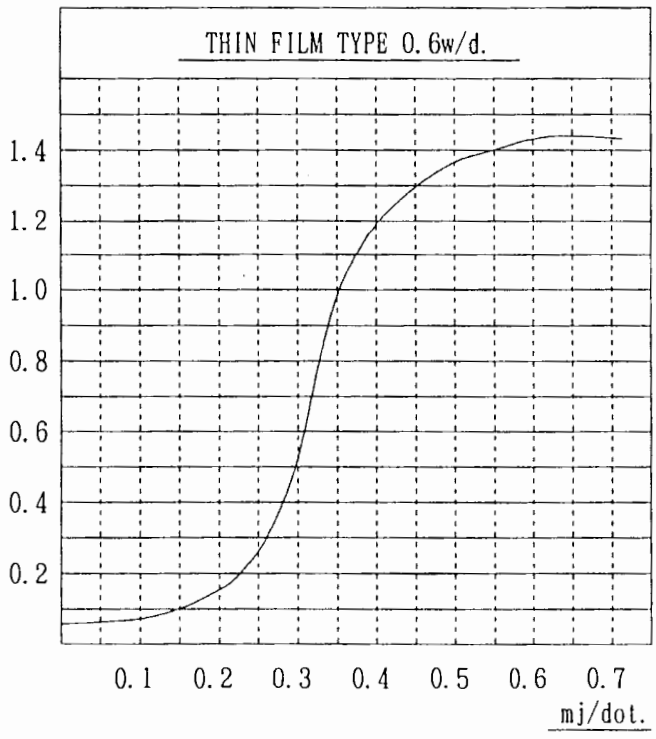
〔 Appendix F 〕

Thermal paper specification

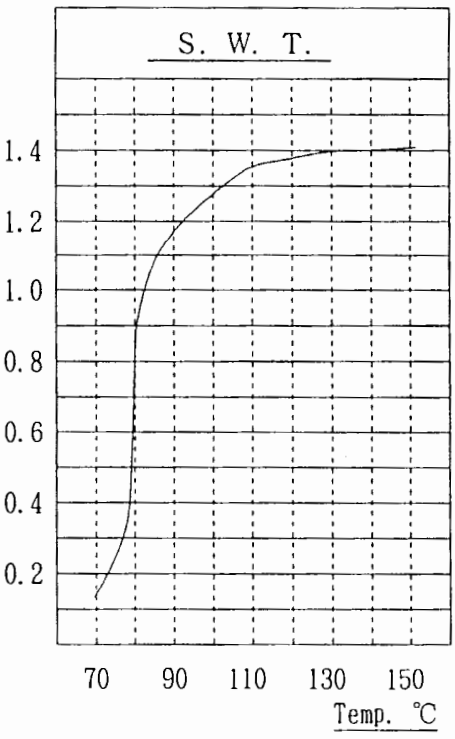
SPECIFICATION OF JUJO THERMAL

CHARACTERISTICS		UNIT	TF50KS-E4	TEST METHOD
PHYSICAL PROPERTIES	BASIS WEIGHT	g/m^2	57±5	JISP-8124
	THICKNESS	μm	65±5	JIS-P-8118
	SURFACE SMOOTHNESS	sec.	400±100	JIS-P-8119
	BRIGHTNESS	%	80±3	JIS-P-8123
	TENSILE STRENGTH	Kg	MD:Min. 3.0	JIS-P-8113
	TEAR STRENGTH	g	MD:Min. 25	JIS-P-8116
COLOR DEVELOPMENT PROPERTIES	IMAGE COLOR		BLACK	
	COLOR DEVELOPMENT TEMPERATURE (DENSITY)			
	0.2	℃	70±5	
	1.0	℃	82±5	
	SATURATION DENSITY		Min. 1.35	
	UNPRINTED PAPER BRIGHTNESS		Max. 0.10	Storing 7days at 40℃, 90%RH.
	PRINTABILITY (SATURATION DENSITY)		Min. 1.20	
	PRINTED PAPER IMAGE STABILITY		Min. 1.20	Storing 7days at 40℃, 90%RH.
			Min. 1.20	Storing 7days at 5000Lux. FLUORESCENT LIGHT
	WARRANTY PERIOD IMAGE AND PRINTABILITY		3 YEARS	Stored in dark place and 25℃ 65%RH. condition

DYNAMIC COLOR DEVEROPMENT

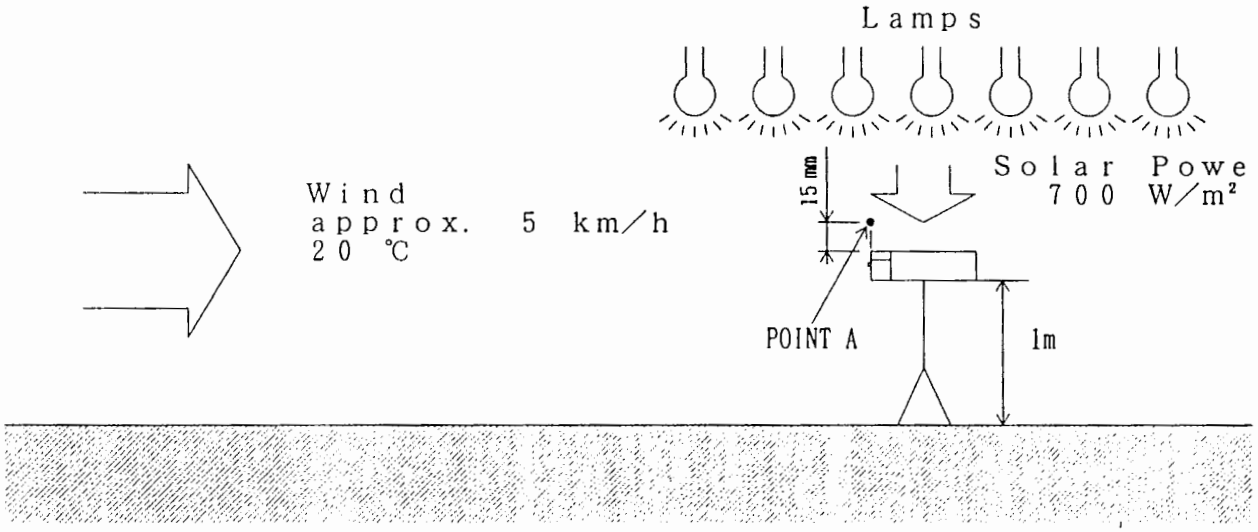


STATIC COLOR DEVEROPMENT



〔 Appendix G 〕

Solar Radiation Test



Testing Method

① Set the temperature of the room at 20℃.
② Leave the printer for 2 hours under the next conditions.
  i) Solar Power : 700 W/m²
  ii) Temperature of POINT A : 50 ℃ (controled by the wind -- approximate 5km/h, 20℃)

③ Do the Test-Printing of 1 roll and measure the temperature of the parts.

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