Maintenance Manual

SP40plus

MAN 10242-01

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Preface

MAN10242-01 (April 2011)

This Maintenance Manual focuses on the maintenance activities on the printer SP40plus.

All defects originated by incorrect paper insertion, wrong menu setting or mistaken controls commands, are not covered by this document to avoid duplication of information available on the USER MANUAL forwarded to each end user within printer package.

When the malfunction eludes all the solutions proposed in the USER MANUAL or deducible from it, a severe failure within the printer hardware, firmware or mechanisms should be suspected.
Then follow the troubleshooting sequence advised in this manual together with defective part removal and replacement.

The informations on this document are subject to change without notice.

All efforts have been made to ensure the accuracy of the contents of this manual.

FCC Regulations

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment and the receiver to outlets on different circuits.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The use of a non-shielded interface cable with the referenced device is prohibited. The length of the parallel interface cable must be 3 meters (10 feet) or less. The length of the serial interface cable must be 15 meters (50 feet) or less.

Canadian D.O.C. Radio Interference Regulation

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des communications du Canada.

EEC Regulations

This equipment conforms to the EEC Directive 89/392 (the sound pressure, measured according to ISO 7779, does not exceed 70 dBA).

Safety Information

This section contains information that you need to be familiar with before servicing this printer

Safety Notices

There are two levels of safety notices that appear in this Maintenance Information.

- **DANGER** calls attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** calls attention to a situation that is potentially hazardous to people.

The following notices are the Danger and Cautions used in the Maintenance Information. Attention notices, Important notices, and Notes may be located throughout the Maintenance Information, but are not listed here.

DANGER

This product is equipped with a 3-wire power cord and plug for the user's safety. Use this power cord in conjunction with a properly grounded electrical outlet to avoid electrical shock.

DANGER

Your country may require an approved power cord and plug, ensure that you have the correct power cord and plug. Use this cord and plug only with and approved correctly-installed power receptacle.

DANGER

Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.

CAUTION

Some components (print head and motors) may be hot during operation.
Be careful when removing or replacing the ribbon.

General Safety

Follow these rules to ensure general safety:

- Upon arrival at the job site, notice the location of functioning telephones in your area that may be used in an emergency.
- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any object:
  1. Ensure you can stand safely without slipping
  2. Distribuite the weight of the object equally between your feet.
  3. Use a lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any object that weight more than 18 Kg (39.7 lb) or objects that you think are too heavy for you*.
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service represantatives and the customer's personnel are not in a hazardous position.
- Store removed covers and other parts in an isolated location, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that othe rpeople will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of the machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clotinh or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the ends.
- Do not wear jewelry, chains, metal-frame eyeglasses, or clothes with metal fasteners.
  Remember: Metal objects are excellent conductors.
- Wear safely glasses when you are involved with:
  - Hammering
  - Drilling
  - Soldering
  - Cutting wire
  - Attaching springs
  - Using liquid cleaners or solvents, or sprays
  - Working in any other conditions that might be hazardous to your eyes
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical Safety

Observe the following rules when working on elecrical equipment:

- Find the room emergency power-off switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you then can operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and lock the wall box in the Off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

  Remember: If conditions require a second person, that person must be present when you power off the printer.

  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back
    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.
    Observe the special safety precautions when you work with very high voltages; these instructions are in the safety section of maintenance information. Use extreme care when measuring high voltages.
- Regurarly inspect and maintain your electrical hand tools for safe operational condition.
- Never assume that power has been disconnected from a circuit. First, check that it has been powered off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- To ensure correct grounding, do not service the following part with the power on when they are removed from their normal operating places in a machine:
  - Power supply
  - Fans
  - Motors
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Power off the printer.
  - Send another person to get medical aid.

Pre-Service Inspection

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products.
Each printer, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgement should be used to identify potential safety hazards because of attachment of other features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

The guide consists of a series of steps presented in a checklist.

Checklist:

1. a. Check exterior covers for damage (loose, broken, or sharp edges).
   b. Check top main cover Interlock operation.
2. Ensure that all safety labels are in place.
   Inspect the customer's power source/receptacle.
3. Ensure that any Safety's EC's have been installed properly.
4. Power off the printer. Disconnect the power cord. Check the power cord for:
   a. A third-wire ground connector in good condition. Use a meter to measure the third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground. The power connector ground wire is fastened with a screw and star washer near the power supply. Repair as needed.
   b. A second star washer must be between frame ground and the wire lug.
   c. The power cord should be the appropriate type, shipped for the printer.
   d. Insulation must not be frayed nor worn.

6. Remove the covers. See "Cover Parts Removal".
7. Check for any obvious alterations. Use good judgement about the safety of any alterations.
8. Check inside the unit for any obvious unsafe conditions, such as metal-filing contamination, water or other liquids, or signs of fire or smoke damage.
9. Check for worn, frayed, or pinched cord or cables.

Chapter 1 General Information

1.1 Overview

This section describes the product and its main characteristics..

1.2 Scope of the Product

The product is a truly “state of the art” Transactional Multifunction Printer for Front Office and Financial Applications.
It is designed to provide print speed, versatility and advanced solutions for banking, financial services, postal and public administration sectors. By assuring process efficiency and offering a competitive low cost of ownership, SP*plus* is the ideal choice for delivering high productivity, durability, simplicity and flexibility.

1.3 Main Features

The following points put in evidence the main features of this product.

- **Handles a wide type of formats and thicknesses**: single sheet up to A4 size, cheques, vouchers, multi-copy forms, passbooks, ID cards, tickets.
- **The superior document handling** provides auto alignment and AGA (automatic gap thickness) and ensures that documents inserted with variable thickness (up to 2.7mm) at different angles in any position will be printed quickly and efficiently.
- **High print quality** supplied by a 24 wires long life print head (400 million characters, equivalent to more than 1 billion strokes/wire).
- **Long life for ribbon cartridge** (more than 10 million charactetrs).
- **User friendly machine interface** with a 2x16 digits LCD display.
- **1 original + 6 copies** printing capabilities.
- **Storage four complete configurations** for instant recall
- **Standard parallel, serial RS232 and USB 2.0 (Full Speed) interfaces** with automatic switch-over function.
- **Available Optional interfaces are:** LAN, additional Serial, additional USB, up to 3 USB 2.0 Hub ports, USB Host interfaces for easy connection with external devices.
- **Easy printer setup** through configuration sheet or remote management.
- **Emulations**: Epson 570, IBM Proprinter XL24E, XL24E AGM, IBM 2390+, IBM 4722, IBM 9068 and Olivetti PR40+, PR2, PR2845, HPR4915.

1.4 Printer Parts

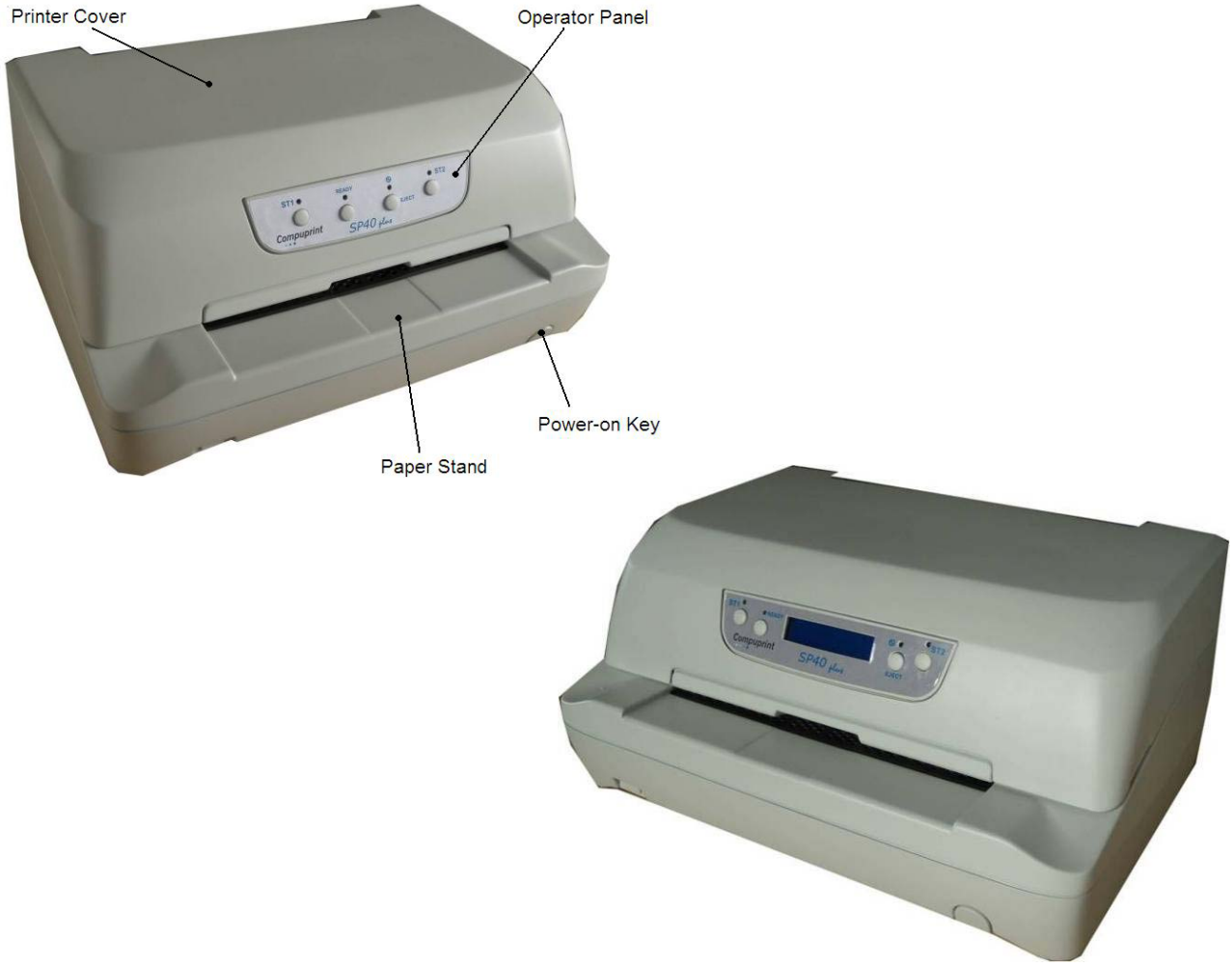


Figure 1.1 - Front View for Standard O.P. (left) and 2x16 LCD O.P.

Figures 1.2-1.3 Rear View for Standard (left) and Full Interfaces Model

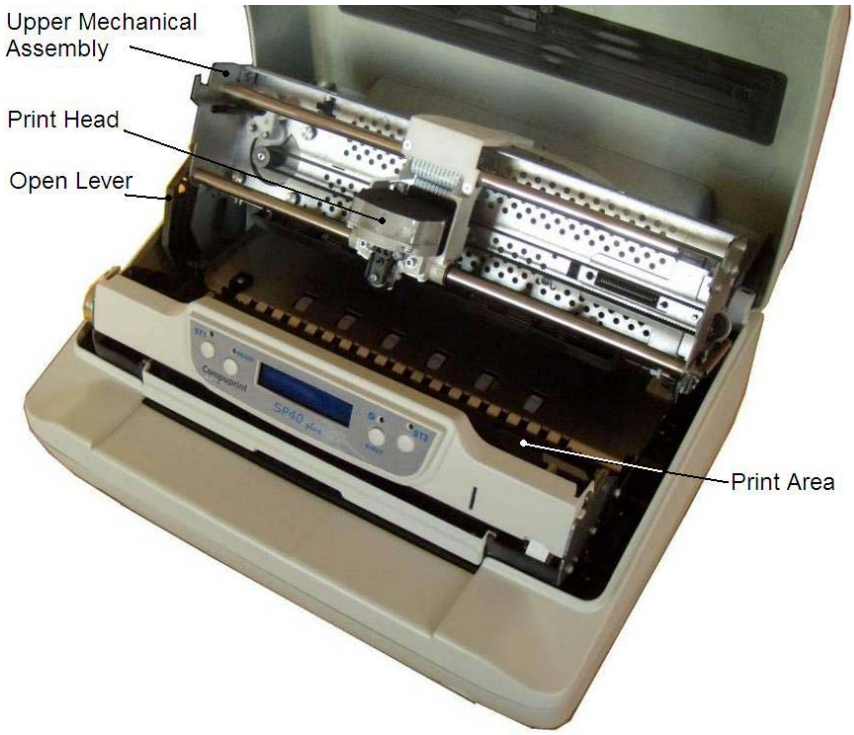


Figure 1.4 - Inside View

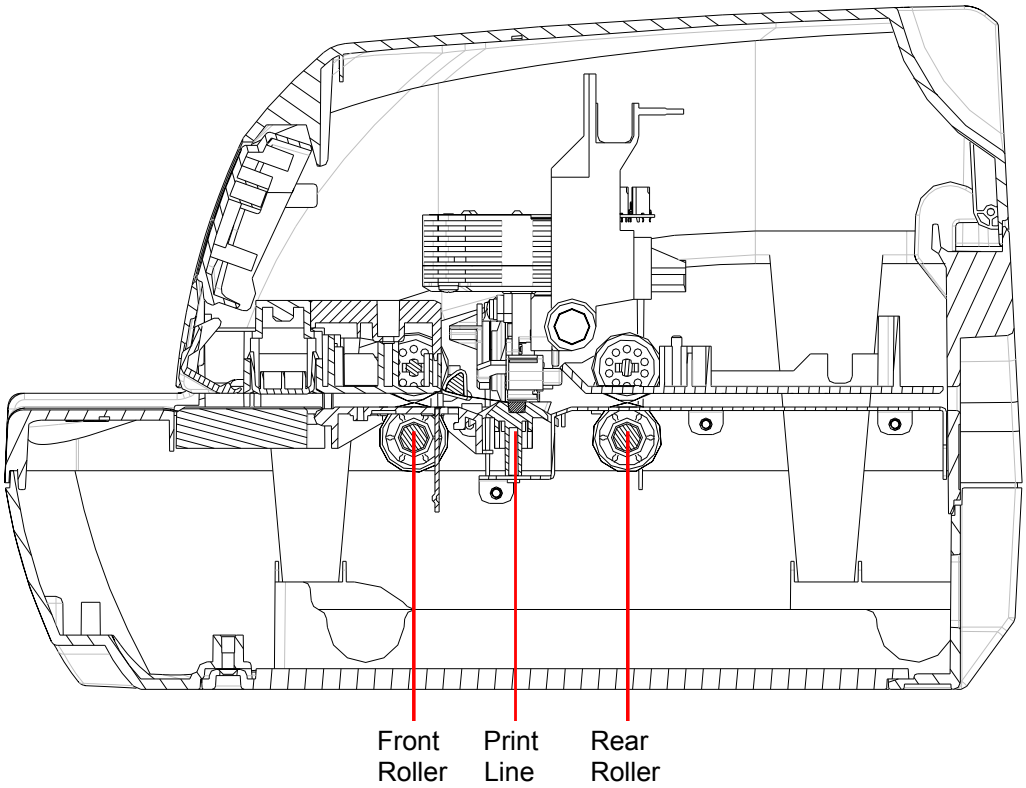


Figure 1.5 - Section Inside View

1.5 Product Structure

1.5.1 Mechanism and Electromechanical Devices

The basic mechanism has been designed to support a flat-bed path oriented to an high reliability of the paper handling.

Paper Handling
A stepper motor, supporting 1/180" paper step movement together with a mini pitch belt, provides the movement of the front and rear rollers.

Rollers opening and Aligner selection
A stepper motor drives a cam installed in the left side of the printer that allows to open/close the paper pressing rollers and to activate the *Aligner* mechanism to provide the *Auto Document Alignment* feature.

Carriage Movement
A stepper motor together supporting 1/120" paper step movement with a mini pitch belt provides the movement of a metal carriage, carrying the print head and the edge sensor for the *Auto Document Alignment* feature.
The correct carriage position is checked time by time by a specific sensor.

Ribbon movement
The motion of the ribbon is driven by mechanical coupling and plastic gears assembly that translate the bidirectional movement of the carriage to one way movement for the pivot driving the ribbon.
The ribbon drive assembly is installed on the left side of the vertical frame.

Gap Distance
A special wheel installed on the metal body of the print head and a movable platen realize together the function of the *Automatic Gap* of the print head gap according to the paper thickness in real time. The AGA wheel forcing continuously on the platen with a force depending from the thickness of the media interposed between them.

Sensors
There are 5 sensors in this printer for the following features:

Cut Sheet Loading	(on the sensor board, 2 pairs)
Cut Sheet Skewing	(on the sensor board, 4 pairs)
Paper Edge Detection	(on the print head assembly)
Home Position Detection	(on the mechanical assembly)
Genuine Ribbon Present and Printed Life Parameters	(on the ribbon cartridge)

See chapter 7 for the electrical schematics.

Print head
The print head to be used is the PH24SM with the following characteristics:

Number of wires:	24
Needle diameter:	0.25 mm
Configuration:	diamond
Technology:	Electromagnetic not Ballistic
Max. frequency	2400 Hz (Text and Graphic Mode)
Energy per dot	5 mJ
Life	400 Million chars @ Draft 10 cpi (up to 1 Billion strokes/wire)
Copies	1 + 6
Dimensions	Length (56 mm), Diameter (55 mm), Weight (180 g, aluminium case)

See chapter 7 for the electrical schematics.

1.5.2 Internal Components Interconnection

Internal electronic and electromechanical components interconnection of the printer are as shown in the figure on next page.
The capital letter indicates the component described below:

Electronics:

A. Main Board with ARM9 microprocessor, LINUX O.S.
   It includes standard attachments: Parallel Centronics, RS232/C 9 pin serial, USB 2.0 Full speed interface connectors.
   On this board are also present the flash memory with firmware and characters generator.
   This structure is intended to make easy update the controller with a new firmware version through a downloading operation through USB and parallel attachments.
   On this board are integrated also all the components driving all the electromechanical devices of the printer.

B. Operator Panel Board (two types):
   B1 (4 keys, 4 leds)
   B2 (4 keys, 4 leds, 2x16 digit LCD display)

C. Sensor Board.

D. Power Supply auto switching type.

Electromechanics:

E. Print Head

F. Edge Sensor Assembly

G. Genuine Ribbon Sensor.

H. Home Sensor Assembly

I. Paper Motor Assembly

J. Carriage Motor Assembly

K. Selector Motor Assembly

Here below the connections of the Electronic and electromechanical parts.

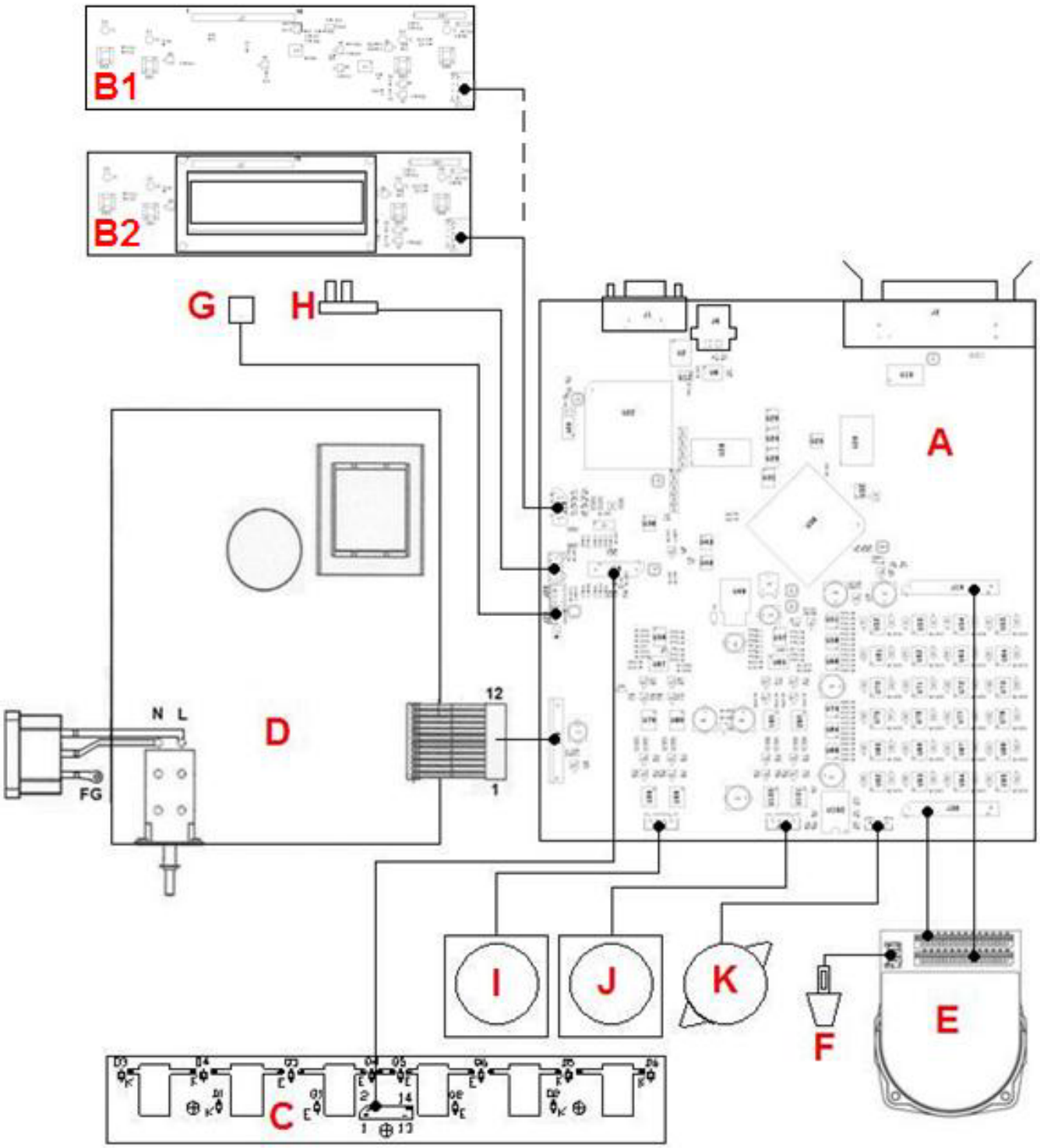


Figure 1.6 - Lay-out Electronic parts

1.6 Printer Technical Specifications Summary

Printing Technology
Impact Dot Matrix
Print Speed
520 cps (HSD), 400 cps (Draft), 200 cps (NLQ), 133 cps (LQ)
Line Length
94 columns (cut sheets) @ 10cpi, 112 columns @ 12 cpi, 141 columns @15 cpi
Paper Handling
Single Sheet, envelopes, label, Passbook (horizontal and vertical) Single Sheet: width 65-244mm, length 65-470mm
Copies
1 original + 6 copies
Special Functions
Automatic Gap Adjustment (AGA), Document Auto Alignment, Auto Border Recognition, Optical Mark Reading, Automatic Set-up
Display
LCD display – 2 lines with 16 characters each
Graphic Resolution
60, 120, 180, 240, 360 horizontal – 72, 90, 180, 216, 360 vertical
Character Sets (IBM and Epson protocols)
PC standard set (CS1-CS2) - 13 National Epson sets - CP437 (USA) - CP437G (Greek) - CP850 (Multilanguage) – CP851 (Greek) - CP852 (Latin 2) - CP853 (Turkish) - CP855 (Russian) - CP857 (Turkish) - CP 858 (Euro) - CP860 (Portuguese) - CP862 (Hebrew) - CP863 (French/Canadian) - CP864 (Arabic) - CP865 (Norwegian) - CP866 (Cyrillic) - CP867 (Turkish) – CP876 (OCRA) - CP877 (OCRB) - CP1250 (Central Europe) – CP1251 (Cyrillic) – CP1252 (Windows Latin1 Ansi) - Gost - Tass – Mazowia - ISO 8859/1/2/3/4/5/6/7/8/9/15 - 96GREEK- Ukrainian – ID 12 – ID 14 – ID 17 – CP1098 (Farsi Arabic) – Roman-8, CP437 Slavic – Sanyo – Ku - Philip
Character Sets (OLIVETTI protocols)
CS000 – CS010 International, CS020 Germany, CS030 Portugal, CS040 Spain1, CS050 Denmark/Norway, CS060 France, CS070 Italy, CS080 Sweden/Finland, CS090 Switzerland, CS100 Great Britain, CS110 USA ASCII, CS140 Greece, CS150 Israel, CS170 Spain 2, CS200 Jugoslavia, CS410 Olivetti TCV 370, CS510 SDC, CS520 Turkey, CS540 CIBC, CS680 OLI-UNIX, CS701 PC-220 Spain2, CS711 PC-Denmark/Norway, CS712 PC-Denmark OPE, CS771 PC-210 Greek
Barcodes
UPC/A, UPC/E, EAN8, EAN13, Code 39, Code 128, Postnet, Codabar, ADD-ON 2, ADD-ON 5, Code 11, Code 93, BCD, MSI, 2/5 Interleaved, 2/5 Matrix, 2/5 Industrial
Resident Fonts
Draft, Courier, Gothic, Prestige, Presentor, Script, OCR-A, OCR-B, Boldface

Table 1.1 Printer Specifications Summary

Resident Emulation
IBM ® Personal Printer 2390+, Proprinter XL24E, Proprinter XL24AGM, IBM 4722, IBM 9068, Epson LQ2250/LQ1170 and Olivetti PR40+, PR2, PR2845, HPR4915

Interfaces
Standard: Parallel, Serial RS-232/C 9pin, USB 2.0 Full Speed
Optional: 2nd Serial RS232/C 9pin, 2nd USB High Speed, Ethernet 10/100, up to 3 USB Hub Ports, USB Host (2.0 Full Speed OHCI)
Automatic Interface Switching
128 Kbytes Input buffer

Drivers
Windows 2000, XP, Vista (32 and 64 bits), Windows 7 (32-64 bits)

Reliability
MTBF > 10,000 hours @25% D.C., MTTR < 16 minutes

Print Head
24 needles, Life > 400 million characters (equivalent to > 1 Billion strokes/wire)

Consumables
Black Ribbon, Life > 10 million characters

Noise Level
< 54db (A)

Power Supply
Universal 100-230V, 50-60Hz Power consumption: 45W (ISO/IEC 10561 Letter Pattern) – Sleep Mode < 3W – Off Mode 0 W Energy Star Compliant

Physical Dimensions & Weight
396 (W) x 200 (H) x 285 (D) mm - 8 Kg (9.2 Kg packed)

Environmental conditions	
Temperature:	working +10 to +40 °C
Humidity:	working 40% to 60% RH (without condensation)

Table 1.1 Printer Specifications Summary cont'd

Chapter 2 Parts Removal

2.1 Overview

This section describes the removal and installation procedures of the recommended printer parts.
Pay attention when the following messages are highlighted.


DANGER notices warn against personal injury that is lethal or extremely hazardous.
CAUTION notices warn against personal injury that is neither lethal nor extremely hazardous.

ATTENTION notices warn against damage to machine, equipment or programs.
REMARK notices warm against some particular procedure to be run.

Necessary Tools:

- Assortment of cross-head and blade screwdrivers.
- Pliers.
- Cutting nippers.
- Spring Hook
- Set of fastener loop-self lock.
- Feeler Gauge.

List of the removal and installation parts:

Action	Parts to replace	Chapter	Steps to do
1	Opening the Upper Mechanical Frame	2.2	1
2	Ribbon Cartridge	2.3	1+2
3	Print Head Assembly and Edge Sensor	2.4	1+2+3
4	Operator Panel Assembly	2.5	4
5	Rear Guide Assembly	2.6	1+5
6	Mylar Bar Assembly	2.7	1+6
7	Flap Assembly	2.8	1+7
8	Ribbon Drive Assembly	2.9	1+2+8
9	Board Cover and Main Board Assembly	2.10	9
9a	Main Board Assembly	2.10.1	9+9a
10	Front Roller and Optical Guides	2.11	1+2+10
11	Selector Motor Assembly	2.12	9+11
12	Cover Set	2.13	12
13	Mechanical Assembly	2.14	9a+12+13
14	Home Sensor Assy	2.15	1+2+13+14
15	Power Supply Board	2.16	9a+12+13+15
16	Carriage Motor Assembly	2.17	9a+12+13+16
17	Carriage Pulley Assembly	2.17.1	9a+12+13+17
18	Print Head Cables	2.18	1+2+3+9a+18
19	Carriage Assembly and Belt	2.19	1+2+3+9a+18+19
20	Lower Shield Assembly	2.20	1+2+9a+13+20
21	Platen Assembly	2.21	1+2+9a+13+21
22	Paper Motor Assembly and Belt	2.22	1+2+9a+13+22
23	Rear Lower Roller Assembly	2.23	1+2+9a+13+20+23
24	Aligner Assembly	2.24	1+2+9a+13+20+24
25	Front Lower Roller Assembly	2.25	1+2+9a+13+20+24+25
26	Sensor Board	2.26	1+2+9a+13+20+24+25+26

Table 2.1 Sequential Actions to replace parts

2.2 Open the Upper Mechanical Frame

DANGER : To prevent serious personal injury from electrical shock always turn off the printer and unplug the power cable before remove the print head.

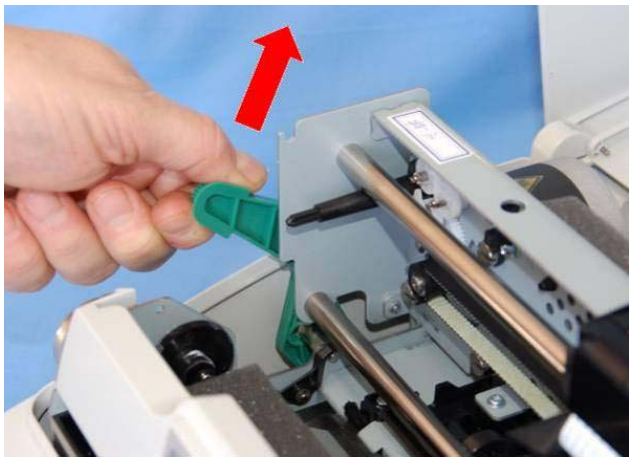
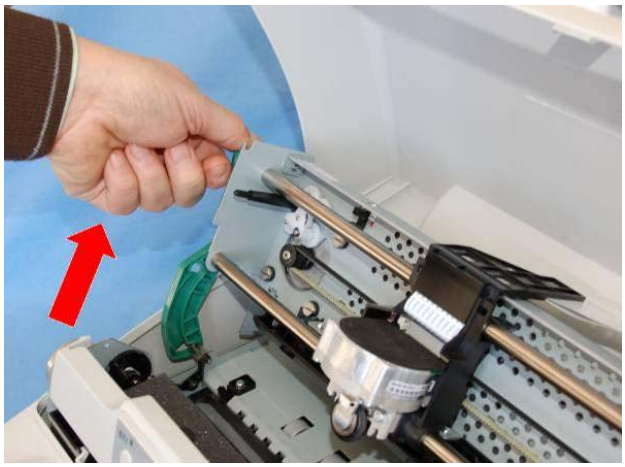
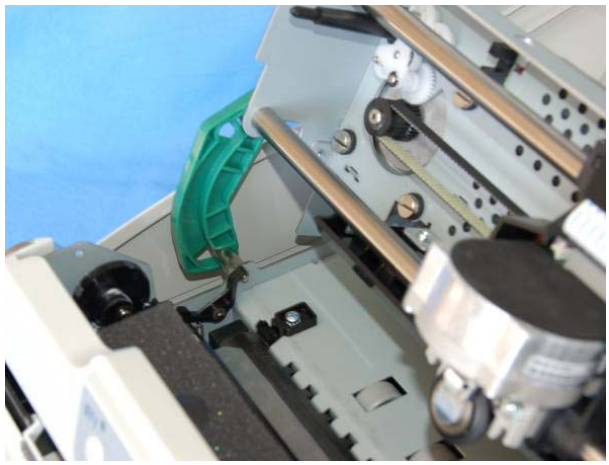
CAUTION: The print head may have hot surface. Wait for it to cool down.

Removal

1) Open the top cover.
2) Open the upper mechanical frame. Locate the open green lever in the left side of the printer
3) UNLOCK the green lever with the left hand towards the rear of the printer in the open position
4) Then PULL UP the lever to its maximum position in order to completely open the head assembly.
5) Check for the “click” which means the correct open lever position, showed in the inset picture.
6) Carefully pull down the green lever following the step 3, 4, and 5 in reverse order in order to securely close the Upper Mechanical Frame. If you do not LOCK the Upper Mechanical Frame, the printer does not print correctly.

Replacement

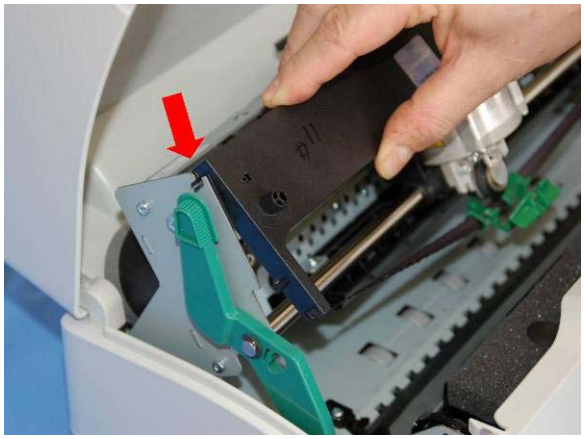
To install, follow the removal step in reverse order.

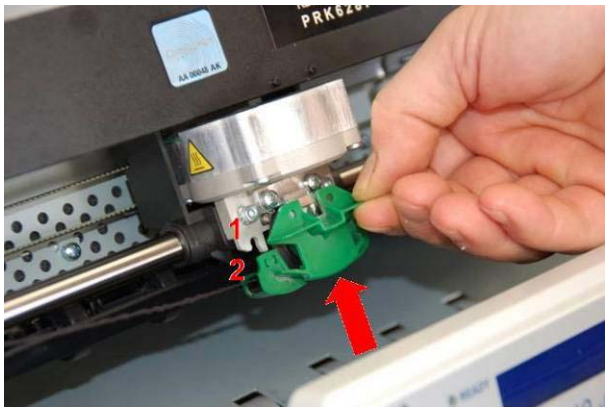





Figures 2.1-2.2-2.3-2.4 Opening the Upper Mechanical Frame

2.3 Ribbon Cartridge

1) Open the top cover.
2) Insert the upper cartridge pins onto the corresponding grooves on both sides of the upper mechanical frame.
3) Then push the lower cartridge pins into the corresponding lower grooves on both sides of the upper mechanical frame until it clicks into place.
4) Insert the green plastic ribbon mask onto the print head. Pay attention to match the two pins (2) on both sides of the green ribbon mask with the grooves (1) on both sides of the print head.
5) Push the green ribbon mask up until it clicks into place.
6) Turn the tension knob in the direction of the arrow to tighten the ribbon.





Figures 2.5-2.6-2.7-2.8-2.9 Ribbon Cartridge removal

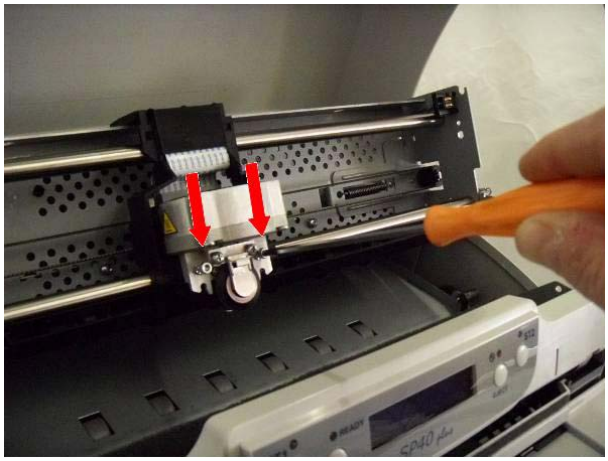
2.4 Print Head Assembly and Edge Sensor

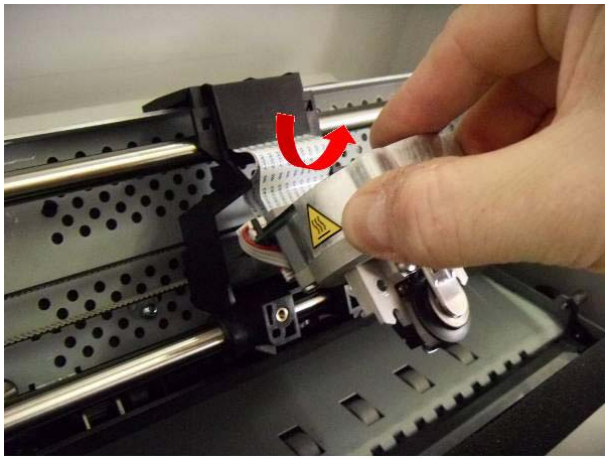
DANGER : To prevent serious personal injury from electrical shock always turn off the printer and unplug the power cable before remove the print head.
CAUTION: The print head may have hot surface. Wait for it to cool down.
ATTENTION: **Only the two allen screws have to be unscrewed to remove the print head. Do not touch other three screws on the print head that are fixing the correct AGA wheel position. (Adjustment done at manufacturing level).**

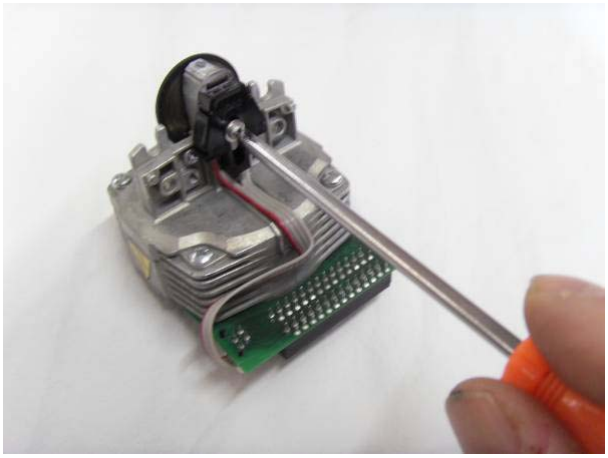
Removal
1) Open the top cover.
2) Rise up the upper part of mechanical assembly.
3) Remove the ribbon cartridge.
4) Unscrew the two allen screws securing the print head assembly to the carriage with the flat and stars washers.
5) Extract the print head assembly from the carriage assembly.
6) Unplug the flat cables from the print head and remove it.
7) To remove the edge sensor from the print head assembly unscrew the little screw securing it from the print head.

Replacement
To install, follow the removal step in reverse order.

Remark:
When reassembly the print head, before to secure the screws, pay attention for the correct position of the print head. This is assured by two lateral pins on the metal part of the print head that fit together print head with the carriage assembly. Secure the screws allen type with a driving torgue of 7 Kg/cm.







Figures 2.10-2.11-2.12 Print Head Assembly and Edge Sensor removal

2.5 Operator Panel Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the operator panel.

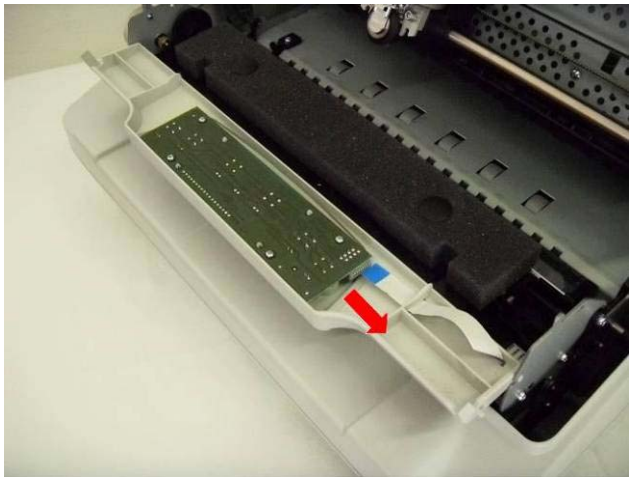
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.
Do not remove the operator panel cable from the o.p board before unplug the AC cable.

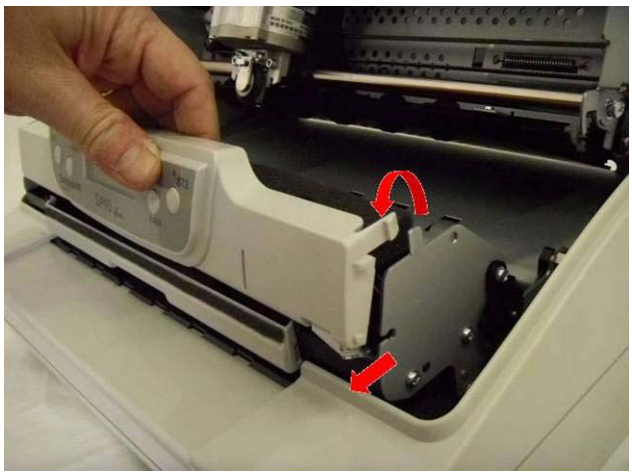
To Remove:

1) Open the top cover.
2) Unhook the operator panel assembly from the mechanical frame by aging on its both sides and meantime rotate it toward the front of the printer.
3) Unplug the O.P. cable from the O.P. board and gently remove the operator panel with its support.

To Install:

To install, follow the removal step in reverse order.





Figures 2.13-2.14 Operator Panel Assembly removal

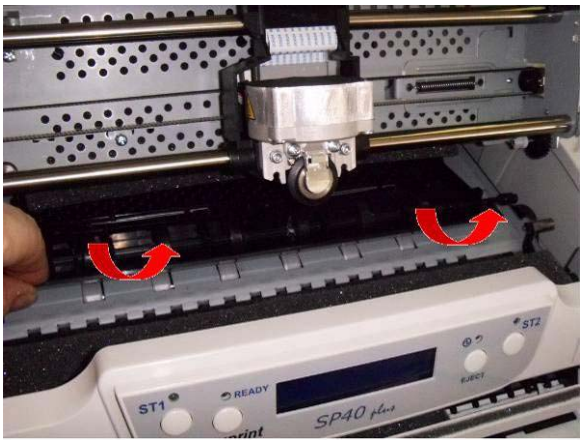
2.6 Rear Guide Assembly

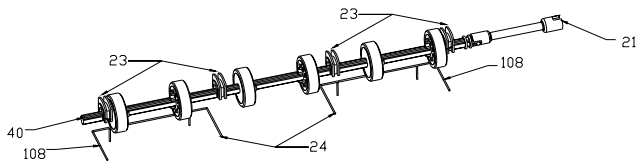
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

To Remove:
1) Open the top cover.
2) Remove the ribbon cartridge.
3) Unscrew the five screws securing the rear guide assembly from the mechanical frame. Two screws are located in the rear part and three are located in the area of the carriage belt and can be reached from the upper frame holes.
4) Gently extract the rear guide assembly with related foam and plastic coupling.

To Install:
To install, follow the removal step in reverse order.
If necessary, put some Molikote grease between the bush spring item 23 and axe of roller assembly item 40.

Remark: Pay attention to the roll springs because the diameters of them are different (0.7mm for the inner springs item 24 and 0.8mm for the outer, yellow coloured, springs item 108.





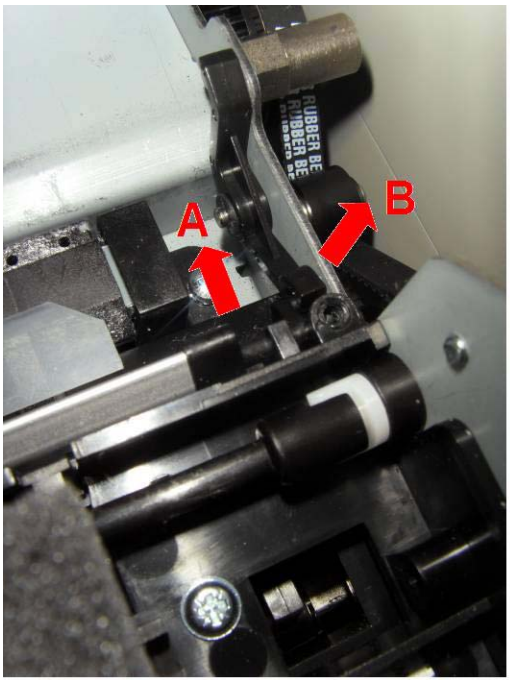
Figures 2.15-2.16-2.17-2.18 Rear Guide Assembly removal

2.7 Mylar Bar Assembly

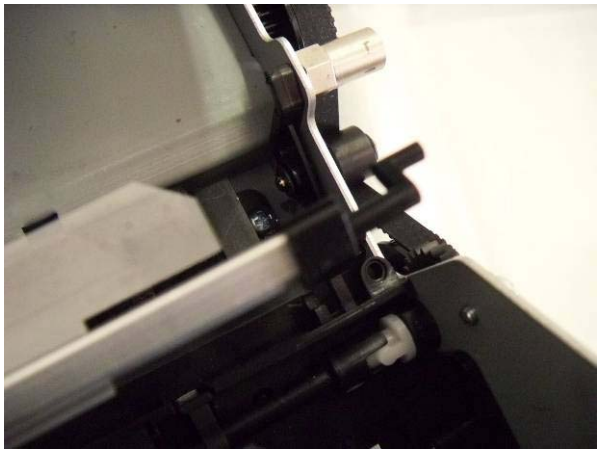
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

To Remove:
1) Open the top cover.
2) Remove the ribbon cartridge.
3) Unscrew the two screws securing the mylar assembly to the front plastic support.
4) Locate the mylar bar assembly fixing point in left and right sides of the printing area.
5) With a spring hook or a little screwdriver gently unhook the mylar bar assembly fixing pin from the front plastic base (A) and from the plastic lever (B).
6) Remove the mylar bar assembly from the printer.
7) Pay attention to the little mylar spring located in the left side. This spring can be accessed from the slot on the left side as shown in figure below.

To Install:
To install, follow the removal step in reverse order.



Figures 2.19-2.20 Mylar Bar Assembly removal



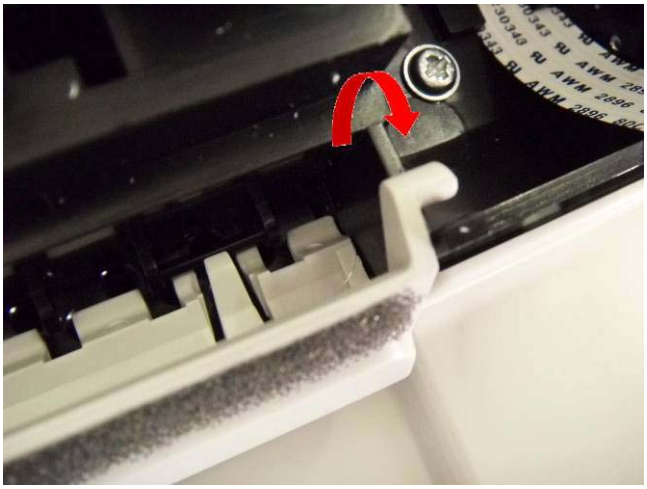
Figures 2.21-2.22-2.23 Mylar Bar Assembly removal

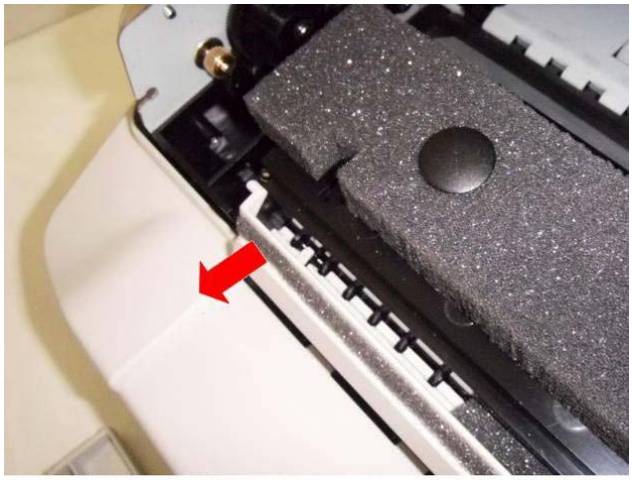
2.8 Flap Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

To Remove:
1) Open the top cover.
2) Open the front flap and gently unhook the flap assembly pin from the front plastic base.
3) Extract the flap assembly from the printer.

To Install:
To install, follow the removal step in reverse order.





Figures 2.24-2-25 Flap Assembly removal

2.9 Ribbon Drive Gears

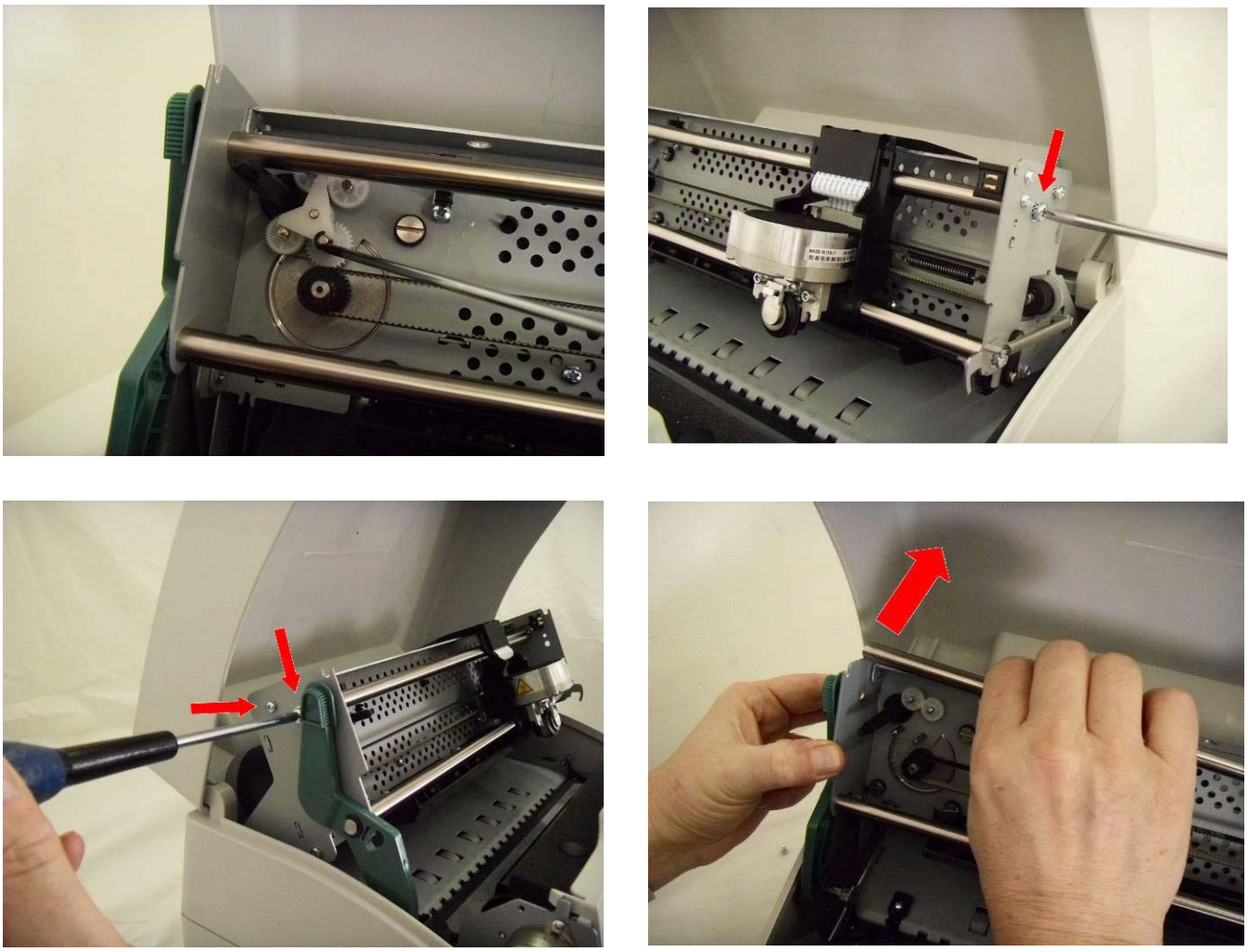
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the ribbon drive gears.

To Remove:

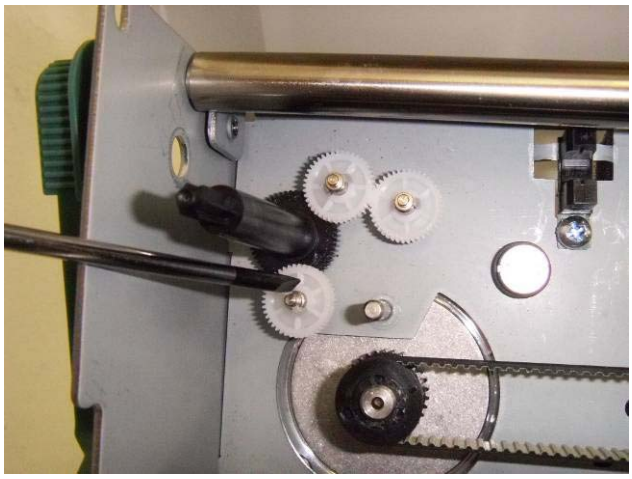
1) Open the top cover.
2) Remove the ribbon cartridge.
3) Using a blade screwdriver remove the D2.3 benzing securing the balance assembly and remove the part.
4) Unscrew the screw securing the upper metal traverse to the left upper mechanical side.
5) Uscrew the screw securing the upper carriage bar to the right side of the upper mechanical frame.
6) Remove the screw securing the upper carriage bar to the left side of the upper mechanical frame.
7) Gently move the left side of the bar from the hole to have visibility to the ribbon drive parts.
8) Using a little flat blade screwdriver gently open the plastic retainers of the ribbon white gears and extract them from the metal axe.
9) Unplug the black ribbon driver gear from its axe.

To Install:

To install, follow the removal step in reverse order.
If necessary, put some Molikote grease on all he gears.



Figures 2.26-2.27-2.28-2.29 Ribbon Drive Gears removal



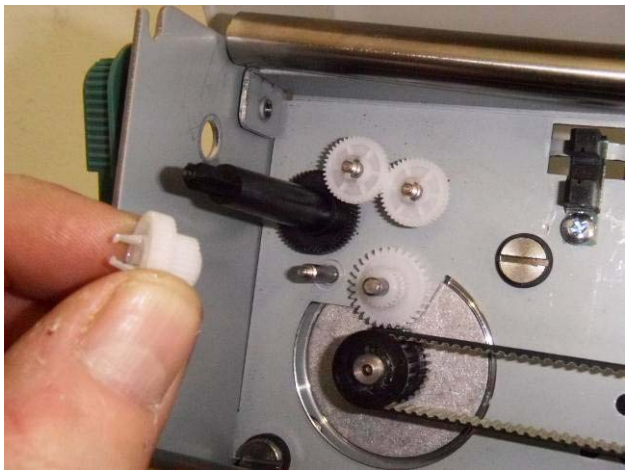


Figure 2.30-2.31-2.32 Ribbon Driver Gears removal

2.4 Board Cover and Main Board Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the engine and the controller board.

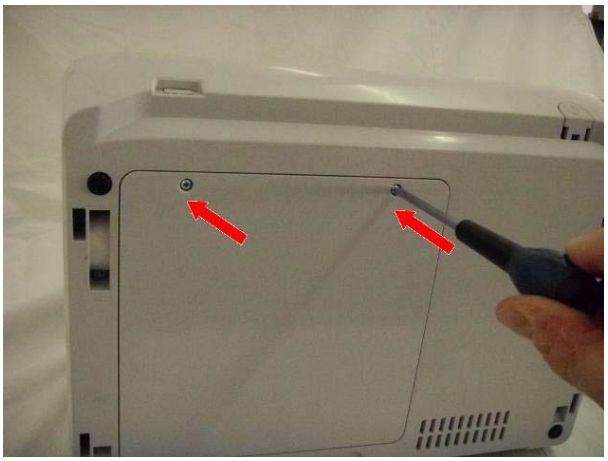
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

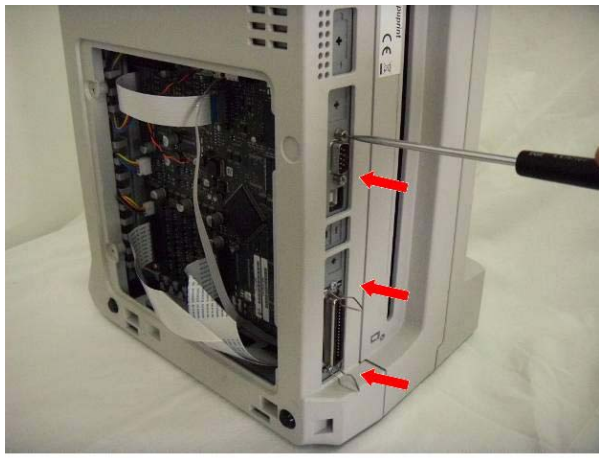
NOTE: Print or obtain from the operator the configuration modules of the Setup for this printer. See how to print the Setup on chapter 3.

1) Rotate the printer on its rear side.
2) Unscrew the two screws securing the plug-in cover to the plastic base assembly and remove it.
3) Unscrew the two screws securing the parallel connector and two screws securing the serial connector to the lower shield.
4) Unplug the all the connectors from the main board.
5) Unscrew the four screws securing the main board to the lower shield.
6) Gently extract the main board from the printer.

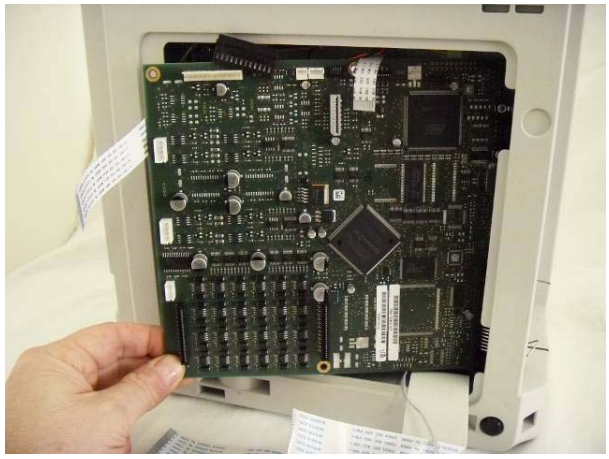
To Install:
Follow the removal step in reverse order.
See main board layout on next page for connector cable routing position.

Remark:
The engine board replacement requires an appropriate T&D test and a complete re-configuration of the printer, because all the setup parameters are stored in a NVM (not volatile memory) i.c. installed on this board.
Run all the tests in Step by Step Mode to complete readjust all the parameters (see chapter 5).
Use the configuration modules to automatically configure the printer (see chapter 3).

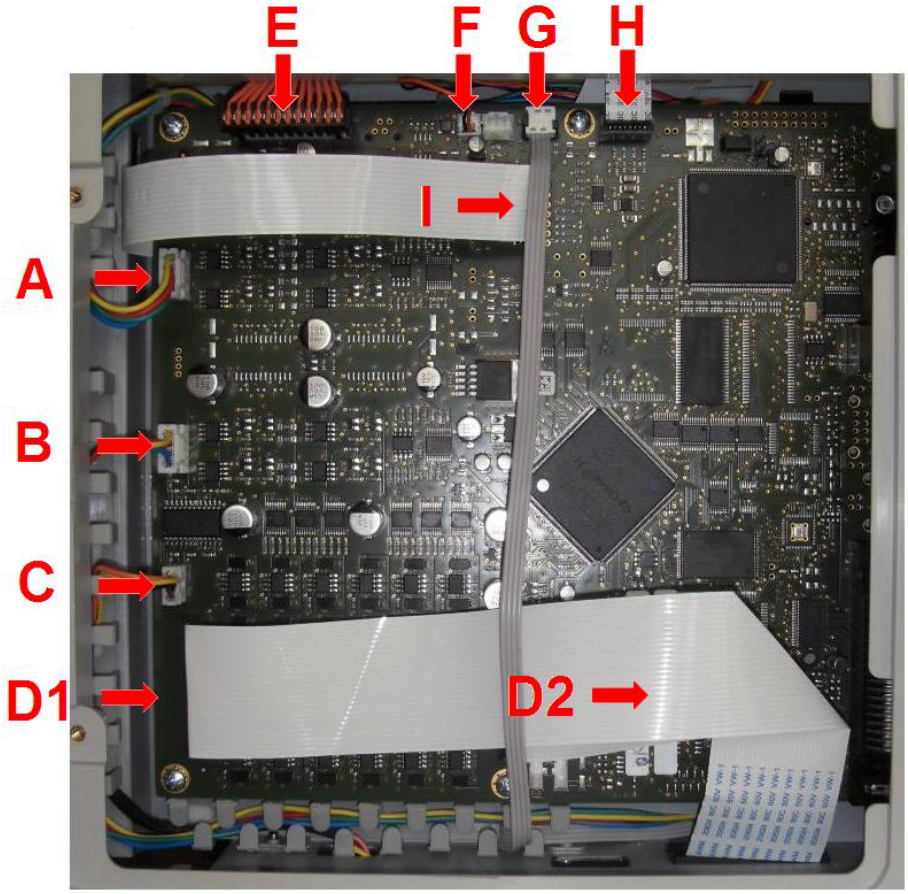




Figures 2.33-2.34-2.35-2.36 Main Board Assembly removal



A = Paper Motor
B = Carriage Motor
C = Selector Motor
D1,D2= Print Head
E = Power Supply
F = Ribbon Sensor
G = Home Sensor
H = Operator Panel
I = Sensor Board



Figures 2.37-2.38-2.39 Main Board Assembly removal

2.11 Front Roller and Optical Guides

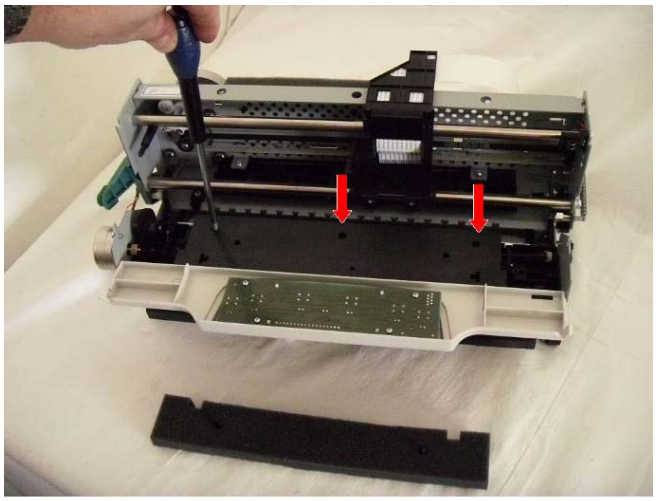
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

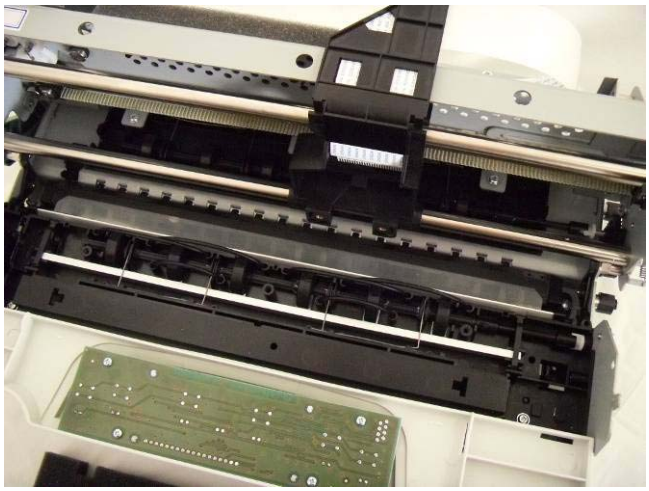
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

1) Open the top cover.
2) Remove the ribbon cartridge.
3) Rotate the operator panel assembly toward the front side.
4) Remove the front foam by pulling out the two secure buttons from the front plastic front base.
5) Unscrew the three screws fixing the optical cover to the plastic front base and remove it.
6) The optical guides can be easily extracted from the plastic front base by pull them. Note there are two sizes of optical guides, 4 longer in rear position and 2 shorter in front position.
7) With a plier extract the four roll springs from their fixing points (A) and holes (B) and remove them.
8) Extract the roller assembly with the four plastic bushings and the plastic coupling.

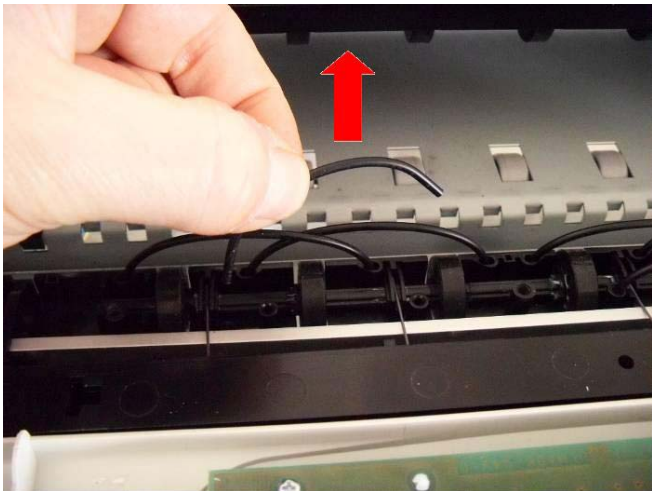
To Install:
To install, follow the removal step in reverse order.
If necessary, put some Molikote grease between the bush spring item 23 and axe of roller assembly item 40.

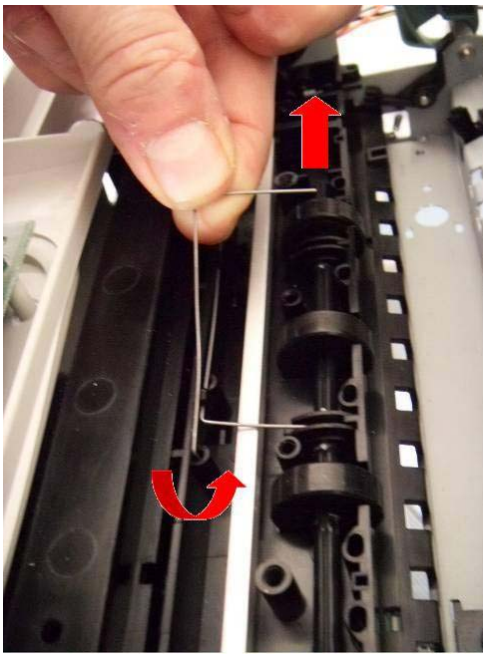
Remark: Pay attention to the roll springs because the diameters of them are different (0.7mm for the inner springs item 24 and 0.8mm for the outer, yellow coloured, springs item 108).

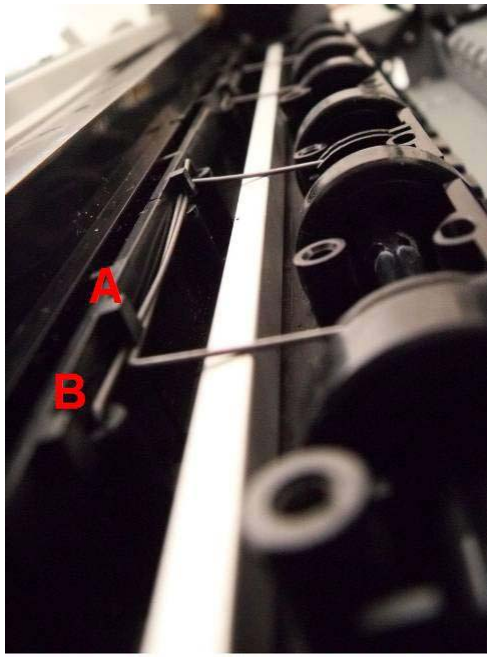


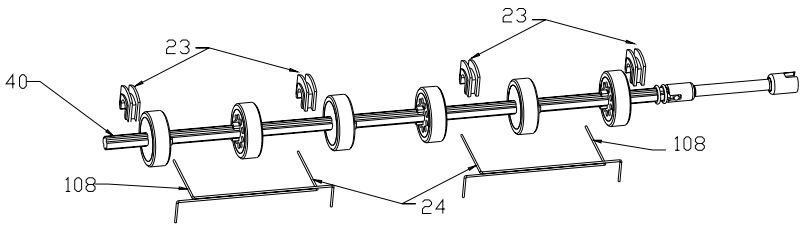


Figures 2.40-2-41 Front Roller and Optical Guides removal









Figures 2.42-2.43-2.44-2.45 Front Roller and Optical Guides removal

2.12 Selector Motor Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the selector motor assembly.

CAUTION: The selector motor may have hot surface. Wait for it to cool down.

To Remove:

1) Remove the cover assembly.
2) Remove the main board cover.
3) Unplug the selector motor cable connector from the main board.
4) Extract the cable from the wiring routing clamp.
5) Unscrew the two screws fixing the selector motor to the left frame.
6) Remove the selector motor assembly from the left frame.

To Install:

To install, follow the removal step in reverse order.

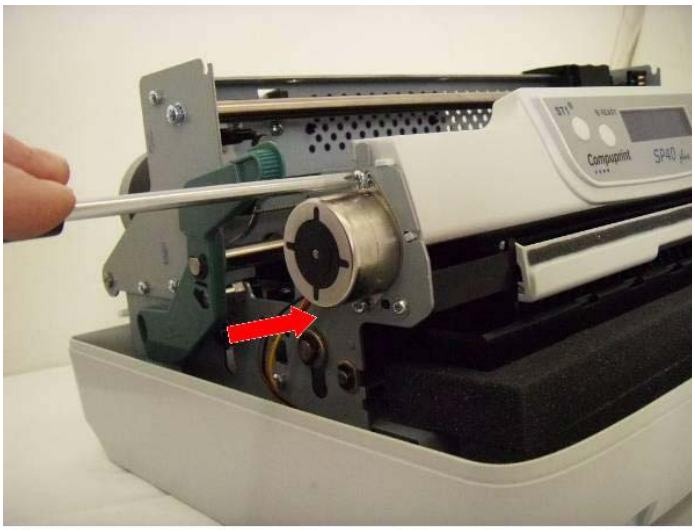


Figure 2.46 Selector Motor Assembly removal

2.13 Cover Set

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

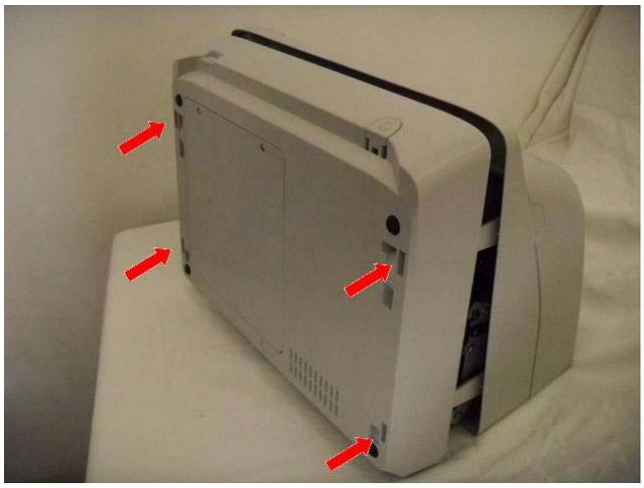
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

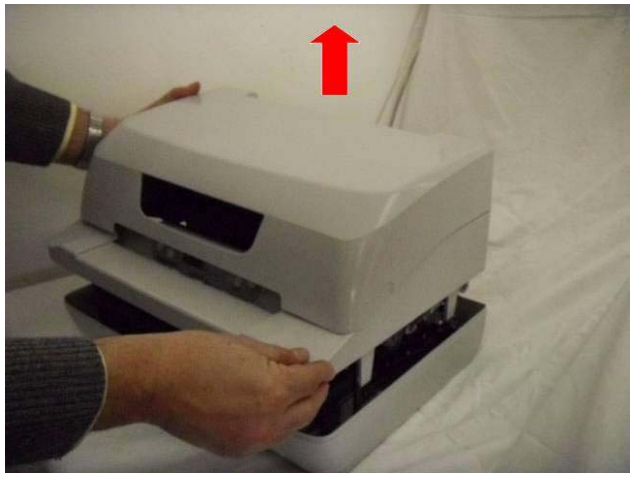
To Remove:

1) Rotate the printer in on its rear side.
2) While acting with a flat screwdriver gently force toward the internal side on the four plastic hooks of the main cover (two for each side) retaining the main cover to the base assembly.
3) Gently raise the main cover.
4) Remove the main cover.

To Install:

To install the main cover, follow the removal step in reverse order.





Figures 2.47-2.48-2.49 Cover Set removal

2.14 Mechanical Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

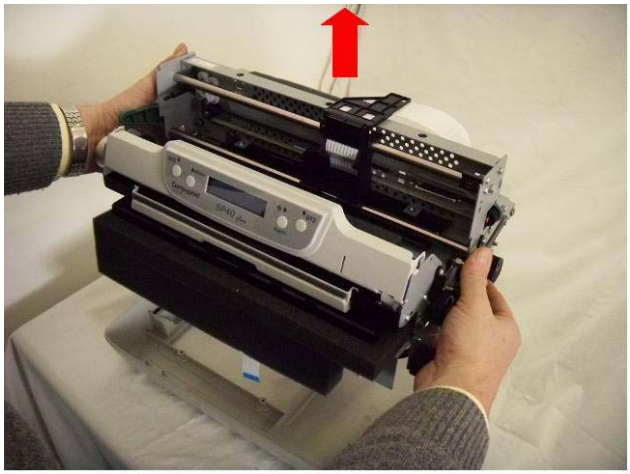
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

To Remove:

1) Remove the printer cover.
2) Remove the main board.
3) Unscrew the four screws retaining the mechanical assembly metal blocks to the base assembly.
4) Gently raise the mechanical assembly.

To Install:

To install the main cover, follow the removal step in reverse order.



Figures 2.50-2.51 Mechanical Assembly removal

2.15 Home Sensor Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before remove the cover parts.

ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge(ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

To Remove:

1) Remove the cover assembly.
2) Remove the main board cover.
3) Unplug the home sensor assembly cable connector from the main board.
4) Extract the cable from the wiring routing clamp.
5) Unscrew the two screws fixing the home sensor assembly to the rear frame.
6) Remove the home sensor assembly from the rear frame.

To Install:

To install, follow the removal step in reverse order.

Figure 2.52 Home Sensor Assembly removal

2.16 Power Supply Board

DANGER : To prevent serious personal injury from electrical shock turn the printer off and unplug the power cable before to remove the power supply.

ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge (ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

1) Remove the printer cover.
2) Remove the main board.
3) Unscrew the four screws retaining the mechanical assembly metal blocks to the base assembly.
4) Gently raise the mechanical assembly.
5) Rotate the mechanical assembly.
6) Unplug the power supply connector from the main board.
7) Unscrew the five screw securing the power supply board to the lower shield.
8) Cut the two plastic retaining self-lock strip retaining the AC power cables to the mechanical assembly.
9) Unscrew the ground wire screw and remove the two nuts securing the AC plug to the lower shield.
10) Gently extract the power supply board from the lower shield.

To Install:
To install the main cover, follow the removal step in reverse order.

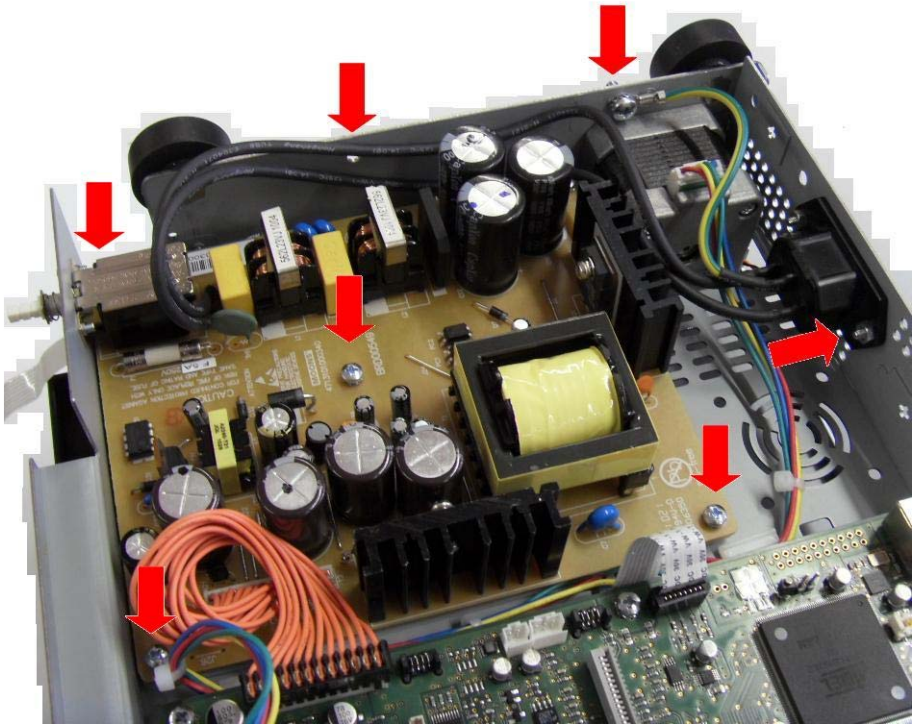


Figure 2.53 Power Supply Board removal

2.17 Carriage Motor Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the carriage motor assembly.

CAUTION: The carriage motor may have hot surface. Wait for it to cool down.

To Remove:

1) Remove the top and the main cover (see chapter 2.2).
2) Remove the inked ribbon cartridge.
3) Remove the mechanical assembly.
4) Unplug the carriage motor cable from the main board and slip off it from the retainers.
5) Unscrew the screw securing the carriage motor pulley support in the vertical metal frame.
6) From the rear metal side unhook the spring keeping tensioned the belt.
7) Drive off the belt from the carriage motor pulley.
8) Using a blade screwdriver, unscrew the three screws from the rear side of the printer.
9) Extract the carriage motor assembly.

To Install:

To install, follow the removal step in reverse order.

2.17.1 Carriage Pulley

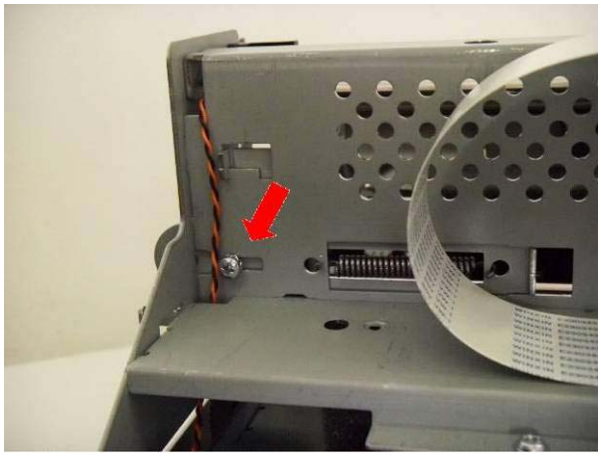
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the carriage pulley assembly.

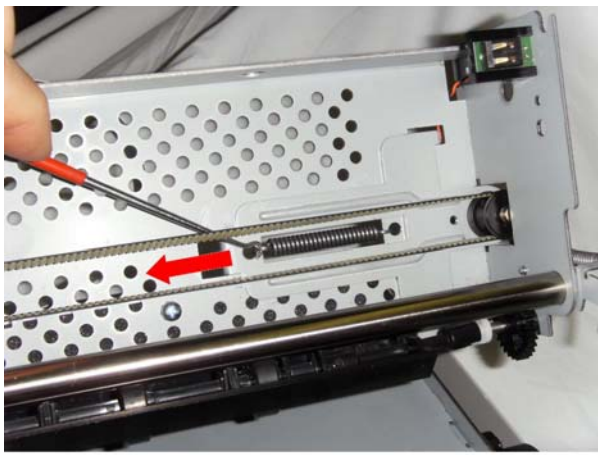
To Remove:

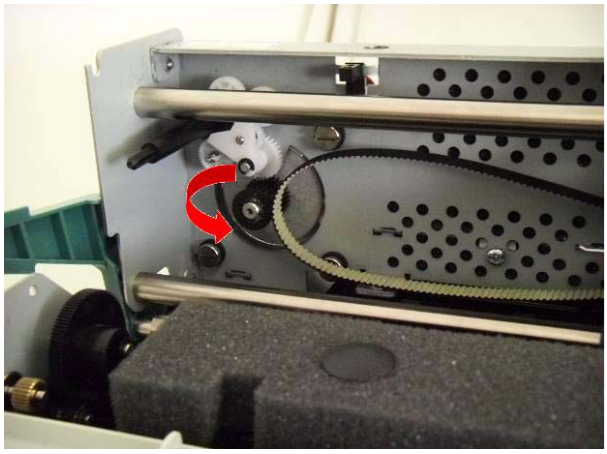
1) Remove the main cover.
2) Remove the inked ribbon cartridge.
3) Unscrew the screw and the washer fixing the carriage pulley metal support on the vertical frame from the rear side of the printer.
4) From the rear metal side unhook the spring keeping tensioned the belt.
5) Drive off the belt from the carriage motor pulley.
6) While raise the carriage pulley metal support from its left side, extract it from the vertical frame.
7) Remove the benzing fixing the pulley on the support.
8) Remove the pulley.

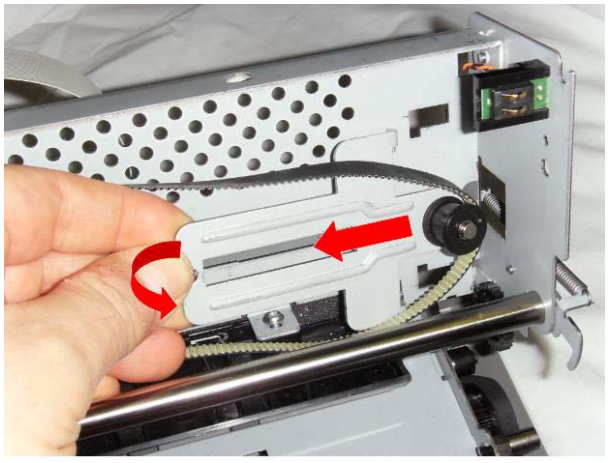
To Install:

To install, follow the removal step in reverse order.









Figures 2.54-2.55-2.56-2.57-2.58 Carriage Motor Assembly, Pulley and Belt removal

2.18 Print Head Cables

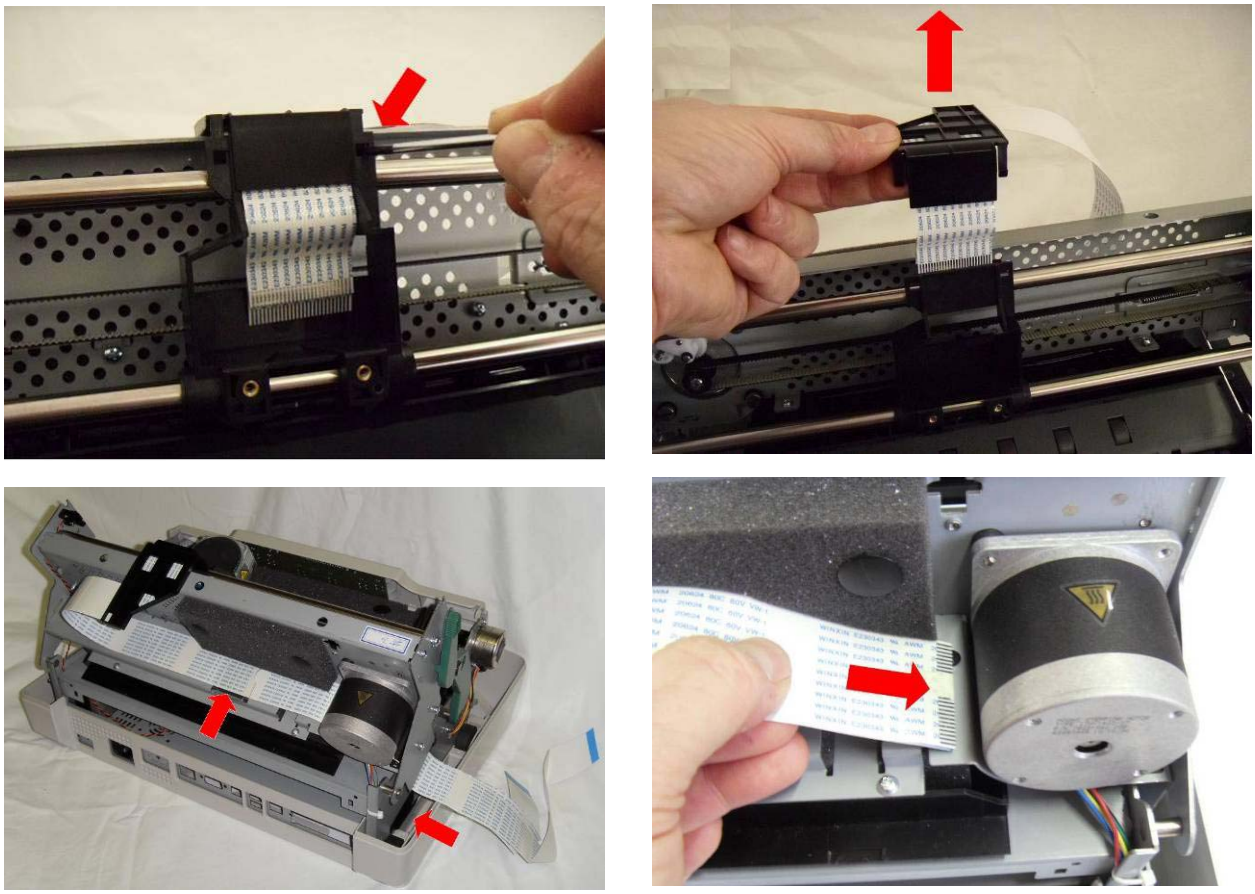
DANGER : To prevent serious personal injury from electrical shock turn the printer off and unplug the power cable before to remove the power supply.

ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge (ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

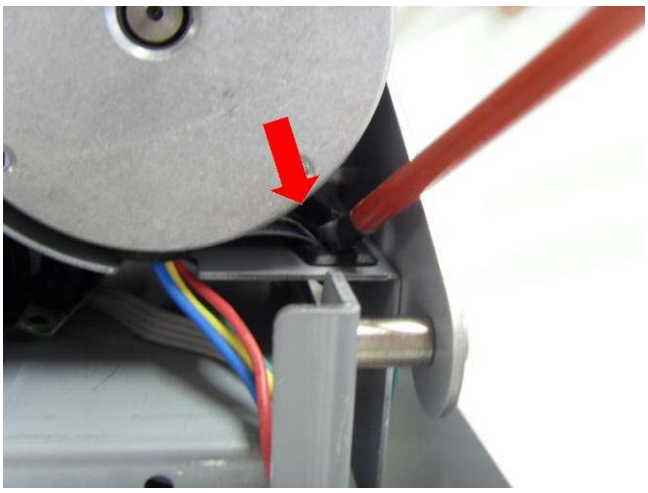
CAUTION: The print head may have hot surface. Wait for it to cool down.

1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the print head assembly.
4) Rotate the printer and open the main board cover and unplug the print head cables from the main board.
5) Rotate the printer in normal position, open the upper mechanical frame and gently extract the print head cables from the left side of the mechanical assembly.
6) With a flat screwdriver unhook the plastic support of the print head cable from the carriage assembly and extract it with the print head cable.
7) Remove the print head cable plastic retainer from the rear part.
8) Gently remove the print head cable assembly from the mechanical assembly.

To Install:
To install the lower shield assembly, follow the removal step in reverse order.
To facilitate the installation, it is suggested to joint the two print head cable end with a tape.
Gently introduce the print head cable under the carriage motor and with a plier or a little screwdriver, help the print head cable introduction in the plastic cable protection.



Figures 2.59-2.60-2.61-2.62 Print Head Cables removal



Figures 2.63-2.64 Print Head Cables removal

2.19 Carriage Assembly

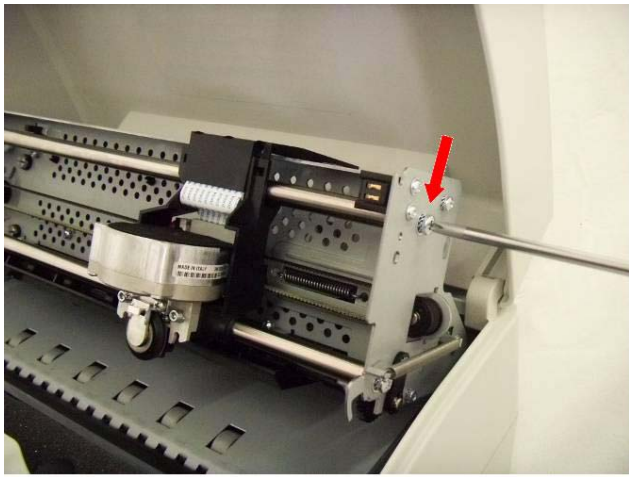
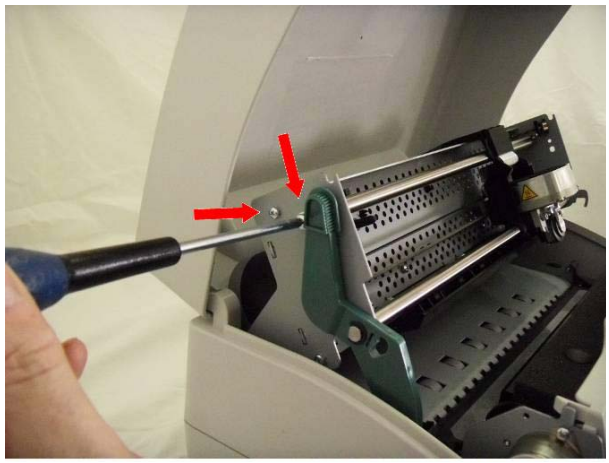
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the carriage assembly.

To Remove:

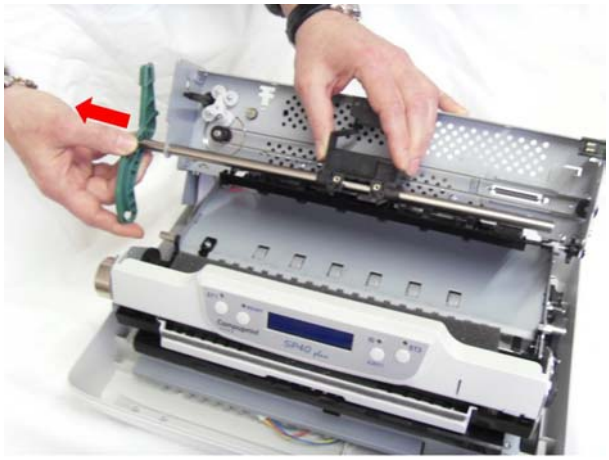
1) Remove the cover assembly.
2) Remove the inked ribbon cartridge
3) Remove the print head assembly.
4) Remove the print head cable assembly from the print head assembly.
5) Unscrew the screw securing the upper metal traverse to the left upper mechanical side.
6) Remove the screw securing the upper carriage bar to the right side of the upper mechanical frame.
7) Remove the screw securing the upper carriage bar to the left side of the upper mechanical frame.
8) Gently remove the upper bar.
9) Unscrew the screw securing the metal open lever on right side.
10) While holding the carriage assembly, extract the main bar from the left side.
11) Extract the carriage belt from the carriage retainer.
12) Remove the carriage.

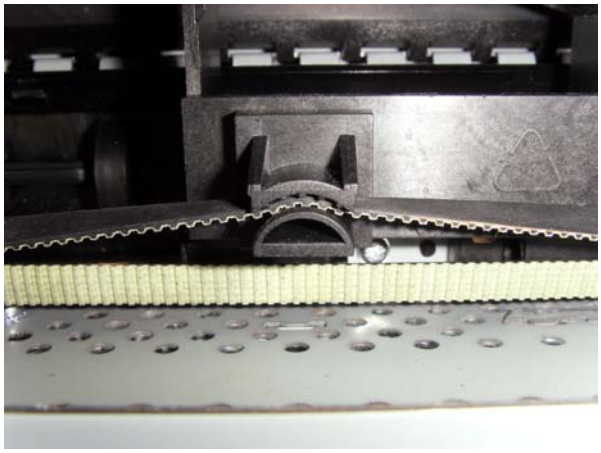
To Install:

To install, follow the removal step in reverse order.

Figures 2.65-2.66-2.67-2.68 Carriage Assembly removal





Figures 2.69-2.70-2.71 Carriage Assembly removal

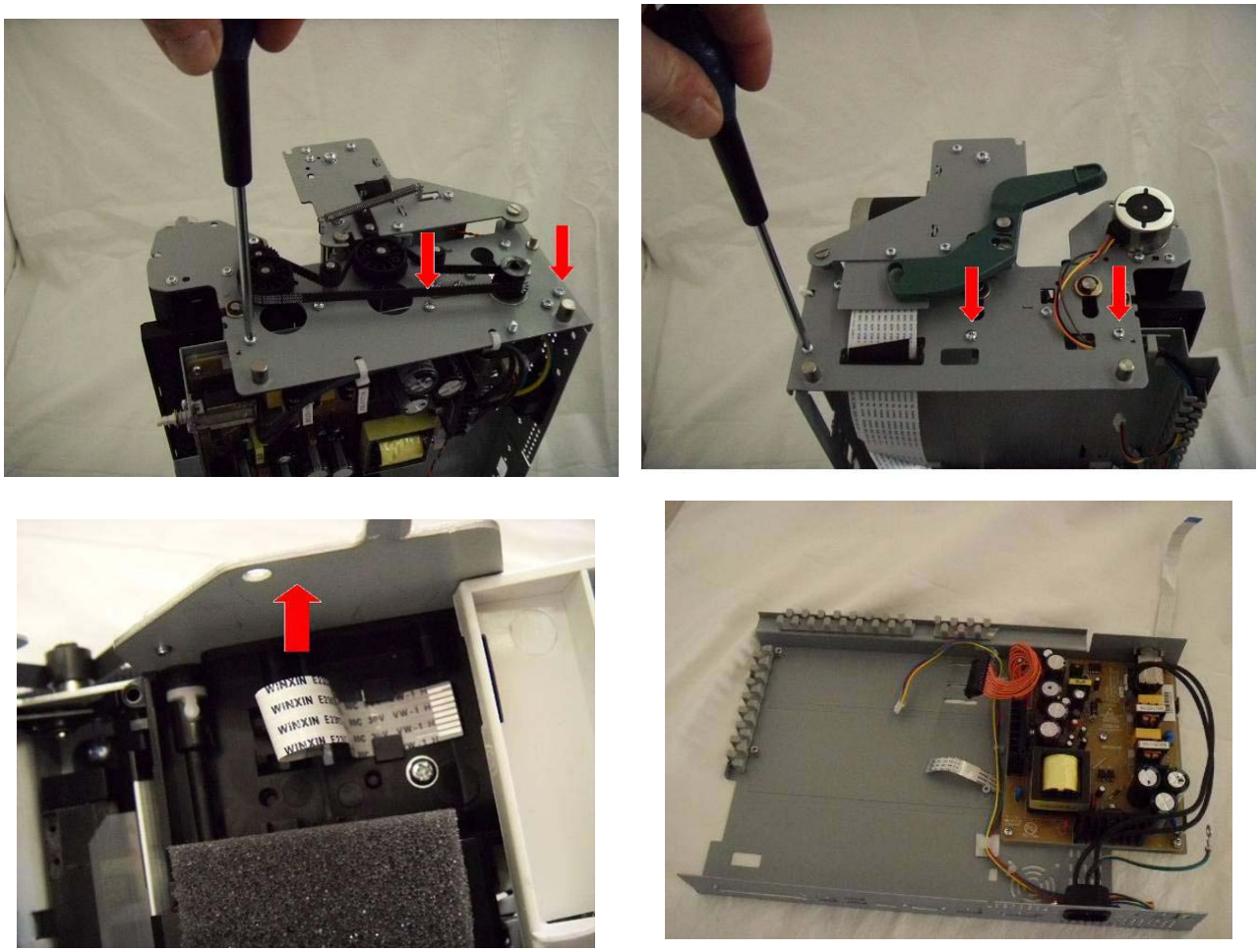
2.20 Lower Shield Assembly

DANGER : To prevent serious personal injury from electrical shock turn the printer off and unplug the power cable before to remove the power supply.

ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge (ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

11) Remove the printer cover.
12) Remove the main board.
13) Unscrew the four screws retaining the mechanical assembly metal blocks to the base assembly.
14) Gently raise the mechanical assembly.
15) Cut the two plastic retaining self-lock strip retaining the AC power cables to the mechanical assembly.
16) Unscrew the ground wire screw from the lower shield.
17) Gently raise the operator panel cable from the front plastic base and extract it.
18) Rotate the mechanical assembly to each side and unscrew the three screws securing the lower shield assembly to the mechanical assembly.
19) Extract all the cables from the plastic retainer and the connector from the paper motor.
20) Gently extract the lower shield assembly (with power supply board) from the mechanical assembly.

To Install:
To install the lower shield assembly, follow the removal step in reverse order.



Figurse 2.72-2.73-2.74-2.75 Lower Shield Assembly removal

2.21 Platen Assembly

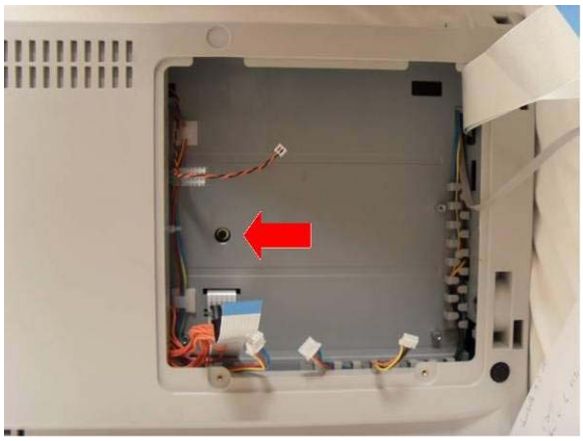
DANGER : To prevent serious personal injury from electrical shock turn the printer off and unplug the power cable before to remove the power supply.

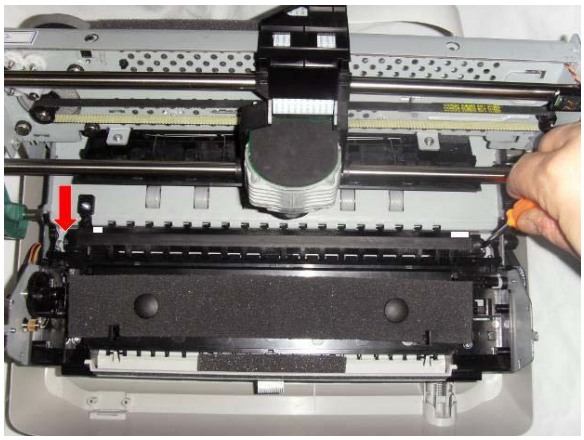
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge (ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

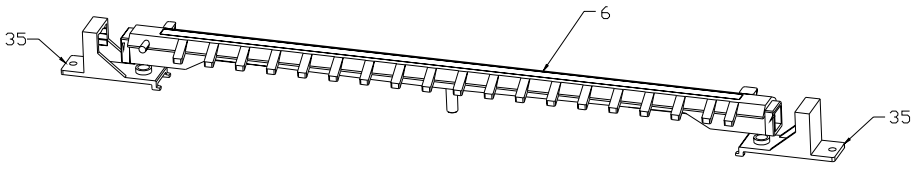
1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Rotate the printer, locate the screw retaining the platen assembly in the middle and unscrew it.
6) Rotate the printer in normal position and unscrew the two screws securing the platen assembly to the mechanical assembly
7) Gently rise the platen assembly

To Install:
To install the lower shield assembly, follow the removal step in reverse order.
If necessary, put some Molikote grease between the platen tem 6 and two lateral plastic guide item 35.

REMARK:
An appropriate adjustment is required in order to have a correct parallelism and a correct gap between platen and AGA wheel. Adjustment procedure is showed also in the chapter 8.
Due to te fact that the platen assembly is movable on its supports (there are two springs which maintained the platen in its correct position) check for the correct platen free movement (down by pressure and up by springs release) by force it both in right an left side. The internal guides of the platen must be lubricate with Molykote PG30L grease as indicated in chapter 4.4.







Figures 2.76-2.77-2.78 Platen Assembly removal

2.22 Paper Motor Assembly and Belt

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the paper motor assembly.

CAUTION: The paper motor assembly may have hot surface. Wait for it to cool down.

To Remove:

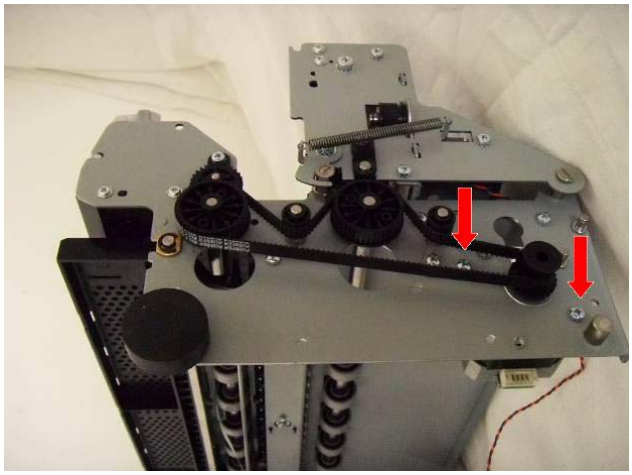
1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Remove the mechanical assembly from the base.
6) Drive off the paper belt from the pulley of the motor.
7) Unscrew the two screws fixing the paper motor to the right frame.
8) Extract the paper motor assembly.

To Install:

To install, follow the removal step in reverse order.

Remark:

The tension of the paper belt has to be verified and if it is need adjusted before assembly operations.
For adjustment procedure see chapter 8.



Figures 2.79-2.80 Paper Motor Assembly and Belt removal

2.23 Rear Lower Roller Assembly

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the rear roller assembly.

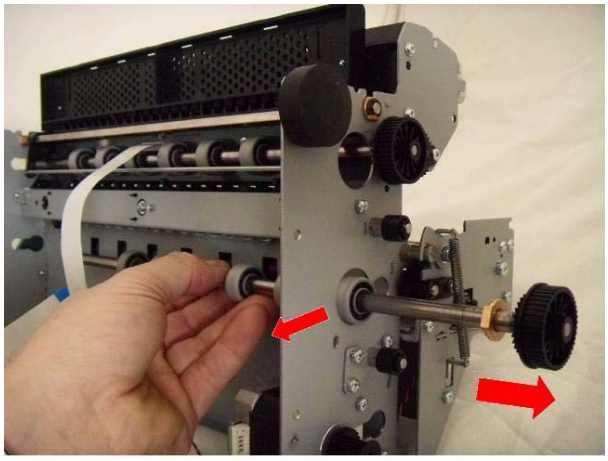
To Remove:

1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Remove the mechanical assembly from the base.
6) Rotate the mechanical assembly and remove the benzing retaining the rear lower roller to the left frame of the mechanical assembly.
7) Gently extract the rear lower roller from the bigger hole of the right side of the mechanical assembly.

To Install:

To install, follow the removal step in reverse order.

REMARK:



Figures 2.81-2.82 Rear Lower Roller Assembly removal

2.24 Aligner Assembly

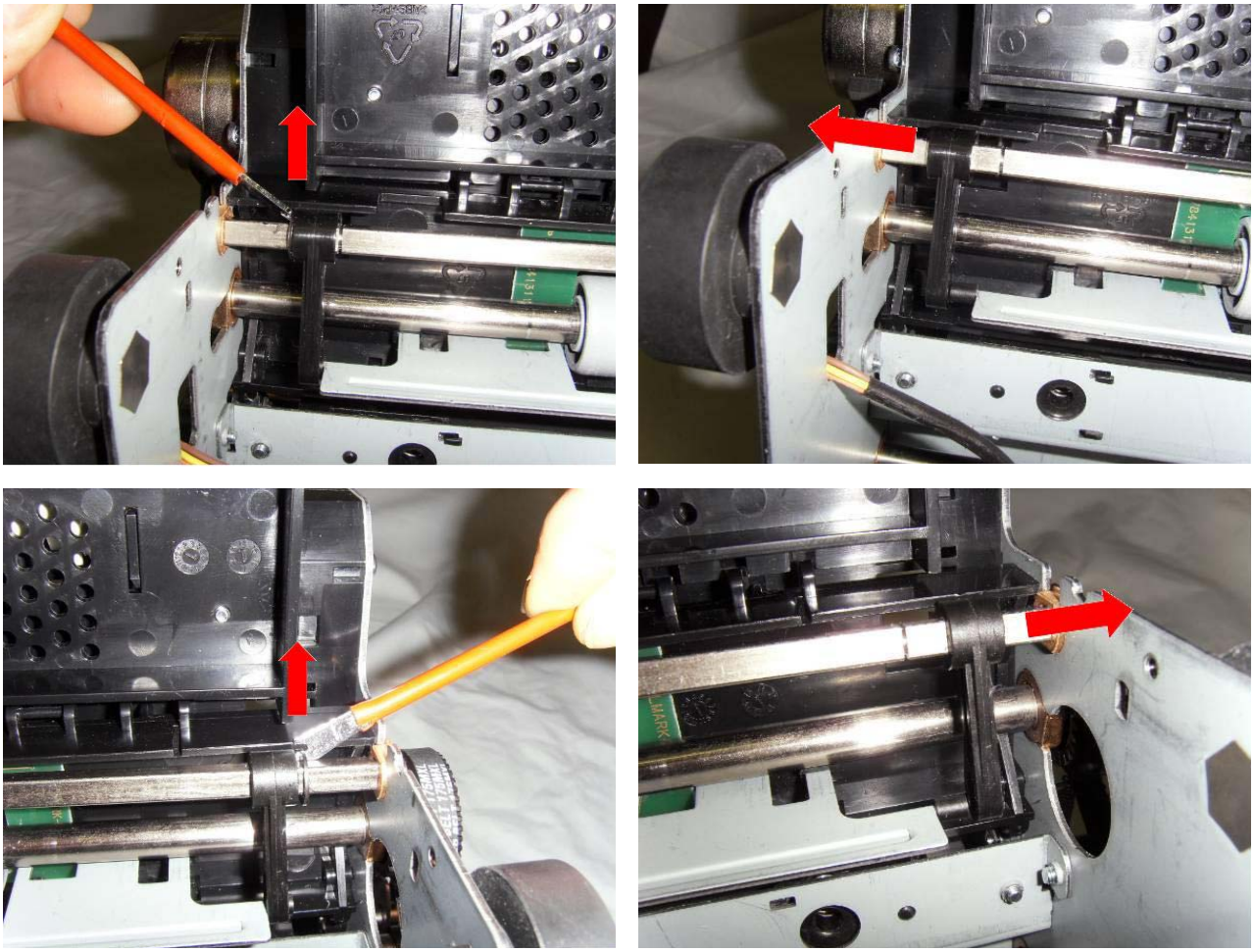
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the lower roller assembly.

To Remove:

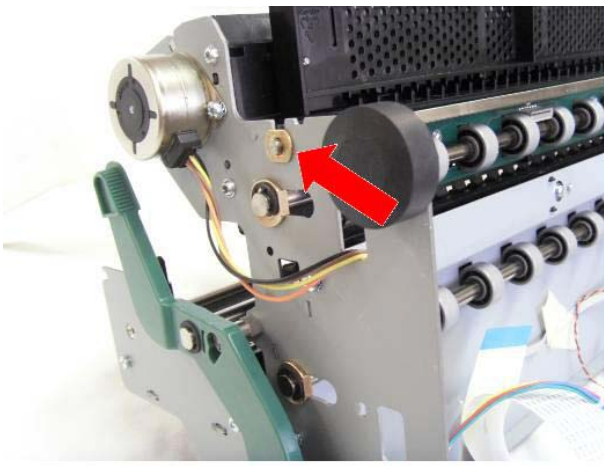
1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Remove the mechanical assembly from the base.
6) Rotate the mechanical assembly and remove the left benzing retaining the left aligner lever to its square axe and gently moves the lever to external side. Pay attention to the little spring retaining the aligner left lever to the plastic support on the upper part as shown on picture below.
7) Remove the right benzing retaining the right aligner lever to its square axe and gently moves the lever to external side.
8) Remove the benzing retaining the aligner square axe to the left mechanical side.
9) Gently extract the square alignment bar from the right side of the mechanical assembly.
10) Gently extract the aligner assembly by extracting it.

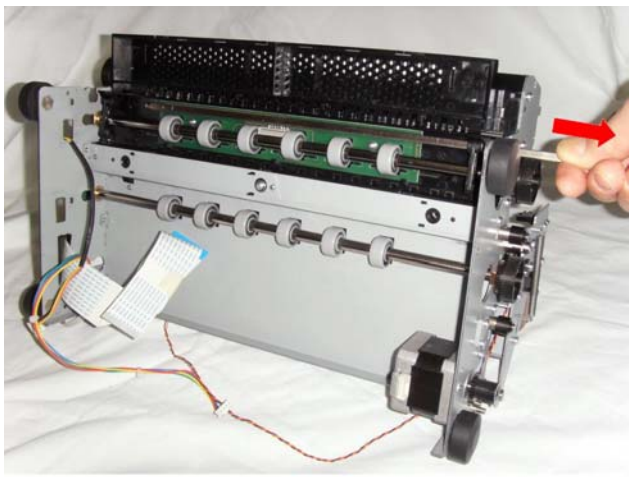
To Install:

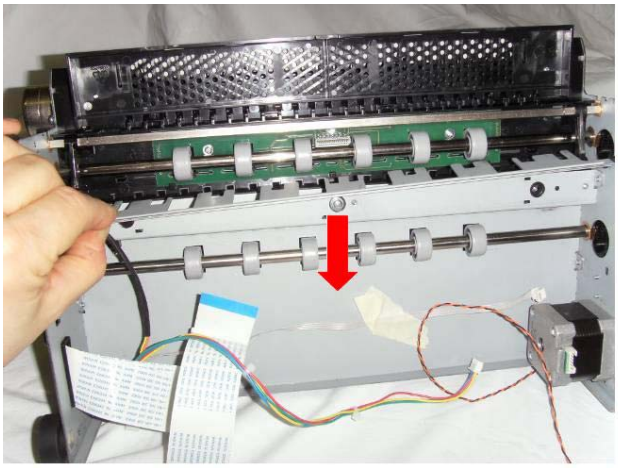
To install, follow the removal step in reverse order.
If necessary, put some Molikote grease between the cam tem 48 and the aligner plastic lever item 46.

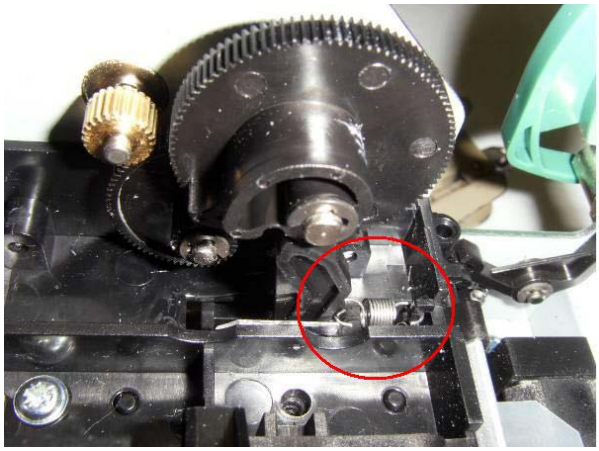


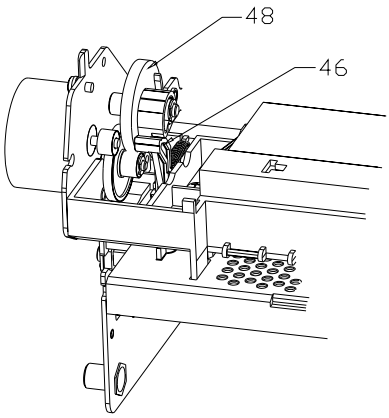
Figures 2.83-2.84-2.85-2.86 Aligner Assembly removal











Figures 2.87-2.88-2.89-2.90-2.91 Aligner Assembly removal

2.25 Front Lower Roller Assembly

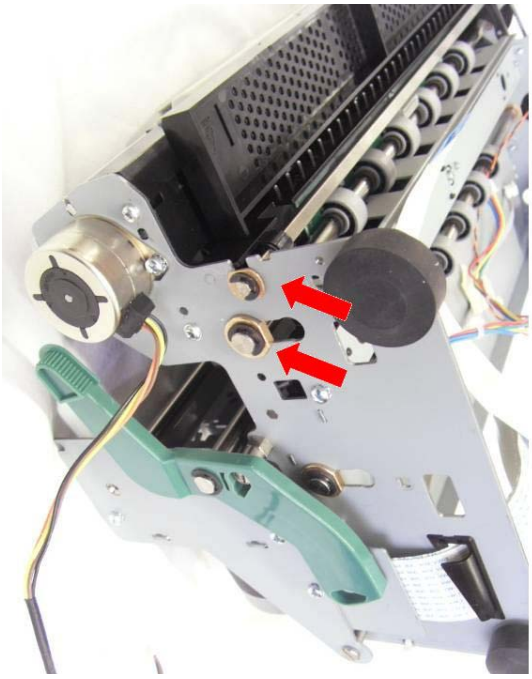
DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the lower roller assembly.

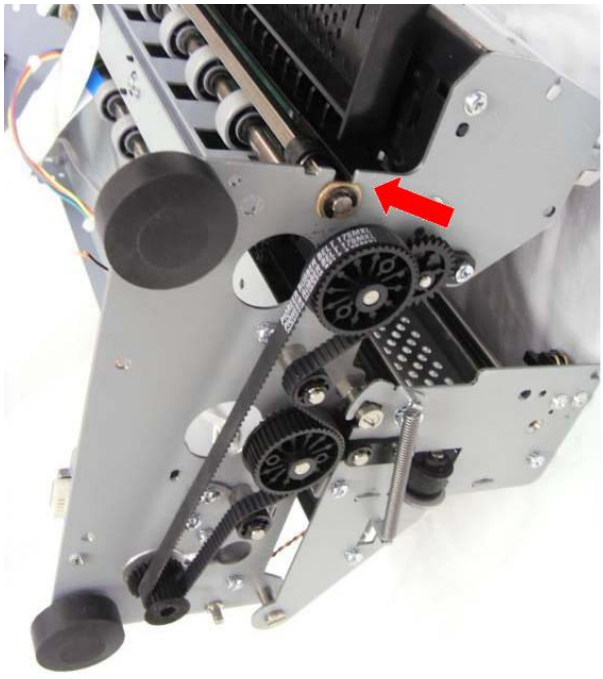
To Remove:

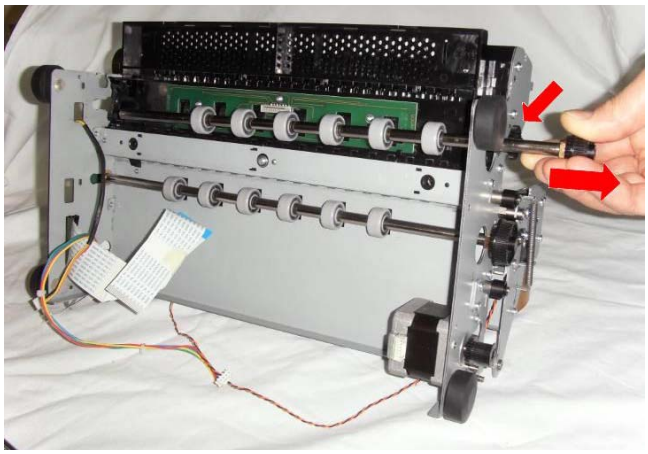
1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Remove the mechanical assembly from the base.
6) Remove the aligner assembly.
7) Remove the benzing retaining the front lower roller on the right side of the mechanical assembly.
8) Gently extract the front lower roller from the bigger hole of the right side of the mechanical assembly.

To Install:

To install, follow the removal step in reverse order.







Figures 2.92-2.93-2.94 Front Lower Roller Assembly removal

2.26 Sensor Board

DANGER : To prevent serious personal injury from electrical shock always turn the printer off and unplug the power cable before to remove the sensor board or its cable.

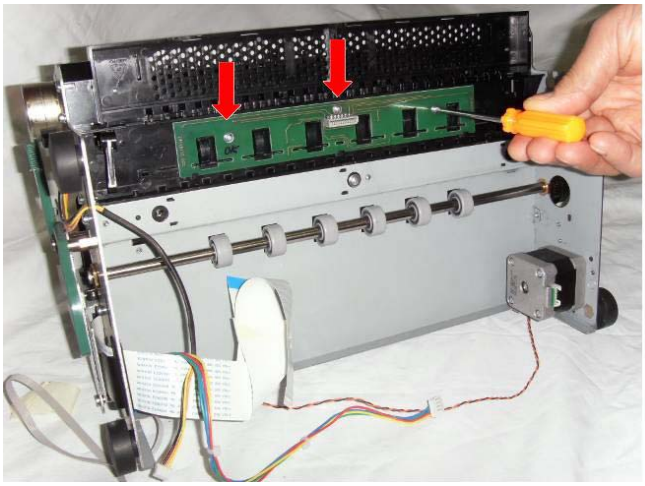
ATTENTION: The electronic parts of this printer are easily damaged by Electronic Static Discharge (ESD). Ensure that ESD protection devices and procedures, including the static discharge wrist wrap, are used while working on this printer.

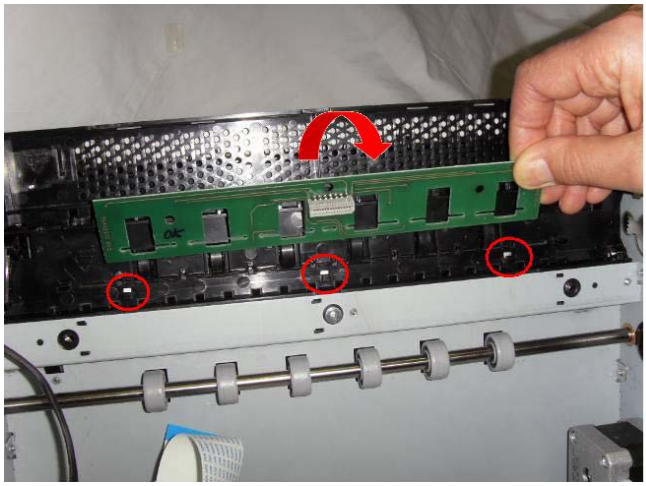
To Remove:

1) Remove the printer cover.
2) Remove the ribbon cartridge.
3) Remove the mylar bar assembly.
4) Remove the main board.
5) Remove the mechanical assembly from the base.
6) Remove the aligner assembly.
7) Remove the front lower roller assembly.
8) Unplug the sensor cable from the sensor board.
9) Unscrew the three screws securing the sensor board to the plastic lower support.
10) Gently extract the sensor board. Pay attention to the three retaining hooks.

To Install:

To install, follow the removal step in reverse order.





Figures 2.95-2.96 Sensor Board and Sensor Cable Removal

Chapter 3 Operability and Configuration

3.1 Overview

This chapter describes the operability and configuration functionalities.
For complete and detailed description, please refer to the specific User manual.
The control panel provides access to normal status, set-up the printer and for special functionalities as well as diagnostic.

3.2 Operator Panel

The operator panel is located in the middle of the printer cover and is composed of four function keys and four leds to easily check the printer status and select the functions.
Optionally it can be equipped with a wide LCD 2x16 characters display.
The figures below show layout of the standard operator panel and the one with 2x16 LCD display.
There are specific SP40 models equipped with one of the two operator panel assembly.

Fig. 3.1 Operator panel (without display)

Fig. 3.2 Operator panel (with display)

3.2.1 Function Keys

KEY	NORMAL MODE	SETUP MODE	SPECIAL MODE
ST1	When using the IBM 4722, IBM 9068 and the Olivetti protocols in two operators (“booking”) mode, the application software determines the function of this key.	When the Printer is in the Printer Setup mode, pressing this key the operator selects the Configuration Page to be printed.	When pressed while powering the printer on with READY key selects the T&D mode (diagnostic). When pressed while powering the printer on with cover open enters in formware upgrading procedure.
READY	Toggles the printer between Ready (on-line) and Local (off-line) status.	If pressed in the Printer Setup mode, the printer prints the Self Test Page.	When pressed while powering the printer on, selects the Printer Setup Mode. When pressed while powering the printer on with READY key select the T&D mode (diagnostic).
EJECT	Pressing this key, when the printer is offline, or when the printer is online and no print data are in the buffer, the printer ejects the paper, if inserted (EJECT function). In the Olivetti protocols, the EJECT function may be performed only if the printer is offline.		
ST2 LQ	When using the IBM 4722, IBM 9068 and the Olivetti protocols in two operators (“booking”) mode, the application software determines the function of this key. When the printer is offline or when the printer is online and no print data are in the buffer, pressing this key, the printer toggles between Letter Quality and Draft printing mode (no Olivetti)	When the Printer is in the Printer Setup mode, pressing this key the Setup Page selected with the ST1 key will be printed.	When pressed while powering the printer on, selects the HEX_DUMP mode.

Table 3.1 Key meaning

3.2.2 Leds

LED	NORMAL MODE	SETUP MODE	SPECIAL MODE
ST1 ●	Lit if paper presence, Unlit without paper (no Olivetti). When using the IBM 4722, IBM 9068 and the Olivetti protocols in two operators (“booking”) mode, the ST1 led is under software control.	If the printer is in Setup Mode, this led indicates which setup page is selected for printing.	Blinks, together with the ST2 led, if a printer error occurs.
READY ●	Lit, when the printer is ready (on line). Unlit, when the printer is in local (off line).	If the printer is in Setup Mode, this led indicates which setup page is selected for printing.	
⏻ / DATA	On, if the printer is powered on without data. Off, if the printer is powered off. Blinks if the printer has data traffic or data in the buffer.	Blinks if the printer is in Setup Mode.	
● ST2	Lit when the Letter Quality print mode is selected. Unlit when the Draft printmode is selected. When using the IBM 4722, IBM 9068 and the Olivetti protocols in two operators (“booking”) mode, the S2 led is under software control.	If the printer is in Setup Mode, this led indicates which setup page is selected for printing.	Blinks, together with the ST1 led, if a printer error occurs.

Table 3.1 Leds meaning

3.3 LCD display messages (only for the model with)

Upper line message Lower line message	Indication
STARTING UP	The printer initialization phase is starting-up.
..INIT..	The printer initialization phase is ended
SP40plus Rel. xxx	The printer firmware release message
PRINTER READY **PROG1 DRAFT**	The printer is in normal ready status showing the current Program and the current Font.
PRINTER READY **HEX-DUMP MODE**	The printer is in normal ready status in hex dump mode.
PRINTER OFF-LINE **PUSH ON LINE**	The printer is in off-line status.
PAUSE ON PRINT **PUSH ON LINE**	The printer is going in off-line status while data are in the buffer and ready to be printed.
WAITING MEDIA **INSERT MEDIA**	Data are sent to the printer, the printer is waiting for the insertion of the paper.
PRINTER BUSY **EPSON PARALLEL**	The printer is currently printing showing the used Emulation and interface
SET UP	The printer is in Set Up status and is waiting for a blank sheet to be loaded See "Printer Setup" later in this manual.
SETUP PAG=CONF **ST1=PAG ST2=PRT**	The printer is waiting for a Set Up operation selection. See "Printer Setup" later in this manual.
NVM CHANGED	The firmware of the printer has been updated and the NVM values have been resored to the default parameters.

Table 3.3 LCD messages

3.4 Printer Setup

The Printer Setup is used to configure the printer parameters and to print a Self Test page, to check the settings and the printer installation, and to perform the Print Offset Tuning.
The default configuration of this printer matches most of the commonly used environments, but it may be necessary to change some printer parameters.
With this printer you print the forms for the setup, you fill them in, and then you insert them back into the printer for reading. Once the printer reads the form, the new values are set.
The following is the complete description of the Setup Procedure.

3.4.1 Entering the Printer Setup Mode

To enter the Printer Setup Mode press and hold the READY key pressed for at least 1 second while powering the printer on. The printer enters the Setup Mode.
The leds ST1, ST2 and READY are unlit, the fourth led Θ/DATA is flashing.

You can now:

1. Print the Self Test.
2. Print one of the Printer Setup Forms (Configuration Menu or Program1 – Program2 – Program 3 - Program4 Menu) or the Offset Tuning Form.
3. Insert a filled-in Printer Setup Form to set the corresponding Setup values.

3.4.2 Printing the Test Page

The Self Test page is useful to test, if the printer has been correctly installed, and allows to see the current parameter settings.

1. With the printer in the Setup Mode, insert a single sheet in A4 or Letter format.
2. The printer loads the sheet and stops.
3. Press the READY key again.

The printer prints the Self-Test page. Check that the printout is correct. The following printout example shows the Printer Setup default values.
Once the self-test is finished, the printer remains in Setup Mode.

SELF TEST

SP40 PLUS : Code Version xa.06 FMW0xa06 CharGen : 78411902 ver.4.07

CONFIGURATION SETUP

PROGRAM	on interface	BUFFER CONTROL	DTR+SRTS
ERROR BUZZER	enabled	ROBUST XON	enabled
JOB BUZZER	no beep	WORD LENGTH	8 bit
COPIES	yes	BAUD RATE	9600 bps
LOW NOISE	no	PARITY BIT	none
SAFE BOTTOM EDGE	yes	STOP BIT	1
GET EDGE QUOTE	1/4"	USB MODE	2.0
PASSBOOK TYPE	sw control		
	fixed thick		
INTERFACE TYPE	automatic		
IBM FINANCIAL	no		
INPUT BUFFER	8 Kb		
AUTOFEED SIGNAL	disabled		
SLCT-IN SIGNAL	disabled		
IGNORE PE	enabled		
RIBBON LIFE	4109 chars	PRINT HEAD LIFE	4109 chars

PROGRAM SETUP

	PROGRAM 1	PROGRAM 2	PROGRAM 3	PROGRAM 4
PROTOCOL	EPSON 570	OLI. PR2	IBM X24E	OLI. PR2
FONT	Draft	Draft	Draft	Draft
QUALITY MODE	lq	lq	lq	lq
DRAFT MODE	draft	draft	draft	draft
DOWNLINE LOADING	enabled	enabled	enabled	enabled
HORIZONTAL PITCH	10 cpi	10 cpi	10 cpi	10 cpi
VERTICAL PITCH	6 lpi	6 lpi	6 lpi	6 lpi
LOCK	no lock	no lock	no lock	no lock
FORM LENGTH	A4	A4	A4	A4
	70	70	70	70
LEFT MARGIN	0	0	0	0
RIGHT MARGIN	93	93	93	93
TOP MARGIN	0	0	0	0
BOTTOM MARGIN	0	0	0	0
IBM C-SET	IBM set 1	IBM set 1	IBM set 1	IBM set 1
IBM COMPRESS	17.1 cpi	17.1 cpi	17.1 cpi	17.1 cpi
EPSON C-SET	graphic	graphic	graphic	graphic
NATION C-SET	USA	USA	USA	USA
CODE PAGE	CP437	CP437	CP437	CP437
OLIVETTI C-SET	INTERN.	INTERN.	INTERN.	INTERN.
OLIVETTI COMPRES	17.1 cpi	17.1 cpi	17.1 cpi	17.1 cpi
VERT. RESOLUTION	1/240 inch	1/240 inch	1/240 inch	1/240 inch
PRINT DIRECTION	sw control	sw control	sw control	sw control
LINE MODE	LF=LF,CR=CR	LF=LF,CR=CR	LF=LF,CR=CR	LF=LF,CR=CR
WRAP MODE	autowrap	autowrap	autowrap	autowrap
REFERENCE EDGE	left	left	left	left
SLASHED ZERO	no	no	no	no
EJECT ON FF	yes	yes	yes	yes
RESET WITH EJECT	yes	yes	yes	yes
CUT SHEET EJECT	on front	on front	on front	on front
VERT.POS 1/10"	0	0	0	0
VERT.ADJ 1/60"	0	0	0	0
HORIZ.POS 1/10"	0	0	0	0
HORIZ.ADJ 1/60"	0	0	0	0

Fig. 3.3 Self Test Printout

3.4.3 Printing the Printer Setup Forms

If you already have the preprinted forms for the printer setup, go to next chapter.

1. With the printer in Setup Mode, insert a blank sheet in A4 or Letter format.
2. The printer loads the sheet and stops.
3. If you press the ST1 key, the three leds change and you can select the Setup Page you want to print as follows:

○ = unlit ● = lit ◐ = flashing

ST1	READY	/ DATA	ST2	SETUP STATUS
○	○	◐	○	Configuration Page
●	○	◐	○	Program 1 – Setup Page
○	○	◐	●	Program 2 – Setup Page
●	○	◐	●	Program 3 – Setup Page
○	●	◐	○	Program 4 – Setup Page
●	●	◐	○	Offset Tuning Set Up Page

Table 3.4 Led combination under Setup

Pressing the ST2 key, the printer prints the selected Setup Page, showed in next pages.
Only the Program 1 Setup Page printout is reported because the other are exactly the same except for the marker.

The printer setup forms contain all printer parameters and the values that can be set.
The current value is indicated by an asterisk (*).
For a detailed description of the parameters and the settings see Setup Parameters.

Each Setup form is identified by a marker in the upper left corner of the page as follows:

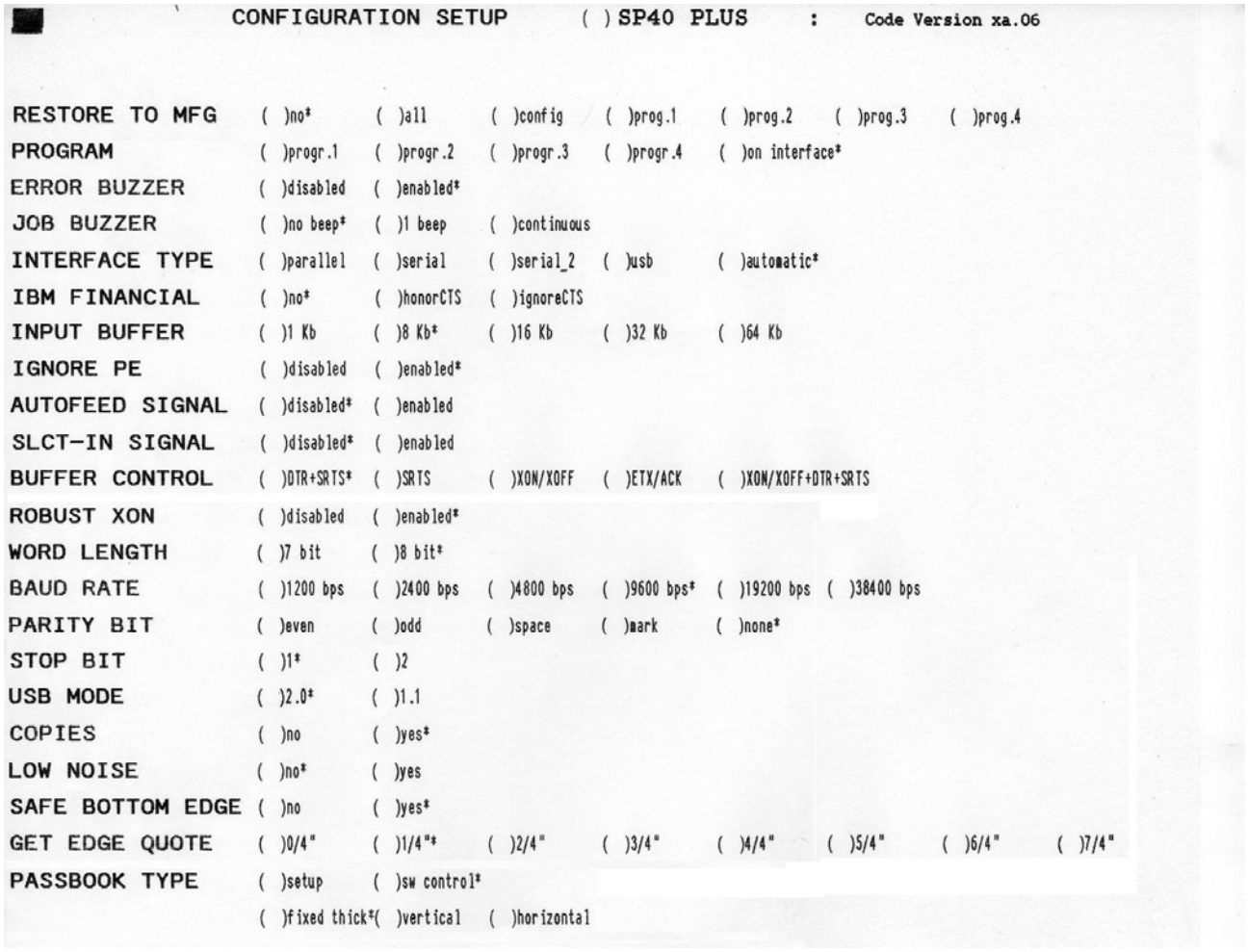
Configuration Setup	■
Program 1	■■
Program 2	■■■
Program 3	■■■■
Program 4	■■■■■
Offset Tuning Setup	■■■■■■■

Table 3.5 Setup marker combination

In this first line an empty marker ( ) is printed within the printer model and the Code Version to be used for the white calibration check.

Remark: do not fill this empty marker

For the printer with operator panel with LCD, the SETUP operation are directly displayed on the LCD jointly with the above described leds combination.



CONFIGURATION SETUP ( ) SP40 PLUS : Code Version xa.06

RESTORE TO MFG	( )no*	( )all	( )config	( )prog.1	( )prog.2	( )prog.3	( )prog.4
PROGRAM	( )progr.1	( )progr.2	( )progr.3	( )progr.4	( )on interface*		
ERROR BUZZER	( )disabled	( )enabled*					
JOB BUZZER	( )no beep*	( )1 beep	( )continuous				
INTERFACE TYPE	( )parallel	( )serial	( )serial_2	( )usb	( )automatic*		
IBM FINANCIAL	( )no*	( )honorCTS	( )ignoreCTS				
INPUT BUFFER	( )1 Kb	( )8 Kb*	( )16 Kb	( )32 Kb	( )64 Kb		
IGNORE PE	( )disabled	( )enabled*					
AUTOFEED SIGNAL	( )disabled*	( )enabled					
SLCT-IN SIGNAL	( )disabled*	( )enabled					
BUFFER CONTROL	( )DTR+SRTS*	( )SRTS	( )XON/XOFF	( )ETX/ACK	( )XON/XOFF+DTR+SRTS		
ROBUST XON	( )disabled	( )enabled*					
WORD LENGTH	( )7 bit	( )8 bit*					
BAUD RATE	( )1200 bps	( )2400 bps	( )4800 bps	( )9600 bps*	( )19200 bps	( )38400 bps	
PARITY BIT	( )even	( )odd	( )space	( )mark	( )none*		
STOP BIT	( )1*	( )2					
USB MODE	( )2.0*	( )1.1					
COPIES	( )no	( )yes*					
LOW NOISE	( )no*	( )yes					
SAFE BOTTOM EDGE	( )no	( )yes*					
GET EDGE QUOTE	( )0/4"	( )1/4"*	( )2/4"	( )3/4"	( )4/4"	( )5/4"	( )6/4" ( )7/4"
PASSBOOK TYPE	( )setup	( )sw control*					
	( )fixed thick*	( )vertical	( )horizontal				

Fig. 3.4 Configuration Form Printout

PROGRAM 1 ( ) SP40 PLUS : Code Version xa.06

PROTOCOL ( )EPSON 570* ( )IBM X24E ( )X24E AGM ( )IBM 2390 ( )OLI. PR40+ ( )OLI. PR2 ( )OLI. PR2845 ( )IBM 4722
( )IBM 9068 ( )HPR 4915

FONT ( )Draft* ( )Courier ( )OCR-B ( )Gothic ( )Prestige ( )Present ( )OCR-A ( )Script
( )Boldface

QUALITY MODE ( )lq* ( )nlq DRAFT MODE ( )draft* ( )hsd ( )vhsd

DOWNLINE LOADING ( )disabled ( )enabled*

HORIZONTAL PITCH ( )10 cpi* ( )12 cpi ( )15 cpi ( )16.6 cpi ( )17.1 cpi ( )20 cpi

VERTICAL PITCH ( )5 lpi ( )6 lpi* ( )8 lpi

LOCK ( )no lock* ( )font ( )hor.pitch ( )font + hor.pitch

FORM LENGTH ( )#lines ( )A4* ( )letter ( )A5 ( )legal
100 x ( )0 ( )1 ( )2
10 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Minimum = 1
1 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Maximum = 255 Current = 70

LEFT MARGIN 10 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Minimum = 0
1 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Maximum = 90 Current = 0

RIGHT MARGIN 100 x ( )0 ( )1
10 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Minimum = 0
1 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Maximum = 190 Current = 93

TOP MARGIN 10 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Minimum = 0
1 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Maximum = 90 Current = 0

BOTTOM MARGIN 10 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Minimum = 0
1 x ( )0 ( )1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9 Maximum = 90 Current = 0

IBM C-SET ( )IBM set 1* ( )IBM set 2 IBM COMPRESS ( )17.1 cpi* ( )20 cpi

EPSON C-SET ( )italic ( )graphic*

NATION C-SET ( )USA* ( )FRANCE ( )GERMANY ( )ENGLAND ( )DENMARK1 ( )SWEDEN ( )ITALY ( )SPAIN1
( )JAPAN ( )NORWAY ( )DENMARK2 ( )SPAIN2 ( )LATIN A1

CODE PAGE ( )CP437* ( )CP437G ( )96GREEK ( )CP850 ( )CP851 ( )CP852 ( )CP853 ( )CP855
( )CP857 ( )CP858 ( )CP860 ( )CP862 ( )CP863 ( )CP864 ( )CP865 ( )CP866
( )CP867 ( )CP876 ( )CP877 ( )CP1098 ( )CP1250 ( )CP1251 ( )CP1252 ( )CP1257
( )GOST ( )TASS ( )MAZOWIA ( )CP437SL ( )UKRAIN ( )KOI8-U ( )8859/1 ( )8859/2
( )8859/3 ( )8859/4 ( )8859/5 ( )8859/6 ( )8859/7 ( )8859/8 ( )8859/9 ( )8859/15
( )ROMAN-8 ( )ID 12 ( )CP874 ( )ID 14 ( )ID 17 ( )SANYO ( )KU ( )PHILIP

OLIVETTI C-SET ( )CODE PAGE ( )INTERN.* ( )GERMANY ( )PORTUGAL ( )SPAIN 1 ( )DEN/NORW ( )FRANCE ( )ITALY
( )SWE/FIN ( )SWISS ( )G. BRITAIN ( )USA ASCII ( )GREECE ( )ISRAEL ( )SPAIN 2 ( )JUGOSLAVIA
( )TCV 370 ( )CANADA ( )SDC ( )TURKEY ( )ARABIC ( )CIBC ( )PC-DEN/NORW ( )PC-DEN OPE
( )PC-210 ( )PC-220 ( )OLI-UNIX

OLIVETTI COMPRES ( )17.1 cpi* ( )16.6 cpi VERT. RESOLUTION ( )1/216 inch ( )1/240 inch*

CUT SHEET EJECT ( )on front* ( )on rear PRINT DIRECTION ( )unidir. ( )bidir. ( )sw control*

LINE MODE ( )LF=LF,CR=CR*( )CR=LF+CR ( )LF=LF+CR ( )LF&CR=LF+CR

WRAP MODE ( )truncate ( )autowrap* REFERENCE EDGE ( )left* ( )right

SLASHED ZERO ( )no* ( )yes EJECT ON FF ( )no ( )yes*

RESET WITH EJECT ( )no ( )yes*

Fig. 3.5 Program1 Form Printout

3.4.4 Filling in the Printer Setup Forms

To change the values of the parameters, fill in the marker ( ) beside the value you want to set with a black or blue pen or a fiber-pen. Do not use pencils.

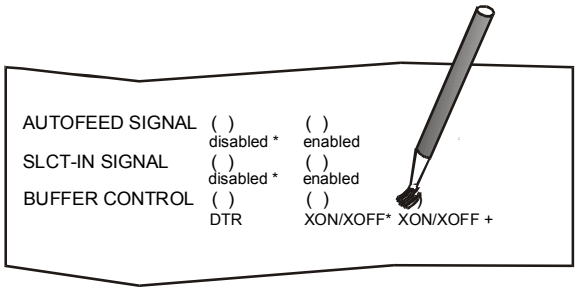


Fig. 3.6 How fill the marker

If more than one value is set for a parameter, the printer ignores these parameters and maintains the currently set value.
Do not fill in the marker beside the title of the preprinted form, otherwise the printer will not be able to read that page.
For a detailed description of the parameters and values contained in the Configuration and Program1, Program2, Program3 and Program4 Menus, see next chapter.
For a detailed description of the Offset Tuning procedure, see Offset Adjustment chapter later in this manual.

3.5 Reading the Pre-printed Forms

When the Printer Setup Forms have been filled in, insert them back into the printer, when the printer is in Setup Mode.
The printer is able to recognize the Setup Forms by means of the markers on these pages. The printer reads the values marked for the various parameters and configures the printer accordingly.
The settings are confirmed by a # symbol printed on the left of the corresponding marker.

3.5 Setup Parameters Details

- **Configuration Setup ( ) SP40 PLUS : Code Version xxxx**

Setup Parameter	Values	Description
RESTORE TO MFG	No* all config prog. 1, prog. 2 prog. 3, prog. 4	The selected values are not set to factory defaults. The values set in all printer setups are reset to factory defaults. The values set in the configuration setup are reset to factory default values
PROGRAM	prog. 1, prog. 2 prog. 3, prog. 4 on interface(*)	Defines the default Program Setup. Selecting prog.1, prog. 2, progr 3 or progr.4 the setup parameters set in the corresponding Program Setup are set. Selecting on interface the printer matches the Program 1 settings with the data arriving on the Centronics interface, the Program 2 settings with the data it receives from the serial interface, Program 3 settings with the data from USB interface and Program 4 setting for any other optional interface. When changing from one interface to the other, the default values are set for the corresponding Program Setup.

Table 3.6 Setup Parameters Details

Setup Parameter	Values	Description
ERROR BUZZER	Disable, enable*	Enables or disables the buzzer in case of an error.
JOB BUZZER	no beep*, 1 beep, continuous	Selects the behavior of the buzzer when a new print job starts: no signal (no beep), one beep (1 beep) or a continuous signal (continuous).
INTERFACE TYPE	parallel, serial, opt, usb, automatic*	Selects the interface type. In case of printer with optional interface ports are installed, they are listed to be selected. Choosing 'automatic' the interface type is selected between all the available interface ports depending on data coming from host. Note: opt. can be dual serial, dual USB, LAN according to the currently installed optional interfaces
IBM FINANCIAL	No* honorCTS, ignoreCTS	Disables the Financial protocol if IBM 4722 or IBM 9068 emulation is selected Enables the IBM FINANCIAL for the IBM 4722 and 9068 protocols. Considers (handles) or ignores the CTS signal received from host for the control of the data stream from host
INPUT BUFFER	1 Kb, 8 Kb*, 16 Kb, 32 Kb, 64 Kb	Selects the buffer size. When the 'financial' interface is selected, this setting is ignored.
IGNORE PE	Enabled, disable*	Selects whether the printer signals the paper empty condition (disabled) or not (enabled) on the busy line.
AUTOFEED SIGNAL	Disable*, enabled	The parallel interface uses (enabled) or does not use (disabled) the AUTOFEED signal.
SLCT-IN SIGNAL	Disable*, enabled	The parallel interface uses (enabled) or does not use (disabled) the SELECT-IN signal.
BUFFER CONTROL	DTR+SRTS*, SRTS, XON/XOFF, ETX/ACK, XON/XOFF+DTR+SRTS	Selection of the buffer protocol. When the 'financial' interface is selected, this setting is ignored.
ROBUST XON	Enabled*, disabled	Perform the Robust XON (enabled) or not (disabled).
WORD LENGTH	7 bit, 8 bit*	Sets the number of the data bits. When the 'financial' interface is selected, this value is always set to 8 bits.
BAUD RATE	1200, 2400, 4800, 9600*, 19200, 38400 bps	Sets the data transfer rate.
PARITY BIT	even, odd, space, mark, none*	Selects the parity control for the data.
STOP BIT	1*,2	Selects the number of stop bit.
USB MODE	2.0*, 1.1	Select the USB specification level
COPIES	no, yes*	Selects the printing on normal paper (no) or on multicopy format paper (yes)
LOW NOISE	No*, yes	Disables/enables the low noise function
SAFE BOTTOM EDGE	no, yes*	Distance from the bottom of the last printer line . Yes = 5,8 mm from bottom edge no = 1,5 mm from bottom edge
GET EDGE QUOTE	0/4", 1/4"*, 2/4", 3/4", 4/4", 5/4", 6/4", 7/4	Sets the position in which the left paper edge is checked. If set to 0, the check is performed at the first line. The other values correspond to the physical distance from the first line.
PASSBOOK TYPE	Setup sw control* Fixed thick* Vertical Horizontal	Enables the setting made in the current PASSBOOK TYPE section and the specific Escape command is not actives. Enables the specific ESCape command. Printing a document with fixed thickness. Printing of passbooks with vertical binding . Printing of passbooks with horizontal binding
PROTOCOL	EPSON 570*, IBM X24E* X24E AGM, IBM 2390, OLI. PR40+, OLI. PR2*, OLI. PR2845, IBM 4722, IBM 9068, HPR 4915	Defines the printer protocol. NOTE: For the IBM 4722 and 9068 protocols, if the software driver uses the controlled link of the IBM financial driver, set the IBM FINANCIAL item in the Configuration Menu. The default value is EPSON 570 for Program1, IBM X24E for Program 3, OLI. Pr2 for Program 2 and 4.

Table 3.6 Setup Parameters Details cont'd

Setup Parameter	Values	Description
FONT	Draft*, Courier, OCR-B, Gothic, Prestige, Present, OCR-A, Script, Boldface	Selects the font.
QUALITY MODE	LQ*, NLQ	Select the level of quality font.
DRAFT MODE	DRAFT*, HSD, VHSD	Select the level of draft font.
DOWNLINE LOADING	disabled, enabled*	Disable or enable the font downloading
HORIZONTAL PITCH	10 cpi*, 12 cpi, 15 cpi, 16.6 cpi, 17.1 cpi, 20 cpi	Selects the character spacing in characters per inch (cpi).
VERTICAL PITCH	5 lpi, 6 lpi*, 8 lpi	Selects the line spacing in lines per inch (lpi).
LOCK	no lock*, font, hor. pitch, font+hor.pitch	The following selections made in the printer setup may be locked: font, horizontal pitch (hor.pitch), or both the font and horizontal pitch (font+hor. pitch). The locked settings cannot be changed via software commands.
FORM LENGTH	# lines, A4*, letter, A5, legal	Sets the page length in number of lines or standard formats A4, Letter, A5 or Legal. If you select # lines, you must indicate the number of lines you want to set in the scheme below this selection. The values range between 0 and 255. To set the values combine the numbers considering that the first line corresponds to the hundreds, the second line to the tens and the third line to the units. See the example below.

Example:
How to set the form length to 82 lines:
FORM LENGTH

■ #lines		( )A4		( )Letter		( )A5		( )Legal	
100x	( )0	( )1	( )2						
10x	( )0	( )1	( )2	( )3	( )4	( )5	( )6	( )7	■ 8	( )9
1x	( )0	( )1	■ 2	( )3	( )4	( )5	( )6	( )7	( )8	( )9

Setup Parameter	Values	Description
LEFT MARGIN	10 x 1 x	Sets the left margin in number of columns. The values range between 0 and 90. To set the values combine the numbers considering that the first line corresponds to the tens, the second line to the units. See the example below.

Example:
How to set the Left Margin to 20.
LEFT MARGIN

10x	( )0	( )1	■2	( )3	( )4	( )5	( )6	( )7	( )8	( )9
1x	■0	( )1	( )	( )3	( )4	( )5	( )6	( )7	( )8	( )9

Setup Parameter	Values	Description
RIGHT MARGIN	100 x 10 x 1 x	Sets the right margin in number of columns. The values range between 0 and 190. The physical position of margin depends on the current character spacing. To set the values combine the numbers considering that the first line corresponds to the hundreds, the second line to the tens and the third line to the units. See the example below:

Table 3.6 Setup Parameters Details cont'd

Example:
How to set the Right Margin to 101.
RIGHT MARGIN

100x ( )0 ■1

10x ■0 ( )1 ■2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9

1x ( )0 ■1 ( ) ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9

Setup Parameter	Values	Description
TOP MARGIN	10 x 1 x	Sets the top margin in number of lines. The values range between 0 and 90. To set the values combine the numbers considering that the first line corresponds to the tens, the second line to the units. See the example below.

Example:
How to set the Top Margin to 15.
TOP MARGIN

10x ( )0 ■1 ( )2 ( )3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9

1x ( )0 ( )1 ( ) ( )3 ( )4 ■5 ( )6 ( )7 ( )8 ( )9

Setup Parameter	Values	Description
BOTTOM MARGIN	10 x 1 x	Sets the bottom margin in number of lines. The values range between 0 and 90. To set the values combine the numbers considering that the first line corresponds to the tens, the second line to the units. See the example below.

Example:
How to set the bottom margin to 34 lines:
BOTTOM MARGIN

10x ( )0 ( )1 ( )2 ■3 ( )4 ( )5 ( )6 ( )7 ( )8 ( )9

1x ( )0 ( )1 ( ) ( )3 ■4 ( )5 ( )6 ( )7 ( )8 ( )9

Setup Parameter	Values	Description
IBM C-SET	IBM set 1*, IBM set 2	Selects the IBM character set.
IBM COMPRESS	17.1 cpi*, 20 cpi	Selects the pitch for the compressed mode printing in IBM emulation.
EPSON C-SET	Italic, graphic*	Selects italic or graphic Epson character set.
NATION C-SET	USA*, FRANCE, GERMANY, ENGLAND, DENMARK1, SWEDEN, ITALY, SPAIN1, JAPAN, NORWAY, DENMARK2, SPAIN2, LATIN A1	Selects the national character sets.
CODE PAGE	CP437*, CP437G, 96GREEK, CP850, CP851, CP852, CP853, CP855, CP857, CP858, CP860, CP862, CP863, CP864, CP865, CP866, CP867, CP876, CP877, CP1098, CP1250, CP1251, CP1252, CP1257, GOST, TASS, MAZOWIA, CP437SL, UKRAIN, KOI8-U, 8859/1, 8859/2, 8859/3, 8859/4, 8859/5, 8859/6, 8859/7, 8859/8, 8859/9, 8859/15, ROMAN-8, ID 12, CP874, ID 14, ID 17, SANYO, KU, PHILIP	Selects the code page for both the IBM and the EPSON emulations.

Table 3.6 Setup Parameters Details cont'd

Setup Parameter	Values	Description
OLIVETTI C-SET	CODE PAGE, INTERN.*, GERMANY, PORTUGAL, SPAIN1, DEN/NORW, FRANCE, ITALY, SWE/FIN, SWISS, G. BRITAIN, USA ASCII, GREECE, ISRAEL, SPAIN 2, JUGOSLAVIA, TCV 370, CANADA, SDC, TURKEY, CIBC, PC-DEN/NORW, PC-DEN OPE, PC-210, PC-220, OLI-UNIX	Selects the character sets for the OLIVETTI protocol. Selecting CODE PAGE, it is possible to select one of the above Code Pages to be used with the OLIVETTI protocol.
OLIVETTI COMPRES	17.1 cpi*, 16.6 cpi	Selects the compressed pitch in OLIVETTI protocol.
VERT. RESOLUTION	1/216 inch, 1/240 inch*	Sets the vertical character resolution. Setting used for the OLIVETTI protocols.
CUT SHEET EJECT	on front*, on rear	Selects whether the cut sheet loaded into the printer is ejected towards the front or the rear of the printer.
PRINT DIRECTION	unidir., bidir., sw control*	Selects the printing direction of the print head: unidirectional (unidir.), bidirectional (bidir.) or selected via software (sw control).
LINE MODE	LF=LF, CR=CR*	If the printer receives a LF code (LF), it only performs a line feed. If the printer receives a CR code (CR), it only performs a carriage return.
	CR=LF+CR	If the printer receives a CR code (CR), it performs a carriage return followed by a line feed. If the printer receives a LF code (LF), it performs a line feed.
	LF=LF+CR	If the printer receives a LF code (LF), it performs a line feed followed by a carriage return. If the printer receives a CR code (CR), it only performs a carriage return.
	LF&CR=LF+CR	If the printer receives a LF code (LF) or a CR code (CR), it performs both a line feed and a carriage return.
WRAP MODE	truncate, autowrap*	The data exceeding the line length are truncated (truncate) or printed on the following line (autowrap).
REFERENCE EDGE	Left*, right	Document reference on left or right, for software compatibility.
SLASHED ZERO	No*, yes	Selects the printing character for zero, with a slash (yes) or without (no).
EJECT ON FF	no, yes*	Performs a form feed according to the selected page format (no) or ejects a cut sheet loaded into the printer (yes).
RESET WITH EJECT	no, yes*	When the printer receives a reset command, if this item is set to yes the paper inserted in the printer is ejected. If the item is set to no the printer performs only the reset command.
CUT SHEET EJECT	On front*, on rear	Selects wheter the cut sheet loaded into the printer is ejected toward the front or the rear of the printer.

Table 3.6 Setup Parameters Details cont'd

3.6 Offset Adjustments

For a precise adjustment of the position of the printed characters on a preprinted form, the printer allows to easily adjust the first line and the first printing column as follows:

1. When the printer is in Setup Mode, insert a blank sheet into the printer press the ST1 key until the leds are in the configuration showed in previous SETUP STATUS table.
2. Press ST2 key, the following sheet will be printed:
3. Fill in the marker corresponding to the value you want to set .

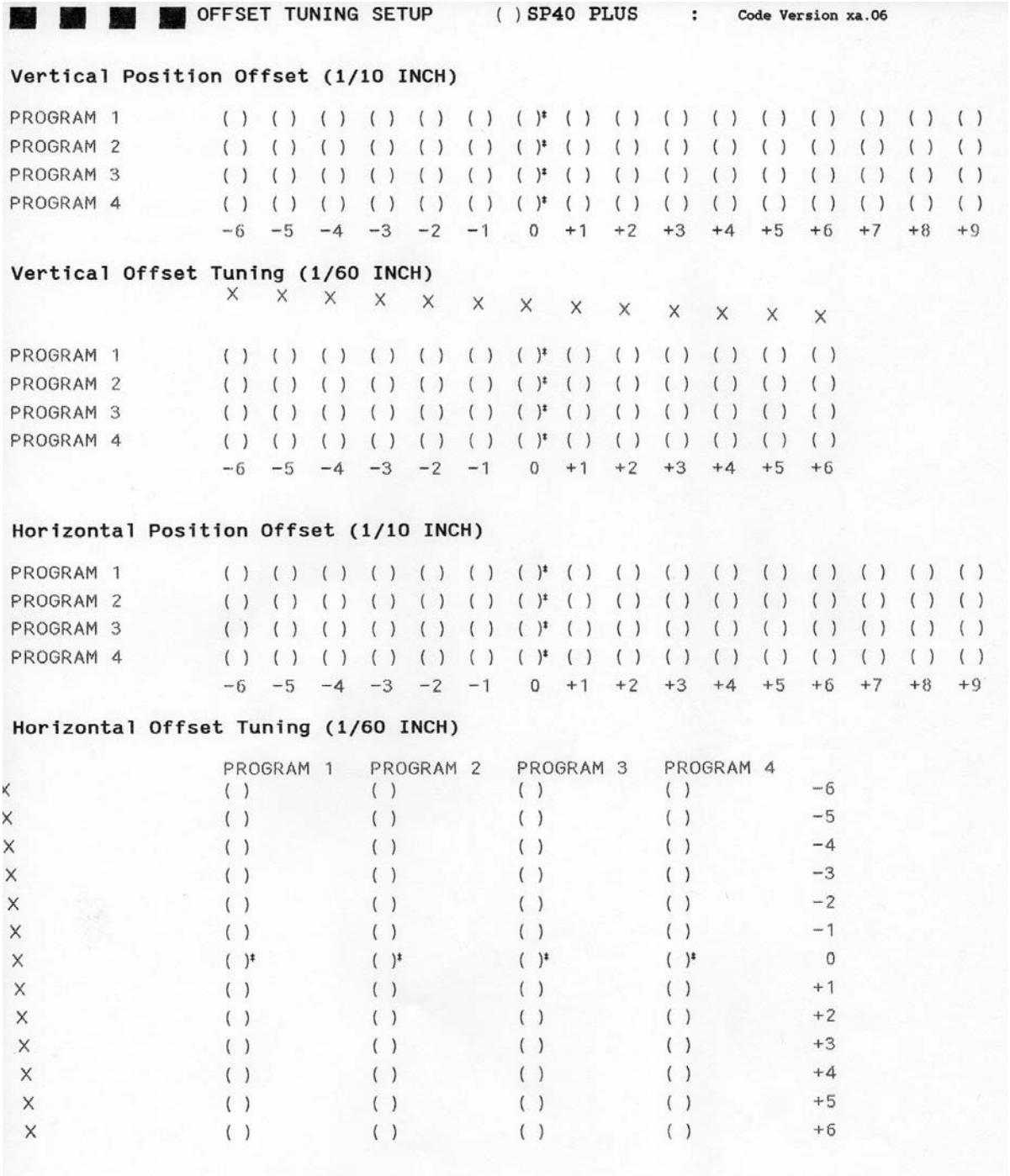


Fig. 3.7 Offset Tuning Form Printout

The Vertical Offset Tuning values correspond to 1/60 inches and set the vertical offset of the first print line starting from the default standard position at 1 mm from the upper paper margin.
The Horizontal Offset Tuning values correspond to 1/60 inches and set the horizontal offset of the first print line starting from the default standard position at 3 mm from the left paper margin.
If you need to change the default position of the first print line the vertical offset can be set in the Vertical Position Offset lines and/or the horizontal offset in the Vertical Position Offset lines. Both these values correspond to 1/10 inch values.

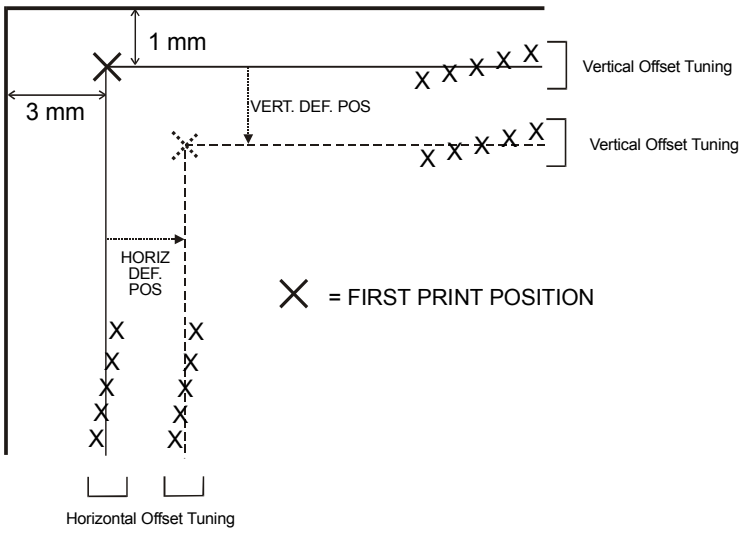


Fig. 3.8 Offset Tuning Example

3.7 Printer Setup Flow Chart

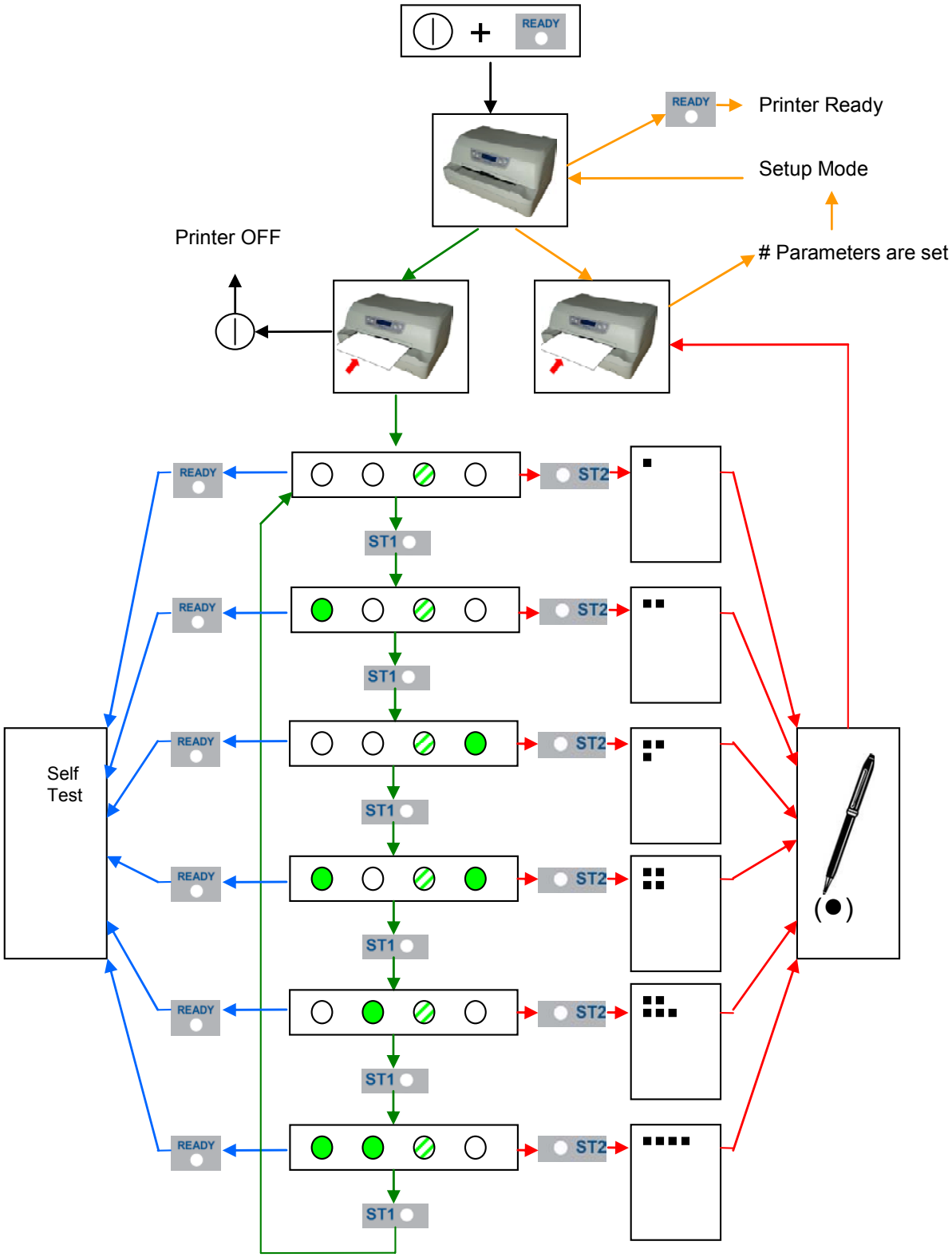


Fig. 3.9 Setup Flow Chart

3.8 Printer Setup through USB and RS232/C Ports

The printer Setup parameters can be changed through normal Setup as described in previous chapter or through USB or Serial 232/C port.

For this purpose is necessary install the ”**Compuprint CDC RS-232 Emulation**” driver creating a virtual serial port and the “**SP40Setup”** software, Windows based utility able to configures the printer through USB (directly) or RS232/C Serial connection (directly or via a serial/USB adapter).
This chapter described how to install the driver and the utility.
This utility can be used also for the Firmware downloading. See chapter 4 for details.

3.8.1 Compuprint CDC RS-232 Emulation Driver installation

If the printer is connected through the USB interface and the Setup mode is running, the Windows gives a message for “founds a new hardware, Compuprint CDC RS-232 Emulation”.
Follow the steps displayed in the below masks in order to correctly install the driver.

The information file for the driver is : Compuprint-CDC.inf

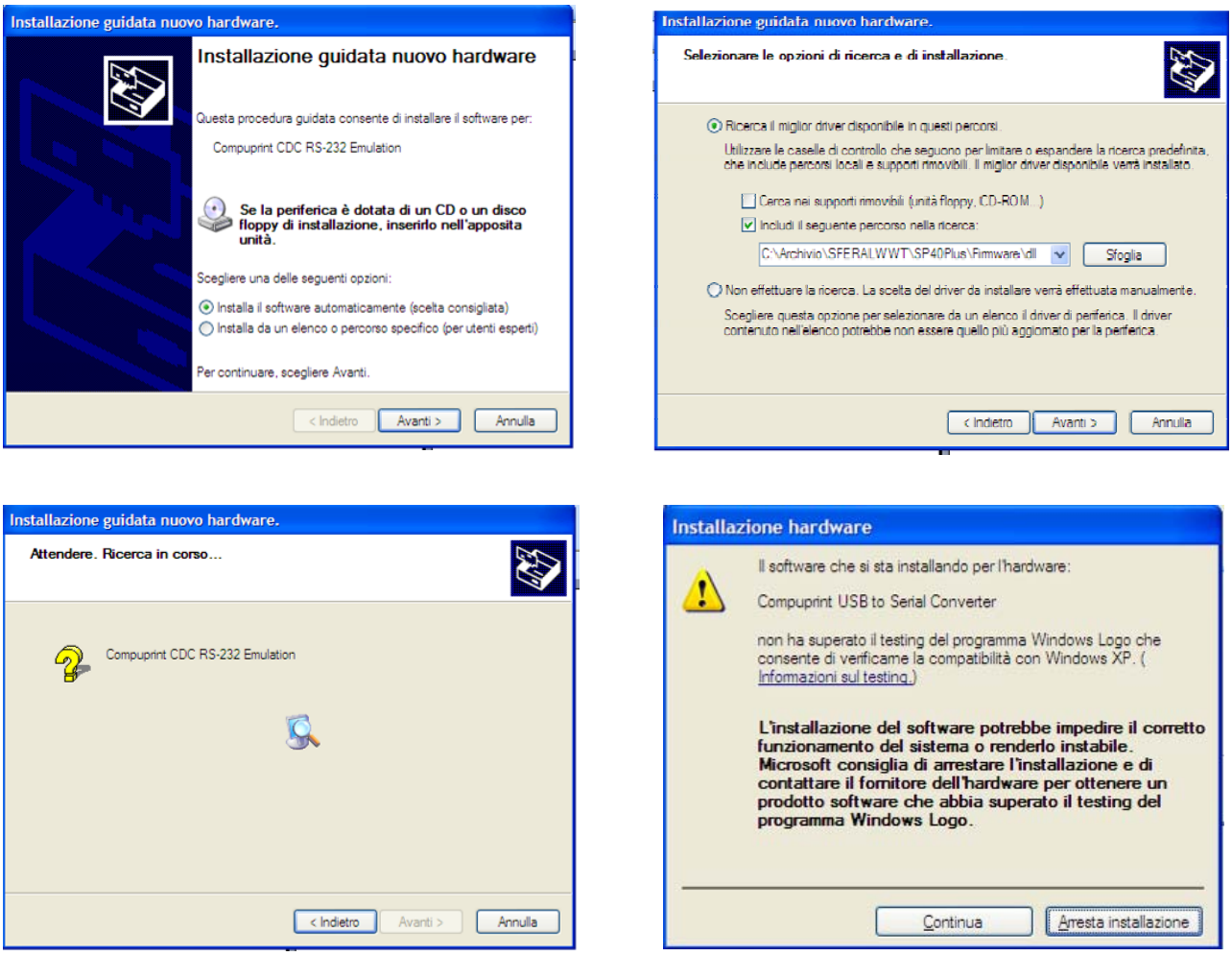
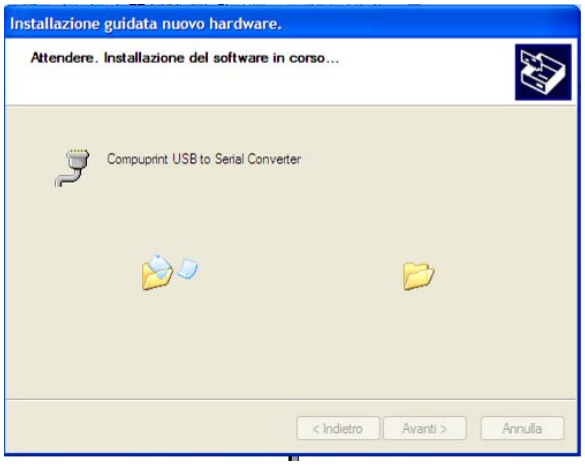
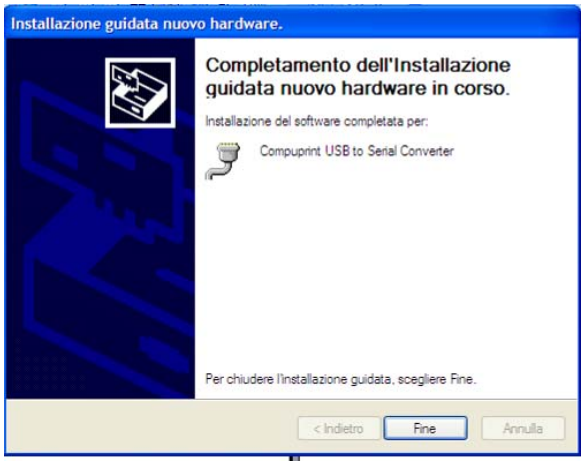


Fig. 3.10-3.11-3.12-3.13 Compuprint CDC-RS232 Installation masks





If the installation is positively ended, in the Windows hardware resources a new COM*n* port will be found. The example below shown COM10.

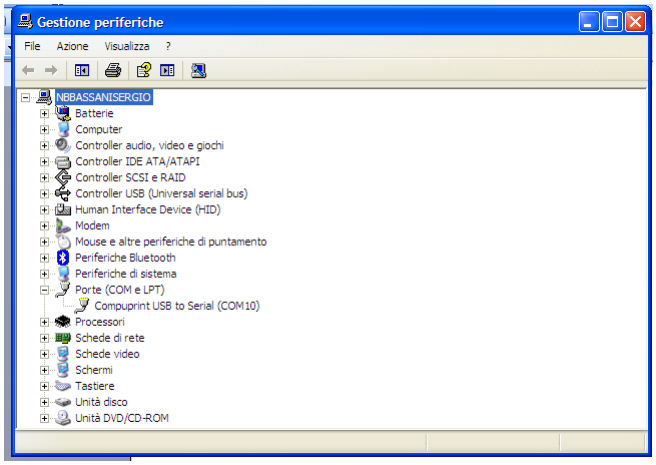
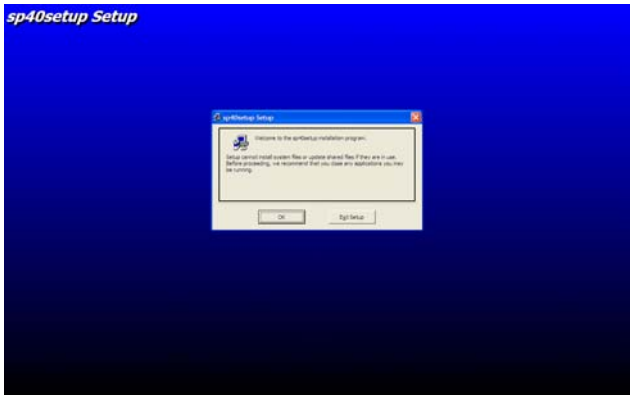


Fig. 3.14-3.15-3.15 Compuprint CDC-RS232 Installation masks

3.8.2 SP40Setup utility installation

Once the Compuprint CDC RS-232 Emulation driver has been installed, found the Setup.exe file and double click on it.
Follow the steps displayed in the below masks in order to correctly install the utility.
The utility will ask where install the program and choose the program group.



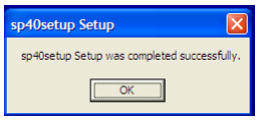


Fig. 3.16-3.17 SP40Setup Installation masks

If the installation is positively ended, in the program pop-up window, the SP40Setup icon will appear.
Double click on it and the SP40Setup utility will be run.
See next chapter for details.

3.8.2.1 Remote Setup

When this utility is running, the following home mask will be displayed.

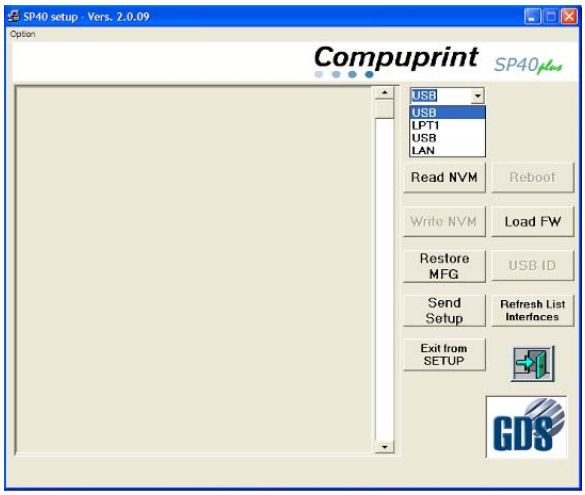


Fig. 3.18 SP40Setup Opening Mask

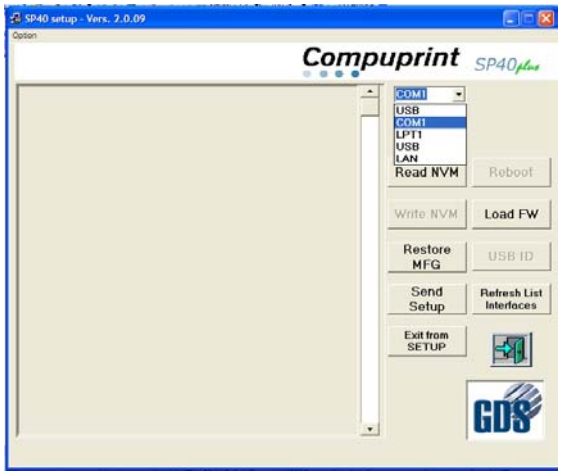
In the left top side, under Option, there is the choice of the SP40 and SP40plus Program Setup selection.
In the right to side there are the following selection window:

1) port selection choice (*)

The following action keys:

2) NVM choices for Read, Write, Send Setup, Restore MFG and Exit from Setup for Setup Parameters
3) Refresh List Interfaces
4) Load FW
5) Other selection keys are currently disables (Reboot and USB ID).

Note (*)
The utility automatically converts the first available COM*n* into USB name, therefore in the previous example, the COM10 in the system registry is now named USB if the printer is directly connected to this interface.
If another Serial-USB adapter is connected to the printer, it will be possible to see another COM*n* port.
In the example below, a Serial-USB adapter is connected to the serial line of the printer; it has been seen by the host as COM4 port and this port will be displayed and selected in the Setup port selection.



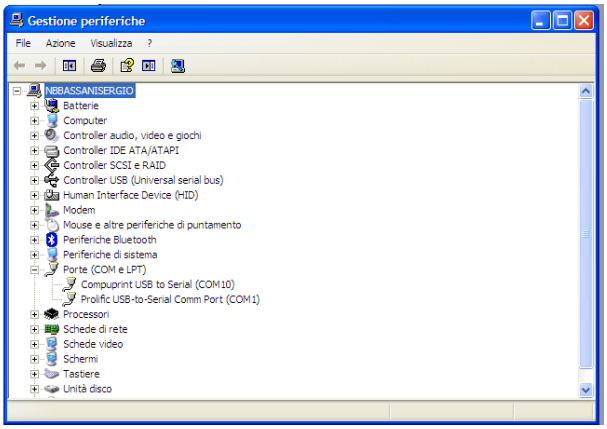


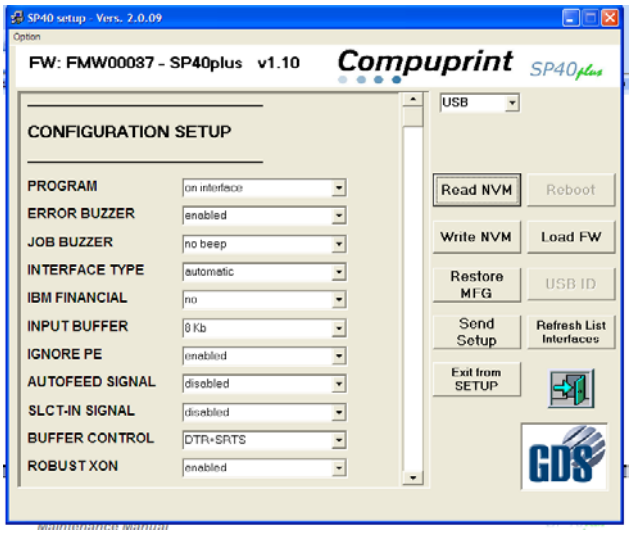
Fig. 3.19-3.20 SP40Setup Port selection masks

When the Read/Write/Restore MFG action will be run, the following message will be displayed by the operator panel LCD :

REMOTE SETUP FROM: USB	REMOTE SETUP FROM: SERIAL

3.8.2.1.1 Read NVM

In the left part are displayed the current Setup parameters when the Read NVM selection are done.
The parametes are read from the selected port.
Through the vertical cursor it is possible to change each of them for all the Setup selection pages (Configuration, Program 1 to 4, Offset Tuning) and write using the selected port.



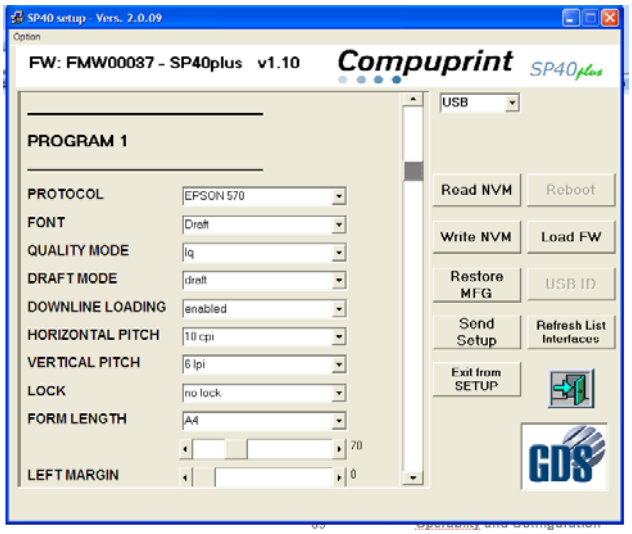


Fig. 3.21-3.22 SP40Setup Configuration masks

3.8.2.1.2 Write NVM

After reading the configuration, it is possible to do all the possible changes simply select the new values.
When all modification are done, the new configuration can be stored in the printer NVM pressing the **Write NVM** action key.
The utility will show the “save as name” mask.
The new configuration can be saved in a specific file and path (default name is ***wnvm.dmp*** and default path is where the SP40Setup utility is stored) to be used for future configuration with a simply copy file action.
After that the printer will reboot.

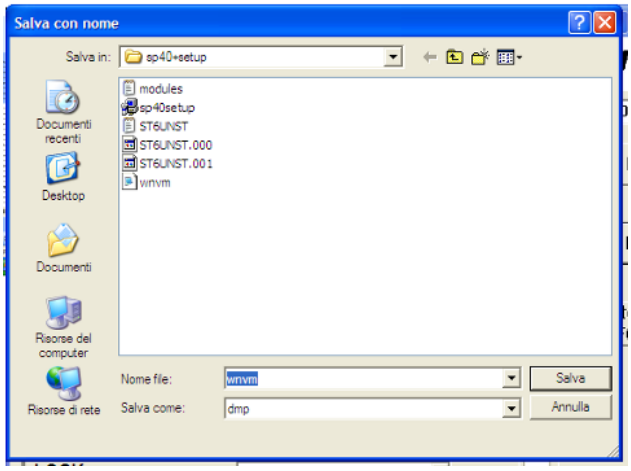


Fig. 3.23 SP40Setup file saving masks

The configuration ***file.dmp*** can be simply used to duplicate the same configuration on more printers.
SP40plus unit has to be powered on in normal mode, connected to the PC through any active interface (Centronics or Serial port) and prompt: **copy *file.dmp* lpt1: /b** command from a DOS shell,
After that the printer will reboot.

3.8.21.3 Send Setup

When **Send Setup** action key is activated, the host will displayed the stored configuration ***files.dmp***; select one and then click on open to immediate send it to the printer.
After that the printer will reboot.

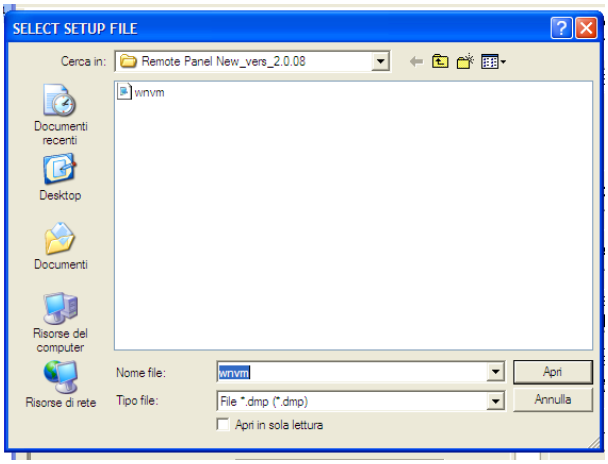


Fig. 3.24 SP40Setup file sending mask

Restore MFG

If the restore of the manufacturing values must be done, press the proper key: all the parameters will be set immediately to the default values.
After that the printer will reboot.

Chapter 4 Service Maintenance

4.1 Overview

This chapter describes how to maintain the printer in order to always obtain the best performances from it.
In this chapter it is possible to find also some helps to test printer and to identify defective components using Test & Diagnostic facilities.
First-Level maintenance is based at O.R.U. (Optimum Replaceable Unit).

4.2 Initial Inspection and Tools

When the printer presents a trouble, before proceeding to the service maintenance, an initial inspection must be done. In fact, a problem in the printout often is due to a bad or wrong condition of the printer itself.

The parameters that must be previous checked are: **set-up**, **cleaning**, **paper specification**.
After that, if the problem remains, a **troubleshooting session** can be activated.

Requested Tools
- Blank paper sheets
- Soft Cloth
- Neutral detergent

4.3 Set-Up

Check for the following items to make sure they are full-filled.
- Is the printer placed in a correct position ?
- Is the environmental temperature in the nominal range ?
- Is the relative humidity in the nominal range ?
- Is the unit installed in a bad location ?
  (Close to high temperatures or humidity, near heat sources, dusty areas, areas where gas is generated, exposed to direct sunlight)
- Has the printer a good configuration ?

Please refer to the user manual and/or chapter 1 and 3 of this manual for more details on all these items.

4.4 Cleaning

No preventive maintenance, on a schedule basis, is required.
Periodic cleaning will help to keep your printer in top condition.

Clean the printer as follows:
- Every time that a maintenance operation has to be done or the ribbon cartridge has to be removed and replaced by a new one, clean the lateral sides of the platen removing the paper dust. Use for this a soft cloth or a little brush. This operation will be helpful for a correct behavior of the edge sensor.
- Use a neutral detergent or water solution on a soft cloth to clean dirt and grease from the cabinet of the printer.
- Do not use an abrasive cloth, alcohol, paint thinner or similar agents because they may cause discoloration and scratching.
- Be careful in the electronic and mechanical components handling.

Check for the paper paths condition and to make sure they are correct.
If they are dirty (by paper residues or by ink), please clean them using a soft cloth.

4.5 Lubrication

In the standard service maintenance, **NO LUBRICATION** is necessary in the mechanical assembly.
The following points of the mechanical assembly should be lubricated when a maintenance activities is done in specific parts of the printer and when the related parts has been replace by a new one.

- Do not lubricate the main shaft, but only clean dirty.
  Normally the internal carriage felt are pre-oiled, therefore it is not necessary to add any other oil.
  Only if the felts are dry a drop of oil can be put on them.
  Before oiled the felts check for their clean conditions.

NOTE: **The oil must be FOMBLIN YN06** (Ausimont, Montedison).

- **Some silicon grease** is put in these points:
  1) Contact point of the plastic rear roller axe and the related plastic bush (see chapter 2.6).
  2) The surface of the ribbon drive gears (see chapter 2.9).
  3) Contact point of the plastic front roller axe and the related plastic bush (see chapter 2.11).
  4) Lateral side of the support of the platen assembly (see chapter 2.21) in contact with left and right plastic support frame.
  5) The surface of the selector cam (see chapter 2.24) in contact with the associated lever.

NOTE: **The silicon grease must be Molykote PG30L** (Dow Corning Corporation) or equivalent with a melting point temperature up than 95°C.

4.6 Paper

The media used must matches with the specifications.
See chapter 6 for more details.

4.7 Consumables

The SP40plus is equipped with a 1-wire EEPROM set as OTP to check the Genuine Compuprint consumable and the printed life parameters.

In this way it is possible to use only original consumable printer at the quality level and reliability stated in the product characteristics can be assured.

If not genuine Compuprint consumable is installed, the printer halts in error.

All usage problems typically related to not certified consumables can be avoided, such as an overall degradation of the printing quality level and often, the reduction of the total life of the product due to the fact that the proper working conditions of the print head and other parts are not assured.

Moreover, the original consumables are controlled in compliance with the international standard rules concerning:

- no cancerous materials
- no inflammability of the plastic materials
- other standard

4.8 Firmware Update

The printer has the basic controller Firmware and the font generator on FLASH device.
This allows an easily update of the Firmware through the USB or parallel interfaces.
On the Main Board used as spare part, the preloaded Firmware has to be intended just as a predisposition allowing to load the specific firmware.

REMARK: **before starts with the Flash FW downloading procedure, be sure the printer is in a safety condition, because any loss of power during the procedure may create an unrecoverable error in the flash device.**

4.8.1 Firmware Update through parallel interface (DOS prompt)

The Firmware updating operation through the parallel interface can be done under DOS (even a Windows DOS) environment.
The default Parallel interface is LPT1.

The firmware of the printer is a file with extension .img (i.e.: ***firmware.img***)

It contains the files for Basic Code + Characters Generator

Updating steps

1. Create a sub-folder and position on it.
2. Copy into this sub-folder the ***firmware.img*** file.
3. Connect the printer to a PC on the parallel port LPT1.
4. Open the cover.
5. Push and hold the key Station 1 while Power-on the printer.
   All the leds on the panel are contemporary blinking, which means waiting for a new firmware.
   If the LCD display O.P. is installed the message below will appear:

   WAITING CODE

   Prompt on the P.C. following syntax:

   C:>\ COPY *firmware.img* LPT1:/b

6. During the downloading the light leds configuration identifies various phases. (Image receiving, image
   decoding, delete and write of new code in flash, updating of the boot).
   With the LCD display the following messages will be displayed:

   RECEIVING CODE

   ERASING SECT.xx

   WRITING SECT.xx

   CODE OK

   When the download is ended with success, the printer will automatically reboot.

7. Print the Self test to assure the new code has been correctly loaded.

4.8.2 Firmware Update through USB interface

The Firmware updating operation through the USB interface can be done using the COPYCOM utility running under DOS (even a Windows DOS) environment or with the Windows Utility SP40Setup as described in chapter 3 or using.

Both procedures use the Compuprint CDC-232 Emulation driver.
See chapter 3 how to install it.

4.8.2.1 Load FW using Copycom (DOS prompt)

The Copycom.exe utility can loads the Firmware through the USB interface under DOS prompt.
It uses the same virtual port created by the Compuprint CDC-232 Emulation driver (see chapter 3 for details).

The Copycom utility can be found in the Compuprint reserved area partner in the SP40plus firmware link.

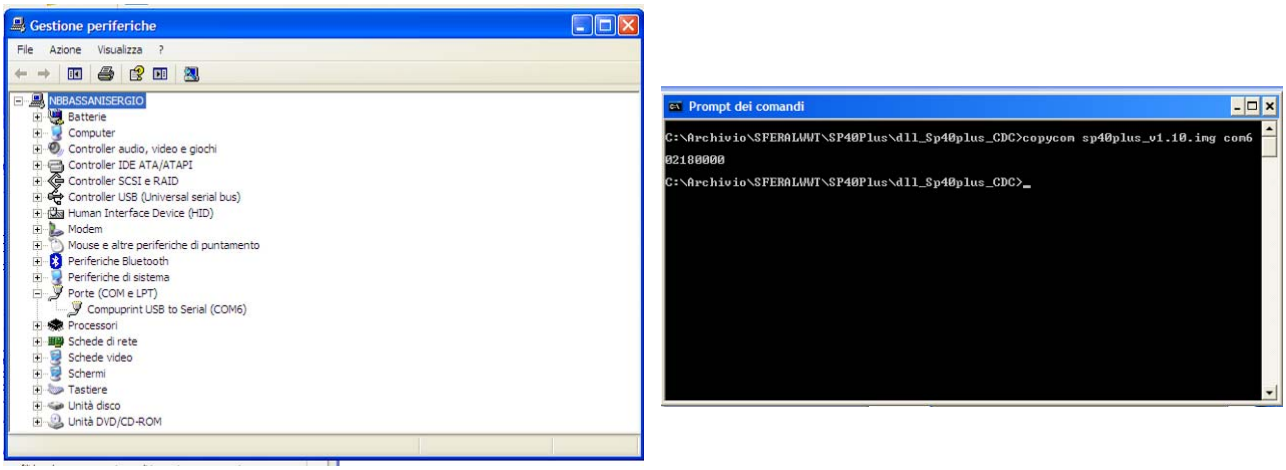


Fig. 4.1-4.2 FW Loading masks

Updating steps

1. Create a sub-folder and position on it.
2. Copy into this sub-folder the ***firmware.img*** file.
3. Connect the printer to the USB interface.
4. Open the cover.
5. Push and hold the key Station 1 while Power-on the printer.
   All the leds on the panel are contemporary blinking, which means waiting for a new firmware.
   If the LCD display O.P. is installed the message below will appear:

   WAITING CODE

   Prompt on the P.C. following syntax:

   C:>\ COPYCOM *firmware.img* COM*n*

Where COMn is the available COM for the Compuprint USB to Serial device and visible in the devices handling in Control Panel of Windows.
Following steps are now the same described in the parallel interface in points 6. and 7..

4.8.3 Load FW using SP40Setup Utility

The SP40setup utility can loads the Firmware through the USB interface.

After the launch of the SP40Setup application, press the proper **Load FW**.

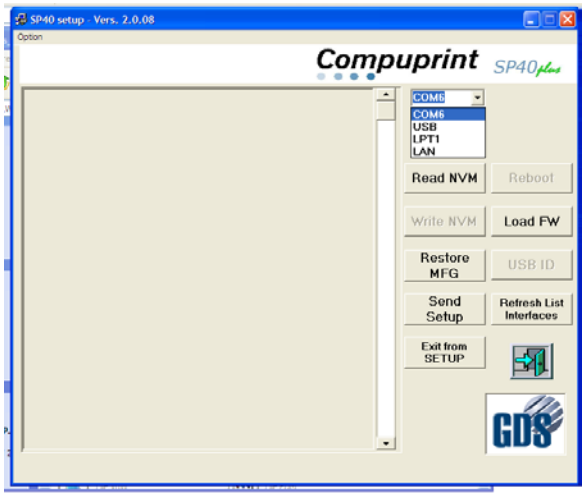
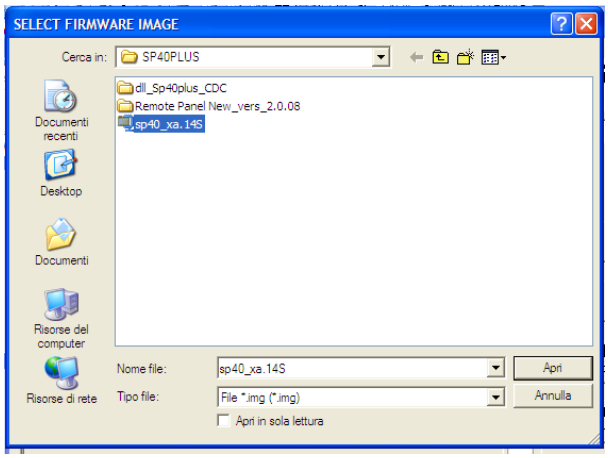


Fig. 4.3 FW Loading mask

After that, this mask will displayed showing all the stored ***firmware.img*** files.



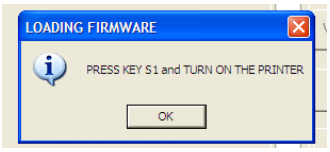


Fig. 4.4-4.5 FW Loading masks

When select the ***firmware.img*** file and click on open key, the attention mask will appear to advise to power-on the printer in the special mode (open the cover and press ST1 key at power on).

All the leds on the panel are contemporary blinking, which means waiting for a new firmware.
If the LCD display O.P. is installed the message below will appear:

WAITING CODE

Following steps are now the same described in the parallel interface in points 6. and 7..

4.8.4 Firmware downloading trace through serial interface

The downloading phases can be monitored through the RS232/C interface by using the Hyper-Terminal accessory application of Windows environment.
The firmware downloading uses the serial interface at 115200 bps. Set for this speed the Hyper-Terminal port.
See chapter 5.12 for detail.

This is the typical trace (positive ended) for a Firmware upgrading procedure through the parallel interface.
If the Firmware is upgraded through USB interface only line is different:

```
"CX-receiving code" changed in "USB-receiving code"
```

```
dll code requested by operator !!
macb0: No PHY present

could not initialize ethernet

Hit any key to stop autoboot:  0
WAITING CODE
11788611
CX-receiving code
################################################################################
...
################################################################################
#
## Checking Image at 20600000 ...
   Legacy image found
   Image Name:   sp40 ver.xa.13S
   Image Type:   ARM Linux Firmware (uncompressed)
   Data Size:    3362224 Bytes =  3.2 MB
   Load Address: 00000000
   Entry Point:  00000000
   Verifying Checksum ... OK
        SECTION  LMA         OFFSET      SIZE
          .text  0x20d00000  0x20608040  0x00004120
        .rodata  0x20d04120  0x2060c160  0x000007fc
          .data  0x20d0c91c  0x2060c95c  0x00000120
           .bss  0x20d0ca3c  0x2060ca7c  0x0000023c
       .comment  0x00000000  0x2060ca7c  0x000003e9
          .info  0x00000000  0x20610040  0x00000010
         .fonts  0x00000000  0x20618040  0x00034fbf
           .rom  0x00000000  0x20650040  0x0018a040
        .linux  0x00000000  0x207e0040  0x0010f994
        .fpga2  0x00000000  0x208f0040  0x000117f8
         .fpga  0x00000000  0x20908040  0x0000fff2
         .boot  0x00000000  0x20918040  0x0001cb24
     .shstrtab  0x00000000  0x20934b64  0x00000059

## Checking Image at 20918040 ...
   Legacy image found
   Image Name:   sp40.boot
   Image Type:   ARM U-Boot Firmware (uncompressed)
   Data Size:    117476 Bytes = 114.7 kB
   Load Address: 00000000
   Entry Point:  00000000
   Verifying Checksum ... OK

## Checking Image at 20908040 ...
   Legacy image found
   Image Name:   sp40.FPGA
   Image Type:   ARM U-Boot Firmware (gzip compressed)
   Data Size:    65458 Bytes = 63.9 kB
   Load Address: 50000000
   Entry Point:  50000000
   Verifying Checksum ... OK

## Checking Image at 208f0040 ...
   Legacy image found
   Image Name:   sp40.FPGA2
   Image Type:   ARM U-Boot Firmware (gzip compressed)
   Data Size:    71608 Bytes = 69.9 kB
   Load Address: 60000000
   Entry Point:  60000000
   Verifying Checksum ... OK
```

```
## Checking Image at 207e0040 ...
   Legacy image found
   Image Name:   Linux Kernel Image
   Image Type:   ARM Linux Kernel Image (gzip compressed)
   Data Size:    1112404 Bytes =  1.1 MB
   Load Address: 20008000
   Entry Point:  20008000
   Verifying Checksum ... OK

## Checking Image at 20650040 ...
   Legacy image found
   Image Name:   sp40.initrd
   Image Type:   ARM Linux RAMDisk Image (uncompressed)
   Data Size:    1613824 Bytes =  1.5 MB
   Load Address: 20a00000
   Entry Point:  20a00000
   Verifying Checksum ... OK

## Checking Image at 20618040 ...
   Legacy image found
   Image Name:   sp40.fonts
   Image Type:   ARM U-Boot Firmware (gzip compressed)
   Data Size:    216959 Bytes = 211.9 kB
   Load Address: 20c00000
   Entry Point:  20c00000
   Verifying Checksum ... OK
        SECTION  LMA         OFFSET      SIZE
          .text  0x20d00000  0x20608040  0x00004120
        .rodata  0x20d04120  0x2060c160  0x000007fc
          .data  0x20d0c91c  0x2060c95c  0x00000120
           .bss  0x20d0ca3c  0x2060ca7c  0x0000023c
       .comment  0x00000000  0x2060ca7c  0x000003e9
          .info  0x00000000  0x20610040  0x00000010
         .fonts  0x00000000  0x20618040  0x00034fbf
           .rom  0x00000000  0x20650040  0x0018a040
         .linux  0x00000000  0x207e0040  0x0010f994
         .fpga2  0x00000000  0x208f0040  0x000117f8
          .fpga  0x00000000  0x20908040  0x0000fff2
          .boot  0x00000000  0x20918040  0x0001cb24
     .shstrtab  0x00000000  0x20934b64  0x00000059
       SECTION  LMA         OFFSET      SIZE
          .fpga  0x00000000  0x00020048  0x0000fff2
         .fpga2  0x00000000  0x00030040  0x000117f8
         .linux  0x00000000  0x00041840  0x0010f994
           .rom  0x00000000  0x001511e0  0x0018a040
         .fonts  0x00000000  0x002db220  0x00034fbf
          .info  0x00000000  0x003101e0  0x00000010
Image sz = 3211760  flash sz = 4096 Kb

ERASING FLASH
ERASING SECTOR   70
...
ERASING SECTOR    9
WRITING CODE
WRITING SECTOR    9 (20000, 30000)
...
WRITING SECTOR   56 (310000, 320000)
CODE OK
```

4.9 Troubleshooting

This chapter is intended to help technical people in the fault finder.
The recommended sequences for the printer fault detection are:

- To observe initializing procedure and led status.
- To check power malfunctions.
- To run the T&D (Test and Diagnostic) procedure.
- If necessary, run the HEXADECIMAL dump procedure (see 4.9.1 here below).

At any stage where appropriate, refer to the troubleshooting guide.

4.9.1 Printer Errors

When an error occurs on the printer, the kind of errror identification can be done looking at the leds configuration on the panel.
These errors can be divided into two main groups:

- Recoverable errors
- Not recoverable errors

4.9.1.1 Recoverable Errors

When an error of this kind occurs:

1. The printer is disabled with the ST1 and ST2 led flashing and the printer sounds a beeps.
2. With operator panel with display, the following messages will be displayed; the first line indicates the error, while the second line gives more details concerning the error conditions.

Press always the READY key to reset the error condition

Recoverable error message description

Upper line message Lower line message	Indication	Solution
RIBBON BROKEN **REPLACE RIBBON**	The ribbon cartridge installed is not genuine or it is wrongly installed.	Verify if the ribbon cartridge is a Compuprint genuine one. Check that the ribbon is correctly inserted See "Installing the Ribbon Cartridge".
RIBBON NEAR END	The ribbon cartridge installed is near its end of life (500.000 characters to be printed)	Prepare a new Compuprint genuine ribbon cartridge. See "Installing the Ribbon Cartridge".
RIBBON EXHAUST. **REPLACE RIBBON**	The ribbon cartridge installed has reached the 105% of the its nominal life.	Install a new Compuprint genuine ribbon cartridge. See "Installing the Ribbon Cartridge".
CARRIAGE ERROR	The carriage movement has been stopped during printing causing print integrity.	Check for carriage free movement.
PAPER JAM **REMOVE PAPER**	A paper jam error condition occurs in the paper path.	Check the paper path and remove the jammed paper.
RS232 FAILURE **DATA LOST**	A buffer overflow condition occurred for the serial interface.	Check the RS232 parameters. Check the interface cable.
RS232 FAILURE **DSR SIGNAL FLT**	The DSR signal is not connected to the printer and is not ready for data transfer.	Check the interface cable connection.
RS232 FAILURE **GENERIC ERROR**	A generic error on the serial interface.	Check the RS232 parameters. Check the interface cable. Check the interface cable connection.

Table 4.1 Recoverable errors

4.9.1.2 Not-Recoverable Errors

When an error of this kind occurs:

1. The printer is halted with all the four leds flashing.
2. With operator panel with display, the following messages will be displayed; the first line indicates the error, while the second line gives more details concerning the error conditions.

Power-off and Power-on the printer.
It the problem remains contact the service.

Not-Recoverable error messages description

Upper line message Lower line message	Indication	Solution
ENGINE FAULT ****UNKNOWN ID****	The software of the printer detects an engine failure during the initialization phase.	The problem may depends by the home carriage or paper sensor initialization errors. Check for paper inside the paper path. Check for the carriage free movement.
SOFTWARE FAULT ****SUPERVISOR****	The software of the printer detects a failure during the displayed phase.	The problem may depends by an internal software routine error.
SOFTWARE FAULT ****PARSER****	The software of the printer detects a failure during the displayed phase.	The problem may depends by an internal software routine error.
SOFTWARE FAULT ***PRINT MANAGER***	The software of the printer detects a failure during the displayed phase.	The problem may depends by an internal software routine error.
SOFTWARE FAULT ****ENGINE****	The software of the printer detects a failure during the displayed phase.	The problem may depends by an internal software routine error.
SOFTWARE FAULT ****LAN****	The software of the printer detects a failure during the displayed phase.	The problem may depends by an internal software routine error (only with LAN interface)

Table 4.2 Not-Recoverable errors

4.9.2 Hexadecimal Dump

Power on the printer pushing "ST2" key to put the printer in Hex Dump mode.

The printer will remain in Hex Dump mode until next power off.
The left part of the printout is showing data sent in their HEX values, while in right part in ASCII values.
In the figure below an example of printout in hexdump and printout as real.

```
0000   0D 0A 0A 50 72 69 6E 74 20 6F 6E 20 53 50 34 30    CR LF LF P r i n t  o n  S P 4 0
0001   70 6C 75 73 0D 0A 1B 45 45 6D 70 68 61 73 69 7A    p l u s CR LF ESC E E m p h a s i z
0002   65 64 1B 46 0D 0A 1B 2D 01 55 6E 64 65 72 6C 69    e d ESC F CR LF ESC - SOH U n d e r l i
0003   6E 65 64 1B 2D 00 0D 0A 4E 6F 72 6D 61 6C 0D 0A    n e d ESC - NUL CR LF N o r m a l CR LF
0004   0C

Print on SP40plus
Emphasized
Underlined
Normal
```

Fig. 4.6 Hex-Dump Printout

4.9.3 Troubleshooting Tables

NOTE: For the electrical value of the electromechanical parts, please refer to chapter 7.

4.9.3.1 Power malfunction

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
The printer is not powered up	No AC power is reaching the printer	Check power cord insertion. Check power at wall. Replace power cord.
The printer is not powered up.	The switch lever don' t correctly acting on the power on switch of the power supply.	Check for the correct behaviour of the switch lever and the springs on the base assembly involved in the movement of the lever. Replace the defective part.
The printer is powered on but it is not working properly.	An incorrect voltage is present on power supply.	Check for the voltages present on the power supply P01 connector. Remove the P01 from the main board. It is recommended to apply a minimum load to the +5VDC and +38VDC to assure the power supply stability. Replace the Power Supply. Replace the Engine Board.
The printer is powered off after short time power on.	An overload is present on power supply.	Check for the correct cables connections. Check for electromechanical parts impedance and replace the faulty one. Replace the Engine Board. Replace Mechanical Assy

Table 4.3 Power Malfunction Troubleshooting

OUTPUT VOLTAGE:

+ 5 VDC
+ 38 VDC

All the voltage are protected for Overvoltage, short-circuit and over-current.

The sketch of the Power supply is described at chapter 1.
The pin out of the Power Supply is :

P01-01 = +38V
P01-02 = +38V
P01-03 = +38V
P01-04 = ZGND
P01-05 = ZGND
P01-06 = ZGND
P01-07 = ZGND
P01-08 = ZGND
P01-09 = TEMP (opt. input Temperature)
P01-10 = N.C.
P01-11 = +5V
P01-12 = +5V

4.9.3.2 Faulty Probability Guide

This table resumes some (not all) of the most frequently symptoms of incorrect functionalities that can appear in the normal usage of the printer with their related probable cause and the corrective actions.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Inconsistent character printing	The ribbon may not be correctly installed	Re-install the inked ribbon cartridge.
	The ribbon cartridge may be faulty (check for its free movement)	Replace with a new one.
	The ribbon does not work properly.	Check for the correct movement of the Ribbon Drive Assy. Replace Ribbon Drive assembly
Some dots are not printed	The print head cables may be incorrectly installed or damaged.	Run T&D10 to check the printout. Check for the print head cables insertion on print head. and engine board. Replace print head cables.
	The print head may be faulty	Check for coils impedance. Replace P.H.
	The main board may be faulty.	Replace engine board.
The printer stops printing	The thermal sensor in the print head may be faulty	Check the sensor resistance. Replace print head.
	The connection between print head. and engine board is defective. The circuit on engine board may be faulty.	Check for the print head cable connection. Replace print head cable. Replace engine board.
The carriage does not move in a properly way.	The home position sensor may be faulty.	Check for the correct insertion of sensor cable Run T&D10 to checking. Replace home position sensor..
The character printing are vertical disaligned.	The printer may be not properly adjusted.	Run T&D09 to readjust the vertical alignment.
	The sensor edge may be not correctly adjusted.	Run T&D09 to check edge sensor. Replace edge sensor.
	The ruby on print head is not installed correctly.	Run T&D10 to verify. Replace the print head.
The paper is loaded but not correctly positioned (skew).	The skew sensors does not work properly.	Check for the skew sensors connection done by the optical fibers. Check for the front roller tension spring correctly position. Run T&D09 to checking. Replace sensor board or optical fiber. Replace engine board.
The paper does not advance properly.	The paper motor is not correctly installed.	Check for paper motor connection on engine board.
	The paper motor may be faulty	Check for its impedance. Replace paper motor assy.
	The paper belt tension is not properly adjusted.	Check paper belt tension adj. Readjust if it is need.
	The paper is out of specifications	Check for the paper specification to be correct.
The paper is loaded but immediately ejected	The paper edge sensor does not work properly.	Check edge connection on print head. Run T&D09 to check edge sensor. Replace edge sensor assy.
		Check for print head cable connection. Replace print head cable. Replace engine board.
The paper is not feeder properly.	The paper path is not free.	Check for the paper path to be free. Open the mechanical assembly through the right and the left green levers and remove residual of paper also through the paper knob.
	The mechanical assembly is not closed.	Close the mechanical assy.
	The selector motor is not correctly installed.	Check for selector motor connection on engine board.
	The selector motor may be faulty	Check for its impedance. Replace selector motor assembly
The printer does not initializes. All the leds are lit.	The main board may be faulty.	Replace the controller board

Table 4.4 Faulty Probability Guide cont'd

4.9.3.3 Sensors Faulty Probability Guide

This table a summary of the printer visible status/conditions when an error related to an internal sensors is detected.
The sensor inside this printer are the following:

1. **Home sensor assy (for basic printer)**
2. **Edge sensor assy**
3. **Ribbon sensor assy**
4. **Print head thermal sensor assy**
5. **Paper detection and skew sensors assy**

In the table below are reported the basic printer status/conditions when the related sensor is in failure.

= fault condition N°

#	SENSOR TYPE	PRINTER INITIALIZATION	ST1	READY	Θ	ST2	PAPER LOADING / PRINTING	NOTE	PARTS SUSPECTED TO BE IN FAILURE
1A	HOME POSITION	NO	◎	◎	◎	◎	NO / NO	The printer moves the print head 1cm on the rigth of the current position. After that is not operative.	Home sensor Engine Board
2B	HOME POSITION	YES	◎	●	○	◎	YES / YES	The printer moves the print head on the right most position. With LCD display the message CARRIAGE ERROR is showing.	Home sensor Engine Board Carriage Motor
2	EDGE SENSOR (on print head)	YES (complete)	●	○	○	●	YES / NO	The printer after paper loading moves the print head to the rigthmost and leftmost position and eject the paper. The operation can be repeated. With LCD display the message WAITING MEDIA/INSERT MEDIA is showing.	Edge Sensor P.H. Cable Engine Board
3	RIBBON GENUINE (on ribbon cartridge)	YES (complete)	◎	◎	○	◎	NO / NO	The printer after initialization detects the error with 3 sounds of buzzer and the print head is moved at the center. Led READY is blinked alternatively with the other S1+S2. With LCD display the message REPLACE RIBBON is showing.	Ribbon Sensor Cable Ribbon Cartridge Engine Board
4	THERMAL SENSOR (inside print head)	YES (complete)	●	○	○	●	YES / NO	The printer after paper loading and file reception moves the print head to the rigthmost position and it is stopped. After that the printer is not operative.	P.H. Cable P.H. Assembly Engine Board
5A	PAPER SENSORS (loading S1-S2)	YES (complete)	●	○	○	●	YES / NO	The printer after initialization try to eject the paper. After that the printer is not able to load paper sheet. With LCD display the message WAITING MEDIA/INSERT MEDIA is showing.	Sensor Board Engine Board Optical Guide
5B	PAPER SENSORS (skew S3 to S6)	YES (complete)	●	○	○	●	YES / YES	The paper is loaded skewed but the printout is done in any case. When the paper is ejected the printer goes in error with a buzzer sound and led S1+S2 flashing.	Sensor Board Engine Board Optical Guide

Table 4.5 Faulty Probability Guide for sensors

Chapter 5 Test & Diagnostic

5.1 Overview

The SP40plus has a diagnostic embedded in the basic firmware which tests all the hardware and electromechanical devices of the printer.
The T&D is an interactive tool which request some manual intervention as well as paper loading, pressure of keys, etc. Due to the fact the printer can has two different operator panel (with or without 2x16 LCD display), the T&D covers both models. The leds and the buzzer are used to decode the different T&D test phases, actions and errors
The display directly show the above mentioned item, therefore it is recommended to install it for service activities..
See chapter 2.2 to remove the standard operator panel assembly and install the one with LCD.

Furthermore, the echo of the messages is also available on the serial interface, therefore it is possible to connect the printer with a P.C. as a remote panel to read the T&D messages.
See chapter 5.11 later in this chapter how to use it.

5.2 How to run T&D USER

The T&D USER can be run in a special power-on mode.
There are two modes of T&DUSER: Step by Step and COMPLETE.
In this chapter will be described the Step by Step mode.

Power on with READY + ST1 keys starts the USER T&D procedure.

READY	+	**ST1**

Push again within 3 seconds to choose the STEP BY STEP mode.

ST1

If no action is done after 3 seconds or ST2 is pressed, the COMPLETE T&D will be run.
In the COMPLETE mode the T&D will execute all the tests consequently and will stop at the first error.
If no error will appear the T&D will stop and the printer have to power-off.

After the launch of the Step by Step mode the main menu is entering and the keys have this meaning:

ST1	Decrement the Test
READY	Run the Test
ST2	Increment the Test

When a specific Test in running, a sub-menu is reached and the keys have this meaning:

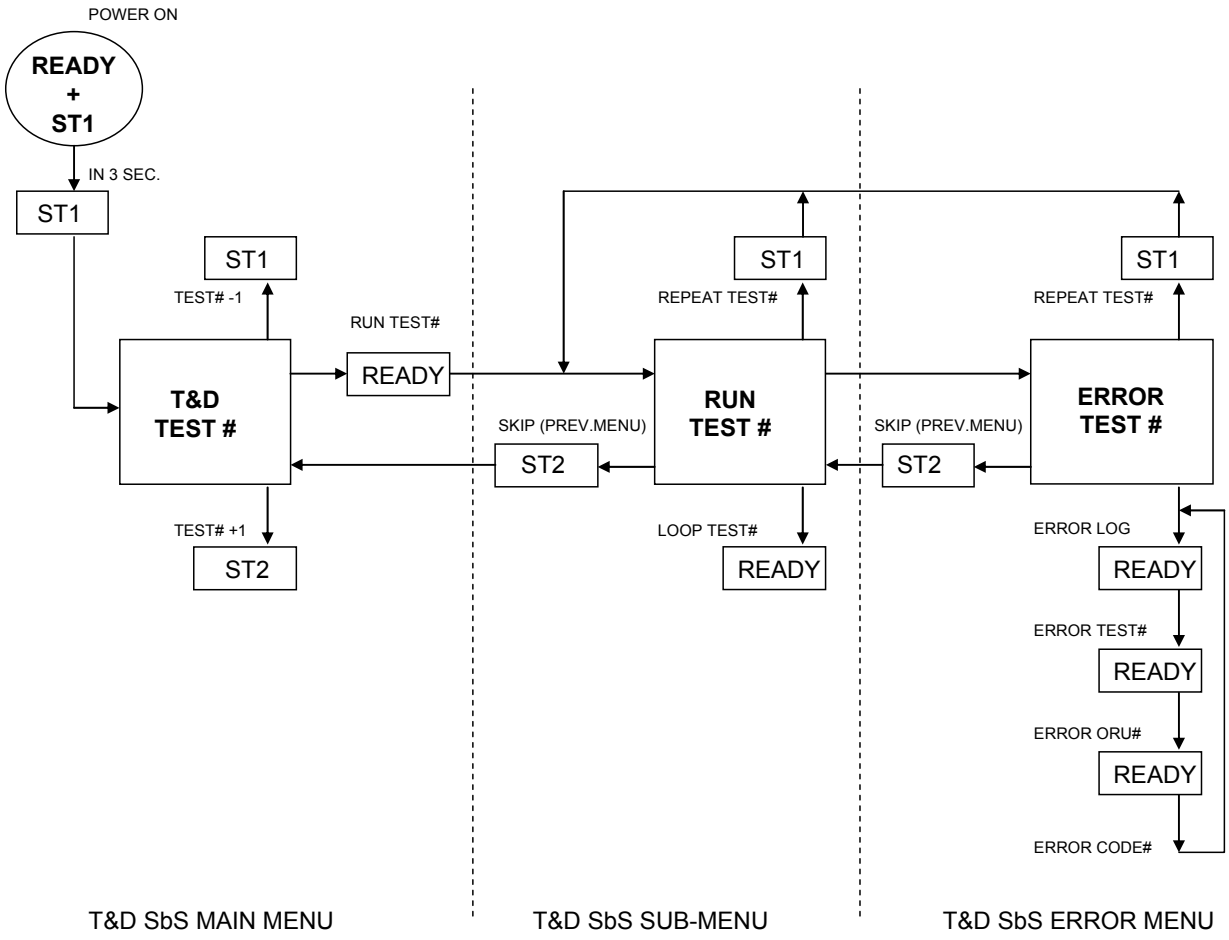
ST1	Repeat the Test
READY	Continuous Loop of Test
ST2	Skip the Test (come back to main menu)

If a Test goes into error menu, the leds L1 and L3 are lit while L2 and L4 and flashing at low frequency and the keys have this meaning:

ST1	Repeat the Test
READY	Rotation of error meaning menu into 4 different conditions: - Error Status leds L1 and L3 are lit while L2 and L4 and flashing at low frequency - # Test in Error - # ORU in error - # Diagnostic error code
ST2	Skip the Test (come back to sub-menu)

5.3 Step By Step T&D Mode Flow Chart

This is a schematic flow-chart of the T&D USER procedure for Step by Step Diagnostic handling.and the complete sequence of actions.



The LCD display will show this basic message for the different menu:

T&D n1 USER	REPT LOOP SKIP	KO n1 ORU n2 [n3]

Fig. 5.1 Schematic flow-chart of the T&D USER in Step By Step mode

5.4 T&D USER Tests Description

TEST#	DESCRIPTION OF TEST	Step By Step mode	Complete mode
T&D2	Test of writing/reading of NVM with 0x55/0xaa patterns. If the test is positively ended, the DEFAULT Setup parameters are stored and the adjustments area data CRC is calculated and saved .	YES	NO
T&D3	Test of reading accessibility and checksum of NVM. Then the adjustments area data CRC is calculated and checked.	YES	YES
T&D4	Test of optional interfaces.		
	LAN: if is present check the LAN firmware version and the stored MAC Address and stored these values in NVM if are different. On standard pattern are printed the specific LAN parameters.	YES	YES
	USB: if this on-board interface is present, the identifying code chip is read and checked.	YES	YES
	SECOND SERIAL: Test of serial interface with a passive loop-back (see figure 5.1). On standard pattern is printed its presence.	YES	YES
T&D5	Test of serial interface with a passive loop-back (see figure 5.1). If the remote terminal is present the test fails.	YES (*)	YES
T&D6	Test of parallel interface with an active loop-back to check the bi-directional functionality (see figure 5.5).	YES	YES
T&D7	Interactive Test of the operator Panel keys (pressure of each of them) and leds. During the test the sequence ST1-READY-EJECT-ST2 is showed by the flashing of the respective led.	YES	YES
T&D8	Interactive test to check the interlock feature. The closure is checked, then the opening (under time-out) and the closure (without time-out) of the front cover is requested	YES	YES
T&D9	Interactive test to automatically check and adjust the printing parameters (vertical, horizontal and bidirectionality adj.) and the sensors PWM calibration. See chapter 5.10.1	YES	YES
T&D10	Some patterns are printed in order to give a feedback about the performances of various components of the printer itself. See chapter 5.10.2	YES	YES
T&D11	Not used.	YES	YES
T&D12	This test handles and updates the T&D log file (for MFG only) See chapter 5.12	YES	YES
T&D13	This test resets the print head life counters.	YES	NO
T&D14	This test loads the ribbon cartridge life counters.	YES	YES

* = the T&D5 fails if the remote connection is running

Table 5.1 T&D USER Tests Description

5.5 GENERAL RULES FOR T&D OPERATIONS

The T&D operations and messages are decoded by specific combinations of the leds useful for printer without the 2x16 LCD display; with the LCD display the actions to do are visible in the 2x16 characters area of the display.

This is the position and the name (between bracket) of the LEDS and KEYS described in the next tables.

LEDs	ST1 (L3)	READY (L2)	Θ/DATA (L4)	ST2 (L1)
KEYs	ST1	READY	EJECT	LQ

Fig. 5.2 Operator Panel Layout (without 2x16 LCD display)

These are the meaning of the LEDS icon described in the next tables:

- ● = LIT status
- ○ = UNLIT status
- ⭘ = low frequency flashing status
- ◎ = high frequency flashing status

The general rule conditions which can appear are shown in the following table.

Type of Operator Message	LEDS				Note
	L3	L2	L4	L1	
Test number in execution	●/○	●/○	●/○	●/○	The leds L1, L2, L3 and L4 are lit or off depending by the binary configuration to be showed (L1 is the LSB*, L4 is the MSB*).
O.R.U. Code	●/○	●/○	⭘	●/○	The leds L1, L2 and L3 are lit or off depending by the binary configuration to be showed
Error Code	⭘	●/○	●/○	●/○	The leds L1, L2 and L4 are lit or off depending by the binary configuration to be showed
Waiting for operator intervention	⭘	●	◎	⭘	The L4 is high frequency blinking if an action of operator is requested (cover open).
Waiting for paper loading	●	◎	○	●	The L2 is high frequency blinking if paper handling is requested (load or exctract paper)
Waiting for key or paper removal	⭘	◎	◎	⭘	The L2 & L4 are high frequency blinking if an action on operator panel is requested
Test KO n1 ORU n2 [n3]	⭘	○	○	⭘	See chapter 5.7. for the code errors decoding and handling.
End T&D	⭘	⭘	⭘	⭘	

(*) Note: LSB means Less Significant Bit
MSB means Most Significant Bit

Table 5.2 General rules for T&D operations

5.6 Step By Step T&D Mode Sequential Table

This is a table of the complete T&D Step by Step USER procedure in sequential mode without any error. If an error is appearing, look at error handling chapter later in this chapter.

The columns have these meaning:

1) T&D SBS Phases
2) Messages on the Operator Panel with LCD display for this step.
3) The leds condition for this step on the standard Operator Panel (without LCD display).
4) Operator panel key to be pressed for this step.
5) Action done by the operator panel key pressure for this step.

T&D SbS PHASE	DISPLAY MESSAGE	LEDS				PUSHED KEY	BUZZER	KEY's ACTION
		L3	L2	L4	L1			
Initialization phase	“▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒”	●	●	○	●	READY + ST1		Run T&D
Initialization phase	“ STARTING UP ”	●	○	○	○			none
Initialization phase	“ STARTING UP ”	●	●	○	○			none
Initialization phase	“ STARTING UP ”	◘	◘	◘	◘			none
Initialization phase	“ ..INIT.. ”	◘	●	○	◘			none
Choice of mode SBS= Step by Step CMP=Complete LST=Last	"SBS CMP LST”	◘	●	○	◘	ST1 (in 2 sec)		Choose of Step by Step Mode
NVM WRITING Test (available only in Step by Step mode)	“T&D 02 S_B_S”	●	○	●	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	“REPT LOOP SKIP”	◘	○	●	◘	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
NVM Checksum Test	“T&D 03 S_B_S”	●	○	●	○	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	“REPT LOOP SKIP”	◘	○	●	◘	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Optional Board Test	“T&D 04 S_B_S”	○	●	●	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	“REPT LOOP SKIP”	◘	○	●	◘	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test

Table 5.3 Step by Step T&D USER Sequential Actions

T&D SbS PHASE	DISPLAY MESSAGE	LEDS				PUSHED KEY	BUZZER	KEY's ACTION
		L3	L2	L4	L1			
Serial Interface Test	"T&D 05 S_B_S"	○	●	●	○	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Parallel Interface Test	"T&D 06 S_B_S"	○	○	●	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Operator Panel Test	"T&D 07 S_B_S"	○	○	●	○	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"KEY1 " "(*) ( ) ( ) ( )"	◎	○	○	○	ST1		ST1 to test key 1
	" KEY2 " "( ) (*) ( ) ( )"	○	◎	○	○	READY		READY to test key 2
	" KEY3" "( ) ( ) (*) ( )"	○	○	◎	○	EJECT		ST1 to test key 3
	" KEY4" "( ) ( ) ( ) (*)"	○	○	○	◎	ST2		ST2 to test key 4
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Interlock Test	"T&D 08 S_B_S"	●	●	○	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"OPEN COVER"	◎	●	○	◎			Open the top cover
	"CLOSE COVER"	◎	●	○	◎			Close the top cover
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Sensor Adjustment Test	"T&D 09 S_B_S"	●	●	○	○	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"LOAD PAPER"	◎	◎	○	◎			Load a blank A4 sheet
	"T&D 09 S_B_S"	●	●	○	○			The adjustment test is printed.
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test

Table 5.3 Step by Step T&D USER Sequential Actions cont'd

T&D SbS PHASE	DISPLAY MESSAGE	LEDS				PUSHED KEY	BUZZER	KEY's ACTION
		L3	L24	L4	L1			
Printing Standard Pattern Module Test	"T&D 10 S_B_S"	●	○	○	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"LOAD PAPER"	◎	◎	◎	◎			Waiting for A4 sheet (same used in T&D9)
	"T&D 10 S_B_S"	●	○	○	●			The standard pattern module test is printed
	"PAPER OR KEY"	◎	◎	○	◎			The standard pattern module can be inserted again to better adjust the bidirectionality. Sign with a pen the line considered the best one and reload the single sheet or press ANY KEY to skip the test.
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Printing LOG File	"T&D 12 S_B_S"	○	●	○	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"LOAD PAPER"	◎	◎	◎	◎			Waiting for a blank A4 sheet
	"T&D 12 S_B_S"	○	●	○	●			The LOG file pattern is printed
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Print Head Characters Clear Test	"T&D 13 S_B_S"	○	○	○	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"CL. HEAD Y<->N"	◎	○	●	◎	ST1 ST2		ST1 to clear print head character counter ST2 to escape
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test
Ribbon Cartridge Loading Test	"T&D 14 S_B_S"	○	○	○	●	ST1 READY ST2		ST1 to decrement test READY to run ST2 to increment test
	"REPT LOOP SKIP"	◎	○	●	◎	ST1 READY ST2		ST1 to repeat the test READY to loop ST2 to skip the test

Table 5.3 Step by Step T&D USER Sequential Actions cont'd

5.7 T&D Errors Handling

When a Test fails the leds ST1 (L3) and ST2 (L1) are blinking at lowe frequency, while the other two READY (L2) and Θ/Data (L4) lit and the buzzer sounds a beep every 1 second.
Follow these steps:

RUNNING TEST	DISPLAY MESSAGE	LEDS				PUSHED KEY	BUZZER	KEY's ACTION
		L3	L2	L4	L1			
ANY	"KO n1 ORU n2 [n3]"	●	○	○	●			See below
	"REPT ERR SKIP"					ST1		ST1 to repeat the same test
		(see table 5.4)				READY		1- N. of Test in error
		(see table 5.5)				READY		2- N. of ORU
		(see table 5.6)				READY		3- Specific or Common Error Codes
						ST2		ST2 to skip the test

Table 5.4 T&D Error Handling Actions

If the operator panel with display is installed, the display immediately shows the error condition.
If the operator panel has not the display, the error message is composed by the following item (see tables 5.7, 5.8 and 5.9 for their meaning):

KO n1 ORU n2 [n3]

n1 means the N° of failed test
n2 means the N° of O.R.U. (Optimal Replacement Unit which has caused the error)
n3 means the N° of diagnostic specific or common error code (detailed information)

For example, if the third key is not properly pressed during the T&D 8 Test, after a time-out the T&D falls in the error condition, showing the follow message: KO 08 ORU 01 [03]

If the display is not installed, these n1, n2 and n3 information's can be showed through four different actions of the READY key as indicated in the tables 5.4, 5.5, and 5.6 on next chapter.

5.7.1 Led Meaning during T&D Error Condition

If the operator panel has not the LCD display installed, when the printer recognizes an error, a pressure on READY key allows to show up to 4 different led combinations (in the meantime the buzzer sound switch from normal to short beep every 1 sec).

The table below shows the led condition after the first pressure of READY key (test in error) during the test failure detection.

Nº Test	L3	L2	L4	L1
Test 1	●	●	●	○
Test 2	●	○	●	●
Test 3	●	○	●	○
Test 4	○	●	●	●
Test 5	○	●	●	○
Test 6	○	○	●	●
Test 7	○	○	●	○
Test 8	●	●	○	●
Test 9	●	●	○	○
Test 10	●	○	○	●
Test 11	●	○	○	○
Test 12	○	●	○	●
Test 13	○	●	○	○
Test 14	○	○	○	●

Table 5.5 Led Status for N. of test in error

The table below shows the led condition after the second pressure of READY key (ORU in error) during the test failure detection.

Nº O.R.U.	L3	L2	L4	L1
ORU 0	●	●	◉	●
ORU 1	●	●	◉	○
ORU 2	●	○	◉	●
ORU 3	●	○	◉	○
ORU 4	○	●	◉	●
ORU 5	○	●	◉	●
ORU 6	○	○	◉	○
ORU 7	○	○	◉	○
ORU 8	●	○	◉	◉
ORU 9	○	●	◉	◉
ORU 10	◉	●	●	○

Table 5.6 Led Status for ORU in error

The table below shows the led condition after the third pressure of READY key (specific/common error codes) during the test failure detection.

N° Error Code	L3	L2	L4	L1
Code 1	◎	●	●	○
Code 2	◎	○	●	●
Code 3	◎	○	●	○
Code 4	◎	●	●	●
Code 5	◎	●	○	○
Code 6	◎	○	○	●
Code 7	◎	○	○	○
Code 8	◎	●	○	●
Code 9	◎	●	◎	○
Code 10	◎	○	◎	●
Code 11	◎	○	◎	○
Code 12	◎	●	◎	●
Code 13	◎	◎	◎	○
Code 14	◎	◎	◎	●

Table 5.7 Led Status for specific/common error codes

5.8 T&D Errors Codes

The table below shows the complete list of T&D error codes with the error description and the O.R.U. (Optimum Replaceable Unit) suspected to be in failure.

Nº Test	Description	Error Code	Display Message	Error Description	Suspected ORU
1	Reserved	-	-	-	-
2	Read/Write E^2PROM	1 2	KO 02 ORU 0 [01] KO 02 ORU 0 [02]	Writing error Reading error	Main Board
3	Checksum E^2PROM	2	KO 03 ORU 0 [02]	Checksum error	Main Board
4	Optional I/F				
	USB I/F	1	KO 04 ORU 0 [01]	USB error	Main Board
	LAN I/F	3 4 5 6 7 8 9 10 11	KO 04 ORU 0 [03] KO 04 ORU 0 [04] KO 04 ORU 0 [05] KO 04 ORU 0 [06] KO 04 ORU 0 [07] KO 04 ORU 0 [08] KO 04 ORU 0 [09] KO 04 ORU 0 [10] KO 04 ORU 0 [11]	LAN: initialization LAN: command LAN: receive command LAN: receive reply LAN: trasmission command LAN: trasmission reply LAN: generic test channel LAN: internal ram LAN: ethernet test	Main Board
	Second SERIAL I/F	1 2 3 4	KO 04 ORU 0 [01] KO 04 ORU 0 [02] KO 04 ORU 0 [03] KO 04 ORU 0 [04]	test pattern rx-tx loop dtr – dsr loop rts - cts loop srts - dcd	Main Board
5	SERIAL I/F	1 2 3 4	KO 05 ORU 0 [01] KO 05 ORU 0 [02] KO 05 ORU 0 [03] KO 05 ORU 0 [04]	test pattern rx-tx loop dtr – dsr loop rts - cts loop srts - dcd	Main Board
6	PARALLEL I/F	1 2 3 4 5	KO 06 ORU 0 [01] KO 06 ORU 0 [02] KO 06 ORU 0 [03] KO 06 ORU 0 [04] KO 06 ORU 0 [05]	loop busy strobe loop slct init loop ack autofeed loop pe^flt – sctin test pattern rx-tx	Main Board
7	Operator Panel	1 2 3 4 7	KO 07 ORU 1 [01] KO 07 ORU 1 [02] KO 07 ORU 1 [03] KO 07 ORU 1 [04] KO 07 ORU 1 [07]	Key 1 (ST1) Key 2 (READY) Key 3 (Θ) Key 4 (ST2) General error	O.P. Board
8	Interlock	1 2	KO 08 ORU 1 [01] KO 08 ORU 1 [02]	Cover closed Cover open	O.P. Board Cover
9	Printing Adjustments	*	KO 09 ORU 0 [yy] KO 09 ORU 2 [yy] KO 09 ORU 3 [yy]	See Common errors tables	Main Board Sensor Board Mechanical Motors
10	Standard Pattern Module	*	KO 10 ORU 0 [yy] KO 10 ORU 2 [yy] KO 10 ORU 3 [yy]	See Common errors tables	Main Board Sensor Board Mechanical Motors
11	Not used	-	-	-	
12	Log File	*	KO 12 ORU x [yy]	Common errors tables	Main Board Sensor Board Mechanical Motors
13	Print Head counter reset	-	-	-	
14	Ribbon Cartridge load test	1	KO 14 ORU 10 [01]	Ribbon Chip ID	Ribbon Cartridge

Table 5.8 T&D Error Codes

5.9 T&D Common Errors Codes

The tables below shows the list of T&D common error codes which can be displayed when the mechanical tests (T&D9-T&D10-T&D12) are running.

O.R.U.	Reference
0	Pwa
1	Operator Panel
2	Sensors
3	Mechanical
4	Eproms / Flash / Rom
5	Supervisor (s/w)
6	LAN
7	USB
8	Option (MSRW-MICR)
9	Scanner
10	Ribbon Cartridge

Table 5.9 T&D O.R.U. codes

Error Code	Error Meaning
1	Sensors S3 – S4 –S5 - S6
2	Sensors S1 – S2
3	Sensor S8
4	Threshold S8
5	Sensor S8 from control
6	Sensor ribbon

Table 5.10 T&D Common error codes for sensor

Error Code	Error Meaning
1	Movement (generic)
2	Paper movement
3	First Line out of tolerance
4	Engine general error
9	Thermal sensor in print head out of tolerance (10°C ÷ 60°C)
10	Dynamic error on thermal sensor in print head
11	Data integrity
12	Not used
13	Selector Error
14	Not used

Table 5.11 T&D Common errors codes for mechanical

5.10 Requested Tools

For a correct maintenance are necessary the following parts:

#	Tools	Part Number	Note
1	Single sheet paper 80 gr/m2 (0.1 mm thickness)	-	-
2	RS232 Serial Loop-back	78901385-001	
3	Parallel loop-back	78900884-001	
4	Operator Panel with display (recommended)		
5	Magnet for Interlock	78201635-001	

Table 5.12 T&D Requested Tools

5.10.1 RS232 Serial Interface Loop-Back Connector

TX (03) _____ (02) RX
RTS (07) _____ (08) CTS
DCD (01) _____ (09) SRTS
DTR (04) _____ (06) DSR

Fig. 5.3 Serial I/F Loop-back

5.10.2 Parallel Interface Loop-Back Connector

The schematic diagram is the following:

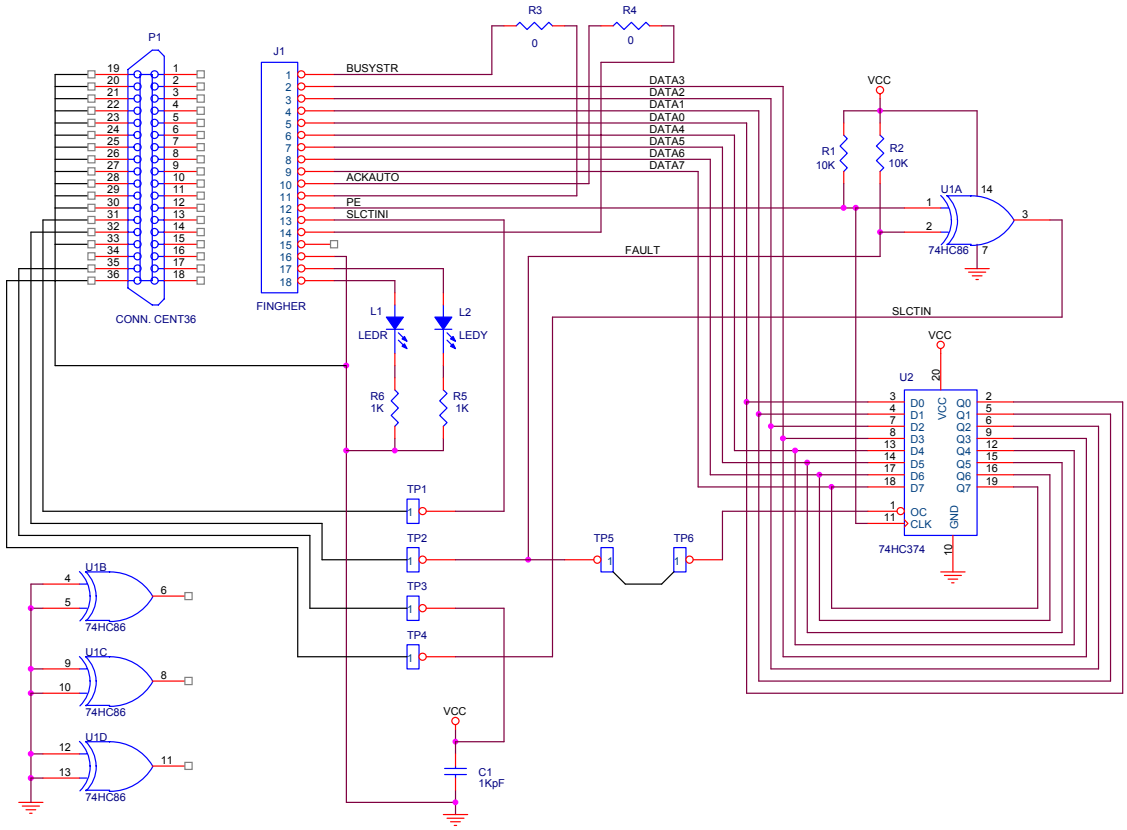


Fig. 5.4 Parallel I/F bi-directional Loop-back

5.11 Analysis of T&D Printouts

5.11.1 Printing Adjustment Printout (T&D 9)

In this test the printer prints three black patterns and with the edge sensor checks and automatically adjusts the following parameters:

The standard A4 paper must be loaded.
If loading fails the message of " Waiting for key or paper" as indicated in operator message status table 5.2.
If the o.p. with display or line monitor is used the message will be "REMOVE PAP->KEY".
The operator has to remove the paper and push any key to confirm the operation.
The printer adjusts the sensors S1 through S6.
At the end the printer enetr in the message of "Waiting for paper loading" status as indicated in table 5.2 or shows "LOAD PAPER" message to display.

After the paper loading, the carriage and the paper are moved in a proper position and the S8 pwm adjustment and the white threshold calibration are executed (White).
Furthermore is check the difference between the white and black level must be at least 200 steps.

If during this phase, the pwm adjustment of the S1 tru S6 sensors is not jet done, the paper is completely rearly feeded outside of the the sensors position and the adjustment is done.
The paper is then frontly parked and reloaded utilizing the sensors with adjusted sensors.

Three squared black mark are printed respectively in the left, middle and right position of the sheet (A1, B1, C1) with carriage moving from left to right and then three more squared mark are printed respectively in the left, middle and right position of the sheet (A2, B2, C2) with carriage moving from right to left as indicated in figure 5.4.
After this, using the S8 sensor these adjustments are automatically done:

- First printing row (F. Col.)
- First printing colunm (F. Lin)
- Alignment check (L/R).
  This is the difference between the upper edge and the markers A1 and C1 less than 10/180"= 1,4mm.
- Bidirectional printing check (Bid.)
  This is the skew between B1 and B2 and set for the best value.

At the end of the test the following printout is done in which are printed :

- The S8 medium values for printed Black, White and Platen black check.
- The old and new values for the four adjustments above described in the first line
- The pwm adj for the S1 to S8 sensors in the second one.

After all the paper is automatically ejected.

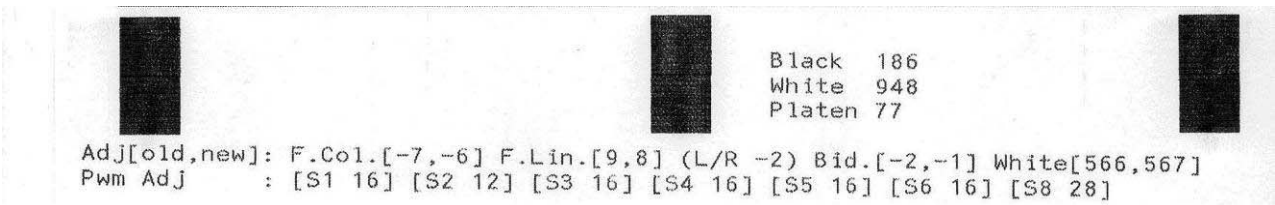


Fig. 5.5 Pattern for Printout T&D 9 of Standard Model (reduced)

5.11.2 Standard Pattern Printout (T&D 10)

In this test the printer prints a pattern with a lot of informations to check all the correct functionalities (print head, motors, sensors, etc.).

If the T&D9 was previously done and the same sheet used is loaded, the printers automatically prints the whole pattern as indicated in next figure 5.5A, otherwise a blank area appears in correspondance of the T&D9 pattern.

At the beginning of this test is also checked the presence of mechanical options (MSRW /MICR).
On the pattern is printed the result of this test:

OPTIONAL DEVICE NOT FOUND (not detected)
OPTIONAL DEVICE <Identify device>

In the case in which the optional device is present, but in error, the pattern is halted and the specific error condition are displayed on the operator panel with the printout:

OPTIONAL DEVICE FAULT

Are also check the presence of optional interfaces and in the pattern are printed the respective parameters.

1. The paper is loaded with 8 step less than the stored value of the first printable line, than are printed:
- 4 underlined signs on the left and right sides to check the loading line skew.
- 9 groups of "EE" separated by a space with an incremental vertical paper movement of 1/180" between each group (from –8 to +8 values).
  Under each group except for the central one (0 value) is printed the check marker which must be signed after the end of the test .
- A continuous line is printed for the reference in the step 9.

2. A line is printed with the controller code ID and version, the character generator ID and version, the quantity of Ram size and the release of built -inT&D.
If the LAN interface is installed its status, version and MAC address are printed.

3. In the following two lines are reported :
- The current Adjustments parameters as indicated in previous chapter (F.Col, F.Lin, Bid, White) and
  also the themperature of the print head (T) in degrees.
- The Log parameters of the T&D (see chapter 5.11).

4. A complete pattern which exercises all the 24 needles of the printer (the single bar printed on the right side is the specific printed needle reported below).

5. A paper movement test (with forward and backward movements) composed by:
A) First the printer prints the first and third chopped-lines.
B) After the point 12. a backward movement is made and the central chopped-line is printed.
This line must be between the two previous chopped-lines.

6. A special vertical bar pattern to choose the best vertical alignment.
The first time this test is printed, the 5 lines show the current value in the middle line (3rd line) associated with an asterisk (*) with the other two lines before and after with the value immediately around the current one associated with a check marker which must be signed after the end of the test .

7. Six patterns of characters set with different type of printing attributes (CPI e Quality).

8. A special mono-directional bars pattern is printed to check the correct most external white-colored guide print-head needle position. If this lines are not regular, the problem depends by the print head itself and not by a vertical disalignment (carriage movement).

9. At about 203,2mm (8") from the continuous line printed in the step 1., a pattern with 8 signs under which a check marker which must be signed after the end of the test or a couple of asterisks are printed to mark the current interline.

10. After a backward movement a special decremental/incremental "H" character pattern of 19 lines to stress the carriage movement.

11. After a backward movement of 19 lines
19 groups of a single “H” on each line horizontally shifted from the first colunm adjustment (the current one is marked by two ** and it is printed in the central one.
Under each group except for the central one (0 value) is printed the check marker which must be signed after the end of the test .

12. A graphic pattern to check the printing during intensive graphic test.

13. The paper is moved backward again to print the line between the chopped ones (see step 5b).

14. The Ribbon Cartridge ID parameters included in the ribbon itself:
- Univocally Serial Number of the Ribbon Cartridge
- Type of Ribbon Cartridge (41 for standard, 42 for Long life)
- Number of printed characters and number of installation (between bracket, decremental from 0xFF to 0x00).

15. A forward paper movement is done to reach the bottom position and a continuous line pattern.

After all the paper is ejected and the printer waits for the best adjustments indicated in the next figures for the :

A) First Printing Line (1.5 mm from the top edge of the paper)
B) Current interline (203,2 mm from the top continuous line of the pattern)
C) First Column (3 mm from the left edge of the paper)
D) Bidirectionality (choose the best result)

For each of these item is is possible to choose the best value and sign it in the proper line bracket [●].
The printer automatically recognizes it by printing a # sign near selected the value and store it.

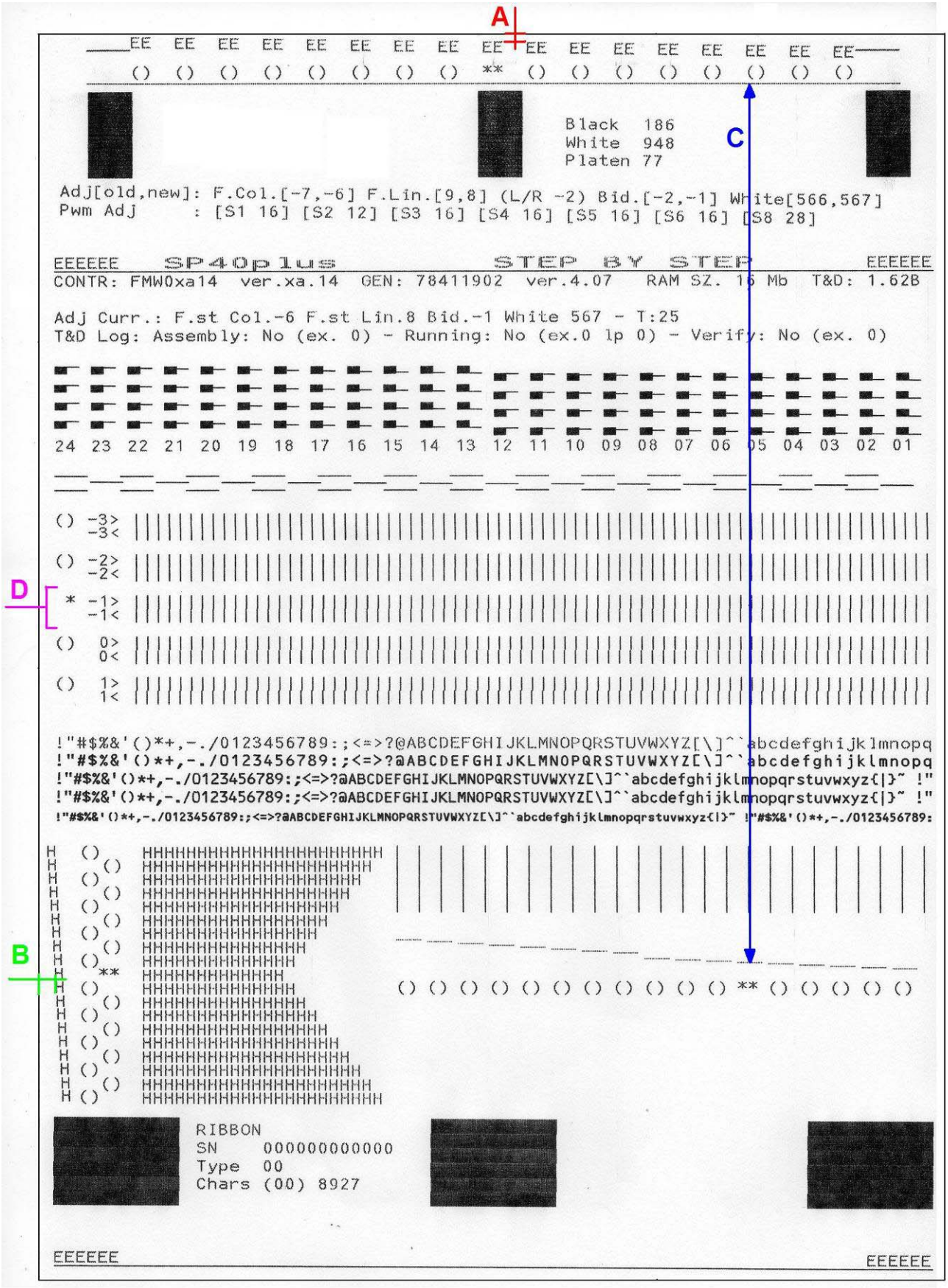


Fig. 5.6 Pattern for Printout T&D10 of Standard Model (reduced) with the adjustments

5.12 Log File Printout (T&D 12)

This test is for MFG site only.
It prints the following three basic informations:

1) LOG FILE
Reports the evolution and the results of the different phases of the T&D executed during the life of the printer, until the basic controller is replaced.

Remark: In the Step by Step mode the log is not saved and no informations are registered.

For the other phases used in MFG only are stored the following informations:

- Execution status:
  Not executed = not-executed phase
  Executed = executed phase (at least 1 time)
  Current = phase running
- Number of executions.

Up to 11 errors are saved which reported for each one: phase in execution during the error, test in error, ORU and error code.
The nvm area containing the log can be cancelled only in the assembly phase.
The informations related to the execution status log are printed on the standard pattern printout and are sent to the serial interface (monitor as described in chapter 5.11) at the beginning of the T&D launch.

In the T&D10 the string is:
T&D Log: Assembly: <St>(ex. #) - Running: <St>(ex. # lp. #) - Verify: <St>(ex. #)

St can be : Yes (executed), No (not-executed), Cur (running), KO (error)
is the number of execution or the Loop in running phase (mfg only).

2) DOE_config
The overall adjustments parameters area of NVM is printed for R&D analisys.

3) CURRENT PWM ADJ
The values of the pwm test for the sensors are printed.
These valuers are the same printed in the T&D10.

The complete report is sent to the serial monitor at the end of the T&D12 and can be printed if a sheet is loaded within 10 seconds.

```
==================== T&D LOG FILE ====================
Assembly: Not exec (ex. 0)
Running:  Not exec (ex. 0 Loop 0 - Pg r 0  v 0)
Verify:   Not exec (ex. 0)


---------   DOE_config ------------
0x082e24 : 08 00 00 00 ff 00 1f 00 0f 00 f8 00 f8 00 56 01  ..............V.
0x082e34 : 56 01 56 01 56 01 c2 01 37 02 00 00 00 1c 0c 10  V.V.V...7.......
0x082e44 : 10 10 10 10 fa 00 00 00 00 00 90 00 07 80 00 00  ................
0x082e54 : 00 00 00 00 af 07 00 00 00 00 00 00 00 00 00 00  ................
0x082e64 : 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................

--------- Current Pwm Adj ---------
S1 16, S2 12, S3 16, S4 16, S5 16, S6 16, S8 28

-----------------------------------------------------
```

Fig. 5.7 Example of T&D 12 Log File (without errors)

5.13 Monitor through RS232/C serial interface

This mode can be very useful in carry-in maintenance of the printer to repair center.
It has been developed to have the same (or in some cases much more) informations appearing on the display of the operator panel assembly, directly to the RS232/C serial interface connector.

It is necessary connect the printer in serial mode using the TERMINAL or HYPER-TERMINAL accessory application of Windows environments.
Through the serial connection all the T&D messages and informations are displayed in the video of a normal PC.

The handshaking setting must have the following parameters:

XON-XOFF, 9600 baud, 8 bit, no parity, 1 stop bit.

The serial connection cable has these wires :

Signal Name	Conn. 9 Female (Host)		Conn. 9 Female (Printer)	Signal Name
DCD/DSR	1/6	----------	4	DTR
RX	2	----------	3	TX
TX	3	----------	2	RX
RTS	7	----------	8	CTS
GND	5	----------	5	GND
DTR	4	----------	1/6	DCD/DSR
CTS	8	----------	7	RTS
RI	9	Not connected	9	RI
Connect shield with metallic cover		Shield	Connect shield with metallic cover	

Table 5.13 Serial Cable Connections for Remote T&D

The following figure shows some steps displayed on the video.

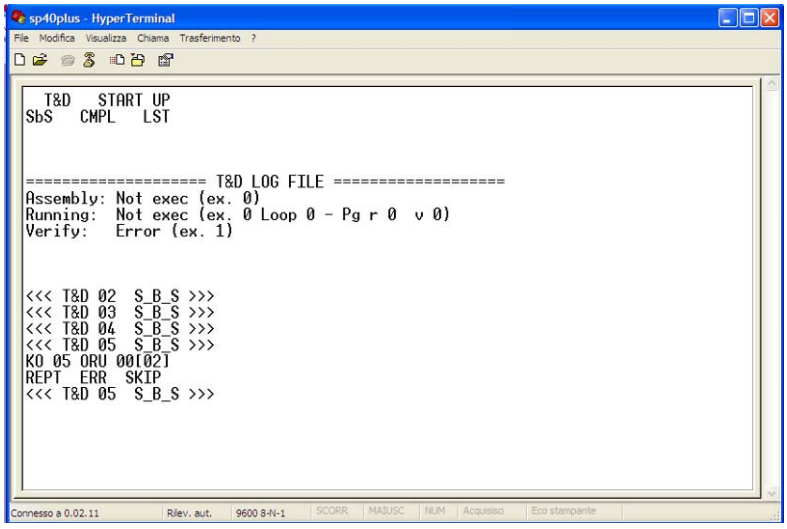


Fig. 5.8 Remote mode display (Hyper Terminal under Windows XP)

The serial monitor is used also for showing in detail the sensors PWM values as showd in the figures below.

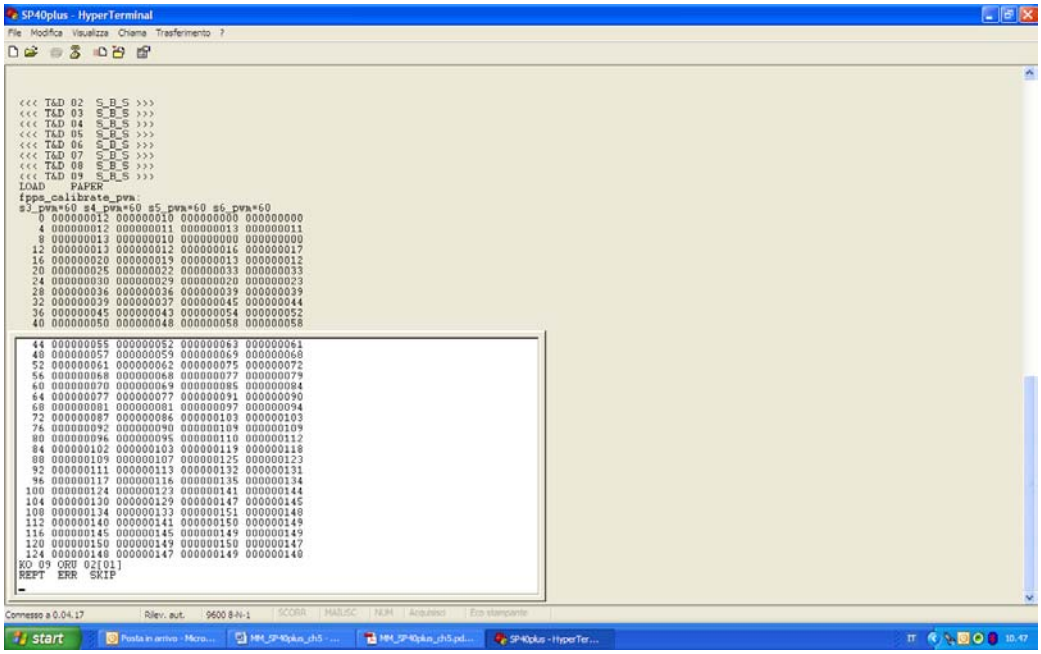


Fig. 5.9 Remote mode display (Sensors 3 to 6 error during T&D09)

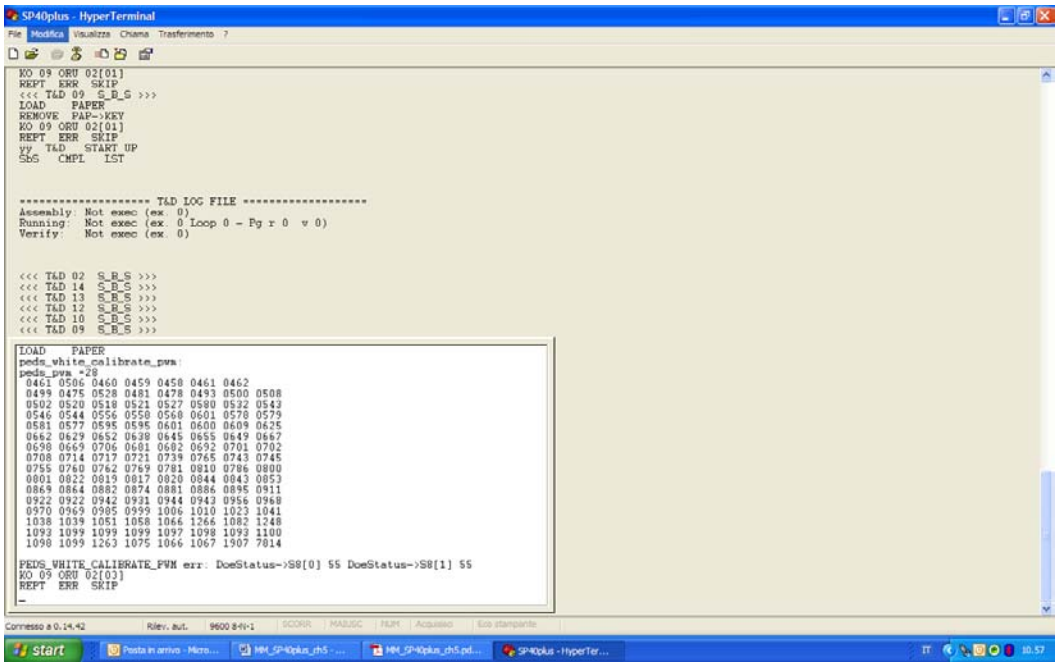


Fig. 5.10 Remote mode display (Sensor 8 error during T&D09)

Chapter 6 Media Specifications

6.1 Paper Specifications

The documents must all guarantee the following characteristics:

- Use paper matching the *indicated characteristics*.
- They must have well defined top and left *edges*, with a square *angle tolerance* of 0.1° on all edges.
- Paper with *holes, perforations, folds or tears* anywhere within the print area of the document cannot be feeded from the front input chute, but could be eventually managed by the rear tractor requesting the specific Compuprint SP40plus model.
- The *radius on a corner* of the form must be within 9.5 mm from the left or right edge.
- The form to be printed must not contain *foreign material*.
- Form *opacity* must be at least 75%. Forms with a lower opacity may cause feed errors.
- Never print on documents with *metallic or hard plastic fasteners or staples*, they may damage the printer. Use only *sewn* passbooks.
- To get the maximum *print contrast* you should print on white or light colored paper. You may overstrike to improve the low contrasting paper.
- It is preferable to use single and multiple documents with the *fibre* running in the insertion direction of the printing unit.
- *Recycled* paper is permitted on principle.
- It is preferable to print on multiple forms with *a narrow glue strip or top-gluing*. The gluing must not cause waving in the set of forms.

6.2 Cuts Sheets

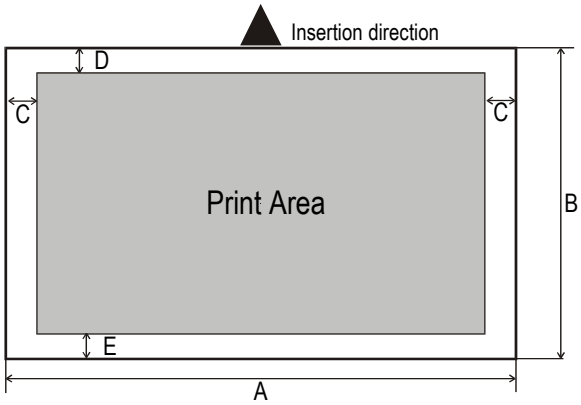


Fig. 6.1 Cut Sheet layout

	Dimensions	Maximum	Minimum
A	Form width	244 mm (9,606 in.)	65 mm (2,559 in.)
B	Form length	470 mm (18,50 in.)	65 mm (2.559 in.)
C	Distance between dot position and left or right paper edge	-	3.0 mm (0,1181 in.)
D	Distance between top of the first printed line and top margin of the document	-	1 mm (0.0394 in.)
E	Distance between the lower margin and the lower part of the last printed line	-	5.8 mm (0..2283 in.) 1.5 mm (0.0591 in.) with item SAFE BOTTOM EDGE = no
	Weight (original)	200 g/m^2	40 g/m^2 With paper <60 g/m^2 set the item PASSBOOK TYPE = horizontal
	Weight (original + 1 to 6 copies)	1st 75 g/m^2 other 75 g/m^2 carbon 35 g/m^2	1st 55 g/m^2 other 45 g/m^2 carbon 14 g/m^2
	Thickness	Single form media up to 0,65 mm (0.0256 in.)	
		Multi form media up to 0.65 mm (0.0256 in.). Overall thicker than 0,35 mm (0.0138 in.) may cause print quality degradation in last copy.	

Table 6.1 Cut Sheet dimension

6.3 Passbooks

			Minimum	Maximum
Paper Weight			75 g/m^2	120 g/m^2
Thickness	(overall, within cover spine)			2.7 mm (0.106 in.)
	Multiple Page Passbooks (except cover spine)			
		Horizontal/vertical Fold	0.28 mm (0.011 in.)	1.80 mm (0.071 in.)
	Thickness difference across the fold of an open passbook			
		Horizontal/Vertical Fold	-	1.52 mm (0.059 in.)
	Single Page Passbook or Ledger Cards		0.18 mm (0.0071 in.)	0.28 mm (0.011 in.)
	Covers		0.18 mm (0.0071 in.)	0.46 mm (0.018 in.)

- Passbooks with torn, folded, creased, incomplete or warped pages or covers should not be used.
- Printing on or across holes, edges, cut outs or folds is not permitted.
- Passbook covers must be of uniform thickness under the printing area.
- The fold of all pages and the stitching must coincide with the cover fold. The stitches should be spaced at 6 to 10 stitches per inch.
- Fiber flow on the inner sheets should be parallel to the center fold.
- The cover bulge and stitches (spine) must not exceed the following dimensions:

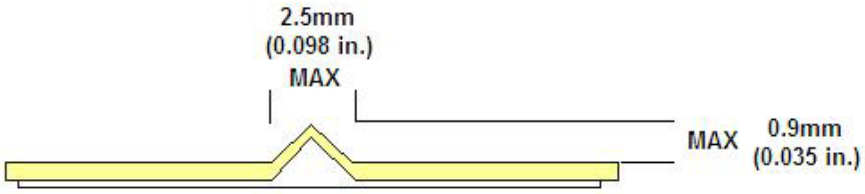


Fig. 6.2 Passbook fold dimension

6.3.1 Passbooks with Horizontal Fold

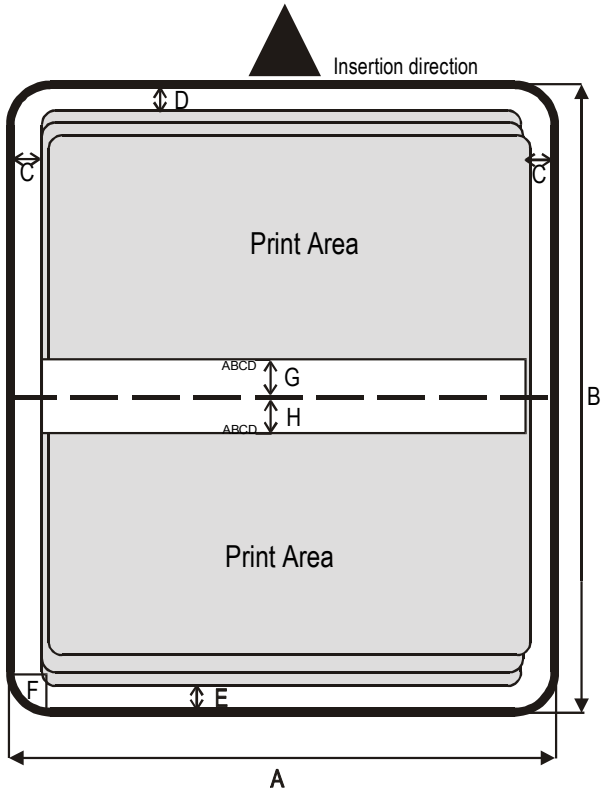


Fig. 6.3 Passbook with horizontal fold layout

	Dimension	Maximum	Minimum
A	Passbook width	241 mm (9.488 in.)	110 mm (4.33 in.)
B	Passbook length	220 mm (8.66 in.)	130 mm (5.12 in.)
C	Distance between print character position and left or right edge	-	3.0 mm (0.118 in.)
D	Distance between top edge of the document and top edge of first printed line	-	1 mm (0.0394 in.)
E	Distance between bottom of last printed line and bottom edge of the document	-	6.6 mm (0.26 in.)
F	Outer corner radius	9.35 mm (0.368 in.)	-
G	Distance from fold to bottom of the first printed line above the fold.	-	3.5 mm (0.138 in.)
H	Distance from fold to top of the first printed line below the fold.	-	3.5 mm (0.138 in.)

Table 6.3 Passbook with horizontal fold dimension

6.3.2 Passbooks with Vertical Fold

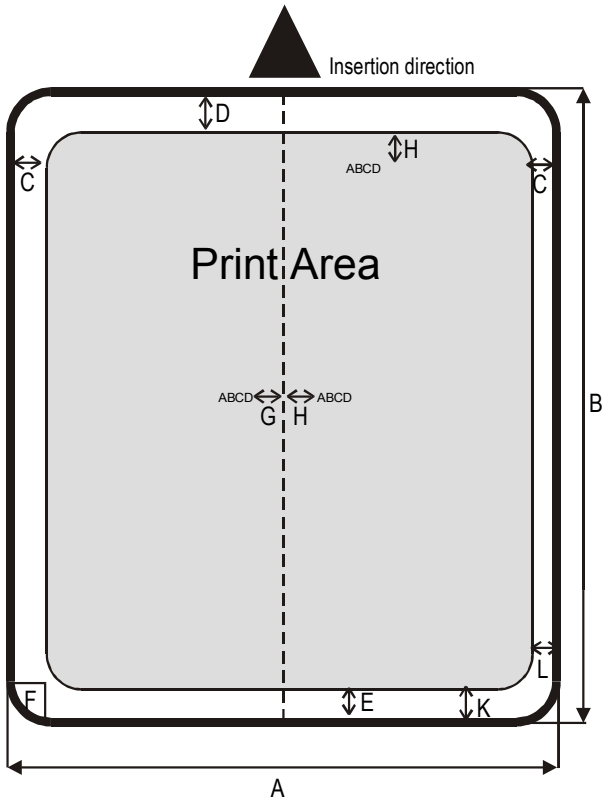


Fig. 6.4 Passbook with vertical fold layout

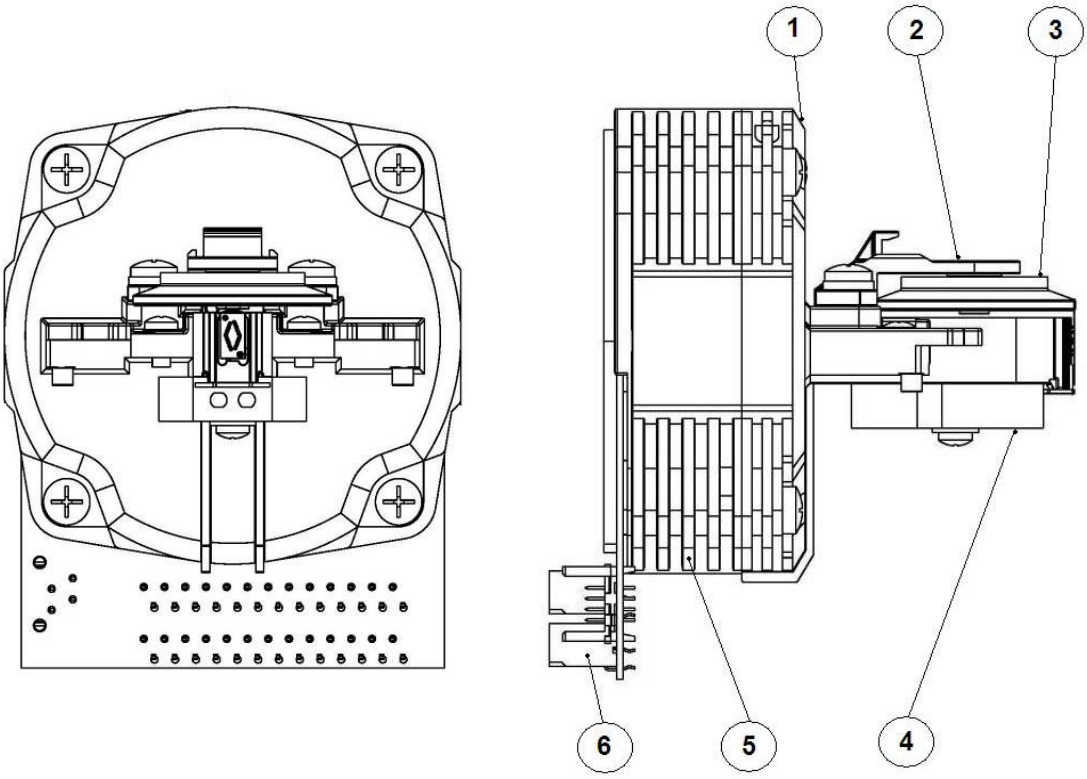
	Dimension	Maximum	Minimum
A	Passbook width	241 mm (9.488 in.)	110 mm (4.33 in.)
B	Passbook length	220 mm (8.66 in.)	85 mm (3.34 in.)
C	Distance for the dot position nearest to the left or right edge	-	3,0 mm (0.118 in.)
D	Distance from the top edge of the document to the top edge of the first printed line	-	1 mm (0.0394 in.)
E	Distance from the bottom of the last printed line to the bottom edge of the document	-	6,6 mm (0.26 in.)
F	Outer corner radius	9,35 mm (0.3681 in.)	-
G	Distance from the fold to the first character position beside the fold.	-	3.5 mm (0.138 in.)
H	Distance from the fold to the first character position beside the fold.	-	3.5 mm (0.138 in.)
K-L	Short Page Offset	-	0,0 mm

Table 6.4 Passbook with vertical fold dimension

Chapter 7 Electromechanical Devices

7.1 Print Head

- N° of needles	: 24
- Needle diameter	: 0.25 mm (0.0098")
- Vertical pitch	: 0.282 mm (2/180")
- Horizontal pitch	: 0.106 mm (1/240")
- Coil resistance	: 4.0 ohm ±10% at 20 °C
- Thermal sensor	: 1.000 ohm ±1% at 25 °C
- Insulation resistance	: Min. 4 Mohm at DC 500 V
- Allowable coil temp.	: 160 °C
- Maximum operating frequency	: 2400 Hz in Alphanumeric and graphic mode
- Maximun operating temperature	: 100°C Alphanumeric mode
	: 90 °C Graphic mode



1) Support
2) Wheel Support
3) Wheel
4) Edge Sensor
5) Electromagnetic Group
6) Connectors

Fig. 7.1 - Print Head Architecture

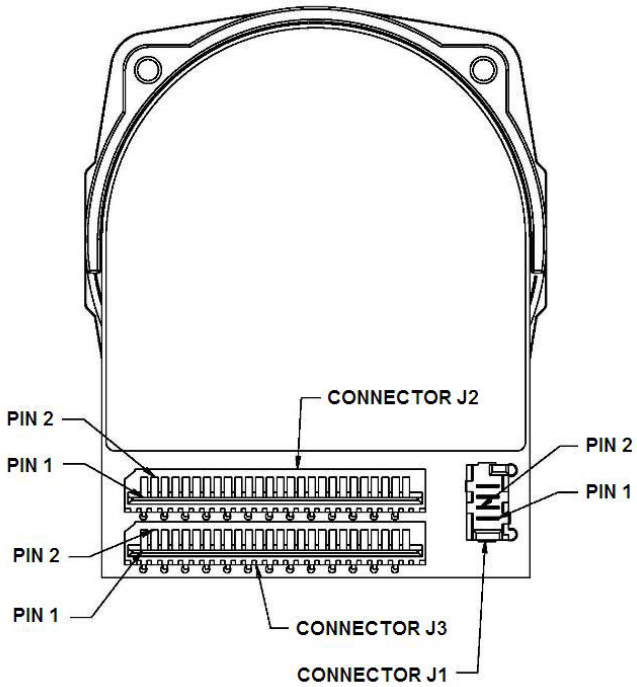


Fig. 7.2 - Print Head Connection (rear view)

CONNECTIONS:

PIN	J2	J3	J1
26	NEEDLE 16A	ZGND	
25	NEEDLE 16B	COLL.	
24	NEEDLE 12A	SENS TMP	
23	NEEDLE 12B	ANOD.	
22	NEEDLE 10A	NEEDLE 14A	
21	NEEDLE 10B	NEEDLE 14B	
20	NEEDLE 20A	NEEDLE 18A	
19	NEEDLE 20B	NEEDLE 18B	
18	NEEDLE 06A	NEEDLE 08A	
17	NEEDLE 06B	NEEDLE 08B	
16	NEEDLE 24A	NEEDLE 22A	
15	NEEDLE 24B	NEEDLE 22B	
14	NEEDLE 02A	NEEDLE 04A	
13	NEEDLE 02B	NEEDLE 04B	
12	NEEDLE 03A	NEEDLE 23A	
11	NEEDLE 03B	NEEDLE 23B	
10	NEEDLE 21A	NEEDLE 01A	
9	NEEDLE 21B	NEEDLE 01B	
8	NEEDLE 07A	NEEDLE 05A	
7	NEEDLE 07B	NEEDLE 05B	
6	NEEDLE 11A	NEEDLE 19A	
5	NEEDLE 11B	NEEDLE 19B	
4	NEEDLE 17A	NEEDLE 15A	ANOD.
3	NEEDLE 17B	NEEDLE 15B	ZGND
2	NEEDLE 13A	NEEDLE 09A	ZGND
1	NEEDLE 13B	NEEDLE 09B	COLL.

Table 7.1 - Print Head Electrical pin-out

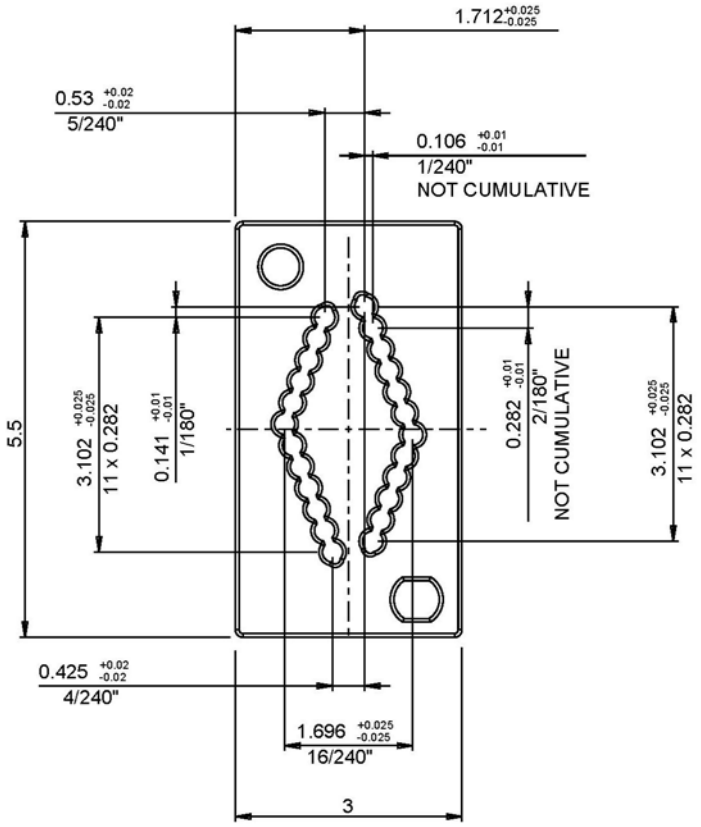


Fig. 7.3 - Needles position (rear view)

OPERATION:
With reference to Fig 7.4a / 7.4b, when the actuator is at rest, the Clapper < 1 > is pushed against the central Stopper < 2 > by the hinge O-Ring < 3 > Fig. 7.4a.
When a dot has to be printed, a proper current pulse is applied to the Coil < 4 > the Clapper < 1 > is attracted by the Core < 5 > and the needles are pushed against the Media < 6 > Fig. 7.4b.

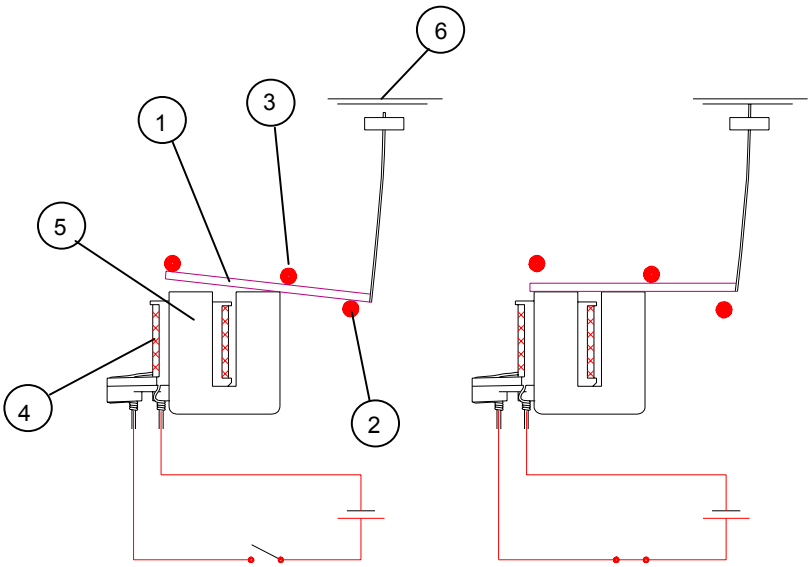


Fig. 7.4a - P.H. Operation

Fig. 7.4b - P.H. Operation

7.2 CARRIAGE MOTOR

Step Angle 1.8°

Electrical phase resistance 0.84 Ω ± 15% measured at 25°C.

Phase inductance 2 mH ± 20%
Measured at 1 KHz, 100 mVpp with energized coil. Each coil should be within the tolerance range, independently of the detent position.

Rated motor voltage 2.1 V
With rated voltage applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperatur 25°C.

Rated phase current 2.5 A
With rated phase current applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperature 25°C.

Insulation Class B
Insulation classification is in accordance with IEC publication 85, the coils maximum temperature is 120°C. Coil temperature is measured using the resistance method.

Insulation Resistance 100 MΩ with 550 Vdc.

Insulation Voltage 500 Vac. 1 minute

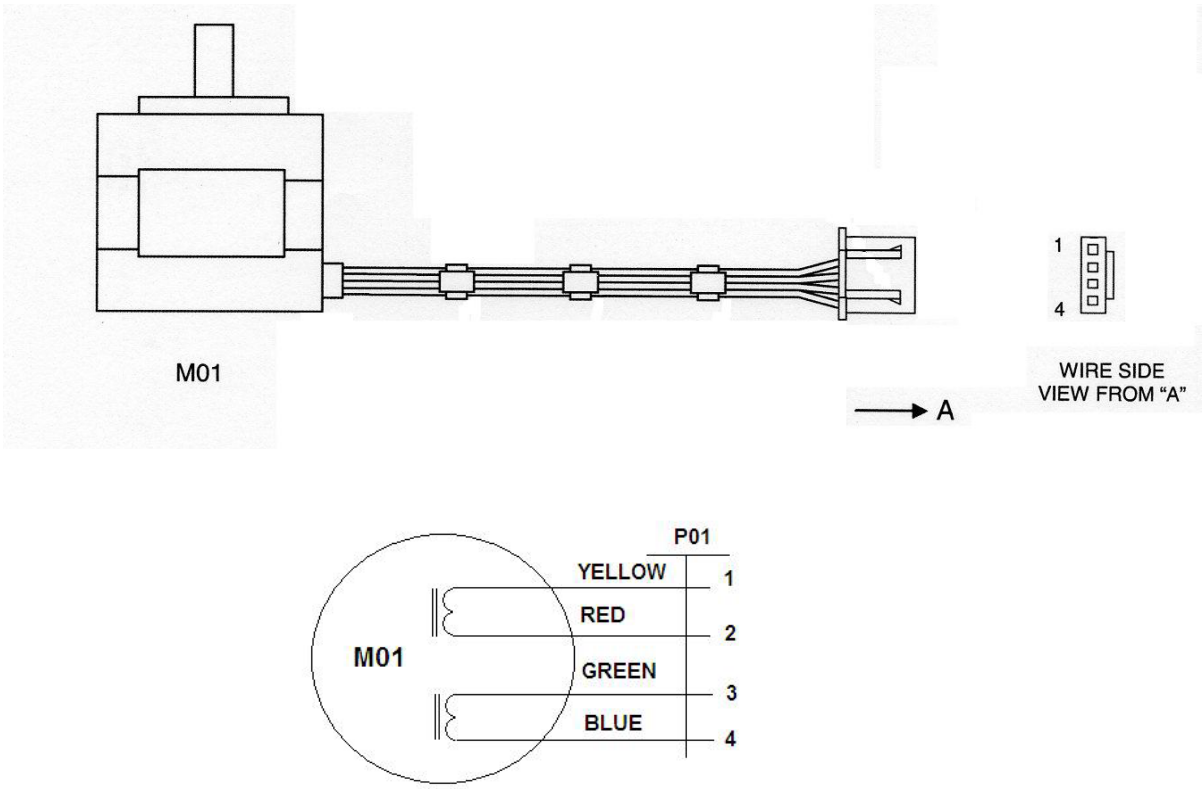


Fig. 7.5 - Carriage Motor layout

7.3 PAPER MOTOR

Step Angle	1.8°
Electrical phase resistance	3.8 Ω ± 10% measured at 25°C.
Phase inductance	11 mH ± 20%

Measured at 1 KHz, 100 mVpp with energized coil. Each coil should be within tolerance range, independently of the detent position.

Rated motor voltage 3.85 V

With rated voltage applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperatur 25°C.

Rated phase current 0.42 A

With rated phase current applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperature 25°C.

Insulation Class B

Insulation classification is in accordance with IEC publication 85, the coils maximum temperature is 120°C. Coil temperature is measured using the resistance method.

Insulation Resistance	100 MΩ with 550 Vdc.
Insulation Voltage	500 Vac. 1 minute

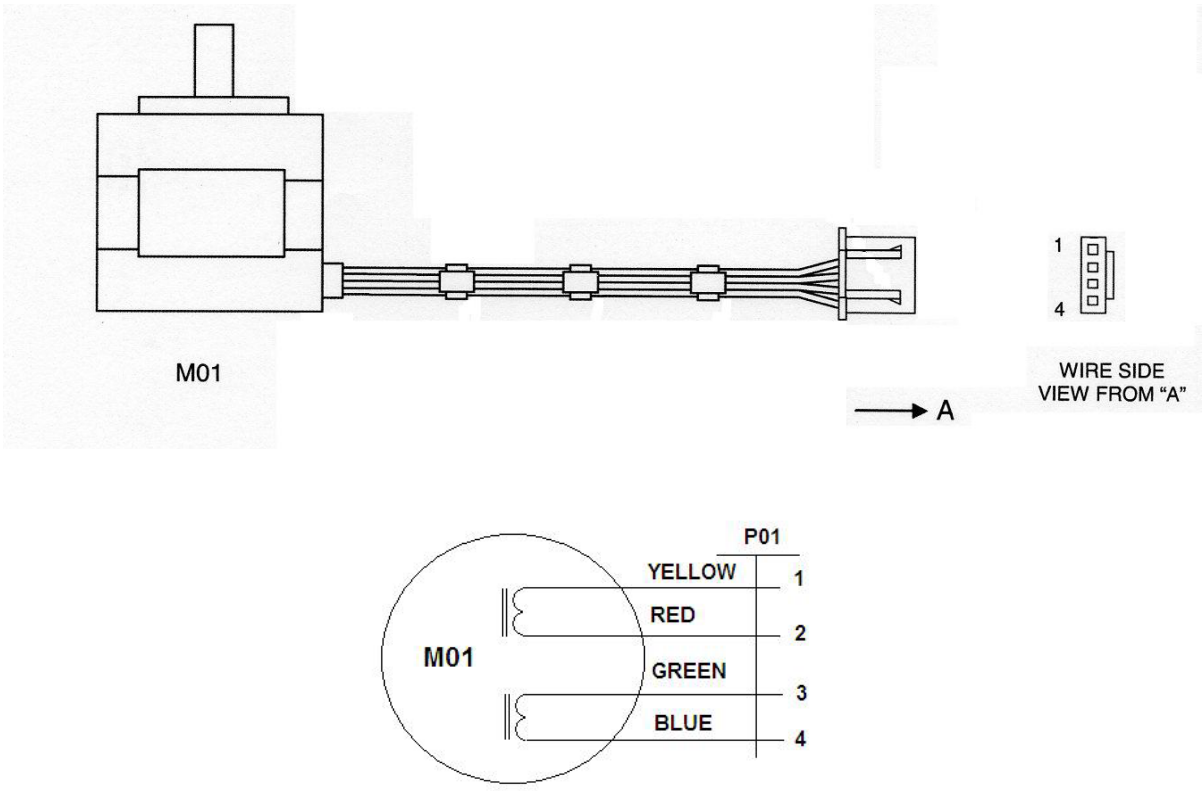


Fig. 7.6 - Paper Motor layout

7.4 SELECTOR MOTOR

Step Angle	7.5°
Electrical phase resistance	7.5 Ω ± 10% measured at 25°C.
Phase inductance	13 mH ± 15%

Measured at 1 KHz, 100 mVpp with energized coil. Each coil should be within tolerance range, independently of the detent position.

Rated motor voltage 3.75 V

With rated voltage applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperature 25°C.

Rated phase current 0.5 A

With rated phase current applied to both phases (parallel), the coils reach the limit of insulation class with motor in air and ambient temperature 25°C.

Insulation Class B

Insulation classification is in accordance with IEC publication 85, the coils maximum temperature is 120°C. Coil temperature is measured using the resistance method.

Insulation Resistance 100 MΩ with 550 Vdc.

Insulation Voltage 500 Vac. 1 minute

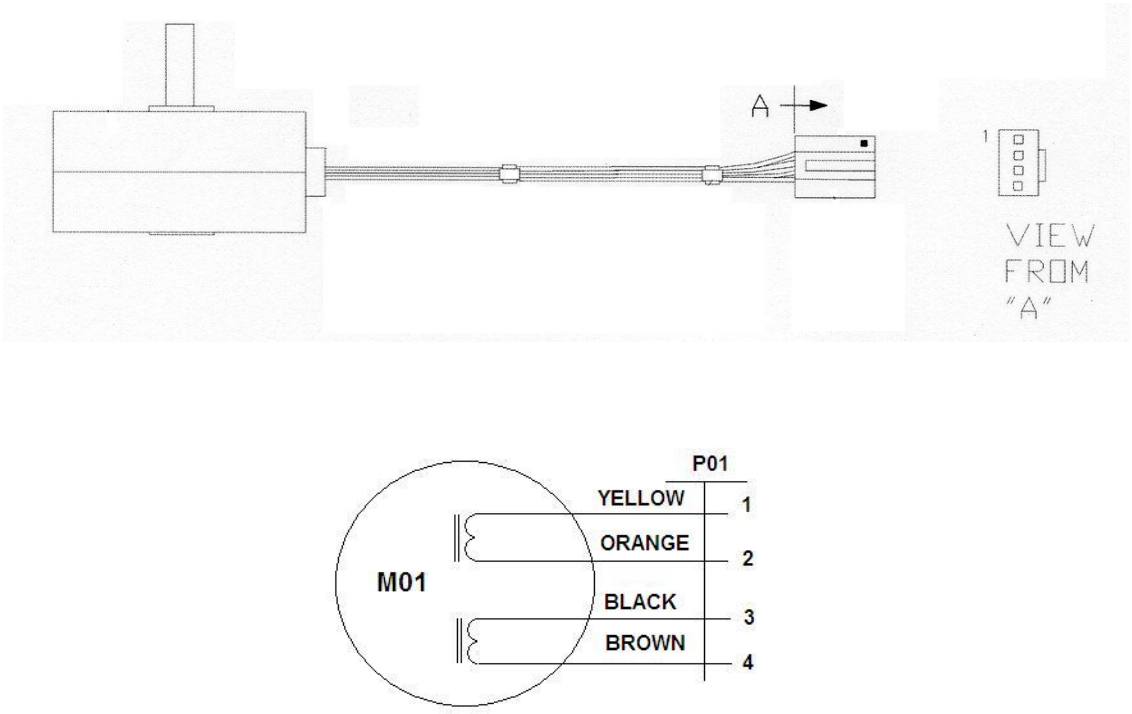


Fig. 7.7 - Selector Motor layout

7.5 SENSORS

Edge Sensor - To detect the paper edge. It is an optical reflection sensor installed on the carriage assy together with the print head.

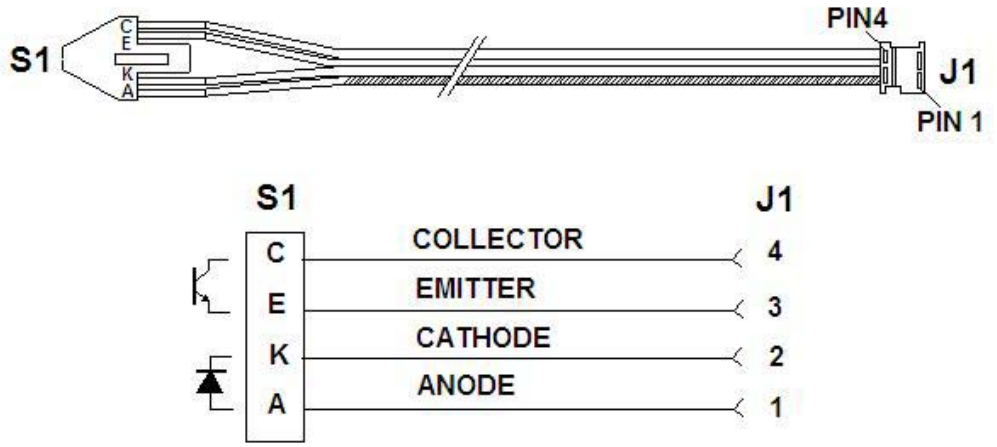


Fig. 7.8 - Edge Sensor

Home Sensor - To detect home position for the carriage assy. It is an optointerrupter installed on the left side of the vertical frame.

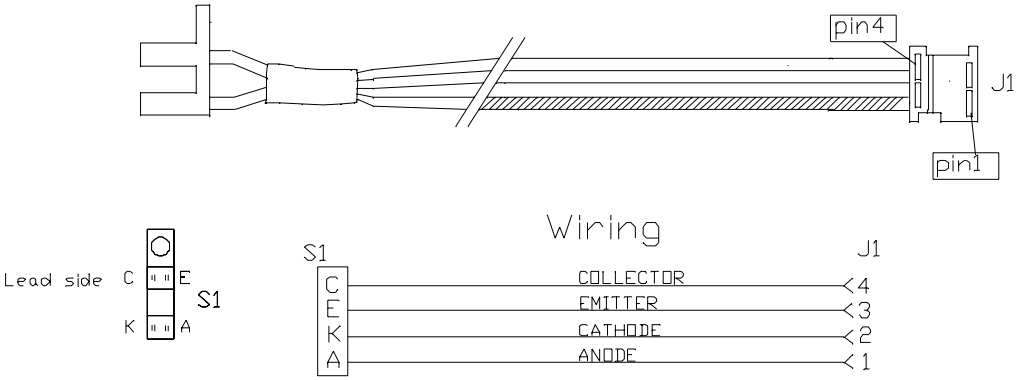


Fig. 7.9 - Home Position Sensor

Sensor Board - To detect loading and skewing of the media. The light emitted by pfhotodiodes on the board is transmitted by the optical fibres to the phototransistors on the same board.

The two following sensor are able to detect loading paper:
D1 ⇒ Q1
D2 ⇒ Q2

The four following sensor are able to detect skewing:
D3 ⇒ Q3
D4 ⇒ Q4
D5 ⇒ Q5
D6 ⇒ Q6

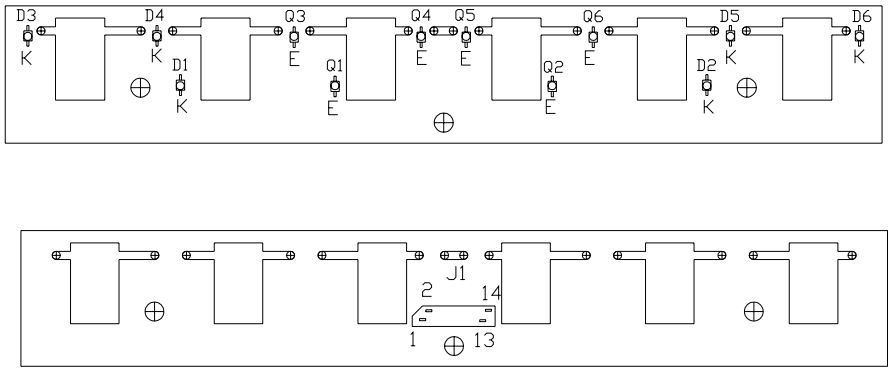


Fig. 7.10 - Sensor Board and Optical Fibre (component and soldered layout)

J1-1	Katode D3
J1-2	Katode D1
J1-3	Katode D4
J1-4	Katode D5
J1-5	Katode D2
J1-6	Katode D6
J1-7	Anodes (all leds)
J1-8	Collectors (all transistors)
J1-9	Emitter Q6
J1-10	Emitter Q5
J1-11	Emitter Q2

Table 7.2 Sensors Board pin-out

Note:
-the collector of Q2 is connected to emitter of Q1
-the collector of Q5 is connected to emitter of Q3
-the collector of Q6 is connected to emitter of Q4

Chapter 8 Mechanical Adjustments

8.1 Overview

This chapter describes the procedures for the basic printer mechanical adjustments.

- Print Head Gap Adjustment
- Paper Belt Tension Adjustment
- Carriage Belt Tension Adjustment

8.2 Print Head Gap Adjustment

This adjustment is required only if the platen assembly is removed and/or the two adjustment gap cams position has been changed.
Its verification it is also recommended when some parts of the mechanical assembly related to the gap are removed and the distance between the print head needles / AGA wheel and the platen is changed.

Tool: **Feeler Gauge**
Standard Values: **0.15 – 0.20 – 0.25 (mm)**

Remark: **The gap cams are painted with a reference mark corresponding to the manufacturing adjustment. Use these mark as reference for an adjustment without any tools.**

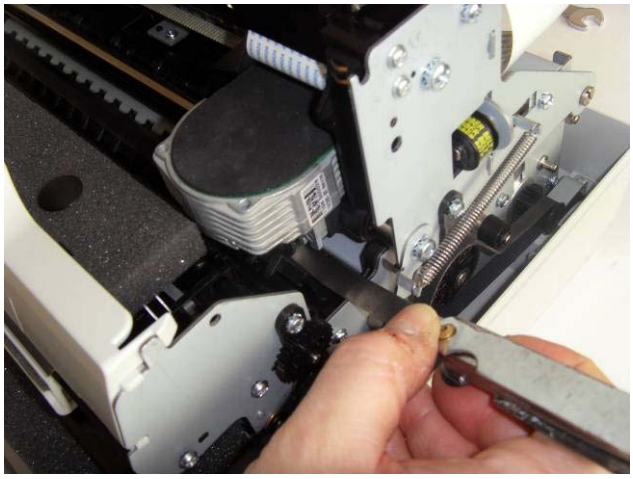
If the marks are missing and/or the adjustment gap cam position is changed, to assure the correct parallelism and the correct gap between platen and AGA wheel, follow this procedure:

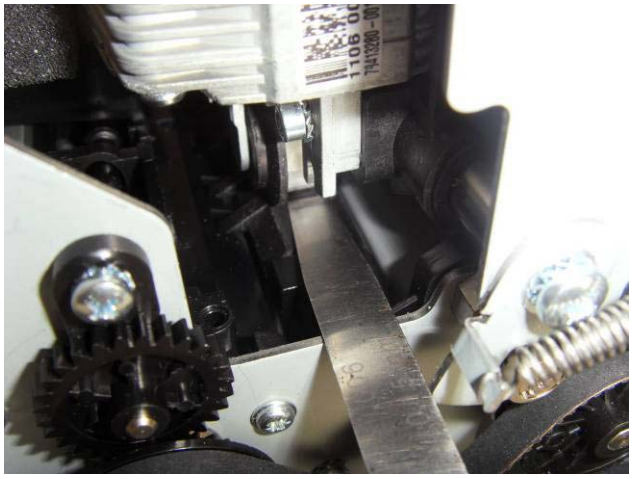
1) Remove the main cover.
2) Remove the inked ribbon cartridge.
3) Remove the mylar bar assembly.
4) Be sure the upper mechanical assembly is correctly closed.
5) Move the print head in the right most position.
6) Gently insert the feeler gauge between the print head noose and the platen assembly. Be sure the test is done outside the AGA wheel as indicated in the figures below and in next page.
7) Repeat the action with the print head in the left most position.

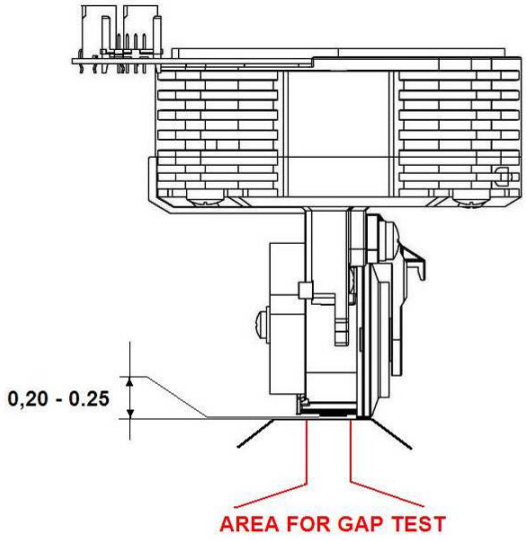
   The standard values must be the following:

   - The 0.15mm gauge pass-through any friction
   - The 0.20mm gauge pass-through with friction
   - The 0.25mm gauge does not pass-through

REMARK:
Due to te fact that the platen assy is movable on its supports (there are three springs which maintains the platen in its correct position) check for the correct platen free movement (down by pressure and up by springs release) by force it both on the right and on the left side.







8) If the above measurements are not correct the gap adjustment must be put in place.
9) Locate the two adjustment cams in left and right side.

Fig. 8.1-8.2-8.3-8.4-8.5 - Print Head Gap adjustments

10) Loose the screw tighten the alignment stud.(step A).
11) With a 8mm wrench gently moves CW or CCW the hexagonal pivot (step B) to decrease or increase respectively the gap.
In the figures and table are shown the different positions of the pivot versus the angle..
It can moves up and down form +0,75mm to -0.75mm with a relative movement progression as reported in the table below.

0° - 360°	0
15°	-0,02mm
30°	-0,08mm
45°	-0,12mm
60°	-0,15mm
75°	-0,19mm
90°	-0,20mm
-15°	+0,02mm
-30°	+0,08mm
-45°	+0,12mm
-60°	+0,15mm
-75°	+0,19mm
-90°	+0,20mm

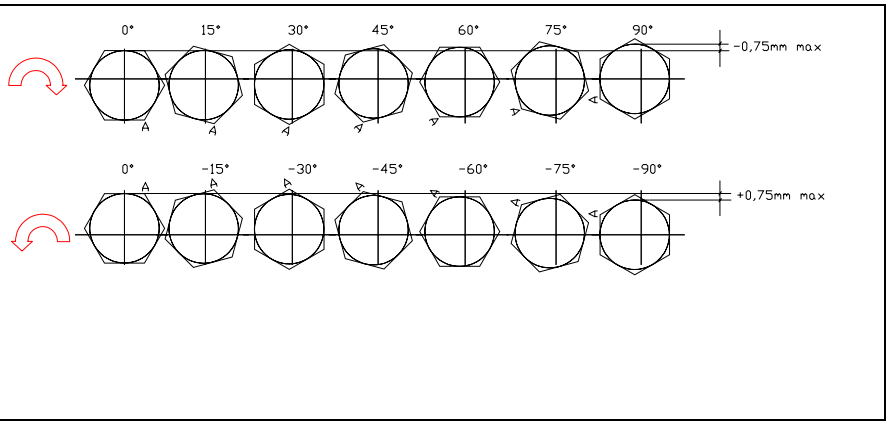


Table 8.1 - Print Head Gap pivot movements

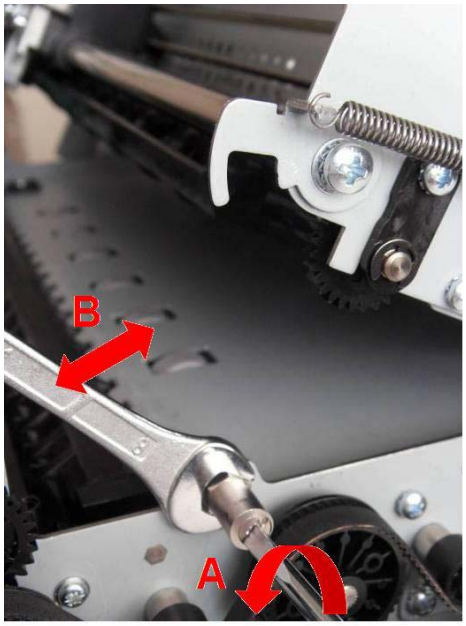


Fig. 8.6 - Print Head Gap adjustments

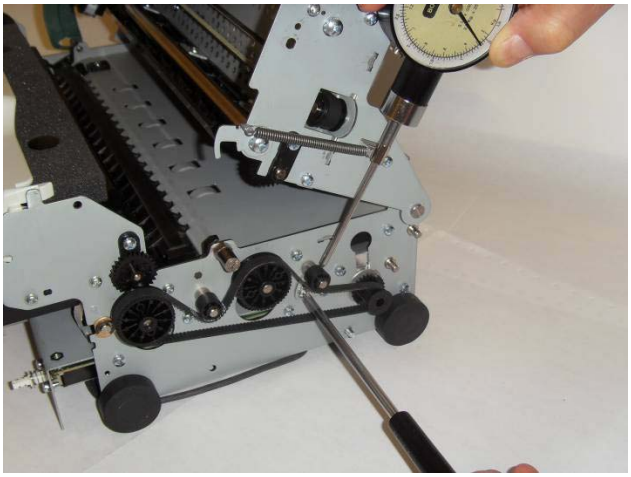
8.3 Paper Belt Adjustment

This adjustment is required when the paper motor or some mechanical parts related to the paper belt installation are removed.

Standard value: **1000gr ± 100gr**
Tool: **Pull force dynamometer**

1. Remove the main cover.
2. Remove the mechanical assembly from the base.
3. Loose the two screws A and B securing the idle pulley roller.
4. Apply the specific load F1 pulling down the idle roller as indicated by the arrow.
5. Securing the screw A and then the screw B.

After this adjustment is necessary to run the T&D procedures (see chapter 5) to check if there is problems in the paper movement.



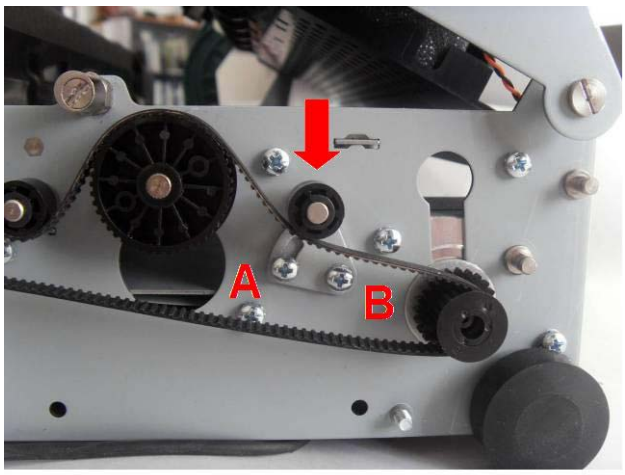


Fig. 8.7- 8.8 - Print Head Gap adjustments

8.4 Carriage Belt Adjustment

The correct belt tension is assured by the spring that keep under proper mechanical tension the support of the carriage pulley on the right side of the vertical frame.

Standard value: **6-7 mm**
Tool: **Feeler gauge or thickness spacer**

Check for a correct installation of the spring and the pulley support.
Light window between vertical frame and pulley bracket must be 6 ÷ 7 mm as showed in the figure below.
This measure assure a correct tension of the belt.
Check for the correct measure with a feeler gauge or a thickness spacer.
Set it at 6 mm. This space value must pass in the window.
Set it at 7 mm. This space value must not pass in the window.

If the values are not correct, loose the screw securing the pulley bracket to the vertical frame and change the position in order to have correct measure of the window.
Tighteen the screw.
This gives a tension value of the carriage belt of 7 Kg ± 0,5Kg.

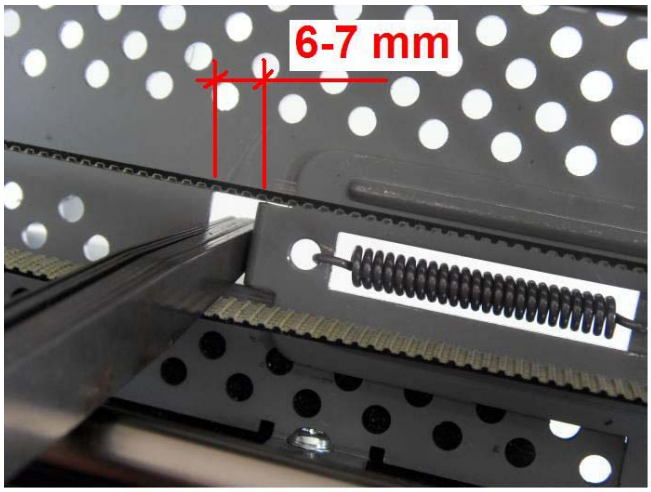


Fig. 8.9 - Carriage Belt Adjustment

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