

BJC-80

SERVICE MANUAL

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BJC-80

SERVICE MANUAL

Canon

Target Readers

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This manual was produced on an Apple Macintosh™ Power Mac 8100/100AV personal computer and Apple LaserWriter™ II NTX-J laser beam printer; final pages were printed on Agfa SelectSet Avantra 25. A YANO 230MO drive system J230MO-FX with MITSUBISHI MO disk cartridge MR230M1 were used for storing large volumes of page layout and graphic data for this manual.

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I. ABOUT THIS MANUAL

This manual is divided into five parts containing the information required for servicing the BJC-80 printer.

Part 1: Safety and Precautions

This part contains information on how to service the unit safely. It is very important, and must be read.

Part 2: Product Specifications

This part outlines the product and its specifications.

Part 3: Operating Instructions

This part explains how to operate the unit properly, how it is installed, and how to use the service mode.

Part 4: Technical Reference

This part outlines the unit operation giving a technically.

Part 5: Maintenance

This part explains maintenance of the unit. It includes details of disassembly/assembly, adjustments required when assembling, troubleshooting procedures, and wiring/circuit diagrams, etc.



REF.

This manual does not contain complete information required for disassembling and assembling the BJC-80 printer. Please also refer to the separate Parts Catalog.

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Part 1

SAFETY AND PRECAUTIONS

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1. PERSONAL SAFETY PRECAUTIONS

1.1 Moving Sections of the Printer

Be careful not to let your hair, clothes, accessories, etc., become caught in any moving sections of the printer. The moving sections of the printer are the carriage belt, and the carriage, which are driven by the carriage motor, and the paper feed roller, the eject roller, the spur, the pickup roller, etc., which are driven by the paper feed motor.

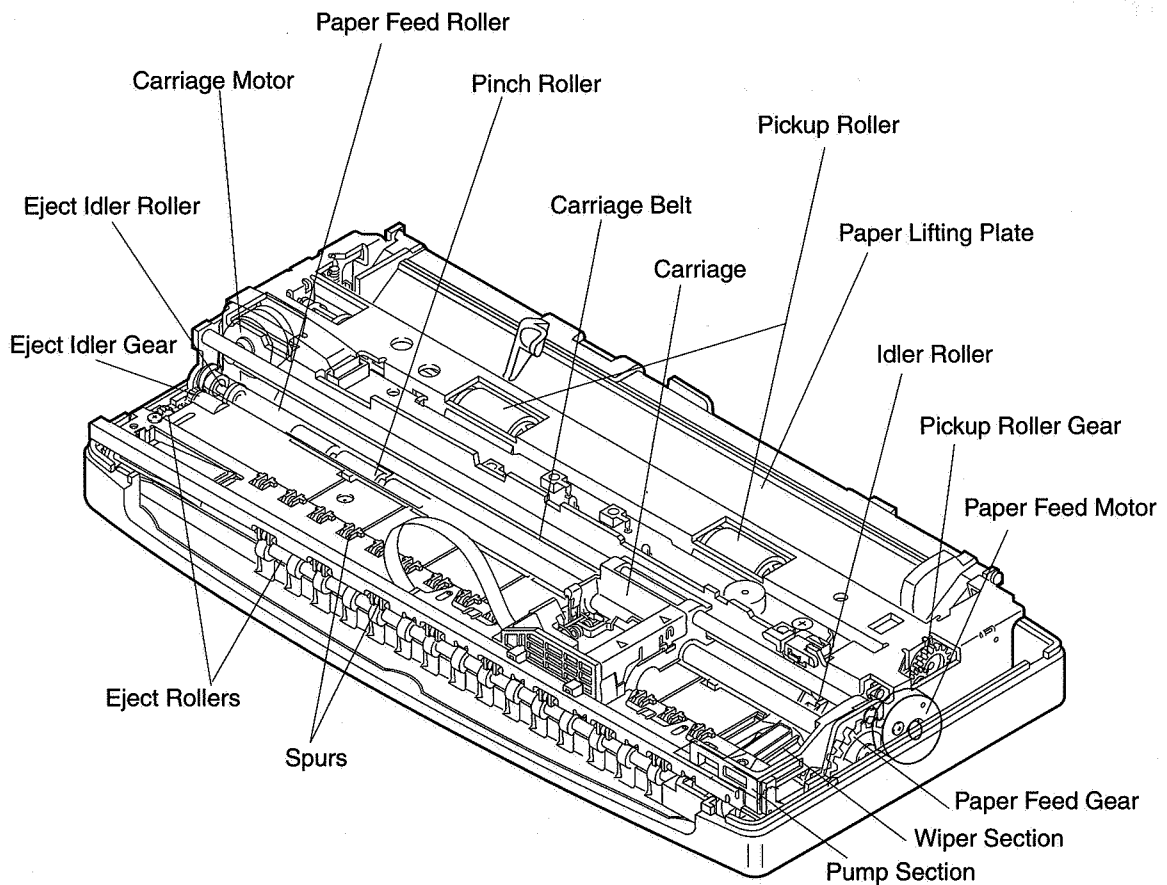


Figure 1-1 Moving Sections of the Printer

1.2 Ink Stains

1.2.1 Ink path

Be careful not to touch the ink path on the printer and get stains of the ink on work table, hands, clothes, etc., during repair.

The ink path is the nozzle section of the BJ cartridge, the head cap, the head wiper, the maintenance jet receiving section, and the waste ink absorber.

The ink inlets of the ink cartridge and the joint pipes of the print head body are also part of the ink path, so take the same care with them.



The ink is not a substance harmful to the human body, but it does contain an organic solvent (Black ink: isopropyl alcohol 67-63-0, glycerin 56-81-5, ethyleneglycol 107-21-1, Color ink: isopropyl alcohol 67-63-0). Be careful not to get any ink in your mouth or eyes. If you do get any into your eyes, wash it out with plenty of water and consult a doctor. If you somehow swallow a large amount of the ink, consult a doctor immediately. At that time, please communicate the items written on the BJ cartridge label. Since this ink contains dyes, if you get it on your clothes, etc., it will not come out.

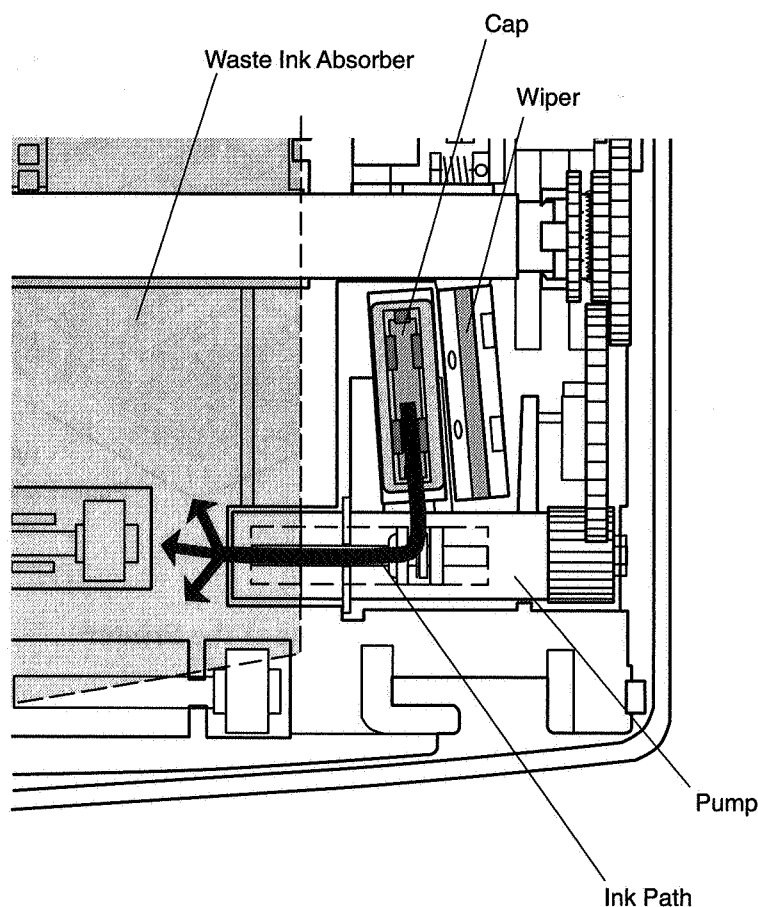


Figure 1-2 Ink Path

1.2.2 Ink mist

The BJ cartridge ejects the ink onto the paper. After the printer has been used for a long time or under heavy duty use, a small amount of ink mist bouncing back off the paper during printing may have soiled the platen section and the purge section. This soiling may soil the paper or the hands or clothes of service personnel, so wipe it off with a soft cloth or the like dampened with water.

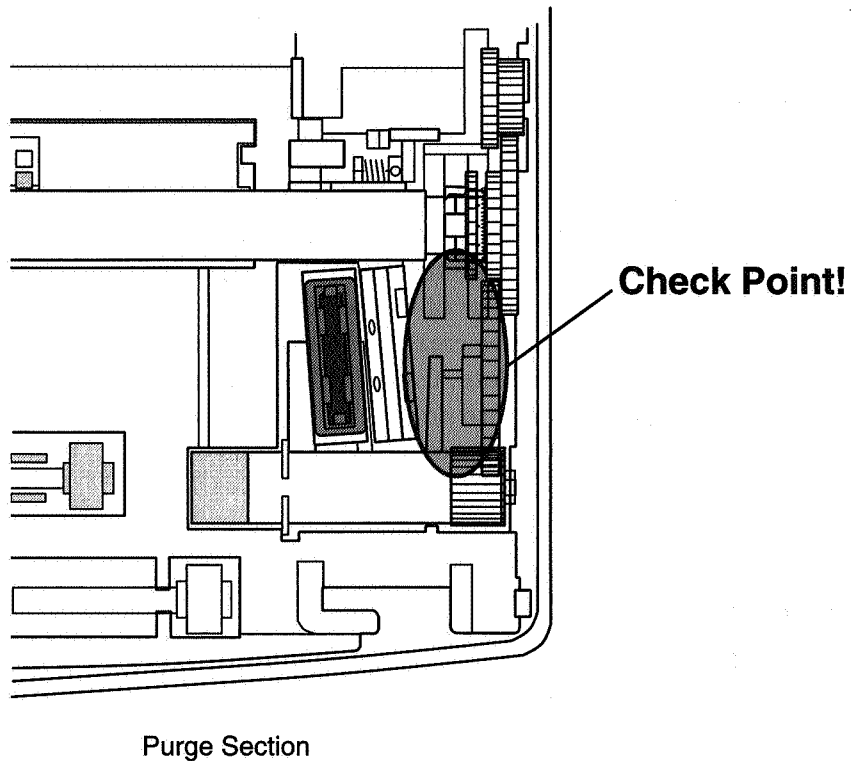
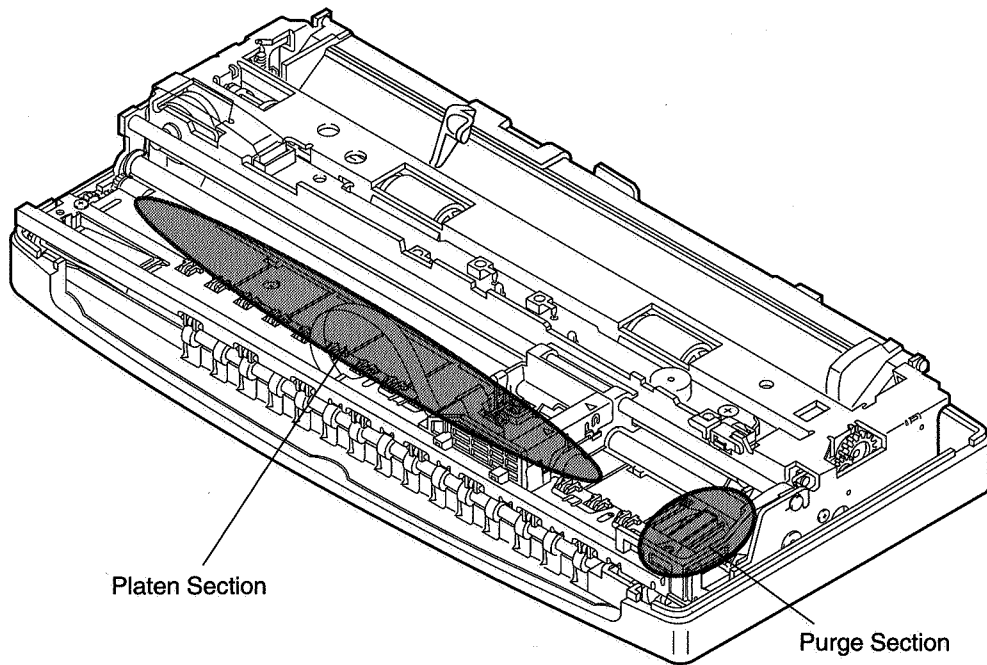


Figure 1-3 Ink Mist

1.3 BJ Cartridge Aluminum Plate

Do not touch the aluminum plate of the BJ cartridge. The aluminum plate heats up during printing and becomes particularly hot during continuous high duty printing. It also heats up if printing is operated after the ink in the cartridge has run out.

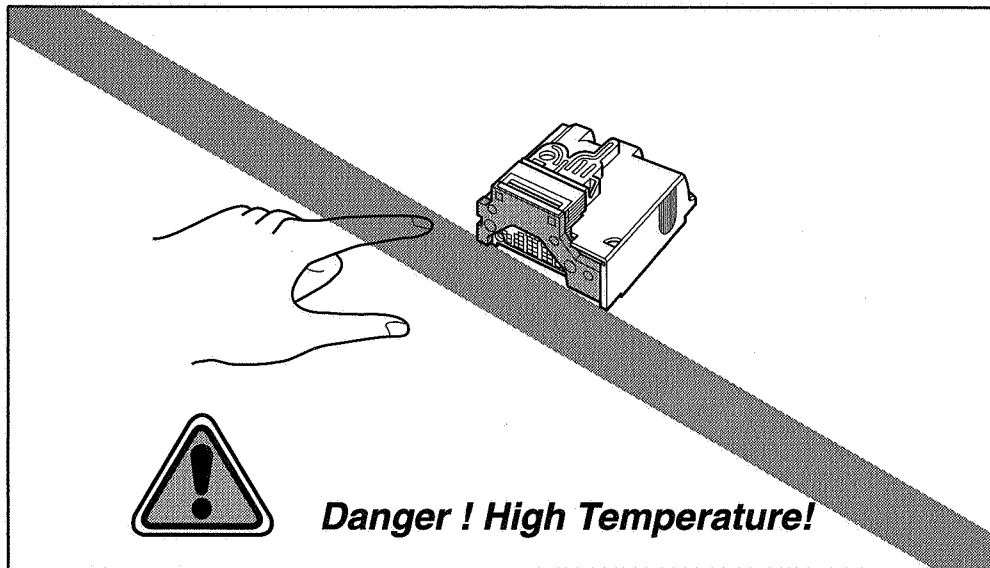


Figure 1-4 BJ Cartridge Aluminum Plate



This printer has the following functions to protect against the above temperature rise. The temperature is detected by the head temperature sensor in the BJ cartridge. (ex. approx. 70°C at 100%Duty printing)

- (1) During printing, if a temperature rise to above a certain temperature is detected, in order to protect the printer, until the BJ Cartridge cools down, it prints in unidirectional and with a wait after each line. Also, when a temperature rise to above a certain temperature is detected, the *ERROR* indicator blinks, and printing is slowly. Then, if this temperature continues for more than a certain period of time, the beeper sounds 8 times, the *ERROR* indicator, and *POWER* indicator blinks to indicate the head temperature error.

Since the same type of temperature rise also occurs if printing is operated after the ink in the cartridge has run out, these protective functions are triggered. Therefore, the criterion for replacing the BJ cartridge or the ink cartridge is non-fire nozzles or diminished dot size during printing or the triggering of these protective functions.



When printing is stopped by a head temperature error, handle the printer as explained in *Part 5: 5. TROUBLESHOOTING (Page 5-5)*.

2. MACHINE PRECAUTIONS

2.1 BJ Cartridge

2.1.1 BJ cartridge handling

To prevent clogging at the nozzles due to foreign matters, never touch the nozzle section of the BJ cartridge or wipe it off with tissue paper or the like. For the BJ cartridge, take the same care with the ink filter of the print head body to prevent poor ink suction due to foreign matters. Also, once you have peeled off the protection tape from a BJ cartridge, either install the BJ cartridge in the printer or store it in the cartridge container to prevent clogging at the nozzles due to ink drying or foreign objects. Do not reinstall the removed print head cap and protection tape on the BJ cartridge. For the BJ cartridge, either install it in the printer with the ink cartridge installed or store it in the cartridge container. If the ink cartridge is not attached, poor ink suction due to ink drying or foreign matters can occur. BJ cartridges cannot be disassembled, assembled, or washed.



If clogging at the nozzles or poor ink suction occurs, horizontal white lines appear in part of the printing. If cleaning does not restore proper printing, you must replace the BJ cartridge.

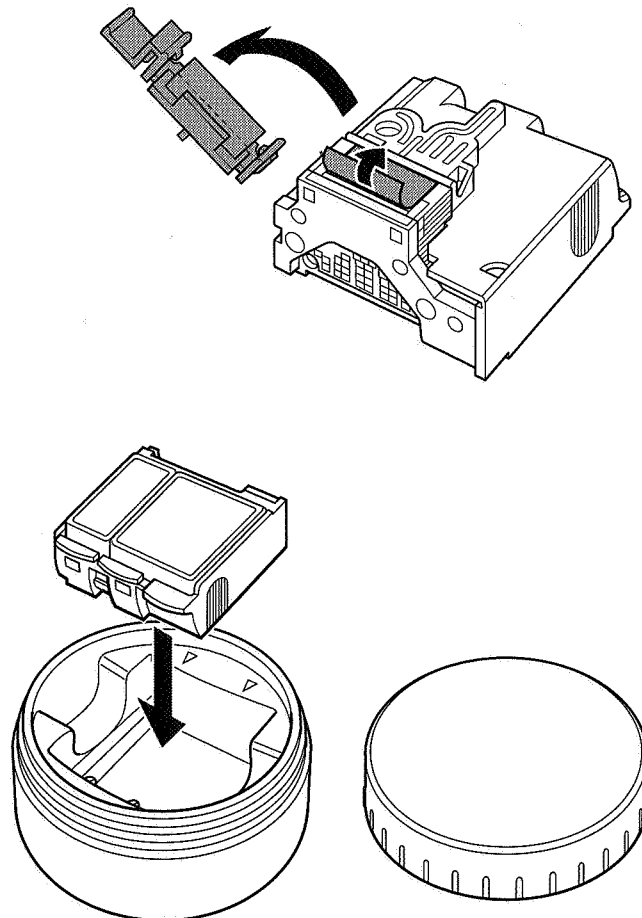


Figure 1-5 BJ Cartridge

2.1.2 Automatically capping

When the power is switched off with the *POWER* button, the printer automatically caps the nozzle section of the BJ cartridge to protect itself and prevent ink leakage. If you unplug the DC plug by mistake and cut off the power supply to the printer, plug the DC plug back in, start up the printer normally, then switch off the power with the *POWER* button.



If the nozzle section is not capped, it may clog at the nozzles due to ink drying, or the ink may leak from the nozzles.

2.1.3 When not using the printer

Even when not using the printer, leave the BJ cartridge installed in the printer or store it in the cartridge container.

Do the same when carrying, shipping or storing the printer.



If you remove the BJ cartridge from the printer and leave it as it is, foreign matters may stick or dry ink may clog the nozzle, making it impossible to use the BJ cartridge.

2.1.4 Ink conductivity

The ink in the BJ cartridge is electrically conductive. If it leaks onto a mechanical section, mop it up with a damp paper towel or the like. If it leaks onto an electrical section, mop it up completely with tissue paper or the like. Especially, if the ink enters as far as to the IC chip of the PCB, and it is hard to wipe off completely, a new PCB should be used.



If the AC adapter is connected to the printer with ink leaked, this may harm the electrical section. Never switch the power on if there has been a leak.

2.2 Ink Cartridge

2.2.1 Ink cartridge handling

To prevent poor ink suction due to foreign matters on the ink filter of the print head body, never touch the ink filter of the ink cartridge. When you remove the cap from an ink cartridge, install the ink cartridge on the print head body immediately to prevent clogging at the nozzles due to ink drying or foreign matters. Do not remove the ink cartridge unless you are replacing it.

Do not use the protection cap removed from the ink cartridge to store the ink cartridge. Install the ink cartridge in the print head immediately after unsealing the pillow bag.



If clogging at the nozzles or poor ink suction occurs, horizontal white lines appear in part of the printing. If cleaning does not restore proper printing, you must replace the BJ cartridge.

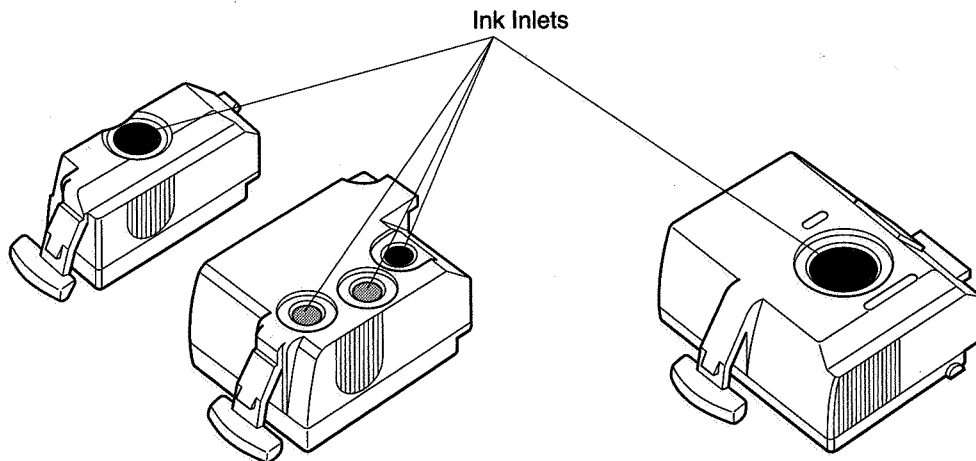


Figure 1-6 Ink Inlet of the Ink Cartridge

2.3 Printer Handling

2.3.1 Precautions to prevent damage from static electricity

The electrical charge accumulated on a person when clothes rub can damage electric elements or change their electrical characteristics. Never touch the contact section of the carriage ribbon cable.

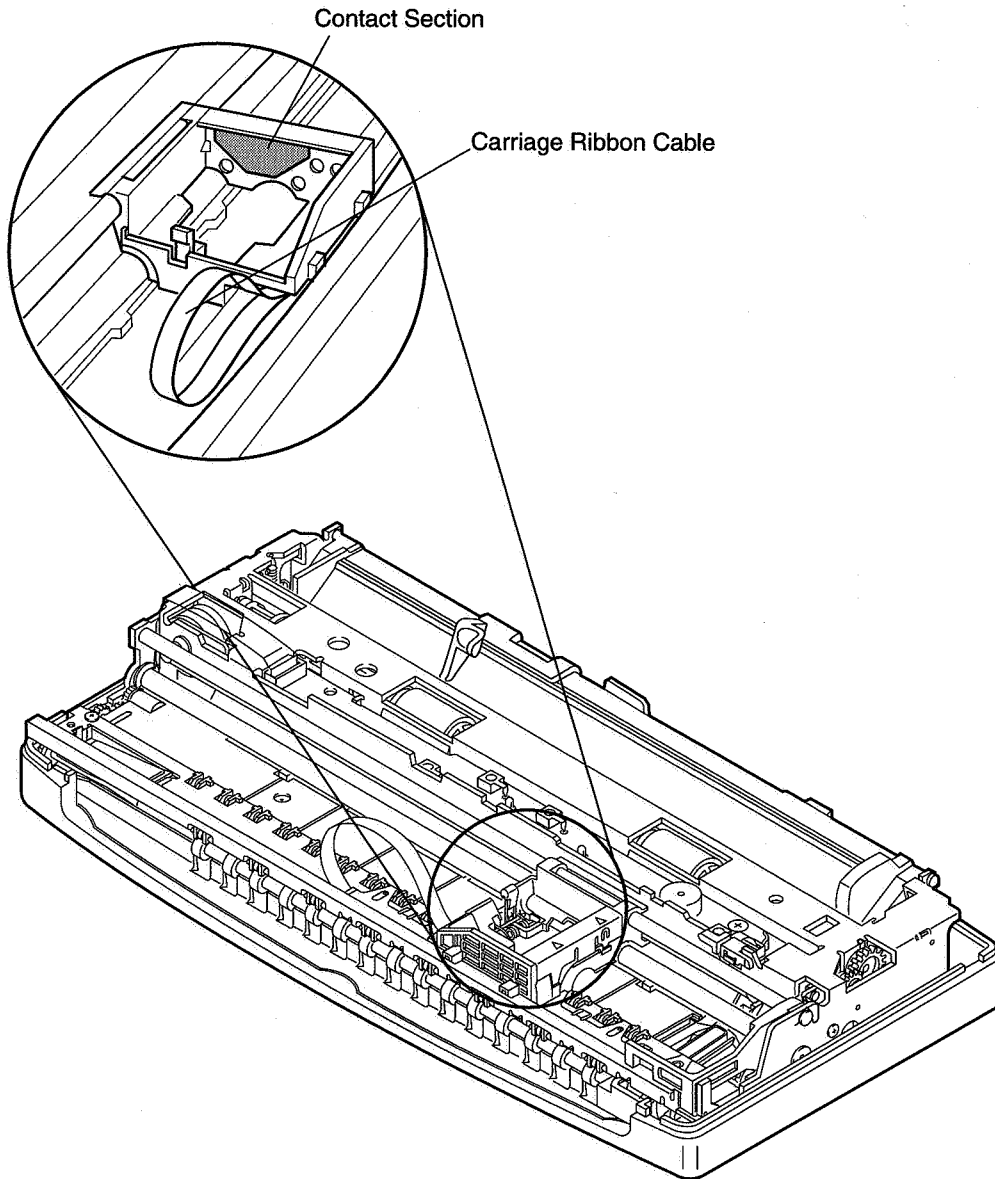


Figure 1-7 Contact Section of the Carriage Ribbon Cable

2.3.2 Ink leakage precautions

Do not carry, pack or store the printer without a BJ cartridge installed. The ink within the cap section will flow back and soil the inside of the printer.

The nozzle section of the BJ cartridge is capped automatically when the power is switched off with the *POWER* button. Be careful. If the power is cut off by unplugging the DC plug of the AC adapter, the BJ cartridge is not capped.

When the power is turned off, the carriage is locked so that it does not move from the capping position.

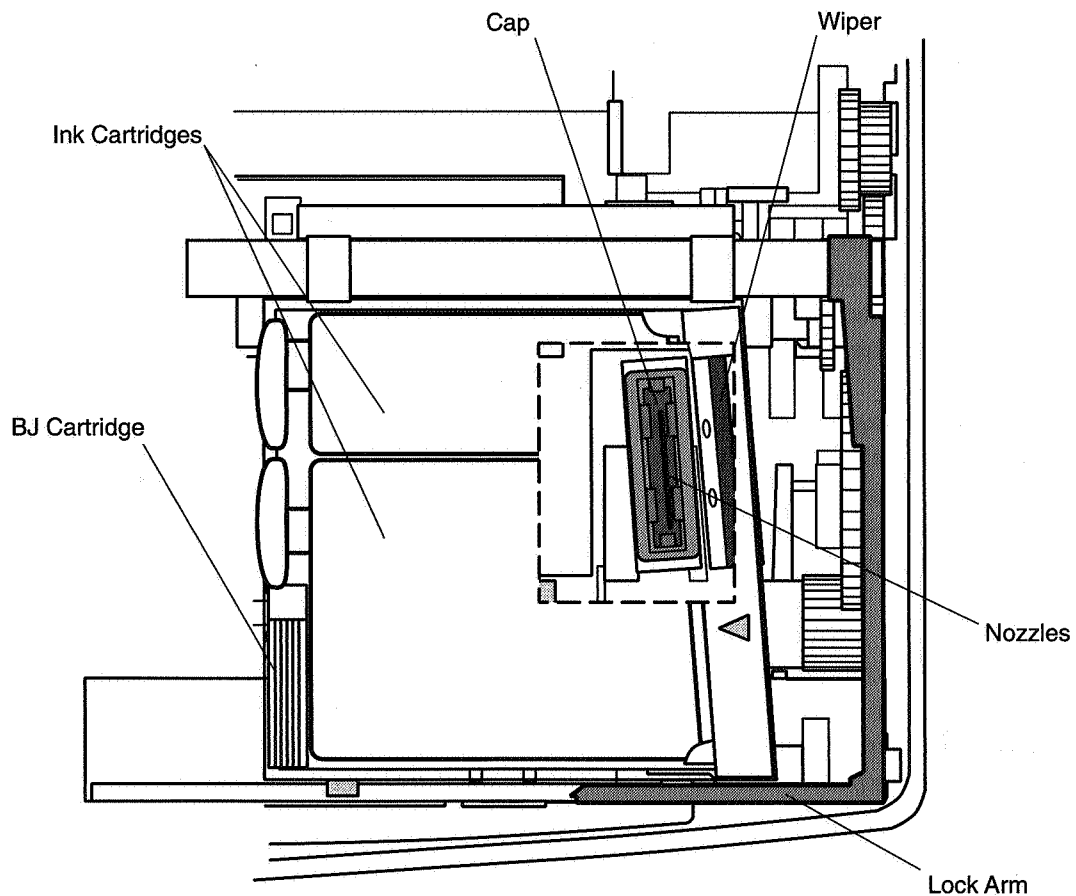


Figure 1-8 Capping Position

3. PRECAUTIONS FOR SERVICE

3.1 Precautions Concerning the Memory Data

This printer counts the total waste ink amount for the black BJ cartridge and the color BJ cartridge and stores these data in the EEPROM on the control board. Observe the following precautions during servicing.

1) Checking EEPROM data

The number of sheets printed is counted and stored in the EEPROM to show the printer operating status. This data can be printed by test print 3 (Ripple pattern print).

The waste ink quantity data is also stored in the EEPROM. This data is used to indicate a waste ink full error to prevent ink leakage if the amount of waste ink absorbed becomes full.

2) When replacing the control board

If the control board on which the EEPROM is mounted is replaced, the quantity of waste ink absorbed must be set in the EEPROM by visually checking the amount of waste ink absorbed into the absorber from behind the printer base unit.

If it is not set, the waste ink full error is not displayed, and ink may leak.

3) When replacing the printer base unit

If a waste ink full error is displayed and the printer base unit is replaced, the waste ink amount data in the EEPROM must be set to zero. If it is not set to zero, a waste ink full error is displayed and the printer stops operating before the waste ink absorber is filled with waste ink.



For details on checking the memory data with test print and for clearing them, see *Part 3: 3.6 EEPROM Data Setting (Page 3-24)*.

When operation is stopped for the waste ink full error, handle the printer as explained in *Part 5: 5. TROUBLESHOOTING (Page 5-5)*.

3.2 Precautions to Prevent Damage from Static Electricity

The electrical charge accumulated on a person when clothes rub can damage electric elements or change their electrical characteristics. In order to prevent static electricity, make sure to touch some metallic part that is grounded to release the static electricity accumulated on your body before disassembling the printer for service.

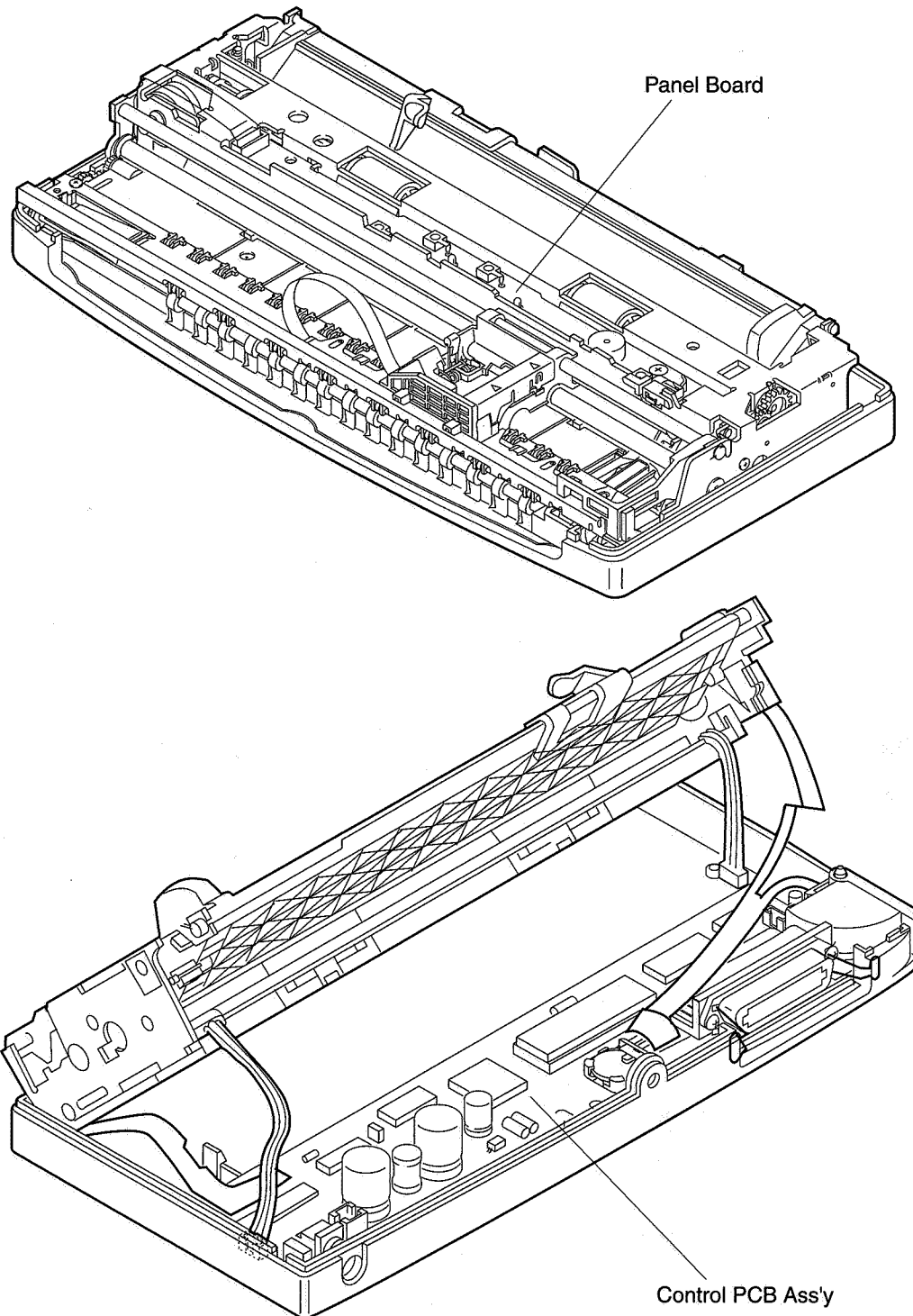


Figure 1-9 Electronic System of the Printer

3.3 Precautions for Disassembly/Assembly

The printer is made by combining many plastic parts. When disassembling the printer, be careful not to brake or bend plastic hooks.

Take special care not to deform or damage the separation sheet when replacing the printer base unit. (If the separation sheet is deformed or damaged, a paper feed error may occur.)

Details of disassembly and reassembly procedures are given in the Parts Catalog.

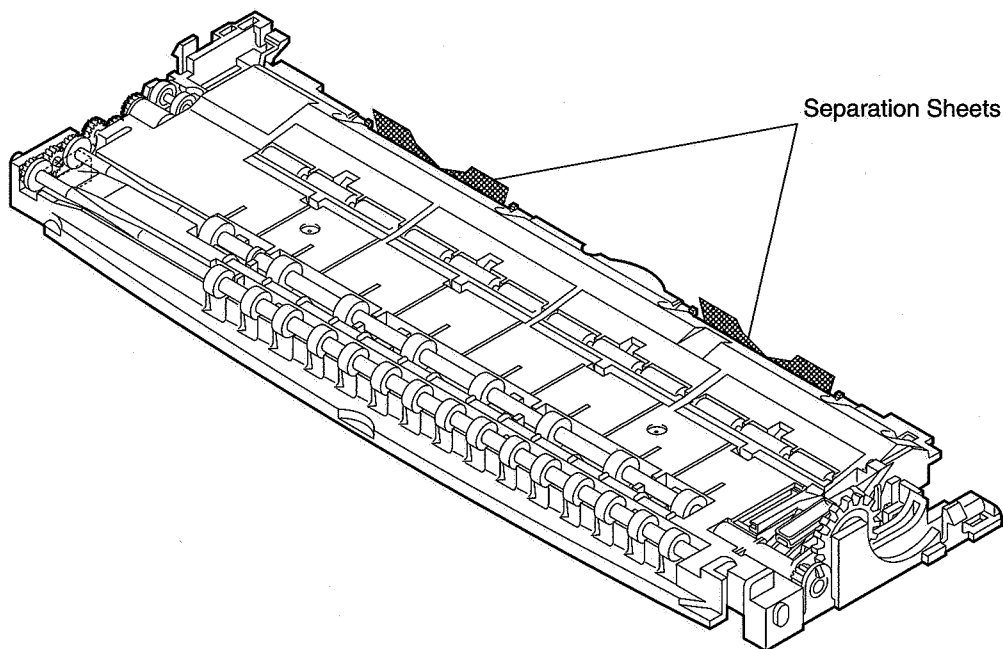
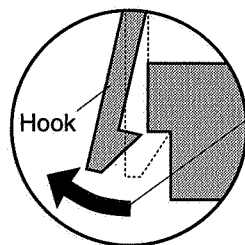


Figure 1-10 Printer Base Unit



Some of the plastic parts use high hardness materials with glass fibers to raise the part precision, but since their viscosity is low, plastic hooks break easily. Use a precision screwdriver or the like for disassembly, and do not apply excessive force to release a hook.



Never apply excessive force when releasing a hook.

Figure 1-11 How to Release Plastic Hooks

When replacing the IrDA unit, be careful not to lose or forget to install the spring and washer. (If the spring and washer are not installed, the printer may become susceptible to noises during communication).

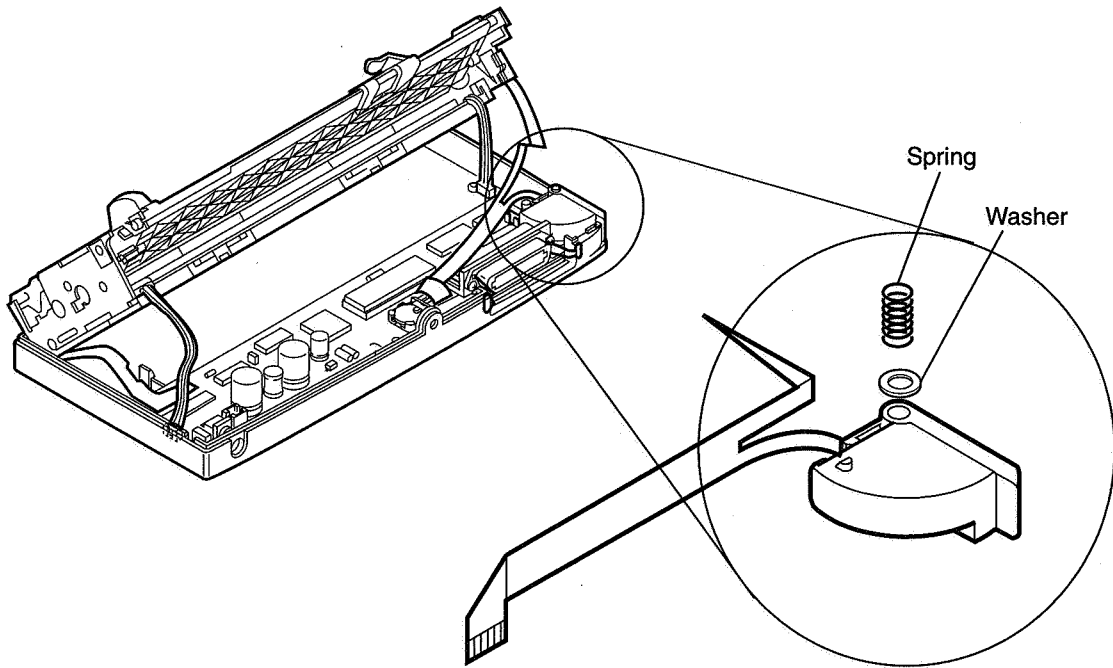


Figure 1-12 IrDA Unit

3.4 Built-in Self-diagnostic Functions

The printer has built-in self-diagnostic functions to judge hardware defects. The results of self-diagnosis are indicated by the indicators and the beeper. For details, see *Part 3: 3.1 Error Indication (Page 3-12)*.

Blank page



Part 2

PRODUCT SPECIFICATIONS

Page	
2 - 1	1. PRODUCT OUTLINE
2 - 1	1.1 Product Outline
2 - 2	1.2 Features
2 - 3	1.3 BJ Cartridge
2 - 5	1.4 Options
2 - 8	1.5 Consumables
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2 - 9	2.1 General Specifications
2 -13	2.2 Paper Specifications
2 -15	2.3 Interface Specifications
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1. PRODUCT OUTLINE

1.1 Product Outline

This printer is a bubble-jet full-color portable printer targeting the personal user market. Its main features are the use of two new BJ cartridges (the black BC-10 with a replaceable ink cartridge and a head with 128 nozzles and the color BC-11e with replaceable ink cartridges and a head with 136 nozzles that produces large and small ink droplets), high speed, 720 dpi mode printing (360 dpi × 720 dpi), the ability to print on plain paper, small size and light weight.

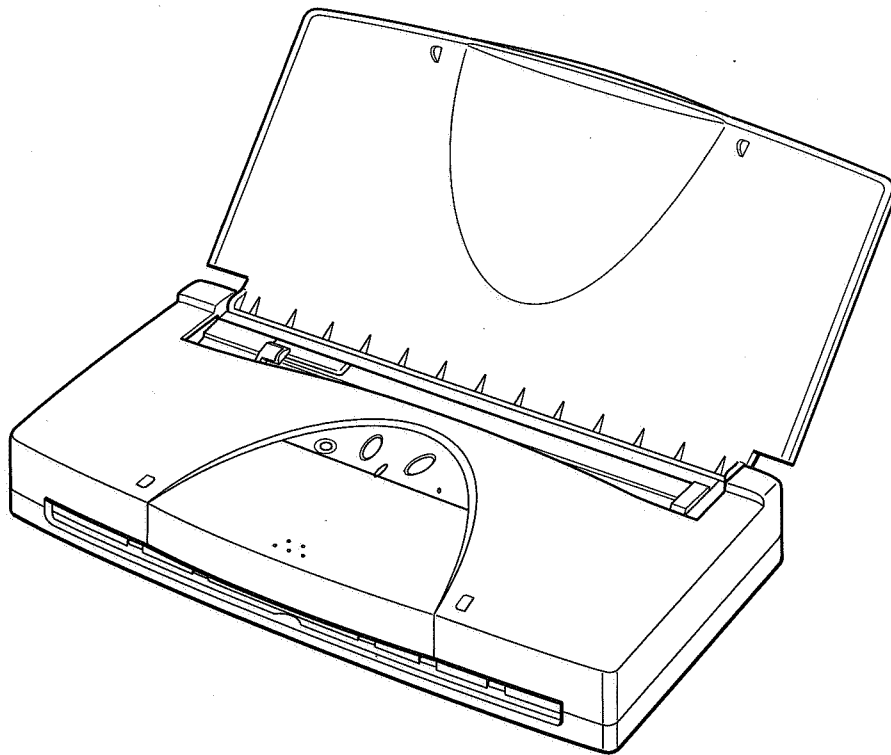


Figure 2-1 Printer Appearance

1.2 Features

1.2.1 Printer

- Compact portable size
External dimensions: 300 mm (11.8") W × 157.6 mm (6.2") D × 57 mm (2.3") H
Weight: Approx. 1.4 kg (3.1 lb) (including BJ cartridge)
- Built-in multi sheet feeder
- High-speed printing (bursts)

	HQ mode	HS mode
BC-11e black printing	173 cps (10 cpi)	217 cps (10 cpi)
BC-10	346 cps (10 cpi)	434 cps (10 cpi)

- High quality printing at 720 dpi
- Three types of built-in printer control modes as standard
 - BJ mode (IBM Proprinter X24E emulation)
 - LQ mode (EPSON LQ printer emulation)
 - Native mode (Canon extended mode)
 - BJL command
- Two new types (black, color) of BJ cartridges that the user can easily change
 - Black BJ cartridge BC-10: 128 nozzles (black), Ink cartridge replaceable.
 - Color BJ cartridge BC-11e: 136 nozzles (64 black + 3 × 24 each yellow, magenta, cyan); Black and color ink cartridges replaceable.
 - Ink cartridge BCI-10 Black: Black ink cartridge for BC-10
 - Ink cartridge BCI-11 Black: Black ink cartridge for BC-11
 - Ink cartridge BCI-11 Color: Color ink cartridge for BC-11 (yellow, magenta, and cyan all in one cartridge)
- Comes with the BJ cartridge container to be used for storing the BJ cartridge after it is removed from the printer.
- Power on/off button (A software power switch is used.)
The printer does not have a mechanical power switch that physically connects and disconnects the AC adaptor. Instead, it has the *POWER* button that starts up and shuts down printer operation. As long as the printer is plugged in, power is always being supplied to it, even when it has been turned off.
- Printing up to legal size paper
- Bidirectional Centronics Interface (IEEE 1284 compatible)
- Infrared communication (IrDA (1.0) compatible)
- Optional scanner cartridge
The printer can be used as a scanner when an image scanner cartridge (option) is installed instead of the BJ cartridge.

1.3 BJ Cartridge

1.3.1 Color BJ cartridge [BC-11e]

The BC-11e color BJ cartridge used for color printing is disposable. It comprises the print head with 136 nozzles and the replaceable ink cartridges (black and color). The heater board inside the printhead is located one in front of the other to separately print the large and small ink droplets.

If a print defect occurs, perform a cleaning. If it cannot restore the print quality, perform one or two more cleanings. If they still cannot solve the problem, perform a head refreshing. [Cleaning: 2 beep, with *RESUME* button; Head refreshing: 3 beeps, with *RESUME* button] If the head refreshing still cannot restore the print quality, replace the BJ head.

If the ink runs out or if more than six months have passed after the BJ cartridge was unsealed and the print quality is not improved by performing cleaning once or twice, the ink cartridge should be replaced with a new one. Since the color ink cartridge contains three color inks, it must be replaced if one of them runs out.

The head has a total of 136 nozzles in a line: 24 yellow nozzles, 24 magenta nozzles, 24 cyan nozzles, and 64 black nozzles.

Numbers of sheets printed

Black: Approx. 23 sheets (HQ mode, 7.5% duty per color pattern)

Color: Approx. 30 sheets (HQ mode, 7.5% duty per color pattern)

BJ cartridge is printed with high quality at 360 dpi.

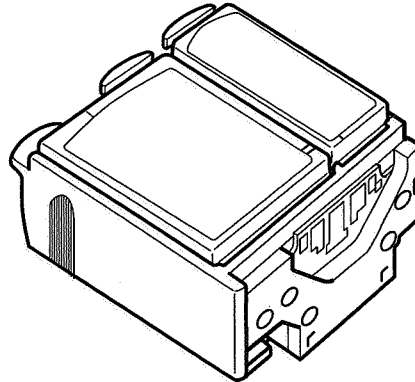


Figure 2-2 Color BJ Cartridge [BC-11e]

1.3.2 Black BJ cartridge [BC-10]

The BC-10 black BJ cartridge used for super-high speed monochrome printing is disposable. It combines the print head with 128 nozzles and the replaceable black ink cartridge.

If a print defect occurs, perform a cleaning. If it cannot restore the print quality, perform one or two more cleanings. If they still cannot solve the problem, perform a head refreshing. [Cleaning: 2 beeps, with *RESUME* button; Head refreshing: 3 beeps, with *RESUME* button] If the head refreshing still cannot restore the print quality, replace the BJ head. If the ink runs out or if more than six months have passed after the BJ cartridge was unsealed and the print quality is not improved by performing cleaning once or twice, the ink cartridge should be replaced with a new one.

The BC-10 BJ cartridge can print approx. 140 sheets (HQ mode, 1500-character pattern) and prints with the same high quality at 360 dpi as the BC-11e.



To prevent nozzle clogging, after opening the seal, either install the BJ cartridge on the printer or store it in the BJ cartridge container. Also, never touch the print head (bubble jet nozzles) or wipe it with tissue paper or the like.

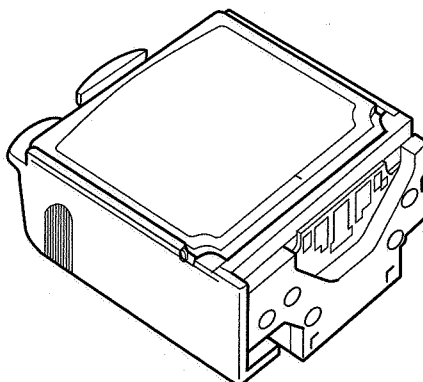


Figure 2-3 Black BJ Cartridge [BC-10]

1.4 Options

1.4.1 BJ cartridge container

The BJ cartridge container is for storing the BJ cartridge removed from the printer. When storing a BJ cartridge, close the lid securely. One BJ cartridge container can store a BC-10 or a BC-11e alternately. When storing a BC-11e, always store it with two ink cartridges (BCI-11 black, BCI-11 color) installed. (Store a BC-10 cartridge with the BCI-10 black ink cartridge installed.)

Store the BJ cartridge with the ink cartridge attached. If the ink cartridge is not attached, ink may spill out or nozzles may be clogged with ink.

When storing a BJ cartridge in the container, do not attach the protection tape and head cap to the cartridge as color mixing or foreign substances adhering to the printhead may affect the printhead performance.

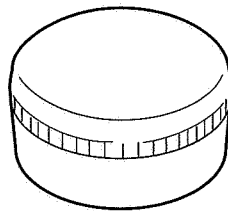


Figure 2-4 BJ Cartridge Container

1.4.2 Portable kit

The portable kit consists of a NiMH battery pack and a battery case. By installing the portable kit in the printer, it can be used with a NiMH battery in places where AC power is not available.

The NiMH battery pack can be removed from the battery case. When the NiMH battery pack is installed in the battery case and AC power is provided to the battery pack from the AC adapter supplied with the printer, the battery pack is charged automatically. It takes about 10 hours to fully charge the battery pack. The battery capacity may be lowered by the memory effect. To prevent this, the battery case has the refresh button, which can discharge the battery completely.

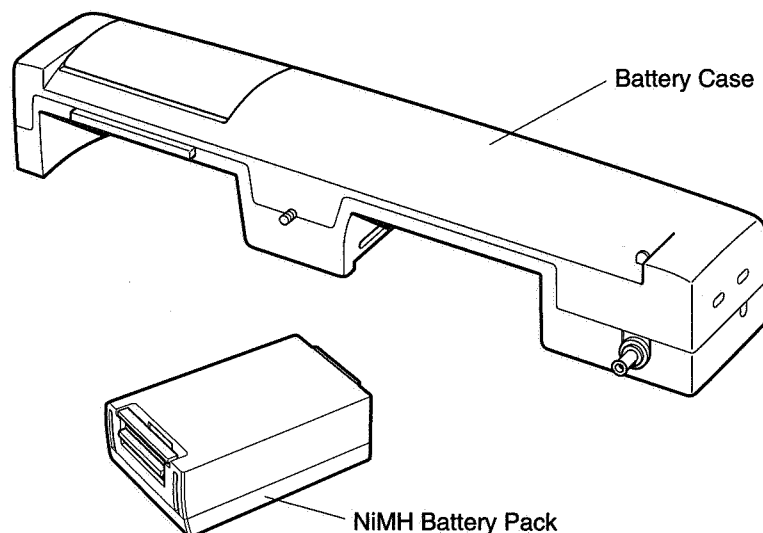


Figure 2-5 Portable Kit

1.4.3 AC adapter (AD-320) / Universal adapter (AD-360U)

There is an AC adapter adapted for each country to supply DC voltage to the printer. There is also a Universal adapter with AC plug cable, which supplies 100-250V AC input voltage to the printer.

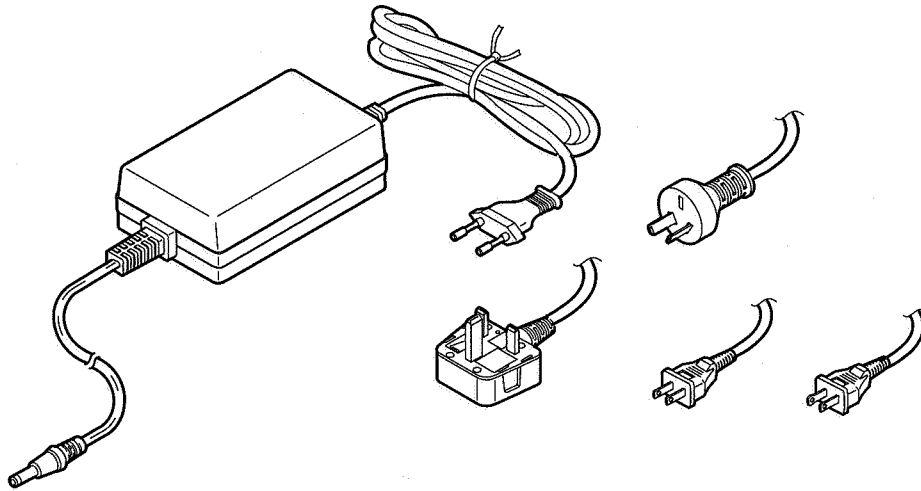


Figure 2-6 AC Adapter

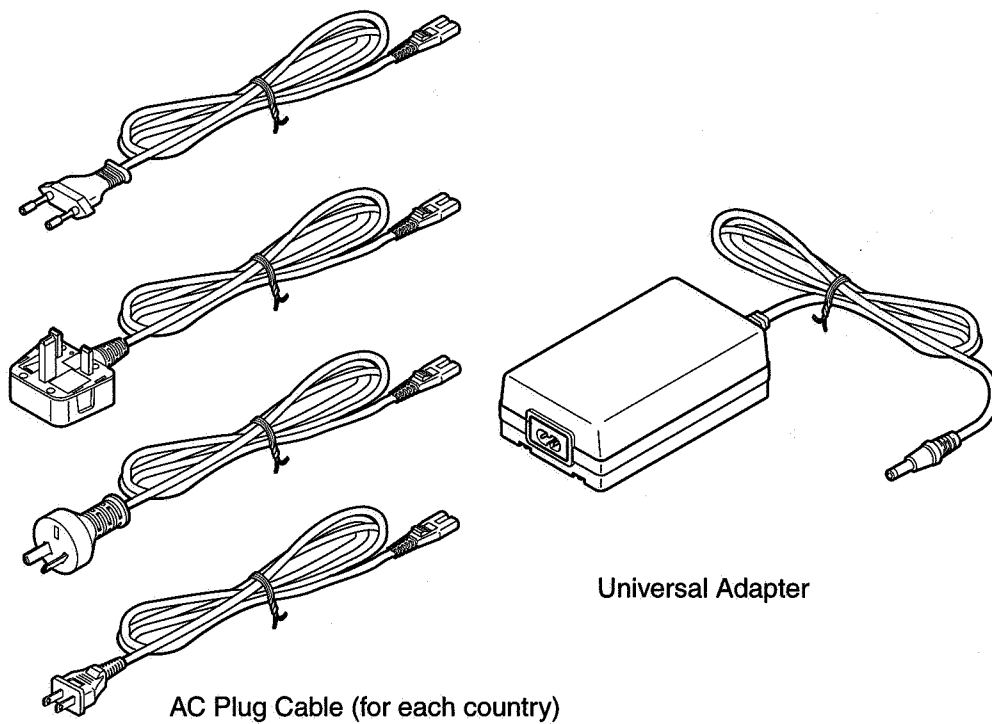


Figure 2-7 Universal Adapter

1.4.4 Color image scanner cartridge (IS-12)

The printer can be used as a color scanner when the color image scanner cartridge is installed in the printer carriage. The appearance of the color image scanner cartridge IS-12 is identical to the BJ cartridge. When the scanner drive is installed in the host computer, BJC-80 can be used as a color scanner.

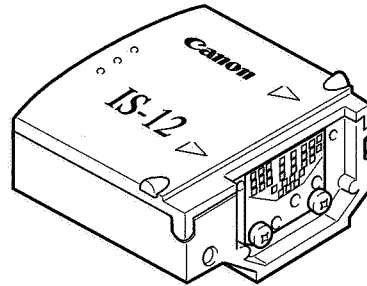


Figure 2-8 Color Image Scanner Cartridge

1.5 Consumables

1.5.1 BJ cartridge (Color and Black)

Replacement BJ cartridges are the same as the ones supplied with the printer.

1.5.2 Ink cartridge

The consumable ink cartridges are the same as the ink cartridges installed in the BC-11e color BJ cartridge and BC-10 black BJ cartridge. There are three types: BC-11e black ink cartridge (BCI-11 black), color ink cartridge (BCI-11 color), and BC-10 black ink cartridge (BCI-10 black).

Either cartridge can be used for half a year after the seal is opened.

Numbers of sheets printed:

BCI-11 Color ink cartridge

Black: Approx. 23 sheets (HQ mode) (7.5% duty per color pattern)

Color: Approx. 30 sheets (HQ mode) (7.5% duty per color pattern)

BCI-10 Black ink cartridge

Black: Approx. 140 sheets (HQ mode) (1500-character pattern)

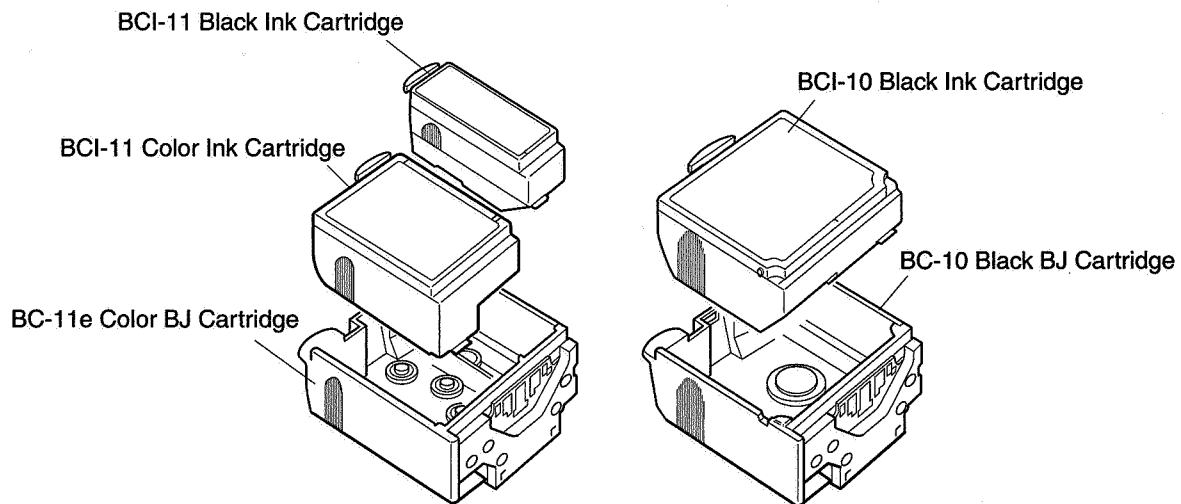


Figure 2-9 Ink Cartridge

2. SPECIFICATIONS

2.1 General Specifications

- 1. Type** Portable serial printer (Bubble jet ink on-demand)
- 2. Paper handling** Auto sheet feed
- 3. Sheet feeder capacity**
- | | |
|--------------------|---|
| Plain paper: | Max. 30 sheets (less than 3mm thickness at 64g/m ²) |
| Coated paper: | Max. 10 sheets |
| Transparency film: | Max. 10 sheets |
| BPF: | Max. 1 sheet |
| Glossy paper: | Max. 1 sheet |
| Glossy film: | Max. 10 sheets |
| BJ cloth: | Max. 1 sheet |
| Envelope: | Max. 5 envelopes |
- 4. Paper weight**
- | | |
|----------------|---|
| Automatic feed | 64 to 105 g/m ² (17 lbs to 28 lbs) |
|----------------|---|

5. Printing speed

Burst

	BC-11e (Black printing)	BC-10 (Black printing)
HQ mode	173 cps (10 cpi)	346 cps (10 cpi)
HS mode	217 cps (10 cpi)	434 cps (10 cpi)

6. Printing direction (automatically selected according to the print data)

Bidirectional/Unidirectional

7. Print width

Max. 203.2mm (8")

8. Line feed speed

Approx. 136 ms/line (128"/360" line feed)

9. Built-in print control mode

BJ mode IBM Proprinter X24E emulation
 LQ mode Epson LQ printer emulation
 Native mode (Canon extended mode)
 BJL command

10. Line feed pitch (n: programmable)

BJ mode 1/6", 1/8", n/60", n/72", n/180", n/216", and n/360"
 (n: programmable)
 LQ mode 1/6", 1/8", n/180", n/216", and n/360"

11. Printing characters

Type face	Roman, Gothic, Courier, Prestige and Draft	
Pitch	BJ mode	10, 12, 17 cpi, and PS
	LQ mode	10, 12, 15, 17, 20 cpi, and PS
Character matrix	HQ mode	36 (H) × 48 (V) dots
	HS mode	18 out of 36 (H) × 48 (V) dots
Character set	BJ mode	IBM character set 1, 2 and all (code page 437, 850, 860, 863, 865, 857, 855, 852, 864 and 869)
	LQ mode	Italic character set and Graphic character set

12. Number of columns printed

	Mode	Pitch	cpl
BJ mode	10 cpi	10 cpi	80 cpl
	10 cpi doublewide	5 cpi	40 cpl
	10 cpi condensed	17 cpi	137 cpl
	10 cpi condensed-doublewide	8.5 cpi	68 cpl
	12 cpi	12 cpi	96 cpl
	12 cpi doublewide	6 cpi	48 cpl
	Proportional spacing	PS	Varies
LQ mode	10 cpi	10 cpi	80 cpl
	10 cpi doublewide	5 cpi	40 cpl
	10 cpi condensed	17 cpi	137 cpl
	10 cpi condensed-doublewide	8.5 cpi	68 cpl
	12 cpi	12 cpi	96 cpl
	12 cpi doublewide	6 cpi	48 cpl
	12 cpi condensed	20 cpi	160 cpl
	12 cpi condensed-doublewide	10 cpi	80 cpl
	15 cpi	15 cpi	120 cpl
	15 cpi doublewide	7.5 cpi	60 cpl
	Proportional spacing	PS	Varies

13. Bit image

Vertical	8, 24 and 48 dots
Horizontal	60, 120, 180, 240, 360 and 720 dpi

14. Buffer

	Input buffer	Download buffer
BJ mode	34 kB (or 2kB)	0 kB (or 32kB)
LQ mode	25 kB (or 2kB)	0 kB (or 23kB)

15. Interface

Bidirectional parallel interface (IEEE 1284 compatible)
IrDA (1.0 compatible)

16. BJ cartridge**1) BC-11e**

Type	Ink cartridge replaceable type of color BJ cartridge (large and small ink droplet producing type.)		
Print head	136 nozzles (vertically-lined) Y, M, C (24 nozzles × 3) + Bk (64 nozzles)		
Ink color	Yellow, Magenta, Cyan, Black		
No. of pages printed	Approx.	23 pages	(in the HQ mode) / black cartridge (7.5% duty per color pattern)
	Approx.	30 pages	(in the HQ mode) / color cartridge (7.5% duty per color pattern)
Weight	Approx.	29 g	(including black and color ink cartridge)

2) BC-10

Type	Ink cartridge replaceable type of black BJ cartridge		
Print head	128 nozzles (vertically-lined)		
Ink color	Black		
No. of pages printed	Approx.	140 pages	(in the HQ mode) / cartridge (1500-character pattern)
	Approx.	280 pages	(in the HS mode) / cartridge
Weight	Approx.	26 g	(including black ink cartridge)

17. Detection functions

Paper-out	Available
Paper width	Not available
Home position	Available
BJ cartridge	Available
Ink cartridge	Not available
Remaining ink level	Available (Default: None)
BJ cartridge identification	Available
Waste ink amount	Available

18. Acoustic noise level

Approx. 45 dB (A) or less during operation
Sound pressure level: According to ISO 9296

19. Environmental requirements

	During operation	During storage
Temperature	5°C to 35°C (41°F to 95°F)	0°C to 35°C (32°F to 95°F)
Humidity	10% to 90%RH (no condensation)	5% to 95%RH (no condensation)

20. Power supply

when the AC adaptor (AD-320/AD-360U) is used,

	Voltage/Frequency	Power consumption	Stand-by status
USA/Canada	AC 120V 60 Hz	Max. 30 W	Max. 5 W
UK/Australia	AC 240V 50 Hz		
Europe	AC 230V 50 Hz		

21. External dimensions

300 mm (11.8") W × 157.6 mm (6.2") D × 57 mm (2.3") H

22. Weight

Approx. 1.4 kg (3.1 lbs) (including BJ cartridge)

2.2 Paper Specifications

1. Paper size

- Letter (8.5" × 11")
- Legal (8.5" × 14")
- A4 (210 mm × 297 mm)
- A5 (148.5 mm × 210 mm)
- B5 (182 mm × 257 mm)
- Commercial number 10 envelope (4.1" × 9.5")
- European DL-size (220 mm × 110 mm)

2. Paper type

- Plain paper
- Coated paper (Canon coated paper LC-101/HR-101, A4/LTR)
- Envelope (Commercial number 10 or DL-size)
- Transparency (Canon transparency film CF-102, A4/LTR)
- BPF (Canon back print film BF-102, A4/LTR)
- Glossy paper (Canon glossy paper GP-201, A4/LTR)
- Glossy film (Canon glossy film HG-101, A4/LTR)
- BJ cloth (Canon BJ cloth, FS-101)
- (Don't use fanfold paper and labels.)

3. Print paper

Type	Paper	Size	Paper feed direction		Remarks
			ASF		
			Vertical	Horizontal	
Plain paper	PB-SK*	A4, B5	○		Suggested paper
	PB-SK*	A4, B5	○		Suggested paper
	Kangas	A4	○		
	Neusiedler	A4	○		
	Boise Cascade	LTR, LGL	○		
	XX4024 (75g/m ²)	LTR, LGL	▲		
	XX4024 (90g/m ²)	LTR, LGL	▲		
	Plover Bond	LTR, LGL	▲		
Envelope	COM#10	240 × 106 (mm)	▲		Mailwell No.582
	DL-size	240 × 110 (mm)	▲		Chapman
Transparency film	CF-102	A4, LTR	▲		OHP film
Thick paper	91 to 105g/m ²				
Coated paper	LC-101/HR-101	A4, LTR	▲		
BPF	BF-102	A4, LTR	▲		Single paper feeding
Glossy paper	GP-201	A4, LTR	▲		Single paper feeding
Glossy film	HG-101	A4, LTR	▲		
BJ cloth	FS-101		▲		Single paper feeding

○ : Usable ▲ : Usable (However, print quality and feedability may be deteriorated.)

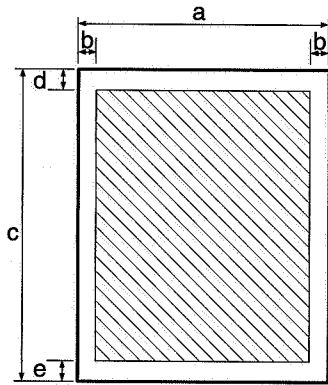
(Blank): Not usable

*PB : PPC & BJ

4. Printing range

1) Plain paper and special media

The shaded position in the following figure shows the recommended printing area for papers and special media. The printer's mechanical printing area is inside the 3 mm top/bottom margins. We recommend setting the margins greater than 22 mm, however, because the print quality degrades below this.



Printable Area

A4 size			Letter size			Legal size		
a	210 mm	8.3"	a	216 mm	8.5"	a	216 mm	8.5"
b	3.4 mm	0.13"	b	6.4 mm	0.25"	b	6.4 mm	0.25"
c	297 mm	11.7"	c	279 mm	11.0"	c	356 mm	14.0"
d	3 mm	0.12"	d	3 mm	0.12"	d	3 mm	0.12"
e	3 mm	0.12"	e	3 mm	0.3"	e	7.6 mm	0.3"

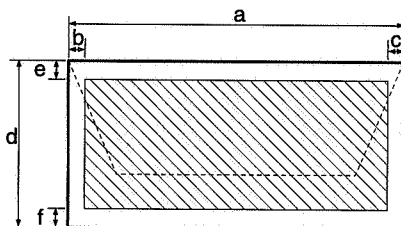
Recommended Printing Area

A4 size			Letter size			Legal size		
a	210 mm	8.3"	a	216 mm	8.5"	a	216 mm	8.5"
b	3.4 mm	0.13"	b	6.4 mm	0.25"	b	6.4 mm	0.25"
c	297 mm	11.7"	c	279 mm	11.0"	c	356 mm	14.0"
d	22 mm	0.87"	d	22 mm	0.87"	d	22 mm	0.87"
e	22 mm	0.87"	e	22 mm	0.87"	e	22 mm	0.87"

Figure 2-10 Printing Area

2) Envelope

The shaded portion in the following figure shows the recommended printing area for a U.S. Commercial 10 envelope (9.5 × 4.1 inches) and an European DL-size envelope (229 × 110 mm).



Printable Area

European DL			U.S. Commercial number 10		
a	220 mm	8.7"	a	241 mm	9.5"
b	6.4 mm	0.25"	b	6.4 mm	0.25"
c	10.4 mm	0.41"	c	31.4 mm	1.2"
d	110 mm	4.3"	d	104 mm	4.1"
e	3 mm	0.12"	e	3 mm	0.12"
f	3 mm	0.12"	f	3 mm	0.12"

Recommended Area

European DL			U.S. Commercial number 10		
a	220 mm	8.7"	a	241 mm	9.5"
b	6.4 mm	0.25"	b	6.4 mm	0.25"
c	10.4 mm	0.41"	c	31.4 mm	1.2"
d	110 mm	4.3"	d	104 mm	4.1"
e	22 mm	0.87"	e	22 mm	0.87"
f	22 mm	0.87"	f	22 mm	0.87"

Figure 2-11 Printing Area (Envelope)

2.3 Interface Specifications

2.3.1 Parallel interface

- 1) Interface Type:** Bidirectional Centronics Interface (IEEE 1284 compatible)
- 2) Operation mode:** Compatibility mode / Nibble mode / ECP mode
- 3) Signal voltage levels:** Low: 0.0 V to +0.4 V
High: +2.4 V to +5.0 V
- 4) Input / output:** Each signal pulled up with +5V.
- 5) Interface cable:** Type: Twisted-pair shielded cable
Material: AWG28 or larger
Length: Up to 2.0 m (6.6 feet)
- 6) Interface connectors:** Printer side: Amphenol 57-40360 (or equivalent)
Cable side: Amphenol 57-30360 (or equivalent)

7) Input / output signals and pin layout

No.	Signal	I/O	No.	Signal	I/O
1	STROBE	IN	19	STROBE-RET*1	...
2	DATA1	IN	20	DATA1-RET	...
3	DATA2	IN	21	DATA2-RET	...
4	DATA3	IN	22	DATA3-RET	...
5	DATA4	IN	23	DATA4-RET	...
6	DATA5	IN	24	DATA5-RET	...
7	DATA6	IN	25	DATA6-RET	...
8	DATA7	IN	26	DATA7-RET	...
9	DATA8	IN	27	DATA8-RET	...
10	ACKNLG	OUT	28	ACKNLG-RET	...
11	BUSY	OUT	29	BUSY-RET	...
12	P.E.	OUT	30	P.E.-RET	...
13	SELECT	OUT	31	INIT	IN
14	AUTO FEED XT	IN	32	ERROR	OUT
15	N.C.*2	...	33	GND	...
16	GND	...	34	N.C.*2	...
17	GND	...	35	+5.0V*3	...
18	+5.0V*4	...	36	SLCT IN	IN

*1. All-RETs are connected to GND.

*2. N.C. means no connection.

*3. The level is raised to +5.0V at 5.6kΩ.

*4. The level is raised to +5.0V at 390Ω.

8) Input / output signals**● COMPATIBILITY MODE****STROBE [Input]:**

When the printer receives the STROBE signal low pulse width must be greater than 1.0 μ s from the computer, the printer reads the data from the interface and sets the BUSY signal high.

DATA 1-8 [Input]:

These signals are the 8 bits of parallel data sent from the computer. A high level indicates a logical 1; a low level indicates a logical 0. The printer reads the DATA signals when a STROBE signal is received.

ACKNLG [Output]:

The ACKNLG signal tells the computer that the data from the previous STROBE signal has been read. In BJ mode, an ACKNLG signal is also generated when the printer is either powered on, or at the completion of the printer initialization by an INIT signal requested from the computer. In LQ mode, regardless of a STROBE signal, an ACKNLG signal is outputted when BUSY is low.

BUSY [Output]:

When the printer sets BUSY signal high, it cannot receive data. The BUSY signal goes high in response to a STROBE signal. This signal remains high until the data is read. BUSY signal is also high when:

Data is received.

Receive buffer is full of data.

A printer error condition such as out-of-paper, paper jamming, etc., has occurred.

P.E. [Output]:

The printer sets Paper End signal high when it determines that it has run out of the paper or that a paper jam has occurred. PE signal remains high until the operator loads paper and presses the *RESUME* button. PE remains unchanged after paper jamming.

SELECT [Output]:**In BJ mode**

When the printer is ready, it sets the SELECT signal high.

The SELECT signal goes low when:

An error condition such as out-of-paper, etc., has occurred.

In LQ mode

The SELECT signal is always high (pulled up to +5V).

AUTO FEED XT [Input]:

This signal is ignored at all time.

INIT [Input]:

INIT signal from the system resets the printer to its initial power-on state. In BJ mode, the BUSY signal goes high, and any received data is printed. In LQ mode, the BUSY signal goes high, and the print buffer is cleared. When INIT signal goes low, the printer resets to the power-on default state. INIT signal pulse width must be greater than 50 μ s from the printer.

The status at start-up is as follows:

- Carriage returns to home position.
- Function setting reverts back to the initial power-on state.

ERROR:

The printer sets the ERROR signal low if the printer detects an error or out-of-paper condition.

SLCT IN:

When this signal is high, the DC1 and DC3 control codes are valid; otherwise, they are invalid. This signal is valid only in LQ printer control mode.

● NIBBLE MODE**STROBE [Input] (Host Clk):**

STROBE signal is always high to prevent the printer from reading data.

DATA 1-8 [Input] (Data 1-8):

Not used

INIT [Input] :

Not used

AUTOFEED XT [Input] (Host Busy):

A low signal indicates that data can be received. This signal is high after data is received.

SELECT IN [Input] (1284 Active):

SELECT IN signal is high at the beginning of negotiation and remains high throughout the nibble mode. This indicates that the printer is operating under bidirectional mode. After completing the nibble mode, SELECT IN signal is low.

ACKNLG [Output] (Ptr Clk):

By lowering ACKNLG signal, the printer informs the computer that the data has been outputted. When the AUTO FEED XT signal from the host computer is raised to high, ACKNLG signal responds by becoming high.

BUSY [Output] (Ptr Busy):

BUSY signal outputs data to the host computer. The third bit byte data is outputted first, followed by the seventh data.

P.E. [Output] (AckData Req):

PE signal outputs data to the host computer. The second bit byte data is outputted first, followed by the sixth data.

SELECT [Output] (X flag):

SELECT signal outputs data to the host computer. The first bit byte data is outputted first, followed by the fifth data.

ERROR [Output] (Data Avail):

ERROR signal outputs data to the host computer. The 0 bit byte data is outputted first, followed by the fourth data.

● ECP MODE**STROBE [Input] (Host Clk):**

STROBE signal handshakes with the BUSY signal (Periph Ack) to transmit data from the computer to the printer during the forward phase. When STROBE signal is low, it indicates that data has been sent to data bus. Reverse phase is always high.

DATA 1~8 [Input]:

When the host computer outputs data during the forward phase, DATA signal is input signal. When the printer outputs data to the host computer during the reverse phase, DATA signal is output signal.

INIT [Input] (Reverse Req):

INIT signal is set to low to perform a recovery process of the data sent from the host computer during the forward phase. INIT signal responds to the low PE signal and becomes high. INIT signal is lowered when the forward phase idle is switched to the reverse phase.

When the reverse phase is switched to forward phase, INIT signal is raised to high.

AUTOFEED XT [Input] (Host Busy):

During the forward phase, the AUTOFEED XT signal on data bus indicates whether the information is in a data or command form.

Low: Command form

High: Data form

SELECT IN [Input] (1284 Active):

SELECT IN signal is high at the beginning of negotiation and remains high during the ECP mode. This indicates that the printer is operating under bidirectional mode. After completing the ECP mode, SELECT IN signal is low.

ACKNLG [Output]:

The ACKNLG signal is always high during the forward phase. During the reverse phase, ACKNLG signal is low to indicate data has been outputted from the host computer to the data bus. ACKNLG signal responds high to the host computer's AUTO FEED XT signal high signal.

P.E. [Output] (AckReverse):

PE signal is always high during the forward phase and it is always low during the reverse phase. PE signal is lowered in response to the host computer's low INIT signal to confirm the request to transfer from the forward phase to the reverse phase.

SELECT [Output] (X flag):

SELECT signal is always high.

ERROR [Output] (Periph Req):

If there is still data to be transferred in the host computer, a low ERROR signal is released to request reverse phase.

BUSY [Output] (PeriphAck):

During the forward phase, BUSY signal is low if the computer can send data. Once the data has been outputted BUSY signal becomes high. During the reverse phase, the form of data sent from the printer to the data bus is shown as follows:

Low: Command form

High: Data form

9) Timing

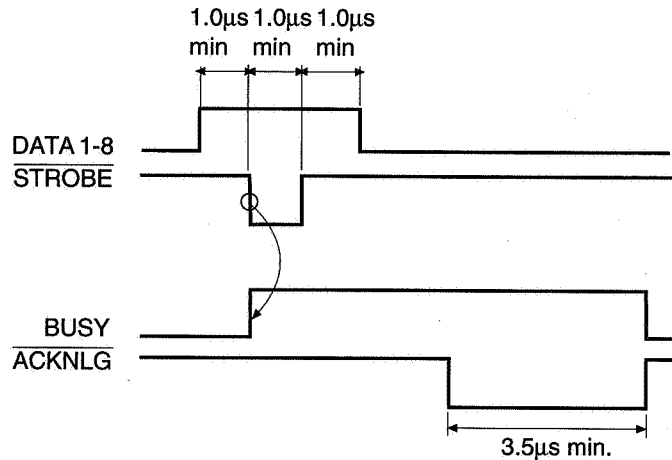


Figure 2-12 Timing Chart (Compatibility Mode)

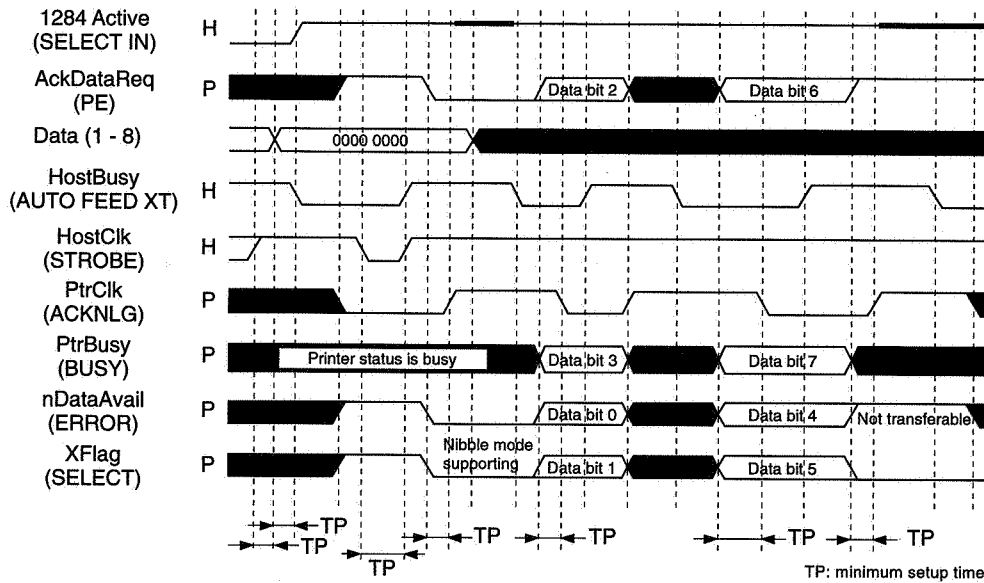


Figure 2-13 Timing Chart (Nibble Mode)

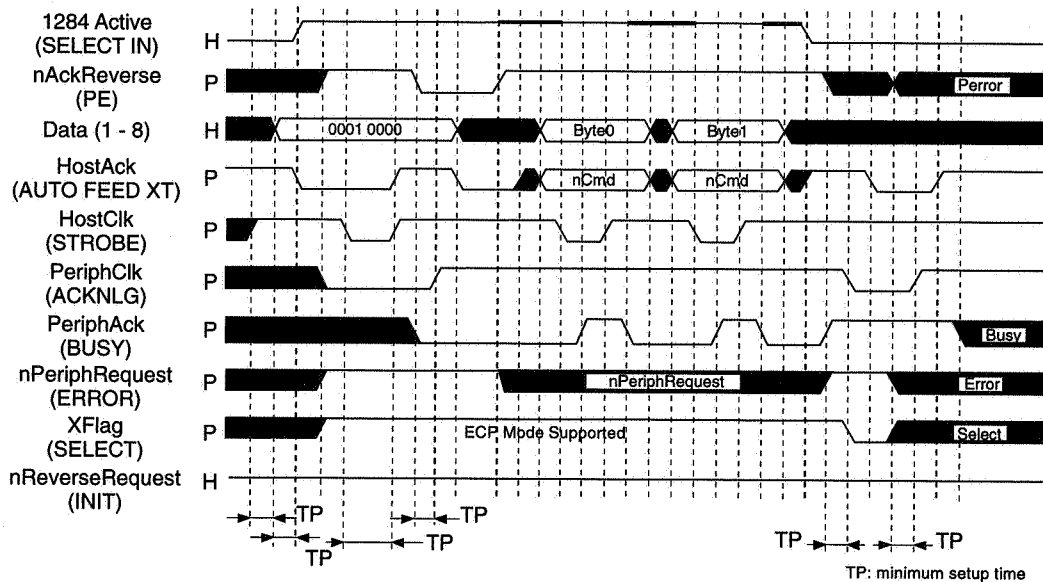


Figure 2-14 Timing Chart (ECP Mode)

2.3.2 Infrared interface

1. IrDA Interface

1) Interface

IrDA Version 1.0 compatible

2) Optical specifications

Light generation

- Wavelength: 0.85 to 0.90 μm
- Intensity: 40 to 500 mW/Sr
- Light angle: $\pm 15^\circ$ to 30° (along optical axis)

Light interception

- Wavelength: 0.85 to 0.90 μm
- Intensity: $4\mu\text{W}/\text{cm}^2$ to $500\text{ mW}/\text{cm}^2$
- Light angle: Max $\pm 15^\circ$ (along optical axis)

3) Transfer speed

9600/19200/38400/57600/115200 bps

4) Communication method

Half duplex, start/stop system (bidirectional)

5) Communication distance

0 to 1 m

6) Maximum received data size

2048 byte/packet

7) Modulation method

3/16 RZI (Return to Zero Invert)

8) Received signal

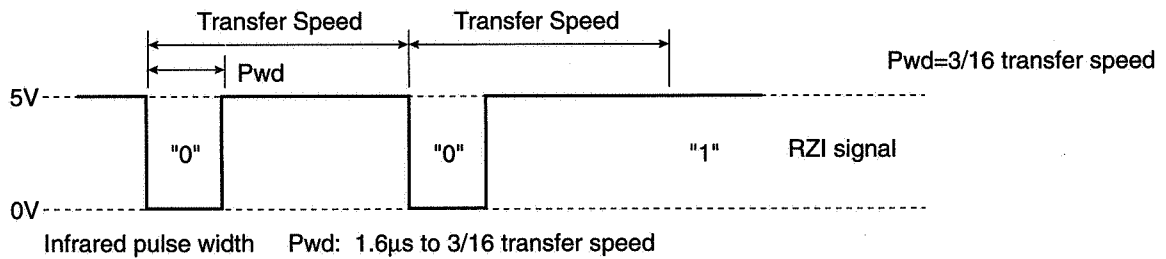


Figure 2-15 IrDA Method

2. ASK Interface

1) Interface

SHARP Liquid Crystal Pen Computer: ZAURUS compatible

2) Optical specifications

Light generation

Wavelength: 0.85 to 0.90 μm Intensity: 40 to 500 mW/Sr Light angle: $\pm 15^\circ$ to 30° (along optical axis)

Light interception

Wavelength: 0.85 to 0.90 μm Intensity: $4 \mu\text{W/cm}^2$ to 500mW/cm^2 Light angle: Max $\pm 15^\circ$ (along optical axis)

3) Transfer speed

9600 bps

4) Communication method

Half duplex, start/stop system (unidirectional)

5) Communication distance

Approx. less than 80 cm

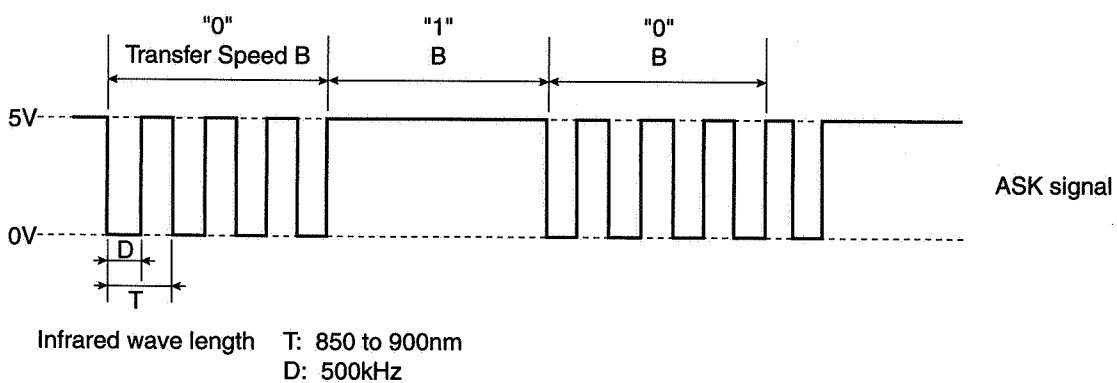
6) Maximum received data size

512 byte/block

7) Modulation method

ASK (Amplitude Shift Keying) Method (carrier: 500 kHz)

8) Received signal

**Figure 2-16 ASK Method**

2.4 Character Code Tables
Code page 437

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	`	p	Ç	É	á	⌘	L	⌘	α	≡	
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⌘	⌘	⌘	β	±	
2	●	↑	"	2	B	R	b	r	é	Æ	ó	⌘	⌘	⌘	Γ	≥	
3	♥	!!	#	3	C	S	c	s	â	ô	ú	⌘	⌘	⌘	π	≤	
4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	⌘	⌘	⌘	Σ	f	
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⌘	⌘	⌘	σ	∫	
6	♠	—	&	6	F	V	f	v	â	û	ä	⌘	⌘	⌘	μ	÷	
7	•	‡	'	7	G	W	g	w	ç	ù	ø	⌘	⌘	⌘	τ	≈	
8	■	↑	(	8	H	X	h	x	ê	ÿ	¿	⌘	⌘	⌘	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌘	⌘	⌘	⌘	Θ	∅
A	◻	→	*	:	J	Z	j	z	è	Ü	⌘	⌘	⌘	⌘	Ω	·	
B	♂	←	+	:	K	[	k	{	ï	ø	½	⌘	⌘	⌘	δ	√
C	♀	⌘	<	<	L	\	l	l	î	£	¼	⌘	⌘	⌘	∞	n	
D	♪	↔	=	=	M	]	m	}	ì	¥	⅓	⌘	⌘	⌘	∅	²
E	♫	▲	.	>	N	^	n	~	Ä	Pts	<<	⌘	⌘	⌘	€	■	
F	⊙	▼	/	?	O	_	o	□	Å	f	>>	⌘	⌘	⌘	∩	SP	
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 850

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	`	p	Ç	É	á	⌘	L	ø	Ó	—	
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⌘	⌘	⌘	Ð	±	
2	●	↑	"	2	B	R	b	r	é	Æ	ó	⌘	⌘	⌘	É	Ò	
3	♥	!!	#	3	C	S	c	s	â	ô	ú	⌘	⌘	⌘	È	Û	
4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	⌘	⌘	⌘	Ê	Ô	
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⌘	⌘	⌘	Ë	Õ	
6	♠	—	&	6	F	V	f	v	â	û	ä	⌘	⌘	⌘	Ì	Ö	
7	•	‡	'	7	G	W	g	w	ç	ù	ø	⌘	⌘	⌘	Í	×	
8	■	↑	(	8	H	X	h	x	ê	ÿ	¿	⌘	⌘	⌘	Ï	Ù
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌘	⌘	⌘	⌘	Ï	Ú
A	◻	→	*	:	J	Z	j	z	è	Ü	⌘	⌘	⌘	⌘	Ï	Û	
B	♂	←	+	:	K	[	k	{	ï	ø	½	⌘	⌘	⌘	Ï	Ü
C	♀	⌘	<	<	L	\	l	l	î	£	¼	⌘	⌘	⌘	Ï	Ý	
D	♪	↔	=	=	M	]	m	}	ì	¥	⅓	⌘	⌘	⌘	Ï	ÿ
E	♫	▲	.	>	N	^	n	~	Ä	x	<<	⌘	⌘	⌘	Ï	ÿ	
F	⊙	▼	/	?	O	_	o	□	Å	f	>>	⌘	⌘	⌘	Ï	ÿ	
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 860

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	˘	p	Ç	É	á	■	L	⋈	α	≡	0000
1	☺	◀	!	1	A	Q	a	q	ü	À	í	■	⊥	≡	β	±	0001
2	●	‡	"	2	B	R	b	r	é	È	ó	■	⊥	≡	Γ	≥	0010
3	♥	!!	#	3	C	S	c	s	â	ò	ú	|	⊥	≡	π	≤	0011
4	♦	¶	\$	4	D	T	d	t	â	õ	ñ	⊥	≡	Σ	∫		0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	≡	+	≡	σ	∫	0101
6	♠	—	&	6	F	V	f	v	Á	Ú	á	≡	≡	≡	μ	÷	0110
7	•	‡	'	7	G	W	g	w	ç	ù	ø	≡	≡	≡	τ	≈	0111
8	■	†	(	8	H	X	h	x	ê	ì	ï	≡	≡	≡	Φ	°	1000
9	○	‡	)	9	I	Y	i	y	Ê	Ô	Ò	≡	≡	≡	Θ	•	1001
A	☐	→	*	:	J	Z	j	z	è	Û	ü	≡	≡	≡	Ω	·	1010
B	♂	←	+	;	K	[	k	{	í	ç	¿	≡	≡	≡	δ	√	1011
C	♀	⊥	,	<	L	\	l	|	î	£	‡	≡	≡	≡	∞	n	1100
D	♫	↔	-	=	M	]	m	}	ï	Ü	ı	≡	≡	≡	∅	²	1101
E	♯	▲	>	>	N	^	n	~	Á	Û	«	≡	≡	≡	€	■	1110
F	⊙	▼	/	?	O	_	o	◊	À	Ó	>>	≡	≡	≡	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 863

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	˘	p	Ç	É	í	■	L	⋈	α	≡	0000
1	☺	◀	!	1	A	Q	a	q	ü	È	˘	■	⊥	≡	β	±	0001
2	●	‡	"	2	B	R	b	r	é	È	ó	■	⊥	≡	Γ	≥	0010
3	♥	!!	#	3	C	S	c	s	â	ò	ú	|	⊥	≡	π	≤	0011
4	♦	¶	\$	4	D	T	d	t	Á	È	"	⊥	≡	Σ	∫		0100
5	♣	§	%	5	E	U	e	u	à	ï	.	≡	+	≡	σ	∫	0101
6	♠	—	&	6	F	V	f	v	¶	Û	z	≡	≡	≡	μ	÷	0110
7	•	‡	'	7	G	W	g	w	ç	ù	-	≡	≡	≡	τ	≈	0111
8	■	†	(	8	H	X	h	x	ê	ÿ	ı	≡	≡	≡	Φ	°	1000
9	○	‡	)	9	I	Y	i	y	ê	Û	ı	≡	≡	≡	Θ	•	1001
A	☐	→	*	:	J	Z	j	z	è	Û	ü	≡	≡	≡	Ω	·	1010
B	♂	←	+	;	K	[	k	{	í	ç	¿	≡	≡	≡	δ	√	1011
C	♀	⊥	,	<	L	\	l	|	î	£	‡	≡	≡	≡	∞	n	1100
D	♫	↔	-	=	M	]	m	}	ï	Ü	ı	≡	≡	≡	∅	²	1101
E	♯	▲	>	>	N	^	n	~	Á	Û	«	≡	≡	≡	€	■	1110
F	⊙	▼	/	?	O	_	o	◊	À	Ó	>>	≡	≡	≡	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 865

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	Ç	É	á	■	L	ll	α	≠	0000
1	☺	◀	!	1	A	Q	a	q	ü	ø	í	■	l	≡	β	±	0001
2	●	↑	"	2	B	R	b	r	é	Æ	ó	■	T	π	Γ	≥	0010
3	♥	!!	#	3	C	S	c	s	â	ô	ú	|	l	π	π	≤	0011
4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	l	l	Σ	∫		0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	l	+	σ	∫		0101
6	♠	—	&	6	F	V	f	v	á	ú	á	l	l	μ	÷		0110
7	•	↓	'	7	G	W	g	w	ç	ù	ø	l	l	τ	≈		0111
8	■	↑	(	8	H	X	h	x	ê	ÿ	¿	l	l	Φ	°		1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	l	l	l	Θ	∅		1001
A	◻	→	*	:	J	Z	j	z	è	Ü	l	l	l	Ω	∅		1010
B	♂	←	+	:	K	[	k	{	ï	ø	½	l	l	δ	√		1011
C	♀	l	,	<	L	\	l	l	î	£	¼	l	l	∞	n		1100
D	♪	↔	-	=	M	J	m	}	ì	Ø	l	l	l	∅	2		1101
E	♫	▲	.	>	N	^	n	~	Ä	Pts	<<	l	l	€	■		1110
F	⊙	▼	/	?	O	_	o	□	Å	f	¤	l	l	∩	SP		1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 857

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	Ç	É	á	■	L	Q	Ó	-	0000
1	☺	◀	!	1	A	Q	a	q	ü	ø	í	■	l	Q	β	±	0001
2	●	↑	"	2	B	R	b	r	é	Æ	ó	■	T	È	Ö	≥	0010
3	♥	!!	#	3	C	S	c	s	â	ô	ú	|	l	È	Ö	≥	0011
4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	l	l	È	ö	≥	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	l	+	σ	∫		0101
6	♠	—	&	6	F	V	f	v	á	ú	á	l	l	μ	÷		0110
7	•	↓	'	7	G	W	g	w	ç	ù	ø	l	l	τ	≈		0111
8	■	↑	(	8	H	X	h	x	ê	ÿ	¿	l	l	Φ	°		1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	l	l	l	Θ	∅		1001
A	◻	→	*	:	J	Z	j	z	è	Ü	l	l	l	Ω	∅		1010
B	♂	←	+	:	K	[	k	{	ï	ø	½	l	l	δ	√		1011
C	♀	l	,	<	L	\	l	l	î	£	¼	l	l	∞	n		1100
D	♪	↔	-	=	M	J	m	}	ì	Ø	l	l	l	∅	2		1101
E	♫	▲	.	>	N	^	n	~	Ä	S	<<	l	l	€	■		1110
F	⊙	▼	/	?	O	_	o	□	Å	§	>>	l	l	∩	SP		1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 855

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	ћ	љ	а	■	Л	Б	Я	-	0000
1	☺	◀	!	1	A	Q	a	q	Љ	Љ	А	■	Л	Р	ы	0001	
2	●	↑	"	2	B	R	b	r	ђ	б	■	Т	В	Р	Ы	0010	
3	♥	!!	#	3	C	S	c	s	ѓ	њ	Б	І	Т	М	с	з	0011
4	♦	¶	\$	4	D	T	d	t	ё	ћ	ц	┘	—	Г	С	З	0100
5	♣	§	%	5	E	U	e	u	ѐ	ћ	ц	х	┘	Н	Т	Ш	0101
6	♠	—	&	6	F	V	f	v	є	ќ	д	Х	к	З	Т	Ш	0110
7	•	↓	'	7	G	W	g	w	Є	К	Д	И	К	О	у	э	0111
8	■	↑	(	8	H	X	h	x	ѕ	ѝ	е	И	Ц	п	У	Э	1000
9	○	↓	)	9	I	Y	i	y	ѕ	ѝ	Е	И	Г	Ј	Ж	Щ	1001
A	⊗	→	*	:	J	Z	j	z	и	џ	Ф	И	Г	Ж	Щ	1010	
B	♂	←	+	:	K	[	k	{	І	Ц	Ф	И	Г	Ж	Ч	1011	
C	♀	┘	<	<	L	\	l	|	й	ю	Г	Ј	И	В	Ч	1100	
D	♪	↔	=	=	M	] m	}	ı	Ю	Г	Й	И	П	Ь	Ѕ	1101	
E	♫	▲	>	>	N	^	n	~	Љ	х	<<	Й	И	Ь	■	1110	
F	⊙	▼	/	?	O	_	o	□	Ј	Ъ	>>	Г	И	№	SP	1111	
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 852

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	Ç	É	á	■	Л	ø	Ó	-	0000
1	☺	◀	!	1	A	Q	a	q	Û	Ł	í	■	Л	Đ	В	~	0001
2	●	↑	"	2	B	R	b	r	é	í	ó	■	Т	Đ	Ó	~	0010
3	♥	!!	#	3	C	S	c	s	â	ô	ú	І	Т	È	Ñ	~	0011
4	♦	¶	\$	4	D	T	d	t	ä	ö	À	┘	—	đ	ń	~	0100
5	♣	§	%	5	E	U	e	u	ú	Ł	ą	┘	—	đ	ń	~	0101
6	♠	—	&	6	F	V	f	v	ć	ÿ	Ż	À	Ā	í	š	+	0110
7	•	↓	'	7	G	W	g	w	ç	š	ž	È	ā	í	š	~	0111
8	■	↑	(	8	H	X	h	x	ı	ś	Ę	Ś	Ц	ě	Ř	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	ę	И	Г	Ј	Ú	~	1001
A	⊗	→	*	:	J	Z	j	z	Ó	Ü	■	И	Г	Ж	·	1010	
B	♂	←	+	:	K	[	k	{	ó	ÿ	ż	И	Г	Ж	Ú	·	1011
C	♀	┘	<	<	L	\	l	|	ı	č	č	И	Г	Ж	ŕ	·	1100
D	♪	↔	=	=	M	] m	}	ž	ł	ś	ż	И	Г	Ж	ŕ	·	1101
E	♫	▲	>	>	N	^	n	~	Ā	x	<<	ž	И	У	†	·	1110
F	⊙	▼	/	?	O	_	o	□	Č	č	>>	Г	И	№	SP	1111	
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

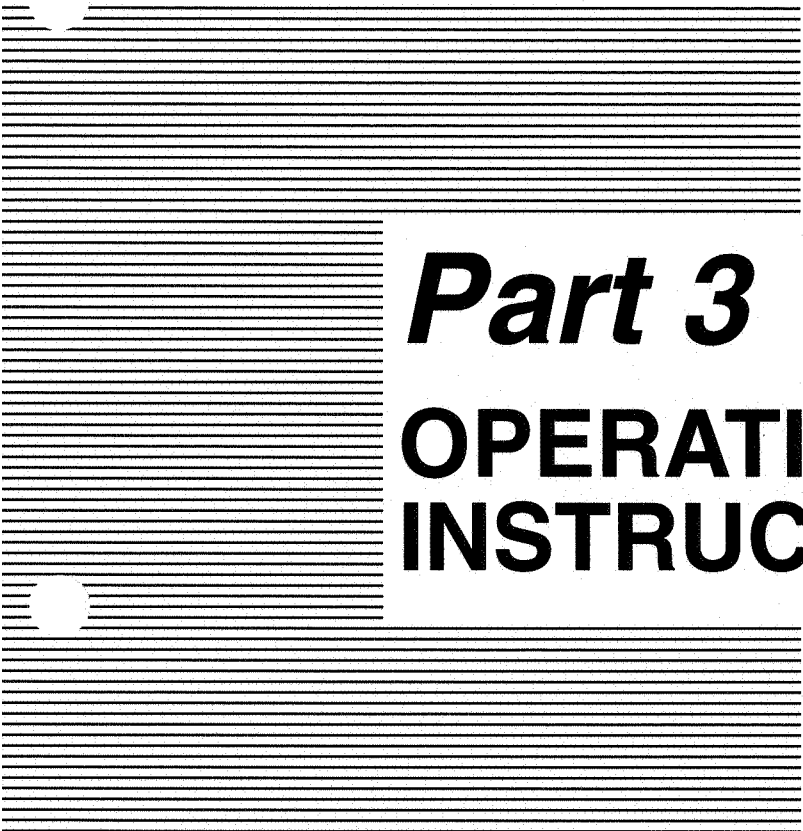
Code page 864

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	°	β	·	ø	ذ	ـ	ـ	ـ	0000
1	☺	◀	!	1	A	Q	a	q	∞	∞	∞	∞	∞	∞	∞	∞	0001
2	♪	↑	"	2	B	R	b	r	∅	∅	∅	∅	∅	∅	∅	∅	0010
3	♪	!!	#	3	C	S	c	s	√	±	£	¥	∞	∞	∞	∞	0011
4	⊙	¶	\$	4	D	T	d	t	☒	½	¼	¾	¾	¾	¾	¾	0100
5	≡	§	%	5	E	U	e	u	—	±	±	±	±	±	±	±	0101
6	||	—	&	6	F	V	f	v	|	=	∞	∞	∞	∞	∞	∞	0110
7	≡	↓	'	7	G	W	g	w	+	<<	∞	∞	∞	∞	∞	∞	0111
8	≡	↑	(	8	H	X	h	x	−	>>	∞	∞	∞	∞	∞	∞	1000
9	≡	↓	)	9	I	Y	i	y	−	∞	∞	∞	∞	∞	∞	∞	1001
A	≡	→	*	:	J	Z	j	z	−	∞	∞	∞	∞	∞	∞	∞	1010
B	≡	←	+	:	K	[	k	{	−	∞	∞	∞	∞	∞	∞	∞	1011
C	≡	↓	<	L	\	l	|	|	−	∞	∞	∞	∞	∞	∞	∞	1100
D	≡	↔	=	M	]	m	}	−	∞	∞	∞	∞	∞	∞	∞	∞	1101
E	≡	▲	.	>	N	^	n	~	−	∞	∞	∞	∞	∞	∞	∞	1110
F	≡	▼	/	?	O	_	o	□	−	∞	∞	∞	∞	∞	∞	∞	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

Code page 869

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	ø	▶	SP	0	@	P	·	p	∫	∫	∫	∫	∫	∫	∫	∫	0000
1	☺	◀	!	1	A	Q	a	q	∫	∫	∫	∫	∫	∫	∫	∫	0001
2	●	↑	"	2	B	R	b	r	∫	∫	∫	∫	∫	∫	∫	∫	0010
3	♥	!!	#	3	C	S	c	s	∫	∫	∫	∫	∫	∫	∫	∫	0011
4	♦	¶	\$	4	D	T	d	t	∫	∫	∫	∫	∫	∫	∫	∫	0100
5	♠	§	%	5	E	U	e	u	∫	∫	∫	∫	∫	∫	∫	∫	0101
6	♣	—	&	6	F	V	f	v	∫	∫	∫	∫	∫	∫	∫	∫	0110
7	•	↓	'	7	G	W	g	w	∫	∫	∫	∫	∫	∫	∫	∫	0111
8	◻	↑	(	8	H	X	h	x	∫	∫	∫	∫	∫	∫	∫	∫	1000
9	◊	↓	)	9	I	Y	i	y	∫	∫	∫	∫	∫	∫	∫	∫	1001
A	◻	→	*	:	J	Z	j	z	∫	∫	∫	∫	∫	∫	∫	∫	1010
B	♂	←	+	:	K	[	k	{	∫	∫	∫	∫	∫	∫	∫	∫	1011
C	♀	↓	<	L	\	l	|	|	∫	∫	∫	∫	∫	∫	∫	∫	1100
D	♫	↔	=	M	]	m	}	∫	∫	∫	∫	∫	∫	∫	∫	∫	1101
E	♫	▲	.	>	N	^	n	~	∫	∫	∫	∫	∫	∫	∫	∫	1110
F	◊	▼	/	?	O	_	o	□	∫	∫	∫	∫	∫	∫	∫	∫	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

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Part 3

OPERATING INSTRUCTIONS

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3 - 1	1. PRINTER SETUP
3 - 1	1.1 Unpacking
3 - 2	1.2 Installation
3 - 9	1.3 Names and Functions of Parts
3-11	2. TRANSPORTING THE PRINTER
3-11	2.1 Carrying the Printer
3-11	2.2 Transporting the Printer
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3-18	3.4 Self Test Print
3-23	3.5 Hexadecimal Dump Test Print
3-24	3.6 EEPROM Data Setting



1. PRINTER SETUP

1.1 Unpacking

After unpacking, check that you have the following:

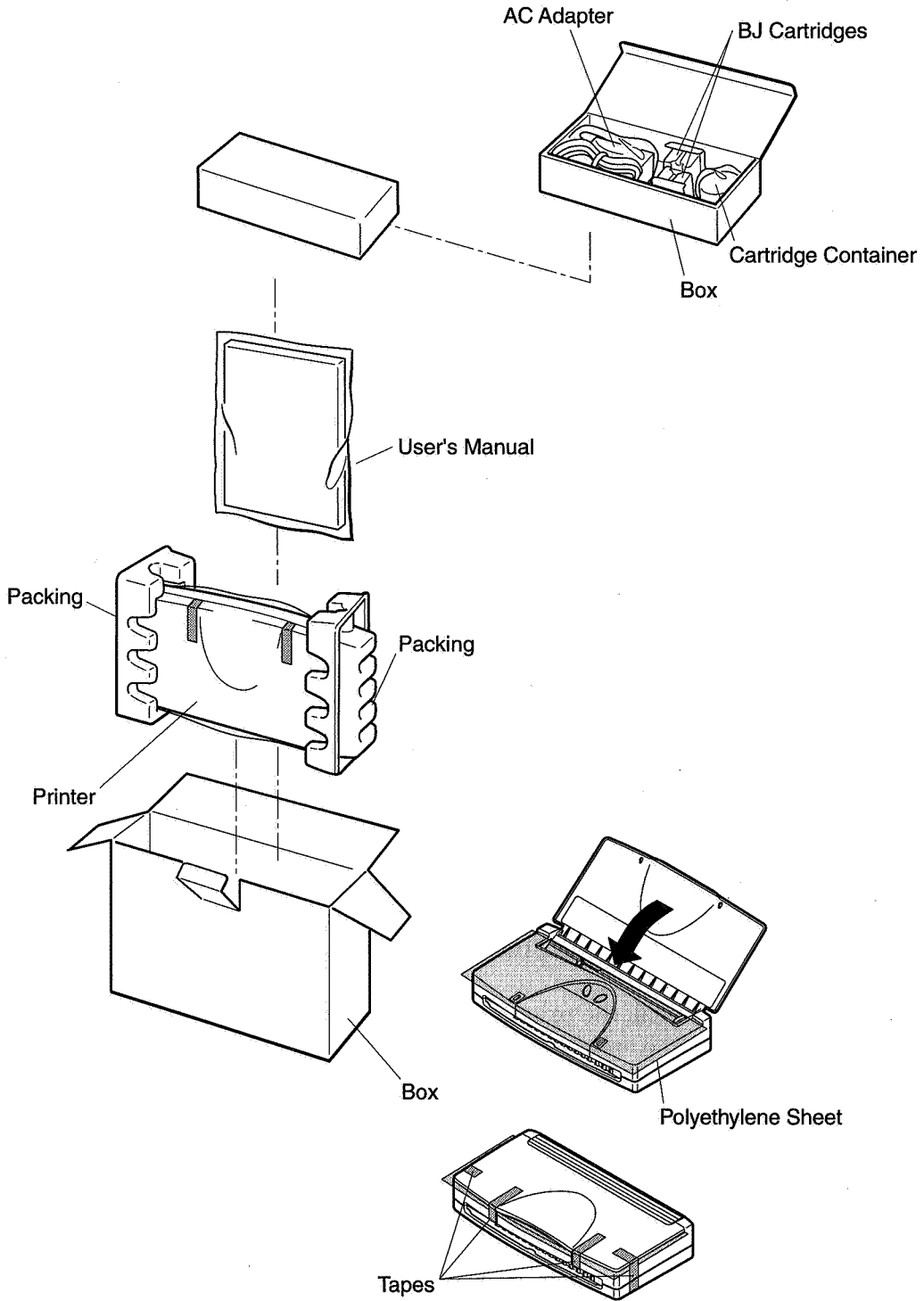


Figure 3-1 Packing Arrangement

1.2 Installation

1.2.1 Installation space

Install the printer with the clearances given below for the printer to be operated efficiently. The spaces required to install the printer are shown below.

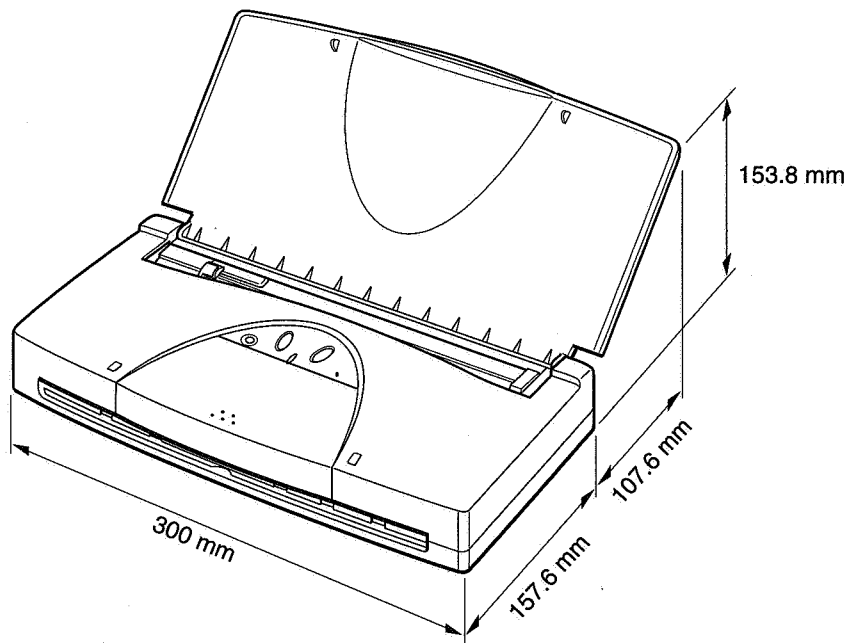


Figure 3-2 Installation Space

NOTE

- Use the printer within the following ranges of temperature and humidity:
Ambient temperature: 5 °C to 35 °C
Relative humidity: 10% to 90% (without condensation)
- Install the printer on a flat sturdy surface. Do not install it in places where it is subjected to vibration.
- Do not install the printer in places where it is exposed to direct sunlight or near a heater or air conditioner where the temperature changes greatly. Do not leave the printer in a car where the temperature rises suddenly.
- Do not install the printer in places where dust accumulates or it is subjected to salty wind.
- Do not place it near a television set, speaker, or other devices which generate magnetic fields.

1.2.2 Installation procedure

a) Connecting the AC adapter

Insert the DC plug into the AC adapter connector of the printer and the AC plug of the AC adapter into the outlet.

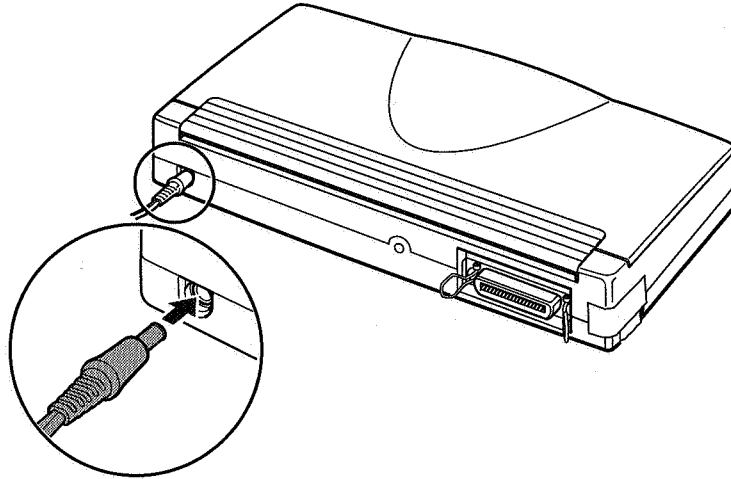


Figure 3-3 Connecting the AC Adapter



The printer powered with the AC adapter executes the initial operation automatically, and enters the power off mode.



When the *POWER* and *RESUME* buttons are held down together and the AC adapter is plugged in, the service function (EEPROM data setting mode) is activated. See *Part 3: 3.6 EEPROM Data Setting (page 3-24)* for details.

b) Connecting the interface cable

Make sure that the printer and the computer are off. Plug the interface cable into the printer interface connector. Secure the cable with connector clips. Connect the other end of the interface cable to the computer and fix it securely.

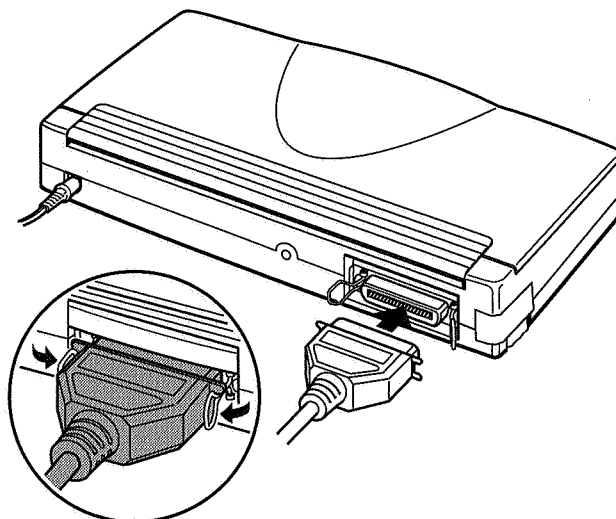


Figure 3-4 Connecting the Interface Cable

c) Connecting the Infrared interface

When transmitting data from the computer to the printer through the built-in IrDA, beware of the following:

- The printer and computer IrDA transmitters should be within 1 m of each other. (Depending on the computer, infrared rays may not reach the printer's IrDA transmitter)
- The printer IrDA module angle is must be within 15 degrees of the vertical and horizontal optical axis. The horizontal rotational angle of the IrDA is between 0 and 105 degrees.

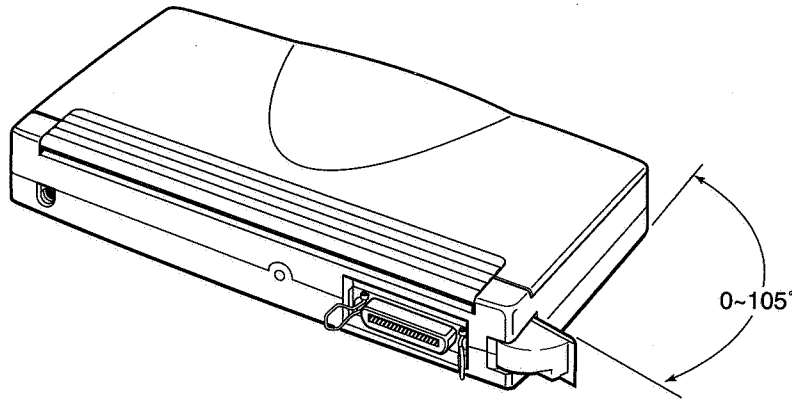


Figure 3-5 Rotational Angle of the IrDA

- Scanning a 180dpi color A4 document with the optional scanner cartridge can take up to 30 minutes. The use of bidirectional centronics interface for data transmission is recommended.



Depending on the signal from the computer either the bidirectional centronic interface or the IrDA, which ever is detected by the printer first, is selected as the method for communication. When both are connected, the switch over is automatic.

d) Switching on the power

Verify that the AC adapter is connected correctly, and press the *POWER* button to switch on the power. When the printer is powered up, it carries out the initial operations, then move the carriage to the cartridge replacing position (center of the printer). The *POWER* indicator blinks to show that the printer is on standby with a BJ cartridge installed. Switch on the power for the equipment in this order: computer, other peripheral equipment, printer.

e) Installing the BJ cartridge

Two types of cartridges can be installed in the printer: black BJ cartridge (BC-10) and color BJ cartridge (BC-11e).

1) Removing the cap from the print head of the BJ cartridge

Remove the BJ cartridge from the cartridge pack, then remove the orange head cap and tape protecting the nozzles as shown in the figure below.

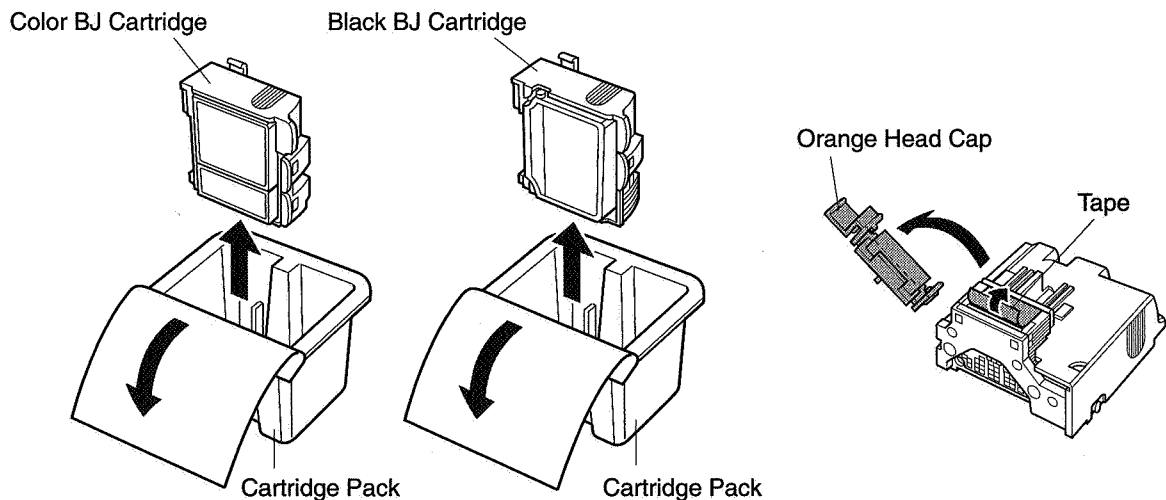


Figure 3-6 Removing the Head Cap and the Tape



Do not reuse a head cap and tape that have been removed once. If they are reused, the head may be clogged with foreign matter, or colors of ink may be mixed.

Peel off the tape protecting the nozzles without touching the print head. Poor printing may be caused by scratches on the printhead or any foreign object adhered to it.

After removing the cap and the tape, do not shake the BJ cartridge. Ink could splatter out if you do.

2) Installing the BJ cartridge

Open the printer upper cover and inner cover, and install a BJ cartridge in the carriage.

Press the *CARTRIDGE* button to return the carriage to the capping position.

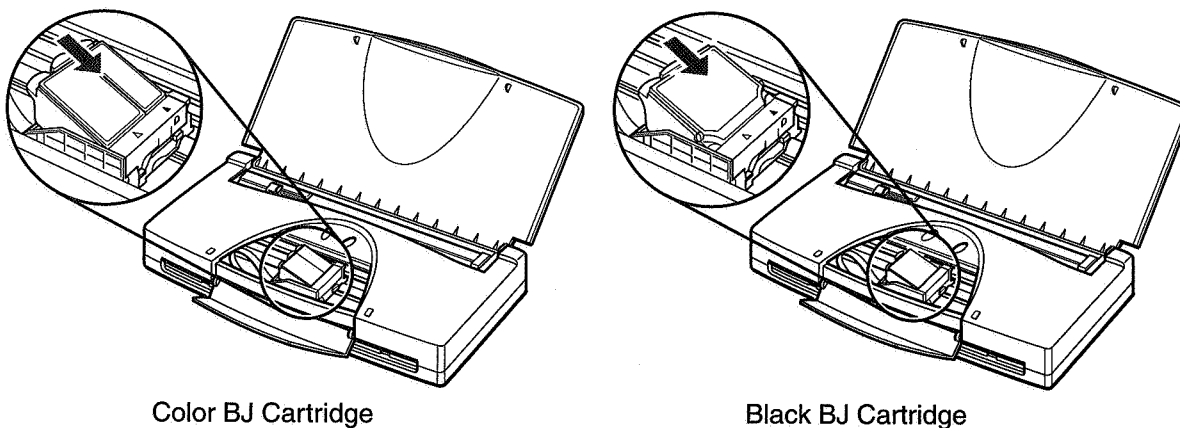


Figure 3-7 Installing the BJ Cartridge



If the BJ cartridge is not installed correctly, the beeper sounds once when the *CARTRIDGE* button is pressed, and the carriage cannot be returned to the capping position. If the carriage does not move to the capping position, remove and reinstall the BJ cartridge. If the error still persists, see *Part 5: 5. Troubleshooting (page 5-5)*.

3) Replacing a BJ cartridge

Open the printer top cover and inner cover, press the *CARTRIDGE* button to return the carriage to the BJ cartridge replacing position (center of the printer).

Lift off the BJ cartridge. Install another BJ cartridge, press the *CARTRIDGE* button to return the carriage to the capping position. Place the removed BJ cartridge in the supplied cartridge container. (The container can contain a color or black BJ cartridge.)



Since the carriage is secured by the lock arm in the capping position, never pull the carriage ribbon cable to move the carriage to the center. If the beeper sounds and the carriage does not move at all when the *CARTRIDGE* button is pressed, the BJ cartridge may be excessively hot. Leave the printer as it is for a while to let it cool and press the *CARTRIDGE* button again.

f) Replacing the ink cartridge

The ink cartridge of the black BJ cartridge and color BJ cartridge can be replaced. (BCI-10, BCI-11 Bk, BCI-11 color)

1) Ink cartridge replacement criteria

If the ink runs out or if more than six months have passed after the BJ cartridge was unsealed and the print quality is not improved by performing cleaning once or twice, the ink cartridge should be replaced with a new one. Since the color ink cartridge contains three color inks, it must be replaced if one of them runs out.



If the print quality does not improve after replacing the ink cartridge, perform cleaning 5 times. If the print quality does not still improve, the BJ cartridge must be replaced with a new one.

2) Removing the ink cartridge

Open the printer upper cover and inner cover, and press the *CARTRIDGE* button to move the carriage to the BJ cartridge replacing position. Lift off the ink cartridge while holding down its tab.

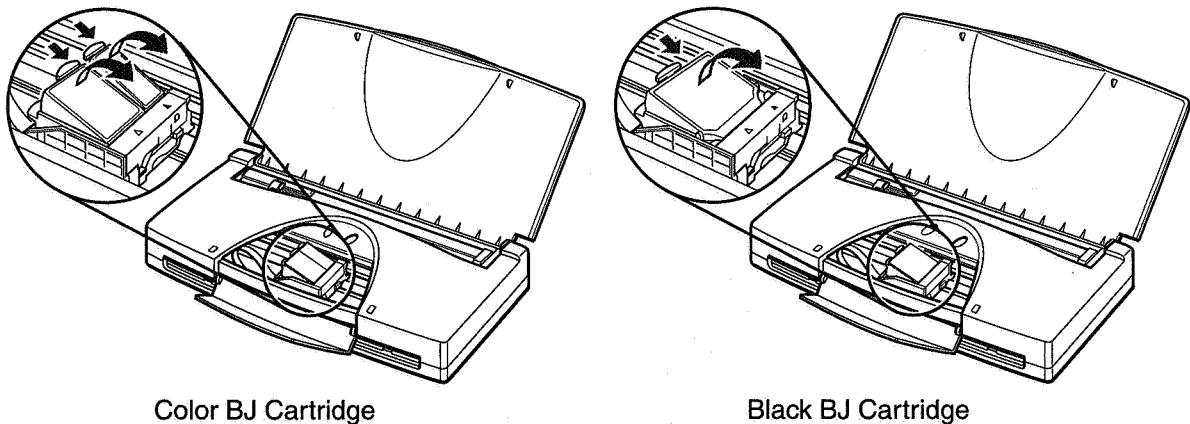


Figure 3-8 Replacing the Ink Cartridge



Ink adheres to and around the ink cartridge's ink inlet, so handle the ink cartridge carefully not to stain your hands or clothes.

3) Installing the ink cartridge

Take out the ink cartridge from its bag, remove the protective cap for the ink inlet as shown in the figure, and install the ink cartridge in the printer with the reverse of the removal procedure.

After installing the ink cartridge, press the *CARTRIDGE* button in the same way as when installing a BJ cartridge to return the carriage to the capping position.

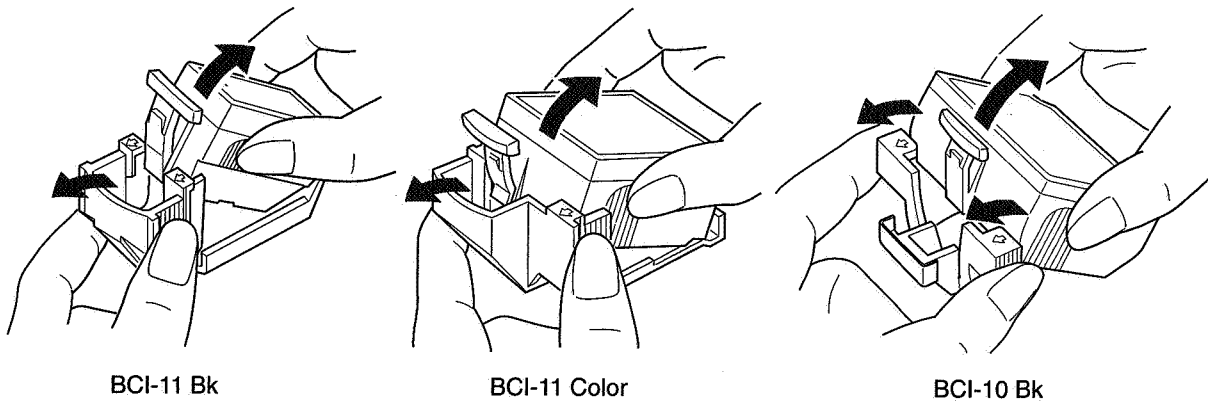


Figure 3-9 Removing the Cap (Ink Cartridge)

g) BJ cartridge container

The printer is supplied with a BJ cartridge container to contain an BJ cartridge. If the BJ cartridge is removed from the printer, place it in the container. If the BJ cartridge is not stored in the container, nozzles may be clogged with ink, the BJ head may be scratched, or the BJ cartridge does not eject the ink onto the paper. The BJ cartridge container can contain a color or black BJ cartridge.

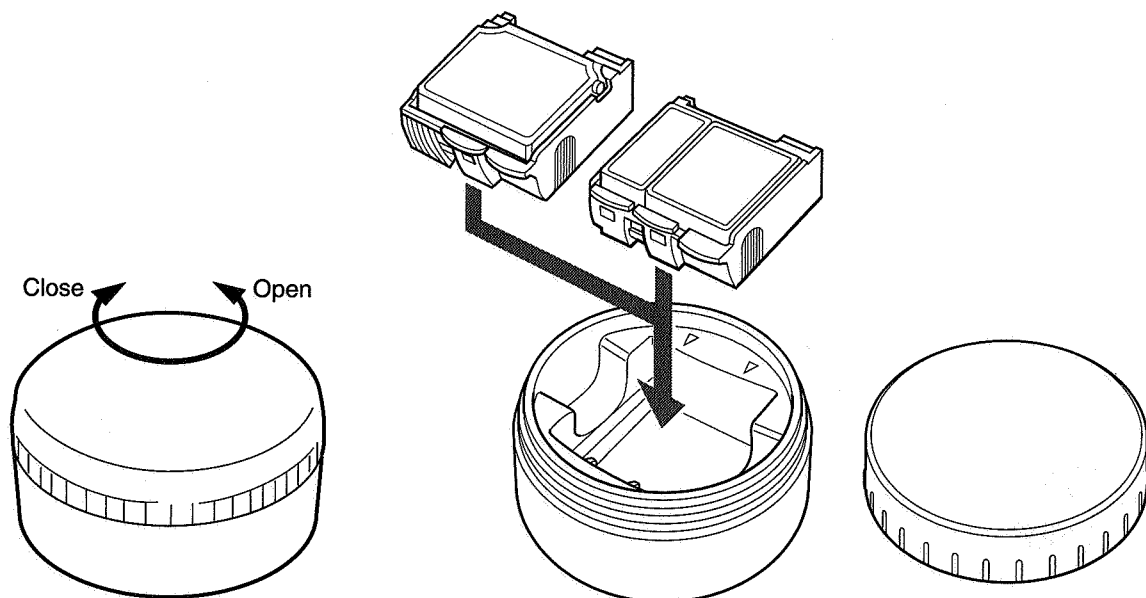


Figure 3-10 BJ Cartridge Container



Store the BJ cartridge with the ink cartridge attached. If the ink cartridge is not attached, ink may spill out or nozzles may be clogged with ink. Do not shake or fall the container. Otherwise, ink may leak.

1.3 Names and Functions of Parts

This section describes the names of the parts of the printer and their functions.

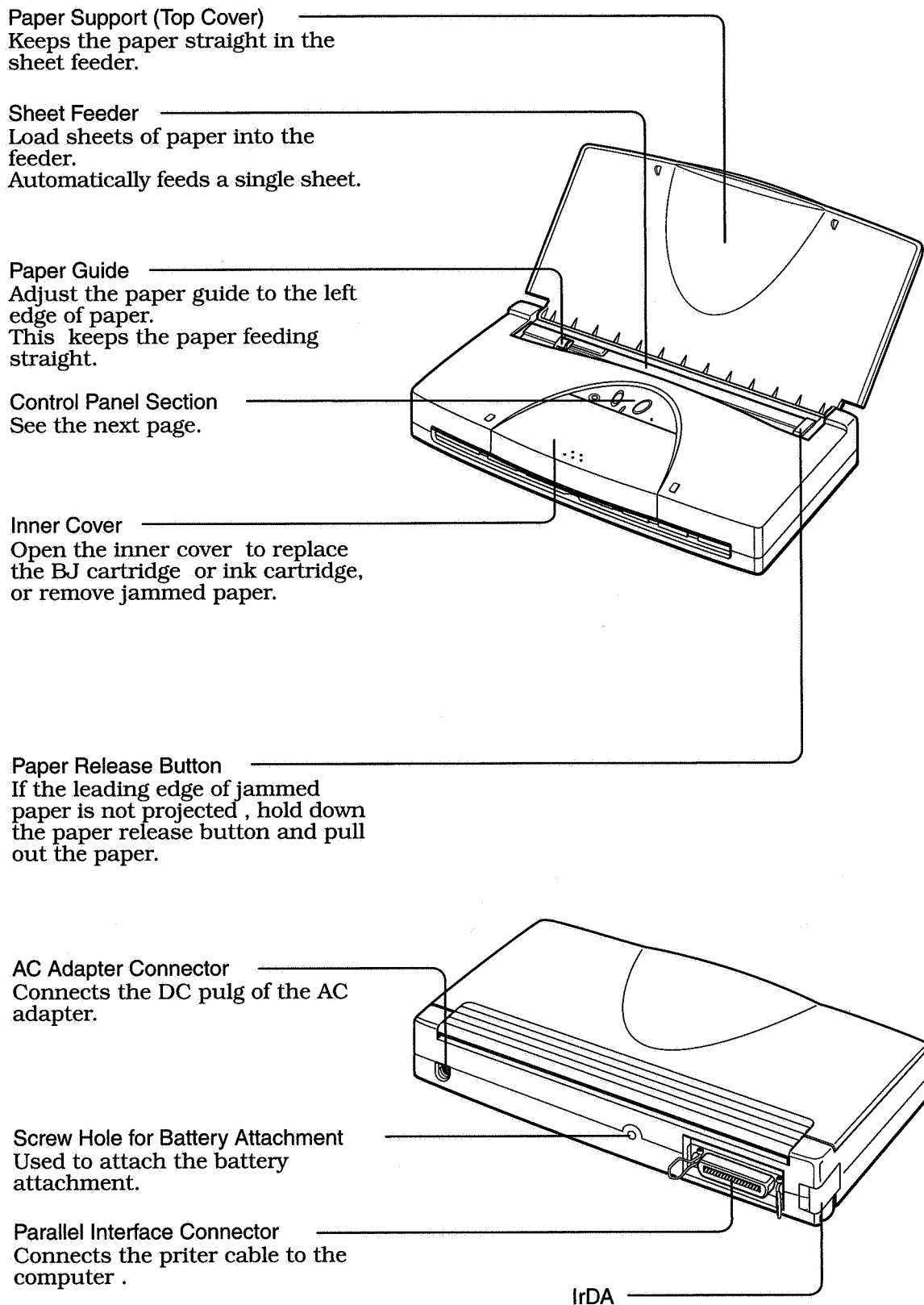


Figure 3-11 Names and Functions of Parts (1)

Control Panel Section

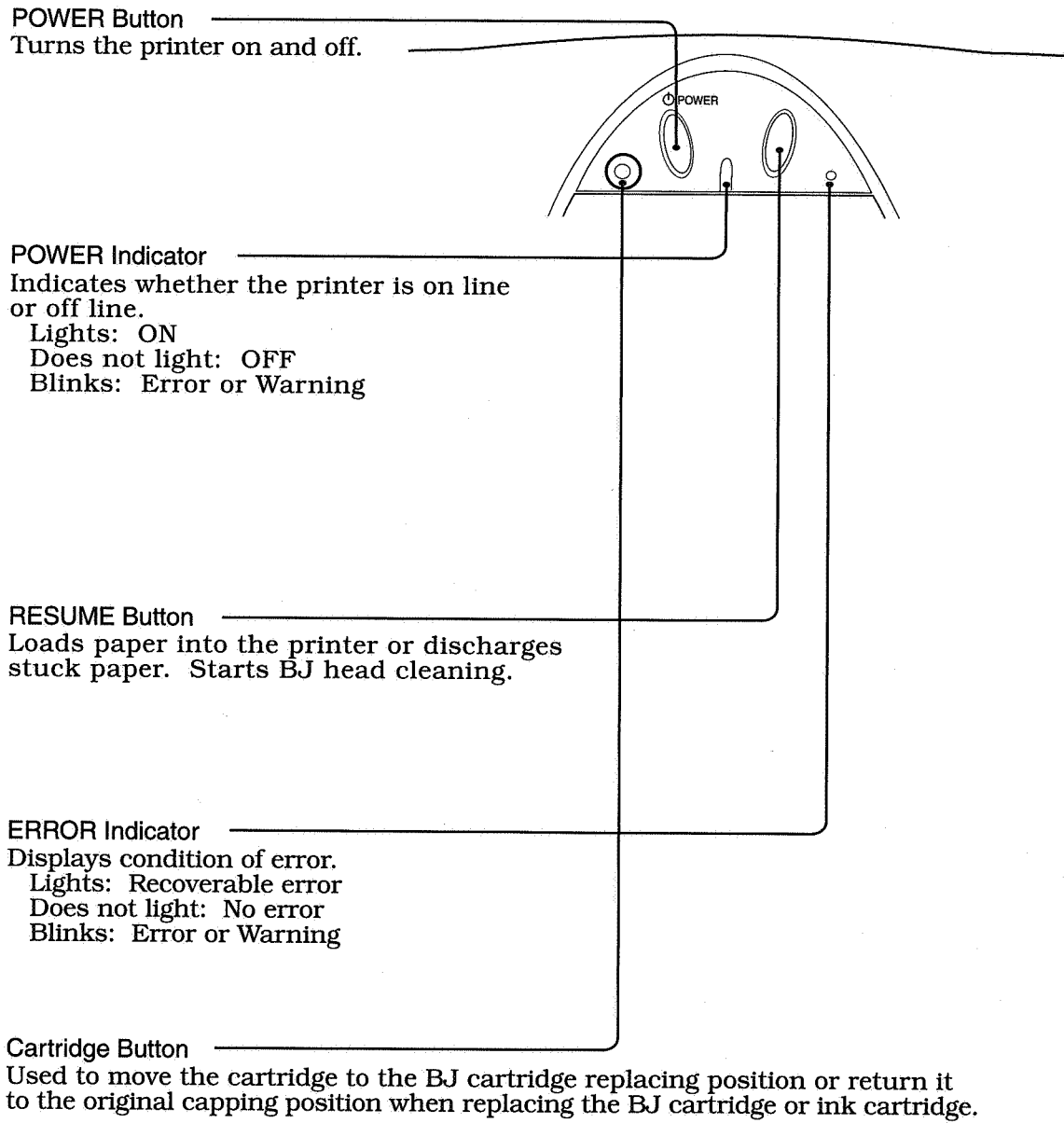


Figure 3-12 Names and Functions of Parts (2)

2. TRANSPORTING THE PRINTER

When carrying or transporting the printer, leave the BJ cartridge in or place it in the cartridge container to prevent ink leakage and drying of cartridge nozzles.

2.1 Carrying the Printer

Before carrying the printer, do the following:

- 1) Press the *POWER* button to turn the printer off and close the top cover. When the power goes off, the display turns off.
- 2) Unplug the interface cable.
- 3) Disconnect the DC plug of the AC adapter from the printer. Disconnect the AC plug of the AC adapter from the outlet.
- 4) Make sure that the BJ cartridge is at the capping position (right edge of the printer). If it is not at the capping position, turn the printer on again and perform step 1 and subsequent steps to move the carriage to the capping position.



If you cut off the power to the printer by just disconnecting the AC adapter or take out the BJ cartridge and carry it around by itself, the cartridge is not capped, so ink can leak or dry up in the nozzles.

2.2 Transporting the Printer

Before transporting the printer, do the following:

- 1) Disconnect the interface cable and the AC adapter in the same way as when carrying the printer.
- 2) If an optional NiMH battery is used, remove the battery attachment from the printer.
- 3) Pack the printer and AC adapter with the original packing materials.



If you have thrown the original packing materials away, pack the printer with plenty of shock absorbing material.

3. PRINTER SERVICING FUNCTIONS

3.1 Error Indications

The LED in combination with the beeper indicates the nature of 3 kinds of errors: fatal, error and warning.

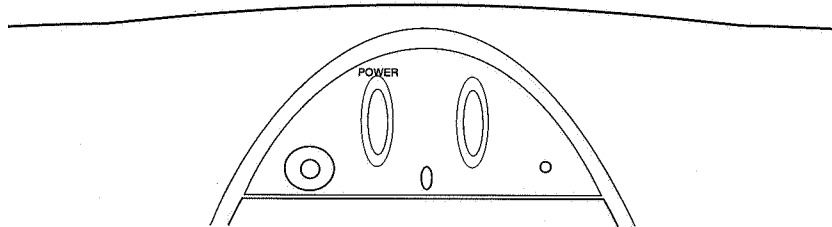


Figure 3-13 Control Panel

Fatal Error: The *ERROR* indicator and *POWER* indicator blink at the same time. The number of beeper sounds indicates the type of the error.

Error: The *ERROR* indicator and *POWER* indicator light. The number of beeper sounds indicates the type of the error.

Warning: The *ERROR* indicator blinks and the *POWER* indicator lights. The number of beeper sounds indicates the type of the error.

Table 3-1 Error Display

Error condition	ERROR LED	POWER LED	Beeper
<i>[Recoverable by customers]</i>	<i>(Orange)</i>	<i>(Green)</i>	
Paper pick-up error	Lights	Lights	1 time
Paper delivery error	Lights	Lights	2 times
BJ cartridge check	Lights	Lights	3 times
Cartridge mis-match	Lights	Lights	4 times
Waste ink warning	Blinks	Lights	4 times
Low battery warning	Blinks	Lights	3 times
Low battery error (with battery)	Blinks	Blinks	Long, then short
Ink low warning*	Blinks	Lights	1 time
Cartridge replacement compulsory completion warning	Blinks	Lights	2 times
<i>[Unrecoverable by customers]</i>			
HP sensor error	Blinks	Blinks	4 times
Print position detection error	Blinks	Blinks	7 times
Diode sensor error	Blinks	Blinks	9 times
Low battery error (with AC adaptor)	Blinks	Blinks	Long, then short
Internal temperature error	Blinks	Blinks	6 times
Abnormal temperature rise	Blinks	Blinks	8 times
No head installation error	Blinks	Blinks	3 times
Waste ink full error	Blinks	Blinks	5 times
ROM error	Blinks	Blinks	1 time
RAM error	Blinks	Blinks	2 times
EEPROM error	Blinks	Blinks	11 times

* Ink low warning is enabled only when the ink low warning selection is set to on.

For details on the countermeasures when the above errors occur, refer to *Part 5: 5.*

Troubleshooting (page 5-5).

Recoverable errors by customer:**1) Paper pick-up error:**

Occurs when the paper cannot be fed properly.

2) Paper jam:

Occurs when the printed paper cannot be ejected.

3) BJ Cartridge check:

Occurs when a BJ cartridge is not installed and the cartridge replacement mode is terminated by the printer. This error is recovered once it enters the cartridge replacement mode by holding down the *CARTRIDGE* button.

4) Cartridge mis-match error:

Occurs when the data in the host computer does not match with that of the installed cartridge. This error is recovered by holding down the *CARTRIDGE* button and installing the correct cartridge.

Unrecoverable errors by the customer:**5) ROM error:**

Occurs when the ROM check during the initializing operation fails.

6) RAM error:

Occurs when the RAM check during the initializing operation fails.

7) EEPROM error:

Occurs when the EEPROM checking function fails during every process.
(eg. initialization, printing, etc...)

8) Home Position error:

Occurs when the home position cannot be detected.

9) Waste ink full error:

Occurs when the "total waste ink amount" recorded on the EEPROM exceeds the prescribed limit.

10) Internal temperature error:

Occurs when the temperature sensor (TH1) on the control board is defective.

11) Abnormal temperature rise error:

Occurs when the diode sensor on a BJ cartridge head detects the internal temperature to be above a predetermined value.

12) Diode sensor error:

Occurs when the diode sensor on a BJ cartridge head is defective.

13) No head installation error:

Occurs when the printer cannot detect the BJ cartridge other than during the cartridge replacement operation.

14) Print position detection error:

Occurs during when the home position cannot be detected during the print position detection process.

15) Low battery error:

Occurs when the DC input voltage is less than a predetermined value.

3.2 Function Setting

Printer function settings are set from the host computer using the printer setup utility and such. The function menu shown on the display itemizes settings 1 to 1A.

3.2.1 Default setting

The default setting can be set by button operation when the power is turned on. When the printer is turned on, hold down the *POWER* button until the beeper sounds the specified number of times. To select one of the default settings, release the *POWER* button.

Release the *POWER* button after seven beeper sounds to display Table 1 with a list of the default setting modes.

Table 3-2 Function Setting (1)

Mode	Beeper	Remark
Table 1	7 times	Factory default setting
Table 2	8 times	
Table 3	9 times	
Table 4	10 times	
Table 5	11 times	

Table 3-3 Function Setting (2)

	Table 1	Table 2	Table 3	Table 4	Table 5
Operation Mode change	LQ	BJ	LQ	BJ	BJ
Print Mode	HQ	HQ	HQ	HQ	HQ
Left Margin	LTR	LTR	A4	A4	A4
Page Length	off	11 inch	off	12 inch	12 inch
Text Scale Mode	Disable	Disable	Disable	Disable	Disable
Paper Feed Position	8.5 mm	3 mm	8.5 mm	3 mm	3 mm
Smoothing	Disable	Disable	Disable	Disable	Disable
Automatic Power Off	Disable	Disable	Disable	Disable	Disable
Font Lock	Disable	Disable	Disable	Disable	Disable
Input/Download Buffer	25 kB/0 kB	34 kB/0 kB	25 kB/0 kB	34 kB/0 kB	34 kB/0 kB
Automatic Line Feed	CR	CR	CR	CR	CR
Automatic Carriage Return	off	LF	off	LF	LF
International Character Set	USA	off	USA	off	off
Alternate Graphic Mode	off	Disable	off	Disable	Disable
Character Set	Italics	Set 1	Italics	Set 1	Set 1
Code Page	437	437	437	850	437
Auto Emulation Change	Disable	Disable	Disable	Disable	Disable
Ink Low Warning	Disable	Disable	Disable	Disable	Disable

3.2.2 Function selector setting

Table 3-4 BJ Mode

Counter No.	Function	On	Off	Factory Setting
1	A4/LTR left margin	A4	LTR	off
2	Page length	12 inches	11 inches	off
3	Text scale mode	Enable	Disable	off
4	Paper pick-up position setting	See Table 3-6		on
5				off
6	Smoothing	Enable	Disable	off
7	Auto power off	Enable	Disable	off
8	Font style lock out	Enable	Disable	off
9	Receive/down load buffer change	2 kB/32 kB	34 kB/0 kb	off
10	Automatic line feed	CR + LF	CR	off
11	Automatic carriage return	LF + CR	LF	off
12	AGM mode	Enable	Disable	off
13	Unused	...	...	off
14	Character set selection	Set 2	Set 1	off
15	Code page	See Table 3-8		off
16				off
17				off
18				off
19	Automatic emulation change	Enable	Disable	off
1A	Ink low warning selection	Enable	Disable	off

Table 3-5 LQ Mode

Counter No.	Function	On	Off	Factory Setting
1	A4/LTR left margin	A4	LTR	off
2	Unused	...	...	off
3	Text scale mode	Enable	Disable	off
4	Print start position setting	See Table 3-6		on
5				off
6	Smoothing	Enable	Disable	off
7	Auto power off	Enable	Disable	off
8	Font style lock out	Enable	Disable	off
9	Receive/down load buffer change	2 kB/23 kB	25 kB/0 kb	off
10	Automatic line feed	CR + LF	CR	off
11	International character set	See Table 3-7		off
12				off
13				off
14	Character table selection	Graphic	Italic	off
15	Code page	See Table 3-8		off
16				off
17				off
18				off
19	Automatic emulation change	Enable	Disable	off
1A	Ink low warning selection	Enable	Disable	off

Table 3-6 Print Position Setting

Print Start Position	Counter No.	
	4	5
3 mm	off	off
5 mm	off	on
8.5 mm	off	on
10 mm	off	off

Table 3-7 Internal Character Set

Country	Counter No.		
	11	12	13
USA	off	off	off
UK	off	off	on
Germany	off	on	off
France	off	on	on
Denmark	on	off	off
Sweden	on	off	on
Italy	on	on	off
Spain	on	on	on

Table 3-8 Code Page

Code Page	Counter No.			
	15	16	17	18
PC437	off	off	off	off
PC850	off	off	off	on
PC863	off	off	on	off
PC865	off	off	on	on
PC860	off	on	off	off
PC857	off	on	off	on
PC855	off	on	on	off
PC852	off	on	on	on
PC864	on	off	off	off
PC869	on	off	off	on
PC437	on	off	on	off
PC437	on	off	on	on
PC437	on	on	off	off
PC437	on	on	off	on
PC437	on	on	on	off
PC437	on	on	on	on

3.3 Control Buttons

3.3.1 Cleaning the BJ cartridge

If the printed image is blurred or a print defect occurs, such as a white streak, print a test pattern to see whether the BJ cartridge is clogged with ink. If nozzles are clogged with ink, use the *RESUME* button to clean the BJ cartridge and nozzles.

Please follow these instructions:

To clean the BJ cartridge, hold down the *RESUME* button until the beeper sounds twice.

The *POWER* indicator blinks and BJ cartridge cleaning starts after a while. Cleaning takes about 30 seconds.

- 1) When the printer is turned on with the *POWER* button hold down the *RESUME* button until the beeper sounds twice.
- 2) Cleaning starts and the *POWER* indicator blinks.
- 3) When cleaning is finished, the *POWER* indicator lights. Cleaning takes approx. 27 seconds.

After cleaning, test print the nozzle check pattern to check the clogged nozzles have recovered. To print the nozzle check pattern, hold down the *POWER* button until the beeper sounds four times. Printing will start upon releasing the *POWER* button.

When the printer's power is on, hold down the *RESUME* button until 3 beeper sounds. Release *RESUME* button to start head refreshing.

The printer carries out cleaning automatically in the following cases:

- 1) When the printer is turned on with the *POWER* button.
- 2) After replacing the BJ cartridge.
- 3) After replacing the ink cartridge.

3.4 Self Test Print

The printer has the "off-line" self test function which can be executed without connection to a computer.

This section explains how to execute the off-line self test.

While the printer is off line, hold down the *POWER* button until the beeper sounds the specified number of times, then release the *POWER* button to start the off-line test.

Test print mode	Beeper
Demonstration pattern print	1 time
Functions settings list print	2 times
Ripple pattern print	3 times
Nozzle check print	4 times
All fonts print	6 times




Do not use any paper whose width is less than the A4-size paper width when executing a print test. Test print data is designed to be printed on A4-sized sheets, so if any paper whose width is less than the A4-sized paper width is used, the platen in the printer base unit may be stained with ink.




To stop the test pattern printing, press either the *RESUME* button or the *POWER* button. When the *RESUME* button is pressed, the printed paper is discharged and the *POWER* button lights to indicate on-line status. When the *POWER* button is pressed, the printed paper is discharged, the printer turns off.


3.4.1 Demonstration print

BJC-80
Color Bubble Jet Printer







•High quality color printing: Canon's new Drop Modulation Technology offers unsurpassed quality in color printing at 720x360 dpi*.




•Professional performance monochrome: Quick, crisp black Printing at 4.5ppm and 720x360 dpi resolution with smoothing.




•Built-in IrDA: Canon's new IrDA interface offers convenient cable-less printing.




•Scanner Cartridge(option): An optional scanner cartridge instantly turns your BJC-80 into a 360 dpi color sheetfed scanner.



•Exceptional portability: Sleek, lightweight design and the optional portable kit with 200-page battery life offer convenient printing anywhere.



•Excellent paper handling: built-in 30 page sheet feeder is compatible with plain, high resolution, and coated papers; envelopes, transparencies, high gloss film, back print film, T-shirt transfers, and even Canon's exclusive fabric sheets.



•Excellent software compatibility: Fully compatible With Microsoft® Windows® 95, Windows® 3.1, and DOS.

•Guaranteed worldwide: Canon International Warranty System provides worldwide coverage for hardware repairs.

*Print Resolution of black in color printing is 720x360 dpi with smoothing.
 *Canon is a registered trademark and BJC and Drop Modulation Technology are trademarks of Canon Inc.
 *Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and / or in other countries.
 *All other brand and product names are registered trademarks or trademarks of their respective owners.

Figure 3-14 Demonstration Print (Sample)

3.4.2 Function settings list print

BJ Mode INFORMATION of FUNCTION		Ver X.XXX
English		
1.	Paper Selection	LTR
2.	Page length	11 inch
3.	Text Scale Mode	Disable
4.	Top margin #1	3mm
5.	#2	
6.	Smoothing	Disable
7.	Automatic power off	Disable
8.	Font lock	Disable
9.	Input/Download buffer	34KB/0KB
10.	Automatic line feed	CR=CR
11.	Automatic carriage return	LF=LF
12.	Alternate graphics mode	Disable
14.	Character set	Set 1
15.	Code page #1	Code page 437
16.	#2	
17.	#3	
18.	#4	
19.	Automatic emulation switching	Disable
1A.	Low Ink Alert	Disable

French		
1.	Choix de support	LTR
2.	Longueur de page	
3.	Mode Text Scale	
4.	Marge supérieure #1	
5.	#2	
	Lissage	

Figure 3-15 Function Settings List Print (Sample)

3.4.4 Nozzle check pattern print

BC-11e

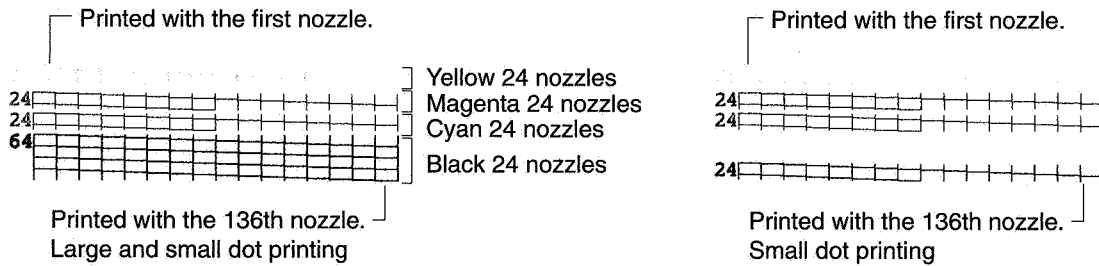


Figure 3-17 Nozzle Check Pattern Print (Sample)

3.4.5 All fonts pattern print

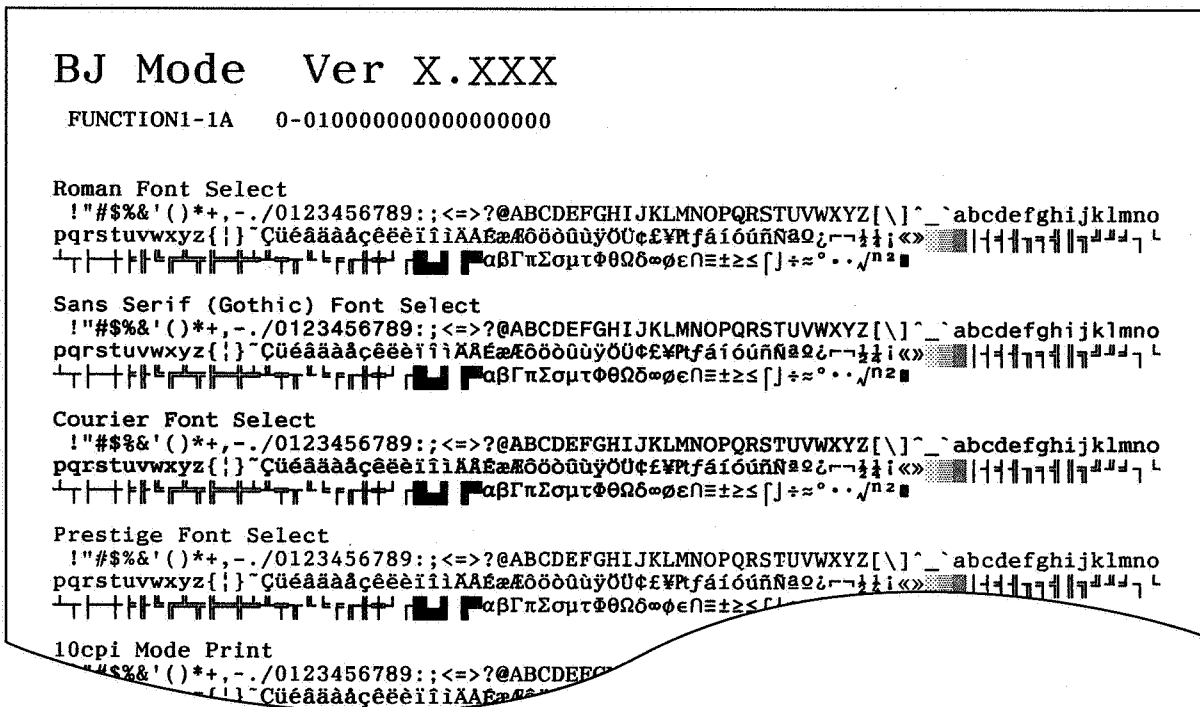


Figure 3-18 All Fonts Pattern Print (Sample)



To stop the test print, press the *RESUME* button.

3.5 Hexadecimal Dump Test Print

The printer has the "on-line" self test function that outputs hexadecimal dump data when it is connected to a computer.

The hexadecimal dump test is carried out when the printer is on line to print the data coming from the computer in hexadecimal code (hexadecimal data). Hold down the *POWER* button until the beeper sounds 5 times, and release the button to start printing the on-line self test.

Printing starts after the print buffer is full since this mode does not recognize the control code data as a control code.

Test print mode	Selected number
Hexadecimal dump test print	5

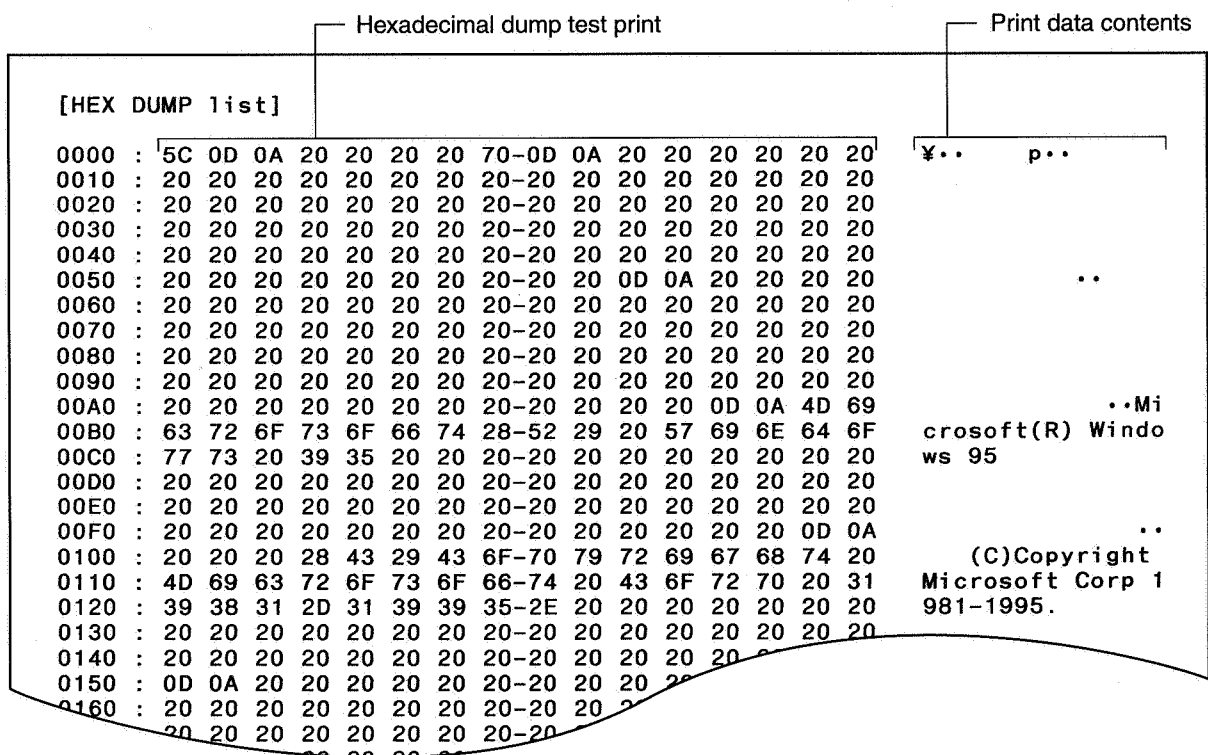


Figure 3-19 Hexadecimal Dump Test Print (Sample)

3.6 EEPROM Data Setting

3.6.1 EEPROM data setting mode

The required EEPROM data is set in this mode when replacing the control PCB assembly or the printer base unit (including the waste ink absorber).

The EEPROM (IC9) on the control PCB assembly contains machine specific data, such as waste ink amount and the remaining quantity of ink in the ink cartridge. Data must be set in the EEPROM when replacing the control PCB assembly or the printer base unit (including the waste ink absorber).

a) When replacing the control PCB assembly

Before installing a new control PCB assembly, visually check the waste ink amount for the waste ink absorber in the printer base unit. After replacing the control PCB assembly, set the waste ink amount in the EEPROM.

b) When replacing the printer base unit (including the waste ink absorber)

Set 0% (EEPROM clear) after replacing the printer base unit.

3.6.2 Setting EEPROM data

1. While holding down the *POWER* and *RESUME* button, insert the DC plug of the AC adapter into the printer, and release both buttons when the initial operations is completed.
2. While holding down the *RESUME* button and the *CARTRIDGE* button, press the *POWER* button. Release all the buttons when one long and short beeper sounds. Press the *CARTRIDGE* button to select the following number of beeper sounds. Set the waste ink amount of the waste ink absorber in the printer base unit (Roughly estimate the amount of ink absorbed on the surface of the waste ink absorber).

Beeper	Waste ink amount (Use the <i>CARTRIDGE</i> button to change)
7 times	0% used (new ink absorbed/EEPROM clear)
12 times	25% used
11 times	50% used
10 times	75% used

If 25%, 50% or 75% is selected:

Press the *RESUME* button to set data in the EEPROM.

After setting is completed, press the *POWER* button to turn off the printer.

If 0%(EEPROM clear)is selected:

Press the *RESUME* button. Initialization starts and a beeper sounds.

To clear the data in the EEPROM, press the *POWER* button to turn off the printer and remove the DC plug of the AC adapter from the printer's power connector.

Clear the data in the EEPROM.

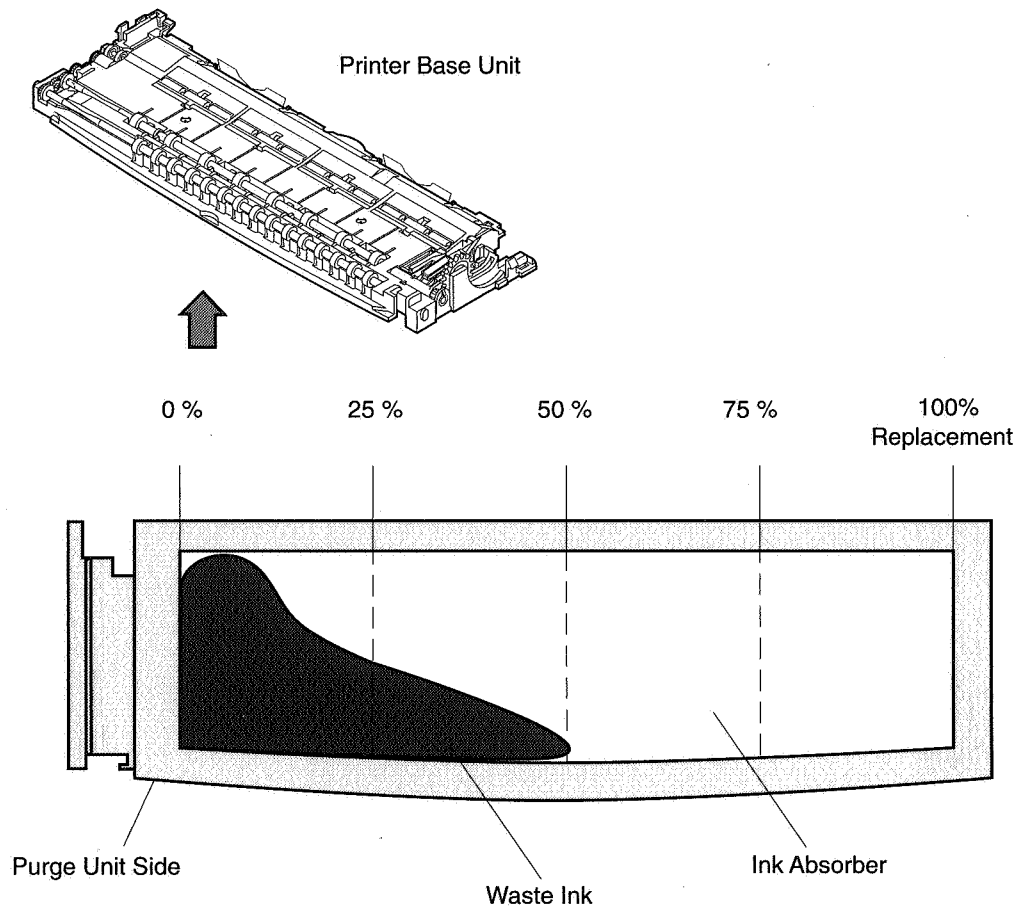


Figure 3-20 Waste Ink Absorber (50% used sample)

3.6.3 Displaying EEPROM data

The EEPROM contains the total waste ink amount and the total number of pages fed, which are counted while the printer is used. This data is useful to know the frequency of use of the printer.

1. While holding down the *POWER* and *RESUME* button, insert the DC plug of the AC adapter into the AC adapter connector of the printer, and release both buttons when the initial operation is completed.
2. While holding down the *RESUME* button and the *CARTRIDGE* button, press the *POWER* button until one long and short beeper sounds. Every time the *CARTRIDGE* button is pressed, a beeper sounds. When the *RESUME* button is pressed after the beeper sounds nine times (i.e. pressing the cartridge button 9 times), the EEPROM setting list will be printed.

Part 4

TECHNICAL REFERENCE

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4 - 9	2. FIRMWARE	4 -44	5.1 HP Sensor
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4 -15	2.2 720 dpi Printing/Smoothing Feature	4 -44	5.3 Temperature Sensor
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		4 -50	6.4 Scan Mode
		4 -50	6.5 Calibration



1. OVERVIEW

1.1 Printer Block Diagram

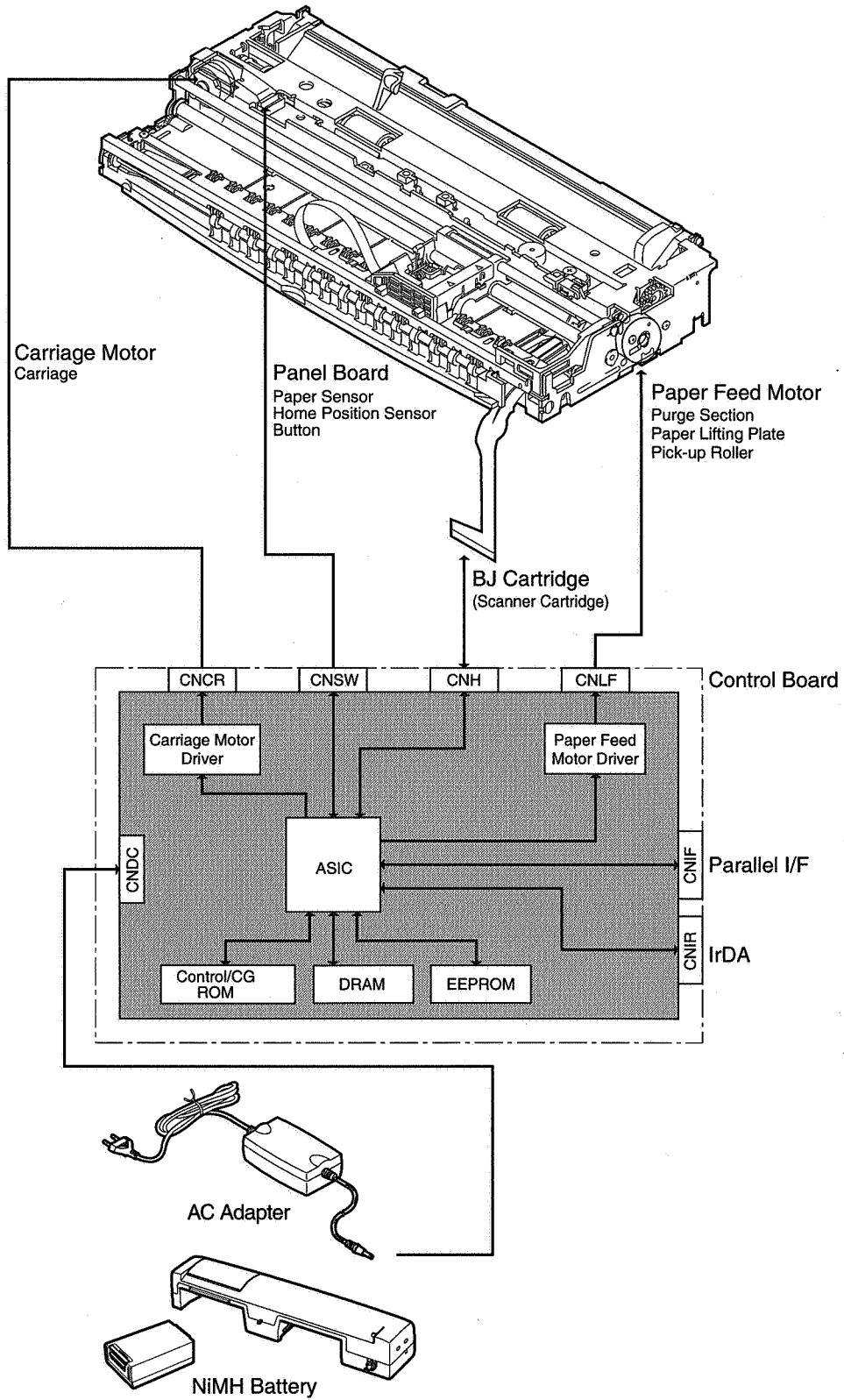
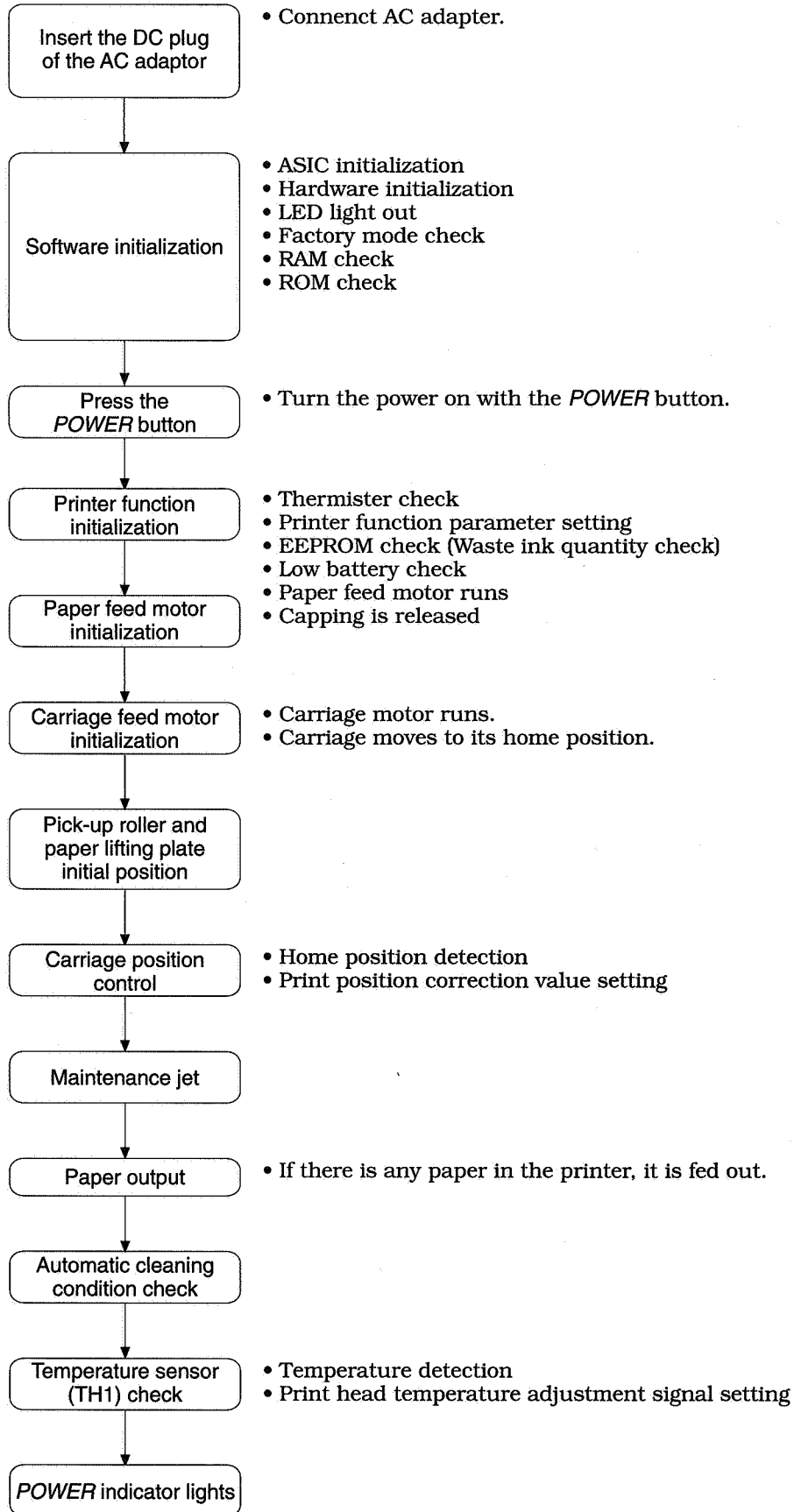


Figure 4-1 Printer Diagram

1.2 Initial Flowchart

1.2.1 Print mode

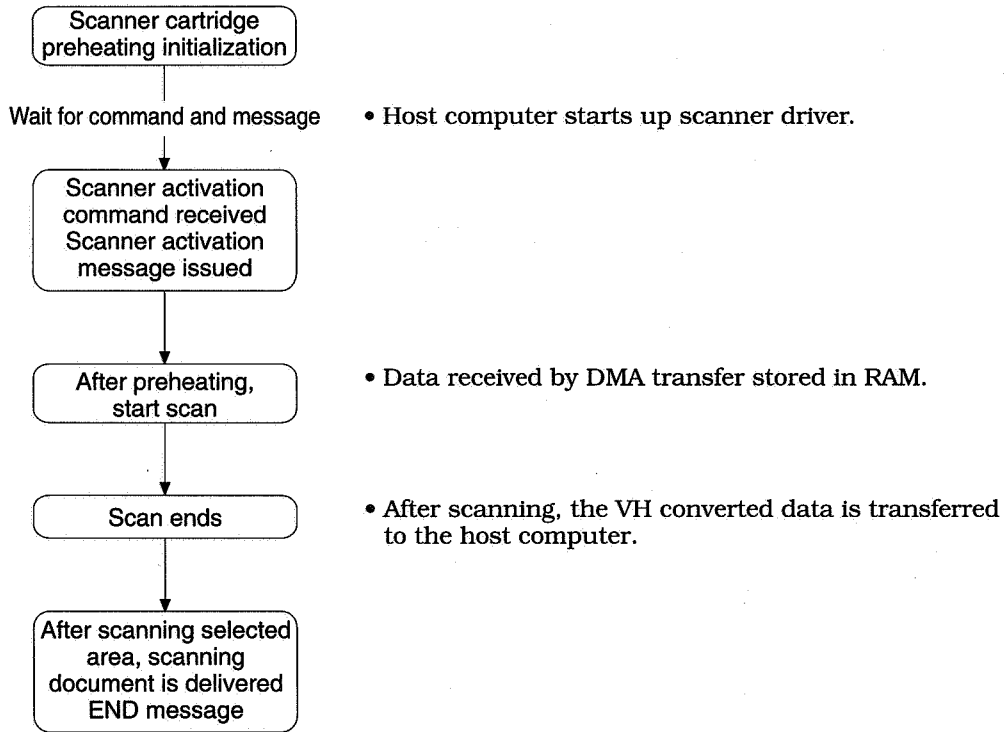


1.2.2 Scanner mode

When powered on, the printer starts up in the printer mode regardless of the printer head type.

Once the printer is on, it stands by to receive a data or a command.

When the printer recognizes the scanner activation command, the printer starts operating in the scanner mode. After the printer recognizes the scanner head and performs the POWER ON operation, the printer starts to preheat the scanner head.



1.3 Print Signal Flow

The print signal flow from when the printer receives the print data to when printing is executed is described below.

- a) The print data (including the control signals) output by the computer is received by the ASIC through the interface, which is controlled by the ASIC on the logic board. Through the dedicated bus between the printer controller and DRAM, print data is stored in the DRAM's receive buffer area.
- b) The print data in the receive buffer is sent to the ASIC and separated into control commands and print data based on the data stored in the control ROM. The control commands are processed in the ASIC.
- c) The print data is stored in the DRAM's print buffer.
- d) When the ASIC receives the command from the DRAM to start printing, it receives print data stored in the DRAM's print buffer. At the same time, the ASIC receives control commands stored in the control ROM.
- e) The ASIC converts the print data into serial data as print drive signals and outputs the serial data to the bubble jet head. In the bubble jet head, the print data is converted from serial signals to parallel print data for each printed line. Printing is executed while the ASIC is controlled by the print control signals.

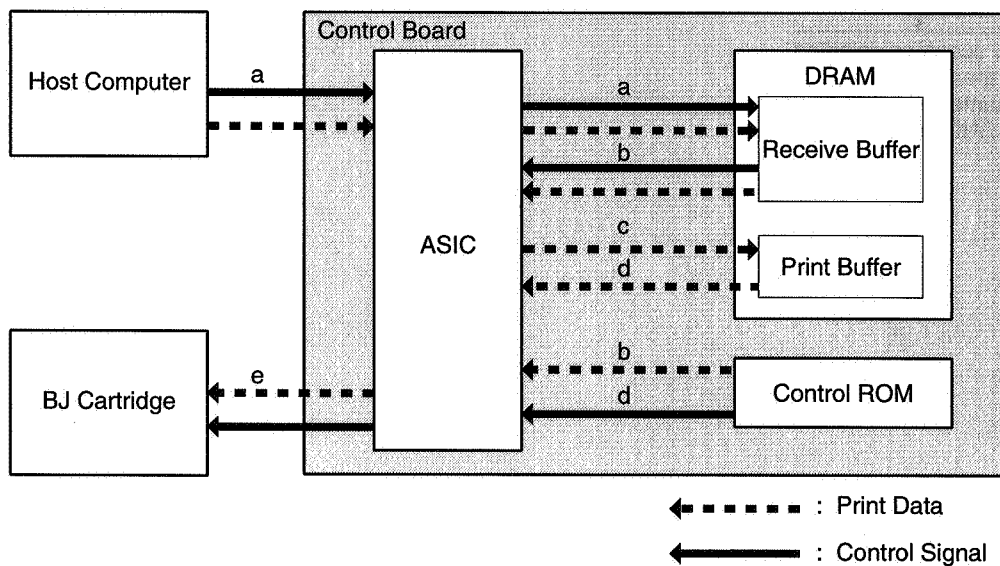


Figure 4-2 Printing Signal Flow

1.4 Print Drive

The printer outputs control signals from the ASIC's printer controller to the BJ head to eject ink from the BJ head for printing.

The control signals consist of the print control signal for ejecting ink from the head's nozzles and the temperature control signal for adjusting the head's temperature so that the amount of ink ejected is uniform.

To archive optimum printing, both these control signals are optimized by the printer controller and sent from the carriage ribbon cable's signal contacts to the BJ head. The drive frequency varies depending on the printing mode and BJ cartridge type.

1.4.1 Printing drive control

a) Black BJ cartridge drive control

The black BJ cartridge drive control is executed by dividing the head's 128 nozzles into 8 blocks (16 nozzles each). These blocks are further divided into odd and even blocks (8 nozzles each). The odd blocks eject ink simultaneously and the even blocks do so as well. The control signals for the former are the block enable 0, 1, and 2 signals (BENB 0, 1, 2) and for the latter the signals are the even/odd enable signals (Even/Odd ENB). The heat enable A and D (HENB A, D), which are the heater drive control signals for ejecting the ink, comprise of a prepulse and main pulse. To constantly archive optimum ink ejection, the internal conditions such as the head's rank, printer temperature, and head temperature are monitored and the heater drive pulse width is varied before the pulse is output. Furthermore, the print drive signal from the printer controller is transferred to the BJ head's shift resistor according to the HLATCH timing. The printing drive signal (HDATA) is latched and when the print control and heater drive control signals are output together, the heater for the applicable nozzles is driven and the ink is ejected.

b) Color BJ cartridge drive control

The color BJ cartridge head's nozzles configuration differs from that of the black BJ cartridge. (The black has 64 nozzles while the color has 24 nozzles each for Y, M, and C.) Therefore, the number of nozzles in each control block is different from that of the black BJ cartridge. Furthermore, since the heaters are driven simultaneously for each color, the heater drive control signals used are the FOUR heat enable signals (HENB A, B, C, and D). All other operations are the same as for the black BJ cartridge.

For each color, (Y, M and C), the HENB B and A signals drive the front and back nozzle heaters. The HENB C and D signals drive the front and back nozzle heaters for black ink.

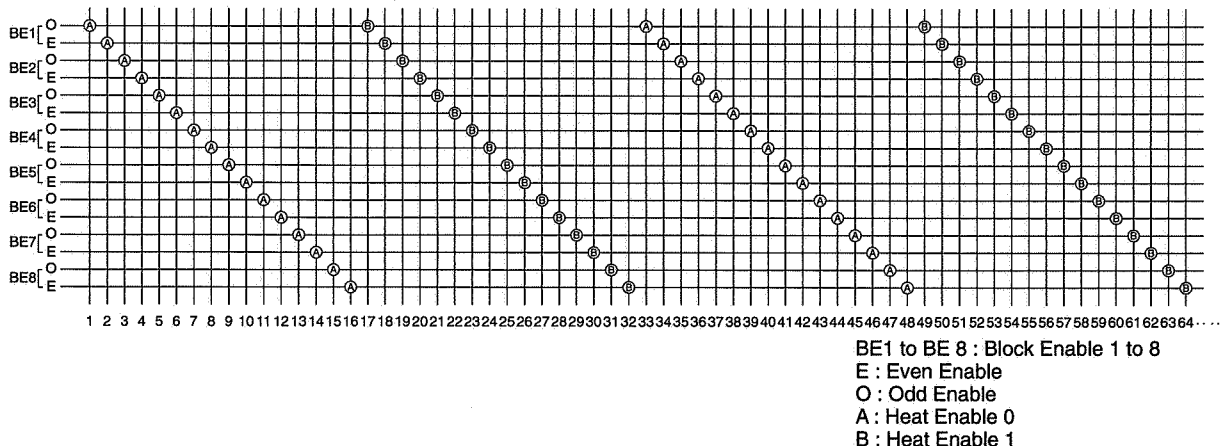
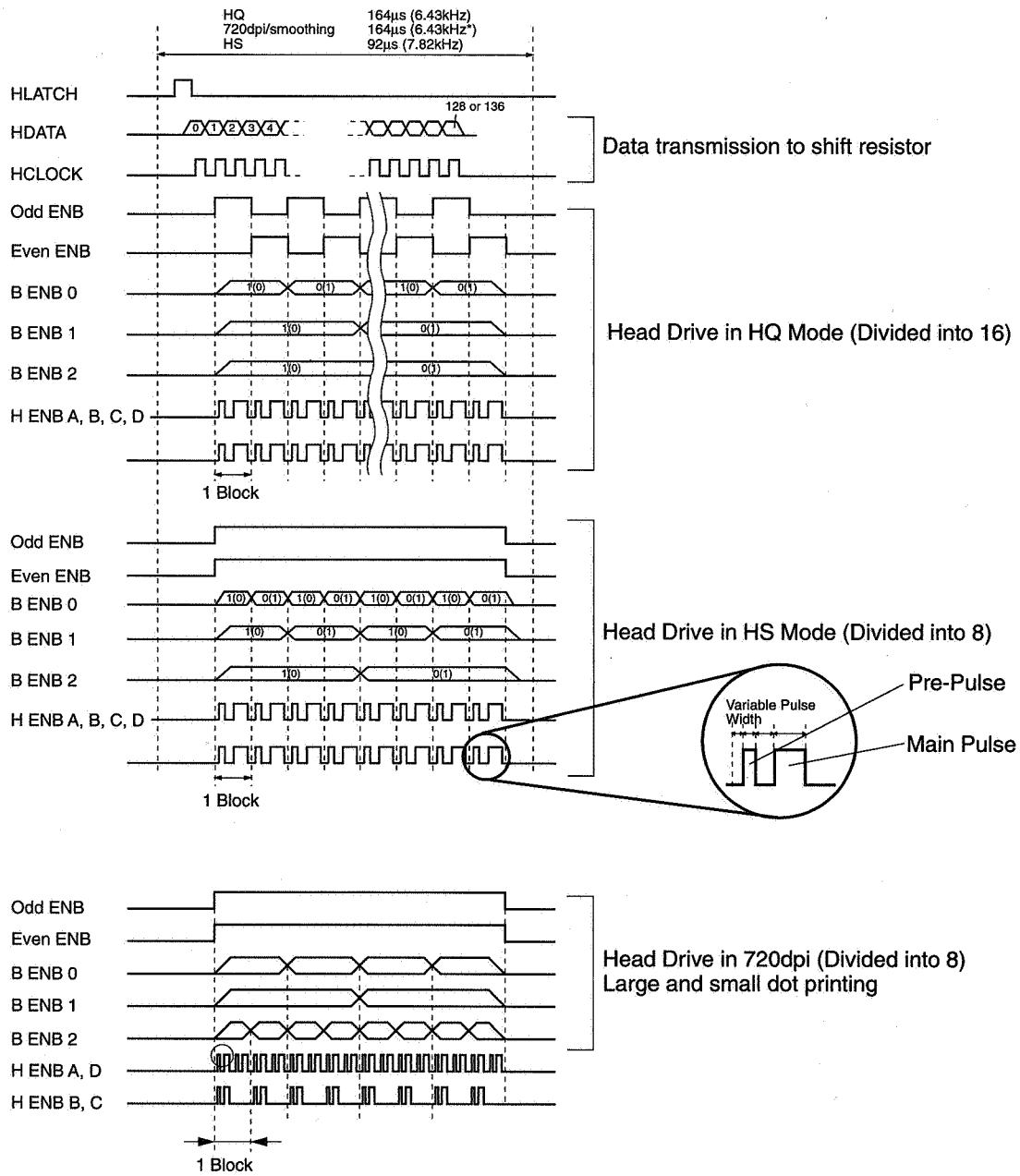


Figure 4-3 Print Sequence (Black BJ Cartridge/HQ Mode)



When using a black BJ cartridge, HENEB A and D are drive signals. When using the color BJ cartridge, HENEB A and B drive yellow, magenta and cyan, and HENEB C and D drive black.

Figure 4-4 Print Signals (HQ Mode)

1.5 Scanner Drive

The scanner cartridge is recognized by the scanner cartridge contacts and TOP.S, C.CHA and C.CHK signals. These three signals are equivalent to the TOP, DIODE A and DIODE K signals of the BJ cartridge.

Color distinction is performed by ID 0 and ID 1 as in the BJ cartridge.

The three signals, CMD 0 (REN), CMD 1 (RWR) and CMD 3 (RDT) are used to set data in the scanner resistor. These signals correspond with the ODD ENB, BENB 0 and BENB 1 signals of the BJ cartridge. Together with a clock signal, serial data is output to the resistor.

Data scanned with a scanner cartridge is output by S.SCLOCK (DTCK), S.SYNE (LNST) and S.DATA (DT). The scanner cartridge is operated when the S.SYNE (LNST) signal is inputted.

The scanning dot data set in the resistor is output as serial data in sync with a clock signal.

Output clock frequencies	Scanner →	Printer
	Binary:	1MHz
	Multi-valued:	2MHz or 4MHz

Table 4-1 Scanner Cartridge Contact Signals

Terminal No.	Scanner Signal		Remarks	Head Signal		ASIC Port
	Signal Name	Polarity		Signal Name	Polarity	
1	LAMP G	n/a	GND for LED	VHG	n/a	n/a
2	LAMP G	n/a	GND for LED	VHG	n/a	n/a
5	V LAMP	n/a	24 V power for LED	HVH	n/a	n/a
6	V LAMP	n/a	24 V power for LED	HVH	n/a	n/a
9	TOP.S	O	GND for scanner recognition	TOP	O	Input Port
10	DIAS		OPEN for scanner recognition	DIODE A	O	Input Port
11	ID 0	O	Color scanner cartridge detection	ID 0	O	Input Port
12	ID 1	O	Color scanner cartridge detection	ID 1	O	Input Port
13	SQW		IS-11 and IS-12 detection	INK S2		Input Port
14	VSS	n/a	GND	H VSS	n/a	n/a
19	CMD 0 (REN)	I	Resistor enable signal	ODD ENB	I	Output Port
20	CMD 1 (RWR)	I	Register recording clock signal	BNEB 0	I	Output Port
21	CMD 2 (RDT)	I	Resistor data signal	BNEB 1	I	Output Port
22	CMD 3 (N.C.)		Unused	BNEB 2	I	Output Port
23	VDD	n/a	5V power	H VDD	n/a	n/a
24	S CLOCK (DTCK)	O	Output clock	H CLOCK	I	Bidirectional Port
25	S SYNE (LNST)	I	Line start signal	H LATCH	I	Output Port
26	S RES (RST)	I	System reset signal	H RES	I	Output Port
28	S DATA (DT)	O	Output data	H DATA	I	Bidirectional Port
29	DIAS		OPEN scanner detection	DIODE K	O	Input Port

2. FIRMWARE

2.1 Interface

The printer supports a parallel interface and IrDA interface. The parallel interface is compatible with the bidirectional Centronics interface-standard (IEEE P1284).

Compatible mode is the same as the Centronics interface-standard protocol. IrDA is an infrared data communication interface that is compatible with IrDA (1.0). The interface data transfer timing for each of the parallel interface mode is described below.

2.1.1 Compatible mode

The parallel interface for the compatible mode transfers data in 8-bit units. Data is transferred with the $\overline{\text{STROBE}}$, BUSY , and $\overline{\text{ACKNLG}}$ handshake signals.

When the printer receives the data (Data 1-8) and a $\overline{\text{STROBE}}$ signal from the host computer and if the $\overline{\text{STROBE}}$ signal is low, then the printer controller which controls the parallel interface outputs the a BUSY signal and latches the data. After the BUSY signal is output, the printer controller sends the latched data from the DRAM bus to the receive buffer in the DRAM. After the data is completely written into the receive buffer in the DRAM, the printer controller outputs the $\overline{\text{ACKNLG}}$ signal and sets the BUSY signal to "Low". It then waits for the next data input from the host computer.

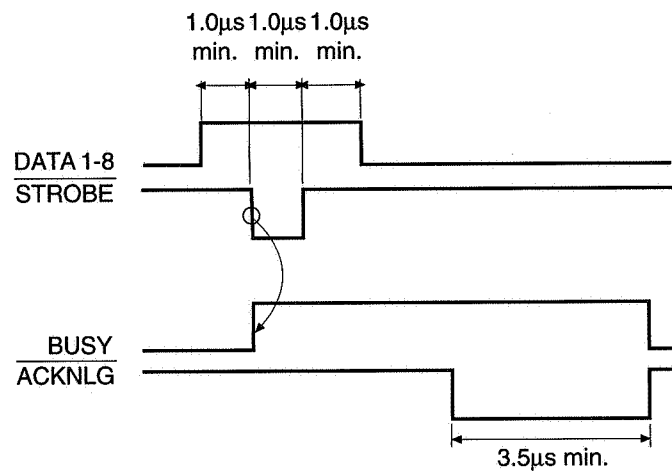


Figure 4-6 Interface Timing (Compatible Mode)

2.1.2 Nibble mode

In nibble mode, the printer transfers data twice to the host computer in 4-bit units. The data is transferred with the PtrClk signal and HostBusy signal handshakes.

After the printer negotiates with the host computer and enters the nibble mode, the printer confirms that the HostBusy signal is low, outputs a PtrClk signal with a nibble setting on the lower bits and lowers the PtrClk signal. After the host computer receives the lower bit data with the nibble mode, it raises the HostBusy signal. This signals the printer that the host computer has read the nibble data. Next, after the printer confirms that the HostBusy signal is low for a second time, it outputs the upper nibble bits and lowers the PtrClk signals.

When the host computer raises the HostBusy signal, the handshake is completed. If there is no data to be sent to the host computer, the DataAvail signal becomes high and the printer stands by for the next data transfer.

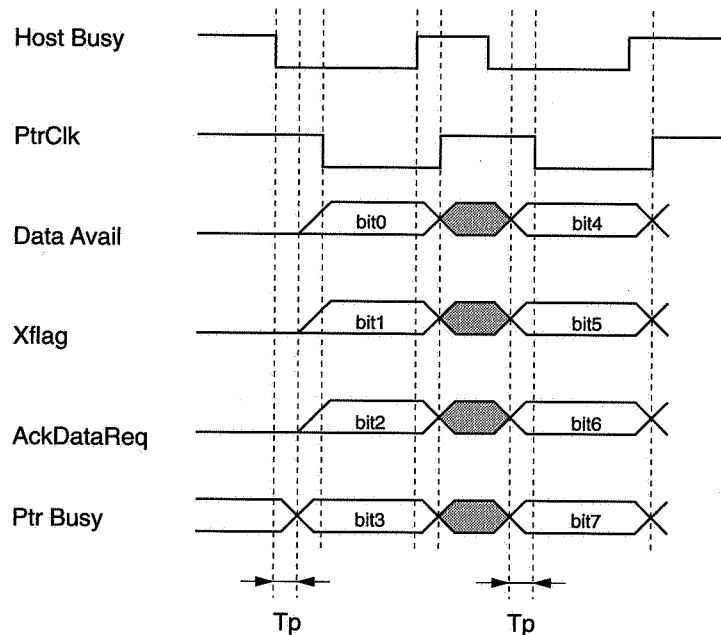


Figure 4-7 Interface Timing (Nibble Mode)

2.1.3 ECP mode

In ECP mode, the PeriphAck signal and the HostClk signal handshake to communicate.

After the host computer negotiates with the printer, the printer raises the PeriphClk signal and the host computer lowers the HostAck signals. At this point the host computer sets the data on the bus and lowers the HostClk signal to transmit the data. When the printer is ready to receive data, it raises the PeriphAck signal. The transfer from the host computer is complete once the printer receives the data and lowers the PeriphAck signal.

Next, to send data from the printer to the host computer, the host computer's ReverseRequest signal is lowered. The printer lowers the AckReverse signal, raises the PeriphRequest signal and prepares the data to be sent on the bus.

In reverse transfer, the PeriphClk signal and the HostAck signal handshake to communicate.

The printer sets the data on the data bus and lowers the PeriphClk signal to transmit data.

The host computer raises the HostAck signal to indicate it is ready to receive the host computer data.

The transfer of data from the printer is complete when the host computer lowers the HostAck signal after it receives the host computer data.

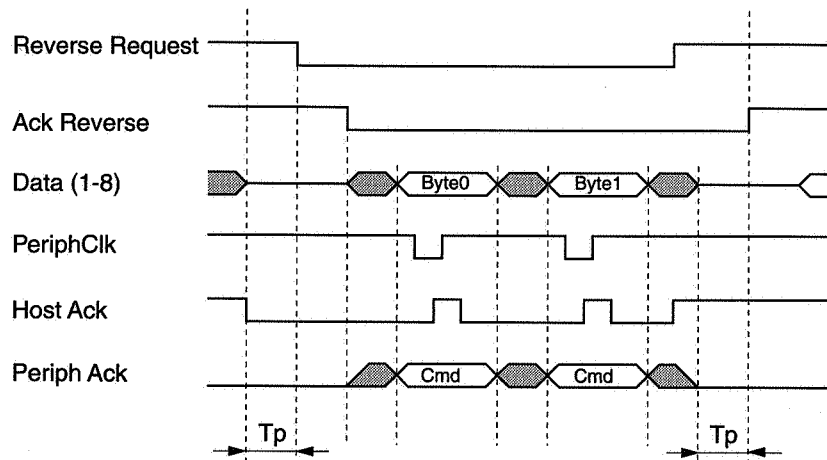


Figure 4-8 Interface Timing (ECP Mode)

2.1.4 IrDA

IrDA is an IrDA (1.0) conforming infrared serial communicating device that is built-in on the back side of the printer. Input and output of infrared light is conducted through this device. For wireless infrared one-to-one communication, the computer's IrDA and the printer's IrDA must be facing each other. The infrared light emitted from the IrDA travel sideways and lengthwise as shown in Figure 4-9. The forward direction is the light axis.

As the infrared light travel sideways and lengthwise in a two dimensional plane, the intensity of the light along the light axis decreases disproportional to the square of the distance between the IrDAs. The IrDA standard establishes the infrared emission intensity and the receptor sensitivity to ensure quality transmission. The IrDA transmission end should be located within the shown circular cone. [distance: 1 m, angle: 15° from the light axis]

The infrared transmitter and the receiver are integrated into one unit.

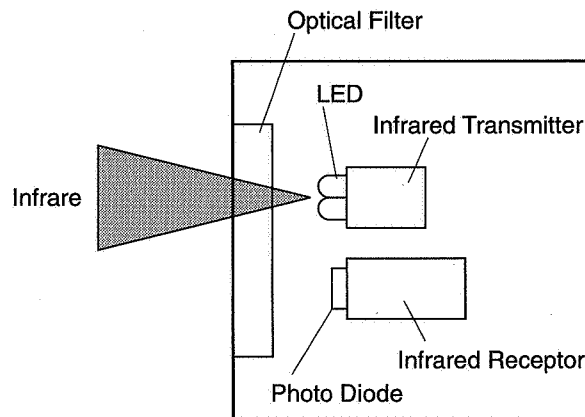


Figure 4-9 IrDA

a) Transmission formats

There are two transmission formats, the base band transmission and the variation transmission.

In base band transmission, the RZ signals that represent bit data control the ON/OFF of the infrared light. When the data is "0" in the IrDA mode, infrared rays are emitted only for a duration of 3/16 of the time required to send 1 bit of data.

In variation transmission, the amplitude of the infrared carrier frequency is varied depending on the digital data. (ASK format)

Infrared light with a peak wavelength between 850 nm and 900 nm is switched on and off at 500kHz to be used as a carrier frequency.

NOTE

The ASK format is used by Sharp's Zaurus.

• **Base band transmission format (IrDA)**

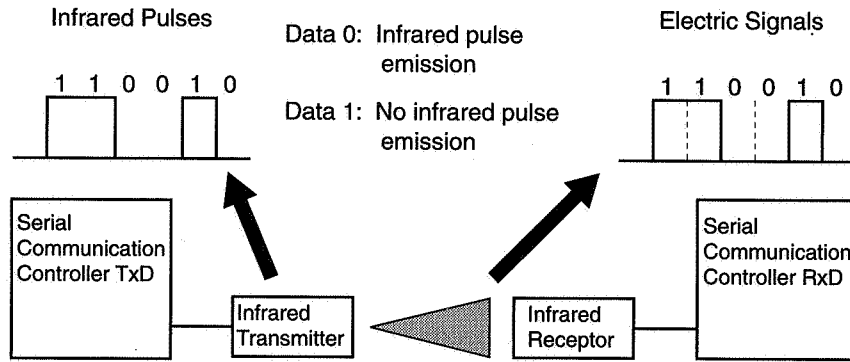


Figure 4-10 Base Band Transmission Format (IrDA)

• **Carrier transmission format (ASK)**

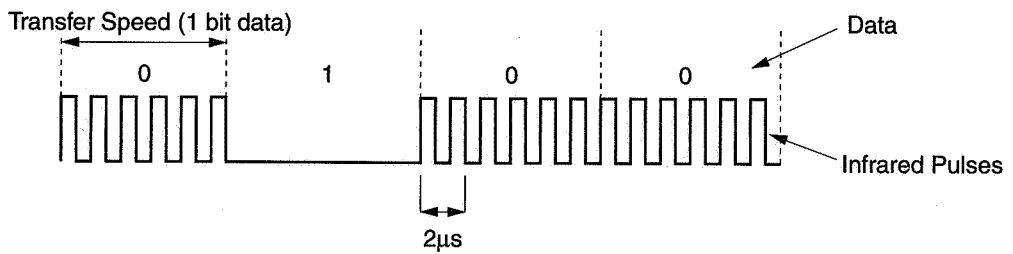


Figure 4-11 Carrier Transmission Format (ASK)

b) IrDA standard

To connect data transmission devices using infrared communication, the protocols physical and transport layers have been standardized.

- 1) Physical Layer (IrDA-SIR)
- 2) Dataring Layer (IrLAP and IrLMP)
- 3) Transport Layer (IrTP)

The Printer does not have a IrTP in the transport layer.

In the physical layer standards (IrDA-SIR), the infrared signal are established.

The physical layer of the IrDA uses RZ signals in the base band format.

As a communication method it employs a start-stop synchronized half-duplex communication and the transfer speeds are 9600/19200/38400/57600/115200 bps.

In start-stop synchronized communication, a start bit (0) and an end bit (1) are added to the 8 bit data. After the 10 bit data has been transformed into RZ signals, the signals are sent to the infrared transmitter.

The infrared receptor releases infrared pulses while the data is Low. When the data is High, the pulses are not released.

The infrared transmitter transforms the received pulses into electric pulses.

2.2 720 dpi Printing/Smoothing Feature

2.2.1 Canon extension mode

In Canon extension mode, the printer driver creates 720 dpi data for the horizontal axis and sends it to the printer, allowing the printer to archive high-quality printing. With a black BJ cartridge installed, the printer driver smoothes the printed character's edges to 720 dpi along the horizontal axis. The 720 dpi data for the horizontal axis is sent to the printer and the edges are smoothed at a higher resolution.

When a color BJ cartridge is installed, a 360 dpi data is represented by a set of two dots printed simultaneously to obtain a 720 dpi resolution. The multi-value data of the pixels processed by the printer driver for color correction, etc., is assigned three values (no printing, single-dot printing, two-dot printing) for each pixel. In the case of two-dot printing, the second dot is printed in the 720 dpi position. As a result, this method enables the printer to archive high degree gradation printing.

2.2.2 Emulation mode

When a black BJ cartridge is installed, the printed character's edges can be smoothed at a high resolution of 720 dpi along the horizontal axis. Dots along the character's edges are added or deleted to smooth their edges. Along the horizontal axis, dots are also overlapped by half a dot. This eliminates jaggies and doubles the equivalent horizontal resolution.

This smoothing feature greatly improves low-resolution, 180 dpi characters. However, it does not give noticeable improvement to TrueType fonts and illustrations.

Note that with a color BJ cartridge installed, the emulation mode smoothing feature cannot be used.

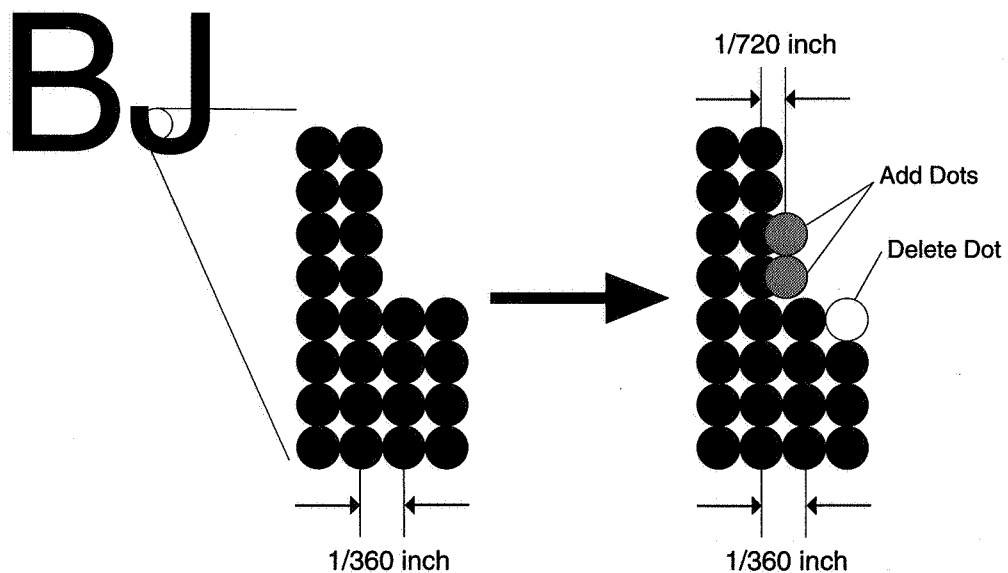


Figure 4-12 720 dpi/Smoothing Function

2.3 Printing Modes

Depending on the cartridge installed, the medium, the printing mode, the resolution, the print data, etc., the printer varies the carriage movement, bubble jet head driving frequency, etc., to attain high-quality printing without any bleeding or shifting in the printout. When the 720 dpi printing/smoothing feature is used, the carriage feed pitch is set to 1/720 inch. Although this slows down the carriage speed, the bubble jet head drive frequency (heat frequency) is increased so that the overall printing throughput decreases.

During color printing at a single pass, the different colors printed at the same time overlap, often causing the colors to run. By printing with three passes, color bleeding is less prone to occur since the color printed immediately before is stable by the time the next color is printed over it. When print data is processed internally by the printer, the data is recognized and the number of ink nozzles to be used by the black ink is change automatically.

The printing method for the respective printing modes are listed below.

Table 4-2 Printing Modes and Heating Methods

With a Black BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Resolution [dpi]	Carriage Speed [kHz]	Heat Frequency [kHz]
Bk-HS	1 pass	128 nozzles	180	7.82	7.82
Bk-HQ	1 pass	128 nozzles	360	6.43	6.43
Bk-FINE	4 passes	32 nozzles	360	6.43	6.43
Bk-Smoothing	1 pass	128 nozzles	360	3.91	7.82
Bk-HQ (720)	1 pass	128 nozzles	720	6.43	12.86
Bk-FINE (720)	4 passes	32 nozzles	720	6.43	12.86

With a Color BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Resolution [dpi]	Carriage Speed [kHz]	Heat Frequency [kHz]
Bk & White-HS	1 pass	64 nozzles	180	7.82	7.82
Bk & White-HQ	1 pass	64 nozzles	360	6.43	6.43
Bk & White-FINE	4 passes	16 nozzles	360	6.43	6.43
Color-HS	1 pass	24 nozzles	180	7.82	7.82
Color-HQ	1 pass	24 nozzles	360	6.43	6.43
Color-FINE	3 passes	8 nozzles	360	6.43	6.43
Color-HQ (720)	1 passes	24 nozzles	720	4.73	9.46
Color-FINE (720)	3 passes	8 nozzles	720	6.43	12.83

* When the print resolution is 720 dpi, print data is not thinned

* When the print resolution is 720 dpi, processing to prevent colors running at the borders is not executed.

2.4 Optimum Printing Direction Control

To prevent vertical misalignment of the printed characters, etc., when print data is printed continuously in the direction of the paper feeding direction, printing is executed with the carriage moving from only one direction.

However, when printing in the paper feed direction is not continuous, since vertical misalignment is not so noticeable, the printing direction is alternated so that printing is also executed from the opposite carriage direction. This improves the throughput.

If four or more successive null rasters are detected in the lower (in the direction of paper ejection) 64 nozzles (24 nozzles with a color BJ cartridge) for the print data in the printer buffer during single-pass printing, printing is executed up to the null raster.

From the null raster onward, printing is executed from the opposite carriage direction.

From the next raster onward, printing is executed from the same carriage direction until the direction changes again.

2.5 Automatic Emulation Switching

The printer analyzes the control command received from the host computer and determines whether it is in BJ or LQ mode. The emulation mode is thereby switched automatically. The BJ setup utility program can be used to turn on or off the automatic switching of the emulation mode.

Control command recognition

By recognizing the control command received from the host computer, the printer can determine which emulation mode to set. The printer determines the emulation mode when the control command is received at any of the following times:

After the power is turned on and no print data has been received, when no print data has been received for over 10 seconds, or when the printer has no print data.

Switching the emulation mode

The emulation mode is switched automatically at any of the following times:

When the printer has received over 512 bytes of data, when the data reception (even for data less than 512 bytes) has been interrupted for over 3 seconds, or when the power has been turned off before over 512 bytes of data is received or before over 3 seconds of data reception.



Upon shipment from the factory or when the EEPROM is reset, it is set as "Invalid".

Immediately after being set to "Valid", the emulation mode that was set immediately before will be valid.



There are control commands with which the printer cannot determine the emulation mode to set. If the emulation mode set automatically is not the correct one, use the BJ setup utility program or the manual default setting to cancel the automatic switching of the emulation mode and set the emulation mode manually.

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3. PRINTER MECHANISM

3.1 Overview of the Mechanical System of the Printer

The mechanical system of the printer is comprised of the ink/BJ cartridge, purge section, ASF/paper feed section, and the carriage section.

The paper pick up/delivery operation of the mechanical system of the printer and the BJ cartridge maintenance operation are carried out by the paper feed motor and carriage motor.

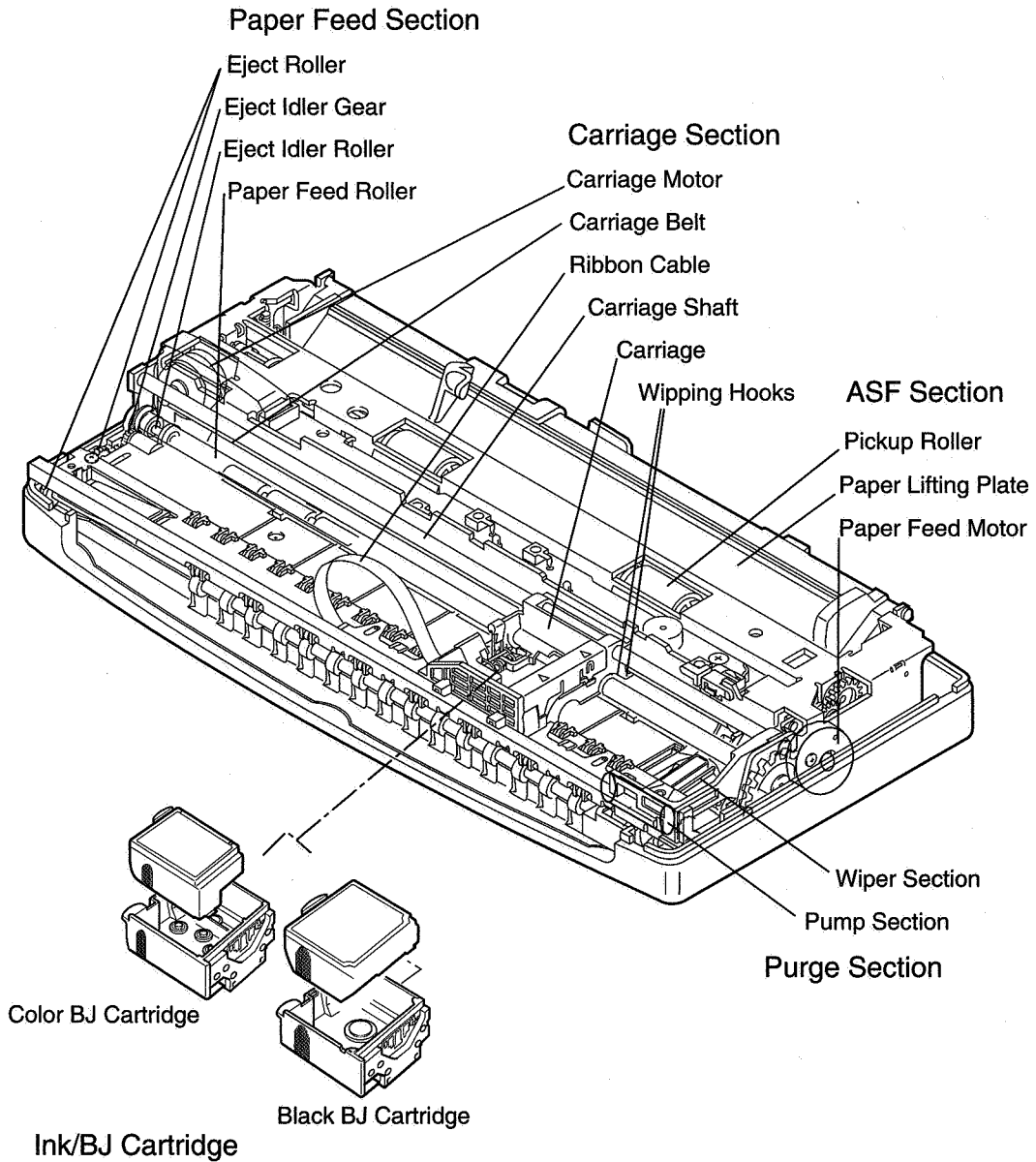


Figure 4-13 Printer Mechanism

3.1.1 Mechanical system configuration

a) Ink/BJ cartridge

The black BJ cartridge (BC-10) has a 360-dpi resolution and 128 nozzles, and the color BJ cartridge (BC-11e) has a 360-dpi resolution, and 64 black nozzles, 24 yellow, 24 magenta, and 24 cyan nozzles. You can print in either black or color simply by replacing the BJ cartridge.

The ink cartridge (BCI-10) for the BC-10 and ink cartridges (BCI-11Bk, BCI-11color) for the BC-11e can be replaced respectively.

b) Purge section

The purge section has a function to maintain the high printing quality of the BJ cartridge bubble jet nozzles.

The purge section consists of the pump section and wiper section.

The pump section sucks ink within the BJ cartridge so that the nozzles are smoothly filled with ink for next printing. The wiper section wipes the head-face of the BJ cartridge.

The purge section is driven by the paper feed motor and carriage motor.

c) ASF/paper feed section

The built in automatic sheet feeder (ASF) can hold the cut sheet up to Legal size and a maximum 3 mm stacking height of sheets (A4 or Letter size) feed them automatically.

The cut sheets stacked in the ASF are fed to the paper feed unit by the pickup roller, which is driven by the paper feed motor.

The paper pick-up section moves the paper forward by using the paper-feed roller.

Since the paper feed unit of the printer does not have a manual-paper feed knob, all paper-feeding operations are carried out with *RESUME* buttons.

d) Carriage section

The carriage that holds the BJ cartridge is moved horizontally by the carriage motor and the drive belt. The position of carriage is detected by the home-position sensor, which is located on the right side of printer. The printing signals sent from the control board are transferred to the BJ cartridge on the carriage through the ribbon cable.

The wiping hooks on the carriage move the latch lever and wiper lever to start wiping.

3.2 BJ Cartridge

3.2.1 Color BJ cartridge structure

The color BJ cartridge contains a 136-nozzle print head (64 black nozzles, 24 yellow nozzles, 24 magenta nozzles, and 24 cyan nozzles) for four colors. The print head, black ink cartridge, and color ink cartridges are designed to be replaced respectively.

a) Air hole

Each the black and colored ink cartridge has an air hole at the same pressure at the atmospheric pressure.

b) Ink sponge

The ink sponge in the black ink cartridge absorbs black ink. The color cartridge has three ink sponges, each of which absorbs each color ink.

c) Ink supplier

The ink supplier supplies a constant amount of ink to the connection among the head, black ink cartridge and color ink cartridge.

d) Bubble jet head unit

The bubble jet head unit consists of 136 nozzles and signal contacts.

Each nozzle has two heaters located one in front of the other. By controlling the temperature of the heaters, the small and large dots can be printed.

e) Holder

The holder has a partition between the black ink cartridge and the color ink cartridge to prevent color mixture and to prevent from being mounted incorrectly the black ink cartridge and the color ink cartridge.

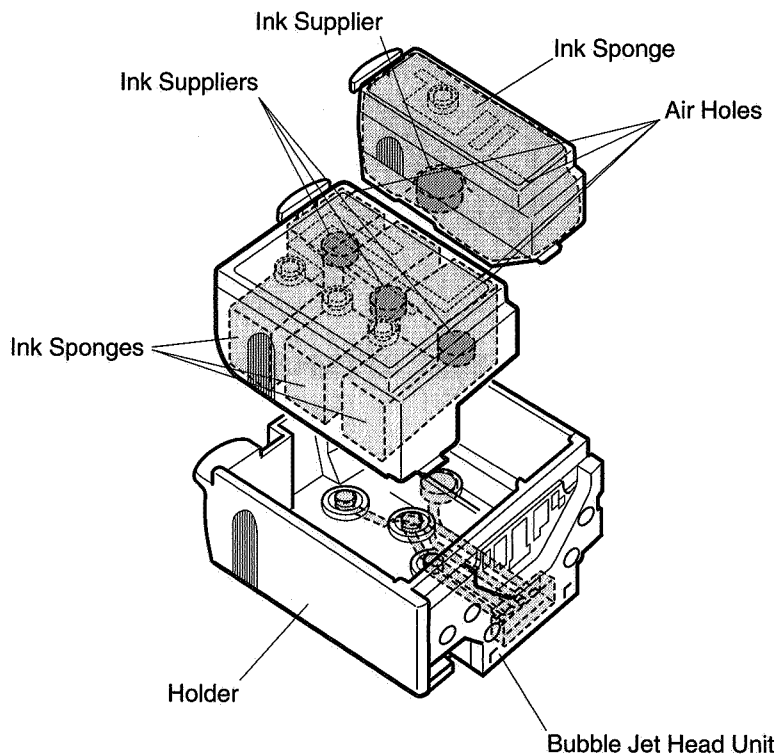


Figure 4-14 Color BJ Cartridge

3.2.2 Black BJ cartridge structure

The black BJ cartridge contains a 128-nozzle print head, and the print head and black ink cartridge can be replaced respectively.

a) Air hole

Air hole is provided in order to keep the ink cartridge at the same pressure as the outer atmospheric pressure.

b) Ink sponge

The ink sponge absorbs black ink.

c) Ink supplier

The ink supplier supplies a constant amount of ink to the connection between the head and ink cartridge.

d) Bubble jet head unit

The bubble jet head unit consists of the 128 nozzles and signal contacts.

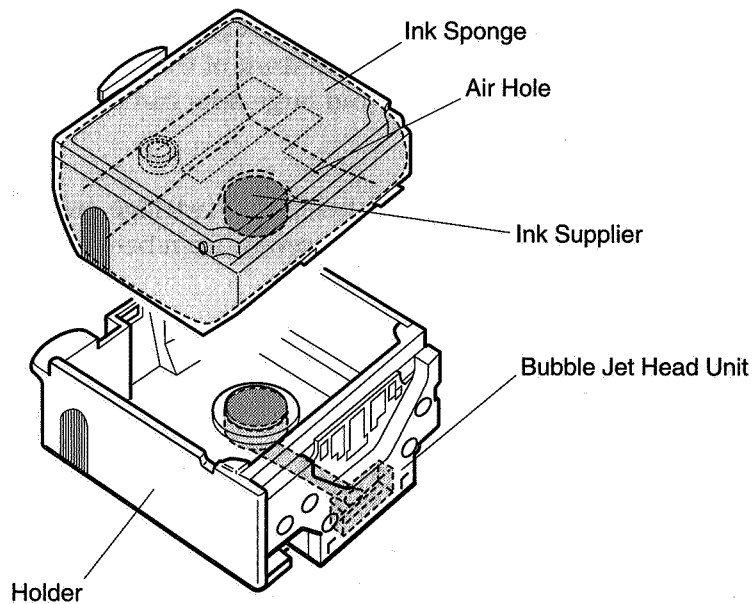


Figure 4-15 Black BJ Cartridge

3.2.3 Bubble jet head-unit structure

a) Bubble jet nozzles

The ink in the ink sponge is filtered through a meshed ink filter, and is fed to the bubble-jet nozzles through the ink path in the holder. When the head-drive-current flows to the heater board of each nozzle, ink is heated up, and bubbles are produced and subsequently form into one large bubble. The head drive current is cut off before a drop of ink is ejected from the nozzle, but bubbling continues due to the heat remaining in the heater and the drop of ink is ejected from the nozzle. After ejecting the ink drop, the nozzle is refilled with ink.



The heaters and their electrical elements within the bubble jet head are formed on a silicon plate by means of semiconductor technology. A photosensitive resin layer (nozzle wall) and plastic cover are bonded to the silicon plate, and nozzles are made in the photosensitive resin layer by laser.

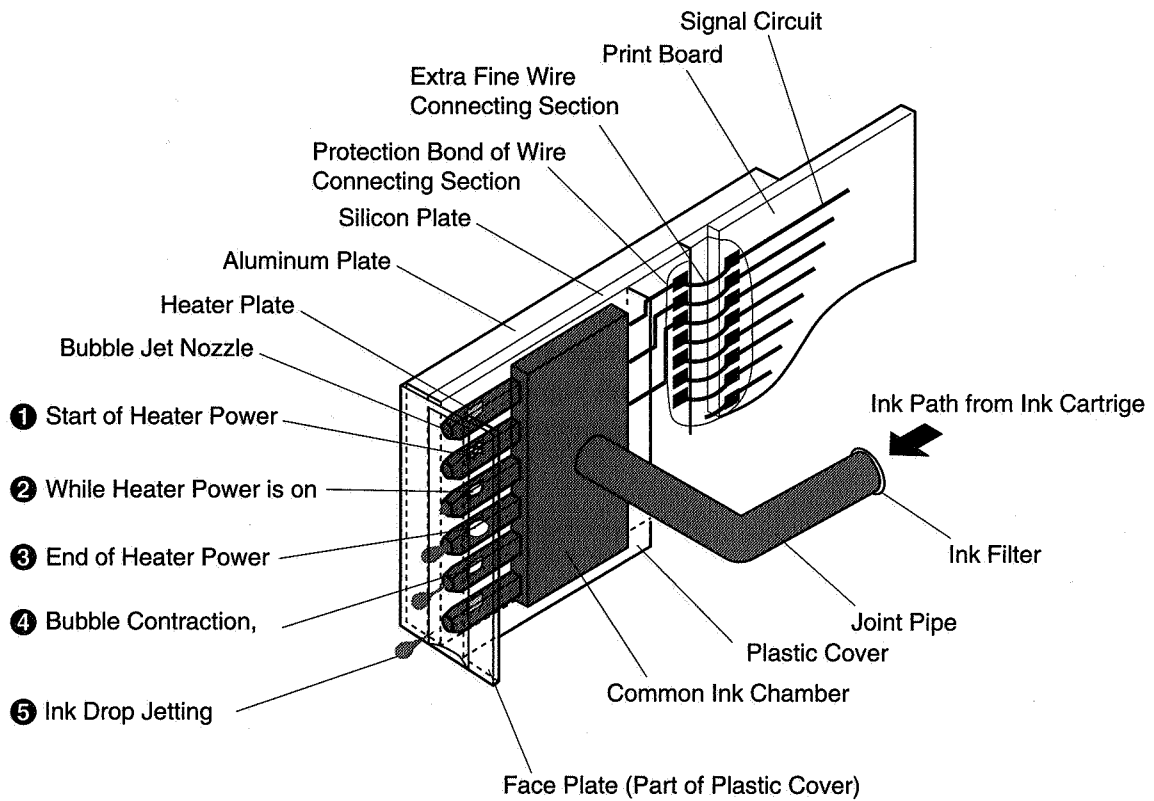


Figure 4-16 Bubble Jet Head

b) Nozzle arrangement

The bubble jet nozzles are arranged in a vertical line at intervals of 1/360 inch.

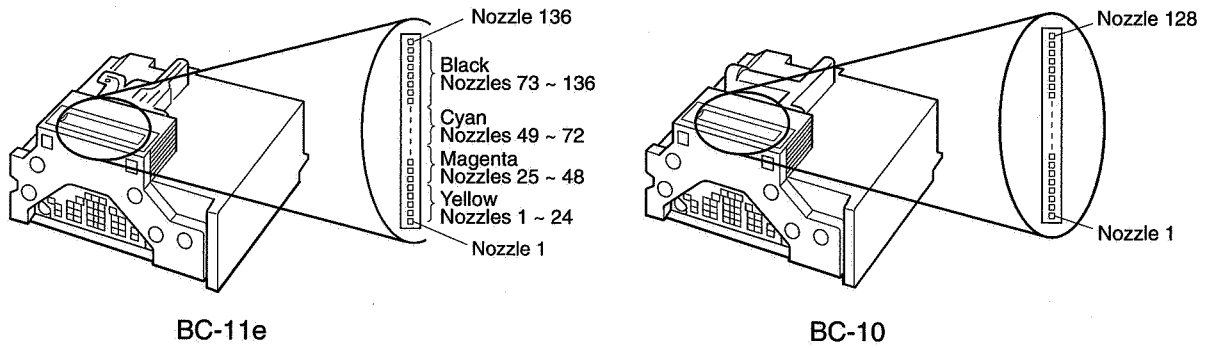


Figure 4-17 Nozzle Arrangement

c) Signal contact part

The signal contact part of the bubble jet head contacts the carriage contact part to transfer control signals including print signal, to the bubble jet nozzles.

Table 4-3 Signal Contact Part

Pin No.	Signal Name	Signal Name
3	MCH 0	Temperature-adjustment heater control signal
4	MCH 1	Temperature-adjustment heater control signal
7	WHT	Head subheater control signal
9	RNK	Head rank resistance
10	DIODE A	Head temperature sensor (anode side)
11	ID 0	BJ cartridge BC-10/BC-11e identification
28	HDATA	Print data signal
29	DIODE K	Head temperature sensor (cathode side)

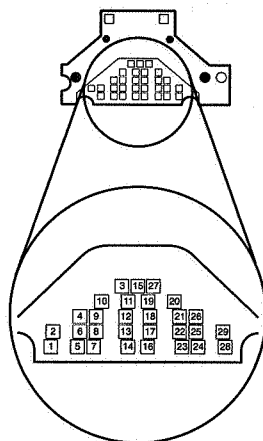


Figure 4-18 Contact Part

3.2.4 Head-maintenance function and structure

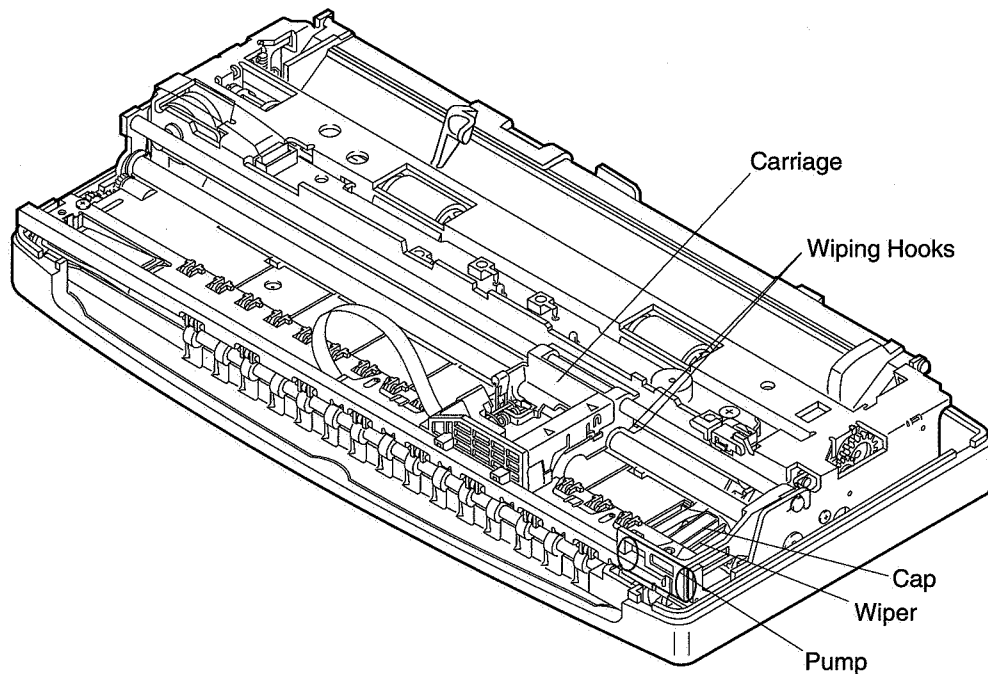


Figure 4-19 Purge Section

a) Cleaning function

Cleaning operation is performed to correct the print quality problem, which is caused by none-ejection of ink, and to prevent the print defects resulting from improper ink ejection from the BJ cartridge head nozzles.

Cleaning operation includes purging, wiping, capping, and maintenance jet. The cleaning time varies according to the type of BJ cartridge installed and the printer status.

The printer carries out cleaning in the following cases:

Table 4-4 Ink Consumption

Printer Status		Ink Consumption (approx....mg)	
		BC-10	BC-11e
When the printer is turned ON with the <i>POWER</i> button	1) Less than 72 hours after the last cleaning operation	7	40
	2) 72 hours or more after the last cleaning operation	150	160
	2) 169 hours or more after the last cleaning operation	300	210
When the BJ cartridge is replaced, ink cartridge is replaced		300	280
When the <i>CLEANING</i> button is pressed	1) Cleaning	150	210
	2) Head refreshing	300	410

The cleaning operation is performed in the purge section. The cap, cylinder, and pump are operated by the gears and cams, which are driven by the paper-feed motor. (See Part 4: 3.3 Purge Section Structure. (page 4-27))

b) Purging

Purging is performed to correct/prevent the non-ejection of ink, which is caused by unnecessary bubbles and dust on the head faceplate.

The cap and pump in the purge section are used for purging operation.

c) Capping

Capping operation is performed to correct/prevent the non-ejection of ink, which is caused by the dried-up of ink inside nozzles.

Cap is pressed against the head faceplate when the carriage moves to the home position.

When the cap moves away from the faceplate, waste ink in the cap is sucked by purging operation. The sucked ink is absorbed by the absorber in the pump and finally absorbed by the waste ink absorber.

Capping operation is performed in the following cases:

1. When the printer is turned off with the *POWER* button
2. When the printer receives no data during printing for a certain period, which is decided by the conditions

d) Wiping

Wiping operation is performed to correct/prevent the non-ejection of ink, which is caused by paper-powder on the head faceplate or by the foreign materials in ink.

The wiper is set and released by wiping hooks on the carriage. When the carriage moves from the home position, the wiper touches the aluminum plate of the head, removes the stain from the wiper and then wipes off the ink from the faceplate.

Wiping operation is performed in the following cases:

1. When the number of dots printed or the print time exceeds the preset value during printing
2. After purging
3. Before capping

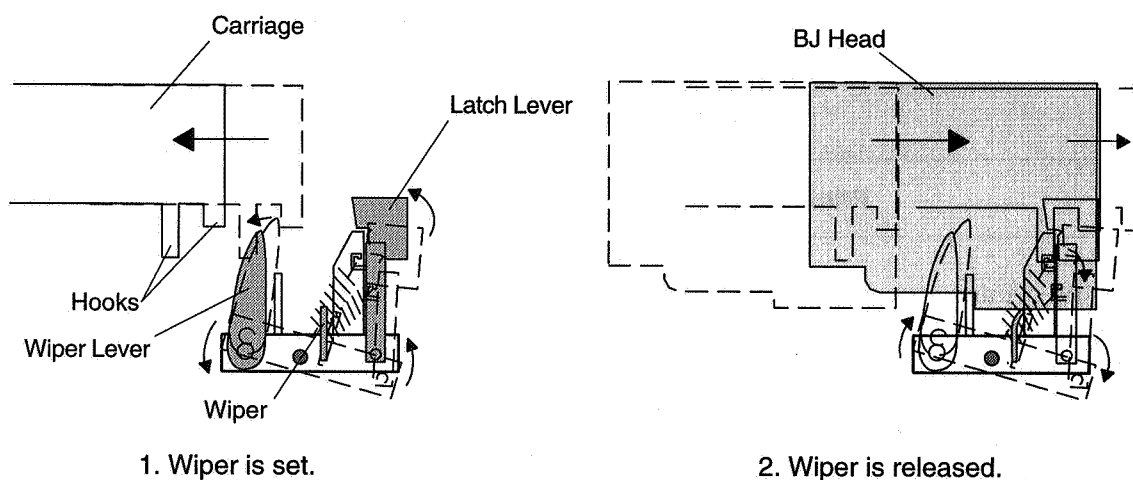


Figure 4-20 Wiping Function

e) Maintenance jet

The maintenance jet is performed during cleaning to remove bubbles inside nozzles and the dust near ink ejection apertures.

In this operation, the ink is ejected from the head into the cap and sucked into the waste ink absorber through the pump section.

3.3 Purge Section Structure

3.3.1 Configuration

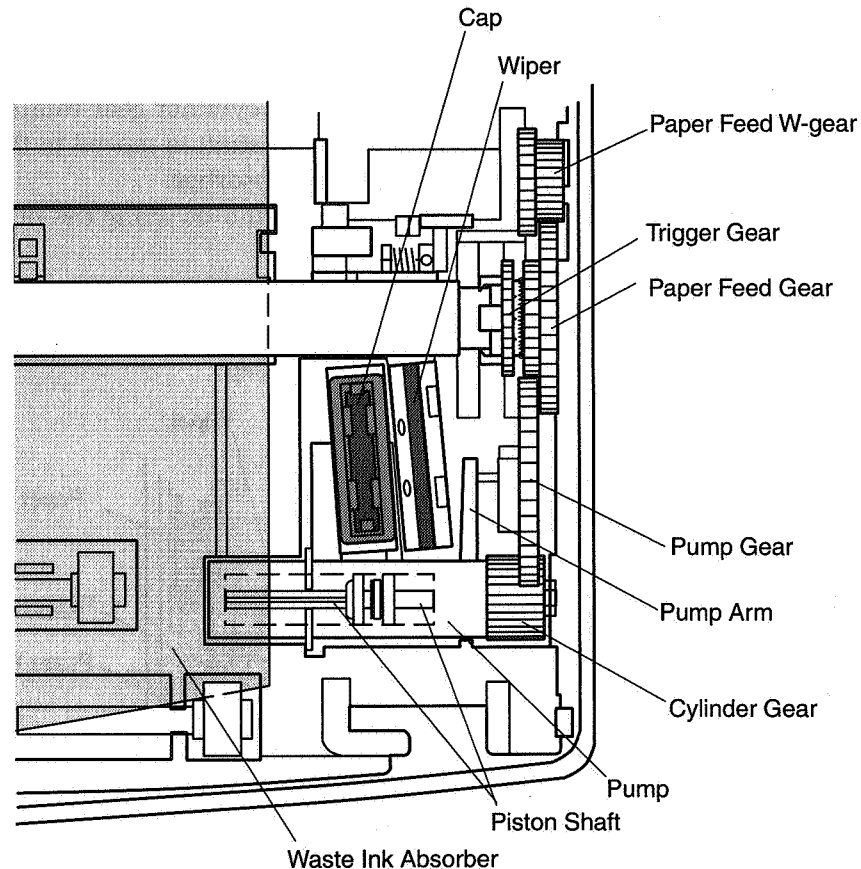


Figure 4-21 Purge Section Structure

a) Cap section

When the carriage is at the home position, the cap is pressed against the print head faceplate to cap the head. The rubber cap connects to the pump, and ink is sucked from the head by the pump during cleaning. The sucked ink is absorbed by the ink absorber in the pump and finally collected in the waste-ink absorber. The cap is moved by the pump arm, which is driven by the pump gear.

b) Wiper section

The wiper wipes excess ink off the print head faceplate when the carriage moves from left to right. The wiper is moved up or down by the projections on the carriage. The ink attached to the wiper is removed by the aluminum plate on the head. Moreover when the wiper comes down, the ink remaining on it is splashed on the pump gear.

c) Pump section

The pump contains a rubber piston, whose piston shaft is linked with the cylinder gear. The cylinder gear is rotated by the pump gear. Then the pump is opened to absorb the ink collected in the cap into the waste ink absorber. The ink in the cap flows into the absorber in the pump, and then into the waste ink absorber.

d) Waste ink absorber

The ink sucked from the cap and the ink collected in the pump are sucked into the absorber in the pump, and absorbed into the waste-ink absorber.

3.3.2 Operation

The purge section is driven by the paper feed motor.

The paper feed motor drives the paper feed gear through the paper feed double gear.

When the carriage moves to the right from the home position, the trigger gear rotates along with the paper feed gear, which rotates the pump gear and cylinder gear. At this time while the ink is stored in the cap, the cylinder gear rotates so as to move the piston shaft to the right. After that, the piston shaft is moved to the left so that the ink in the cap is absorbed into the waste ink absorber.

The cap moves up and down as the pump arm moves along the pump gear cam. (Capping)

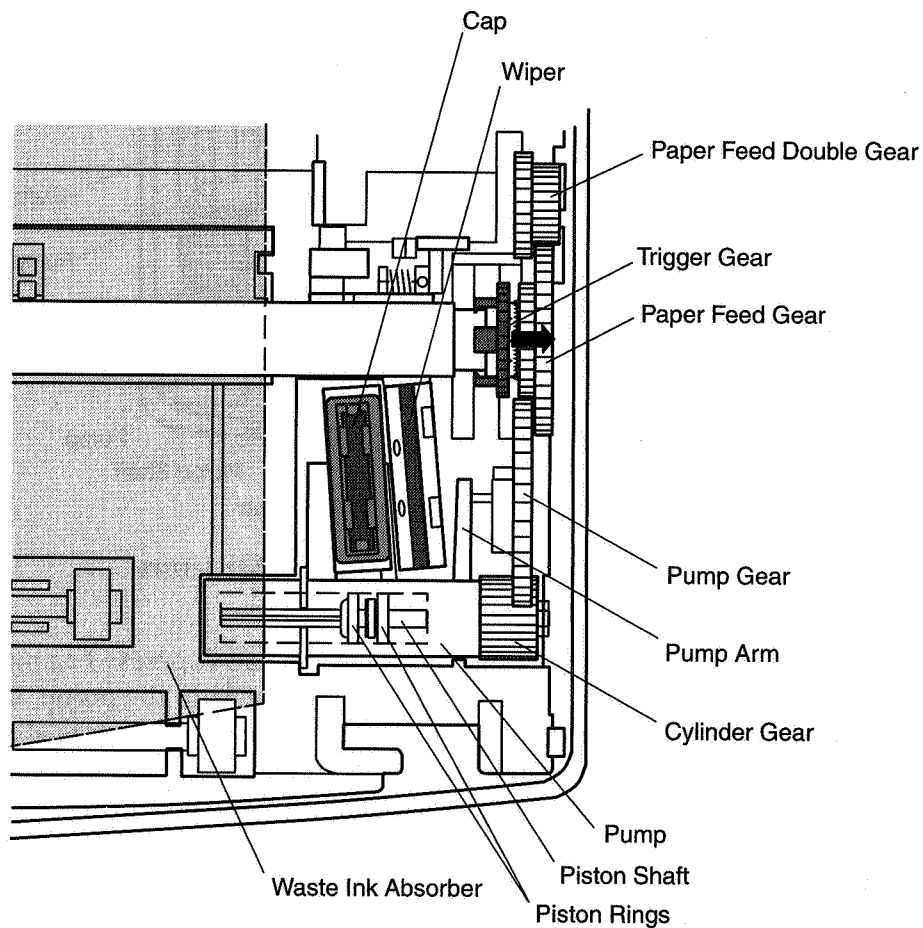


Figure 4-22 Purge Operation

3.4 ASF/Paper Feed Mechanism

3.4.1 Outline of ASF/paper feed mechanism

The ASF/paper feed mechanism of the printer is divided into the paper pick-up operation unit and printing/paper-delivery operation section.

These operations are driven by the paper feed motor. This motor can feed the paper at a line feed pitch of 1/360 inch.

a) Paper pickup operation section

When the paper is picked-up, the pickup roller, paper lifting plate, coil spring, and separation sheet are operated. Since the paper pickup operation makes use of the elasticity of the separation sheet, it is not necessary to change the paper setting method according to the thickness of the plain paper.

b) Printing/paper delivery operation section

After the paper is picked up, it is fed to the print start position by the paper feed roller and the pinch roller.

There is no need to adjust the head-to-paper distance since the paper is lifted up by the pinch roller. After the paper is printed, it is delivered out by driving the eject roller and spurs.

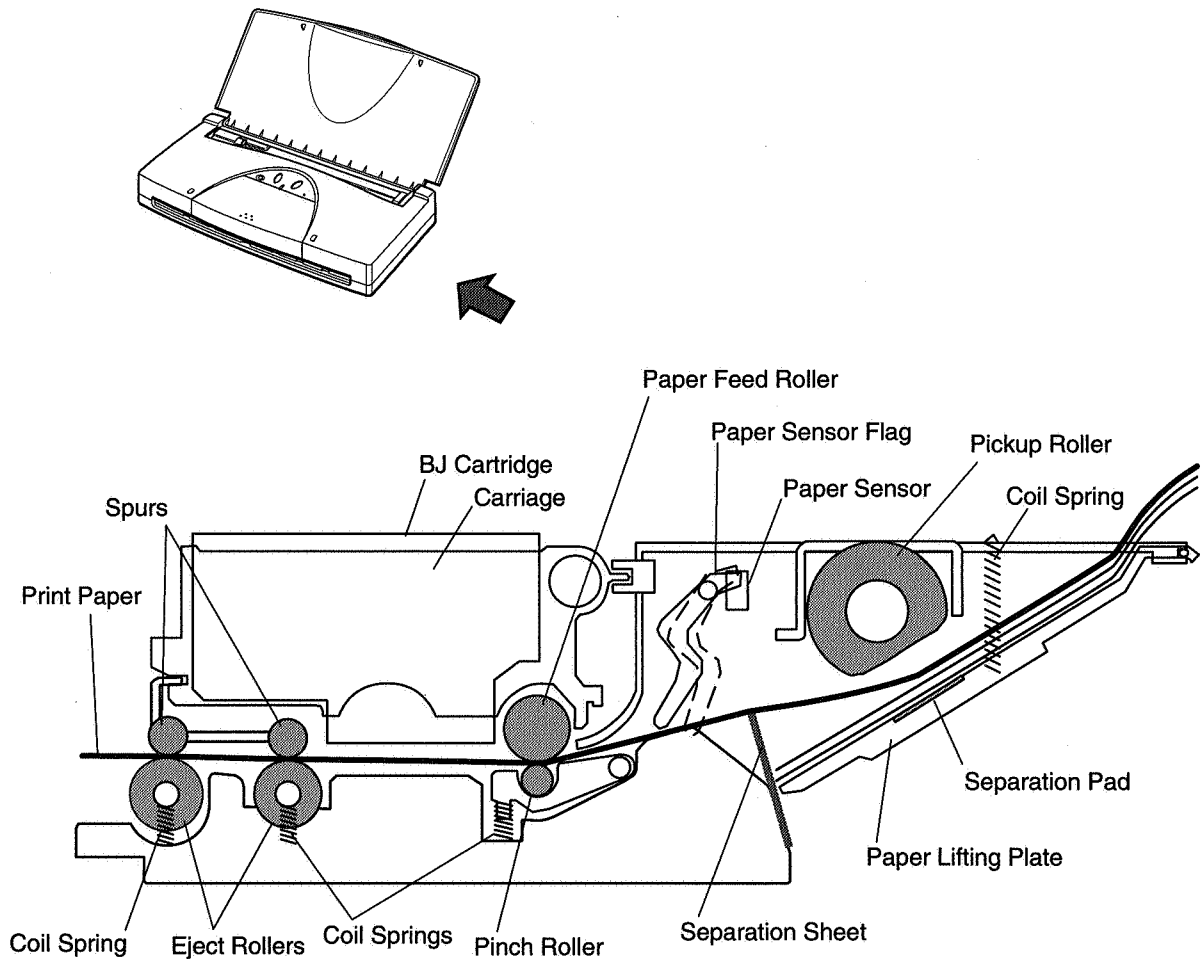


Figure 4-23 Paper Pass

3.4.2 Paper feed function and structure

a) Initial operation

When the printer is turned on, the paper feed motor rotates in a clockwise direction. When the paper feed motor is driven, gear A is rotated. At this time, gear A transmits power to the pickup roller gear to rotate the pickup roller. When the pickup roller gear rotates until it comes to the part having no tooth, the paper lifting plate is pushed down. Owing to this operation, a clearance is made between the paper lifting plate and the pickup roller for paper setting.

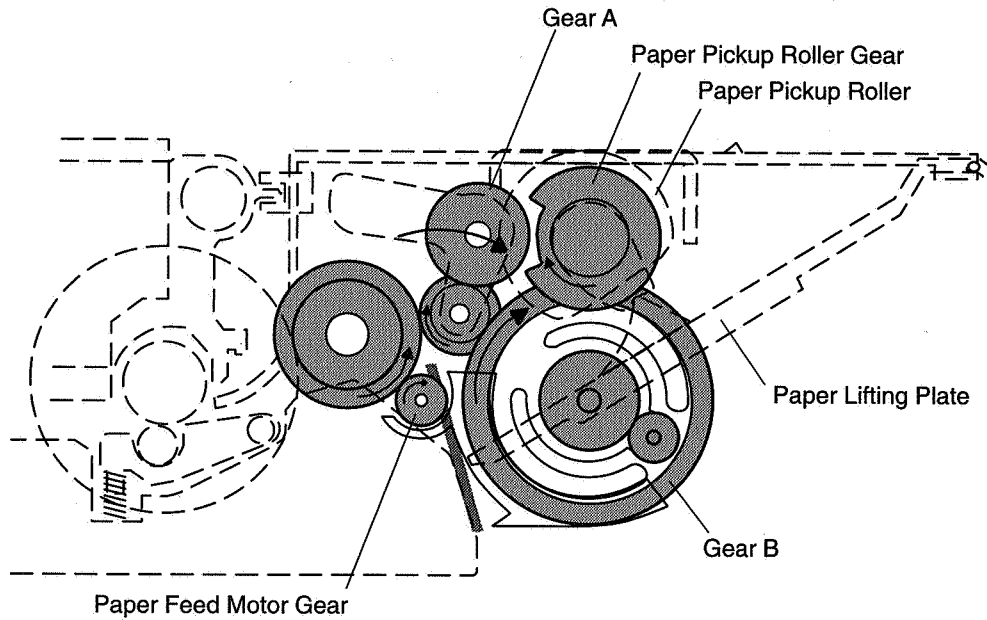


Figure 4-24 Initial Position

b) Paper feed operation

When a paper feed command is sent, the paper feed motor runs counterclockwise, starting the paper feeding operation.

The drive of paper feed motor is transmitted from gear B to gear C to rotate the pickup roller. Then the top sheet of the paper stack is picked up by the pickup roller.

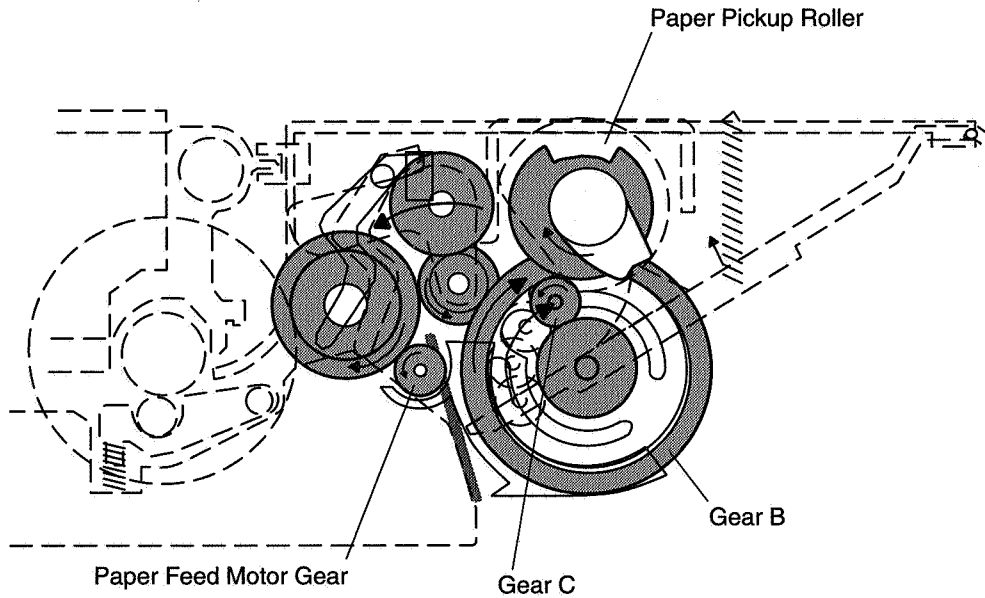


Figure 4-25 Paper Pickup (1)

When the paper is detected by the paper sensor, the paper feed motor is reversed. The paper feed roller and the pinch roller deliver the paper to the print start position set by the function selector. When paper feeding is completed, the pickup roller and paper lifting plate return to the initial position.

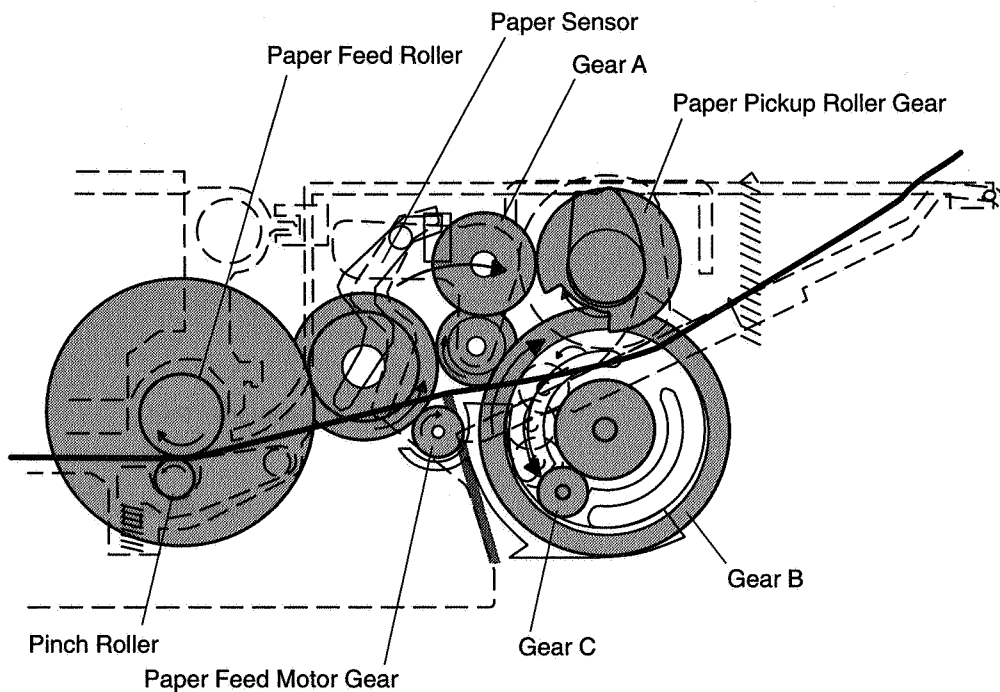


Figure 4-26 Paper Pickup (2)

c) Paper separation operation

The cut sheets stacked in the ASF are separated one by one using the separation sheets.

The two separation sheets attached to the printer base unit separate only the top sheet from the paper stack in the ASF due to their elasticity retained regardless of the paper thickness.

The shape of these separation sheets is designed to separate papers regardless of thickness and size of paper.



The paper feed performance of the printer depends upon the elasticity of the separation sheet. If the separation sheets are deformed or damaged, a paper feed problem may occur. To prevent this, handle it carefully during servicing.

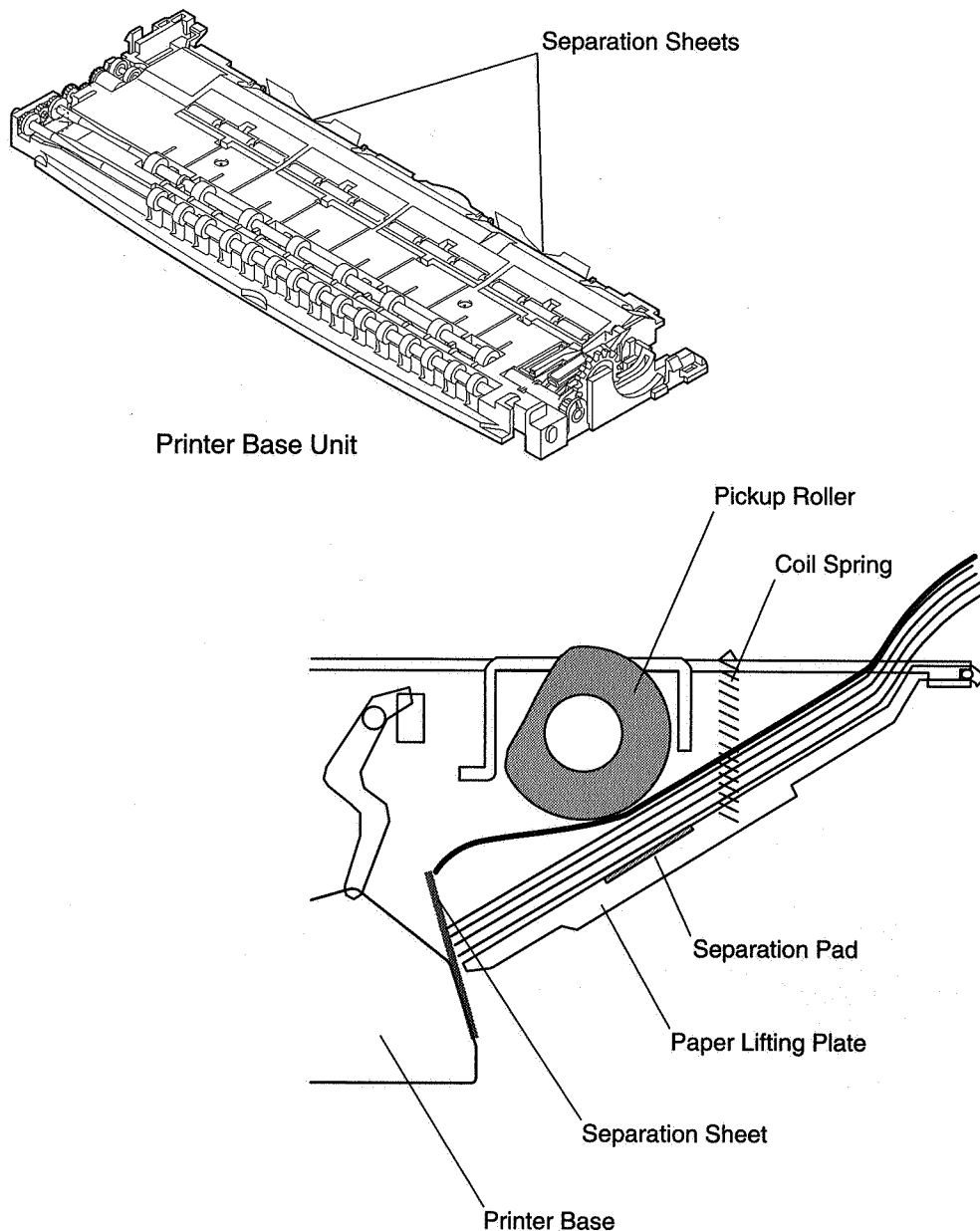


Figure 4-27 Paper Separation

3.4.3 Printing/paper feed function and structure

a) Printing/paper feed function and structure

The paper fed by the paper feed roller is printed on the platen, and output by the eject roller and spurs. Two eject rollers are installed to prevent the warp or deflection of paper being output, to reduce variations in paper feeding intervals, and to improve the print quality.

b) Automatic head-to-paper distance adjustment mechanism

The ejection idle roller and ejection roller are lifted against the paper feed roller and spurs by the coil springs. Owing to this, the clearance between the BJ cartridge head face and the paper is maintained constant regardless of the paper thickness. It is possible to perform printing without changing the position of carriage according to the paper thickness.

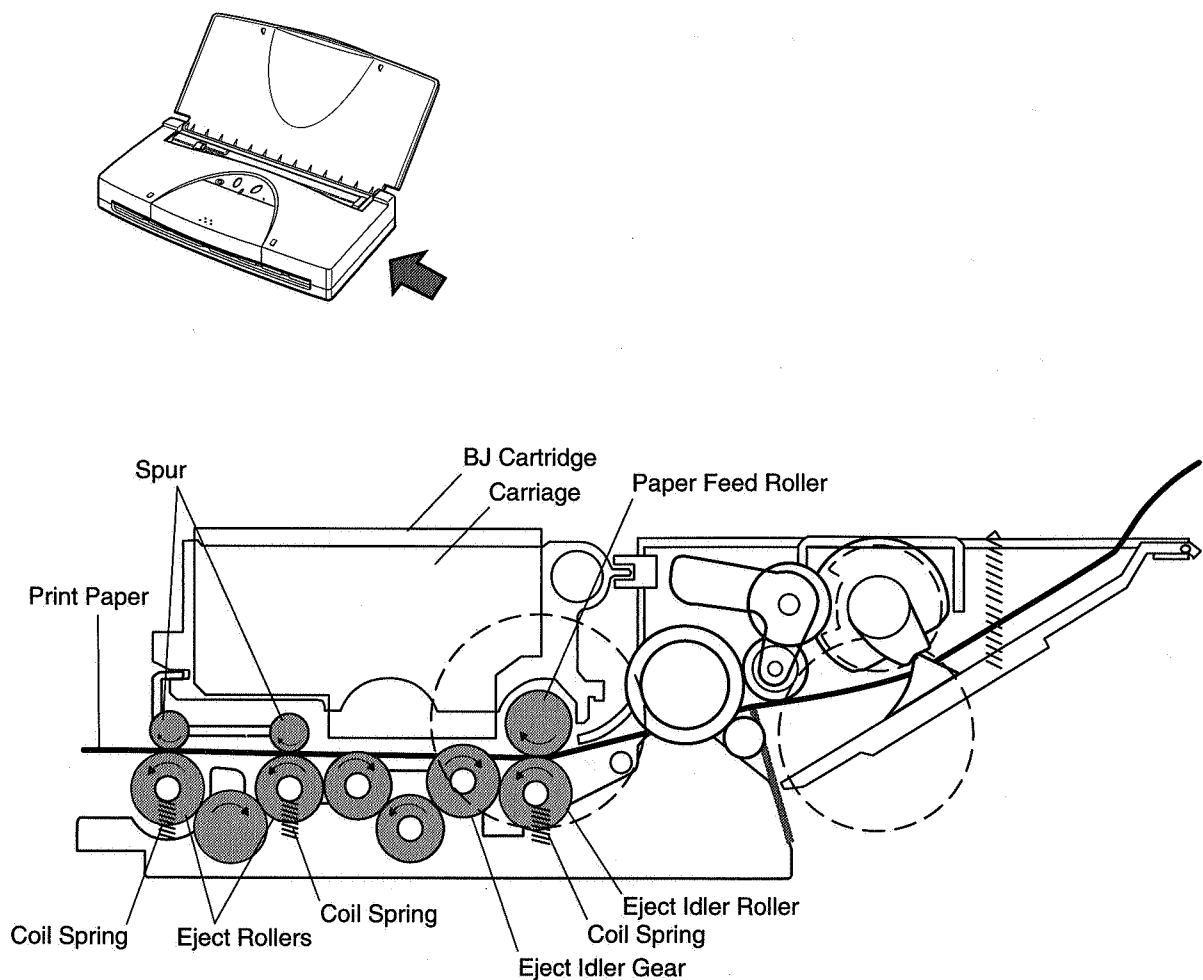


Figure 4-28 Paper Feed Structure

3.5 Carriage Section

3.5.1 Carriage section function

a) Ink/BJ cartridge mounting function

The carriage holds the BJ cartridge and connects it electronically to the control board through the carriage ribbon cable. When the power is off, the carriage is locked at the capping position where the carriage is locked by the lock arm.

b) Carriage drive function

The carriage is moved horizontally by the carriage belt, which is driven by the carriage motor.

c) BJ cartridge maintenance function

The printer performs the wiping operation and cleaning operation for the BJ cartridge by controlling the position of carriage.

1) Setting and Releasing the wiper

When the carriage moves horizontally, the wiper lever and the latch lever in the purge section are operated.

2) Start of the cleaning operation

The BJ cartridge cleaning starts when the carriage moves horizontally and the trigger gear is engaged with the paper feed gear to drive the pump gear.

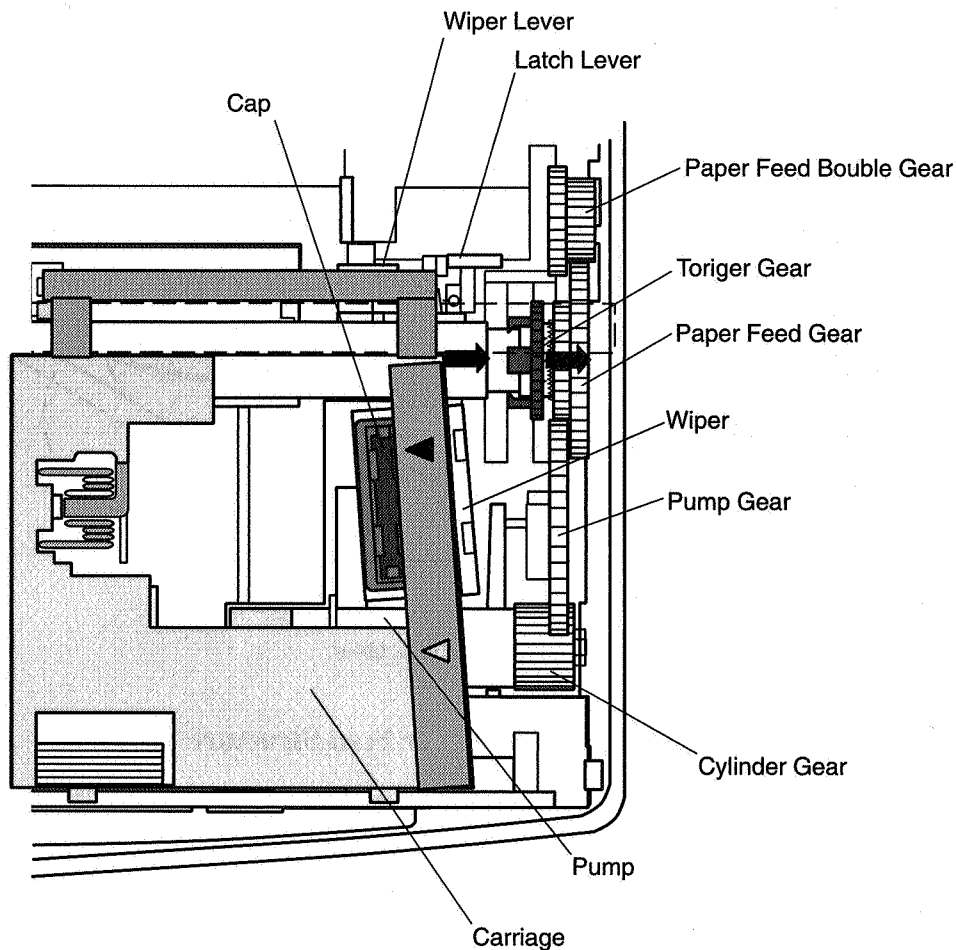


Figure 4-29 BJ Cartridge Section Function

3.5.2 Carriage section structure

a) BJ cartridge mounting section

The BJ cartridge is fixed to the carriage by the carriage contact spring.

When the BJ cartridge is mounted on the carriage, the contacts of the carriage ribbon cable connect with the signal contacts of the BJ cartridge to transfer printing signals sent from the control board.

There are wiping hooks that set and release the wiper on the back of the carriage.

There also is a home position edge that shields the home position sensor on the chassis on the back of the carriage.

b) Carriage drive section

The power from the stepping type carriage motor moves the carriage horizontally with the carriage belt. After the home position sensor attached to the rear of the carriage detects the home position edge, the carriage is controlled with the stepping pulses transmitted to the carriage motor. The pulses driving the carriage motor are controlled by the MPU section to have the optimum pulse width. (PWM control) This reduces the operating noise. Also, if the print position is shifted mechanically, it is corrected automatically, the home position sensor detects the home position edge on the carriage, and the print start position is shifted with software. This adjustment is conducted when the initial operation is performed after the printer is powered on by the *POWER* button, or when the printing operation is performed after the print mode is changed.

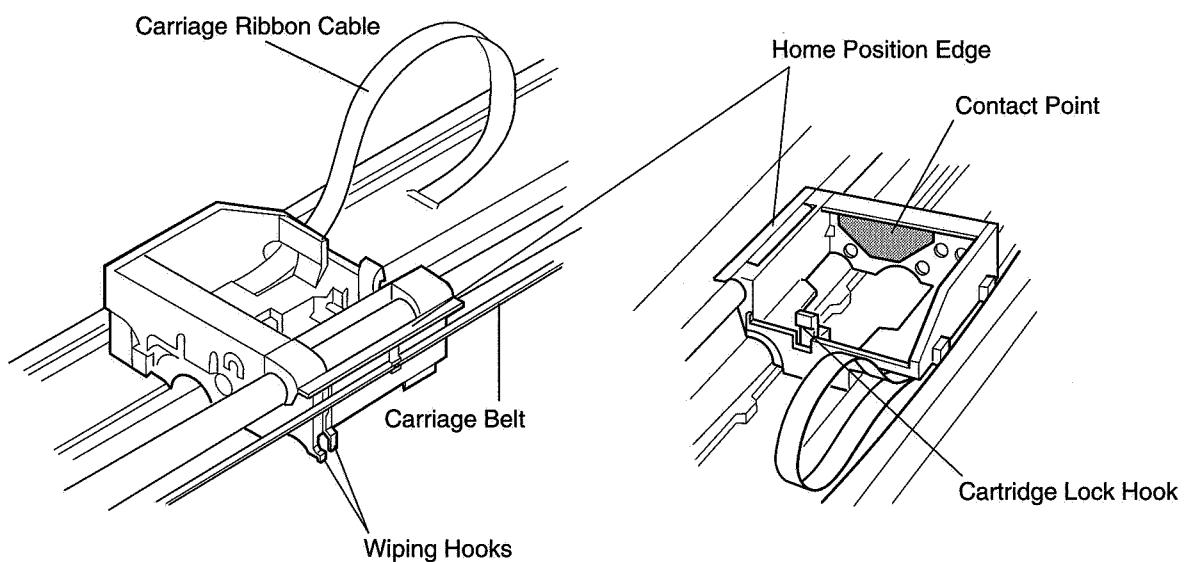


Figure 4-30 Carriage Section Structure

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4. PRINTER ELECTRICAL SYSTEM

4.1 Overview

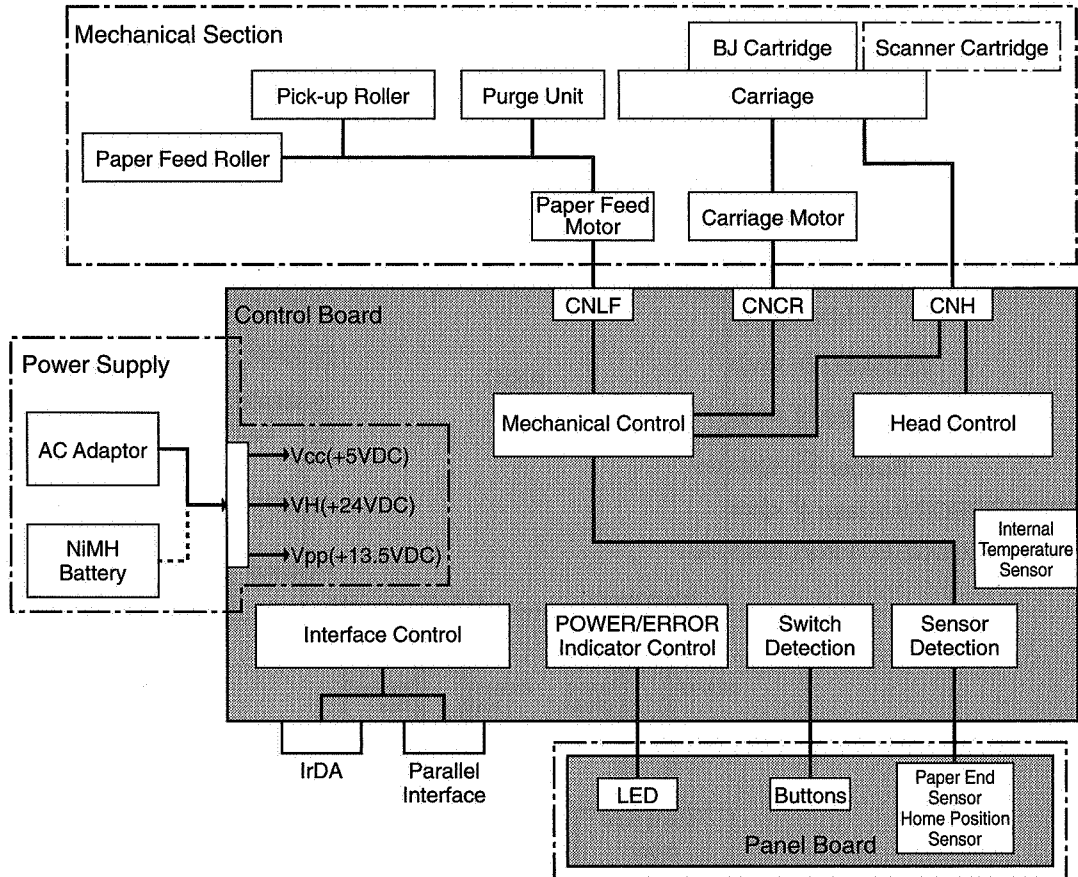


Figure 4-31 Printer Block Diagram

The electrical system functions are handled by the control section and the power supply section. The control section converts the data from the interface into print signals or printer operation signals and drives the BJ cartridge and motors while monitoring the status of the sensors.

The power supply unit converts the AC power to DC output using the AC adaptor (NiMH battery) and converts it into drive power for the motors, IC, head etc.

When there is AC input into the power supply, the control board always retains a +5V voltage.

(Even during POWER off)

4.2 Signal Control Section
4.2.1 Control board block diagram

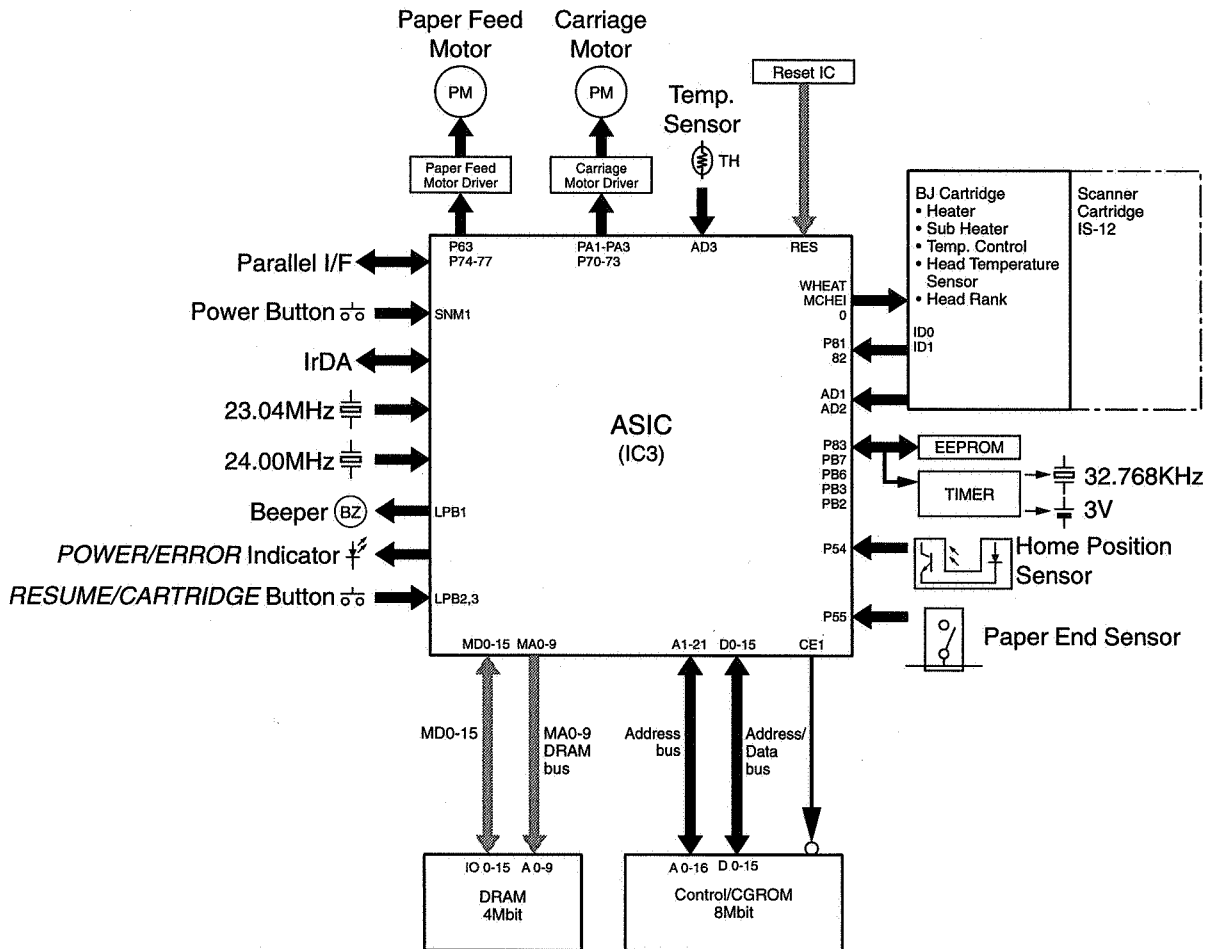


Figure 4-32 Control Board Block Diagram

4.2.2 Control section components

a) ASIC (IC3)

The ASIC is comprised of the MPU section and the printer controller section. It has a built-in 16-bit CPU and the operating synchronized frequency is 23.04 MHz. The printer controller's operating synchronized frequencies are 23.04 MHz and 24.00 MHz. The MPU section and the printer controller section operate in synchronization.

1) MPU

Address bus

The 21-bit address bus ports is connected to an 8 M-byte control/CG ROM. The controller/CG ROM synchronizes with the read signals output by the MPU and the 23.04 MHz clock signal. The printer controller then selects the chip.

Data bus

Like the address bus, the 16-bit data bus port is connected to the 8 M-Byte control CG/ROM.

Stepping motor controller

The stepping motor controller outputs the carriage motor micro-step control signals and paper feed motor's double-phase exciter drive signals and single-and double-phase exciter drive signals.

Interrupt controller

For external interruption, the MPU has *POWER* button on/off switch, data reception, initial interrupt request and other signals. Each signal is inputted to each port and interrupt processing is executed.

A/D converter

The following analog signals are detected through the built-in A/D converter:

AD0: Detects the input power voltage.

AD1: The head temperature is detected by the head temperature sensor in the BJ cartridge.

AD2: The head rank is detected by the rank resistor in the BJ cartridge.

AD3: The printer's internal temperature is detected by the thermistor on the control board.

EEPROM write/read control

The TE-CLK signal output from the ASIC is EEPROM's clock signal. The recorded data in the EEPROM is read using the TOE signals. The read-out data is output from the ASIC by the TEDIO signals and written on the EEPROM using EDO signals.

I/O port

The following signals are inputted to the input port: (i) sense signals from the head ID, paper end sensor and home position sensor, and (ii) signals from the *POWER*, *RESUME* and *CARTRIDGE* buttons. The power supply, all LEDs, BJ cartridge detection, head-driving voltage control, and other signals are output from the output ports.

2) Printer controller section

The printer controller contains the interface controller, print head controller, scanner head controller, buffer controller, DRAM controller, large and small drop print data controller, etc. It operates in synchronization with an external 23.04 MHz external clock input.

Interface controller

The interface controller receives from the computer, 8-bit parallel data which is synchronized with the data strobe pulse (STROBE) through the BUSY/ACKNLG handshake. It also controls IrDA and ASK interface signals.

The data received through the interface is stored in the DRAM's receive buffer and analyzed by the ASIC.

DRAM controller

The DRAM controller is a DRAM-specific bus separate from the MPU section bus. It controls the 4 M-bit DRAM's 10-bit address/16-bit data bus and also executes read/write control, RAS/CAS control, and refresh control.

Buffer controller

The buffer controller automatically writes the received data to the receive buffer on the DRAM, manages the receive buffer's remaining capacity, automatically reads the print buffer, and clears the data after it is read.

Print head controller

The print head controller converts the print data read from the DRAM's print buffer from parallel to serial and sends the serial data to the print head. For large and small dot printing, the print head controller outputs 4 Heat-enable signals (HENBA, HENBB, HENBC and HENBD). Each enable signal can be output independently.

Scanner cartridge controller

The scanner cartridge controller tries to operate the printer as a scanner once it receives a scanner activation message from the host computer. In the scanner mode, data cannot be removed from the receiver buffer.

I/O port

The I/O port senses the *RESUME* and *CARTRIDGE* button's input status. The output port controls the beeper.

b) Control/CG ROM (IC6)

The control/CG ROM is a 8 M-bit IC 6 and contains a 4 M-bit's worth of printer control programs. The rest is occupied by bitmap font data for printer control.

c) DRAM (IC4)

Controlled by the ASIC, the 4 M-bit DRAM is used as a receive buffer, download buffer, print buffer, and working area.

d) Paper feed motor driver IC/Carriage motor driver IC (IC11/IC10)

The paper feed motor driver IC (IC11) is a constant-voltage bipolar driver IC. It is controlled by the motor signal output from the ASIC that supplies a constant voltage to each phase. The carriage motor drive IC (IC10) is a constant-voltage bipolar driver IC. It is controlled by the motor signals output from the ASIC that supplies a constant voltage to each phase.

e) EEPROM (IC9)

Controlled by the ASIC, the EDO, TE-CLK and TIDIO signals, the EEPROM data is read into the ASIC when the hardware/software is powered ON. The data is written onto the EEPROM when the hardware/software is powered OFF. The data stored in the EEPROM waste ink absorption amount, fed sheets, BJ cartridge installation and removal frequencies, function settings, etc.

f) IC SOCKET (IC5)

A socket for a 4 M-bit EPROM is provided in case the printer's control ROM version is upgraded

4.3 Power Supply Section

4.3.1 Block diagram of power supply section

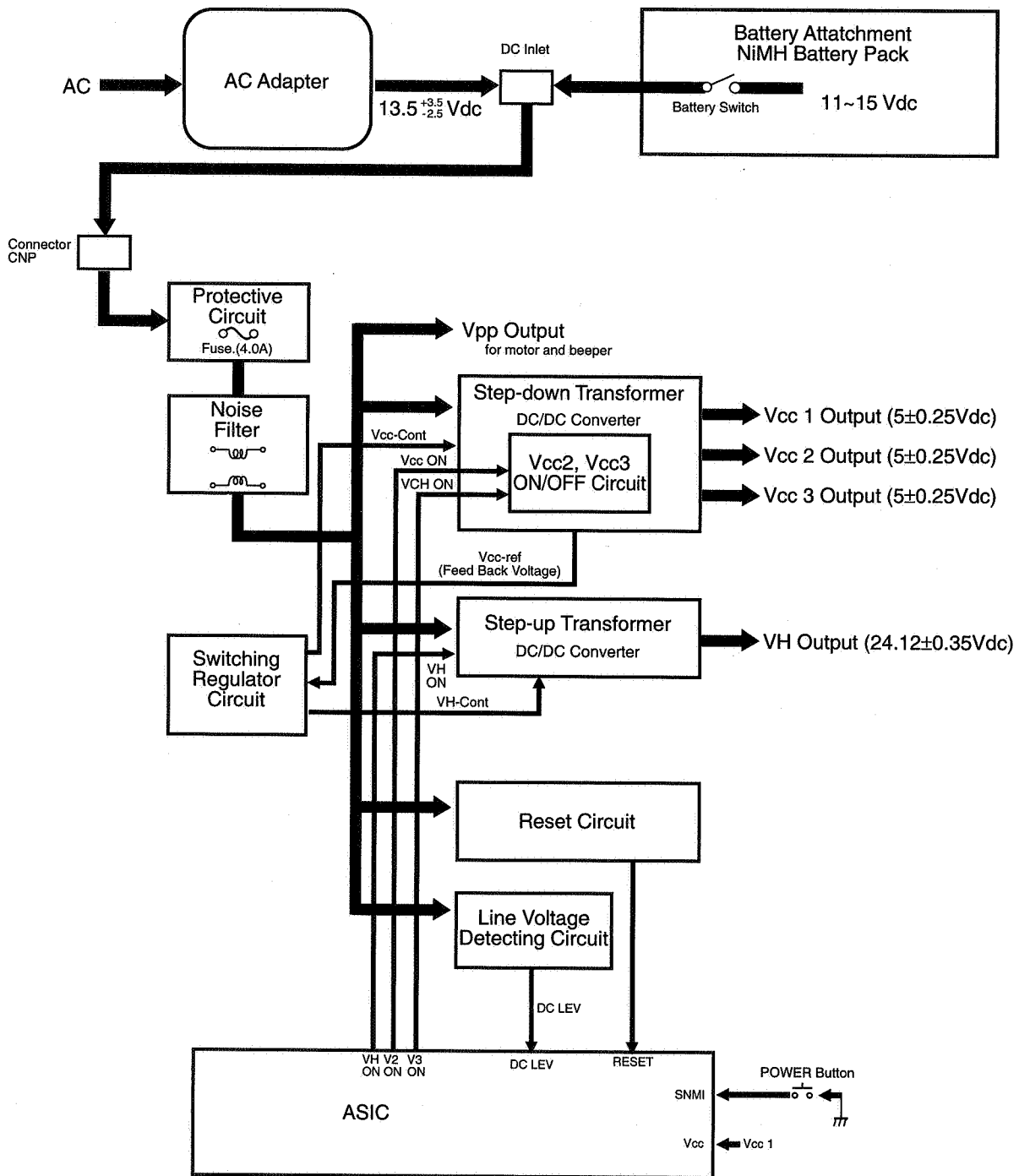


Figure 4-33 Block Diagram of Power Supply Section

4.3.2 Power supply section structure

a) Input power supply

The voltage input to the power supply section is 13.5 ± 0.5 VDC (by the AC adapter). It is supplied by an AC adapter or portable kit (NiMH battery pack). When the DC plug is inserted into the power connector, 13 VDC is supplied to the power control section on the control board.

b) Vcc1 output

The Vcc1 is +5VDC output produced by the DC/DC converter. Vcc1 is supplied to operate the reset IC, CPU, ROM, RAM, timer IC, EEPROM, and as a pull-up power supply for the *POWER* button. It is always supplied, even after the power switch is OFF.

c) Vcc2 output

The Vcc2 (+5VDC) output controlled by the ASIC is used to operate the IC in the print head. The ASIC outputs a signal that turns Vcc2 output off to stop it when the BJ cartridge is replaced, the ink cartridge is replaced, or the printer is turned OFF with the *POWER* button.

d) Vcc3 output

The Vcc3 (+5VDC) output controlled by the ASIC is supplied to operate the interface, paper sensor, and HP sensor. When the *POWER* button is turned OFF with the *POWER* button, the ASIC stops the Vcc3 output.

e) Vpp output

The DC input voltage supplied from the AC adapter becomes Vpp output to drive the carriage motor driver, paper feed motor driver, and the buzzer on the panel board.

f) VH output

The VH (24.12 VDC \pm 0.35 VDC) output generated by the DC/DC converter is supplied to the print head and the paper feed driver. This is monitored by the ASIC. The VH output voltage is supplied to the subheater temperature adjustment driver transistor and the nozzle heater temperature adjustment drivers transistor in the BJ cartridge and the paper feed motor driver. The DCLEV, which is generated by dividing the VH output using a DC/DC converter, is fed back to the ASIC and the ASIC monitors the VH output voltage to be kept at approx. 24.12 VDC.

g) Portable Kit (NK-300)

The portable kit is available as an option, and supplies the DC voltage to the printer by making use of the NiMH battery pack. The portable kit has a function to charge/discharge the NiMH battery pack. To charge it, connect the optional AC adaptor to the outlet, and do the DC plug to the portable kit. While the printer is not being operated, the NiMH battery pack charged. (The charging time is approximately 10 hours.)

To discharge the battery pack, connect the AC adaptor as well, and press the refresh button on the portable kit. The discharging time varies according to the battery voltage left in the battery pack, however, it is 10 hours or less. The battery capacity may be lowered by the memory effect. To prevent this, the battery pack has the refresh button, which can discharge the battery completely.



The refresh button is also used for switching to charging/discharging. If the button is pressed during charging, it will be switched to discharging. To stop charging/discharging, disconnect the power cord of the AC adaptor. (Power off the printer by pressing the *POWER* button, then disconnect the power cord.)

5. DETECTION FUNCTION

The printer uses HP sensor, paper sensor and inside temperature sensor, and head temperature sensor. Also, the capacity of the waste ink absorber is stored in the EEPROM. When the absorber becomes full, an error is output. The printer detects the level of the ink remaining in the ink cartridge by counting the number of dots ejected, and indicates when the ink runs out. The remaining ink level detection function can be enabled or disabled by function setting.

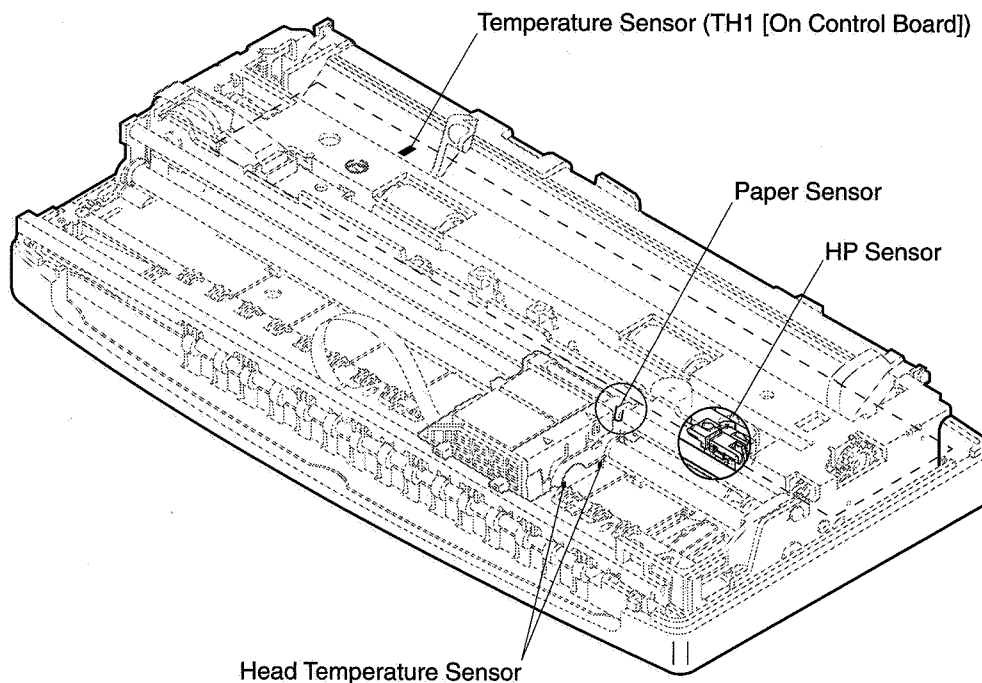


Figure 4-34 Sensor Location

5.1 HP Sensor

The photointerrupter type HP sensor detects the edge of the carriage in order to detect the carriage position.

After the carriage senses the edge, it moves to the right, and the print head is capped at its home position.

5.2 Paper Sensor

The switch type paper sensor detects the presence of paper.

5.3 Temperature Sensor

The temperature sensor on the control board detects the temperature inside the printer. The ASIC detects a change in the thermistor resistance that changes along with changes of the inside temperature. The ASIC converts the input analog value, which is a voltage converted from the thermistor resistor to a digital value with the internal A/D converter. This value is used to control the pulse width of the head drive control signal and temperature adjustment signal.

5.4 Head Temperature Sensor

The head temperature sensor in the print head detects the head temperature. The ASIC detects the diode sensor that changes as a change in voltage along with changes in the

head temperature. The ASIC converts the input analog value to a digital value with the internal A/D converter. When the head temperature rises excessively, the digital value becomes large, which can stop ejecting the ink from the head.

5.5 Waste Ink Level Detection

When ink is ejected from the head, the dot counter in the ASIC counts the number of dots ejected. There is a counter for each color of ink. The values of the counters are summed and the dot count is converted to an amount of ink by the ASIC.

The ASIC calculates the capacity of the waste ink absorber from the total dot count and the number of cleaning operations by consideration of the amount of ink consumed and evaporated. It then writes the result into the specified area of the EEPROM when the *POWER* button is turned off or paper is output.

The ASIC reads settings from the EEPROM at hardware and software power on. If the capacity of the waste ink absorber exceeds the permissible range, a warning is displayed. If the capacity increases further, the printer indicates an error and stops operating.

5.6 Remaining-ink Level Detection

This function detects the remaining ink level and notifies the user that the ink has run out. (The function is enabled or disabled by function setting.)

The dot counter for each color of ink in the ASIC counts the number of dots ejected. When cleaning is performed, ink is consumed by purging, and the total combination of this consumption and that converted from the number of dots is written into the EEPROM (when the power is turned off, paper is delivered out, or cleaning operation ends.)

The ASIC reads the EEPROM contents when the printer is turned on with the *POWER* button. If the remaining ink level reaches the prescribed value, a caution is displayed, notifying the user that the ink is low (the printer can operate even after a caution is displayed.)

Table 4-5 Detection Function

Detection Function	Description	Available	Remarks
Paper presence	Detection with paper end sensor.	available	
Paper width		None	
Home position	Detection with home position sensor.	available	
BJ cartridge presence	Detection with head rank, and head temperature sensor.	available	
Ink cartridge presence		None	
Remaining-ink level	Calculation from dot count and recovery count. Set the function to on or off by function setting.	available	Default: off
BJ cartridge identification	Identification by head ID0 and ID1.	available	
Waste ink absorption	Calculation from dot count and recovery count.	available	

6. SCANNER CARTRIDGE

6.1 Scanner Cartridge Overview

The scanner cartridge is a replaceable scanner unit that carries a one-line 128 pixel BASIS. The scanner separates each of the three RGB primary colors of the LED by scanning the same line three times. The color image is output by 8-bit signals, 256 gradation in each RGB primary color. For a monochrome image, the image is lit with a green LED and scanned once to output either a 8-bit or 2-bit signal. The maximum scanning resolution is 360 dpi \times 360 dpi.

The light source LED within the scanner lights up and illuminates the document on the platen. The light rays hit the image and using an imaging lens the reflected light rays are converged onto the BASIS. The converged light rays are converted to analog signals by the BASIS. After the analog signals have been converted to digital signals by the scanner controller, the scanned image is processed and the image data is sent to the computer via the printer's Centronics interface.

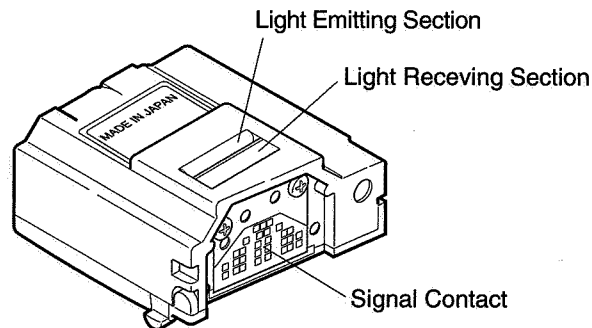


Figure 4-35 Scanner Cartridge

6.1.1 Block diagram

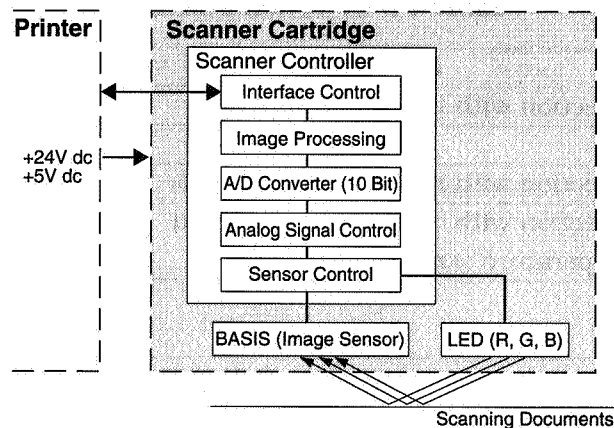


Figure 4-36 Block Diagram

6.2 Scanner Cartridge Structure

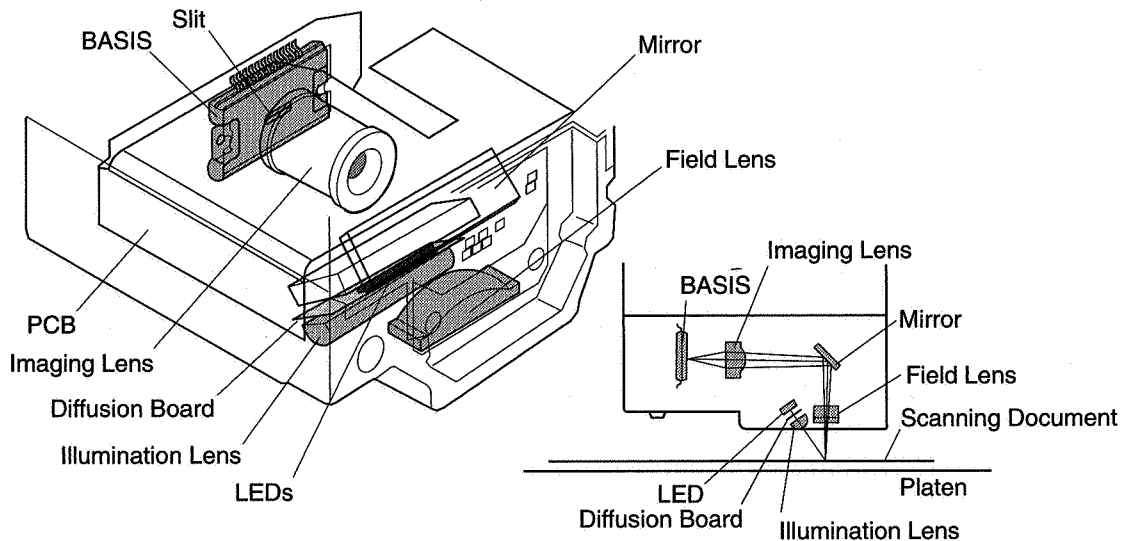


Figure 4-37 Scanner Cartridge

1) LED

Red, green and blue LEDs are used to illuminate the scanning document. To compensate for the low intensity of the red and green LED's, two red and green LEDs have been incorporated and a total of five LEDs are mounted on the scanner. Only the green LED is used for monochrome scanning.

2) Illumination lens

This "D" shaped lens converges the light from the LED light source.

3) Diffusion board

The light intensity of the LED is brighter at the center than at the ends. The diffusion board allows even distribution of light onto the document.

4) Field lens

This lens prevents any magnification reduction caused by paper gaps when scanning a lifted or bent document.

5) Imaging lens

This lens is used for forming an image of the light rays converged by the field lens onto the BASIS.

6) Shading board

The shading board with a slit at the front surface of the BASIS is used to prevent crosstalk generated in areas adjacent to high contrast areas.

7) BASIS

The scanner cartridge uses a semiconductor type, one-line 128 pixel BASIS (Base-Stored Image Sensor). Depending on the light amount of the image formed on the BASIS, electric voltage signals are sent to the scanner controller as image signals.

8) Scanner controller

The scanner controller is an IC that controls the BASIS and processes the analog signal output from the BASIS. The scanner controller also controls the following image processing:

- Black level Correction

The black level is set to maximum BASIS output.

- A/D Converter

The A/D converter converts the image signals to 10 bits image data.

- Shading Correction

The variation of the image signal is corrected by the shading correction. Due to (i) the variation of the sensitivities of the BASIS sensor elements and (ii) the uneven distribution of light transmitted through the center and the periphery of the lenses, the intensity of each scanned line is not uniform. The scanned data is compared against a standard white data to even out and correct the density.

- Carriage Scanning Direction Resolution Converter

The carriage scanning direction resolution converter converts the resolution of the output in the scanning direction according to the carriage direction.

- Edge emphasis

- Binary image processing function

The scanner controller has a built-in SRAM used for output buffer memory.



Scanner cartridge cannot be disassembled, reassembled.

As the imaging lens is used for forming an image on the BASIS, it is moved from its fixed position to adjust the optical path for focusing. Focusing cannot be conducted during servicing.

6.3 Signal Contacts

The scanner cartridge is recognized by TOP.S, DIAS and CCHK signals. The scanned image output to the printer is transmitted with a SCLOCK signal in sync with a SDATA signal.

The scanner is controlled by the internal register setting signals, CMD0, 1, 2 and 3.

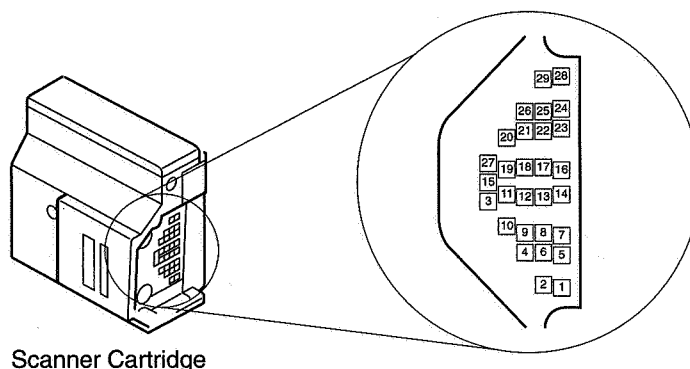


Figure 4-38 Contact Pad Layout

Table 4-6 List of Scanner Cartridge Signal Contacts

No.	Signal	Type	Description	(Ref. BJ Cartridge)
1, 2	LAMP G	...	GND for LED	VHG
5, 6	V LAMP	IN	LED drive voltage (+24Vdc)	HVH
9	TOP. S	OUT	Scanner detection GND	TOP
10	C. CHA	OUT	Scanner detection OPEN	DIODEA
11	ID0	OUT	Color scanner cartridge acknowledge signal	ID0
12	ID1	OUT	Color scanner cartridge acknowledge signal	ID1
13	INKS 2	OUT	IS-11/IS-12 detection	—
14	Vss	GND	GND	HVss
19	COM 0 (REN)	IN	Register enable	Odd ENB
20	COM 1 (RWR)	IN	Register write clock signal	BENB1
21	COM 2 (RDT)	IN	Register data signal	BENB2
22	COM 3 (N.C)	...	Not used	BENB3
23	Vdd	...	IC driver voltage (+5Vdc)	HVdd
24	S CLOCK (DTCK)	OUT	Scan data transfer signal	HCLK
25	S SYNE (LNST)	IN	Line start signal	HLATCH
26	S RES	IN	System reset signal	HRES
28	S DATA (DT)	OUT	Scan data	HDATA
29	C. CHK	OUT	HScanner detection OPEN	DIODEK

6.4 Scan Mode

Table 4-7 List of Scan Mode

Scanning Resolution (dpi)	Scanning Image Pixel Width			Carriage Speed
	Color	Black & White		
	Multi Value	Multi Value	Binary	
360 × 360	48 dots	48 dots	128 dots	3.91 KHz
300 × 360	64 dots	64 dots	128 dots	3.91 KHz
200 × 360	64 dots	112 dots	128 dots	3.91 KHz
200 × 180	64 dots	128 dots	128 dots	6.43 KHz
180 × 180	64 dots	128 dots	128 dots	6.43 KHz
90 × 390	64 dots	128 dots	128 dots	7.81 KHz

6.5 Calibration

The process of sampling and collecting data such as the printer's internal temperature, black standard data and white standard data is referred to as calibration.

The scanner application retains the past 5 calibration data and saves them in a file.

When a scanning operation is performed, a value from the compiled temperature data that is within $\pm 5^{\circ}\text{C}$ of the printer's internal temperature at the time is downloaded to the scanner controller. The scanner application requests calibration when there is no compiled data within $\pm 5^{\circ}\text{C}$.



Part 5

MAINTENANCE

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5 - 1	1.1 Periodically-replaced Parts
5 - 1	1.2 Consumables
5 - 1	1.3 Periodic Maintenance
5 - 2	2. SERVICING TOOLS
5 - 2	2.1 List of Tools
5 - 3	3. APPLYING THE GREASE
5 - 4	4. ADJUSTMENT
5 - 5	5. TROUBLESHOOTING
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5 - 7	5.2 Error Condition Diagnosis
5 -29	6. CONNECTOR POSITION & PIN ALIGNMENT
5 -29	6.1 Control Board
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5 -34	6.3 Carriage Ribbon Cable
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5 -35	6.5 Scanner Cartridge IS-12
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1. MAINTENANCE

1.1 Periodically-replaced Parts

Level	Periodically-replaced parts
User	None
Service engineer	None

1.2 Consumables

Level	Consumables
User	Black BJ cartridge BC-10 Color BJ cartridge BC-11e Ink cartridge BCI-10 Black BCI-11 Black BCI-11 Color
Service engineer	None

1.3 Periodic Maintenance

Level	Periodic Maintenance
User	None
Service engineer	None



The control board of the printer incorporates a lithium battery. When replacing the lithium battery the following:

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

Dispose of used batteries according to the manufacturer's instructions.

ADVARSEL!

Lithium batteri-Eksplosionsfare ved fejlagtig håndtering.

Udskiftning må kun ske med batteri

af samme fabrikat og type.

Levér det brugte batteri tilbage til leverandøren.

2. SERVICE TOOLS

2.1 List of Tools

General tool	Use
Phillips screwdriver	For removing screws
Flathead screwdriver	For removing plastic parts
Multi Mater	For troubleshooting
Tweezers	For fitting and removing coil springs

Special tool	Use
Grease (CK-0562-000)	MOLYKOTE PG-641

3. APPLYING THE GREASE

The points to grease with a special tool are shown below.

Apply a thin coat of grease to the specified points. See the Part Catalog for details of the printer disassembling and reassembling procedures.



Take special care not to apply grease to the wiper or the cap when greasing the guide shaft.

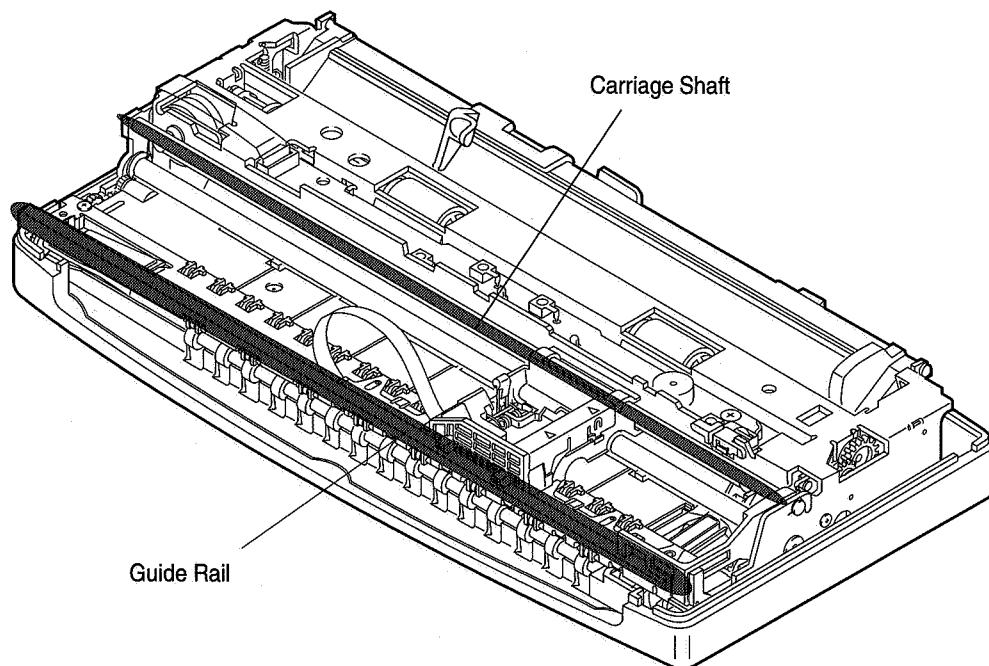


Figure 5-1 Grease Application Sections

4. ADJUSTMENT

No parts need to be adjusted.

5. TROUBLESHOOTING

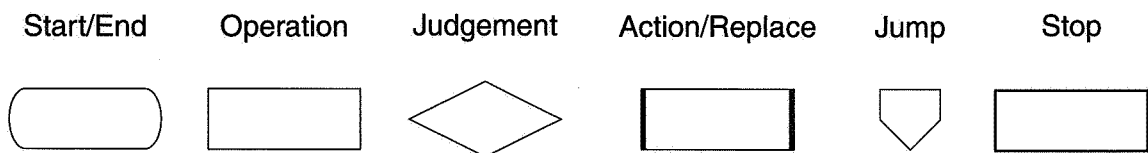
5.1 Overview of Troubleshooting

5.1.1 Definition

Troubleshooting consists of error condition diagnosis, which is required if the cause of an error is unknown, and error recovery, which is performed if the cause of an error is known. If the cause of an error is unknown, perform the error condition diagnosis, and if it is known, perform error recovery.

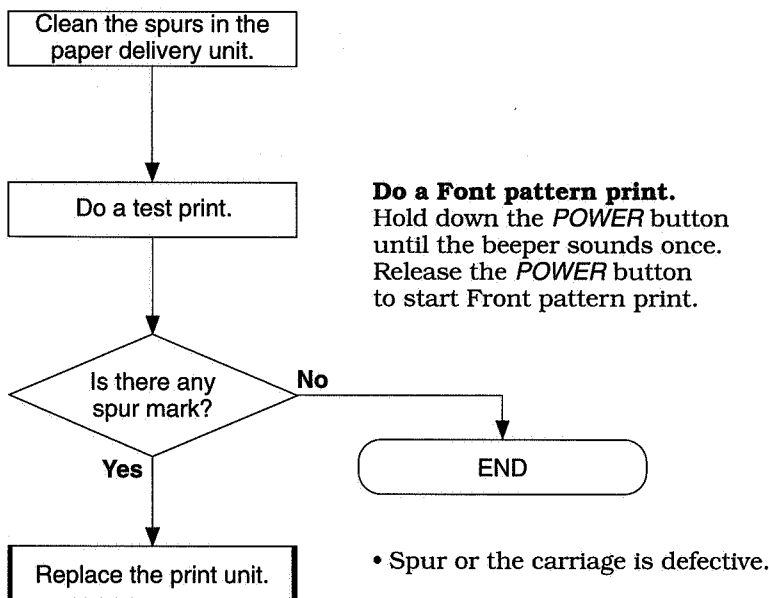
5.1.2 Precautions for troubleshooting

1. Before starting error condition diagnosis, make sure all the connectors and ribbon cables are plugged in.
2. If you repair the printer with its case removed and the AC adapter or battery pack installed, take utmost care to prevent electric shock from the power supply unit and PCB shorting.
3. Troubleshooting procedures are given in flowcharts. The following symbols are used in the flowcharts:



4. After replacement or repair, do a test print to make sure the printer works properly. If the printer does not work properly, perform troubleshooting again, skipping the steps that were done before.

Example 1



5. Several measures may be described in the error condition diagnosis and error recovery.

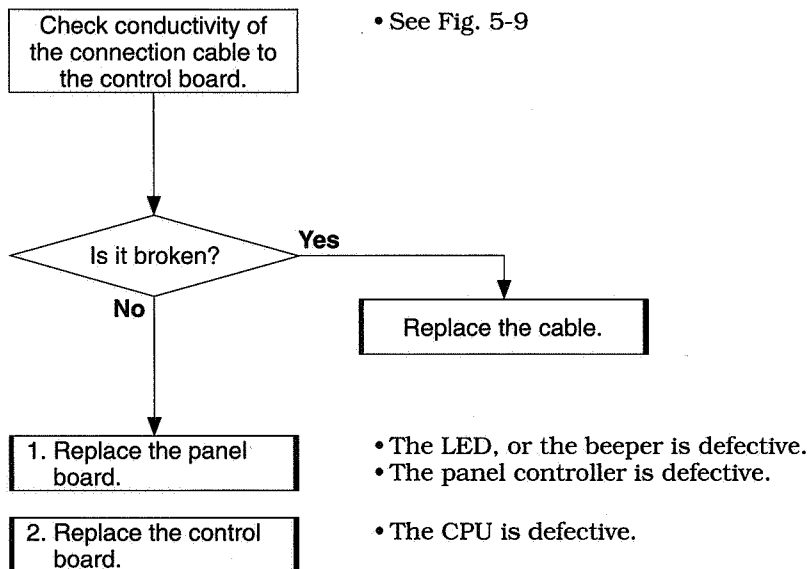
They are shown in each step to be done to solve the problem.

Do a test print after completing each step to make sure the problem has been eliminated. If it persists, go to the next step.

Example 2

After replacing the panel board in step 1, carry out a test print to make sure the problem has been solved.

If it still persists, go to step 2 and replace the control board.

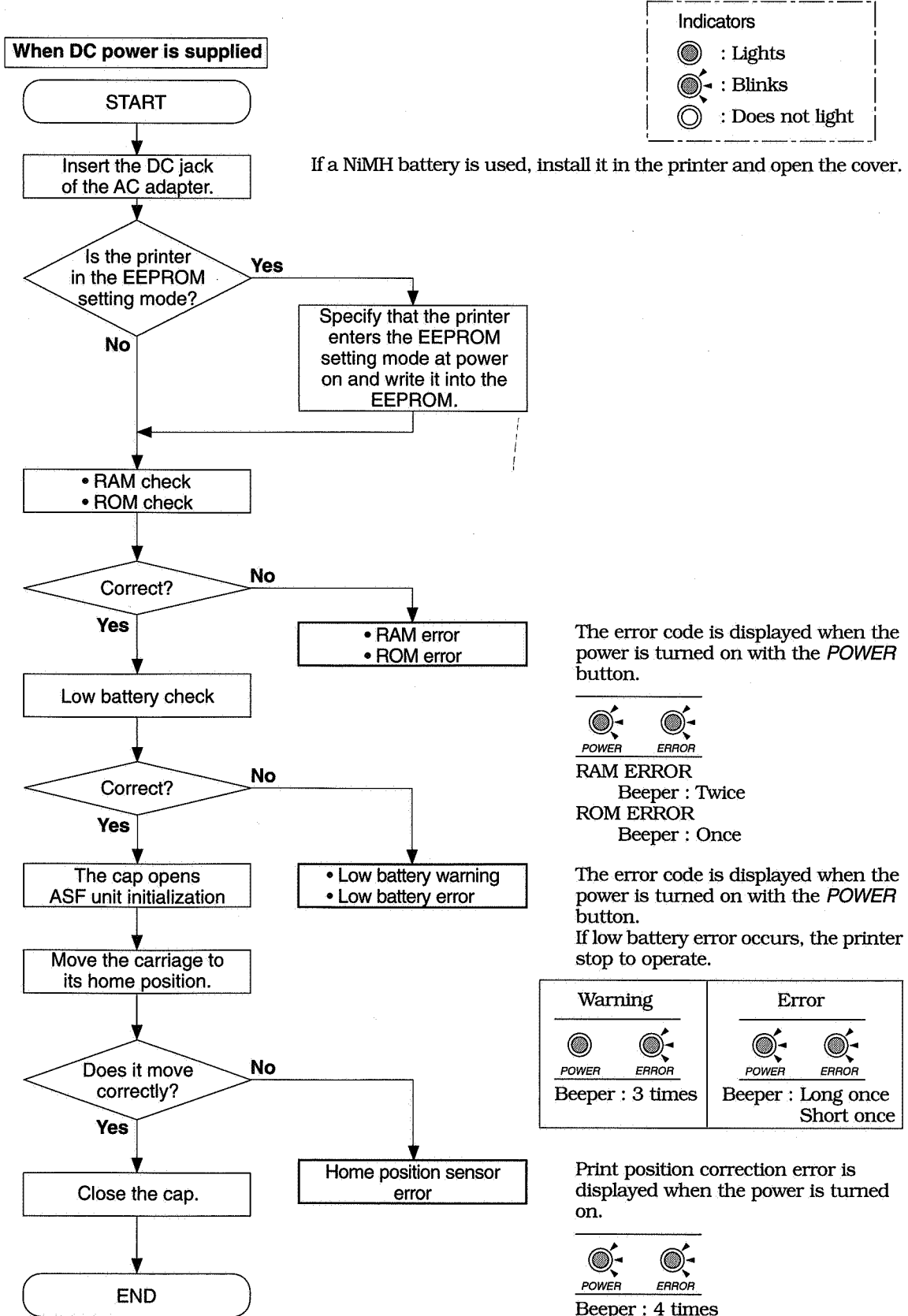


6. After troubleshooting, make sure that all the connectors have been plugged back in correctly and that all the screws are tight.



When replacing the control board, check the quantity of waste ink absorbed in the waste ink absorber in the printer base unit, and reset the quantity of waste ink absorbed in the EEPROM. See *Part 3: 3.6 EEPROM Data Setting (Page 3-24)*.

5.2 Error Condition Diagnosis
5.2.1 Diagnosis flowchart



When the power is turned on with the **POWER** button

START

Press the **POWER** button.

POWER and **ERROR** indicator turn on.

- RAM check
- ROM check

Correct?

No

- RAM error
- ROM error

Yes

Read the hardware power-on time, software power-on time, and cap close time from the EEPROM.

Check the inside temperature sensor.

Correct?

No

Thermistor error

Yes

Read the low battery value from the EEPROM.

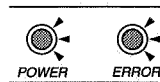
Is the test print button pressed?

No

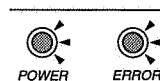
When the **POWER** button is pressed, do the selected test print after initialization.

Yes

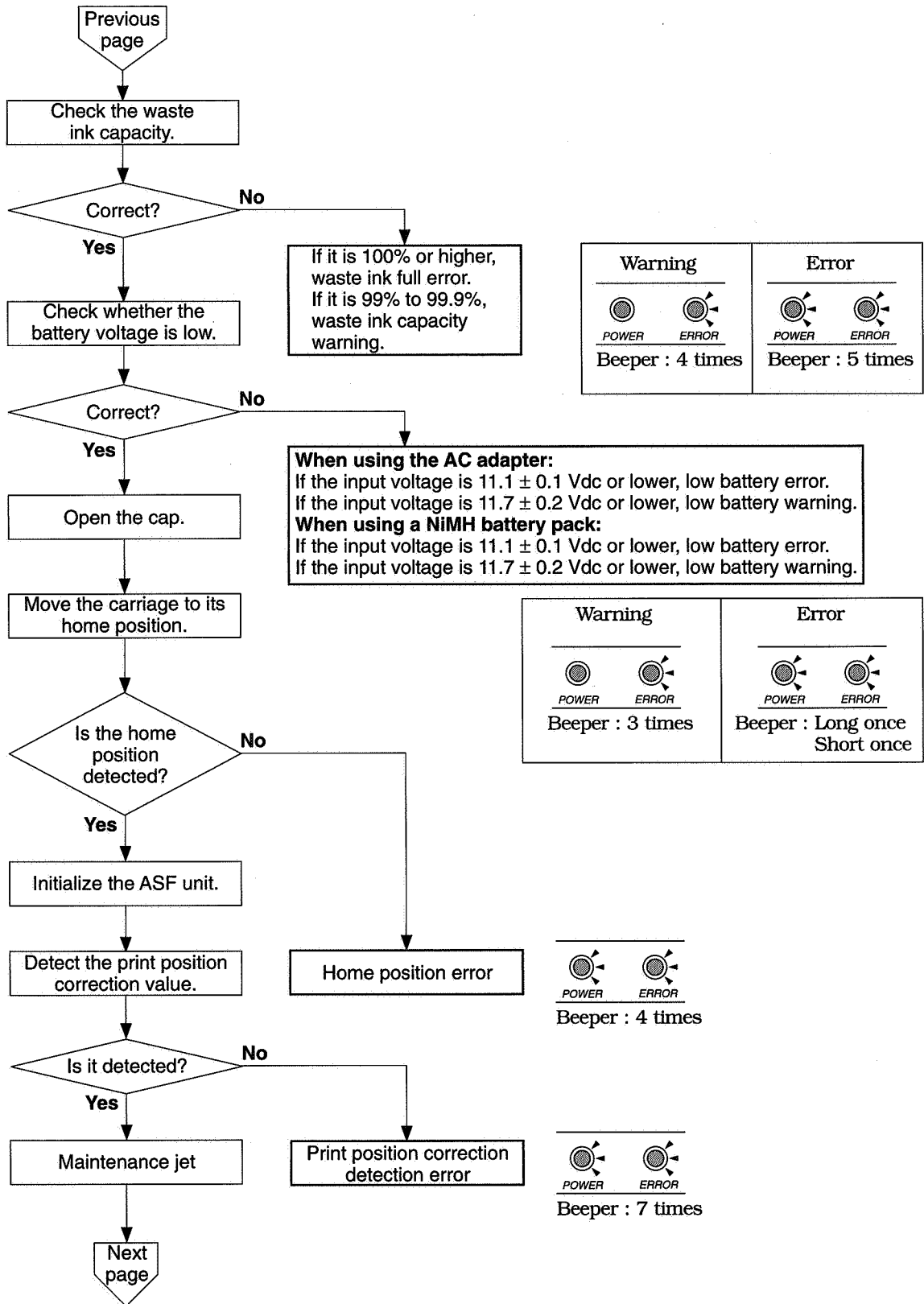
Next page

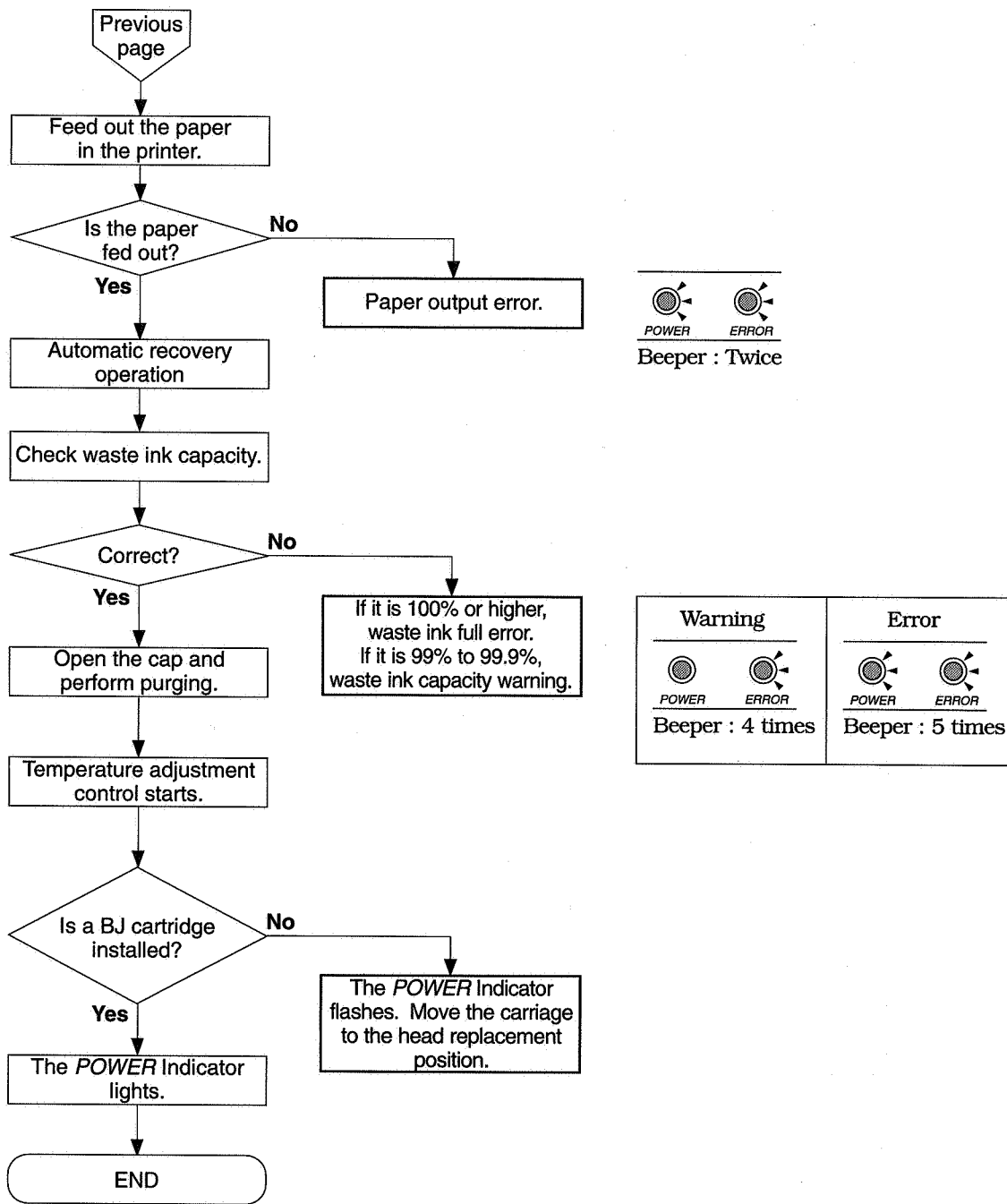


RAM ERROR
Beeper : Twice
ROM ERROR
Beeper : Once



Beeper : 6 times





5.2.2 Error recovery

a) Error display

1. ROM Error

<Cause> During initialization, the content in ROM cannot be read.

<Suspected parts> Control/CG ROM

<Measure> Replace control board.

2. RAM Error

<Cause> RAM reading and writing cannot be done properly.

<Suspected parts> DRAM

<Measure> Replace control board.

3. EEPROM Error

<Cause> EEPROM reading and writing cannot be done properly.

<Suspected parts> EEPROM

<Measure> Replace control board.



When a ROM or RAM error occurs, the correct error may not be displayed. When replacing the control board, check the amount of waste ink absorbed by the waste ink absorber and reset the EEPROM in the printer base unit.

See *Part 3: 3.6 EPROM Data Setting (Page 3-24)*.

4. Home Position Sensor Error

<Cause> The home position sensor cannot detect the carriage.
<Suspected part> Home position sensor, carriage motor, paper feed motor, control board

<Measure>

Visually check the carriage drive unit operation.

- Visually check for disconnected gears, removed parts, deformation, or jammed paper.

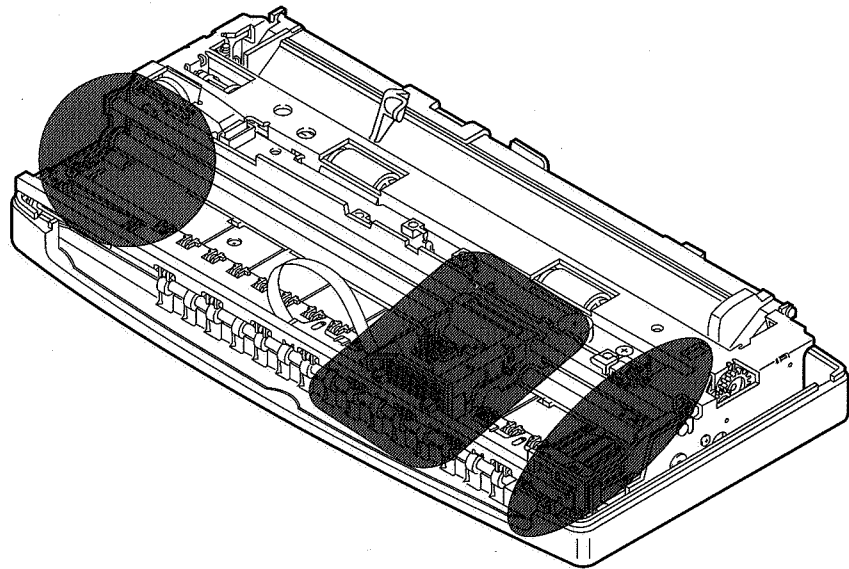
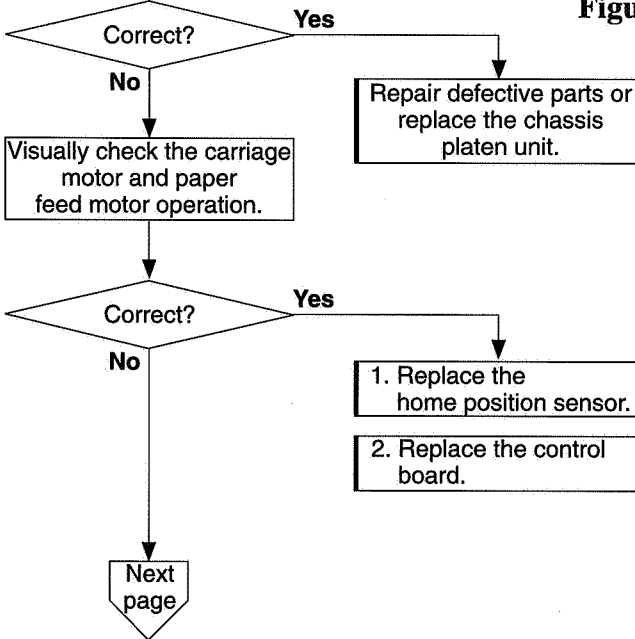
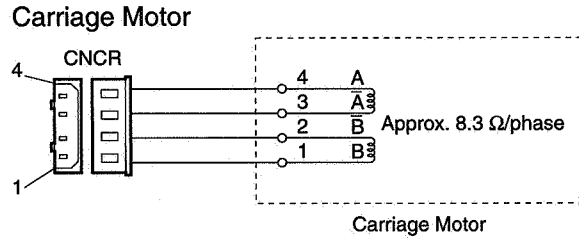
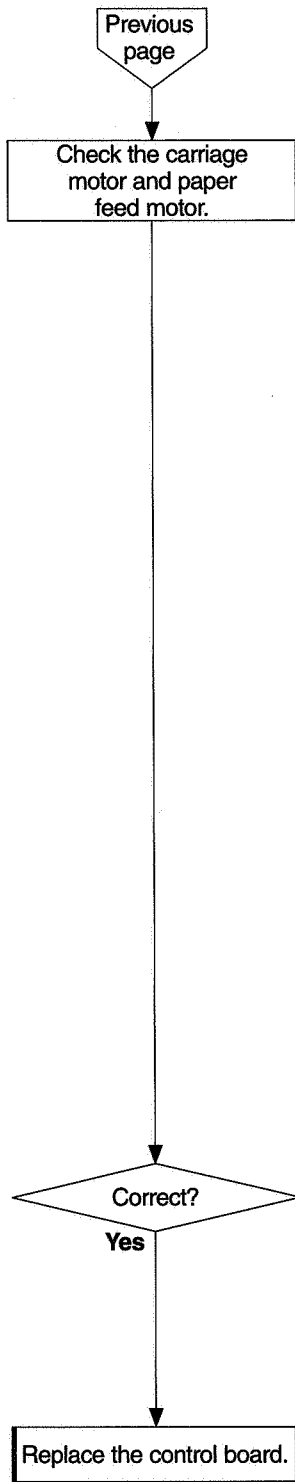


Figure 5-2 Check Point



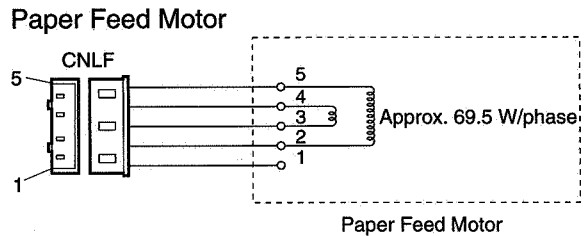
When replacing the control board, check the quantity of waste ink absorbed in the waste ink absorber in the printer base unit, and reset the quantity of waste ink absorbed in the EEPROM.
 See Part 3: 3.6 EEPROM Data Setting (page 3-24).



Meter connection	Reading
CNCR	Approx. 8.3Ω
Pin No.	
	1-2
	3-4

- Disconnect the carriage motor connector from the control board before check.

Figure 5-3 Carriage Motor



Meter connection	Reading
CNLF	Approx. 69.5Ω
Pin No.	
	2-5
	3-4

- Disconnect the carriage motor connector from the control board before check.

Figure 5-4 Paper Feed Motor

- The carriage motor or paper feed motor is defective.



When replacing the control board, check the quantity of waste ink absorbed in the waste ink absorber in the printer base unit, and reset the quantity of waste ink absorbed in the EEPROM. See *Part 3: 3.6 EEPROM Data Setting (page 3-24)*.

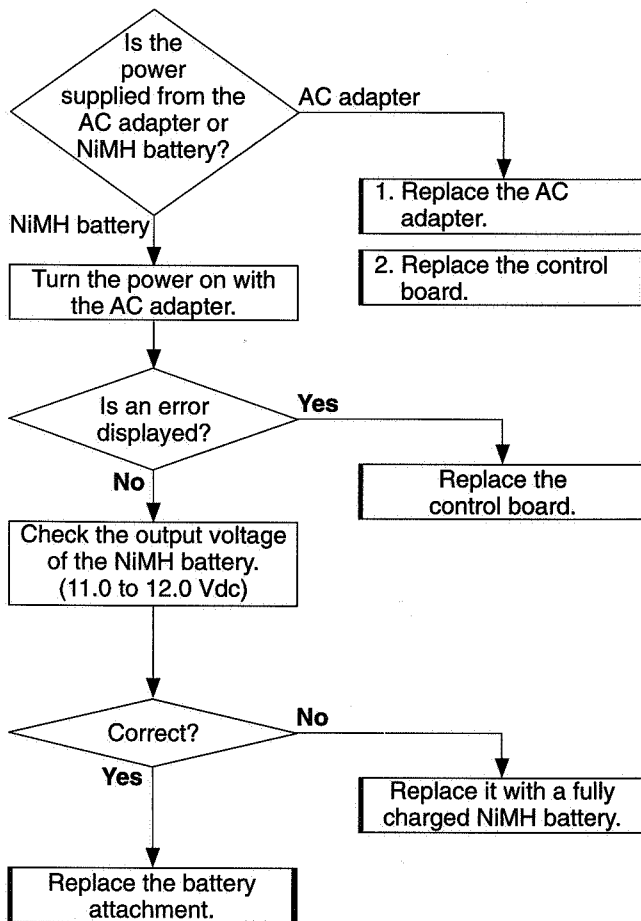
5. Print Position Correction Detection Error

<Cause> Print position correction cannot be detected properly.
<Suspected part> Carriage motor, control board, home position sensor
<Measure> Same as when the home position sensor error is displayed.

6. Low Battery Error

<Cause> The input voltage is incorrect. (11.1 ± 0.1 Vdc or lower)
<Suspected part> NiMH battery, AC adapter, Control board

<Measure>



7. Thermistor Error

<Cause> The thermistor is faulty.
<Suspected part> Thermistor
<Measure> Replace the control board.

8. Head Temperature Error

<Cause> The head temperature has risen excessively.
<Suspected part> BJ head or control board

<Measure>

Switch the power off and leave the printer for several minutes.

• Do not touch the head because it can be too hot.

Remove and reinstall the BJ cartridge.

Switch the power on.

Is any error displayed?

No

END

Yes

Check connectors.

• Check whether the carriage ribbon cable, paper feed motor cable, carriage motor cable, control board/panel board cable are plugged in the connectors.

Correct?

No

Repair defective parts.

Yes

Next page

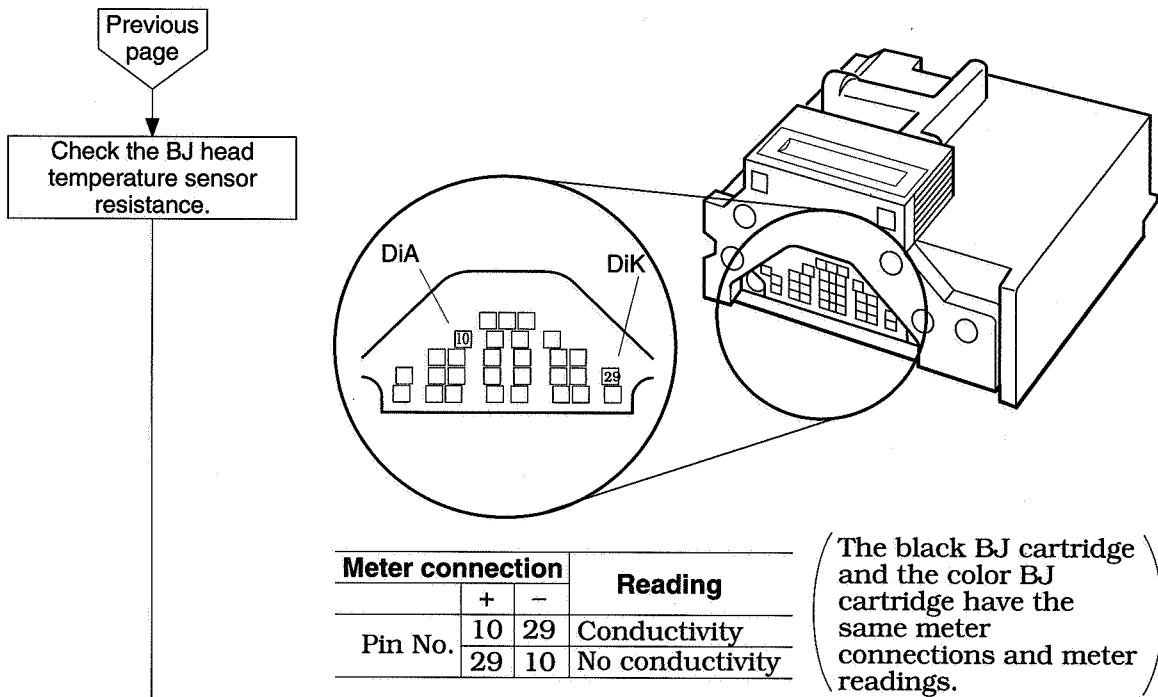


Figure 5-5 BJ Head Temperature Sensor

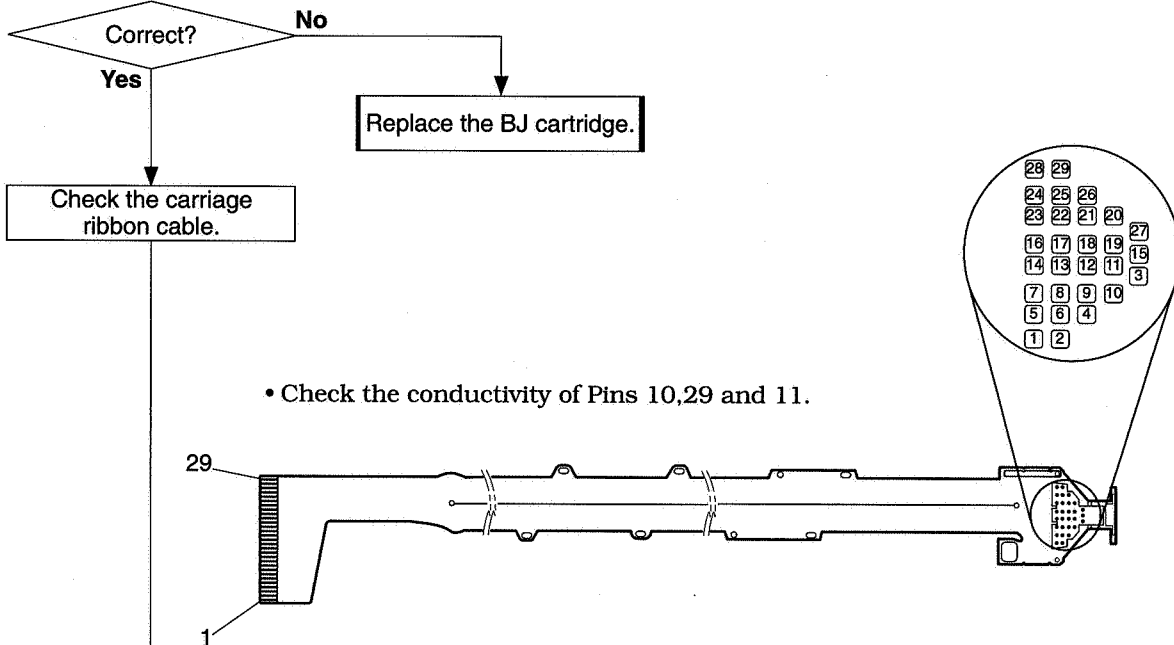
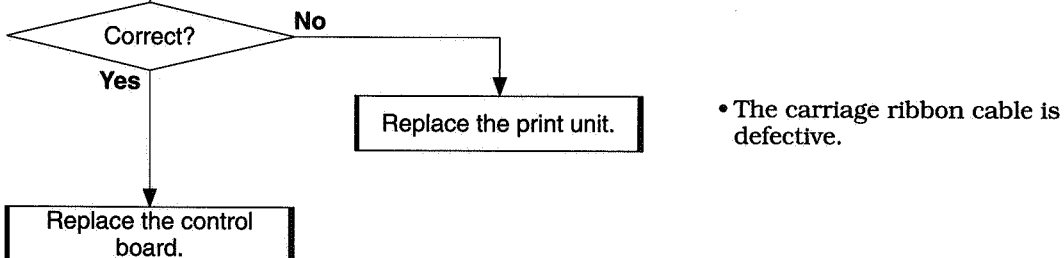


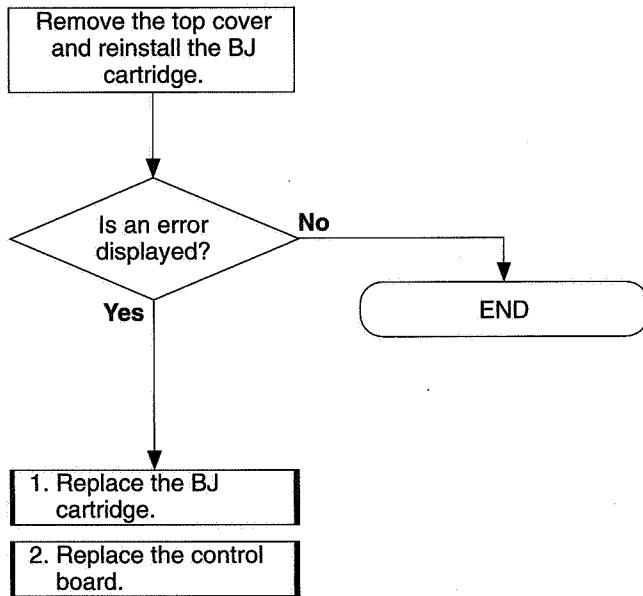
Figure 5-6 Carriage Ribbon Cable



9. No Head Error

<Cause> The BJ cartridge is removed from a position other than the BJ cartridge removal position.
<Suspected part> BJ cartridge or control board

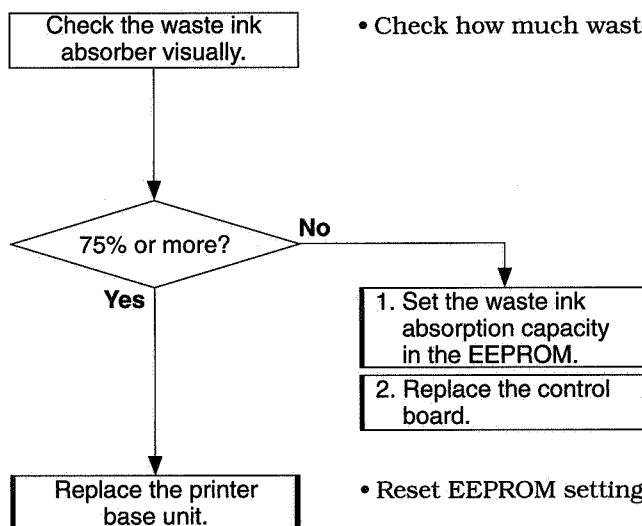
<Measure>



10. Waste Ink Full Error

<Cause> The capacity of waste ink absorbed into the waste ink absorber reaches 100%.
<Suspected part> Waste ink absorber or control board

<Measure>



• Check how much waste ink is contained in the waste ink absorber.

• See Part 3: 3.6 EEPROM Data Setting.

• Reset EEPROM setting.

11. Paper Feed Error / Paper Jam

<Symptom>

- Paper cannot be fed. More than one sheet is fed at a time.
- Paper is not loaded horizontally. Paper is not output.
- Paper jams frequently.

<Cause>

- The separation sheet is deformed.
- The pickup roller does not work correctly.
- Paper lifting is not done correctly.
- The paper delivery roller does not work correctly.
- Paper jam

<Measure>

Check the conditions for using the printer and printing paper specifications.

Do they meet the specifications?

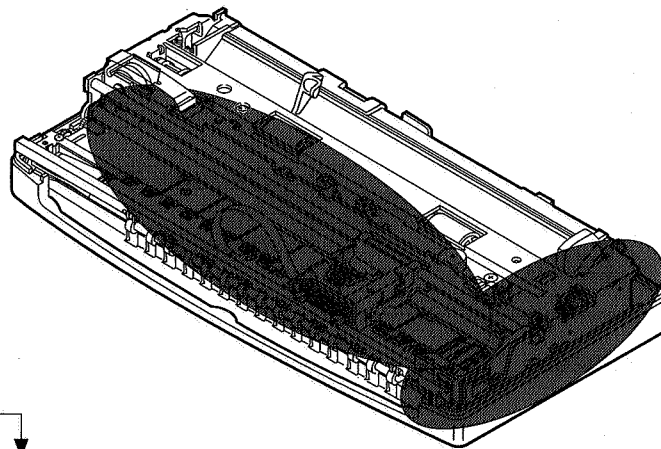
No

Use printing paper that meets the specifications.

Yes

Inspect the inside of the printer visually.

- Paper jam
- Deformed chassis, etc.
- Missing gear teeth



Correct?

No

Replace defective parts or eliminate paper jams.

• Chassis platen unit

Yes

Does the printer feed paper correctly?

No

1. Replace the paper lifting assembly.

2. Replace the chassis platen unit.

• The pickup roller is defective.

Yes

Dose any paper feed error occur?

No

END

Yes

1. Replace the printer base unit.

• The separation sheet is defective.

2. Replace the chassis platen unit.

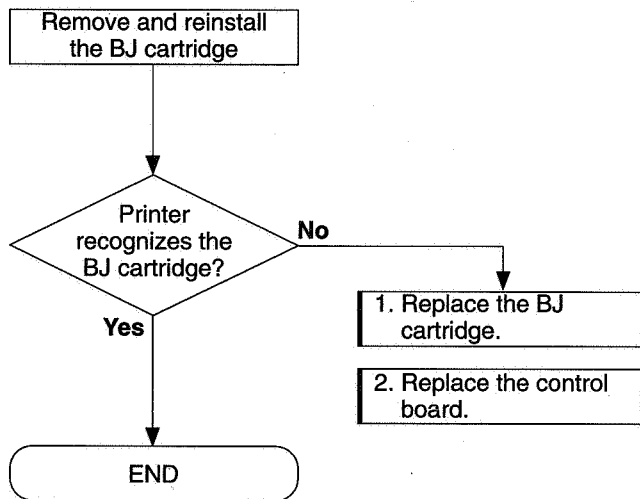
• Spurs are defective.

12. BJ Cartridge Check Error

<Cause> This error appears when the carriage is returned to the home position without the BJ cartridge installed, or when presence of BJ cartridge is not recognized through it is installed.

- <Suspected part>**
- Faulty contact between the BJ cartridge and carriage
 - Faulty BJ cartridge
 - Faulty carriage ribbon cable
 - Faulty control board

<Measure>



13. Cartridge Mismatch Error

<Cause> The BJ cartridge is not recognized correctly. The printer is set at scanner mode but the BJ cartridge is not installed.

- <Suspected part>**
- Connection between the BJ cartridge and the carriage
 - BJ cartridge
 - Scanner cartridge
 - Carriage ribbon cable
 - Control board

14. Waste Ink Capacity Warning

<Cause> When the power is turned on or when recovery operation completes, the remaining capacity of the absorber is 1%.

<Suspected part> Waste ink absorber

- <Measure>**
- Press the *RESUME* button to recover.
 - If the capacity of waste ink in the waste ink absorber reaches 100% (calculated value), a waste ink error occurs.
 - Replace the printer base unit.

15. Low Battery Warning

<Cause> The input voltage is 11.8 ± 0.1 Vdc to 11.1 ± 0.1 Vdc.
(Normal voltage: 13Vdc +2.5Vdc, -1.5 Vdc)

<Suspected part> NiMH battery, AC adapter

<Measure> 1) When using a NiMH battery

- It can be recovered by pressing *RESUME* button within five minutes after the warning displayed
- If the printer is recovered, it can print about one sheet of A4-sized paper. However, if the battery capacity falls below 11.1 ± 0.1 Vdc, a low battery error occurs.
- If the voltage is not restored within five minutes after the warning is issued, the printer turns off automatically.
- Recharge the NiMH battery.

2) When using the AC adapter

- Replace the adapter.

16. Cartridge Compulsory Completion Warning

<Cause> This error appears when the carriage is left for five minutes at replacement position and the carriage is compulsorily returned to the home position.

<Suspected part> The BJ cartridge is in the replacement mode for five minutes or longer.

<Measure>

- Press the *RESUME* button to recover.
- Press the *CARTRIDGE* button again and replace the cartridge.

17. Ink Low Warning

The ink low warning is displayed when the ink low warning function is enabled.

<Cause> The ink consumption calculated from the numbers of dots, maintenance jets, and cleanings exceeds the maximum ink consumption value in EEPROM, the beeper sounds once, the *POWER* indicator lights and the *ERROR* indicator blinks.

<Suspected part> Ink cartridge (Out of ink)

<Measure> Replace the ink cartridge and reset the ink low warning.



The ink low resetting/canceling is effective only when the BJ cartridge is installed.

b) Symptoms

1. The Power Does Not Turn On.

<Symptom> • When the *POWER* button is pressed, the printer does not turn on.
 • When DC power is supplied, the printer does not start initialization.

<Cause> The AC adapter, NiMH battery, control board, or panel board is defective.

<Measure>

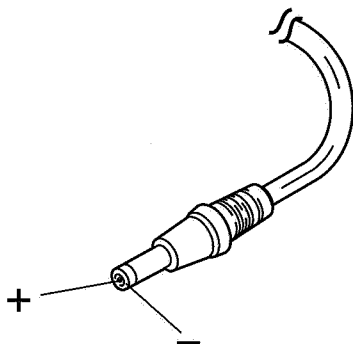
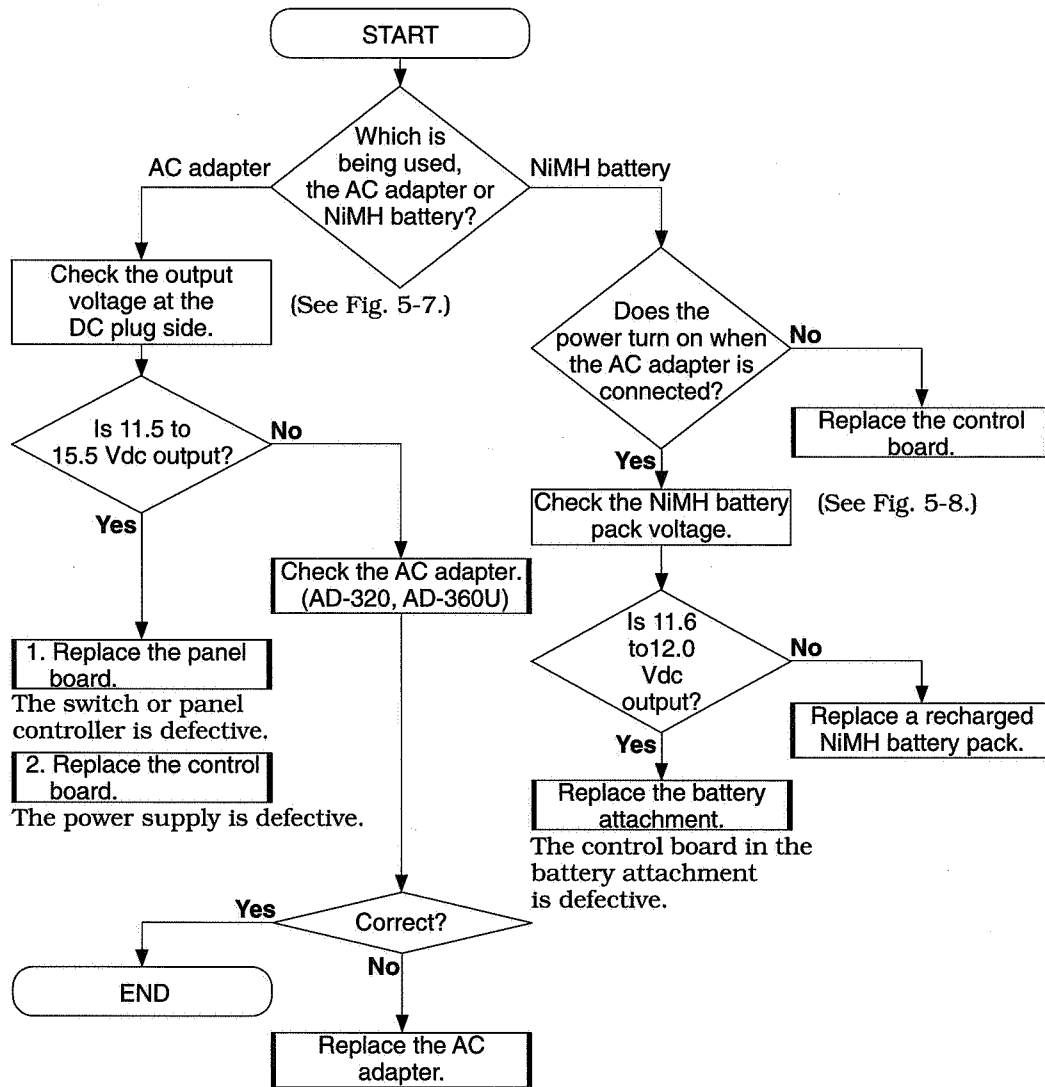


Figure 5-7 DC Plug

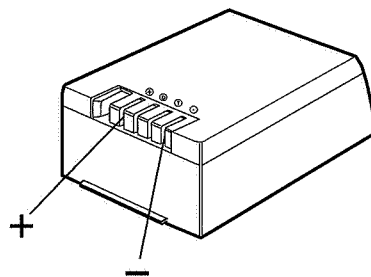


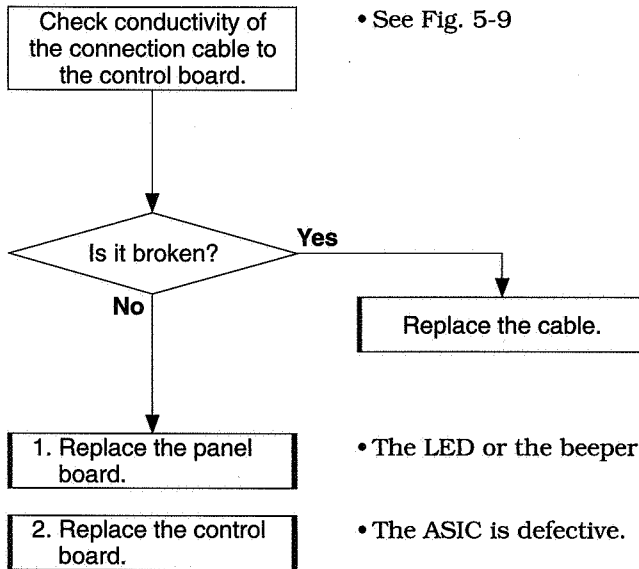
Figure 5-8 NiMH Battery Pack

2. Control Panel Failure

- <Symptom>**
- LED does not light.
 - The buzzer does not sound.
 - Test printing cannot be done.
 - Operation buttons are ineffective.

- <Cause>**
- The LED or the beeper is defective.
 - Buttons are defective.
 - The panel board is defective.
 - The control board is defective.

<Measure>



- The LED or the beeper is defective.
- The ASIC is defective.

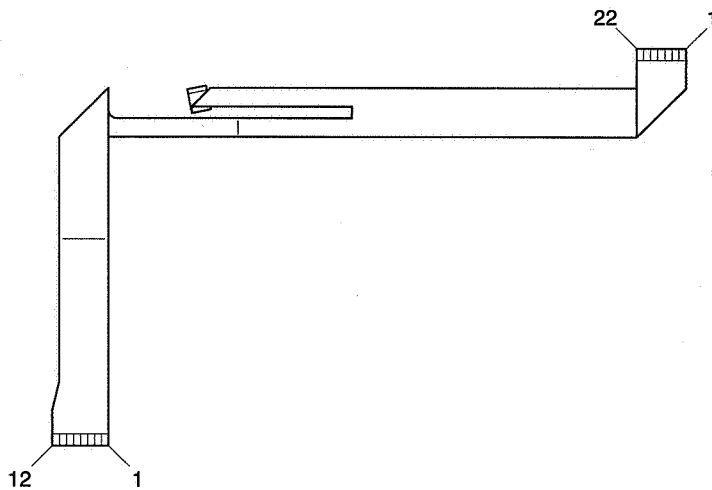


Figure 5-9 Cable

2. BJ Cartridge is Not Recognized.

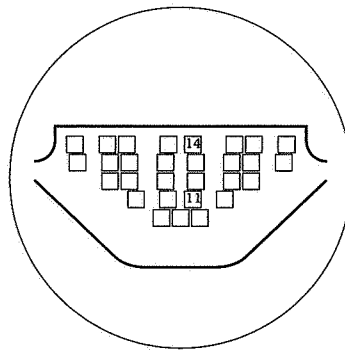
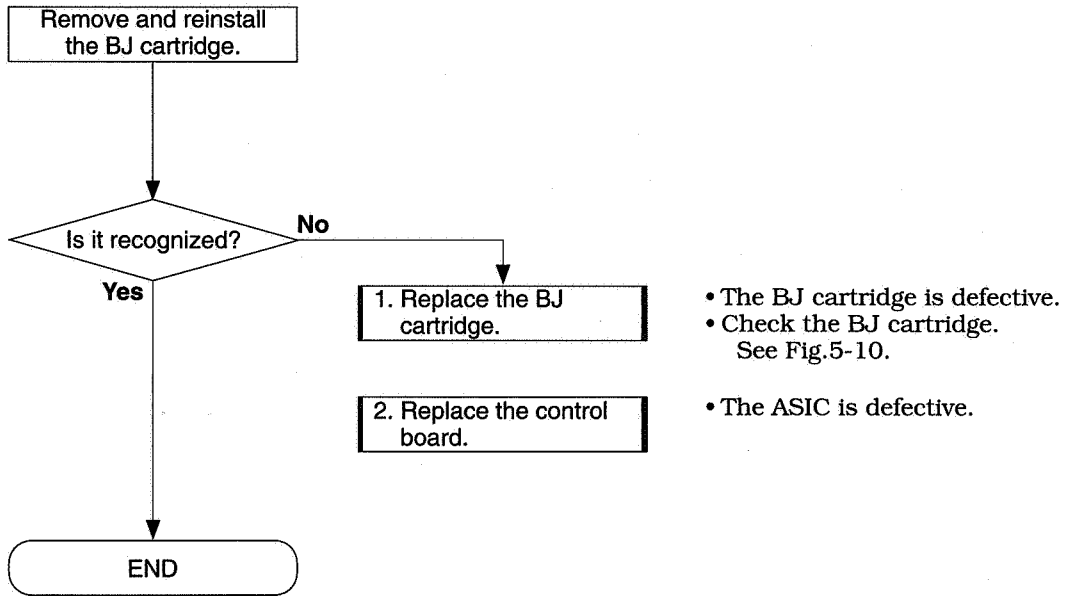
<Symptom>

- The installed BJ cartridge is not recognized.
- When the BJ cartridge is installed, the carriage returns to the replacement position.
- The installed BJ cartridge is not recognized correctly.

<Cause>

- The BJ cartridge does not contact the carriage properly.
- The BJ cartridge is defective.
- The carriage is defective.
- The control board is defective.

<Measure>



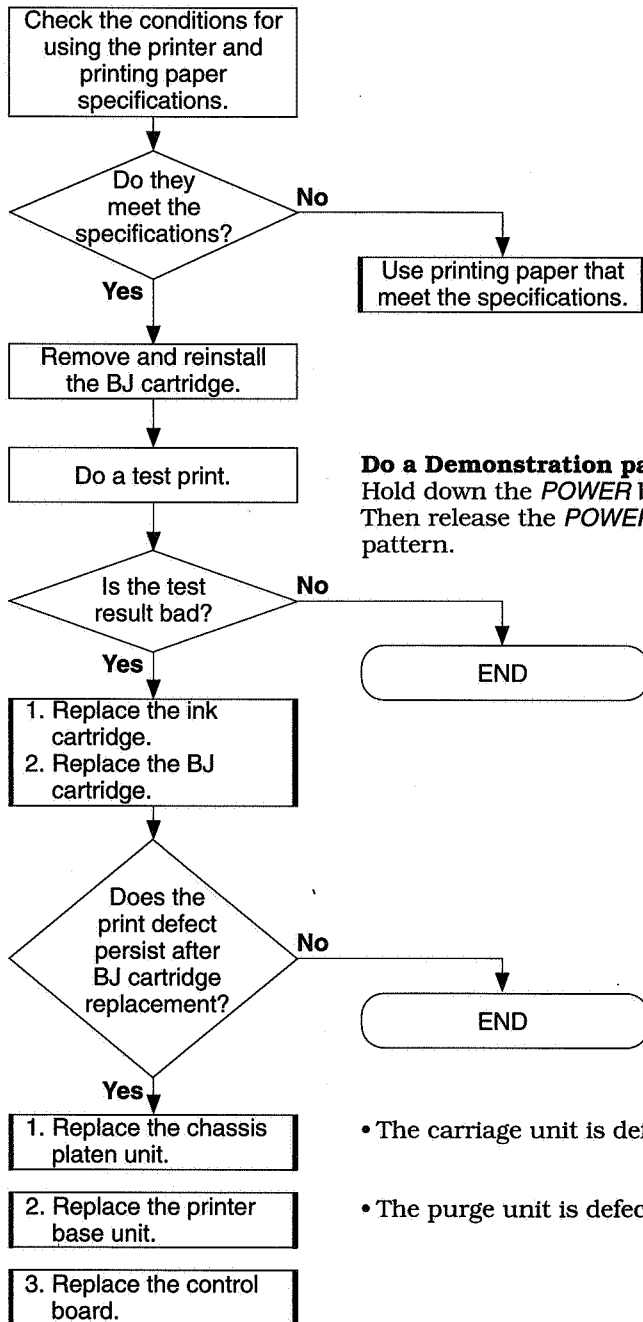
Meter connection		Reading	
Pin No.	11	14	Approx. 0 Ω BC-10
	11	14	∞ BC-11e

Figure 5-10 Head Connector

**4. Print Defect <1>
The Printer Does Not Print.**

- <Symptom>**
- The printer does not print at all.
 - The printer does not print in the middle.
 - The printer does not print one or more colors.
- <Cause>** No ink/defective BJ cartridge/
defective control board/defective carriage ribbon
cable/defective purge unit

<Measure>



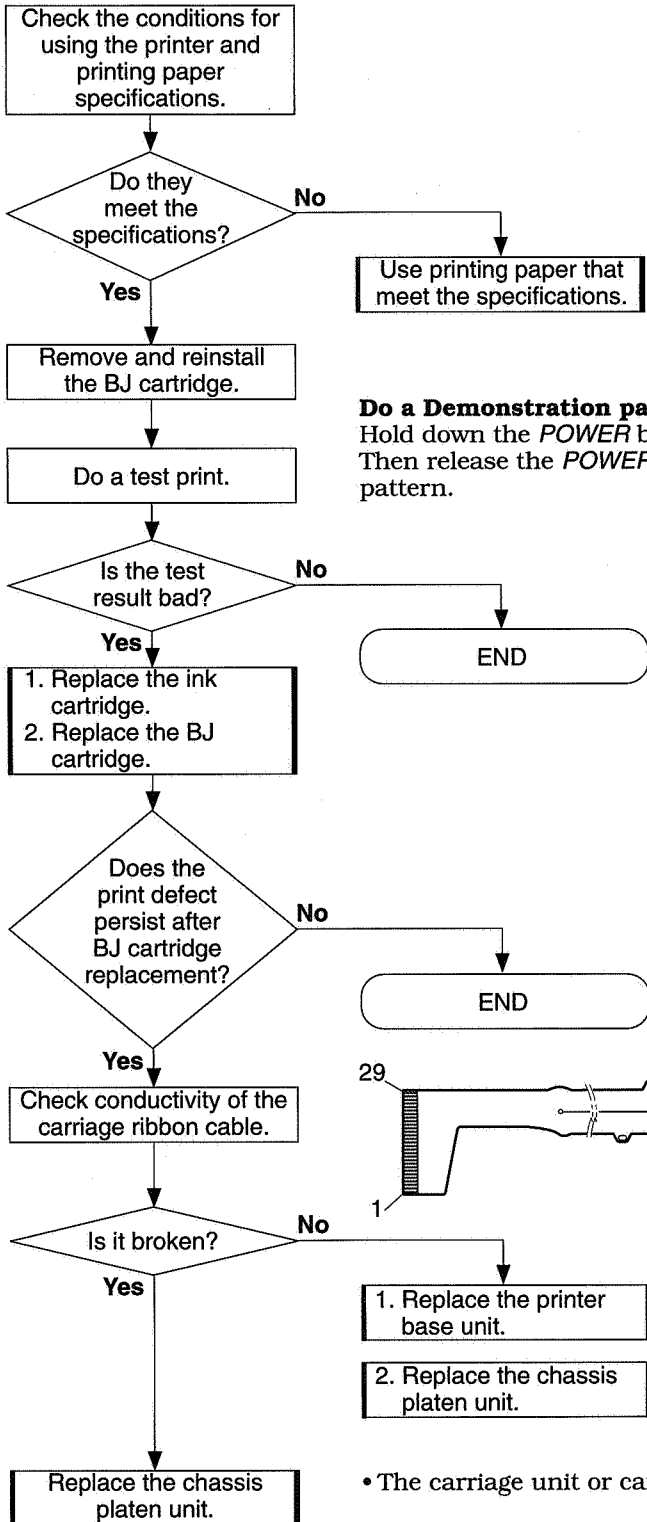
Do a Demonstration pattern print.
Hold down the *POWER* button until the beeper sounds once. Then release the *POWER* button to print out the Demonstration pattern.

- The carriage unit is defective.
- The purge unit is defective.

**5. Print Defect <2>
White Streaks
Appear.**

<Symptom> • The print is blurred.
• White streaks appear.
<Cause> The BJ cartridge, carriage ribbon cable, purge unit, or paper feed unit is defective (missing gear teeth).

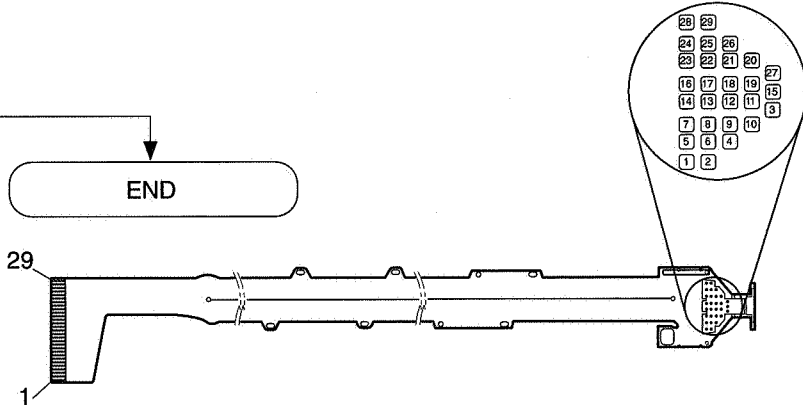
<Measure>



White Line Sample

Troubleshooting consists of error diagnosis, which is required if the cause of an error is unknown, and error recovery, which is required if the cause of an error is known. If an error is unknown, perform the diagnosis, and if it is known, perform recovery.

Do a Demonstration pattern print.
Hold down the *POWER* button until the beeper sounds once. Then release the *POWER* button to print out the Demonstration pattern.



- The purge unit is defective.
- The purge drive unit is defective.
- The carriage unit or carriage ribbon cable is defective.

<p>6. Print Defect <3> Other Print Problems</p>
--

Symptom	Check Item	Measures
• Smearred paper	Ink mist on the platen.	Use a soft cloth moistened with water to clean.
	Ink has clogged around the head's nozzles. (No smearing during paper feeding and discharging).	Clean a few times, If the problem persists, replace the BJ cartridge.
	Ink has clogged or paper bits have stuck around the purge unit's head wiper or head capping area.	Replace printer base unit.
	Ink has adhered to the paper transport system. (The paper is already smeared by the time it reaches the platen).	Clean the paper feed roller and the paper pick-up roller's washer.
• Spur tracks appear	Ink has adhered to the spurs.	Use a soft toothbrush to clean.
	Spurs have deformed	Replace the chassis platen unit.
• Misaligned vertical lines appear	The BJ cartridge is installed incorrectly.	Reinstall the BJ cartridge correctly.
	The problem re-occurs when the user's BJ cartridge (causing the problem) is installed in a normally-operating printer.	Replace the BJ cartridge.
• Corrugated printing	Chassis is deformed.	Replace the chassis platen unit.
	Frictional wear between the carriage unit and the carriage shaft.	Replace the chassis platen unit.
• Irregular darkness of printout	Check the printing mode.	Reset the printing mode.
	BJ cartridge is faulty.	Replace the BJ cartridge.

7. Faulty Interface

<Symptom> • No printing
 • An unspecified font is used to print characters.
 • Text is printed in an unspecified color.

<Cause> The printer driver is set incorrectly.
 The interface cable is defective.
 The control board is defective. (Printer)

<Measure>

Put the printer off-line and do a test print.

Do a Demonstration pattern print.
 Hold down the *POWER* button until the beeper sounds once. Then release the *POWER* button to print out the Demonstration pattern print.

Is the test result good?

No

Replace the control board.

Yes
(Normal)

Check the settings of the host computer and printer.
 • Emulation
 • Printer driver setting
 • Font

Are all settings correct?

No

Correct settings.

Yes
(Correct)

Set the printer to dump mode. Send data from the host computer and print it.

Do a dump mode test print.
 Hold down the *POWER* button until the beeper sounds 5 times. After releasing the *POWER* button the printer stands by for data transmission from the host computer.

Do transmitted data and received data match?

Yes

END

No

1. Replace the interface cable.

2. Replace the control board.

• The interface connector or ASIC is defective.

8. Scanner Cartridge: Installation Problems

Symptom	Check Item	Measures
No head error message	Scanner cartridge is installed incorrectly.	Press the cartridge button, move the carriage to the cartridge replacement position and reinstall the cartridge correctly. Restart using the power button.
Head mismatch error message	Scanner cartridge is installed incorrectly.	Press the cartridge button, move the carriage to the cartridge replacement position and reinstall the cartridge correctly. Restart using the power button.
	Driver not set to scanner mode.	Activate the scanner driver in the host computer. Switch setting to scanner mode.
Paper feed error message	Scanning document is jammed.	Press the RESUME button to erase the error message.
	Check scanning document size. Check scanning document thickness.	Place the document between the scanning folder and rescan.
Paper delivery error message	Scanning document is jammed.	Remove jammed document.
	Check scanning document length.	Make sure the scanning document fits within the scanning folder.
Irregular scanned graphic image	Check if white standard was taken using the white calibration sheet.	Recalibrate the white standard.
	Check the scanner driver setting.	Reset the scanner driver.
	Problems occur when the user's faulty scanner cartridge is installed.	Replace the scanner cartridge.
	Check computer-printer connection.	Reconnect cables.

6. CONNECTOR POSITION & PIN ALIGNMENT

6.1 Control Board

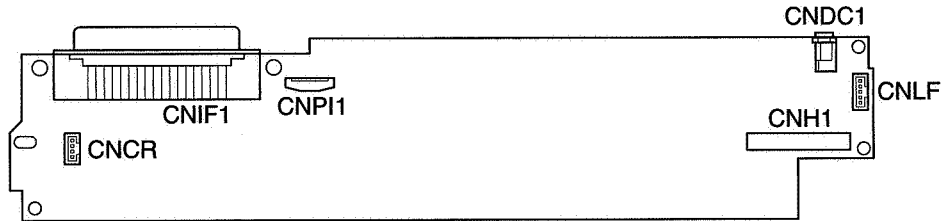


Figure 5-11 Control Board

CNIF1 (Parallel Interface Connector)

Pin No.	Signal name	IN/OUT	Description
1	STROBE	IN	See Part 2: 2.3.1 Parallel Interface for details (page 2-15)
2	DATA1	I/O	
3	DATA2	I/O	
4	DATA3	I/O	
5	DATA4	I/O	
6	DATA5	I/O	
7	DATA6	I/O	
8	DATA7	I/O	
9	DATA8	I/O	
10	ACKNLG	OUT	
11	BUSY	OUT	
12	PE	OUT	
13	SELECT	OUT	
14	AUTOFEEDXT	IN	
15	N.C		
16	GND		
17	F.G		
18	+5.0V		
19	STROBE-RET		
20	DATA1-RET		
21	DATA2-RET		
22	DATA3-RET		
23	DATA4-RET		
24	DATA5-RET		
25	DATA6-RET		
26	DATA7-RET		
27	DATA8-RET		
28	ACKNLG-RET		
29	BUSY-RET		
30	PE-RET		
31	INIT	IN	
32	ERROR	OUT	
33	GND		
34	N.C		
35	+5.0V		
36	SELECT IN	IN	





CNH1 (Cartridge Ribbon Cable Connector)

Pin No.	Signal name	IN/OUT	Description / (scanner cartridge in use)
1	VHG (LAMPG)	...	GND for head drive voltage VH (GND for scanner drive voltage 24V)
2	VHG (LAMPG)	...	GND for head drive voltage VH (GND for scanner drive voltage 24V)
3	MCH0 (N.C.)	IN	Drive signal for temperature control heater (Unused)
4	MCH1 (N.C.)	IN	Drive signal for temperature control heater (Unused)
5	HVH (VLAMP)	OUT	Head drive voltage (Scanner drive voltage)
6	HVH (VLAMP)	OUT	Head drive voltage (Scanner drive voltage)
7	WHT (N.C.)	OUT	Drive signal for subheater (Unused)
8	N.C. (N.C.)	...	Unused (Unused)
9	TOP (TOPS)	IN	Detection signal for rank resistance (Scanner cartridge recognition signal)
10	DIA (C.CHA)	IN	Head temperature sensor (diode) anode (Scanner cartridge recognition signal)
11	ID0 (ID0)	IN	BJ cartridge (black/color) detection signal (Scanner monochrome/color detection signal)
12	ID1 (ID1)	IN	BJ cartridge (black/color) detection signal (Scanner monochrome/color detection signal)
13	HCONT (INKS2)	IN	BJ cartridge (BC-11/BC-11e) detection signal (IS-11/IS-12 detection signal)
14	HVSS (VSS)	...	GND for head's logic drive voltage (GND for scanner's PCB drive voltage)
15	HENBD (N.C.)	OUT	Head's heater drive signal (Unused)
16	EVEN ENB (N.C.)	OUT	Even nozzle heater drive signal (Unused)
17	HENBA (N.C.)	OUT	Head's heater drive signal (Unused)
18	HENBC (N.C.)	OUT	Head's heater drive signal (Unused)
19	ODD ENB (REN)	OUT	Odd nozzle heater drive signal (Scanner's register setting signal)
20	BENB0 (RWR)	OUT	Block enable decoder generation signal (Scanner's clock signal for serial data transfer to register)
21	BENB1 (RDT)	OUT	Block enable decoder generation signal (Scanner's serial data signal)
22	BENB2 (N.C.)	OUT	Block enable decoder generation signal (Unused)
23	HVDD (VDD)	OUT	Head's logic drive voltage +5V (Scanner's PCB drive voltage +5V)
24	HCLOCK (DTCK)	OUT	Clock signal for print data transfer (Clock signal for scanning data input)
25	HLATCH (LNST)	OUT	Timing signal to latch print data (Timing signal to start scanning)
26	HRES (SRES)	OUT	Latch reset signal (Scanning operation reset signal)
27	HENBB (N.C.)	OUT	Head's heater drive signal (Unused)
28	HDATA (DT)	OUT	Print data (Scanning data)
29	DIK (C.CHK)	IN	Head temperature sensor (diode) cathode (Scanner cartridge recognition signal)

CNPI1 (Panel board connector)

Pin No.	Signal name	IN/OUT	Description
1	+5.0V (Vcc1)		Connection to IrDA unit
2	+5.0V (Vcc1)		
3	MODE	OUT	IrDA/ASK switch signal
4	GND		
5	TXD/PTXD	OUT	Infrared pulse (output)
6	GND		
7	RXD/PRXD	I/O	Infrared rays receive signal
8	GND		
9	FRXD/PRXD	I/O	Infrared rays receive signal
10	GND		
11	GND		Connection to panel board unit
12	GND		
13	PCV-SW	IN	Reset button detection signal
14	CC-SW	IN	Cartridge button detection signal
15	PWRON	IN	Power button detection signal
16	ERR-LED	OUT	Error LED control signal
17	PW-LED	OUT	Power LED control signal
18	HPS	IN	Home position sensor detection
19	PES	IN	PE sensor detection
20	BZOUT	OUT	Buzzer control signal
21	+5.0V (Vcc3)		
22	+5.0V (Vcc1)		

The BJ cartridge or the scanner cartridge is recognized by the pin No. of connector CNH1 on the control board or by a combination of ID1 and ID0 as shown below.

Pin No.	Signal name	Cartridge type
11	ID0	Low  Black High  Color
12	ID1	Low  Black Low  Color
13	HCONT	Low (BC-11e) / High (BC-10, BC-11)

CNLF1 (Paper feed motor connector)

Pin No.	Signal name	IN/OUT	Description
1	COM	IN	Paper feed motor drive voltage +20.0 VDC
2	$\overline{\text{LF A}}$	OUT	Paper feed motor phase $\overline{\text{A}}$
3	$\overline{\text{LF B}}$	OUT	Paper feed motor phase $\overline{\text{B}}$
4	LF B	OUT	Paper feed motor phase B
5	LF A	OUT	Paper feed motor phase A

CNCR1 (Carriage motor connector)

Pin No.	Signal name	IN/OUT	Description
1	$\overline{\text{CR B}}$	OUT	Carriage motor phase $\overline{\text{B}}$
2	CR B	OUT	Carriage motor phase B
3	$\overline{\text{CR A}}$	OUT	Carriage motor phase $\overline{\text{A}}$
4	CR A	OUT	Carriage motor phase A

CNDC1 (DC power connector)

Pin No.	Signal name	IN/OUT	Description
1	VIN	IN	+13 VDC
2	-VIN	IN	Negative (-) side of DC input voltage
3	GND		

6.2 Panel Board

CN5 (Control board connector)

Pin No.	Signal name	IN/OUT	Description
1	GND		
2	GND		
3	PCV-SW	OUT	Reset button signal
4	CC-SW	OUT	Cartridge button signal
5	PWRON	OUT	Power button signal
6	ERR-LED	IN	Error LED signal
7	PW-LED	IN	Power LED signal
8	HPS	OUT	Home position sensor sense signal
9	PES	OUT	PE sensor sense signal
10	BZOUT	IN	Buzzer signal
11	+5.0V (Vcc3)		
12	+5.0V (Vcc1)		

CN6 (HP sensor connector)

Pin No.	Signal name	IN/OUT	Description
1	+5.0V (Vcc3)		
2	HPS	...	Home position sensor signal level detection
3	HPS	...	

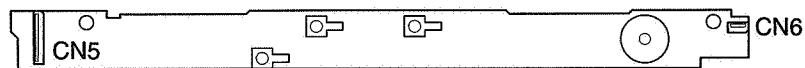


Figure 5-12 Panel Board

6.3 Carriage Ribbon Cable

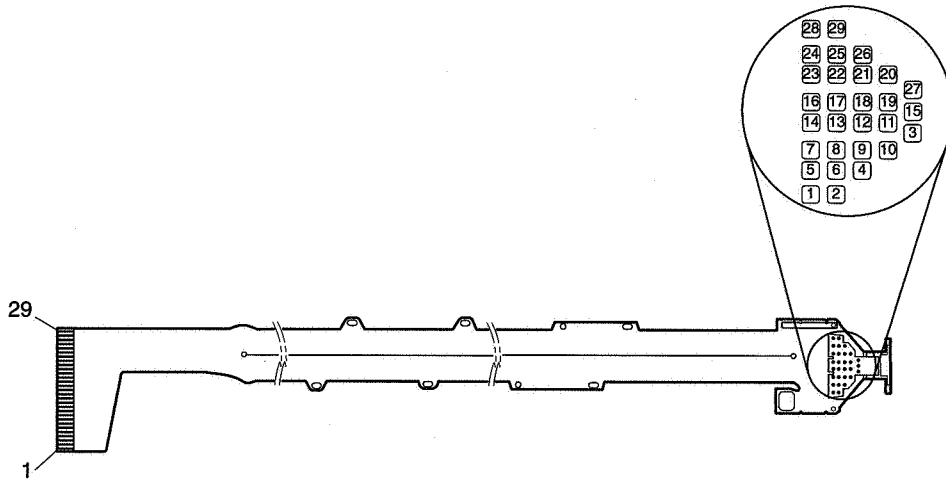


Figure 5-13 Carriage Ribbon Cable

Pin No.	Signal name	IN/OUT	Description	To BJ cartridge
1	VHG		See CNH1	GNDH
2	VHG			GNDH
3	MCH0	OUT		MCH1
4	MCH1	OUT		MCH2
5	HVH			VH
6	HVH			VH
7	WHT	IN		SUB
8	N.C			Spare 1
9	TOP	OUT		RNK
10	DIA	IN		DIA
11	ID0	OUT		ID0
12	ID1	OUT		ID1
13	HCONT	OUT		IND
14	HVSS			GNDL
15	HENBD	IN		HEAT-D
16	EVENENB	IN		EVEN
17	HENBA	IN		HEAT-A
18	HENBC	IN		HEAT-C
19	ODDENB	IN		ODD
20	BENB0	IN		B-ENB0
21	BENB1	IN		B-ENB1
22	BENB2	IN		B-ENB2
23	HVDD	IN		VDD
24	HCLOCK	IN		D-CLK
25	HLATCH	IN		LT-CLK
26	HRES	IN		RESET
27	HENBB	IN		HEAT-B
28	HDATA	IN		I-DAT
29	DIK	OUT		DIK

6.4 BJ Cartridge BC-11e

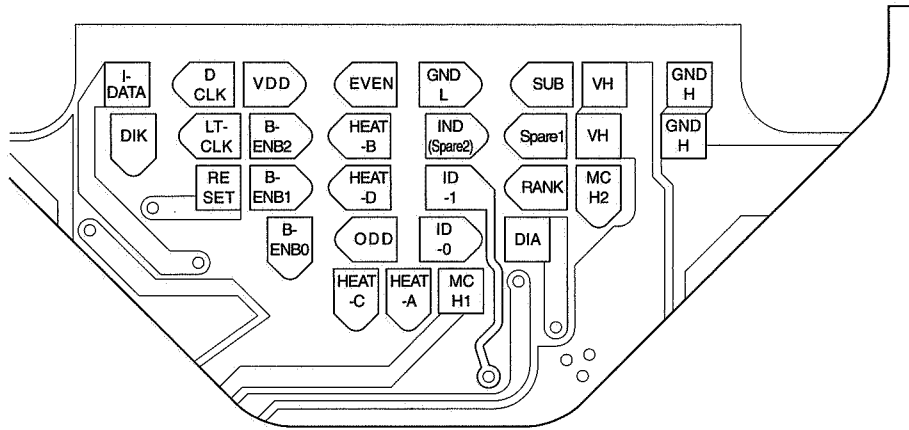


Figure 5-14 BC-11e Contact Pad

6.5 Scanner Cartridge IS-12

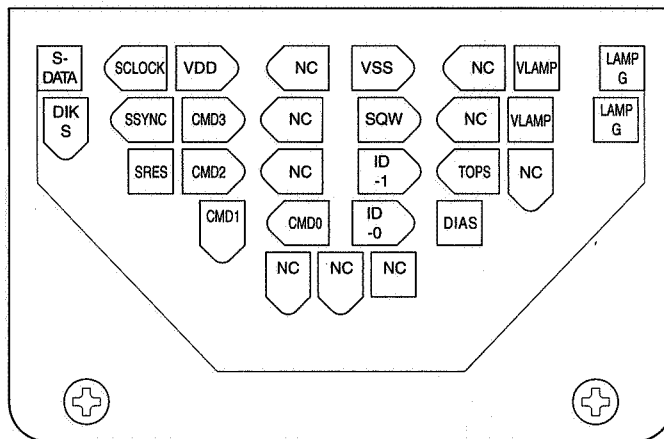
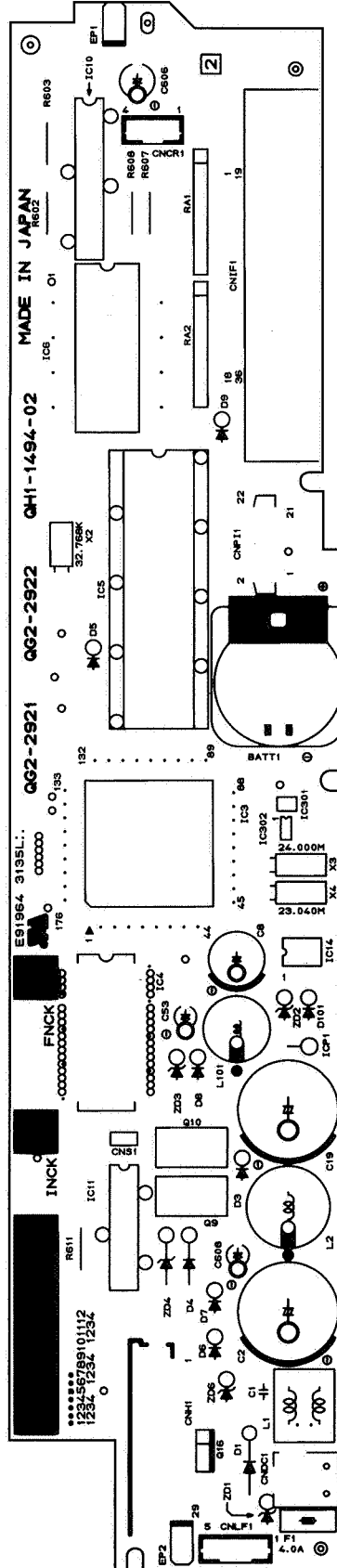


Figure 5-15 IS-12 Contact Pad

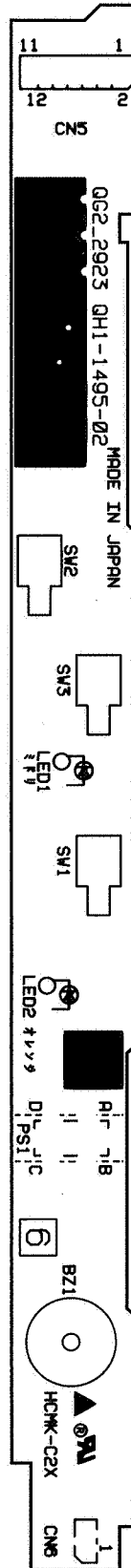
7. CIRCUIT DIAGRAMS

7.1 Parts Layout

7.1.1 Control PCB assembly

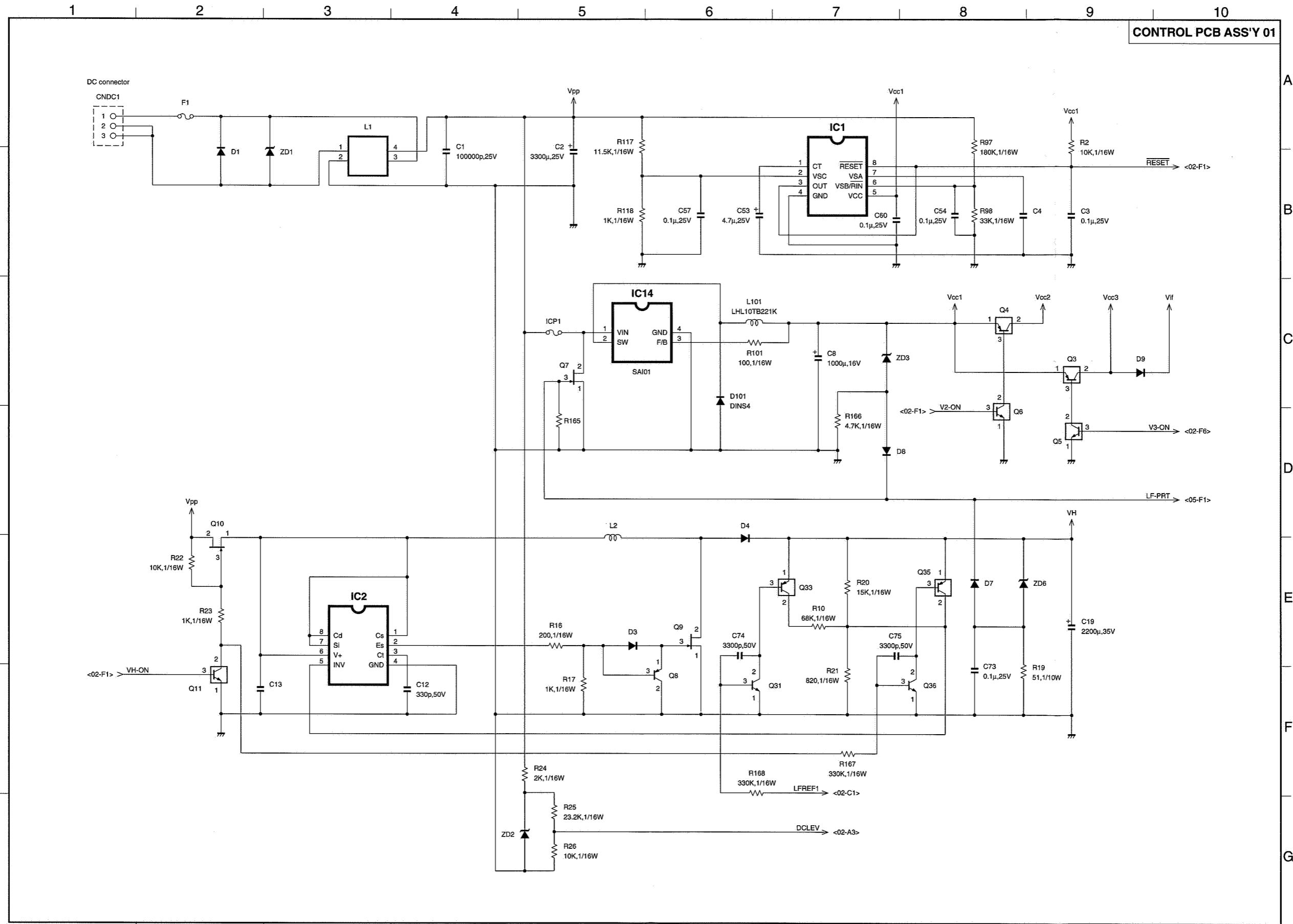


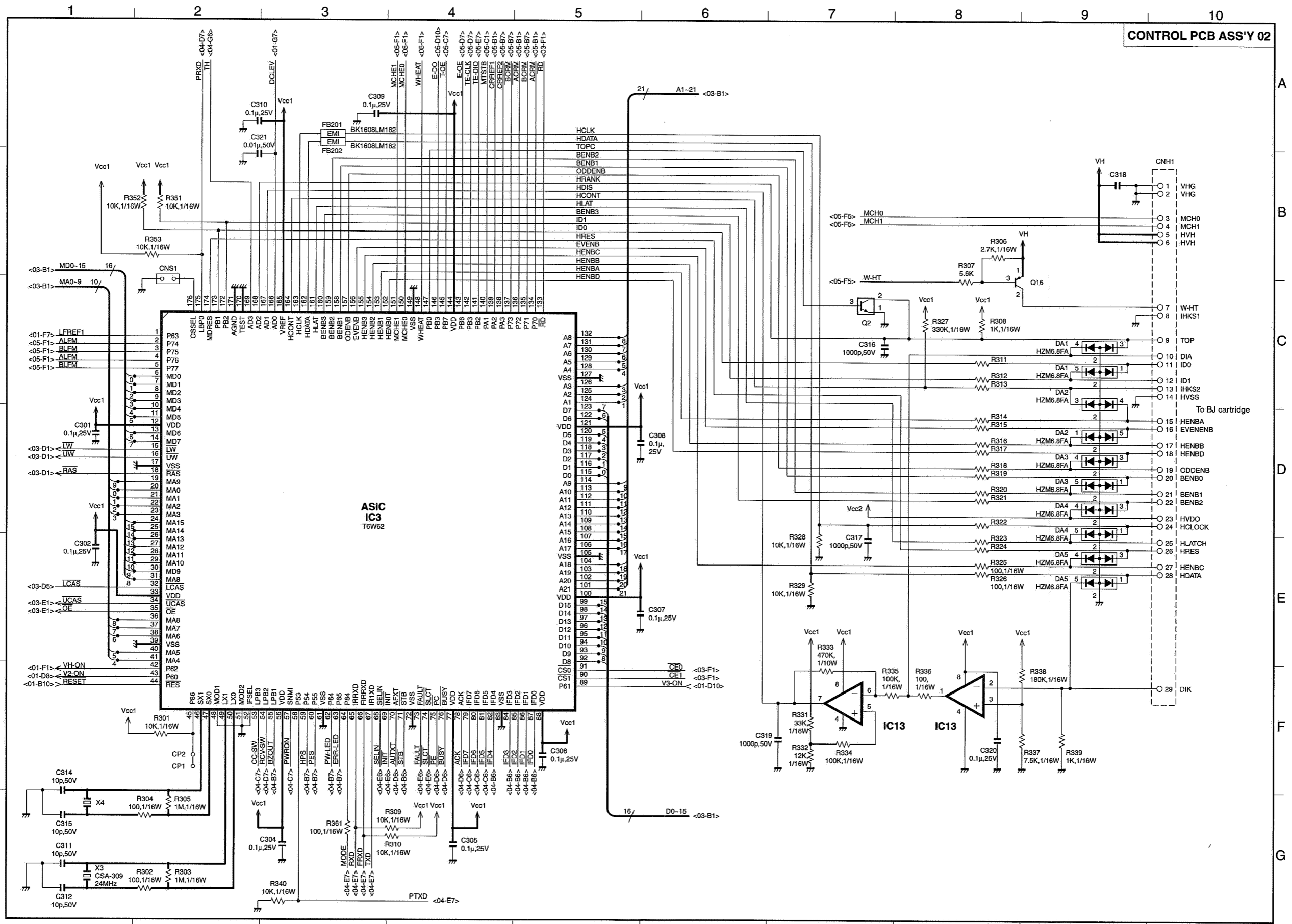
7.1.2 Panel board panel

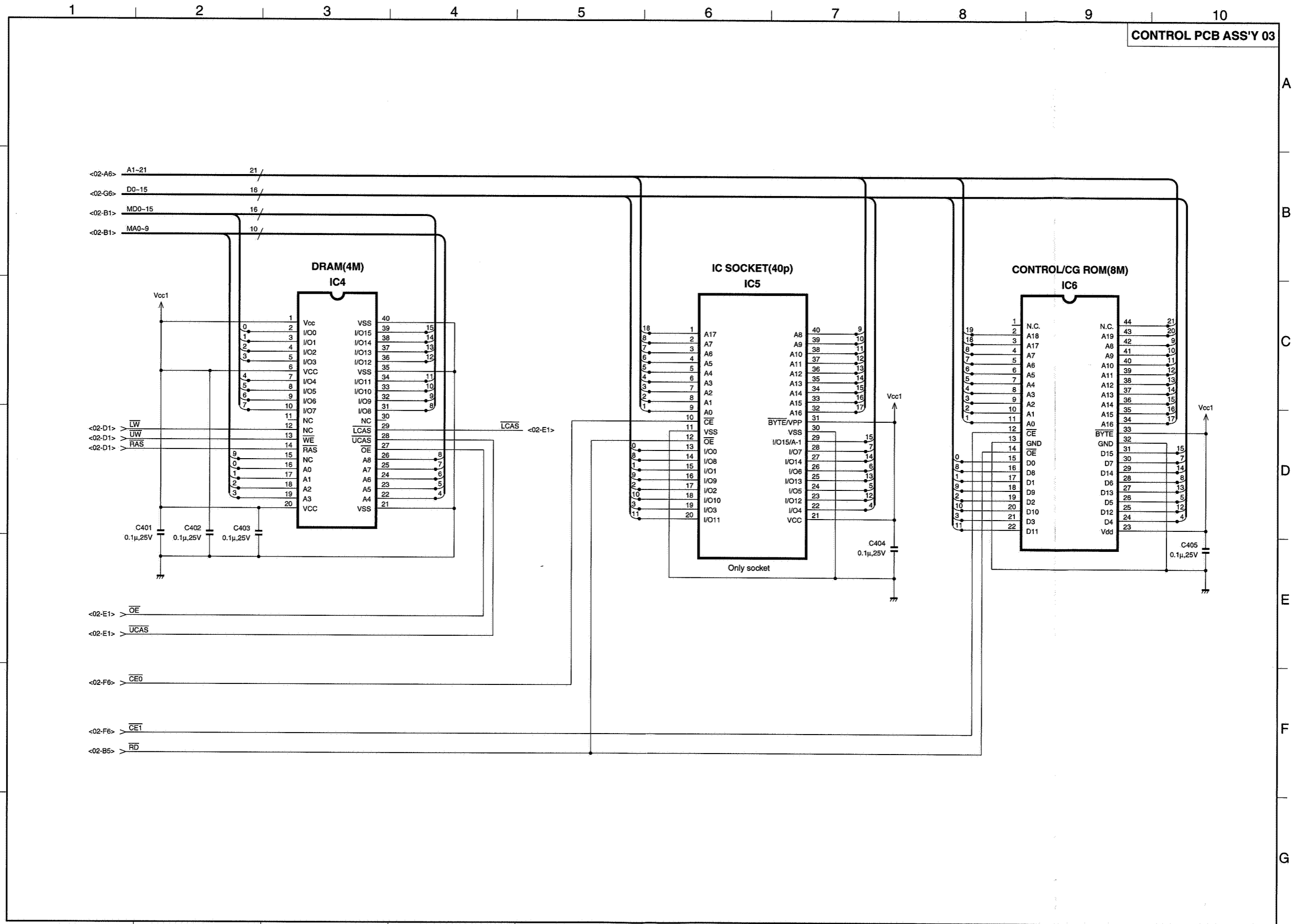


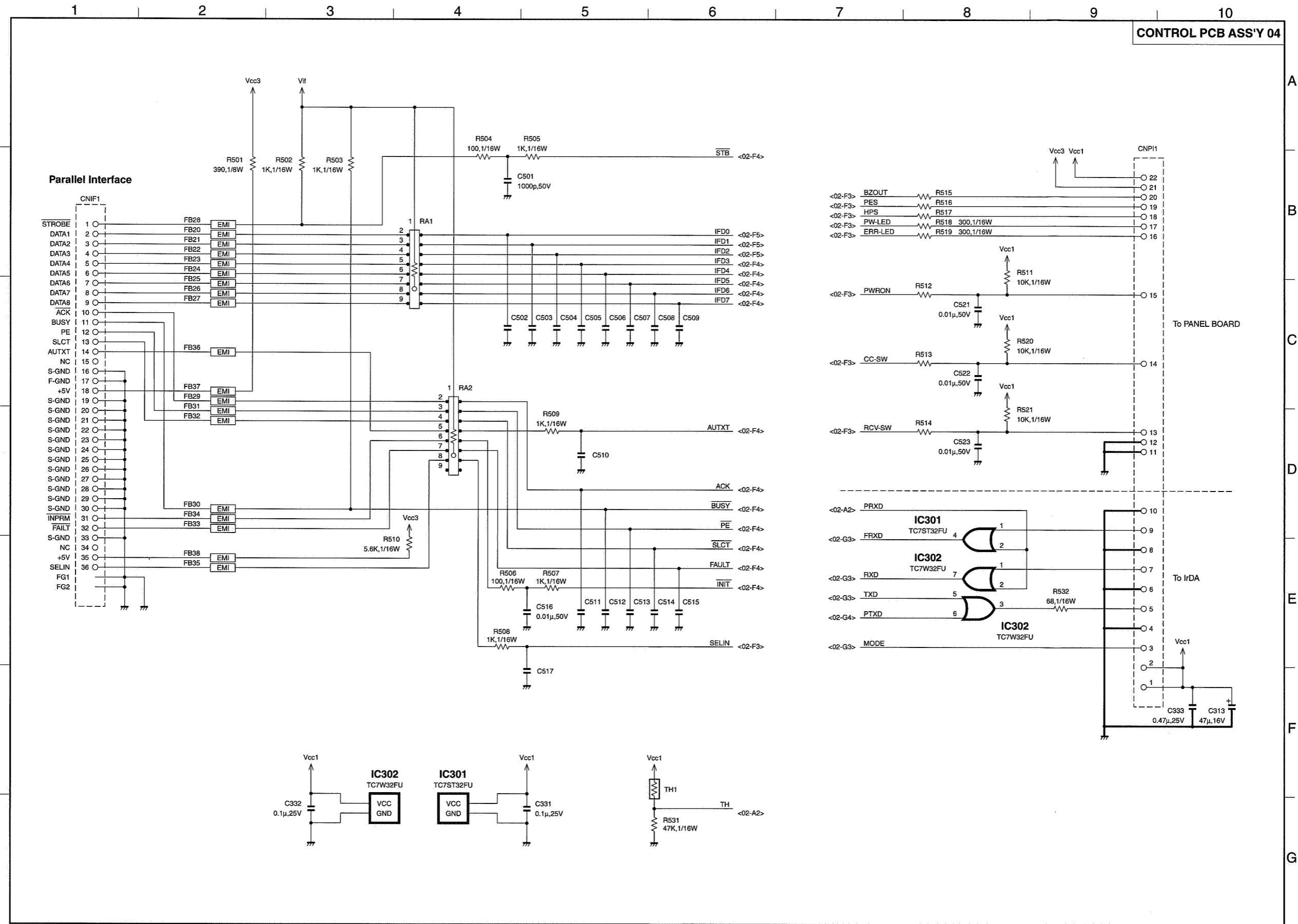
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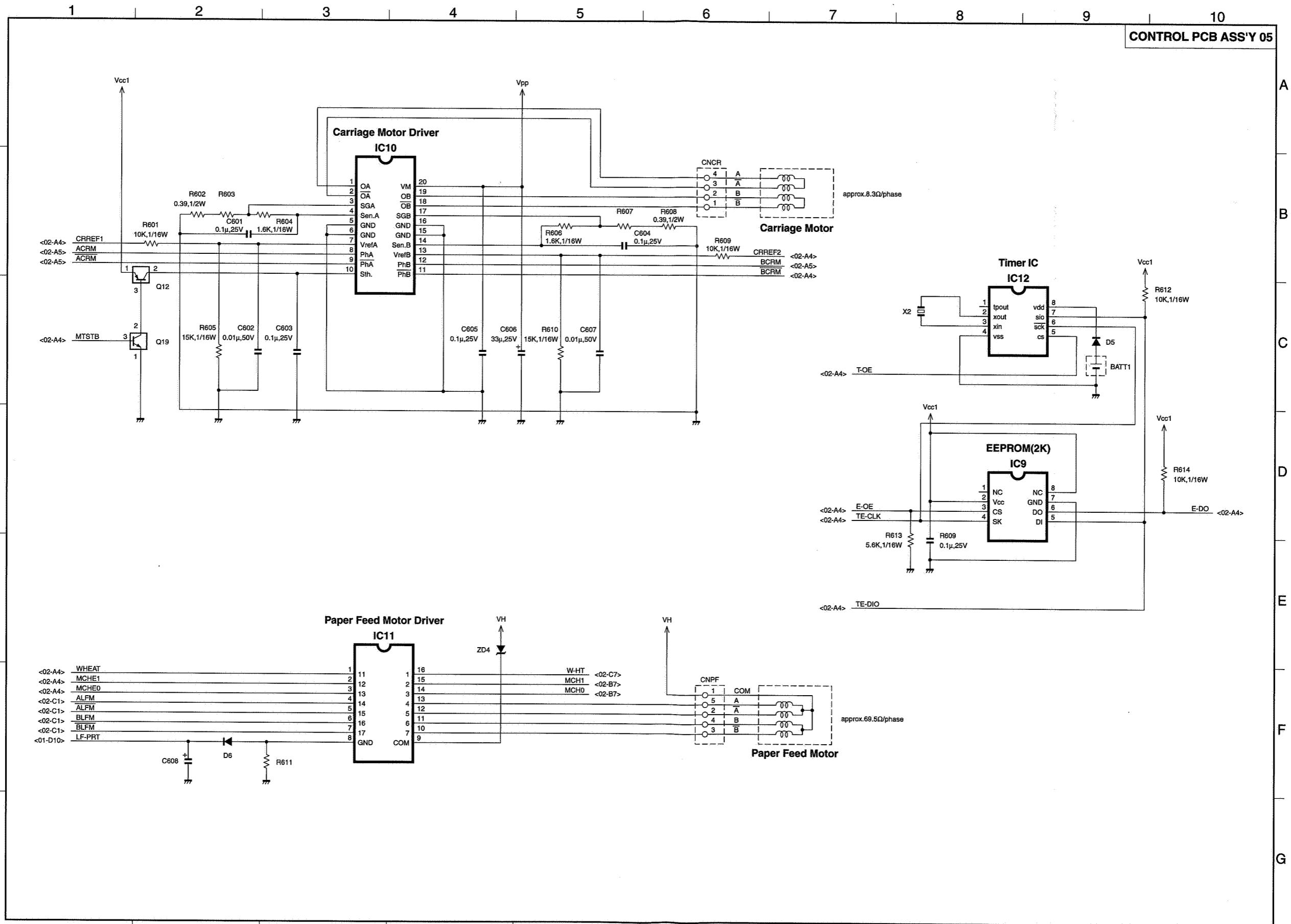
7.2 Circuit Diagrams

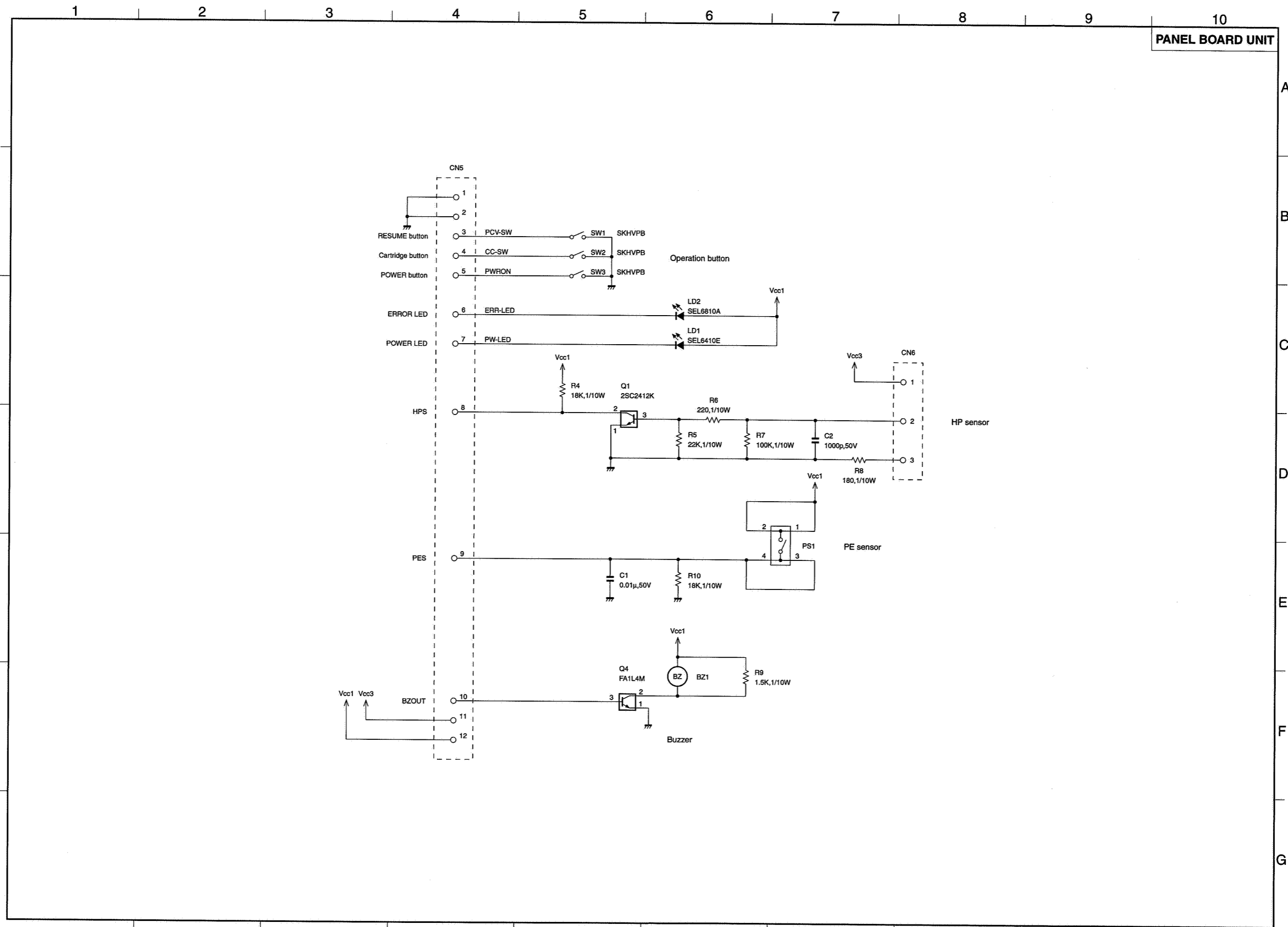




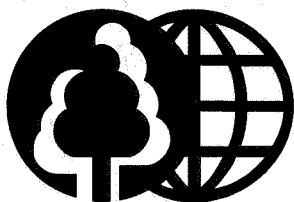












The printing paper contains
70% waste paper.

Canon