DECwriter 110i Printer
DECcolorwriter 120ic Printer

digital™

Service Manual

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Preface

This Service Manual provides the mechanical and electronic information needed to service the LJ 110/120 ink-jet printer. Refer to this manual only if the fault has not been corrected after following the troubleshooting steps explained in the User Guide that comes with this printer.

Summary

This service manual is intended for the DECwriter 110i (LJ 110) monochrome printer and the DECcolorwriter 120ic (LJ 120) color printer. The only difference is that the LJ 120 is shipped with the color kit (including a color print head, a print head storage box and the DECcolorwriter 120ic color printer driver) and that the LJ 110 can be upgraded with the color kit. In all other respects the two printers are identical and therefore all instructions described in this manual are applicable to both printers, unless reference is made to a specific model.

The chapters are ordered in a way to develop an autonomous and gradual approach to the printer functions. Certain paragraphs are on a dark background to bring particularly important information or procedures to your attention. Disregarding the information contained in these paragraphs could cause the printer to malfunction.

Associated Documentation

EK-LJ12E-UG   DECcolorwriter 120ic Printer - User Guide

EK-LJ12E-RF   DECcolorwriter 120ic Printer - Setting Up Your Printer

EK-LJ11*-UG   DECwriter 110i Printer - User Guide

EK-LJ11*-RF   DECwriter 110i Printer - Setting Up Your Printer

The DECcolorwriter 120ic Printer documentation set is only available in English.

The * in the above order numbers corresponds to the language identifier for the appropriate language: A for American, E for English, F for French, G for German, I for Italian, S for Spanish.

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General

This chapter introduces the features of the LJ 110/120 ink jet printer, its technical characteristics and details the firmware and the available character generators.

Introduction

The LJ 110/120 is an ink-jet printer that combine excellent quality printing with a fast writing speed, a low noise level and considerable versatility in the paper handling.

This non-impact printer is designed and constructed to guarantee reliability and to give constant quality of both text and high resolution graphics. It uses "drop on demand" thermal inkjet technology, associated with very low power consumption. It produces a laser-like print density of up to 300 dpi. the monochrome print head can be refilled and its ink is water-resistant.

The LJ 110/120 can be connected to a PC with standard parallel or optional serial interface. Compatible with MS-Windows and many other software applications, it can be used in most working environments. The resident firmware emulates the HP DeskJet 500C printer (PCL III +).

Technical Characteristics

Printing Technique	Non-impact, bubble ink jet
Black Print Head	- With replaceable ink cartridge and water-resistant ink - Resolution: 300 x 300 dpi - Repetition frequency: 5000 Hz - Nozzles: 50 (in 4 groups of 12 or 13) - Vertical construction (2 columns of 25 nozzles) - Ink cartridge life: 90,000,000 dots (400,000 characters, average) - No. cartridges per print head: up to 10 (depending on usage)
Color Print Head	- Monoblock disposable - Resolution: 300 x 300 dpi - Repetition frequency: 3000 Hz - Nozzles: 51 (in 3 vertical groups: yellow, magenta, cyan) - Vertical construction (2 columns, one of 25 and one of 26 nozzles) - Print head life: 200 pages at 8% capacity
Print Matrix	- 300 x 300 dpi
Print Definition (**Vertical x Horizontal**)	- 1/150 in x 1/300 in for Draft - 1/300 in x 1/300 in for LQ
Print Density	75, 100, 150, 300 dpi
Print Pitch	10, 12, 16.67 cpi; PS Each basic fixed pitch value can be condensed to half and expanded to double its value (e.g.: 10 cpi: 5 cpi / 20 cpi)
Print Line Length	Portrait orientation: - 80 characters with 10 cpi pitch - 96 characters with 12 cpi - 132 characters with 16.67 cpi pitch Landscape orientation: - 112 characters with 10 cpi pitch - 134 characters with 12 cpi

Printing Speed	- DOS and similar environments: 180 cps in Draft, 120 cps in LQ
	- Windows and similar environments:
	  - Draft : up to 3 pages per minute (ppm)
	  - Letter Quality : up to 3 ppm
	
	NOTE: These values may vary depending on the software application and / or the type of computer used

Work Load	Not to exceed 1000 pages per month, average of 400 pages per month, including 160 color pages. Printer life: 25000 pages.
Print Path	Bi-directional
Graphic Printing	Bit Image Mode - Density: 300 x 300 dpi
Ink Save Mode	10 % ink saving in graphics mode
Linespacing	- Elementary value: 1/300 in - Resident value: 1/6 in (4.23 mm)
Vertical Paper Motion	4 in/s (101.6 mm/s)
Print Pitch	10, 12, 16.67 cpi; PS Each basic fixed pitch value can be condensed to half and expanded to double its value (e.g.: 10 cpi: 5 cpi / 20 cpi)
Printer Emulation	- Resident : HP PCL III + - Optional : IBM X24 / EPSON LQ 850 (on emulation card)
Resident Fonts	- **Courier**: Upright / Italic; Portrait / Landscape - **Letter Gothic**: Upright / Italic - Portrait; Upright - Landscape - **Book Face Times**: Upright / Italic - Portrait - **Times Nordic**: Upright / Italic - Portrait - **Linea**: Upright / Italic - Portrait - **Line Draw**
Fonts Cards	One optional memory card at a time
Paper Handling	- Automatic: ASF (tray capacity: 70 x 21 lb sheets (80 g/m2)) - Manual: including thick documents, film, envelopes (weight up to 135 g/m2)
Interface	- Resident: Parallel (Centronics) - Optional: Serial RS 232C / V 24
RAM	128K bytes
Operating Environment	- Temperature: 15 to 35 °C - Relative Humidity: 15% - 85%

Noise Emission	ISO 7779 print test (ECMA 74 text) with 10 cpi pitch:
	46 dBA Letter Quality print mode Front bystander position

Electrical Characteristics	- Voltage: 115 V (+/- 10%)
	                  220 / 230 V (+6% / -10%)
	                  240 V (+ 6% / - 10%)

	- Frequency: 50 or 60 Hz - Power absorbed (operate): 25 W
Certification	*For power supply voltage 115 V (USA and Canada)*
	- Electromagnetic Compatibility: FCC Class B "Certified" - Safety Regulations: USA: UL 1950/478, Canada: CSA C22.2
	For power supply voltage 220 - 240 V
	- Electromagnetic Compatibility: EN 55022 Class B, CEE 87/308, VDE 0871 level B (DBP Verf. 243/1991) - Safety Regulations: EN 60950 + Nordic Deviations, Germany: GS (EN 60950/9.88 e ZH/618)
Physical Characteristics	Printer ready for use - **Height**: 11.05 in (281 mm) - **Width**: 14.21 in (361 mm) - **Depth**: 14.21 in (361 mm) - **Weight**: 8.8 lbs (4 kg)
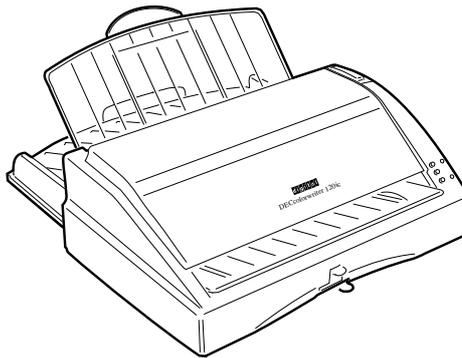
Fig. 1-1: The LJ 110/120 printer

Firmware and Character Generators

Basic Emulation

This printer's basic firmware is stored in a 4 MB EPROM mounted on the main board. It emulates both HP Deskjet 500 and HP Deskjet 500C printers, with all the relative character generators.

The LJ 110/120 automatically selects between the two emulations depending on the type of print head installed (monochrome print head: HP Deskjet 500; color print head: HP Deskjet 500C).

Optional Emulations

EPSON LQ 850 and IBM X 24 are the optional emulations available. Each emulation contains the relative character sets, and both are stored on a specific card.

The optional emulations are capable of handling optional memory card fonts. In order to enhance the graphic fonts of the LQ 850 and X 24 emulations, a memory extension card that allows DLL (Down Line Loading) management needs to be installed.

Character Generator

The character generator assigns a specific printable character to each code in the graphic set.

The first 128 codes in the ISO table (0-127) are standard and represent the USA ASCII character set. National variants and semigraphic symbols are not included in this code group.

The allocation of codes from the second ISO character set table (128-255) differs depending on the country and product.

Character Sets

Character Sets	Character Sets
CP 437 - International	Danish OPE II
Roman-8	Spain II
PC 8 Denmark/Norway	CP 863 - French Canadian
CP 850 (Multilingual)	**PC-WIN - ANSI Windows 3.1**
ECMA 94 Latin 1	**CP 852 - Latin 2**
ISO 4 - United Kingdom	**ISO 8859 / 2 - Latin 2**
ISO 21 - Germany	**PC-WIN - Eastern Windows 3.1**
ISO 69 - France	**CP 857 - Turkey**
ISO 15 - Italy	**ISO 8859 / 9 (Turkey)**
ISO 60 - Norway 1	**PC-WIN - Turkish Windows 3.1**
ISO 61 - Norway 2	**CP 866 - Cyrillic**
ISO 11 - Sweden Names	**CP 855 - Cyrillic**
ISO 10 - Sweden	**ISO 8859 / 5 (Cyrillic)**
ISO 17 - Spain	**PC-WIN - Cyrillic Windows 3.1**
ISO 6 - ASCII	**CP 210 - Greece**
ISO 2 - IRV	**CP 851 - Greece**
ISO 16 - Portugal	**ISO 8859 / 7 (Greece)**
ISO 14 - JIS ASCII	**PC-WIN - Greek Windows 3.1**
Legal	**CP 862 - Hebrew**
CP 860 - Portugal	**ISO 8859 / 8 (Hebrew)**
Danish OPE I	**PC Slovenia**
UNIX International	**PC Kamenicky**
Line Draw	

NOTE: In the above table, the character sets displayed in bold-face type exclude the use of internal fonts Book Face Times and Linea, and are not available if an optional font card is inserted and selected.

Resident Fonts

The character fonts residing in the printer firmware are grouped according to the requested page format, being either portrait or landscape.

Listed in the following tables are all the fonts available, along with their character heights and spacings.

List of Fonts for Portrait Page Formats

Font	Height (dots)	Pitch (cpi)
Courier	6 / **12**	5 / **10** / 20
Courier italic	6 / **12**	5 / **10** / 20
Courier	6 / **12**	8,33 / **16,67** / 33,34
Letter Gothic	6 / **12**	5 / **10** / 20
Letter Gothic	6 / **12**	6 / **12** / 24
Gothic italic	6 / **12**	6 / **12** / 24
Letter Gothic	4.75 / **9.5**	8.33 / **16.67** / 33.34
TMS Nordic	6 / **12**	Proportional
TMS Nordic italic	6 / **12**	Proportional
BF Times	7 / **14**	Proportional
BF Times italic	7 / **14**	Proportional
BF Times	6 / **12**	Proportional
BF Times italic	6 / **12**	Proportional
BF Times	5 / **10**	Proportional
BF Times italic	5 / **10**	Proportional
BF Times	4 / **8**	Proportional
BF Times italic	4 / **8**	Proportional
Linea	7 / **14**	Proportional
Linea	6 / **12**	Proportional
Linea italic	6 / **12**	Proportional
Linea	5 / **10**	Proportional
Linea italic	5 / **10**	Proportional
Linea	4 / **8**	Proportional

List of Fonts for Landscape Page Formats

Font	Height (dots)	Pitch (cpi)
Courier	6 / **12** / 24	**10** / 20
Courier italic	6 / **12** / 24	**10** / 20
Courier	6 / **12** / 24	**16.67** / 33.34
Letter Gothic	6 / **12** / 24	**12** / 24
Letter Gothic	4.75 / **9.5** / 19	**16.67** / 33.34

Optional Fonts Available with the Basic Emulation

Consist of a series of characters with the same ISO code as the basic character generator but with different fonts. These fonts reside on optional cards whose contents are listed in the following tables:

"**Prestige Elite**" Card (256 Kbytes)

Fonts	Height	Pitch	Page Format	Setup N⁰
Prestige Elite	10	12	Portrait	101
Prestige Elite corsivo	10	12	Portrait	102
Prestige Elite	7	16.67	Portrait	103
Letter Gothic corsivo	12	12	Landscape	104
Line Draw	10	12	Portrait	

"Times Nordic" Card (256 Kbytes)

Font	Height	Pitch	Page Format	Setup N⁰
Times Nordic	30	Proportional	Portrait	111
Times Nordic	14	Proportional	Portrait	112
Times Nordic italic	14	Proportional	Portrait	112
Times Nordic	12	Proportional	Portrait	114
Times Nordic italic	12	Proportional	Portrait	115
Times Nordic	10	Proportional	Portrait	116
Times Nordic italic	10	Proportional	Portrait	117
Times Nordic	8	Proportional	Portrait	118
Times Nordic italic	8	Proportional	Portrait	119

"Nordic" Card (256 Kbytes)

Font	Height	Pitch	Page Format	Setup N⁰
Nordic	30	Proportional	Portrait	121
Nordic	14	Proportional	Portrait	122
Nordic italic	14	Proportional	Portrait	122
Nordic	12	Proportional	Portrait	124
Nordic italic	12	Proportional	Portrait	125
Nordic	10	Proportional	Portrait	126
Nordic italic	10	Proportional	Portrait	127
Nordic	8	Proportional	Portrait	128
Nordic italic	8	Proportional	Portrait	129

Options

All the options can be installed directly by the user by following the instructions provided in the single cartons.

Color Kit

- Set of 1 color print head + 1 storage box + 2 Printer Drivers diskettes (including **Digital DECcolorwriter 120ic** Printer Driver)   **LJ11X-BK**

PCMCIA Font Cards

Each font card is supplied with a booklet which illustrates the font card contents and explains the font selection procedure.

- Font Card B   Prestige Elite / 7-10 pt / 16.67-12 cpi   **LJ50X-CH**
                   Letter Gothic / 12 pt / 12 cpi
                   Line Draw

- Font Card R,U   Times Nordic / 8-10-12-14-30 pt / PS   **LJ50X-CJ**

- Font Card T,V   Nordic / 8-10-12-14-30 pt / PS   **LJ50X-CK**

PCMCIA Emulation Card

- IBM Proprinter X24 / EPSON LQ 850 multi-emulation   **LJ11X-IE**

PCMCIA RAM Card

Other standard PCMCIA Type 1 cards up to 4 Mbytes, available on the market, can be used.

- 256 KB card   **LJ50X-DB**

Serial Interface

- User-installable kit for EIA RS 232C / V24 interface   **LJ50X-SI**

Parallel Data Cables

- 10 ft parallel shielded cable   **BC19M-10**
- 6 ft parallel shielded cable   **BC19M-06**

Accessories

Monochrome Print Head and Ink Cartridge

The monochrome print head, consisting of a printing unit and a replaceable ink cartridge, is available packaged as follows:

- Set of 1 complete monochrome print head (printing unit + ink cartridge) and 1 monochrome ink cartridge   **LJ50X-AB**
- Set of 2 monochrome ink cartridges (400 pages life each)   **LJ50X-AC**

Color Print Head

The color print head, consisting of a single unit, including the printing unit and the ink cartridge (not replaceable), is available packaged as follows:

- Set of 1 color print head (200 pages life)   **LJ50X-AK**

Transparencies

Digital transparencies are available in two sheet sizes:

- Letter size (50 sheets box)   **LJ50X-AE**
- A4 size (50 sheets box)   **LJ50X-AF**

2

Functional Description

This chapter describes the different functional and physical parts of the LJ 110/ 120 printer. It also explains how an ink jet print head functions.

Printer Components and Internals
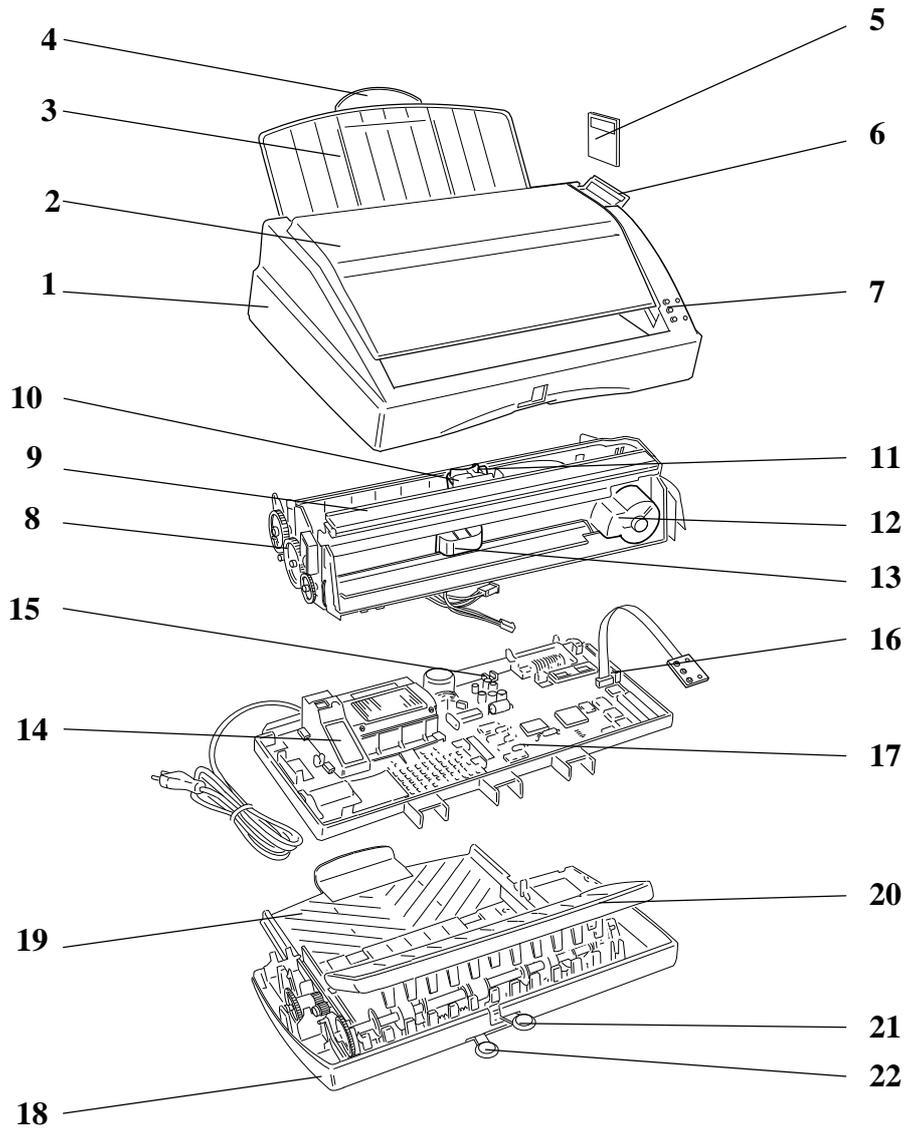
Locating the Functional Components

The figure on the previous page show a front view of the components of the printer. The following parts are indicated:

  1 Casing

  2 Top cover

  3 Paper output tray

  4 Extendible support

  5 Optional memory card

  6 Memory card slot cover

  7 Operator panel

  8 Paper feed stepper motor

  9 Selector switches

10 Print head

11 Carriage reset and setup parameter read photosensor

12 Carriage transport stepper motor

13 Ink slide

14 Power group (On/Off switch, power cord, 115/220/240 V transformer)

15 Paper detection photosensor

16 Optional memory card connector

17 Main board

18 Printer base and ASF support

19 Paper input tray

20 Paper insertion guide

21 Paper securing lever

22 Paper centering lever

General Block Diagram

```
                          ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                          │    Serial Interface    │
                          │  (EIA RS 232C /V24)    │
                          └ ─ ─ ─ ─ ─ ┬ ─ ─ ─ ─ ─ ┘
                                      ↓
        Power Supply          ┌───────────────────┐
        ─────────────         │  Parallel Interface│
              │               │    (Centronics)    │
              ↓               └─────────┬──────────┘
  ┌────────────────────┐               ↓                  ┌ ─ ─ ─ ─ ─ ┐
  │ Power Group         │      ┌───────────────────┐       │  Memory   │
  │ - Transformer       │      │                   │ ←──── │   Card    │
  │  (115, 220, 240 V)  │ ───→ │                   │       └ ─ ─ ─ ─ ─ ┘
  │ - Fuse              │      │                   │       ┌───────────┐
  │ - ON/OFF Switch     │      │    MAIN BOARD     │ ←───→ │ Operator  │
  └────────────────────┘      │                   │       │  Panel    │
                              │                   │       └───────────┘
  ┌──────────────┐           │                   │       ┌───────────┐
← │ Paper Feed   │ ←──────── │                   │ ────→ │ Carriage  │
  │   Motor      │           │                   │       │  Motor    │
  └──────────────┘           └───┬───────────┬───┘       └───────────┘
  ┌──────────────┐               ↓           ↑
→ │  ASF Tray    │        ┌────────────┐  ┌───────────────────────┐
  └──────────────┘        │ Print Group│  │ Carriage Reset and Setup│
  ┌──────────────┐        └────────────┘  │  Parameter Read Sensor  │
→ │Manual Paper  │                         └───────────────────────┘
  │    Feed      │
  └──────────────┘
```

NOTE: The blocks with dashed lines are options.

Monochrome Ink Jet Print Head Functioning

Ink Jet Print Head Description

The monochrome ink jet print head is made up of an interchangeable resin shell containing 50 print nozzles and an electrical circuitry with 50 resistive heating elements (see figure 2-1a).

The nozzles are assembled on a nickel and gold compound referred to as being electroformatted, and have a conical shape as shown in figure 2-1b.

The ink is contained in a disposable cartridge mounted inside the shell hosting the nozzles. The ink flows to the nozzles through small channels in the print head's resin layer. This layer is electrically insulated from the resistive heating elements.

A sponge inside the cartridge prevents the ink from being shaken during print head movements. This avoids problems during carriage translations, avoids the ink from leaking out of the bleedholes and the forming of froth.

Each resistive heating element corresponds to a nozzle and is connected to the head's external electric contacts.
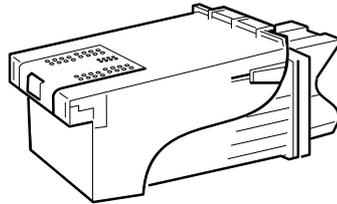
Fig. 2-1a: Ink jet print head and ink cartridge

50μm

Nozzle

Fig. 2-1b: Nozzle cross section

Heating Element

140-150μm

Heating Element - Nozzle Pad

Flexible Electric Grid

INK CARTRIDGE

Cover

Ink Sponge

Shell
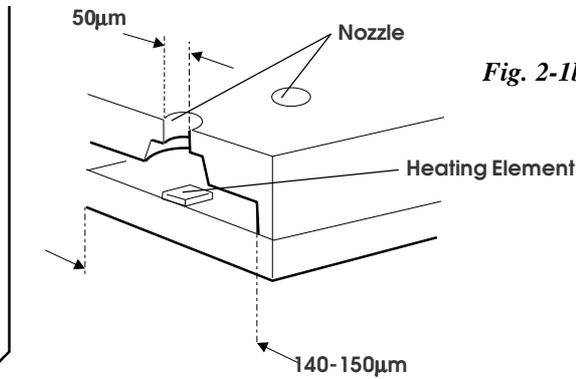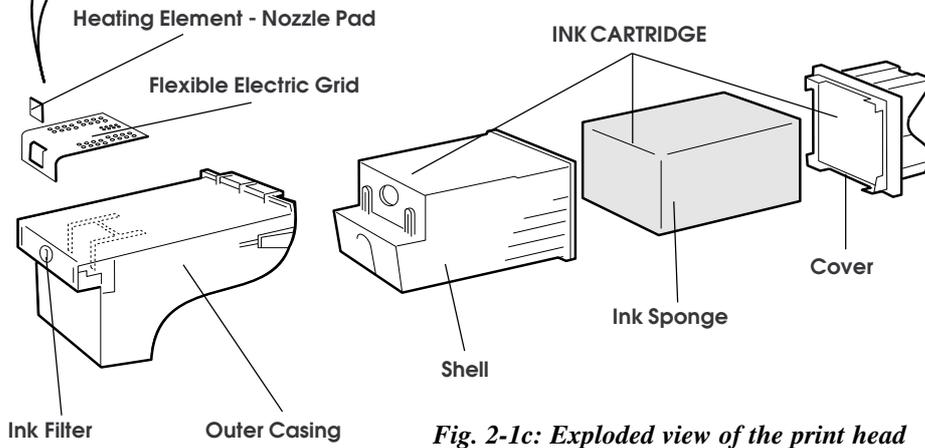
Ink Filter   Outer Casing   *Fig. 2-1c: Exploded view of the print head*

Fig. 2-1: Ink-jet print head

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Ink Jet Printing

Each nozzle expels an ink bubble whenever an electrical signal is applied for a few microseconds to the corresponding resistive heating element.

The small amount of ink that comes into contact with the resistive heating element the moment the electrical signal is applied boils and begins to vaporize thus creating an ink bubble.

As the ink bubble begins to expand, it pushes the ink out of the nozzle and onto the paper. This ink droplet is expelled from the nozzle at a rate of about 15 m/ sec.

Figure 2-2, a-e, shows the highlights of how an ink bubble is created and expelled from the nozzle.

When the resistive heating element is no longer energized and the ink droplet exits the nozzle, new ink from the cartridge replaces the ink that was expelled onto the paper.

A new signal can now be applied to the heating element so that another ink bubble can be created.

Nozzle

Fig. 2-2a
Initial stage.

**Resistive
Heating
Element**

Ink
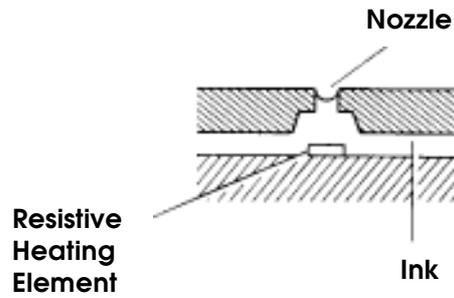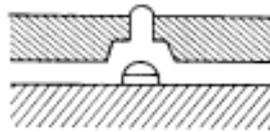
Fig. 2-2b
*An electrical signal is applied to
the heating element and an ink
bubble is created. The ink exits the
nozzle.*
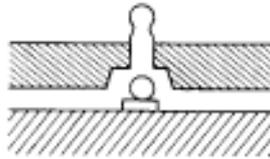
Fig. 2-2c
*The ink bubble expands to its
maximum size.*
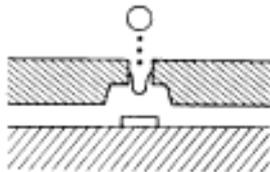
Fig. 1-4d
*The ink bubble breaks and the ink
is propelled onto the paper.*
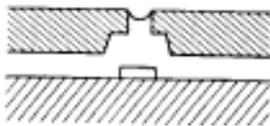
Fig. 1-4e
*New ink from the cartridge replaces
the droplet that has been expelled.*

Fig. 2-2: The creation of an ink droplet

Print Nozzles

A total of 50 print nozzles are arranged on two rows of 25 nozzles each. In each row the nozzles are sequentially placed on each column as shown in figure 2-3.

Matrix components

- Dampering/balancing nozzles A, C and B, D for the outermost 2-50 and 1-49 nozzles.
- Ink cartridge balancing nozzles E and L.

Fig. 2-3: Nozzle matrix

Information on the Resistive Heating Element's Activation Circuitry

The resistive heat elements are divided into four groups. Two groups have 12 elements, the other two groups have 13. Only one element can be activated at each time in each group, and therefore no more than four elements can be activated simultaneously.

To avoid induction between adjacent elements, each element will be activated according to a specific sequence (see figure 2-4).

Fig. 2-4: Activation sequence of the resistive heating elements

Each group of heating elements is controlled by an 18.8 V driver circuit. This voltage must be regulated in order to guarantee correct print head operation.

The most typical faults that may occur with lower voltages are the following: lack of ink bubble expulsion if the print head is not used for a determined period of time, lack of ink bubble expulsion in low temperatures. Higher voltages, on the other hand, can cause the generation of incorrect ink bubble control commands or no command at all due to the possible deterioration of the heating element.

Color Ink Jet Print Head Functioning

Ink Jet Print Head Description

The color ink-jet print head is made up of an interchangeable sealed shell containing 51 print nozzles, three liquid ink cartridges (one for each major color) and an electrical circuitry with 51 resistive heating elements (see figure 2-5a).

The nozzles are divided among the three major colors as follows:

- Yellow: 18 nozzles
- Magenta: 17 nozzles
- Light blue: 16 nozzles

The nozzles are constructed in the same way as the ones on the monochrome ink-jet print head. They are assembled on a nickel and gold compound referred to as being electroformatted, and have a conical shape as shown in figure 2-5b.

The ink is contained in three cartridges, one for each color.

A sponge inside each cartridge prevents the ink from being shaken during print head movements. This avoids problems during carriage translations, avoids the ink from leaking out of the bleedholes and the forming of froth.

The ink flows to the nozzles through small channels in the print head's resin layer. This layer is electrically insulated from the resistive heating elements.

Each resistive heating element corresponds to a nozzle and is connected to the head's external electric contacts.
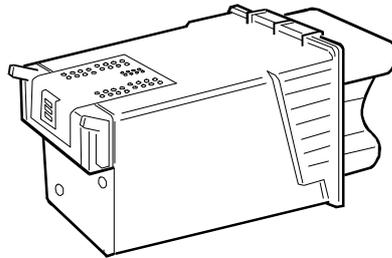
Fig. 2-5a: Color ink jet print head

50µm

Nozzle

Fig. 2-5b: Nozzle cross section

Heating Element

140-150µm

Heating Element - Nozzle Pad

Flexible Electric Grid

INK CARTRIDGE

Outer Casing

Cover

Ink Sponges

Ink Filter
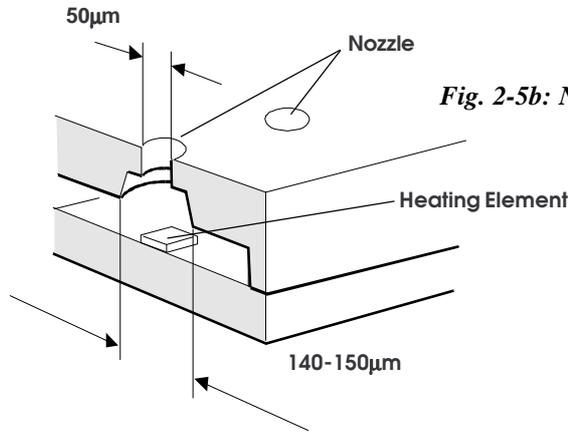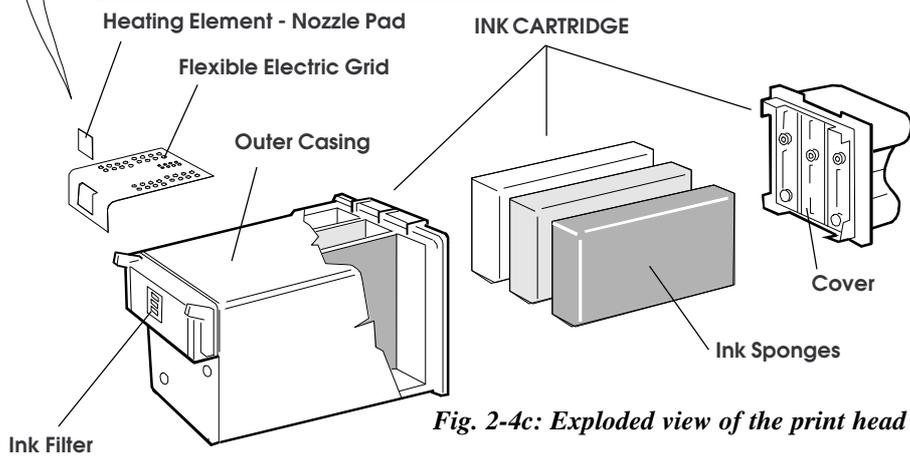
Fig. 2-4c: Exploded view of the print head

Fig. 2-5: Ink-jet print head

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Ink-Jet Printing

Turn to section page 2-7 for a full explanation on ink-jet printing.

Print Nozzles

A total of 51 print nozzles are arranged on two vertical rows of 25 and 26 nozzles and are divided horizontally in three groups, one for each color.

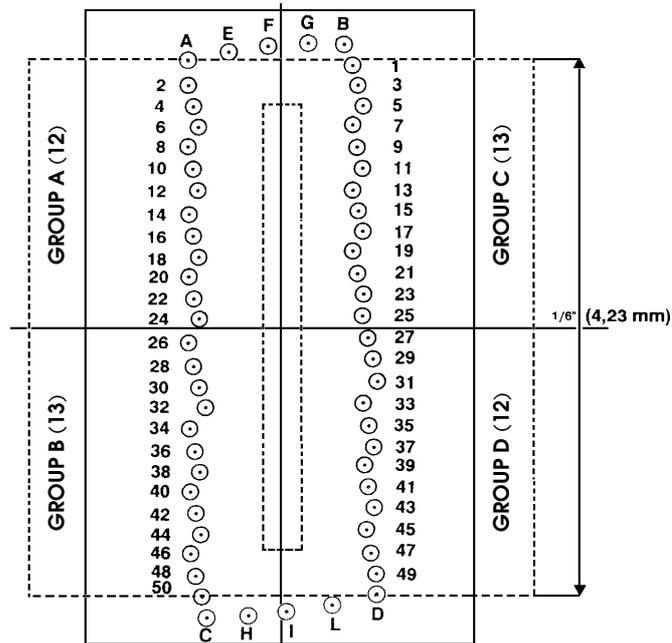Figure 2-6 shows how the nozzles are placed on each row.
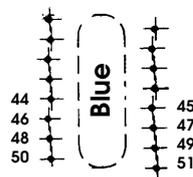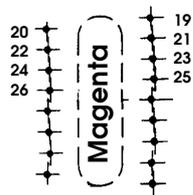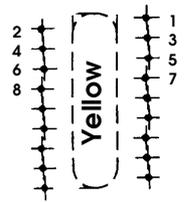
Fig. 2-6: Nozzle matrix

Information on the Resistive Heating Element's Activation Circuitry

The resistive heat elements are divided into four groups. Two groups have 12 elements, the other two groups have 13. Only one element can be activated at each time in each group, and therefore no more than four elements can be activated simultaneously.

To avoid induction between adjacent elements, each element will be activated according to a specific sequence (see figure 2-7).
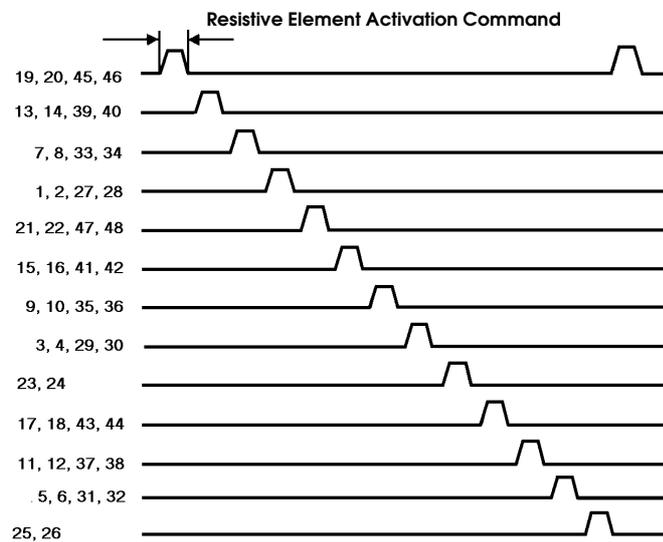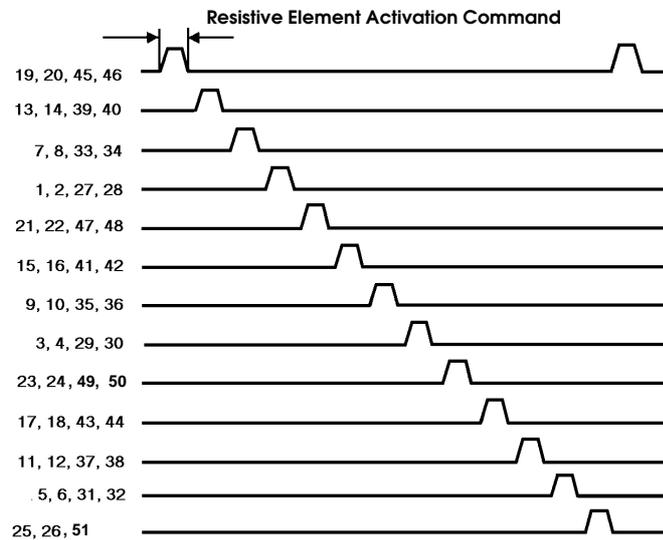

Fig. 2-7: Activation sequence of the resistive heating elements

Each group of heating elements is controlled by an 18.8 V driver circuit. This voltage must be regulated in order to guarantee correct print head operation.

The most typical faults that may occur with lower voltages are the following: lack of ink bubble expulsion if the print head is not used for a determined period of time, lack of ink bubble expulsion in low temperatures. Higher voltages, on the other hand, can cause the generation of incorrect ink bubble control commands or no command at all due to the possible deterioration of the heating element.

Operating Controls

Operator Panel

The operator panel on the LJ 110/120 has three buttons and two indicators.
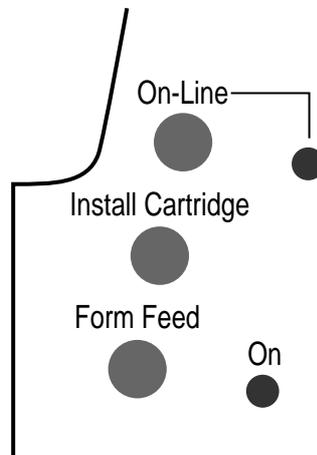
Fig. 2-8: Operator panel

The operator panel buttons allow you to install the print head, expell the paper and switch the printer ON or OFF line.

The indicators signal machine status, and out of paper or error conditions. For more information about the indicator meanings, see chapter 6.

Buttons Functions

The following table describes the functions of the keys in the different printer operating modes.

Some functions are obtained by pressing one or more keys simultaneously.

On-Line	Toggles between ON LINE and OFF LINE while changing the indicator status.
Install Cartridge	Moves the print head carriage to the print head installation/replacement position.
Form Feed	- With the printer ON LINE and FREE, allows you to manually load a sheet of paper to the first print line (TOF). If the printer is already loaded with paper, it expels the sheet of paper - With the printer ON LINE and BUSY, immediately prints the contents of the buffer and expels the printed sheet. - With the printer OFF line and loaded with paper, expels the paper. If the printer is out of paper, allows you to manually load a sheet of paper to the first printable line.
Install Cartridge + Switching On	Pressing this button while powering on the printer will automatically run a print test. Upon completion of the print test the printer will automatically switch ON LINE.
On-Line + Install Cartridge + Switching On	Pressing these two buttons while powering on the printer will print all the data in their hex format. Power off the printer to exit this print mode.

Print Head Selection Lever

The color selection lever is located on the right-hand side of the paper guide, just under the top cover.

When installing a monochrome (black ink) print head, move this lever away from the printer (BLACK).

When installing a color print head, move this lever towards the inside of the printer (COLOR).
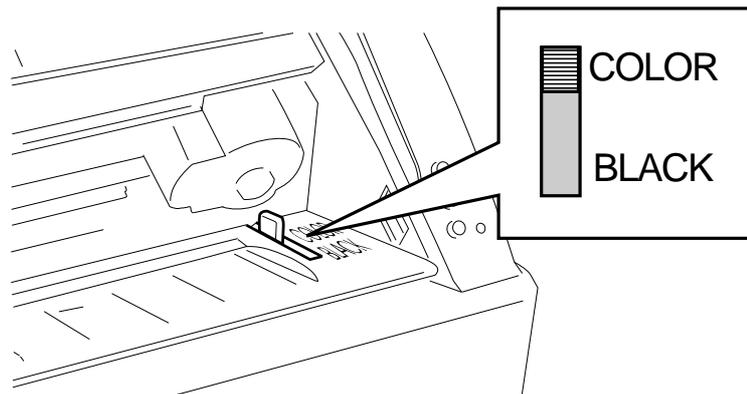
Fig. 2-9: Print head selection lever

NOTE: Always make sure that the lever is positioned according to the type of print head installed. The lever is not positioned correctly if the **On-Line** indicator begins to flash twice followed by a single flash of the **On** indicator.

3

Installation

This chapter quicly describes the general installation rules, where to install the printer and how to prepare it for use (unpacking, connecting, loading the paper...). For details about the installation procedure, see the LJ 110/120 Printer User Guides.

General Rules

The following rules need to be followed to ensure optimum printer performance and to avoid making service calls for problems that do not directly involve the printer.

Line Voltage Supply

The LJ 110/120 complies with the safety and electromagnetic interference (EMI) norms drawn up by the following commissions:

For power supply voltage 115 V (USA and Canada)

- Electromagnetic Compatibility:
  FCC Class B "Certified"

- Safety Regulations:
  USA: UL 1950/478, Canada: CSA C22.2

For power supply voltage 220 - 240 V

- Electromagnetic Compatibility:
  EN 55022 Class B, CEE 87/308, VDE 0871 level B (DBP Verf. 243/1991)

- Safety Regulations:
  EN 60950 + Nordic Deviations, Germany: GS (EN 60950/9.88 e ZH/618)

Never connect the printer to the same power outlet as industrial equipment since the printer will be subject to variations that are higher than those tolerated and with a greater degree of electromagnetic interference.

Always connect the printer to a grounded power outlet.

Locating the Printer

The printer must be used on a flat, steady surface. Keep it away from ventilators, radiators and direct sunlight.

These instructions are particularly important for ink-jet printers.

Environmental Conditions

The environmental conditions of the area in which the printer will permanently reside must comply with the indications defined in the AB quality objectives (normal office environment). When using the printer, avoid variations in temperature that could cause condensation.

Unpacking the Printer

Checking the Box Contents

The printer is shipped in a single box containing the following components:

1. LJ 110/120 printer
2. Print head storage box (LJ 120 only or LJ 110 color kit)
3. Monochrome print head
4. Color print head (LJ 120 only or LJ 110 color kit)
5. Setting Up Your Printer booklet
6. Printer User Guide
7. Paper output tray
8. Paper input tray
9. Printer driver diskettes (number depending on the printer type)
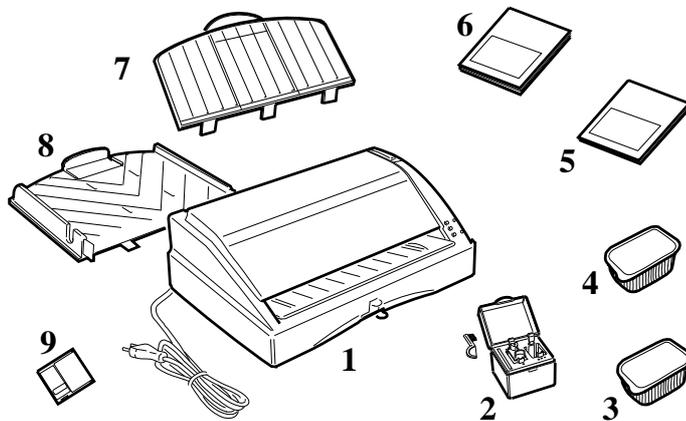
Fig. 3-1: Box contents

Connecting the Printer to a Power Outlet

Firstly make sure that the voltage indicated on the printer's electrical data plate matches the actual line voltage rating, then plug the power cord into the wall outlet.

Read section "General Rules" for information on optimum printer performance.

Installing the Print Head

The print head is equipped with an ink detection sensor that guarantees constant quality printing by indicating when the ink cartridge is nearly empty.

To install the print head:

- Power on the printer.

- Press the Install Cartridge button in order to move the print head to the print head installation / replacement position.

- Lift the printer's top cover.

- Open the container in which the print head is stored.

- A User Guide inside the container gives you the information needed for installing the print head.

- Remove the print head from its container, holding it on the side opposite the electrical contacts so that you do not touch them.
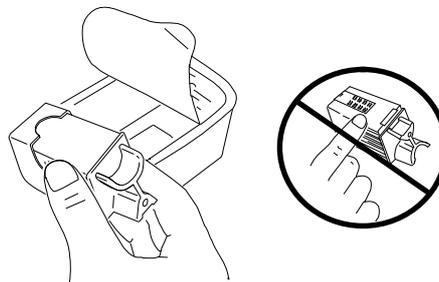
Fig. 3-2: Removing the print head from its container

- Holding the print head by its outside shell, remove the protective tape from the nozzles in the direction of the arrow indicated below. Never touch the nozzles area, nor rest the print head on it.
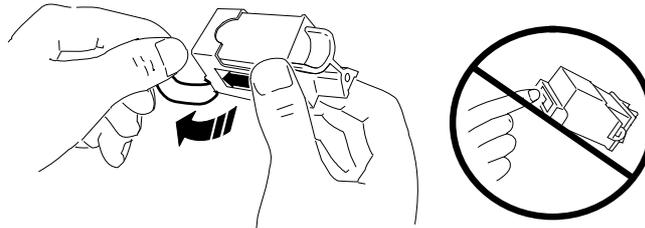
Fig. 3-3: Removing the protective tape

- **With the electrical contacts facing the front of the printer**, insert the print head in its slot by pushing it downwards (**1**), then pull it towards the front of the printer until it clicks (**2**).
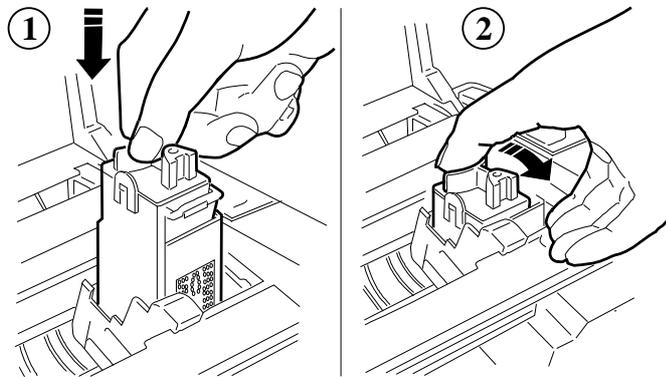
Fig. 3-4: Installing the print head

- Make sure the print head is installed correctly. Try again if you are not sure.

- Close the printer's top cover.

Inserting the Paper Input Tray

Paper is loaded into the printer from the paper input tray located underneath the printer. Before loading a pack of paper, however, install the outer part of this tray supplied with the printer.

The paper input tray can hold up to 70 x 21 lb (80 g/m^2), sheets of paper.

- Insert the paper feed tray's mounting studs into the respective slots on the lower rear of the printer (**1**).

- Make sure that the power cord is threaded through the U-shaped guide on the edge of the paper feed tray (**2**).
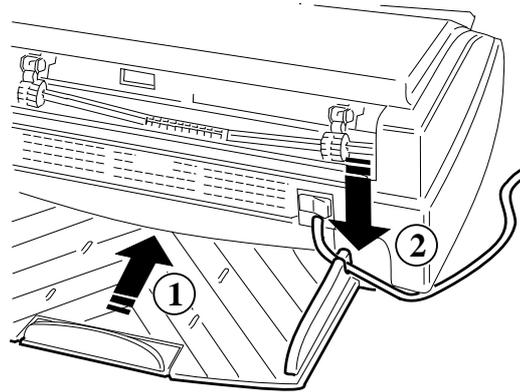
Fig. 3-5: Inserting the paper input tray

Mounting the Paper Output Tray

The paper is expelled from the rear of the printer into a paper output tray which is supplied with the printer. This tray is positioned on the top rear of the printer.

Insert the tray's mounting studs into the respective slots on the top rear of the printer. This tray can hold up to 30 x 21 lb (80 g/m^2) sheets of paper. The center part of the tray can be extended outward so that the tray can hold longer forms.
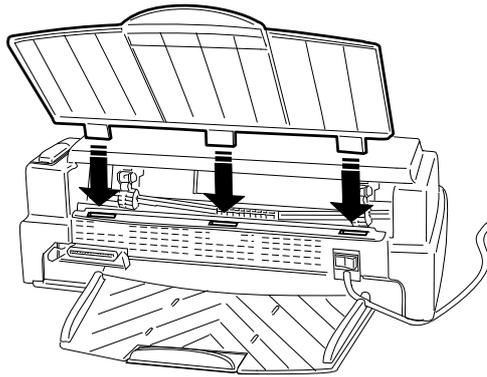
Fig. 3-6: Mounting the paper output tray

Loading the Paper

Paper is loaded into the printer through the ASF tray that the printer is equipped with.

This tray can hold up to 70 x 18 to 24 lb (70 to 90 g/m^2) sheets of paper.

The following table will aid you in determining the printable area for the two most common paper formats used, A4 and Letter/Legal. The figure on the facing page shows the meaning of the listed values.

	A4		Letter/Legal	
	mm	inches	mm	inches
M	210.0	8.26	215.9	8.5
W	203.2	8.0	203.2	8.0
L	3.4	0.134	6.4	0.25
R	3.4	0.134	6.4	0.25
T	1.0	0.04	1.0	0.04
B	15.24	0.6	15.24	0.6
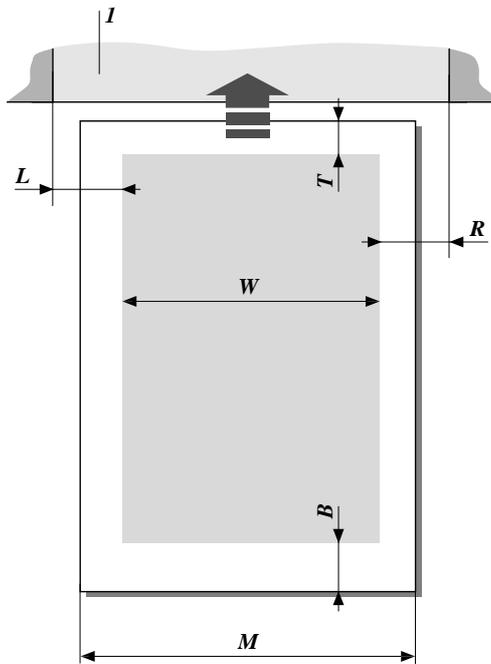
*Fig. 3-7: Print area (**1**: Printer mechanical path)*

On the lower front of the printer there are two levers which control the centering and the securing of the paper in the paper tray.
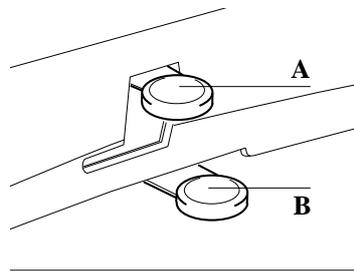
*Fig. 3-8: **A**: Paper securing lever - **B**: Paper centering lever*

- Move the paper centering lever (**B**) located on the front side of the printer towards the right.

- Lower the paper securing lever (**A**) and move towards the left.
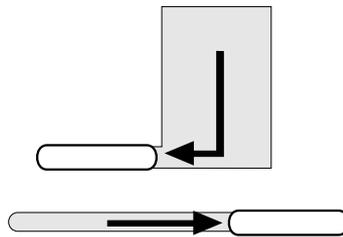
Fig. 3-9: Moving the levers to insert the paper

- To make paper loading easier, extend the central part of the paper tray without removing it.

- Leaf the pack of paper.

- Place the paper in the tray and then push it towards the printer until touching the feed rollers inside the tray.
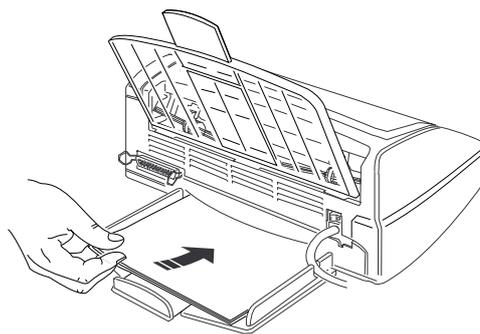
Fig. 3-10: Loading the paper

- Close the central part of the tray against the paper.
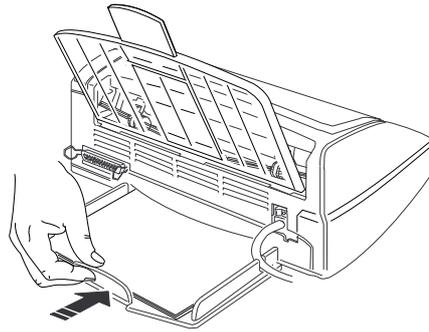
Fig. 3-11: Closing the paper tray

- Once paper is loaded in the tray, move the lower level (**B**) to the left in order to close the lateral guides and center the paper in the tray.
- Move lever (**A**) to the right and then upwards.
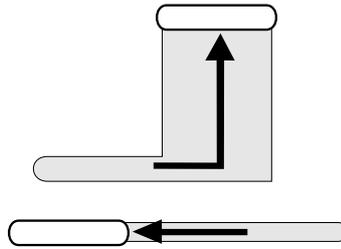
Fig. 3-12: Moving the levers to secure the paper

Loading the Paper Manually

You can manually load paper and envelopes one at a time through the slot on the front of the printer.

The following table will aid you in determining the printable area for the most commonly used envelope sizes, C5, DL, COM-10 and C6.

	C5		DL		COM-10	
	mm	inches	mm	inches	mm	inches
M	229.0	9.02	220.0	8.66	241.3	9.5
W	203.2	8.0	203.2	8.0	203.2	8.0
L	-	-	-	-	-	-
R	-	-	-	-	-	-
T	1.0	0.04	1.0	0.04	1.0	0.04
B	15.24	0.6	15.24	0.6	15.24	0.6
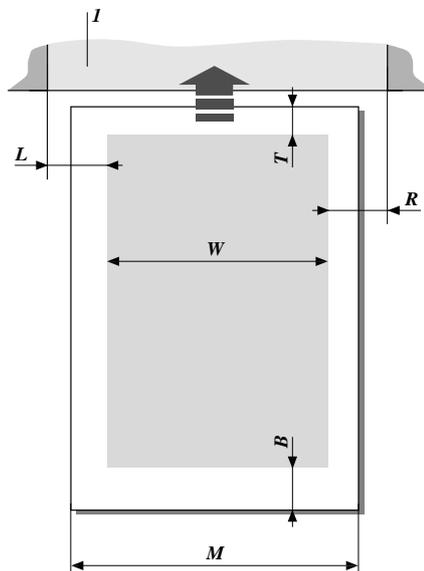
*Fig. 3-13: Print area (**1**: Printer mechanical path)*

To manually load a sheet of paper into the printer:

- Power on the printer.

- Place a sheet of paper on the support and align the sheet against its left-hand side (envelopes should be aligned against the right-hand side of the support).

- Push the paper into the paper feed slot until touching the feed rollers.

- Press the Form Feed button.
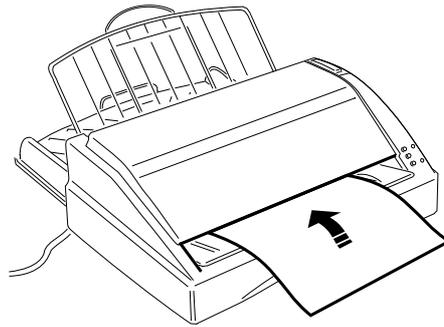
Fig. 3-14: Manually loading a sheet of paper

NOTE: You will need to program the printer via Setup if you wish to systematically load sheets of paper manually.

Inserting a Memory Card

Memory cards can contain firmware emulations, an EPROM with a determined group of character fonts, or additional memory (RAM or Flash EPROM).

The memory card can be added to the printer at a later date. Information on the characteristics of the specific memory card and how to install it are provided in an appropriate document supplied with the card itself.

Power off the printer before removing or inserting a memory card.

When a memory card with optional emulations is inserted, only the codes of this new memory card will be interpreted. To reselect the basic PCL3 emulation you need to remove the memory card.

Memory cards containing character fonts are specific of the basic PCL3 emulation and therefore cannot be handled by the optional IBM Proprinter 4207 and EPSON LQ 850 emulations.

To insert a memory card:

- Power off the printer.

- Open the memory card cover (**1**) and insert the memory card in its reserved slot (**2**).
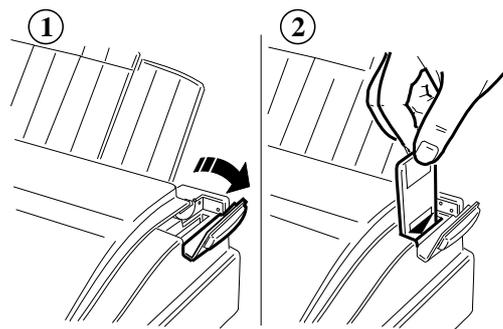
Fig. 3-15: Inserting a memory card

- Power the printer back on again.

- Program the new Setup parameters if the memory card contains an emulation, or select the external font if the memory card contains an external font.

Installing the Serial Interface

The serial interface is a user-installable option.

Installation instructions are provided with the interface itself.

The following figure shows the serial interface's CANNON 25-pin connector along with the relative transmission signals.
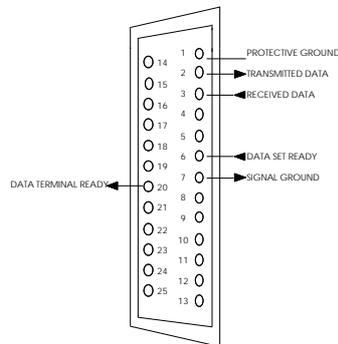
Fig. 3-16: Serial connector pin positions and corresponding signals

Print Test

To check whether the printer is installed correctly, simply run a print test.

To run the print test:

- Make sure there is paper in the input tray.

- Power the printer off and then on again while pressing the Install Cartridge button.

- The printer will load a sheet of paper and begin to print the test. The mono-chrome print test is four pages long, the color print test one page long.

- The test ends when all pages have been printed; the printer is now ready to be connected to the personal computer.

With this test you can check whether the printer works correctly, you can obtain a printout of the printer's configuration data and view its default Setup parameters.

Connecting the Printer to the Computer

Centronics Parallel Interface

This interface is a standard component on the printer; no additional options are required.

Handshaking is synchronized by the character strobe signal, issued from the system, and by the BUSY signal issued from the printer.
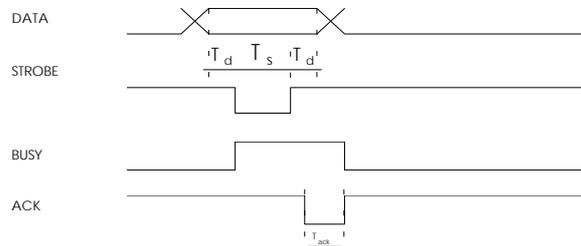
Fig. 3-17: Signal timing

The 36-pin connection cable is NOT supplied with the printer and must not be more than 2.5 meters long. Optional parallel interface cables are however available.

The following figure gives the connector's pin-out.

STROBE 01	19 GROUND
DATA 0 02	20 GROUND
DATA 1 03	21 GROUND
DATA 2 04	22 GROUND
DATA 3 05	23 GROUND
DATA 4 06	24 GROUND
DATA 5 07	25 GROUND
DATA 6 08	26 GROUND
DATA 7 09	27 GROUND
ACKNOWLEDGE 10	28 GROUND
BUSY 11	29 GROUND
PAPER EMPTY 12	30 GROUND
ON LINE 13	31 INIT.
AUTOFEED XT 14	32 ERROR
NC 15	33 LOGIC GROUND
LOGIC GROUND 16	34 NC
FRAME GROUND 17	35 +5 V (PULL-UP: 3.3K ohm)
+5 V 18	36 INPUT / SELECT IN

Fig. 3-18: Parallel connector pin positions and corresponding signals

Powering off the Printer

Before powering off the printer make sure the print head is at the far right-hand side of the carriage. It should automatically reach this position after a few seconds of printer inactivity. The purpose for this is to tightly seal the print nozzles to prevent the ink inside them from drying-out.

NOTE: If the personal computer is powered off while the printer is still on, the printer will automatically reset itself. If the printer is powered off during the reset phase, the print head may stop outside its parking position.

It is therefore suggested to power off the printer before the personal computer.

Installation Setup

You can configure the printer with a printer driver corresponding to the basic HP DJ 500C emulation.

The LJ 110/120 comes with a diskette containing the specific Windows 3.1 drivers, making it possible to take full advantage of the features offered by this printer model.

The **Digital DECwriter 110i** monochrome printer driver is provided with the LJ 110 and the LJ 120. The **Digital DECcolorwriter 120ic** color printer driver is provided with the LJ 120 and the LJ 110 color kit option.

If the printer is not configured from the system it will use the factory default settings.

Factory Settings

Run a print test to see how the printer has been configured at the factory. This test will print the default settings and available fonts on a total of four pages.

Features	Factory Settings
Paper Size	Letter (North America) or A4
Paper Insertion	Paper tray
Perforation Skip	Enabled
Text Scale Mode	Disabled
Ink Save Mode (Text)	Disabled
Graphic Density	75 dpi
Automatic Line Feed	Disabled (CR=CR)
Print Quality	Letter Quality
Width Type	Normal
Font	Courier Upright Portrait 10 12
Character Set	CP 437 International

If the optional serial interface has been installed:

Baud Rate	2400
Parity	None
Handshaking	Hardware

Programmable Parameters

You can change the factory default settings using a total of seven selector groups.

Programming the Parameters and Running Setup

- Power off the printer.

- Open the printer's top cover (**1**), then the selector switches cover (**2**).
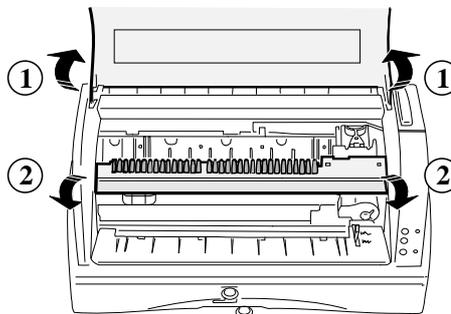
Fig. 3-19: Programming Selectors

- Set the selectors according to the parameters given in the tables on next pages.

- Power the printer back on again.

NOTE: The selectors are read during the printer's power on phase.

First Group of Selectors (1-6)

The six selectors in this group allow you to select the different fonts available.

Second Group of Selectors (A-H)

The eight selectors in this group allow you to define the print attributes and other features.

Third Group of Selectors (I-J)

The two selectors in this group are reserved.

Fourth Group of Selectors (1-3)

The three selectors in this group allow you to select the paper size.

Fifth Group of Selectors (1-6)

The six selectors in this group allow you to select the character set.

Sixth Group of Selectors (1-5)

The five selectors in this group allow you to select the features of the optional serial interface.

Seventh Group of Selectors (1-3)

The three selectors in this group are reserved.

The following figures show the different available features according to the selector switches settings.

OFF ☐   ■ ON
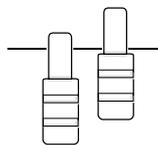
Fig. 3-20: Selector switches position meanings

1	2	3	4	5	6	Font
						Courier Upright Portrait 10 cpi / 12 pt
					�	Courier Upright Portrait 10 cpi / 12 pt
				�		Courier Italic Portrait 10 cpi / 12 pt
				▉	▉	Courier Upright Portrait 16.67 cpi / 12 pt
			▉			Letter Gothic Upright Portrait 10 cpi / 12 pt
			▉		▉	Letter Gothic Upright Portrait 12 cpi / 12 pt
			▉	▉		Letter Gothic Italic Portrait 12 cpi / 12 pt
			▉	▉	▉	Letter Gothic Upright Portrait 16.67 cpi / 9.50 pt
		▉				Times Nordic Upright Portrait PS / 12 pt
		▉			▉	Times Nordic Italic Portrait PS / 12 pt
		▉		▉		BF Times Upright Portrait PS / 14 pt
		▉		▉	▉	BF Times Italic Portrait PS / 14 pt
		▉	▉			BF Times Upright Portrait PS / 12 pt
		▉	▉		▉	BF Times Italic Portrait PS / 12 pt
		▉	▉	▉		BF Times Upright Portrait PS / 10 pt
		▉	▉	▉	▉	BF Times Italic Portrait PS / 10 pt
	▉					BF Times Upright Portrait PS / 8 pt
	▉				▉	BF Times Italic Portrait PS / 8 pt
	▉			▉		Linea Upright Portrait PS / 14 pt
	▉			▉	▉	Linea Upright Portrait PS / 12 pt
	▉		▉			Linea Italic Portrait PS / 12 pt
	▉		▉		▉	Linea Upright Portrait PS / 10 pt
	▉		▉	▉		Linea Italic Portrait PS / 10 pt
	▉		▉	▉	▉	Linea Upright Portrait PS / 8 pt
	▉	▉				Courier Upright Landscape 10 cpi / 12 pt
	▉	▉			▉	Courier Italic Landscape 10 cpi / 12 pt
	▉	▉		▉		Courier Upright Landscape 16.67 cpi /12 pt
	▉	▉		▉	▉	Letter Gothic Upright Landscape 12 cpi / 12 pt
	▉	▉	▉			Letter Gothic Upright Landscape 16.67 cpi / 9.50 pt
▉						External fonts

Fig. 3-21: Fonts selector switches settings

1	2	3	4	5	6	Character Set
	■		■	■	■	Danish OPE II
	■	■				Spain II
	■	■			■	CP 863 - French Canadian
	■	■		■		PC-WIN - ANSI Windows 3.1
	■		■	■	■	CP 852 - Latin 2
	■	■	■			ISO 8859 / 2 - Latin 2
	■	■	■		■	PC-WIN - Eastern Windows 3.1
	■	■	■	■		CP 857 - Turkey
	■	■	■	■	■	ISO 8859 / 9 (Turkey)
■						PC-WIN - Turkish Windows 3.1
■					■	CP 866 - Cyrillic
■						CP 855 - Cyrillic
■					■	ISO 8859 / 5 (Cyrillic)
■			■			PC-WIN - Cyrillic Windows 3.1
■			■		■	CP 210 - Greece
■			■	■		CP 851 - Greece
■			■	■	■	ISO 8859 / 7 (Greece)
■		■				PC-WIN - Greek Windows 3.1
■		■			■	CP 862 - Hebrew
■		■		■		ISO 8859 / 8 (Hebrew)
■		■		■	■	PC Slovenia
■		■	■			PC Kamenicky
■	■	■	■	■	■	Default set in optional card

Fig. 3-22: Character sets selector switches settings

3-22

1	2	3	4	5	6	Character Set
						CP 437 - International
					■	CP 437 - International
				■		Roman-8
				■	■	PC 8 Denmark/Norway
			■			CP 850 (Multilingual)
			■		■	ECMA 94 Latin 1
			■	■		ISO 4 - United Kingdom
			■	■	■	ISO 21 - Germany
		■				ISO 69 - France
		■			■	ISO 15 - Italy
		■		■		ISO 60 - Norway 1
		■		■	■	ISO 61 - Norway 2
		■	■			ISO 11 - Sweden Names
		■	■		■	ISO 10 - Sweden
		■	■	■		ISO 17 - Spain
		■	■	■	■	ISO 6 - ASCII
	■					ISO 2 - IRV
	■				■	ISO 16 - Portugal
	■			■		ISO 14 - JIS ASCII
	■			■	■	Legal
	■		■			CP 860 - Portugal
	■		■		■	Danish OPE I
	■		■	■		UNIX International

Fig. 3-23: Character sets selector switches settings

Fig. 3-24: Selector switches settings

4

User Maintenance

This chapter describes basic maintenance operations the user will be required
to perform during the printer's working life.

Precautions

**Preventive maintenance is not required, however during each service
intervention it is suggested that you:**

– **Make sure there is no trace of ink on the surface of the print head
nozzles. If you do find trace of ink, clean or replace the rubber
cleaning cap.**
– **Check the squareness and adherence between the ink discharge
rubber and the external surface of the nozzles.**
– **Remove any paper dust or ink residue from inside the machine.**

**NEVER TOUCH NOR MANUALLY CLEAN THE NOZZLES OR
ELECTRIC CONTACTS.**

Nozzle Cleaning and Priming

The printer automatically cleans the external surface of the nozzles during paper movement. It is up to the user, however, to restore ink after one or more nozzles have been found to be clogged.

The print test runs a gradual check on the nozzles. This test is particularly indicated for finding faulty nozzles.

Automatic Nozzle Cleaning

Nozzle cleaning is carried out by a rubber cap located at the far right-hand side of head travel. When the print head is moved to its parking position (when printing temporarily stops to favor paper feed), the print nozzles rub against the rubber cap and are cleaned of any ink particles and paper dust.

Cleaning and Servicing the Monochrome Print Head

The ink-jet print head demands special care as far as nozzle cleaning is concerned. Given their particular structure, dust or the drying-out of exposed ink can easily clog the nozzles.

Listed below are some useful tips that will guarantee the optimum use of the print head.

- Remove the print head from its sealed container only when you are about to install it in the printer. The print head has an 18-month warranty if stored in its sealed container, otherwise the warranty is reduced to about six months (both warranty periods are cumulative).

- Never rest the print head on its nozzle or electric contact sides. Never rest the head on heat sources, air conditioners, nor on dirty or dusty surfaces.

- If necessary (when the nozzles are clogged), prime the print head.

  This command forces ink through the nozzles to clear the passages. Priming will have to be run whenever one or more nozzles clog (see next section).

- After a print job, tightly seal the nozzle bay so the nozzles are protected against dust and to avoid the ink from drying-out when exposed for a certain period of time. Since on the LJ 110/120 this operation is carried out automatically after a few seconds of printer inactivity, wait a few seconds before powering off the machine after a print job.

If a black out occurs while the printer is on, power off the printer and manually push the print head to its farthest right-hand position.

NOTE: If after a print job the personal computer is powered off before the printer, the printer will reset itself. If the printer is powered off during its reset phase, chances are that the print head may come to a stop outside of its parking position.

It is suggested therefore to power off the printer before the personal computer.

Priming the Monochrome Print Head

Ink must be restored whenever the print head is replaced or whenever one or more nozzles stop printing. This operation, however, is not required when the initial characters of a printout are incomplete after the printer has been inactive for a certain period of time.

Priming forces a small quantity of ink out of the nozzle. Carry out this operation only when strictly necessary so as to avoid wasting the ink and therefore reducing the life span of the ink cartridge.

Never perform priming with the printer casing off and the ink tube disconnected from the pad. Priming in this condition may spash anything in the vicinity of the end of the tube with ink.

To prime the monochrome print head:

- Switch the printer OFF LINE (the print head will move to its parking position).

- Open the printer's top cover.

- Pressing down the ink slide (labeled <PUSH>) (**1**), move it slowly from right to left along the full length of its shaft (**2**). Release the slide and return it to the right edge (**3**).
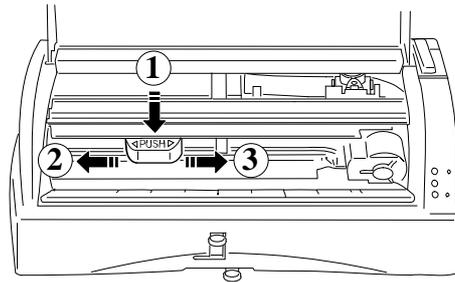
Fig. 4-1: Priming the print head

- Repeat the operation until ink appears in the tube below the slide.

- Press Install Cartridge to move the print head carriage to the head loading position, and repeat the above operation to empty the tube.

- Press Install Cartridge to return the print head carriage to its rest position.

- Close the top cover

- Press On-Line to return the printer to ON LINE condition.

If priming the print head does not result in improved print quality, switch the printer off and then on again, and prime the print head again.

WARNING: Priming MUST NOT be repeated systematically, as it will damage the print head. For used print heads, it should ONLY be attempted as a last resort, before changing the ENTIRE print head.

Cleaning and Servicing the Color Print Head

Also the color ink-jet print head demands special care as far as nozzle cleaning is concerned.

Given their particular structure, dust or the drying-out of exposed ink can easily clog the nozzles.

Listed below are some useful tips that will guarantee the optimum use of the print head.

- Remove the print head from its sealed container only when you are about to install it in the printer.

  The print head has an 18-month warranty if stored in its own sealed container, otherwise the warranty is reduced to about six months (both warranty periods are cumulative).

- Never rest the print head on its nozzle or electric contact sides. Never rest the print head on heat sources, air conditioners, nor on dirty or dusty surfaces.

- After installing the new color print head the printer will automatically run a nozzle bleed cycle, **therefore the Prime function is not available for color print heads**.

- After a print job, tightly seal the nozzle bay so the nozzles are protected against dust and to avoid the ink from drying-out when exposed for a certain period of time. Since on the LJ 110/120 this operation is carried out automatically after a few seconds of printer inactivity, wait a few seconds before powering off the machine after a print job.

  If a black out occurs while the printer is on, power off the printer and manually push the print head to its farthest right-hand position.

- Whenever removing the color print head from the printer, make sure to store it in the print head storage box supplied with the LJ 120 or the LJ 110 color kit. This will ensure that the ink on the print head does not dry-out.

5

Diagnostics and Tests

This chapter describes the several diagnostics and testing procedures available on the LJ 110/120 printer. These procedures are designed to help the user to check the machine correct functioning.

Power On Diagnostics

The machine firmware has been designed so that a check is made on the printer's major function each time the printer is powered on.

If errors are detected during this autodiagnostic phase, the **On-Line** indicator on the printer console will begin to flash rapidly.

Monochrome Print Test

This test checks whether the print head operates correctly, displays the printer's operating parameters and reviews the character fonts available in the printer.

The following information is provided:

- The printer's selected emulation and firmware release.
- The type of print head installed.
- Whether the nozzles are operating correctly (Print Head Test).
  If the test finds that the ink droplet is not propelled from one or more nozzle but the Nozzle Test is successful, you may need to prime the print head (for monochrome print head only).
- The electrical continuity of the nozzle activation circuitry (Nozzles test).
  If the test finds that the electrical signal is not being provided by the nozzles, turn to the section entitled "Troubleshooting Guide".
- The list of programmable parameters, with a graphical representation of where the selectors are located.
- The table of the selected character generator.
- The fonts available for both portrait or landscape printing.

To run a print test:

- Make sure there is paper in the input tray.

- Power off the printer, then power it back on again while pressing the Install Cartridge button.

The printer will load a sheet of paper from the input tray and begin to print the first page of the print test. This page is shown on the facing page.

To interrupt the print test, press the On-Line button. This button will need to be pressed again to resume printing.

To exit the print test mode before it actually finishes, simply power off the printer.

When the four pages of the print test are all printed, the test ends automatically and the printer switches ON LINE.

Fig. 5-1: Example of monochrome print test: page 1

Color Print Test

The color print test requires a single sheet of paper and is divided into three separate subtests, one for each color. With the color print test structured in this way you can check that each nozzle group works correctly.

Data Scop Printing (**Hex Dump**)

To make sure that the command codes sent from the system are received correctly, this feature prints the corresponding ASCII code (hexadecimal) of all the characters that are input into the printer.

To start printing:

- Power off the printer, then power it back on again while pressing the On-Line and Install Cartridge buttons simultaneously.

To stop printing:

- Press On-Line; press this button again to resume printing from where it had been stopped.

- Simply power off the printer to exit this print mode.

Troubleshooting Guide

This section talks about some of the most significant faults that may be detected, along with their probable cause and corrective action.

These faults have been grouped as follows:

Problems at Power On

These faults concern the Vac/Vdc power and control circuits.

- If the printer does not power on (the On indicator is off and there are no mechanical movements), make sure the line voltage is available. Power the printer off and then on again to check whether this fault persists.

- If the fault has not been cleared, check that the fuse on the power supply board has not blown, then check the voltage input to the main board.
  Replace the main board as last resort.

- If the printer powers on but does not go through its initialization process (printer initialization is run at each power on and resets the printer), make sure the print head moves freely and that there is no paper jammed inside the printer. Disconnect the printer from the system and remove the memory card. Try powering the printer off and then on again.

- If the On-Line indicator begins to flash rapidly when the printer is powered on, replace the main board.

Inacceptable Print Quality

These faults do not stop the printer from operating but cause a considerable deterioration of the print quality.

- If the printout is incomplete because one or more dots are missing (the print test shown in the corresponding section can be used as a comparison), try cleaning the nozzles.

- If the Nozzle Test shows that one or more nozzles are not receiving the electrical signal, remove the print head and clean the electric contacts on both the carriage and print head using a clean brush or a cloth dampened with an alcohol solution. If the fault persists, replace the print head. If this did work, try replacing the print head carriage and relative flat cable. Replace the main board as last resort.

- If incorrect or smeared characters are printed, make sure the print head carriage moves freely.

  Bear in mind that an excessive increase in the printer's environmental temperature can cause the printed characters to smear or the creation or irregular ink droplets.

Incorrect Paper Feed

These faults include paper jams, irregular paper feed or no paper feed at all.

Paper movements are controlled by a stepper motor. If the paper is not loaded in the printer, check the mechanisms that transfer motion from the motor to the paper feed rollers, then check the motor cabling. Replace the main board as last resort.

Paper or other obstructions along the paper path can cause paper jams or irregular paper feeds. To avoid paper jams, it is suggested that you load paper in the input tray only when it is empty. When loading new paper in the input tray or after moving a jammed piece of paper, always remove the sheets already present in the input tray and then reload the entire block again.

Incorrect Data Transmission

- Make sure you are using the right interface cable and that it is not too long (up to 2.5 m for a parallel interface cable).

- Make sure the printer and personal computer are connected together correctly.

- Also make sure that the printer's configuration parameters satisfy the requirements of the application software installed on the personal computer.

6

States and Indicator Meanings

This chapter describes the several operting and functional states relative to the printer working. It also describes the indicators meanings, considering both normal and fault conditions.

Operating States

- ON LINE	**On-Line** *indicator lit*
	The printer is ready to receive data.
- OFF LINE	**On-Line** *indicator off*
	State imposed by the operator, who has pressed the On-Line button. Any printing operation is suspended. Return the printer to the ON LINE operating state by pressing the On-Line button.

Functional States

One of the following states will be present in the ON LINE or OFF LINE operating states.

- FREE   No data to be printed.

- BUSY   From the reception of data until the completion of its printing.

- IDLE   Data to be printed, but awaiting a Form Feed command (from console or line).

Indicator Meanings

On-Line

- Lit   Indicates that the printer is in the ON LINE operating state (under operator and computer system control).

On

- Lit   Indicates that the printer is switched on, and remains lit until the printer is switched off.

Indicator Warnings

On-Line *and* ***On*** *indicators flashing alternately*

State caused by end of ink condition. Load a new print head, and then return the printer to the ON LINE operating state by pressing the Install Cartridge button.

On-Line *and* ***On*** *indicators flashing with the sequence* ***On-Line*** *twice followed by* ***On*** *once*

State caused by incompatibility between the type of print head inserted and the position of the print head selection lever. Load the correct type of print head and / or position the print head selection lever correctly, and then return the printer to the ON LINE operating state by pressing the Install Cartridge button.

On-Line *and* ***On*** *indicators flashing with the sequence* ***On-Line*** *five times followed by* ***On*** *once*

State caused by an incompatibility between the type of print head inserted and the printer driver loaded. Insert the correct type of print head, and then return the printer to the ON LINE operating state by pressing the Install Cartridge button.

On-Line *indicator flashing slowly*

State caused by lack of paper during a printing operation. Load paper and then return the printer to the ON LINE operating state by pressing the On-Line button.

On-Line *indicator flashing rapidly*

State caused by an operating failure.

7

Electrical Interconnections

This chapter describes the electrical interconnectionns between the different functional elements of the printer.

Major Components on the Main Board

J2	Paper feed motor
J3	Carriage motor
J12	Console
J13	Print head
J14	Print head
J15	Memory card
J16	Parallel interface
IC1	20 Volt regulator
IC3	IC87R
IC4	Paper feed motor driver
IC7	Carriage motor driver
IC8	TL074
IC9	LM 393
IC10	Print head driver
IC11	Print head driver
IC12	LM 393
IC13	LM 317 LM
IC14	Socket for a PIGGYBACK board
IC16	80C186 CPU
IC18	Dynamic RAM
IC19	256-bit EEPROM
IC20	NADINE ASIC
IC21	Photoemitter
IC22	Photoemitter
F1	Fuse
XT1	20 MHz quartz

Fig. 7-1: Main board

Power Supply Circuit
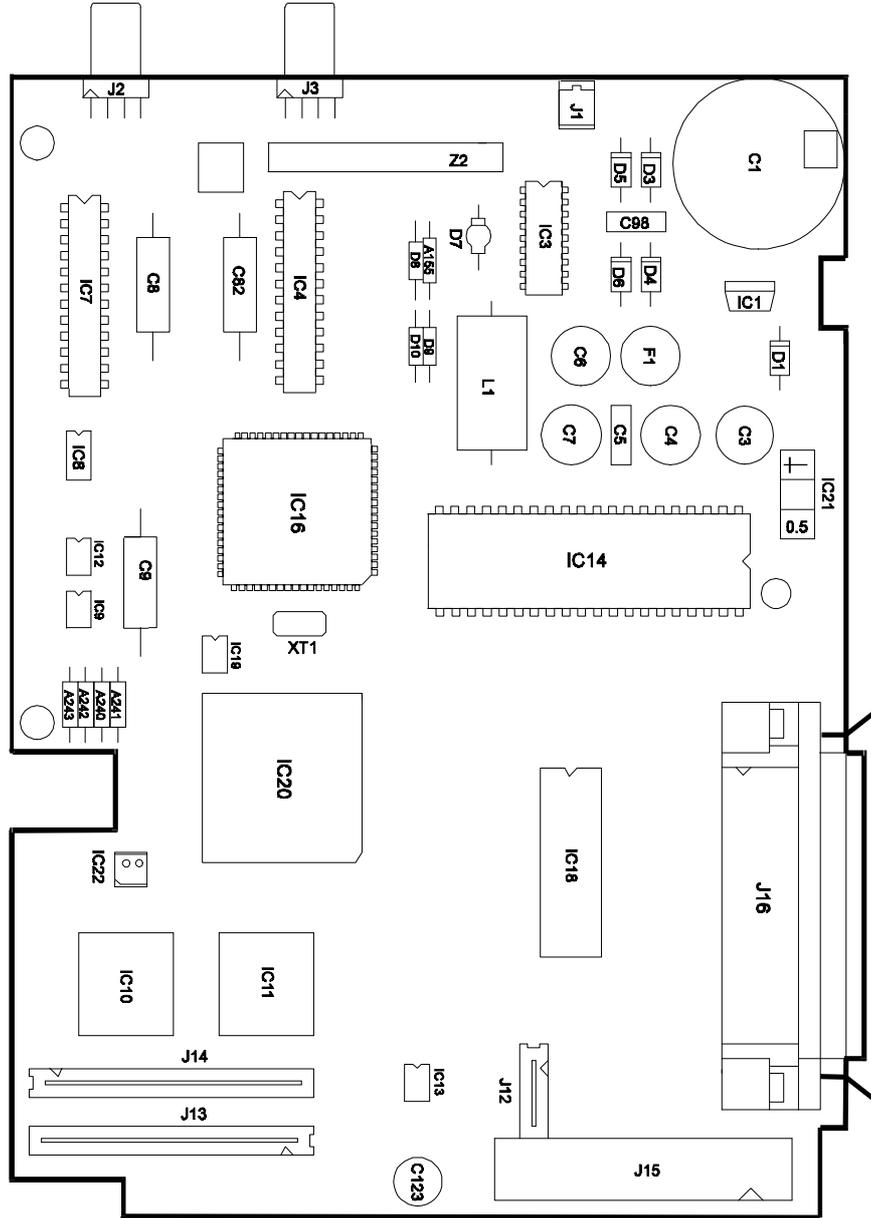
Connections between the Main Board and Drive Mechanisms

Fig. 7-2 : Connections between the main board and drive mechanisms

Connector Signals

MAIN BOARD						
POWER SUPPLY	**J1**	**J2**	**J3**	**J12**	**J13**	**J14**

POWER SUPPLY
J2: 2, 1

PAPER FEED MOTOR
J2: 1 OUT1A, OUT1B, OUT2A, OUT2B, 4

CARRIAGE MOTOR
J3: 1 OUT1A, OUT1B, OUT2A, OUT2B, 4

OPERATOR PANEL
J12:
1 VCC
PWRLED
GND
LOCAL1
CARTRIDG
FORMFEED
VCC
LOCLED
8

J13		J14	
COD1	1	S49	1
S51	2	RINK1	2
COD2	3	S47	3
S6	4	S33	4
S10	5	S35	5
S8	6	S45	6
C1	7	S43	7
S2	8	S41	8
S4	9	S37	9
S12	10	S39	10
S14	11	S31	11
S16	12	S29	12
S22	13	S25	13
S18	14	S27	14
S20	15	S23	15
S24	16	S19	16
S28	17	S17	17
S26	18	S21	18
S30	19	S15	19
S32	20	S13	20
S38	21	S11	21
S40	22	S3	22
S42	23	S1	23
S44	24	C4	24
S46	25	S7	25
S36	26	S9	26
S34	27	S5	27
S48	28	RINK2	28
INKON	29	PWRHOM	29
S50	30	NTC	30
C2	31	HOMING	31
C3	32	PWRCAPT	32
CHB	33	CHA	33

PRINT HEAD

MAIN BOARD

J15	J16	

J16 (Parallel Interface)

/STRB1	01	19	GND	
CD 0	02	20	GND	
CD 1	03	21	GND	
CD 2	04	22	GND	
CD 3	05	23	GND	
CD 4	06	24	GND	
CD 5	07	25	GND	
CD 6	08	26	GND	
CD 7	09	27	GND	
/ACK 0	10	28	GND	
BUSY0	11	29	GND	
PE 0	12	30	GND	
ONLINE0	13	31	/INIT 1	
AUTOFD1	14	32	/ERROR0	
	15	33	GND	
GND	16	34		
	17	35	/UART	
VCC	18	36	/SLCTIN	

PARALLEL INTERFACE

J15 (Memory Card)

GND	01	35	GND
AD3	02	36	/CD1
AD4	03	37	AD11
AD5	04	38	AD12
AD6	05	39	AD13
AD7	06	40	AD14
/CE1	07	41	AD15
AD10	08	42	/CE2
/OE	09	43	
A11	10	44	
A9	11	45	
A8	12	46	A17
A13	13	47	P0
A14	14	48	P1
/WE	15	49	P2
	16	50	P3
VCC	17	51	VCC
VPP1	18	52	VPP2
A16	19	53	
A15	20	54	
A12	21	55	
A7	22	56	
A6	23	57	
A5	24	58	RST
A4	25	59	
A3	26	60	
A2	27	61	/REG
A1	28	62	/BVD2
A0	29	63	/BVD1
AD0	30	64	AD8
AD1	31	65	AD9
AD2	32	66	AD10
	33	67	/CD2
GND	34	68	GND

MEMORY CARD

8

Parts Replacement

This chapter explains the different disassembly/reassembly procedures.

Premiliminary Warnings

To ensure maximum safety, power off the printer and unplug it from the line voltage before beginning any operation.

All operations must be carried out in a clean and lear area.

Make sure the print head is in its parking position before powering off the printer. When removing the print head from the printer, never rest it on its electrical contacts, nor on the nozzles; never touch these parts.

No adjustements need to be made to the parts after their disassemly/ reassembly. To reassemble the parts, follow their disassembly procedues in reverse order, make sure all the connectors are fitted properly.

**When finished, run a test on the printer to make sure that the fault is corrected.**

Replacing the Monochrome Ink Cartridge

- Press Install Cartridge to move the print head carriage to the print head installation/replacement position.

- Open the printer's top cover.

- Do not remove the print head, but just the ink cartridge (**2**) by moving the plastic tab located on the print head (**1**).

- Remove the protective tape from the new ink cartridge.

- Immediately insert a new ink cartridge by gently pressing it downwards until the lever snaps back into place.

- Close the printer's cover.

- Press Install Cartridge to move the print head carriage back to its parking position.
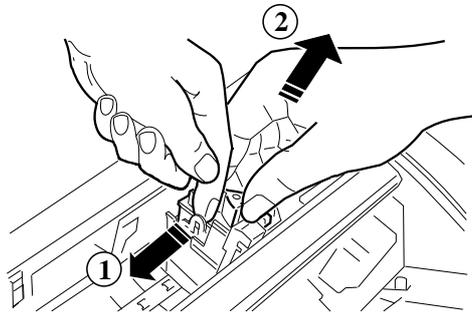
Fig. 8-1: Replacing the ink cartridge

NOTE: Before installing a new ink cartridge, check its expiration date printed on the sealed shell. If top print quality is not obtained, prime the print head.

Replacing the Print Head

- Press Install Cartridge to move the print head cariage to the print head installation/replacement position.

- Open the printer's top cover so as to access the print head.

- Remove the print head by first pushing it towards the rear of the printer (**1**) and then lifting it out of its slot (**2**).

- Be very carefull in holding the print head if it needs to be installed back into the printer. Follow the instructions explained in section "Preliminary Warnings".

- Close the printer's top cover.

- Press Install Cartridge to return the print head carriage back to its parking position.
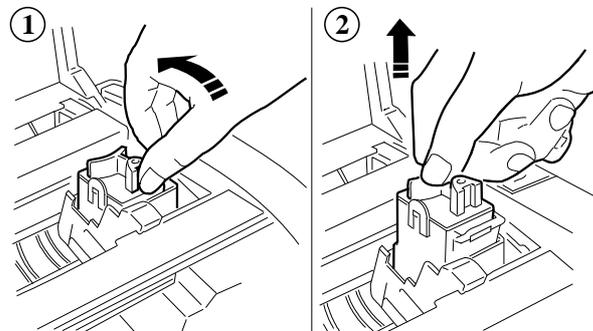
Fig. 8-2: Replacing the print head

NOTE: Before installing a new print head, check its expiration date printed on the sealed shell. If top print quality is not obtained for a monochrome print head, prime the print head.

Removing / Remounting the Printer's Casing and Base

- Disconnect the interface cable.
- Remove the paper input and output trays.
- Remove the memory card, if inserted.
- Open the top cover and remove the paper insertion guide **1** by lifting it from the front and then turning it to free the studs from their respective slots.
- Free the casing from catches **2**, **3**, **4** and **5** (do so by inserting the blade of a screwdriver in the points just indicated).
- Turn the casing backwards and disconnect the console's flat cable from connector **6**.
- Separate the base of the printer from the frame by pressing catch **7** and lifting the part that has been released.
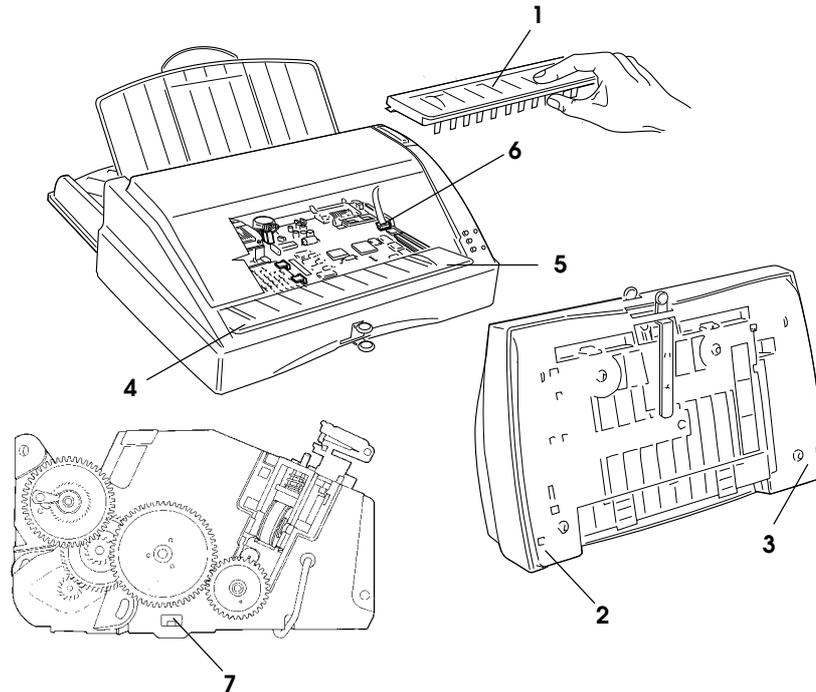
Fig. 8-3: Removing the printer's case and base

Removing / Remounting the Mechanical Assembly

- Disassemble the base from the frame as explained in previous section.

- Disconnect the print head's flat cables from connectors **1** and **2**.

- Press catch **3** to release the mechanical assembly from the electronic board and power supply support and remove connectors **4** and **5**.
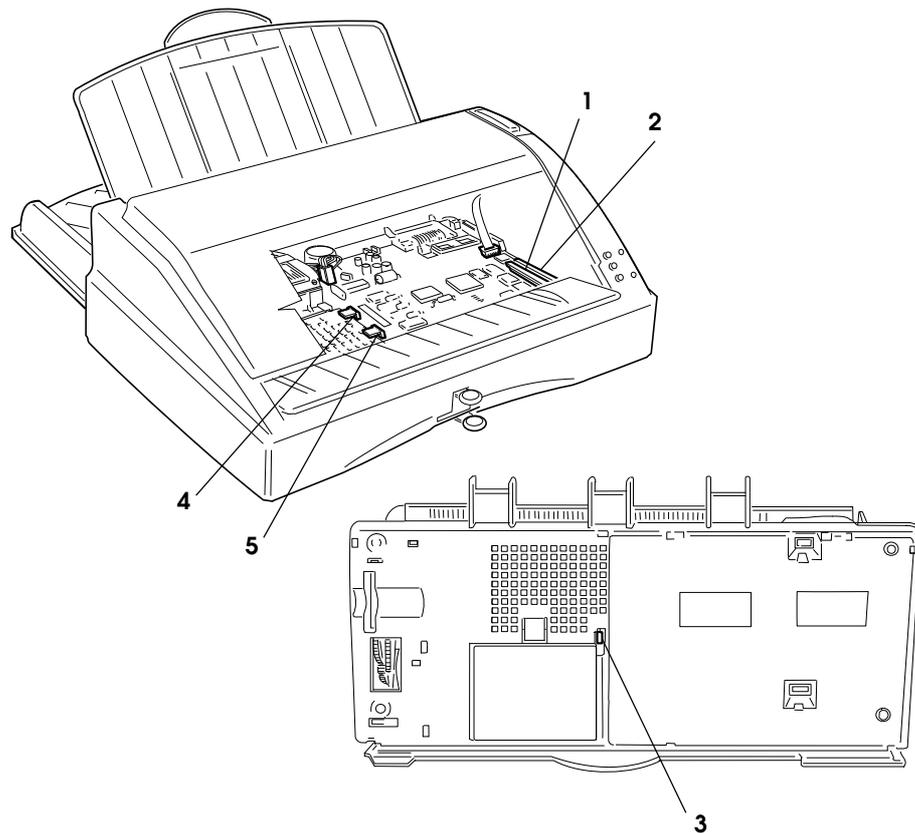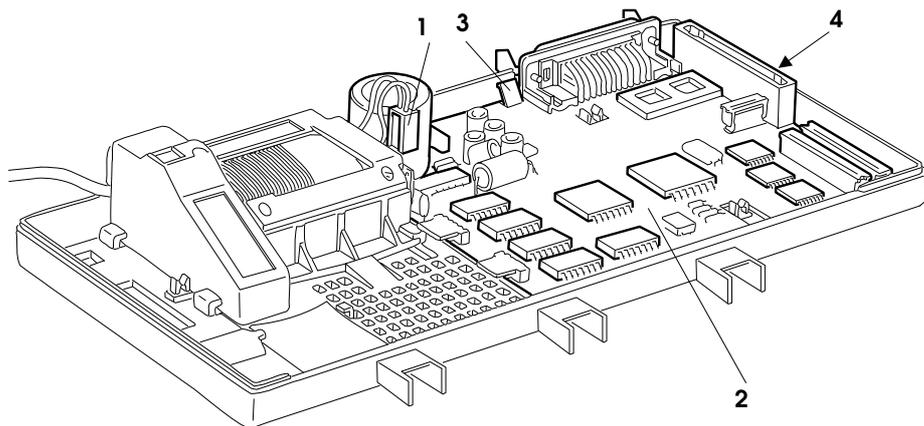

Fig. 8-4: Removing the mechanical assembly

Removing / Remounting the Main Board

- Remove the mechanical assembly as explained in previous section.

- Remove connector **1**.

- Release board **2** from catches **3** and **4**.

NOTE: If the main board needs replacing, remember to remove the firmware and character generator EPROMs from the old board so they can be installed on the new one.
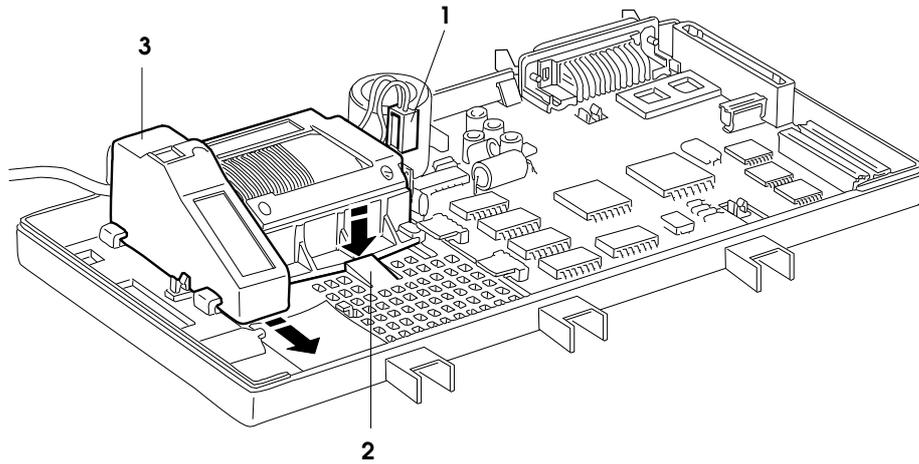

Fig. 8-5: Removing the main board

Removing / Remounting the Power Group

- Remove the mechanical assembly as explained in the corresponding section.

- Remove connector **1**.

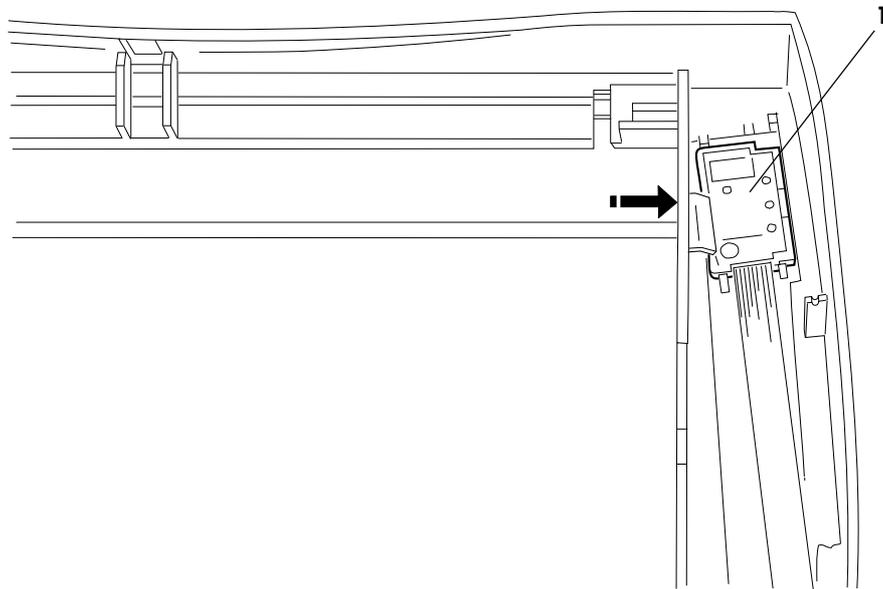- Press catch **2** and lift power group **3**.

Fig. 8-6: Removing the power group

Removing / Remounting the Operator Panel

- Remove the printer casing as explained in the corresponding section but remove just the operator panel connector.

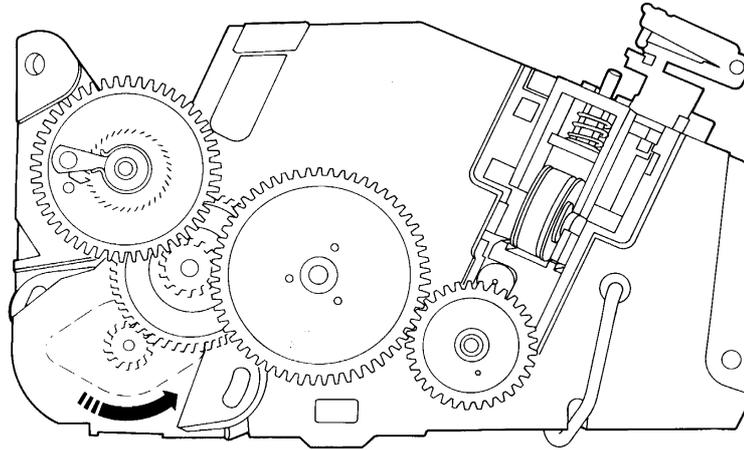- Press where indicated by the arrow and slide off operator panel **1**.

Fig. 8-7: Removing the operator panel

Removing / Remounting the Paper Feed Motor

- Remove the mechanical assembly as explained in the corresponding section.

- Release the motor by turning it in the direction of the arrow.

- Remove the motor after releasing the cable from the cable clips.
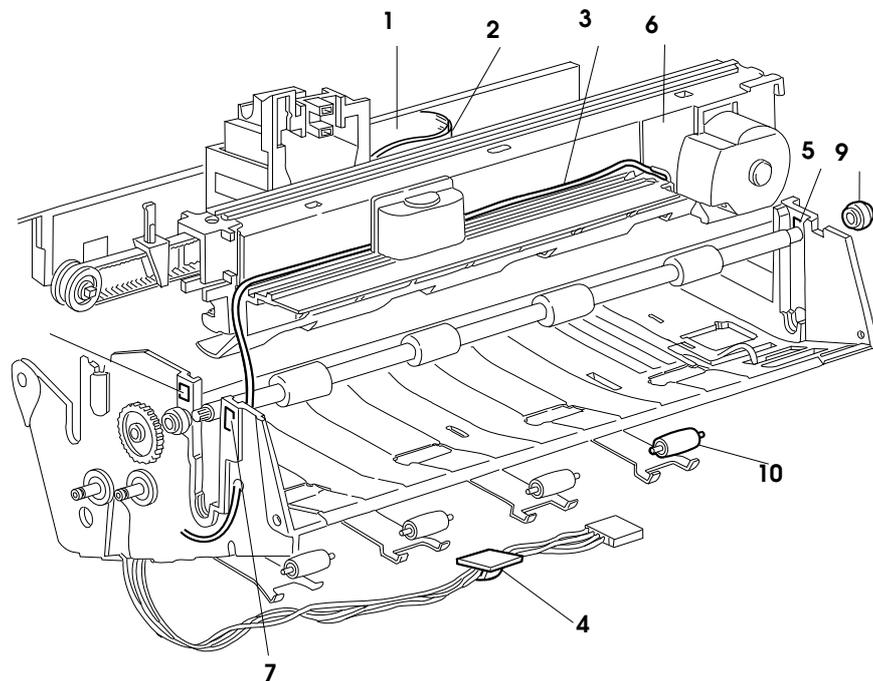

Fig. 8-8: Removing the paper feeed motor

Removing the Mechanical Assembly Front Structure

- Remove the mechanical assembly as explained in the corresponding section.
- Disconnect flat cables **1** and **2**.
- Disconnect the ink discharge tube **3**.
- Release the carriage motor cable from cable clip **4**.
- Press catch **5** and partly lift the front structure **6**.
- Press catches **7** and **8** to separate the front and rear structures.
- Remove bush **9**.

NOTE: Before remounting the two structures back together again, insert the carriage motor connector into the slot on the rear structure. Make sure rollers **10** are mounted correctly.
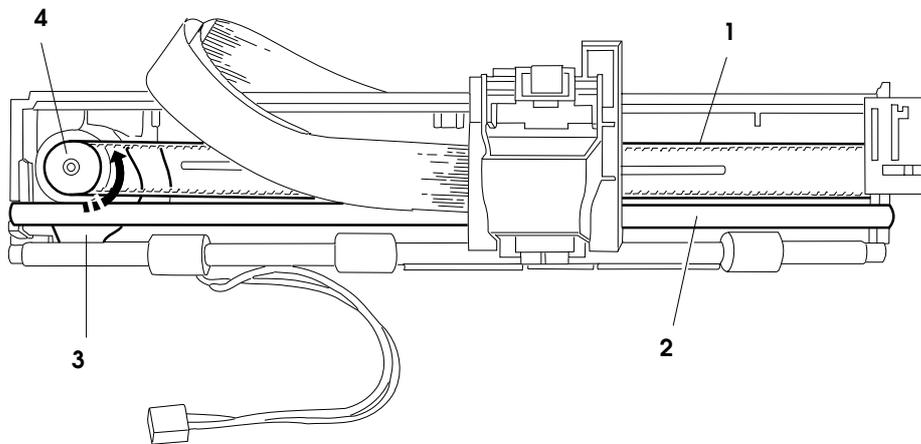

Fig. 8-9: Removing the mechanical assembly front structure

Removing / Remounting the Carriage Motor

- Remove the mechanical assembly as explained in the corresponding section.

- Remove the front structure as explained in the corresponding section.

- Disconnect belt **1**.

- Slide off shaft **2**.

- Release the motor by turning flange **3** in the direction of the arrow.

- Remove flange **3** and motor **4**.
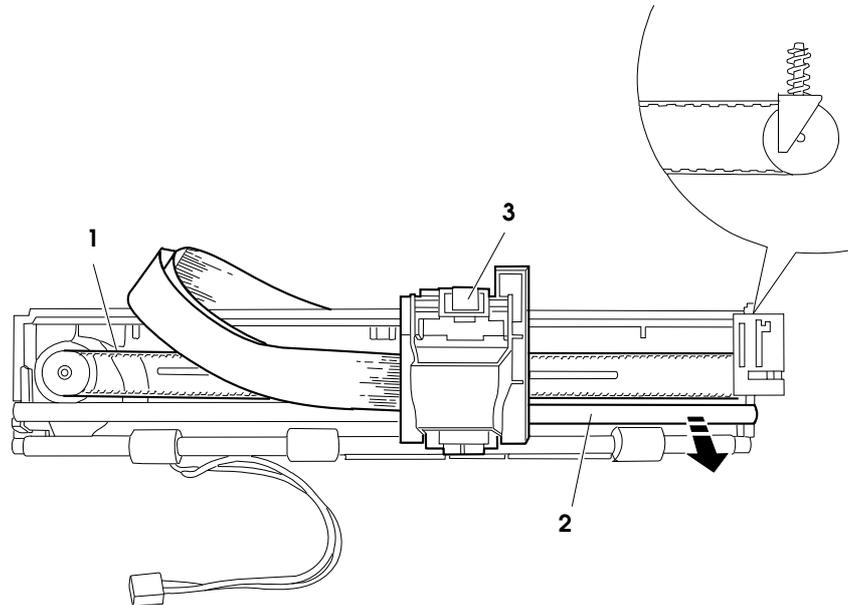

Fig. 8-10: Removing the carriage motor

Removing / Remounting the Head Transport Carriage

- Remove the mechanical assembly as explained in the corresponding section.

- Remove the front structure as explained in the corresponding section.

- Disconnect belt **1**.

- Slide off shaft **2** in the direction of the arrow.

- Remove carriage **3** after disconnecting its belt.

NOTE: If the belt tightener comes away, mount it back on as shown in the highlight.

Fig. 8-10: Removing the head transport carriage